ANCASTER ELEVATED WATER RESERVOIR

SCHEDULE 'B' CLASS ENVIRONMENTAL ASSESSMENT

PROJECT FILE REPORT

MARCH 2017

WSP

CITY OF HAMILTON – ANCASTER ELEVATED WATER RESERVOIR

SCHEDULE 'B' CLASS ENVIRONMENTAL ASSESSMENT PROJECT FILE REPORT

Project No. 111-25440-00

Prepared for:

City of Hamilton

Date: March 2017

Prepared by:

WSP Canada Inc.
100 Commerce Valley Drive West
Thornhill, ON L3T 0A1

Phone: +1 905-882-1100
Fax: +1 905-882-0055
www.wspgroup.com

Project No 111-25440-00

March 17, 2017

Winston Wang, M. A. Sc., P. Eng.
Project Manager, Water & Wastewater Planning
City of Hamilton
77 James St. N., Suite 400
Hamilton, ON L8R 2K3

Re: Ancaster Elevated Water Reservoir
Schedule 'B' Class Environmental Assessment Project File Report

Dear Mr. Wang:

We are pleased to provide the Project File report for the abovementioned Schedule ‘B’ Class Environmental Assessment.

Yours truly,

Gustavo Arvizu, P. Eng., M. Eng.
Project Manager

WSP Canada Inc.
100 Commerce Valley Drive West
Thornhill, ON L3T 0A1

Phone: +1 905-882-1100
Fax: +1 905-882-0055
www.wspgroup.com

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EXECUTIVE SUMMARY

The City of Hamilton retained WSP (previously GENIVAR) to complete a Schedule 'B' Class Environmental Assessment (Class EA) for the construction of the Ancaster Elevated Water Reservoir, pursuant to the requirements of the Municipal Engineers Association Class EA Document (MEA, 2015).

The need for the Ancaster Elevated Water Reservoir was identified and documented in the City of Hamilton Water and Wastewater Master Plan Class EA Report (KMK Consultants, 2006), which indicated an unbalanced water supply, with low pressure concerns in certain areas, limited redundancy, and insufficient capacity to service future system demands in the area.

The Problem/Opportunity Statement for this project has been defined as:

> *A solution is required to mitigate low pressure issues in Ancaster, to improve the operability and efficiency of the HD018 Garner Road Pumping Station, to provide redundancy and security of supply, and to meet MOECC guidelines and City design standards, while reducing energy consumption and GHG emissions in accordance with the City's Corporate Energy Policy.*

The Study Area is bound by Power Line Road in the north, Scenic Drive in the east, Book Road in the south, and Trinity Road South in the west.

To confirm that an elevated storage reservoir was the preferred solution for the Study Area, four alternative servicing solutions were identified and evaluated, in addition to the Do Nothing Alternative:

- Alternative 1 – Increase the capacity of the HD018 Garner Road Pumping Station
- Alternative 2 – Construct a new elevated water storage reservoir in Ancaster
- Alternative 3 – Construct a new booster pumping station and increase the capacity of HD018 Garner Road Pumping Station
- Alternative 4 – Construct a new booster pumping station and in-ground reservoir and increase the capacity of HD018 Garner Road Pumping Station

Following the evaluation of each alternative against natural, social, economic, and technical evaluation criteria, the preferred solution was identified to be Alternative 2.

12 alternative locations were evaluated for siting the proposed elevated water reservoir. The preferred locations were Sites 3, 4, 7-12, a group of properties located near the intersection of Fiddler's Green and Garner Roads. Selection of the specific site is subject to property purchase negotiations and agency approvals.

The following must be completed prior to implementation of the preferred solution at the preferred location:

- Geotechnical investigation
- Stage 2 Archeological Assessment (findings from Stage 2 may trigger additional study which would also need to be completed prior to implementation)
- Zoning variance to allow for construction of an elevated storage facility
- Additional cultural heritage study
- Additional detailed natural environment studies
- Property acquisition, contingent upon outcomes of the above items

Public, Agency, and First Nations consultation was conducted in accordance with the requirements of the MEA Class EA document.

1 INTRODUCTION

The City of Hamilton is planning to construct new water infrastructure to address existing constraints in the water system servicing Ancaster. The need for this project was documented in the City of Hamilton's Water and Wastewater Master Plan Class Environmental Assessment Report (KMK Consultants, 2006), which indicated an unbalanced water supply and limited ability to adequately service future system demands in the area. The project is identified as a Schedule 'B' project under the Municipal Class Environmental Assessment (EA) Process.

This Project File Report documents the information corresponding to Phases 1 and 2 of the Class Environmental Assessment process.

1.1 PURPOSE AND STUDY BACKGROUND

Ancaster is divided into Pressure Districts 13, 14, and 18. Currently all of the water for Ancaster is supplied by the HD018 Pumping Station and HDR18 Reservoir, located on Garner Road. The Ancaster distribution system also feeds sub-zone PD-15 through a pressure reducing valve, and provides a secondary feed into PD-22 in northwest Dundas through a watermain along Sulphur Springs Road. below shows the water distribution system in Ancaster.

PD-18 operates as a direct pumped system and does not have floating storage. PD-18 is fed solely by the HD018 Pumping Station (also referred to as the Garner Road Pumping Station) with no redundancy of supply.

The HD018 Pumping Station is equipped with four pumps: two pumps with a capacity of 22,500 m^3/d each, and two pumps each with a capacity of 11,500 m^3/d. The *Design Guidelines for Drinking-Water Systems* (Ministry of Environment and Climate Change, 2008) recommend that the capacity of pumping stations be defined in terms of their firm capacity. Pumping station firm capacity is defined, for systems that do not have adequate floating storage and for which the pumping station is the only source of supply, as the capacity of the station with the two largest pumps out of service. The rationale for this definition is that the pumping station should be designed to be able to maintain supply to the system even during extreme emergency conditions (two largest pumps failing). Therefore, the firm capacity of the HD018 Pumping Station is 23,000 m^3/d.

The MOECC recommends that booster pumping stations servicing areas without floating storage be sized for a firm capacity able to handle peak hourly flows or maximum day plus fire flows (whichever are higher). The firm capacity of the HD018 Pumping Station is currently insufficient to meet current maximum day flow plus fire requirements.

Furthermore, low pressure issues have been reported in the high elevation areas of Ancaster (corresponding roughly to areas northwest of Wilson Street). To address these issues, the City has modified the operation of the HD018 Pumping Station such that the pressure in the system is maintained at 667 kPa (96 PSI) on average. However, the design of the existing pumps was based on an operating pressure of 520 kPa (75 PSI). This change in operation has resulted in increased water recirculation within the station, lower pump efficiency, increased equipment wear and tear, and increased maintenance and energy costs. Overall, the feedback received from the City's operations staff suggests that the pumps at HD018 have been over-worked for the last five to 10 years, and that the pumps are now "old, inefficient, and hard to operate."

Therefore, a solution is required to mitigate low pressure issues in the distribution system, to improve the operability and efficiency of the HD018 Pumping Station, to provide redundancy and security of supply, and to meet MOECC guidelines and City design standards, while reducing energy consumption and GHG emissions in accordance with the City's Corporate Energy Policy.

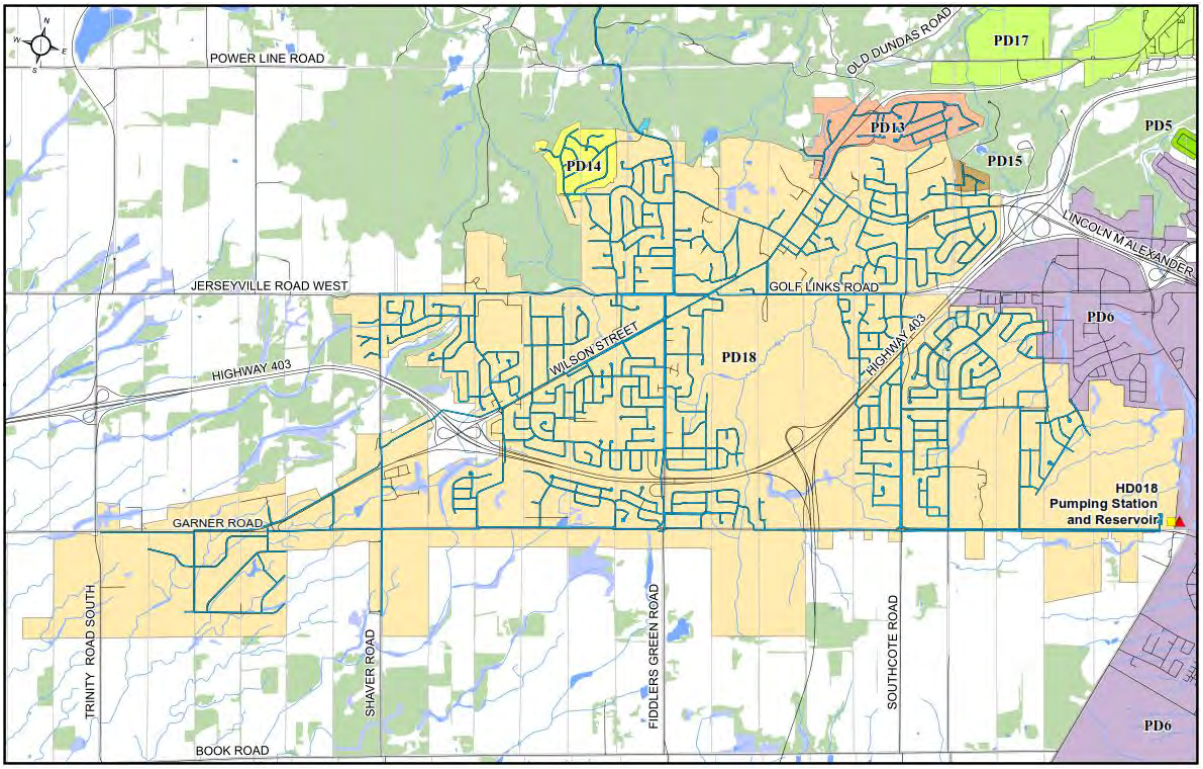


Figure 1-1 Ancaster Pressure Districts

1.2 STUDY OBJECTIVES

The objective of this study is to satisfy the Class EA requirements outlined in the Municipal Class Environmental Assessment document (MEA, 2015) to allow the project to proceed to implementation. The study approach involved understanding the issues with the existing system, identifying alternative solutions and evaluating alternatives to determine the preferred solution for implementation. Further details on the Class EA process are provided in Section 2.

1.3 RELATED DOCUMENTS AND PROJECTS

1.3.1 CITY OF HAMILTON WATER AND WASTEWATER MASTER PLAN CLASS ENVIRONMENTAL ASSESSMENT

KMK Consultants was retained by the City of Hamilton to complete a Master Plan in 2006 to provide the City with a water and wastewater servicing strategy to support forecasted growth in the City.

The Master Plan outlined the framework for future works and infrastructure requirements over the planning horizon of 2007 to 2031 to support growth envisioned by the Province in the Growth Plan for the Greater Golden Horseshoe (Ministry of Infrastructure, 2006).

The Master Plan (KMK Consultants, 2006) determined that an elevated storage reservoir would increase supply and storage capacity in Ancaster, and would also provide added security and operational flexibility.

1.3.2 GARNER ROAD (HD018) PUMPING STATION UPGRADE FEASIBILITY REVIEW

The City of Hamilton retained AECOM to provide a high level feasibility review of upgrade alternatives to the Garner Road Pumping Station (HD018) and the HDR18 Reservoir.

The review included an assessment of existing issues and risks related to these facilities, an evaluation of viable alternatives, economic evaluation and a cost benefit analysis.

This feasibility review considered two alternatives: Alternative A - replacing the existing HD018 pumping station with a new pumping station and Alternative B - upgrading the existing the HD018 Pumping Station with the assumption that a new elevated tank would be constructed to provide redundancy of supply (AECOM, 2015).

The report indicated that Alternative B was preferred as it resulted in the highest benefits/cost ratio.

AECOM recommended that the upgrades proceed as soon as possible given the criticality of HD018 Pumping Station as the single water supply to PD13, 14, 15, 18 and 22.

2 ENVIRONMENTAL ASSESSMENT PROCESS

This section describes the Environmental Assessment (EA) process and the specific requirements associated with this study.

2.1 ENVIRONMENTAL ASSESSMENT ACT (1990)

Ontario's *Environmental Assessment Act,* R.S.O. 1990 (henceforth referred to as "the Act") was passed in 1975 and proclaimed in 1976. The planning of major municipal projects or activities is subject to the Act and requires the Proponent to complete an EA, including an inventory and description of the existing environment in the area affected by the proposed activity.

The Act defines the environment broadly as:

1. Air, land or water
2. Plant and animal life, including human life
3. The social, economic and cultural conditions that influence the life of humans or a community
4. Any building, structure, machine or other device or thing made by humans
5. Any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities, or
6. Any part or combination of the foregoing and the interrelationships between any two or more of them

The purpose of the Act is the betterment of the people in the whole or any part of Ontario by providing for the protection, conservation and wise management of the environment in the Province (RSO1990, c. 18, s.2).

As set out in Section 5(3) of the Act, an EA document must include the following:

1. A description of the purpose of the undertaking including:
   - → The undertaking
   - → The alternative methods of carrying out the undertaking
   - → Alternatives to the undertaking
2. A description of:

- The environment that will be affected or that might reasonably be expected to be affected, directly or indirectly, by the undertaking or alternatives to the undertaking
- The effects that will be caused or that might reasonably be expected to be caused to the environment by the undertaking or alternatives to the undertaking
- The actions necessary or that may reasonably be expected to be necessary to prevent, change, mitigate or remedy the effects upon or the effects that might reasonably be expected upon the environment by the undertaking or alternatives to the undertaking
- An evaluation of the advantages and disadvantages to the environment of the undertaking, the alternative methods of carrying out the undertaking and the alternatives to the undertaking

2.2 PRINCIPLES OF ENVIRONMENTAL PLANNING

The Act sets a framework for a systematic, rational and replicable environmental planning process that is based on five key principles, as follows:

- **Consultation with affected parties** - Consultation with the public and government review agencies is an integral part of the planning process. Consultation allows the proponent to identify and address concerns cooperatively before final decisions are made. Consultation should begin as early as possible in the planning process.
- **Consideration of a reasonable range of alternatives** – Alternatives should include functionally different solutions to the proposed undertaking and alternative methods of implementing the preferred solution. The “do nothing” alternative must also be considered.
- **Identification and consideration of the effects of each alternative on all aspects of the environment** - This includes the natural, social, cultural, technical, and economic environments.
- **Systematic evaluation of alternatives in terms of their advantages and disadvantages, to determine their net environmental effects** - The evaluation shall increase in the level of detail as the study moves from the evaluation of alternatives to the proposed undertaking to the evaluation of alternative methods.
- **Provision of clean and complete documentation of the planning process followed** – This will allow traceability of decision-making with respect to the project. The planning process must be documented in such a way that it may be repeated with similar results.

2.3 MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT (2015)

Class Environmental Assessments were approved by the Minister of the Environment in 1987 for municipal projects having predictable and preventable impacts. The Class EA approach streamlines the planning and approvals process for municipal projects which have the following characteristics:

- Recurring
- Similar in nature
- Usually limited in scale
- Predictable range of environmental impacts
- Environmental impacts are responsive to mitigation

The Municipal Class Environmental Assessment document, prepared by the Municipal Engineers Association (MEA) (October 2000, as amended in 2007, 2011, and 2015), outlines the procedures to be followed to satisfy Class EA requirements for water, wastewater and road projects (MEA, 2015). The process includes five phases:

- Phase 1: Problem Definition
- Phase 2: Identification and Evaluation of Alternative Solutions to Determine a Preferred Solution
- Phase 3: Examination of Alternative Methods of Implementation of the Preferred Solution
- Phase 4: Documentation of the Planning, Design and Consultation Process
- Phase 5: Implementation and Monitoring.

Since projects undertaken by municipalities can vary in their complexity and potential environmental impacts, projects are classified in “Schedules” as follows (MEA, 2015):

- **Schedule ‘A’** – Generally includes normal or emergency operational and maintenance activities. The environmental effects of these activities are usually minimal and, therefore, these projects are pre-approved. (i.e. no public consultation is required)
- **Schedule ‘A+’** – In 2007, MEA introduced Schedule ‘A+.’ These projects are pre-approved. However, the public is to be advised prior to project implementation.

- **Schedule 'B'**
  - Generally includes improvements and minor expansions to existing facilities/infrastrucure. There is the potential for some adverse environmental impacts and, therefore, the Proponent is required to proceed through a screening process including consultation with those who may be affected.
  - Typical projects that follow a Schedule 'B' process will include projects requiring watercourse crossings, construction of watermains and sewers outside of existing road allowances, construction of pumping stations and reservoirs.
- **Schedule 'C'**
  - Generally includes the construction of new facilities and major expansions to existing facilities.
  - Typical projects that follow the Schedule 'C' process include the expansion of existing, or construction of new Water and Sewage Treatment Facilities.

Public and agency consultation are integral to the Class EA planning process. It is important to note that the Schedule assigned to a particular project is proponent-driven. For example, even if a project can be categorized as Schedule 'A', the proponent can decide to comply with the requirements of a Schedule 'B' or 'C' of the MEA process based on the magnitude of anticipated impacts or the special public and agency consultation requirements specific to that particular project (MEA, 2015).

The Class EA process also provides an appeal mechanism to change the project status. Under the provisions of Subsection 16 of the amended EA Act, there is an opportunity under the Class EA planning process for the Minister to review the status of a project. Members of the public, interest groups and review agencies may request the Minister to require a Proponent to comply with Part II of the EA Act before proceeding with a proposed undertaking. For Schedule 'B' and 'C' projects the public has the opportunity to request additional investigation by filing a Part II Order Request to the Ministry of the Environment. The Minister determines whether or not this is necessary, with the Minister's decision being final. The procedure for dealing with concerns, which may result in the Minister, by order, requiring the Proponent to comply with Part II of the Act is outlined in the MEA document (MEA, 2015).

A flow chart describing the Class EA Planning and Design Process, taken from the Municipal Engineers Association Class Environmental Assessment document is shown in Figure 2-1.

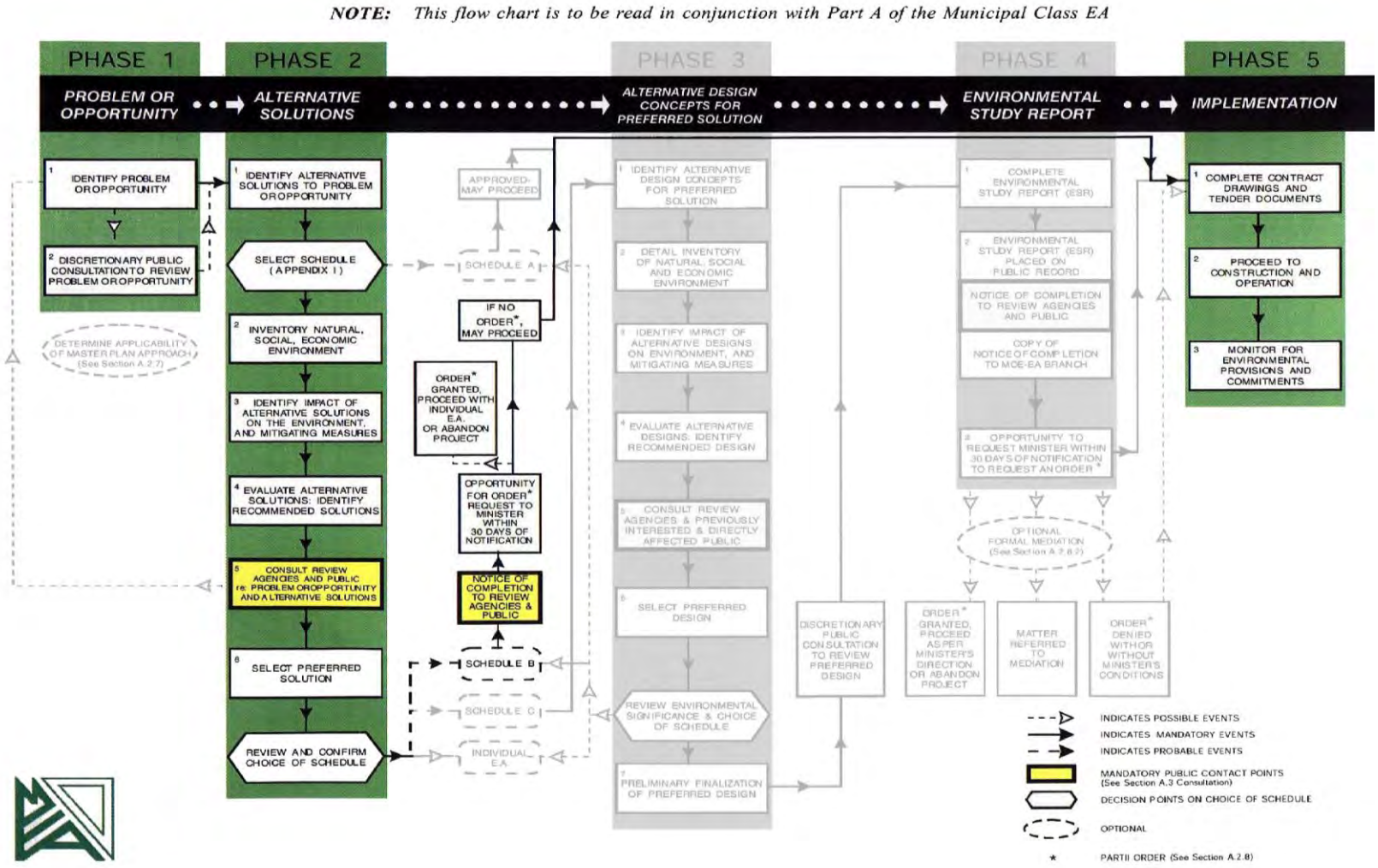


Figure 2-1 Municipal Class EA Process (MEA, 2015)

2.4 PROJECT CLASS EA SCHEDULE

The Ancaster Elevated Water Reservoir project is proceeding in accordance with the Class EA process in the MEA document (MEA, 2015). This Class EA is being completed as a Schedule 'B' project. This project generally fits the description listed under Item 1 for Schedule 'B' Water Projects in Appendix A of the MEA Class EA document:

1. *Establish, extend or enlarge a water distribution system and all works necessary to connect the system to an existing system or water source, where such facilities are not in either an existing road allowance or an existing utility corridor.*

Schedule 'B' projects require the completion of Phases 1 and 2 followed by Phase 5 (problem or project implementation), as summarized in the following figure.

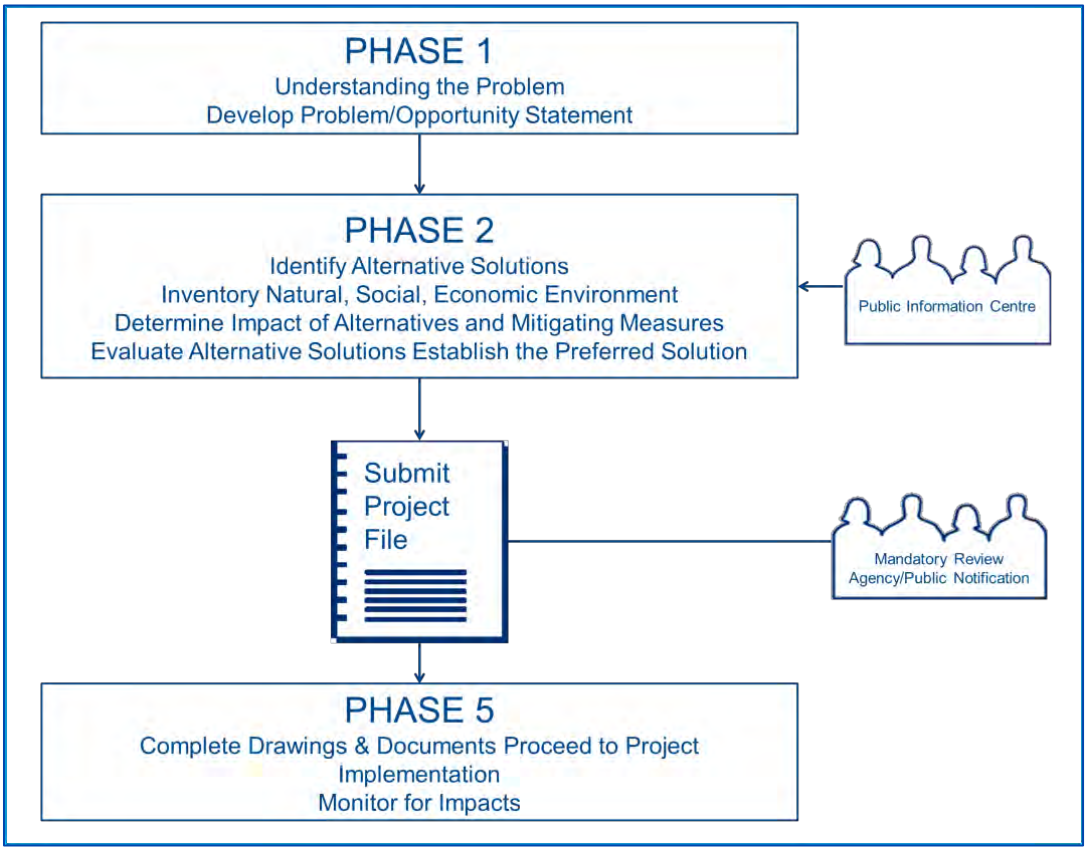


Figure 2-2 Schedule B Class EA Process Summary (MEA, 2015)

As required for Schedule 'B' projects, this report documents requirements of Phases 1 and 2 of the Municipal Class EA Planning and Design Process.

Phase 1 is documented in Section 3 and Phase 2 is documented in Sections 4 and on.

3 PROBLEM DEFINITION

3.1 DEFINITION OF PROBLEM OR OPPORTUNITY

The purpose of the Problem/Opportunity Statement is to define the starting point of the Class EA and assist in defining the scope of the project. The Problem/Opportunity Statement has been defined as follows:

> *A solution is required to mitigate low pressure issues in Ancaster, to improve the operability and efficiency of the HD018 Pumping Station, to provide redundancy and security of supply, and to meet MOECC guidelines and City design standards, while reducing energy consumption and GHG emissions in accordance with the City's Corporate Energy Policy.*

3.2 STUDY AREA

The Study Area is bound by Power Line Road in the north, Scenic Drive in the east, Book Road in the south, and Trinity Road South in the west. The Study Area map is shown in Figure 3-1.

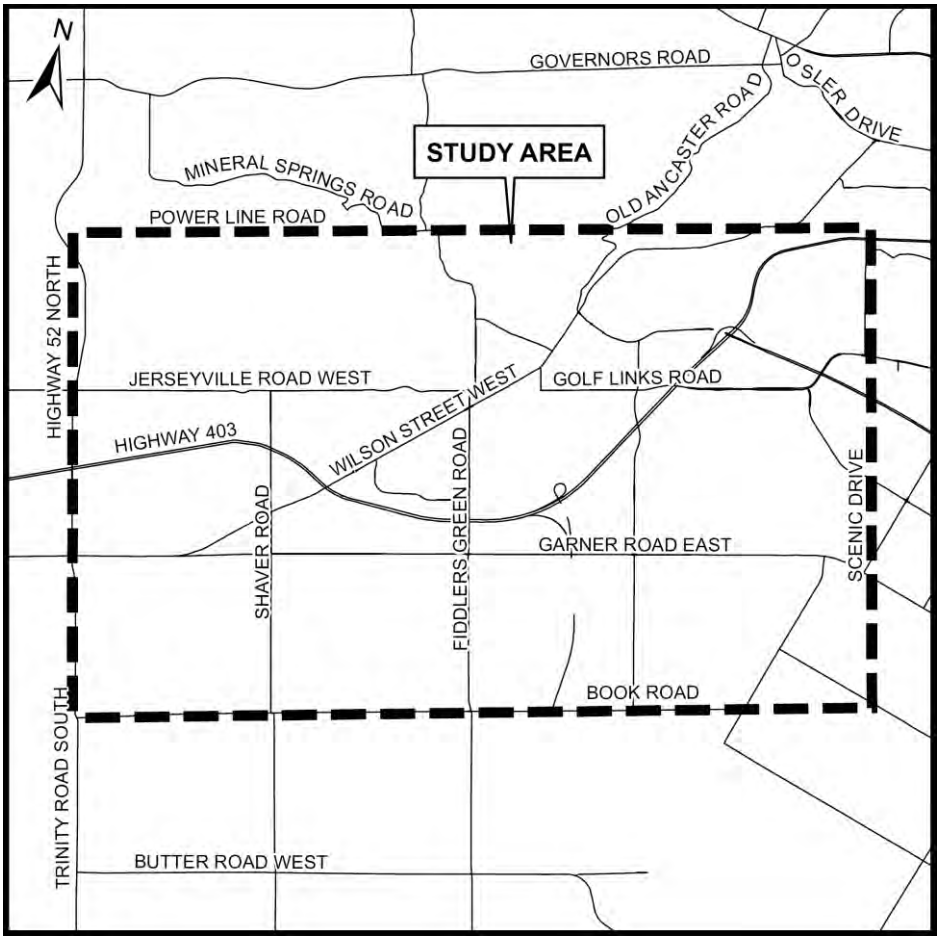


Figure 3-1 Study Area Map

4 EXISTING CONDITIONS

4.1 EXISTING INFRASTRUCTURE

Pressure District 18 (PD-18) is supplied through PD-6 by pumping station HD018 and reservoir HDR18, both located on Garner Road. PD-18 also feeds sub-zones PD-13, PD-14, and PD-15 through Pressure Reducing Valves (PRV) and provides a secondary feed into PD-22 through Sulphur Springs Road. HD018 has four pumps: two duty pumps rated each rated at 22,500 m^3/d and two standby pumps each rated at 11,500 m^3/d. The firm capacity of this station is 23,000 m^3/d, as discussed in Section 1 regarding firm capacity for a direct-pumped system with no floating storage. HDR18 has a storage capacity of 33,186 m^3 (33.2 ML).

The water distribution system in PD-18 is shown in Figure 4-1.

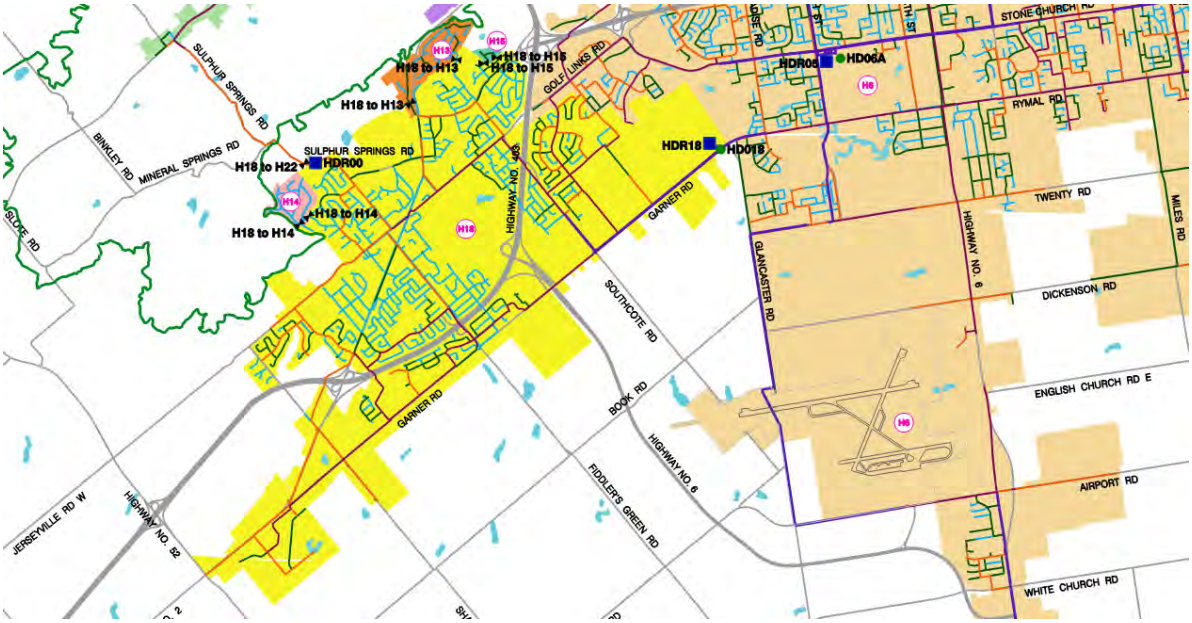


Figure 4-1 Existing Water Supply System PD-18 (KMK Consultants, 2006)

WSP (previously GENIVAR) completed a condition assessment of the HD018 pumping station in 2009. Although the pumping station was determined to be in average condition, some systems were in need of full rehabilitation or replacement in a 10 year period due to age. This included equipment control panel replacements, replacement of building mechanical and electrical systems, process equipment replacement and replacement of the majority of instrumentation and control equipment. However, as noted above, changes to the operation regime of the station (running at a higher pressure, beyond the pump's best operation point) have

resulted in excessive wear and tear. Thus the pumps are deemed to have reached the end of their expected service lives.

4.2 NATURAL HERITAGE FEATURES

The natural heritage features in the Study Area include the Niagara Escarpment World Biosphere Reserve, located at the north end of Ancaster, and components of the City's Natural Heritage Systems (NHS). A variety of land uses have been identified within the Study Area, ranging from agricultural fields and commercial development to deciduous forest and wetland habitat. Desktop screening for Species at Risk (SAR) was conducted. However, additional species specific field surveys of the preferred site will be required prior to construction to fully characterize potential SAR habitat (Azimuth Environmental Consulting, 2016).

The natural environment features for the Study Area are presented in Figure 7-1 and additional details for the alternative sites considered for this Class EA are provided in Appendix B and Section 7.1.1.

4.3 ARCHAEOLOGICAL HERITAGE FEATURES

Archaeological Services Inc. (ASI) was retained by the City of Hamilton to conduct a Stage 1 Archaeological Assessment in the study area. The assessment discovered that 204 archaeological sites have been registered within a 1 km radius of the study area. A review of the geography and history of the Study Area suggested that the Study Area has potential for the identification of Aboriginal and Euro-Canadian archaeological resources (Archaeological Services Inc., 2012).

The archaeological heritage features for the Study Area are presented in Figure 7-1 and additional details for alternative sites are provided in Appendix C and Section 7.1.2.

4.4 CULTURAL HERITAGE FEATURES

Archaeological Services Inc. (ASI) was retained by the City of Hamilton to conduct a Cultural Heritage Resource Assessment in the study area. The assessment discovered 11 previously identified cultural heritage resources. These sites were either listed on the inventory of buildings of archaeological and/or historical interest, or have a Part IV Heritage Designation. Of the 11 cultural heritage resources identified, three are former farmhouses/farmsteads, one is a farmstead, five are residences, one is a nineteenth-century church and cemetery, and one is a late twentieth-century church. Identified cultural heritage resources are historically, architecturally, and contextually associated with early nineteenth to mid twentieth-century land use patterns in the former Township of Ancaster (Archaeological Services Inc., 2016).

The cultural heritage features for the Study Area are presented in Figure 7-1 and additional details for alternative sites are provided in Appendix C and Section 7.1.3.

4.5 PROXIMITY TO INTERNATIONAL AIRPORT

Due to the proximity of the Study Area to the John C. Munro International Airport, if a new elevated water reservoir is constructed NAV CANADA would need to be consulted and potentially permits would be required.

Based on initial consultation with a representative from the airport, it was understood that selection of potential sites for an elevated facility near the Airport Zoning Regulation will need to consider the height and elevation of the proposed structure and its proximity to the approach, outer and transitional surfaces of the airport.

Furthermore, Airport representatives advised that objects that exceed 45 m above ground level within a 4 km radius of the Airport Reference Point (N43°10’25.2” W79°56’06.2” – at 230 m elevation ASL) usually penetrate the outer surface of the airport. The height restriction for lands located under the runway approach surfaces also varies as the imaginary surface inclines at a ratio of 1 m vertically to 60 m horizontally for a distance extending 15 km horizontally from the runway strip. For example, a 60 m tall structure would need to

be farther than 3.6 km away from the airport runway.

These constraints and other constraints are illustrated in Figure 7-1.

4.6 AESTHETIC CONSIDERATIONS

There is a desire to locate the elevated water storage facility in an area where it will not be visible to the majority of the residents in Ancaster. The previous water tower was considered an eyesore by many, and there is strong opposition to having a new elevated water tank constructed.

5 SYSTEM REQUIREMENTS

5.1 CURRENT AND FUTURE WATER DEMANDS

The new storage facility would provide additional storage for PD-18 and zones PD-13, PD-14, and PD-15 that are supplied from PD-18.

The City’s design criteria as defined in the 2006 Master Plan are shown in Table 5-1 below.

Table 5-1 Water System Design Criteria

CRITERION	VALUE
Average Day Residential Consumption	360 Lpcd*
Average Day Employment Consumption	260 L/employee/d – 125 employment/ha*
Maximum Day Factor	1.9
Peak Hour Factor	3.0

*Values recommended in Master Plan for individual zone analyses

The projected demands in PD-18, PD-13, PD-14 and PD-15 for the years 2021 and 2031 are shown in Table 5-2 below.

Table 5-2 Demand Projections for PD-18, PD-13, PD-14 and PD-15

YEAR	AVERAGE DAY DEMANDS (m^3/d)	MAXIMUM DAY DEMANDS (m^3/d)	PEAK HOUR DEMANDS (m^3/d)
2021	11,853	22,520	33,781
2031	12,908	24,525	36,783

* 2021 and 2031 values taken from 2006 Master Plan Appendix A-1(02) Demand Projection and A-1(03) Water System Capacities.

5.2 CURRENT AND FUTURE STORAGE REQUIREMENTS

Storage within a Pressure District is provided for equalization, fire protection and emergency supply. Storage requirements are calculated using the formula indicated in the MOECC Guidelines (Ministry of Environment and Climate Change, 2008) as follows:

$$Storage\ Volume\ Required = A + B + C$$

Where A = *Fire Storage = 12,000 L/min for 2.5 hrs,*

B = Equalization Storage = 25% of Maximum Day Demand, and

C = Emergency Storage = 25% of (A + B)

This equation is applicable to municipal water systems providing fire protection and satisfying only maximum day demand. Where a system can supply more than the maximum day demand, it may be possible to reduce the storage volume requirements.

Fire flow requirements are generally estimated based on the latest version of “Water Supply for Public Fire Protection – A Guide to Recommended Practice,” prepared by Fire Underwriters Survey. Following this procedure (detailed in Technical Memorandum #2 included in Appendix A) results in an estimated fire flow requirement of 200 L/s (12,000 L/min) for 2.5 hours.

Table 5-3 Summary of Storage Requirements for PD-18, PD-13, PD-14 and PD-15

YEAR	AVG. DAY DEMAND (ML/D)	MAX. DAY DEMAND (ML/D)	FIRE STORAGE (ML) A	EQUALIZATION STORAGE (ML) B	EMERGENCY STORAGE (ML) C	TOTAL STORAGE (ML) A+B+C
2021	11.9	22.5	1.8	5.6	1.9	9.3
2031	12.9	24.5	1.8	6.1	2.0	9.9

The summary of the storage requirements for PD-18, PD-13, PD-14, and PD-15 presented in Table 5-3 above indicates that the required storage to meet demand within this planning horizon would be approximately 9.9 ML. This is more conservative than the capacity assumed in Technical Memorandum #2 in Appendix A and that presented at PIC #2. The larger capacity reservoir ensures that there is storage capacity for fire protection and system redundancy in case of failure at the HD018 Garner Road Pumping Station.

6 ALTERNATIVE SERVICING SOLUTIONS

6.1 IDENTIFICATION OF ALTERNATIVE SERVICING SOLUTIONS

As noted above, the need for an elevated storage reservoir was identified in the City's Master Plan (KMK Consultants, 2006). However, as part of this Class EA, alternative servicing approaches were evaluated to confirm that an elevated storage reservoir was the preferred solution for Ancaster.

Technical Memorandum #2 provided in Appendix A included an analysis of alternative servicing solutions for Ancaster. The following section summarizes the alternatives evaluated and the findings of the evaluation.

6.1.1 DO NOTHING ALTERNATIVE

This option involves maintaining the current mode of operation at the Garner Road HD018 Pumping Station. This means that the distribution system would have to be operated at an average pressure of 667 kPa (96 PSI) to ensure that the pressure at higher elevation points is within the acceptable range required by the MOECC. However, the station was originally designed for an operating pressure of 520 kPa (75 PSI). This means that the pumps need more energy to pump at the same rates given the higher pressure requirements.

For the evaluation of the "Do Nothing" approach it is assumed that future upgrades to the system would only involve a replacement of the existing pumps with similar

capacity pumps. It is assumed that these upgrades would ***not*** involve an increase to the capacity of the station and the station's operation would still be suboptimal. Therefore, the firm capacity of the pumping station would continue to be insufficient per MOECC Guidelines.

6.1.2 ALTERNATIVE 1 – INCREASE THE CAPACITY OF HD018 PUMPING STATION

There is an ongoing design project to upgrade the Garner Road HD018 Pumping Station by replacement of the pumps. Under Alternative 1, the scope of the project would involve replacing the existing pumps with larger capacity pumps to achieve a firm capacity (with the two largest pumps out of service) of 48,000 m^3/d at the higher system pressure of 667 kPa. Furthermore, the upgrades would also include modifications to the existing in-ground reservoir (HDR018). The scope of the upgrades is described in detail in the Feasibility Review completed by AECOM as Alternative A (AECOM, 2015).

To accommodate these upgrades it is expected that a brand new pumping station would need to be constructed given that the existing facility cannot be retrofitted to increase the capacity of the pumps.

6.1.3 ALTERNATIVE 2 – CONSTRUCT A NEW ELEVATED STORAGE RESERVOIR IN ANCASTER

This alternative involves the construction of an elevated storage reservoir to provide floating storage for pressure districts PD-18, PD-13, PD-14 and PD-15. The elevated storage facility is meant to provide equalization, emergency storage, and security of supply and to alleviate low pressure issues in the higher elevation areas within Ancaster. In this alternative theHD018 Pumping Station would need to be upgraded.

Elevated storage is the recommended storage approach by the MOECC, as it is the most reliable method to ensure supply during emergency conditions and to reduce pumping costs.

6.1.4 ALTERNATIVE 3 – CONSTRUCT A NEW BOOSTER PUMPING STATION AND INCREASE THE CAPACITY OF HD018 PUMPING STATION

This alternative involves the construction of a new booster pumping station to service the higher elevation areas in Ancaster. The new PD-26 booster pumping station would have to have a firm capacity of 11,000 m^3/d (127 L/s). This essentially would create a new pressure district (PD-26) as shown in Figure 6-1.

This alternative would require HD018 Pumping Station to be upgraded to provide firm capacity (defined as that with the two largest pumps out of service) for PD-18, PD-13, PD-14, PD-15 and the new PD-26. That is, the Garner Road HD018 Pumping Station would have to be upgraded to have a firm capacity of 48,000 m^3/d. However, given that the new booster station would satisfy the demand and pressure

requirements in the new PD-26, the HD018 Pumping Station would only need to pump at a lower pressure (520 kPa).

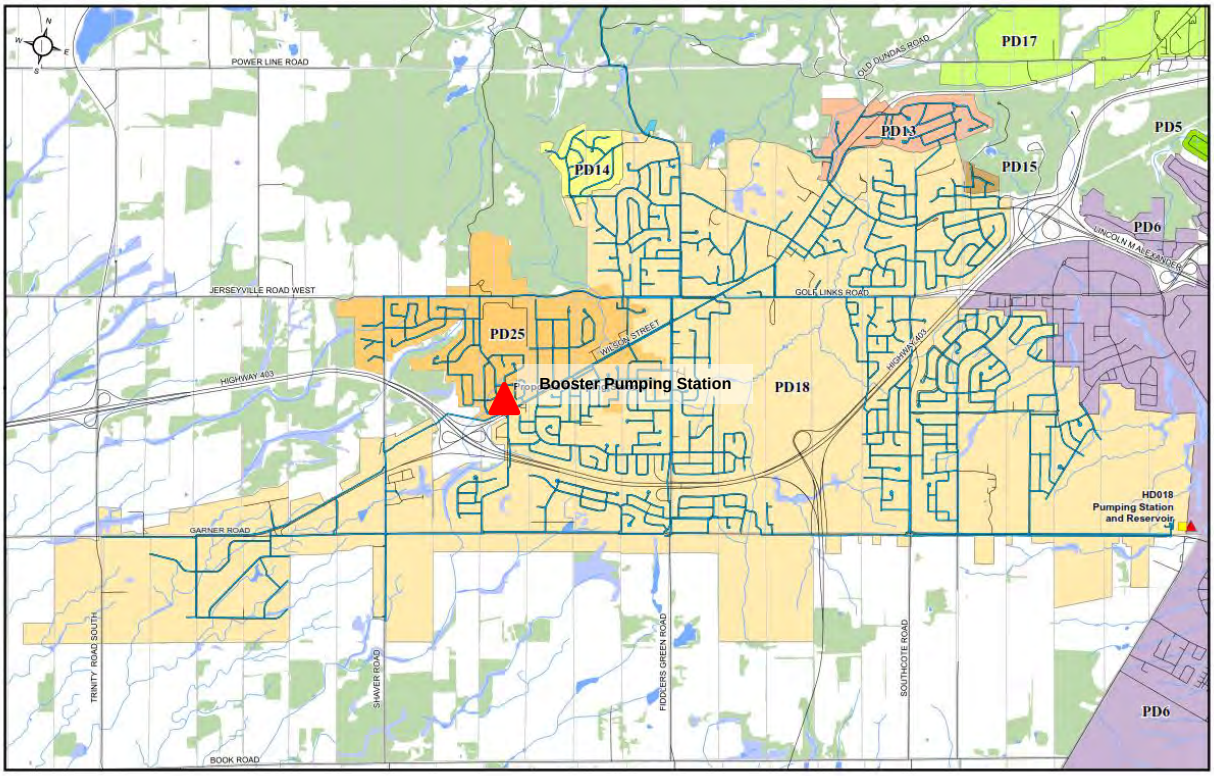


Figure 6-1 Potential Location for New PD-26 Booster Pumping Station

6.1.5 ALTERNATIVE 4 – CONSTRUCT A NEW BOOSTER PUMPING STATION AND IN-GROUND RESERVOIR AND INCREASE THE CAPACITY OF HD018 PUMPING STATION

This alternative is a variation of Alternative 3. This alternative involves the construction of a booster station for the higher elevation areas in PD-18 and construction of an in-ground reservoir to provide pumped storage for the new pressure district PD-26.

The new PD-26 booster pumping station would have to have a firm capacity of 11,000 m^3/d (127 L/s). The HD018 Pumping Station would also need to be upgraded to a firm capacity (two largest pumps out of service) of 48,000 m^3/d. The reservoir would be sized to provide sufficient storage to allow the booster station to meet the demands in PD-26.

6.2 EVALUATION OF ALTERNATIVES

The detailed assessment and evaluation of the alternative servicing solutions were evaluated based on their resulting impact on system hydraulic performance, economics and aesthetics. Details of the evaluation are presented in Technical Memorandum #2 included in Appendix A.

6.3 PREFERRED SERVICING ALTERNATIVE

The elevated storage reservoir option (Alternative 2) is the preferred alternative from a system performance and cost standpoint. Since the Ancaster area does not currently have floating storage, it relies completely on the HD018 Pumping Station to maintain system pressure. A power failure (due to failure of the standby generator) or an instrumentation fault could result in loss of system pressure and potential water quality issues for PD-18, PD-13, PD-14 and PD-15. The construction of an elevated storage reservoir would make the system more robust and less vulnerable in case of pumping station failure. It would also result in significant operating and energy cost reductions relative to the current conditions.

Technical Memorandum #2 provided in Appendix A includes a detailed lifecycle cost comparison of the alternatives. Although the “Do Nothing” alternative was found to have the lowest initial capital cost, it has the greatest operations, maintenance, and energy costs over its lifecycle. The initial capital costs associated with the elevated storage reservoir option (Alternative 2) are lower than those for the remaining alternatives. Furthermore, the elevated storage reservoir option results in the lowest operation, maintenance, and energy costs of the options considered.

7 ALTERNATIVE ELEVATED WATER RESERVOIR SITES

This section provides a discussion on the identification and evaluation of alternative sites for an elevated storage reservoir and on the approach to determine the preferred location. The alternative sites were evaluated based on their impacts on the social, natural, economic and technical impacts/merits.

7.1 IDENTIFICATION OF ALTERNATIVE ELEVATED WATER RESERVOIR SITES

Various sites were identified within the study area to construct an elevated storage reservoir.

Potential sites were selected such that they were located in vacant areas with ground elevation greater than 233 m (to minimize pedestal height), in the vicinity of

the existing water distribution network, and in areas with the least or no natural, social, cultural and archaeological constraints.

Table 7-1 and Figure 7-1 show the 12 sites considered for the construction of an elevated water reservoir in Ancaster.

Table 7-1 Alternative Elevated Water Reservoir Sites

SITE	NEAREST INTERSECTION	GROUND ELEVATION (m)	HEIGHT TO HIGH WATER LEVEL (m)
1	Jerseyville Rd. W & Martin Rd.	251	44
2	Garner Rd. W & Braithwaite Ave.	247	48
3, 4, 7 to 12	Fiddler's Green Rd. & Garner Rd. E	248	47
5	Garner Rd. E & Southcote Rd.	245	50
6	Garner Rd. E & Raymond Rd.	240	55

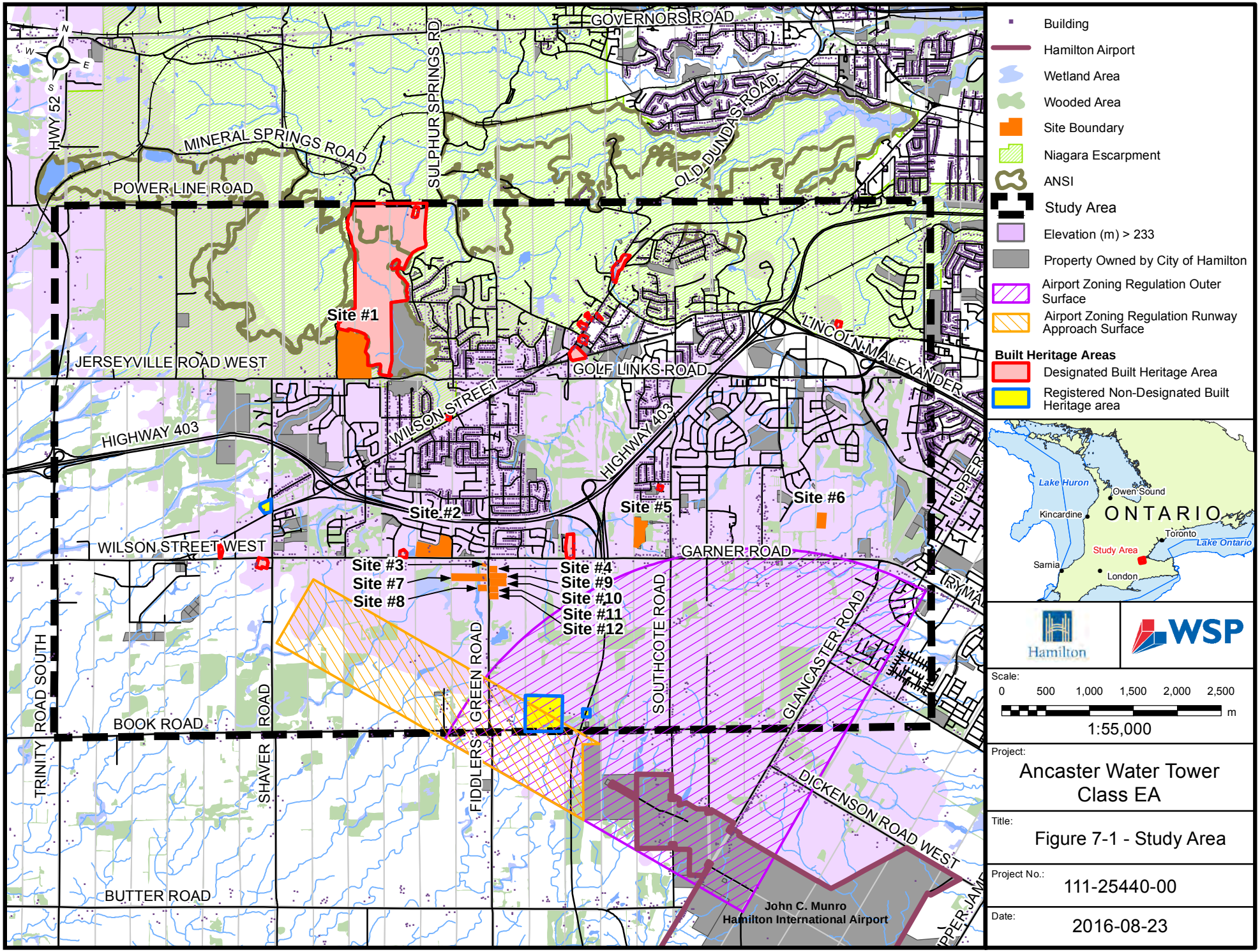
7.1.1 NATURAL HERITAGE FEATURES

The City retained Azimuth Environmental Consulting Inc. to complete an assessment of the natural heritage features within the Study Area. Azimuth completed the assessment in two stages: an initial assessment of six sites in 2012 and a follow-up assessment for six additional sites in 2016. The reports are included in Appendix B.

Sites 1, 3, 4, and 6 were not found to have any constraints from a natural heritage perspective. However, Site 1 is located within the Niagara Escarpment World Biosphere Reserve area (Azimuth Environmental Consulting, 2016).

The western portion of Site 2 and Site 5 were found to have potential constraints given the mature vegetation that is present and the intermittent surface drainage. Additional investigation would be required to determine the impact of siting the elevated tank at either of these sites (Azimuth Environmental Consulting, 2016).

Sites 7 through 12 generally showed no natural heritage constraints, though all properties were located within close proximity to features identified as components of the City's Natural Heritage System (NHS). In addition, these sites may potentially have Species at Risk (SAR) habitat for Butternut and Barn Swallow and further study is required to ensure development of the land does not negatively impact SAR or SAR habitat. Therefore, additional study is recommended to mitigate potential impacts to natural features and functions of the NHS (Azimuth Environmental Consulting, 2016).


GOVERNORS ROAD
HWY 52
MINERAL SPRINGS ROAD
SULPHUR SPRINGS RD
OLD DUNDAS ROAD
POWER LINE ROAD
Site #1
JERSEYVILLE ROAD WEST
GOLF LINKS ROAD
LINCOLN M ALEXANDER
WILSON STREET
HIGHWAY 403
HIGHWAY 403
Site #2
Site #5
Site #6
WILSON STREET WEST
GARNER ROAD
Site #3
Site #7
Site #8
Site #4
Site #9
Site #10
Site #11
Site #12
SOUTHCOTE ROAD
GLANCASTER ROAD
TRINITY ROAD SOUTH
BOOK ROAD
SHAVER ROAD
FIDDLERS GREEN ROAD
DICKENSON ROAD WEST
BUTTER ROAD
John C. Munro
Hamilton International Airport
Building
Hamilton Airport
Wetland Area
Wooded Area
Site Boundary
Niagara Escarpment
ANSI
Study Area
Elevation (m) > 233
Property Owned by City of Hamilton
Airport Zoning Regulation Outer Surface
Airport Zoning Regulation Runway Approach Surface
Built Heritage Areas
Designated Built Heritage Area
Registered Non-Designated Built Heritage area
Lake Huron
Owen Sound
Kincardine
ONTARIO
Toronto
Lake Ontario
Study Area
Sarnia
London
Hamilton
WSP
Scale:
0 500 1,000 1,500 2,000 2,500 m
1:55,000
Project:
Ancaster Water Tower Class EA
Title:
Figure 7-1 - Study Area
Project No.:
111-25440-00
Date:
2016-08-23

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7.1.2 ARCHEOLOGICAL HERITAGE FEATURES

Archaeological Services Inc. (ASI) was retained in 2012 by the City to complete a Stage 1 Archaeological Assessment of Sites 1 through 6. The assessment noted that 204 archaeological sites have been registered within 1 km of the Study Area. However, only Sites 1, 3, 4 and 5 retain archaeological potential. Therefore, ASI recommended that a Stage 2 Archaeological Assessment be completed at these sites (Archaeological Services Inc., 2012). The report is included in Appendix C.

In 2016, Archaeological Research Associates Ltd. (ARA) was retained by the City to complete a Stage 1 Archaeological Assessment for Sites 7 through 12. The assessment indicated that 11 previously registered or known archaeological resources were found within a 1 km radius of the sites. All six of the assessed sites were determined to have archaeological potential. ARA has recommended that a Stage 2 Archaeological Assessment be completed at these sites (ARA, 2016). The report is included in Appendix C.

7.1.3 CULTURAL HERITAGE FEATURES

Archaeological Services Inc. was retained IN 2016 by the City of Hamilton to conduct a Cultural Heritage Resource Assessment of the 12 sites considered. Preliminary data collection (desktop study) indicated that there were 11 previously identified cultural heritage resources. These resources were either listed on the inventory of buildings of architectural and/or historical interest, or have a Part IV Heritage Designation. ASI noted that there is potential for additional cultural heritage resources in the area.

ASI recommended that a field review be completed prior to detailed design to photograph and confirm the location and integrity of previously identified cultural heritage resources, to identify additional cultural heritage resources, and to obtain information to accurately map above-ground cultural heritage resources. The findings of the field review would then be used to identify potential impacts and mitigation measures related to siting of the elevated water reservoir (Archaeological Services Inc., 2016). The report is included in Appendix D.

7.1.4 GEOTECHNICAL CONSIDERATIONS

The City has completed several geotechnical assessments within the study area. However, none of the previously completed geotechnical assessments provide adequate information for purposes of siting and determining the structural foundation design requirements for an elevated water reservoir.

Additional geotechnical assessment is required prior to detailed design to confirm the loading capacity of the ground at the preferred site(s).

For the purposes of this evaluation a 30% cost contingency allowance was included to account for the lack of geotechnical information.

7.1.5 HYDRAULIC ANALYSIS

The City's hydraulic water model was used to compare the operation of the Ancaster water system with an elevated water reservoir located at each of the alternative sites. The analysis was based on a steady state model running maximum day and maximum day plus fire flow scenarios. The findings of the hydraulic analysis are summarized below.

Site 1 is located within the highest elevation zones of the pressure district in close proximity to the areas of the pressure district that are more likely to experience low pressures. This site is the farthest away from the pumping station. Site 1 is serviced by 300 mm diameter watermains which would result in greater pressure losses in the system relative to locations in close proximity to one of the district's trunk mains (>400 mm diameter). The combination of the pipe sizes and distance from the pumping station results in lower overall system pressures than some of the other elevated reservoir sites.

Sites 2 to 5 and Sites 7 to 12, located near Garner Road and Fiddler's Green Road, are the most preferred hydraulically. These sites are centrally located and result in the highest pressures in the district and are in close proximity to the existing 400 mm diameter trunk main along Garner Road. These sites are also located in close proximity to the future trunk watermain that is planned along Garner Road.

Site 6, closest to the pumping station, is the least preferred hydraulically due to its distance to the west side of the pressure district which is more likely to experience low pressures. The model shows that during the maximum day demand scenario, pressures within the district fall below 40 psi if the tank is not close to full. This makes it less feasible to operate pumps on off-peak hydro hours to fill the tank and servicing the district by gravity (i.e. without the pumps running) during the day. In addition, the tank site is serviced by 300 mm diameter watermains which is less preferred than being in close proximity to one of the districts trunk mains (>400 mm).

7.1.6 ESTIMATED CAPITAL COSTS

Planning level capital cost estimates (Class D) for each potential location of the Ancaster Elevated Water Reservoir were estimated, as detailed below. It should be noted that these costs differ from those presented at PIC 2 and have been updated to include additional items. However, these updated costs do not impact the comparative evaluation of alternatives. Costs are presented as ranges to account for the lack of geotechnical information and the fact that land acquisition is still required.

ELEVATED WATER RESERVOIR

Budgetary capital cost estimates were obtained from Landmark Structures (a company that specializes in the construction of elevated water reservoirs) for a 9.9 ML tank volume at varying pedestal heights. Estimates ranged from $5,040,000 to $5,220,000. The estimates do not include the costs for site works and auxiliary systems within the reservoir. These items are discussed further below.

RECHLORINATION AND RECIRCULATION SYSTEM

A rechlorination and recirculation system, if required, is estimated to cost an additional $180,000. This includes a mixing system, centrifugal recirculation pump, and chemical feed system.

OTHER PROCESS AND ELECTRICAL EQUIPMENT AND APPURTENANCES

The elevated water reservoir would require process and electrical equipment. This would include a standby generator, process piping and valving, a flow meter, etc. It is estimated that these items would amount to approximately $800,000.

SITE WORKS

Each site will require basic site works, including:

- Access driveway and parking lot
- Landscaping and restoration
- Security features, such as fencing, lighting, and security system

It is estimated that each site will require approximately $500,000 for site works.

WATERMAIN EXTENSION

Sites 1, 2, and 5 are located in close proximity to an existing 300 mm diameter or larger watermain. Therefore, we have assumed that a watermain extension to the elevated water reservoir would not be required for these sites, and that the cost to connect to the existing watermain can be covered in the contingency allowance.

The remaining sites, however, would require a connection to the existing nearest 300 mm or larger watermain. A cost of $500 per metre of watermain was assumed and has been included in the capital cost estimate.

LAND ACQUISITION

The land for the preferred site would need to be purchased by the City of Hamilton. The purchase price will vary depending on market conditions at the time of negotiations. However, for purposes of this study, a cost of $550,000 per acre was assumed.

The elevated water reservoir would require minimum site dimensions of approximately 61 m x 61 m (200 ft x 200 ft), or 1 acre (0.4 ha), for a cost of approximately $550,000. However, the property area to be acquired will depend on property negotiations as it may not be possible to subdivide smaller properties due to frontage and access requirements.

ALLOWANCES

Budget should be allocated for the following items during construction:

- Electrical utility design and connection: $50,000
- Welding, coating and geotechnical engineering inspections and testing: $100,000
- Utility relocation: $50,000
- Other allowances: $100,000

Therefore, the budget for each site should include $300,000 for various construction allowances.

ENGINEERING AND INTERNAL RESOURCES

An allowance for engineering costs of 10% of the capital cost was assumed. Also an allowance of 10% of the sum of the construction and engineering costs was assumed for the City's internal administration costs.

CONTINGENCY

A contingency allowance of 30% of the capital and engineering costs for each site has been assumed. The contingency amount is meant to account for uncertainty with costs that cannot be foreseen at this stage, such as those associated with geotechnical conditions, archeological potential, property acquisition, sewer extension, and permitting requirements.

SUMMARY

The summary table below outlines the total estimated capital costs of all 12 sites

Table 7-2 Elevated Water Reservoir Total Class D Cost Estimate by Site

	SITE 1	SITE 2	SITES 3, 4, 7 TO 12	SITE 5	SITE 6
	North-East corner of Martin Rd. and Jerseyville Rd. W. In the Robert E Wade Ancaster Community Park	West of Fiddler's Green Rd. and Garner Rd. W In James Smith Park	South-West corner of Fiddler's Green Rd. and Garner Rd. W.	North-West of Southcote Rd. and Garner Rd. E.	North-East of Raymond Rd. and Rymal Rd. W.
Elevated Water Reservoir	$5,040,000	$5,110,000	$5,100,000	$5,130,000	$5,220,000
Rechlorination and Recirculation System	$180,000	$180,000	$180,000	$180,000	$180,000
Other Process and Electrical Works	$800,000	$800,000	$800,000	$800,000	$800,000
Site Works	$500,000	$500,000	$500,000	$500,000	$500,000
Watermain Extension	$0	$0	$240,000	$0	$170,000
Engineering (10% of construction costs)	$652,000	$659,000	$682,000	$661,000	$687,000
Internal Resources /Staffing (10% of the sum of construction and engineering cost)	$718,000	$725,000	$751,000	$728,000	$756,000
Land Acquisition ($0.55 M/acre)	$550,000	$550,000	$550,000	$550,000	$550,000
Utility and Testing Allowances	$300,000	$300,000	$300,000	$300,000	$300,000
Contingency (30%)	$2,622,000	$2,647,200	$2,730,900	$2,654,700	$2,748,900
Total	$11,362,000	$11,471,200	$11,833,900	$11,503,700	$11,503,700

*The total costs for the alternative sites are higher than those presented in PIC #2 given that they are based on a 9.9 ML reservoir.

7.2 EVALUATION OF ALTERNATIVE SITES

The alternative sites were evaluated according to their natural environment, social and cultural environment, economic, and technical impact/merits. A comparative assessment of the alternatives was conducted to determine which site had the least overall impact on the environment and resulted in the lowest capital cost. The evaluation approach is described in detail in Technical Memorandum #3, which can be found in Appendix A. Note that the reservoir heights presented in this table differ slightly from those presented in PIC 2 because they are based on more recent topographical data for the various sites.

The evaluation matrix showing the comparison of the various sites is included below.

7.3 PREFERRED SITE ALTERNATIVE

Sites 3, 4, 7-12 are preferred as they result in the least overall impact to the natural environment and result in low to moderate impacts to the social and cultural environment. The capital cost associated with this alternative is slightly higher than Sites 1, 2, and 5, but lower than for Site 6.

The results of the evaluation matrix are presented in the table below. A colour scheme was used to differentiate whether an alternative is “most preferred” (green), “less preferred” (orange) or “least preferred” (red).

Evaluation Criteria	Site #1 North-East corner of Martin Rd. and Jerseyville Rd. W.	Site #2 West of Fiddler's Green Rd. and Garner Rd. W In James Smith Park	Site #3, #4, #7 to #12 South-West corner of Fiddler's Green Rd. and Garner Rd. W.	Site #5 North-West of Southcote Rd. and Garner Rd. E.	Site #6 North-East of Raymond Rd. and Rymal Rd. W.
	Natural Environment Considerations				
Proximity to Environmentally Sensitive Areas	In Niagara Escarpment	Identified as Provincially Significant Wetland by City. Sections of previously disturbed areas. No natural features of note.	No significant natural features were identified, although there is the City's Natural Heritage System and unevaluated wetlands within close proximity. Further investigation is required.	American Chestnut and Significant Woodlands located within the site.	No environmentally sensitive areas within the site.
	Social & Cultural Environment Considerations				
Proximity to Built Heritage Areas	Near Designated Built Heritage Area	Near Designated Built Heritage Area	Areas listed in the City's inventory of Buildings of Architectural and/or Historical Interest.	Not in the proximity of any Built Heritage Areas	Not in the proximity of any Built Heritage Areas
Proximity to Archaeological and Cultural Heritage Areas	Several sections appear undisturbed and retain archaeological potential. A Stage 2 Archaeological Assessment is required.	Area disturbed by grading and heavy landscaping. Previously assessed in 1995 and 1997. No archaeological potential found.	Several sections appear undisturbed and retain archaeological potential. A Stage 2 Archaeological Assessment is required. A portion of the area within the sites has been identified as Cultural Heritage Resources.	Several sections appear undisturbed and retain archaeological potential. A Stage 2 Archaeological Assessment is required.	Area disturbed by grading and heavy landscaping. Previously assessed in 2004. No archaeological potential found.
Aesthetic Impact	High, in the Niagara Escarpment	High, within residential areas	Low, south of Garner Rd.	High, within residential areas	High, within residential areas
Land Ownership	Owned by the City	Owned by the City	Privately Owned	Owned by the City	Owned by the City
Noise, Traffic, and Dust Impacts Disrupting Surrounding Area During Construction	High, near residential areas. High traffic impact on Jerseyville Rd. W.	High, within residential areas. High traffic impact on Garner Rd.	Low, south of residential areas. High traffic impact on Fiddler's Green Rd.	High, within residential areas. Low traffic impact on local roads	High, within residential areas. Low traffic impact on local roads
	Economic Considerations				
Capital Cost including Land Acquisition ($M)	$8.7 M to $11.4 M	$8.8 M to $11.5 M	$9.1 M to $11.8 M	$8.8 M to $11.5 M	$9.2 M to $11.9 M
	Technical Considerations				
Tower Height	49 m	53 m	52 m	55 m	60 m
Constructability and Site Access	Accessible by urban local road Jerseyville Rd. W.	Accessible by minor arterial road Garner Rd.	Accessible by minor arterial road Fiddler's Green Rd.	Accessible by urban local road Bookjans Dr.	Accessible by urban local road Vinton Rd.
System Reliability and Hydraulic Performance	Located within the highest elevation area of the pressure district, near the areas more likely to experience low pressures. The distance from the pumping station and the size of the pipe feeding the site results in greater pressure losses.	Most preferred hydraulically. Highest pressures in the district when operated under gravity. In close proximity to the existing 400mm diameter trunk main along Garner Rd.	Most preferred hydraulically. Highest pressures in the district when operated under gravity. In close proximity to the existing 400mm diameter trunk main along Garner Rd.	Most preferred hydraulically. Highest pressures in the district when operated under gravity. In close proximity to the existing 400mm diameter trunk main along Garner Rd.	This Site is the least preferred hydraulically due to the distance to the west side of the pressure district, which is more likely to experience low pressures. Low pressure during maximum day condition. In addition, the tank location is serviced by 300mm diameter pipes.
Summary	Located within the Niagara Escarpment and near a built heritage area. Contains archaeological potential. Owned by the City. High aesthetic impact on the Escarpment and high impact during construction. Reduced tank height. Accessible by urban local roads. Less preferred hydraulically.	Located beside a designated built heritage area and in a Provincially Significant Wetland. No archaeological potential. High impact during construction due to being within a major residential area. Owned by the City. Reduced tank height. Accessible by minor arterial road. Most preferred hydraulically.	Not near any environmentally sensitive areas or built heritage areas. Contains archaeological potential. Privately owned. Is not near major residential areas and will have low construction impact. Reduced tank height. Accessible by minor arterial road. Most preferred hydraulically.	Located within the American Chestnut and Woodlands area. Not near any built heritage areas. Owned by the City. High impact during construction due to being within a major residential area. Tank is required to be taller due to lower ground height. Accessible only by urban local roads. Most preferred hydraulically.	Not located near any environmentally sensitive areas or built heritage areas. No archaeological potential. Large aesthetic and construction noise impact on the residential area. Owned by the City. Tank is required to be taller due to lower ground height. Accessible only by urban local roads. Least preferred hydraulically.
Rank	Least preferred	Less preferred	Most preferred	Less preferred	Less preferred

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8 PREFERRED ALTERNATIVE: POTENTIAL EFFECTS AND MITIGATING MEASURES

When constructing any type of infrastructure, there is a potential for environmental impacts to occur as a result of the construction activities. In such situations, measures must be taken to either minimize or offset the negative effects. Actions taken to reduce the effects of a certain project on the environment are called “mitigating measures”.

The Class EA process requires development of mitigating measures after identification of the magnitude of the net negative impacts of the preferred alternative solution. These measures are defined in such a way to allow the project to be undertaken at a reasonable cost, while at the same time protecting the environment against net negative impacts.

The elevated water reservoir will have the potential for environmental impacts, and where these can be anticipated in the design stage, special provisions should be written into the construction specifications and/or incorporated in the design. The provisions will dictate the construction methods that are permitted and more importantly the construction methods that are not allowed. Unforeseen problems that arise during construction will be addressed on site, and judgment should be used to ensure that any resulting changes to the contract do not cause negative environmental impacts.

Staff responsible for inspecting the contractor’s work must be made aware of such provisions in order to ensure compliance during construction. It will be the responsibility of the City/their contract administrator to ensure that inspectors enforce compliance with the environmental provisions, as well as the standard engineering provisions of the construction package.

This project is also subject to permitting and approvals from regulatory agencies. The potential permit and approval requirements are listed in Section 8.3 below and should be reviewed again during the detailed design stage.

It is recommended that an environmental site assessment (ESA) be completed on the selected site(s) prior to or during property acquisition negotiations to assess whether there is existing soil or groundwater contamination.

A conceptual design for the preferred alternative was completed and is detailed in Technical Memorandum #4. Refer to Appendix A for further details on the preferred alternative design.

8.1 NATURAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Azimuth Environmental Consulting conducted a screening assessment of the natural environment for the preferred sites. A copy of the report is provided in Appendix C, with a summary from the report excerpted below.

Overall, Sites 3, 4, 9, and 10 as well as most of Site 7 and a small portion of Site 8 have been characterized with having low level ecological constraints following a preliminary site assessment, as detailed in Appendix C. These areas have historically been significantly altered from natural habitat and are currently being maintained in a permanently altered state with ongoing anthropogenic influence. Nonetheless, there are concerns that the existing land use (i.e. buildings, structures, gravel lots, agricultural fields) may provide habitat for Species at Risk (SAR) known to occur in the area including Barn Swallow, Common Night Hawk, and Chimney Swift. If development is proposed within and/or adjacent to these areas, additional species specific field surveys will be required to fully characterize the potential SAR habitat. However, these sites are otherwise suitable for construction of the elevated reservoir.

The remaining sites have been characterized with having medium and high constraints and are not suitable for construction (Azimuth Environmental Consulting, 2016).

There may be a potential requirement for additional field surveys, dependent on site selection and sensitivity. The following field surveys are recommended, subject to Review Agency comments and the preferred site selection (Azimuth Environmental Consulting, 2016):

- Three season natural heritage survey to inventory existing vegetation communities and search for SAR that may be associated with the preferred site
- Dawn and nocturnal breeding bird surveys to determine if SAR birds are utilizing the preferred site
- Nocturnal owl surveys to determine if SAR owl species are utilizing the preferred site
- Bat Maternity Roosting surveys to determine if woodland habitat meets the criteria to be classified as roosting habit for SAR bat species
- Butterfly surveys to determine if SAR butterflies are utilizing the preferred site
- Fish habitat assessment and fish community survey if appropriate habitat is present within/adjacent to the preferred site

The sections below summarize additional impacts and mitigation measures related to the natural environment.

8.1.1 SEDIMENT AND EROSION CONTROL

Sediment and Erosion Control Plans should be developed prior to the proposed works. Any requirement for dewatering should include the use of envirobags and sediment traps (or equivalent) located an adequate distance from a watercourse and proper overland flow paths atop stable vegetation to ensure that proper filtration of discharge water occurs prior to returning to the receiving drain. Runoff should be directed away from exposed soil surfaces to mitigate the potential for soil mobilization (Azimuth Environmental Consulting, 2016).

Diligent application of sediment and erosion controls (e.g., erosion and sediment control fencing) is recommended surrounding the proposed development to alleviate the risk of sediment migration or erosion into adjacent natural features.

8.1.2 VEGETATION

Impacts to vegetation will, for the most part, be limited to some trees located within the working areas. Where possible and if required, mature trees will be protected with temporary construction fence to ensure that they are not damaged during construction.

Vegetation removal should occur outside of the sensitive breeding bird window to prevent interruption of the avian lifecycle. The timing window typically falls between April 1 and July 31, but is dependent on seasonal variation. If, due to timing constraints associated with construction of the elevated water reservoir, vegetation removal must occur within this timeframe, the area can be assessed immediately prior to site alteration to ensure that the activities are not in contravention of the Migratory Birds Convention Act, 1992, or the ESA.

Native plants should be used for re-vegetation efforts post-construction. Invasive species, which have a tendency to create a monocultural stand and outcompete native species, should be especially avoided.

A naturalized setback should be implemented adjacent to all components of the City's NHS. All disturbed lands to be included within the naturalized buffer should be planted with native species, as required (Azimuth Environmental Consulting, 2016).

8.1.3 WILDLIFE AND WILDLIFE HABITATS

A review of the preferred sites indicated that the area is generally commercial and lacks significant constraints. However, the sites are located within close proximity to features identified as components of the City's NHS and there may be some impact to wildlife inhabiting the working areas that will be displaced for the duration of construction. Further studies are required to ensure that development of the preferred site does not negatively impact the features and functions of the NHS, SAR or habitat of the SAR. Appropriate actions must be taken to protect SAR and

related habitats during construction. All workers on site should be informed of the potential for SAR to occur within the active work area. The Ministry of Natural Resources and Forestry (MNRF) should be contacted to determine the appropriate actions to protect the species if SAR are observed within the active work area.

Once construction and subsequent restoration is complete, wildlife may introduce itself into the disturbed areas. A construction fence should be used to prevent wildlife from entering the working areas during the construction period (Azimuth Environmental Consulting, 2016).

8.1.4 DEWATERING REQUIREMENTS

Construction dewatering may be required depending on groundwater levels. The dewatering requirements will need to be confirmed during the detailed design stage. If dewatering is needed during construction, a Permit to Take Water (PTTW) may be required.

8.2 SOCIAL, CULTURAL AND ECONOMIC IMPACTS AND MITIGATING MEASURES

8.2.1 TRAFFIC

There will be an increase in construction traffic for delivery of material and equipment to the site. Construction signage will be posted on the impacted roads to make motorists aware of the construction entrances.

8.2.2 ARCHAEOLOGY AND HERITAGE FEATURES

A Stage 1 Archaeological Assessment was completed by ARA for the Sites south of the Garner Road and Fiddler's Green Road intersection. The assessment found that the sites included a mixture of areas with archaeological potential and no archaeological potential. It is recommended that the areas of archaeological potential that could be impacted by the construction of the elevated water reservoir undergo a Stage 2 Archaeological Assessment (ARA, 2016).

8.2.3 NOISE, DUST AND VIBRATION

Noise, dust and vibration during construction projects is unavoidable. Potential sources of noise, dust, and vibration are truck traffic and regular construction activities. These impacts can generally be mitigated following the guidelines below:

- All truck traffic, excavation equipment and other activity that potentially generates significant noise levels should be restricted to normal work hours pursuant to local municipal noise bylaws.
- Excavated materials should be used on-site wherever possible in order to minimize truck haulage to off-site disposal areas.
- Dust control agents should be applied as necessary.

- Dry exposed soil should be kept wet to make it less susceptible to wind erosion, and should be covered if left for extended periods of time.
- Pre-construction and post-construction surveys of neighboring building/properties should be completed to ensure that any impacts associated with construction can be clearly identified.
- Construction in residential areas should be scheduled during cool or cold weather periods, when recreational usage of outdoor areas on residential properties is generally lower, if at all possible.

8.2.4 PUBLIC NOTIFICATION

Public notification during construction is to be facilitated through newspaper ads, construction signage and flyers to local residents and businesses. All emergency services (Police, Fire, and EMS) should be notified of the project, specifically where construction is to impact access to public roads.

8.3 PERMITS AND APPROVALS

8.3.1 MOECC

The City will need to complete an amendment to its existing DWWP to add the elevated water reservoir. This will involve a technical review by the MOECC. A watermain extension, if required, is a pre-approved work requiring completion of "Schedule C" to the DWWP.

8.3.2 CITY OF HAMILTON

A site plan approval and building permit need to be obtained from the City of Hamilton.

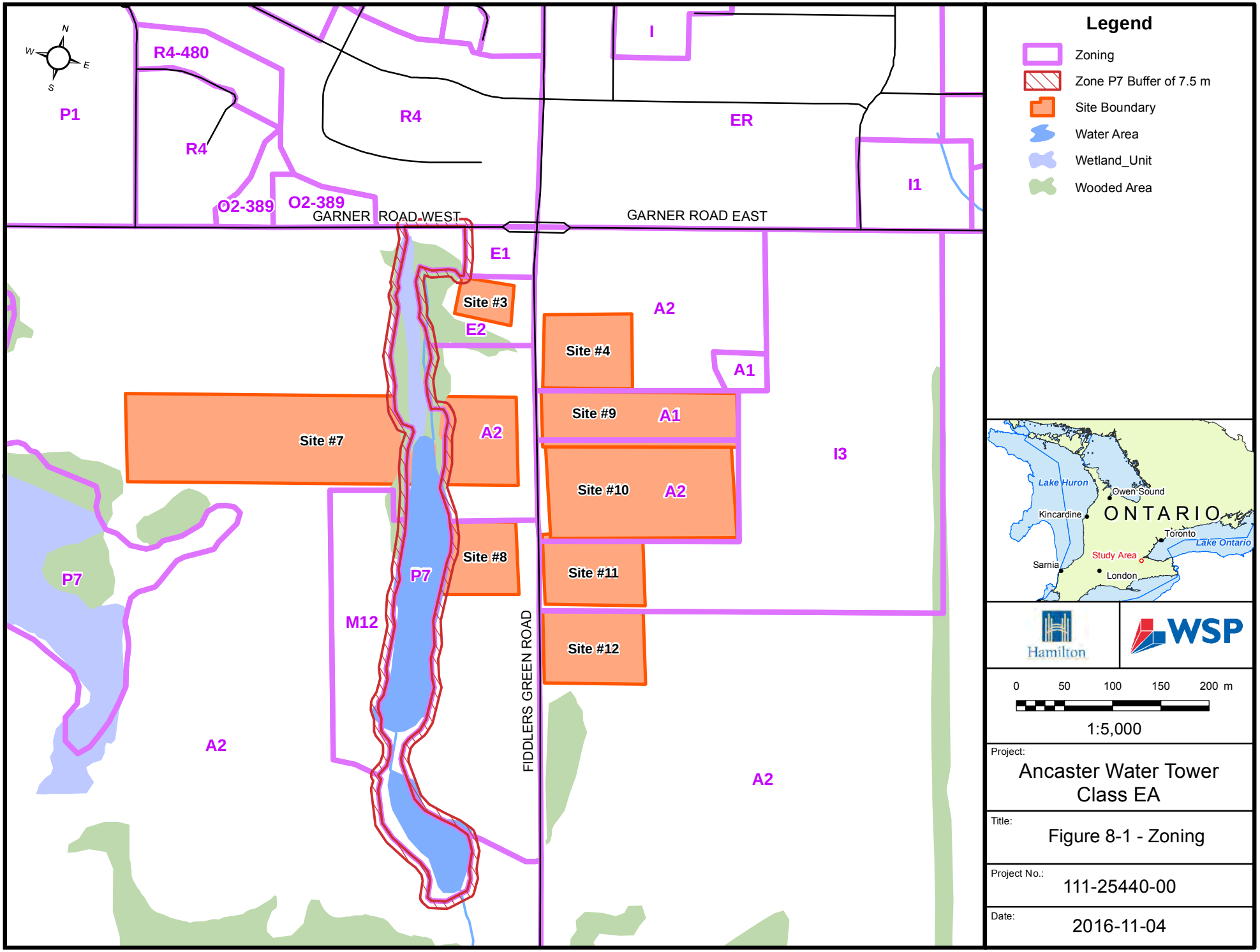
The existing zoning at the preferred sites does not allow the construction of tall structures. The City's Zoning Bylaw (05-200) defines permitted uses for the preferred sites. Therefore, a zoning variance will be required to allow construction to proceed. The zoning requirements for each of the preferred sites are listed in Table 8-1.

Furthermore, if Site 3, 4, or 8 is selected, the elevated water reservoir must be set back at least 7.5 m from the boundary of Zone P7 – Conservation/Hazard Land. This is shown in Figure 8-1. Zone P7 also divides Site 7 into east and west portions. This division renders the west portion not feasible for construction because it does not front on a road and, as such, would require an access road north to Garner Road through other properties.

Table 8-1 Current Zoning for Preferred Sites

SITE	ZONING CODE	ZONING DESCRIPTION	PERMITTED USES	MAXIMUM BUILDING HEIGHT
3	E2	Existing Rural Industrial	Abattoir Agricultural Processing Establishment Agricultural Storage Establishment Farm Product Supply Dealer Uses Existing at the date of passing of the By-law	15.0 m
4, 7, 10, 12	A2	Rural	Abattoir Agriculture Agricultural Processing Establishment Agricultural Storage Establishment Farm Product Supply Dealer Kennel Livestock Assembly Point Residential Care Facility Secondary Uses to Agriculture Single Detached Dwelling Veterinary Service – Farm Animal	10.5 m
8	M12	Extractive Industrial	Agriculture Conservation Mineral Aggregate Operation Recreation, Passive Secondary Uses to Agriculture	10.5 m

SITE	ZONING CODE	ZONING DESCRIPTION	PERMITTED USES	MAXIMUM BUILDING HEIGHT
9	A1	Agriculture	Agriculture Residential Care Facility Secondary Uses to Agriculture Single Detached Dwelling Veterinary Service – Farm Animal	10.5 m
11	I3	Major Institutional	Community Garden Day Nursery Educational Establishment Emergency Shelter Hospital Lodging House Long Term Care Facility Medical Clinic Multiple Dwelling Place of Worship Recreation Residential Care Facility Retirement Home Social Services Establishment Street Townhouse Dwelling Urban Farm Urban Farmers Market	18.0 m


N
W
E
S
P1
R4-480
R4
R4
I
ER
I1
O2-389
O2-389
GARNER ROAD WEST
GARNER ROAD EAST
E1
E2
Site #3
A2
Site #4
A1
Site #9
A1
Site #7
A2
Site #10
A2
I3
Site #8
Site #11
P7
P7
M12
Site #12
FIDDLERS GREEN ROAD
A2
A2
Legend
Zoning
Zone P7 Buffer of 7.5 m
Site Boundary
Water Area
Wetland_Unit
Wooded Area
Lake Huron
Owen Sound
Kincardine
ONTARIO
Toronto
Lake Ontario
Study Area
Sarnia
London
Hamilton
WSP
0
50
100
150
200 m
1:5,000
Project:
Ancaster Water Tower Class EA
Title:
Figure 8-1 - Zoning
Project No.:
111-25440-00
Date:
2016-11-04

8.3.3 AIRPORT

The elevated water reservoir is proposed to be located in proximity to the John C. Munro International Airport. Therefore, it is recommended that NAV Canada, Transport Canada, and John C. Munro International Airport be provided the pertinent information for review prior to proceeding with project implementation. These parties have been contacted during the Class EA as part of the consultation process.

9 PUBLIC AND AGENCY CONSULTATION

9.1 POINTS OF CONTACT

Consultation with the public (which includes stakeholders and interested parties) and government review agencies is a necessary and important component of the Municipal Class Environmental Assessment process. To meet the consultation requirements for this Schedule 'B' project, the City of Hamilton ensured that the public and review agencies were informed of the Study and given the opportunity to provide input on the assessment and alternative evaluation process. The following sub sections provide a summary of the key points of contact that were established throughout the course of the Study, as well as a summary of comments and feedback received. Furthermore, the project status and notices were published on the City's website at https://www.hamilton.ca/city-planning/master-plans-class-eas/ancaster-elevated-water-reservoir.

9.1.1 NOTICE OF STUDY COMMENCEMENT AND PIC 1

The Notice of Study Commencement was developed to target the ministries, organizations, agencies and other stakeholders that may be affected and/or interested in the Ancaster Elevated Water Reservoir Project. The Notice of Study Commencement was published on the City's website and in the Ancaster News on September 14 and 21, 2012. This notice briefly outlined the purpose and justification for the Study and also served as a Notice of Public Information Centre (PIC) 1.

The City of Hamilton sent letters and contact response forms along with a copy of the Notice of Study Commencement to stakeholders and affected government agencies within the study area. Each recipient was asked to respond to the project team, indicating their interest in receiving further correspondence on the Study. Stakeholders remained on the mailing list for the duration of the public consultation process unless they requested to be removed.

The Notice of Study Commencement and stakeholder list, as well as the letter and response form can be found in Appendix E.

9.1.2 PUBLIC INFORMATION CENTRE 1

The Ancaster Elevated Water Reservoir PIC 1 was held on September 25, 2012 at the Hamilton Public Library-Ancaster Branch, to present an overview of the Study, the evaluation criteria and methodology that were used, and the preferred servicing solution. The purpose of this Public Information Centre was to communicate the process used to carry out the Study and provide an opportunity to receive comments on both the approach used by the City and the alternatives identified for evaluation.

A total of nine attendees recorded their names on the sign in sheet with two requesting to be added or to remain on the mailing list. A copy of the material presented at the PIC is included in Appendix F, along with the sign in sheet for the PIC and the Response Form provided to all attendees.

9.1.3 NOTICE OF PUBLIC INFORMATION CENTRE 2

Notice of PIC 2 was published in the Ancaster News on September 22, 2016 and September 29, 2016. The notice briefly outlined the purpose and justification for the Study. The notices also indicated that the PIC would be held on October 5, 2016 to present the alternative servicing solutions, the evaluation of the alternatives and the preferred recommended solution.

The City of Hamilton sent a copy of the Notice of Public Information Centre 2 to stakeholders and agencies as well as members of the public in close proximity to the preferred sites identified for the elevated water reservoir. Each recipient was asked to respond to the project team, indicating their interest in receiving correspondence on the Study. Stakeholders remained on the mailing list for the duration of the public consultation process unless they requested to be removed. A copy of the Notice can be found in Appendix E.

9.1.4 PUBLIC INFORMATION CENTRE 2

The Ancaster Elevated Water Reservoir PIC 2 was held on October 5, 2016 at the Ancaster Old Town Hall. The purpose of this Public Information Centre was to communicate the process used to carry out the Study and provide an opportunity to receive comments on both the approach used by the City and the preferred sites for the elevated water reservoir.

A total of nine attendees, including City staff, recorded their names on the sign in sheet with two requesting to be added or to remain on the mailing list. A copy of the material presented at the PIC is included in Appendix F, along with the sign in sheet for the PIC and the Response Form provided to all attendees.

9.1.5 NOTICE OF STUDY COMPLETION

A Notice of Study Completion will be sent to individuals and agencies included on the stakeholder list upon filing of this Project File Report. This Notice is relevant for

two reasons: it provides the public and relevant agencies with a final period of 30 days to review the final conclusions of the Study, and it informs the general public of the outcome of the Study and the nature of the resulting project.

The Notice and stakeholder list are included in Appendix F.

9.2 PUBLIC, FIRST NATIONS, AND AGENCY COMMENTS AND RESPONSES

A summary of the comments and questions received from the public, agencies, and First Nations representatives during the Class EA process is provided in Table 9-1. The text of the questions and responses is provided verbatim. Copies of the actual written correspondence received from agencies and the public (confidential information redacted) are provided in Appendix G.

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Table 9-1 Summary of All Comments Received

POINT OF CONTACT	DATE RECEIVED	COMMENTER	COMMENT	RESPONSE/ACTION
Email and Telephone Call	February 14, 2017	Ministry of Municipal Affairs (MMA), in response to email comment by WSP (WSP requested clarification on the implications of the revised Greenbelt Plan boundary on the Ancaster Elevated Water Reservoir location.)	MMA representative contacted WSP by telephone to clarify the intended interpretation of the Greenbelt Plan as it pertains to new water infrastructure. The MMA representative explained that the proponent shall reference Section 4.2.1, Clause 1 of the Plan and that interpretation was at the discretion of the City of Hamilton Planning Department.	The Ancaster Elevated Water Reservoir would support existing developed areas, and will not facilitate growth in protected Greenbelt areas. Therefore, it does not contradict the Plan.
Response Form	August 18, 2016	Transport Canada, Environmental Assessment Program	Please note Transport Canada **does not** require receipt of all individual or Class EA related notifications. We are requesting project proponents to self-assess if their project will interact with a federal property **and** require approval and/or authorization under any Acts administered by Transport Canada.	Self-Assessment under the Aeronautics Act was completed and determined that this project will not require further approval or authorization form Transport Canada.
Response Form	August 18, 2016	Drew Cherry Grand River Conservation Authority	Interest in wetlands/ floodplains/ watercourses/ valleylands within Study Area. We wish to be notified for continued involvement in the project process. GRCA mapping provided.	Noted
Response Form	August 30, 2016	Cathy Plosz City of Hamilton, Planning and Economic Development, Development Planning, Heritage, and Design	We wish to be notified for continued involvement in the project process.	Noted
Response Form	August 19, 2016	Melissa Kiddie City of Hamilton, Planning and Economic Development, Development Planning, Heritage, and Design	We wish to be notified for continued involvement in the project process.	Noted

POINT OF CONTACT	DATE RECEIVED	COMMENTER	COMMENT	RESPONSE/ACTION
Response Form	September 27, 2016	Abu Sanneh Coordinator, Airport Operations John C. Munro International Airport	Due to the proximity of the proposed sites to the Hamilton International Airport, a review of the sites is required to determined potential effect on airport zoning regulations. It is also recommended that the proposal be submitted to Transport Canada and NAV Canada for review to ensure the structure(s) meet lighting requirements and flight procedures are not impacted.	As you noted, we have included NAV Canada and Transport Canada on our contact list. We would like to invite you or a representative of the John C. Munro Airport to attend the upcoming PIC on October 5th, 6:00p.m. to 8:00p.m. for the previously discussed Ancaster Elevated Water Reservoir. Please see attached the Notice of Public Information Centre 2. To aid in the evaluation of the proposed sites, we would like to know what we can provide you with i.e. shape files, coordinates, maps, etc. If you are unable to attend, we would be happy to send you a copy the PIC boards after October 5th, and welcome any additional comments you may have on behalf of the Airport.
PIC 2	October 12, 2016	Public	I live on Garner Rd. right near Fiddler's Green and was wondering exactly where it will be situated. Is it behind the Avondales or further down Fiddler's to the south? What is the timeline for this project?	The location is slightly further south of the Avondales where private land will be purchased. It all depends on the availability of lands. The project may be in 2020 or later, it is not clear yet at the moment.
Comment	September 23, 2016	Public	How will this affect me? I live on Book Rd. E within the study area. Will that mean I will get city water?	Thanks for your email and you are welcome to come to the Public Information Centre 2 on October 5, 2016 at Old Town Hall from 6:00pm to 8:00pm to discuss and provide your input in this matter.
Notice of PIC 2	October 3, 2016	Stantec, Matt Ninomiya	I am not able to attend the PIC but would like to be able to review the material presented at the PIC. Is it possible to get the information in advance or shortly thereafter? Could you also add myself to the mailing list for information related to this project moving forward.	Thanks Matt for your information and it will be available on-line (City's website) sometime after PIC. We will add you to the mailing list.
Response Form	October 1, 2016	Public	We drink Hamilton tap water at present. Will there be any change to quality or taste? I wish to be notified for continued involvement in the project process.	No. The proposed project will not affect the quality or taste of the water. It will help ensure there is a reliable supply (quantity).
Response Form	August 23, 2016	Mohawk College,	Does not wish to be notified for continued involvement in the project process.	Removed from project contact list

POINT OF CONTACT	DATE RECEIVED	COMMENTER	COMMENT	RESPONSE/ACTION
Telephone Call	August 23, 2016	Public	Yesterday, I spoke on the telephone with you concerning the Ancaster Elevated Water Reservoir. Please add my name to your mailing list for notifications on this project. I see the announcement I spoke with you about and is scheduled for October 5, 2016, is called PIC No. 2. When I put the name of the project in the Search box at the City's web site I found a few sentences that ended with "Study status: Active (on hold)..." Further exploration through Google indicates that there was PIC No. 1 in 2012. I find it odd that no reference to this is made in the notice of PIC No.2 and that in our conversation you did not mention the information distributed at that time including a map showing possible sites. In the notice I have for PIC No. 2, in the third section (Public Information Centre (PIC) No. 2, it says "As part of this study, two (2) Public Information Centres (PIC's) will be held to present the findings of the study to the public and other stakeholders, ..." The use of the future tense indicates that there will be a PIC No. 2 and a PIC No. 3. However apparently there has already been a PIC No.1, held some years ago. Since you call the October 5, 2016 session PIC No. 2, the total number of PICs in the end will be 3, will it not? Please clarify for me the status of the project, the relevance of PIC No. 1 that has already been held to the PICs yet to be held, and the proper way of identifying the PICs to be held in future.	Thanks for pointing out the status of this project. It has already been changed to “Active”. I will add your name to the mailing list for notifications. As for the PIC number, the coming PIC is No. 2 and there will not be a No. 3. Sorry for the confusion due to my poor grammar.
Telephone Call	August 24, 2016	Public	You did not explain the relevance of PIC No 1 to PIC No 2. Specifically: will the 6 sites proposed in PIC No. 1 be presented at PIC No. 2 and the one or more preferred identified and justified? My second question is: what are the names of the North - South roads that abut or are closest to Site #1?	Generally PIC 1 is to present background information and current conditions while PIC 2 is to present proposed alternatives and the preferred alternative, this the “rule of thumb” as you may be aware. You are welcome to come to PIC 2 for discussion. The road name abutting Site #1 on the west is called Martin Rd.

POINT OF CONTACT	DATE RECEIVED	COMMENTER	COMMENT	RESPONSE/ACTION
PIC 2 Questionnaire		Public	Interest in reasoning for need of elevated reservoir. Interest in reasoning of groups which probably will oppose location favoured by study.	I have contacted the individual by phone and explained the reasons for the elevated water reservoir to meet the water servicing issues, such as water supply reliability, sustainability, energy saving, and greenhouse gas reduction, some low water pressure at a higher elevation within the community etc. Basically, he asked if there are any complaints and if someone is protesting. I said that no complaints from the residents have been received so far and there are no protests as well. He finally understood the purpose and the reasoning for constructing this elevated water reservoir in Ancaster community.
Letter	September 12, 2016	Ministry of Tourism, Culture and Sport	MTCS's interest in this EA project relates to its mandate of conserving Ontario's cultural heritage, which includes: • Archeological resources, including land-based and marine • Built heritage resources, including bridges and monuments and • Cultural heritage landscapes Under the EA process, the proponent is required to determine a project's potential impact on cultural heritage resources. We would appreciate being informed as this project continues through the EA process.	Noted
Response Form	September 22, 2016	Ministry of Transportation	I'd like to be copied on all correspondence during the design phase as much as the MTO ROW is impacted (Hwy 403 ROW). I wish to be notified for continued involvement in the project process.	Noted
Response Form	October 7, 2016	MHBC Planning on behalf of TransCanada Pipelines Limited	We wish to be notified for continued involvement in the project process.	Noted
PIC 1 Questionnaire		Public	Site 6 is preferred. Would like to see examples of what the tower looks like. Remind people that Ancaster used to have water towers	Noted. Photo of a sample elevated water reservoir was presented in PIC 2

POINT OF CONTACT	DATE RECEIVED	COMMENTER	COMMENT	RESPONSE/ACTION
PIC 1 Questionnaire		Public	Including a Study Area outside of current urban boundary is confusing. Residents living south of Garner do not get water service so why should reservoir be located on their lands. Want to ensure need is now and not connected to future plans of AEGD.	Noted
Response Form	August 23, 2012	Alderville First Nations	The project has been deemed as a level 3, having minimal potential to impact out First Nations' rights. Please keep us apprised of any archaeological findings, burial sites, or any environmental impacts should any occur during the study.	Noted.
Response Form	August 31, 2012	Ancaster BIA	Ancaster previously had water towers that were removed. There is concern that the tower near the Ancaster Heritage Village (Dalley Drive to Montgomery Drive) deflects from the beauty and historic features of the BIA.	Noted.
Response Form	September 21, 2012	Public	I have concerns about the height and style of the water reservoir. I would like further information directed towards me either by my mailing address or e-mail. Consider a more artistic approach to the water reservoir.	Thank you and we will take you feedback into consideration. We will add you to the mailing list. You are also encouraged to visit the project website.
Response Form	August 16, 2012	Aboriginal Affairs and Northern Development Canada	There are 15 First Nation communities with a 100 km radius of the project. For each First Nation, community information, treaties, claims, negotiations, and litigations have been provided.	Noted. All 15 First Nation communities identified consulted.
Response Form	August 21, 2012	Canadian Environmental Assessment Agency (CEAA)	Under CEAA 2012 the proponent must provide the CEAA with a description of their proposed project if it is captured under the above noted regulations.	Noted. Regulations were reviewed and the project does not fall under the specified criteria.
Response Form	August 10, 2012	Hamilton Conservation Authority	Study area included regulated areas, ESA's PSW's. Specific comments can be provided through EA review.	Noted.
Response Form	September 18, 2012	Public	Our company owns land and homes in the study area. We would like to be informed of the study as it progresses will there be online access to the material at the PIC 1?	Noted. All material was made available on the project webpage.

POINT OF CONTACT	DATE RECEIVED	COMMENTER	COMMENT	RESPONSE/ACTION
Response Form	October 2, 2012	Curve Lake First Nations	The study area is situated within the Traditional Territory of Curve Lake First Nation. We strongly suggest you provide the Williams Treaty First Nations Claims Coordinator with a copy of your proposal. The Council is not currently aware of any issues that would cause concern. If any archaeological findings are discovered, please notify without delay.	Noted. We will provide a copy of the Project File to the Williams Treaty First Nations Claims Coordinator.
Response Form	August 8, 2012	Ministry of Environment	A Schedule 'B' Class EA includes the completion of a project file, notice of completion, and public consultation.	Noted.
Response Form	August 10, 2012	Hydro One	We have confirmed that Hydro One transmission facilities are located within the immediate vicinity of the proposed sites. Once details are known and it is established that your development will affect Hydro One facilities please submit plans that detail your development to the below address.	Noted.
Response Form	August 7, 2012	Niagara Escarpment Commission	Parts of the study area are in the Niagara Escarpment Plan (NEP). Escarpment Natural Areas are to be avoided. Urban areas of are confined to the Urban Area Designation of the NEP. Water storage facilities are defined as urban areas.	Noted.
Response Form	September 28, 2016	Horizon Utilities	The address is not within the Horizon Utilities service territory.	Noted.
Response Form	August 16, 2012	Grand River Conservation Authority	We are interested in continuing to participate in the study design. A copy of GIS mapping showing the extent of the GRCA regulated areas within the study area.	Noted. The GRCA were continuously provided with information as the study progressed.
E-mail	January 12, 2017	Huron-Wendat Nation Council	HWN has no further comments on this Class EA.	Noted.

10 CONCLUSIONS AND RECOMMENDATIONS

The following is a summary of the key findings presented in the Project File report:

- A solution is required to mitigate low pressure issues in the Ancaster, to improve the operability and efficiency of the HD018 Garner Road Pumping Station, and to provide redundancy and security of supply, and to meet MOECC guidelines and City design standards, while reducing energy consumption and GHG emissions in accordance with the City's Corporate Energy Policy. s
- A total of five servicing alternative solutions, in addition to Do Nothing, were considered:
  - Alternative 1 – Increase the Capacity of HD018 Pumping Station
  - Alternative 2 – Construct a new Elevated Storage Reservoir in Ancaster
  - Alternative 3 – Construct a new Booster Pumping Station and Increase the Capacity of HD018 Pumping Station
  - Alternative 4 – Construct a New Booster Pumping Station and In-ground Reservoir and Increase the Capacity of HD018 Pumping Station
- The alternatives were evaluated based on the following:
  - Natural Environment Considerations
  - Social and Cultural Environment Considerations
  - Economic Considerations
  - Technical Considerations
- Through the evaluation process, the preferred servicing solution was determined to be Alternative 2 - construction of a new elevated water reservoir.
- A total of 12 sites were considered for locating the elevated water reservoir. Each site was evaluated using the same criteria noted above and through the evaluation process, the preferred sites were determined to be located south of the Fiddler's Green Road and Garner Road intersection (Sites 3, 4, 7-12).
- Selection of a specific site within this area is dependent on outcomes of additional studies and investigations, property acquisition negotiations, zoning, and approvals detailed below.

- → It is recommended that the following tasks be completed prior to implementation of the preferred solution:
  - Geotechnical investigation
  - Stage 2 Archeological Assessment (findings from Stage 2 may trigger additional study which would also need to be completed prior to implementation)
  - Zoning variance
  - Environmental Site Assessment
  - Additional cultural heritage study
  - Additional natural environment studies
  - Property acquisition, contingent upon outcomes of the above items.
- → All public, agency and First Nations consultation was conducted in accordance with the requirements for Schedule B Municipal Class EA projects. All comments received have been documented and addressed as part of the Project File Report.

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Appendix A

TECHNICAL MEMORANDA

TECHNICAL MEMORANDUM #1

TO: City of Hamilton Technical Committee

FROM: WSP

SUBJECT: **Problem Statement Definition and Existing Conditions Review – Ancaster Elevated Water Reservoir Class EA**

DATE: **August 16, 2016 (Revision)**

1 INTRODUCTION

The City of Hamilton is planning to construct a new elevated water storage facility to provide floating storage for the Pressure District 18 (PD-18) in Ancaster. The need for the elevated water storage facility was documented in the City of Hamilton's Water and Wastewater Master Plan Class Environmental Assessment Report (November 2006), which indicated an unbalanced water supply and limited ability to adequately service future system demands in the area. The project is identified as a Schedule 'B' project under the Municipal Class Environmental Assessment (EA) Process. This Class EA will include an evaluation of environmental, social and cultural conditions as well as an assessment of the technical feasibility of the alternative water storage solutions.

This technical memorandum explains the approach to be followed to conduct the Class EA, identifies the project Study Area, defines the problem statement, and examines the existing conditions that may affect the selection of the preferred site. The information presented in this document corresponds to Phase 1 of the Class Environmental Assessment process.

2 THE MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT PROCESS

The planning of major municipal projects or activities is subject to the Ontario Environmental Assessment (EA) Act, R.S.O. 1990, and requires the Proponent to complete an Environmental Assessment, including an inventory and description of the existing environment in the area affected by the proposed activity.

The Class EA process was developed by the Municipal Engineers Association (MEA), in consultation with the Ministry of the Environment and Climate Change (MOECC), as an alternative method to Individual Environmental Assessments for recurring Municipal projects that were similar in nature, usually limited in scale, with a predictable range of environmental effects, and which were responsive to mitigating measures. The Municipal Class EA process applies to municipal infrastructure projects including roads, water and wastewater projects, etc.

The Ancaster Elevated Water Storage Facility project is proceeding in accordance with the Class EA process as outlined in the "Municipal Class EA" document (October 2000 edition as amended in 2007, 2011, and 2015). Since projects undertaken by municipalities can vary in their complexity and potential environmental impacts, projects are classified in terms of schedules as follows:

Schedule 'A' – Generally includes normal or emergency operational and maintenance activities. The environmental effects of these activities are usually minimal and, therefore, these projects are pre-approved.

Schedule 'A+' – In 2007, MEA introduced Schedule 'A+.' These projects are pre-approved. However, the public is to be advised prior to project implementation.

Schedule 'B' – Generally includes improvements and minor expansions to existing facilities. There is the potential for some adverse environmental impacts and, therefore, the Proponent is required to proceed through a screening process including consultation with those who may be affected.

– Typical projects that follow a Schedule 'B' process will include projects requiring watercourse crossings, construction of watermains and sewers outside of existing road allowances, construction of pumping stations and reservoirs.

Schedule 'C' – Generally includes the construction of new facilities and major expansions to existing facilities.

– Typical projects that follow the Schedule 'C' process include the expansion of existing, or construction of new Water and Sewage Treatment Facilities.

The Class EA process also provides an appeal mechanism to change the project status (i.e. the Class EA Schedule). Under the provisions of Subsection 16 of the amended EA Act, there is an opportunity under the Class EA planning process for the Minister to review the status of a project. Members of the public, interest groups and review agencies may request the Minister to require a Proponent to comply with Part II of the EA Act before proceeding with a proposed undertaking. This is what is known as a "Part II Order." The Minister determines whether or not this is necessary, with the Minister's decision being final. The procedure for dealing with concerns, which may result in the Minister, by order, requiring the Proponent to comply with Part II of the Act is outlined in the Municipal Class Environmental Assessment document.

A flow chart describing the Class EA Planning and Design Process is shown in Figure 2-1.

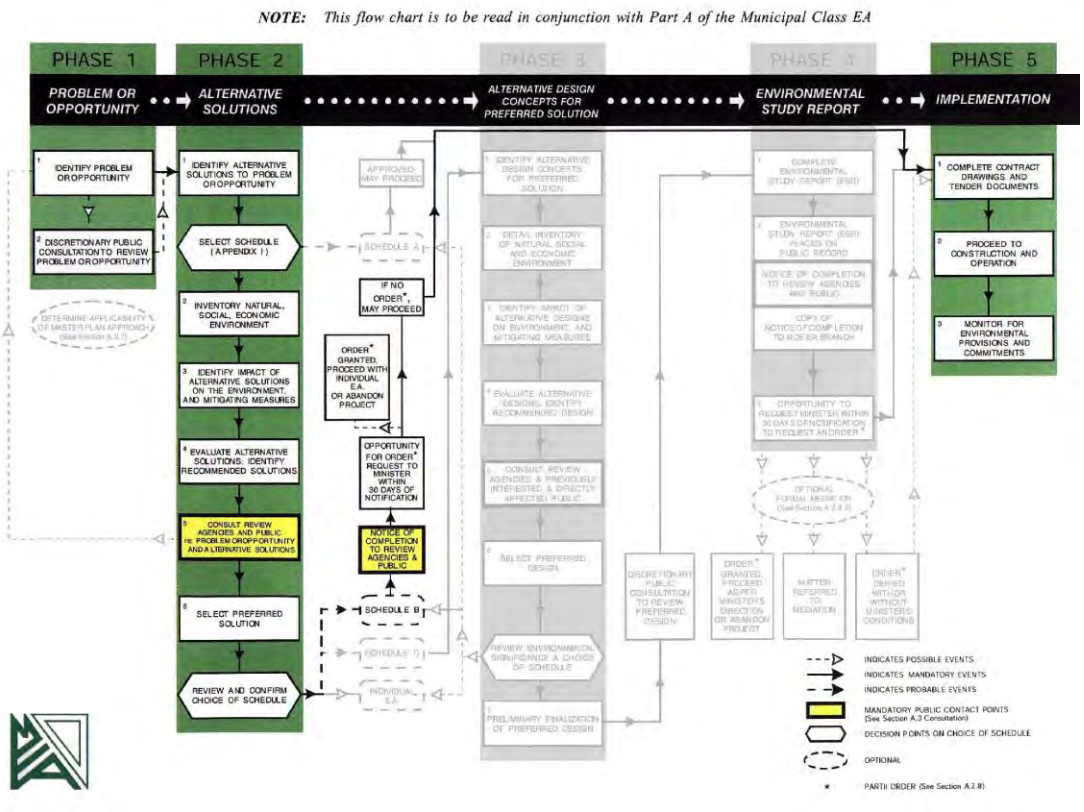


Figure 2-1 Municipal Class EA Process

As detailed in Appendix 1 of the *Municipal Class EA* document, the following water projects are included under **Schedule 'B'**:

- Establish, extend or enlarge a water distribution system and all works necessary to connect the system to an existing system or water source, where such facilities are not in either an existing road allowance or an existing utility corridor
- Establish new or expand/replace existing water storage facilities

Therefore, the proposed Ancaster Elevated Storage Facility project is subject to a **Schedule 'B'** environmental assessment, which includes reviews with the public and relevant agencies prior to implementation.

This project will satisfy the requirements and procedures of **Phases 1 and 2** of the Municipal Class EA Planning and Design Process, which are described as follows:

- **Phase 1** Identify the problem (deficiency) or opportunity.
- **Phase 2** Identify alternative solutions to address the problem or opportunity by taking into consideration the existing environment, and establish the preferred solution taking into account public and review agency input.

3 STUDY AREA

Pressure District (PD) 18 is situated in Ancaster, in the southwest portion of the City of Hamilton. It is hydraulically a closed zone with no floating storage. Ground elevations in the serviced areas of the zone range between 220 m to 255 m. The zone is supplied through PD-6 by pumping station HD018 located on Garner Road. The zone also feeds sub-zones PD-13, PD-14, and PD-15 through PRVs and provides a secondary feed into PD-22 through Sulphur Springs Road.

The Study Area to determine the most suitable location for the water tower is bounded by Trinity Road to the west, Power Line Road to the north, Scenic Drive to the east, and Book Road to the south. The Study Area is shown in Figure 3-1 below.

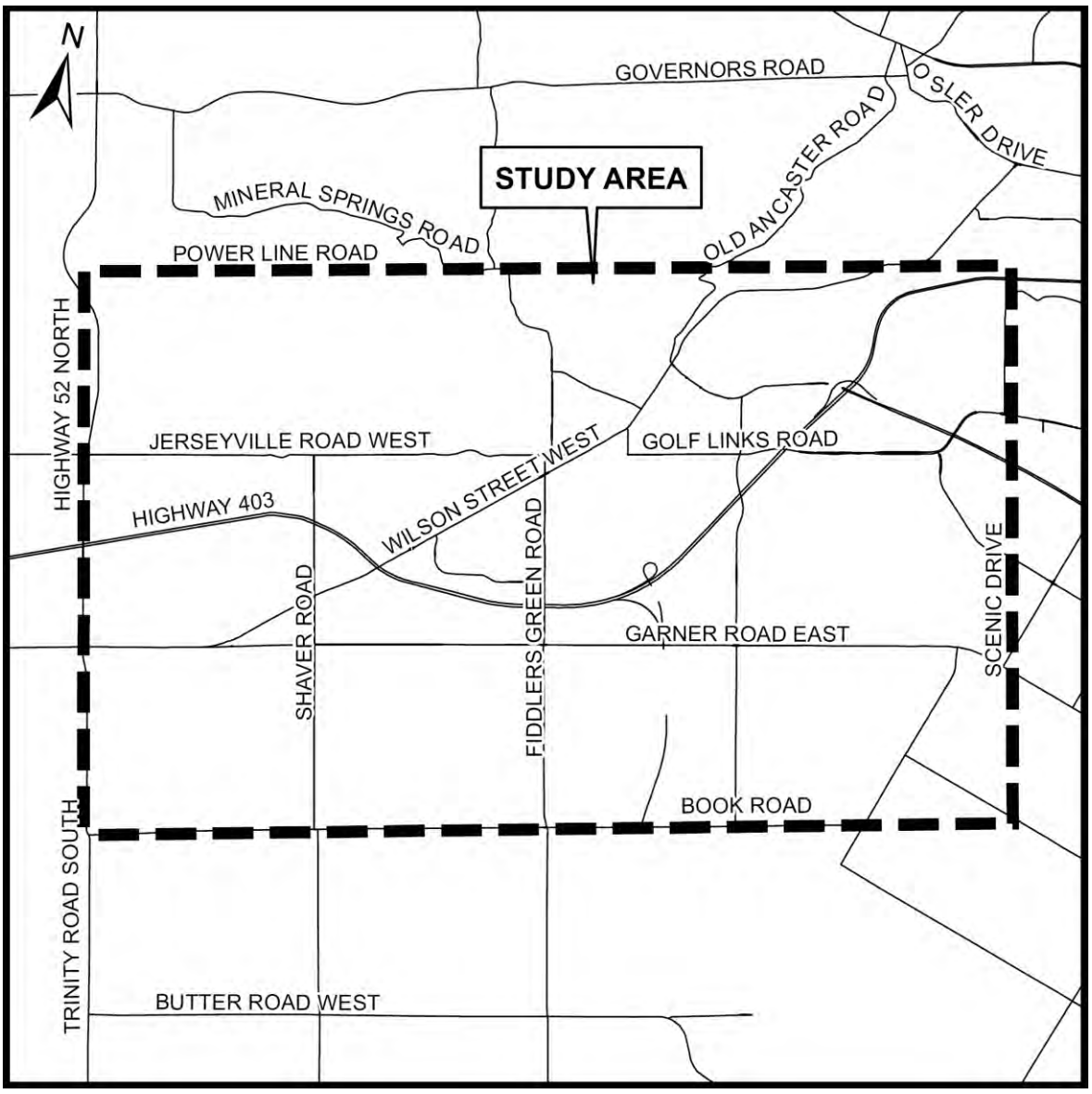


Figure 3-1 Study Area

4 PROBLEM DEFINITION

PD-18 operates as a direct pumped system and does not have floating storage. It is pressurized solely by pumping station HD018, with no redundancy of supply. Furthermore, HD018 is nearing the end of its useful service life and requires substantial rehabilitation.

In 2006, the City completed a Water and Wastewater Master Plan which defined the following water servicing policies:

1. The City of Hamilton shall endeavor to protect its raw water sources.
2. The City of Hamilton shall meet or exceed legislated water quality criteria.
3. The City of Hamilton shall provide potable water at adequate pressure and flow to its customers.
4. The City of Hamilton shall provide reliability and security throughout the water distribution system.
5. The City of Hamilton shall ensure that acceptable water quality is maintained throughout the distribution system.
6. The City of Hamilton shall consider the Ministry of the Environment Guidelines and the Insurance Underwriters Guidelines for establishing the acceptable level of fire flow.
7. The City of Hamilton shall adopt the Ministry of the Environment Guidelines as the minimum acceptable level of water storage.
8. The City of Hamilton shall have an adequate combination of reservoir capacity, pumping capacity, and stand-by power to meet the desired level of service under emergency conditions.
9. The City of Hamilton shall encourage and promote water conservation.
10. The City of Hamilton shall utilize reasonable design and costing criteria for establishing and evaluating servicing scenarios.

Additional storage/redundancy of supply in PD-18 is therefore required to provide adequate pressure and flows to the City's customers (Item 3), to provide reliability and security of supply (Item 4), to maintain acceptable levels of fire flow (Item 6), to satisfy the MOECC's minimum storage requirements (Item 7), and to have the ability to maintain the levels of service under emergency conditions (Item 8).

The City's Master Plan identified the need for 7 ML of additional storage in PD-18 to satisfy the growth requirements within the pressure district to 2031. Given the lack of floating storage in the zone, the Master Plan recommended the implementation of this project in 2011. Low service pressures have been experienced in the system increasing the need for elevated storage in PD-18.

4.1 SECURITY OF WATER SUPPLY

Currently, all of the water supply is dependent on Pumping Station HD018 and Reservoir HDR018. The pumping station is responsible for providing adequate pressure and the combined Maximum Day plus Fire demand for PD-18.

4.2 FUTURE DEMAND REQUIREMENTS

The storage facility would provide additional storage for PD-18 and sub-zones PD-13, PD-14, and PD-15.

The City's design criteria as defined in the 2006 Master Plan are shown in Table 4-1 below.

Table 4-1 Water System Design Criteria

CRITERION	VALUE
Average Day Residential Consumption	360 Lpcd*
Average Day Employment Consumption	260 L/employee/d – 125 employment/ha*
Maximum Day Factor	1.9
Peak Hour Factor	3.0

*Values recommended in Master Plan for individual zone analyses

The projected demands in PD-18, PD-13, PD-14 and PD-15 for the years 2011, 2021 and 2031 are shown in Table 4-2 below.

Table 4-2 Demand Projections for PD-18, PD-13, PD-14 and PD-15

YEAR	AVERAGE DAY DEMANDS (m^3/d)	MAXIMUM DAY DEMANDS (m^3/d)	PEAK HOUR DEMANDS (m^3/d)
2011	9,194	17,468	26,207
2021	11,853	22,520	33,781
2031	12,908	24,525	36,783

* 2011, 2021 and 2031 values taken from 2006 Master Plan Appendix A-1(02) Demand Projection and A-1(03) Water System Capacities.

4.3 DETERMINATION OF STORAGE REQUIREMENTS

Storage within a Pressure District is provided for balancing, fires and emergency storage. The calculation for Required Storage, the City's Master Plan and the MOECC Design Guidelines, is as follows:

$$Storage\ Volume\ Required = A + B + C$$

Where A = *Fire Storage = 15,000 L/min for 3 hrs, B = Balancing Storage = 25% of Maximum Day Demand, and C = Emergency Storage = 25% of (A + B)*

Fire flow requirements are generally estimated based on the latest version of "Water Supply for Public Fire Protection – A Guide to Recommended Practice," prepared by Fire Underwriters Survey. However, for the purposes of determining storage requirements, a fire flow of 250 L/s for 3 hours is assumed.

Table 4-3 Summary of Storage Requirements for Pressure District 18

YEAR	AVG. DAY DEMAND (ML/d)	MAX. DAY DEMAND (ML/d)	FIRE STORAGE (ML) A	BALANCING STORAGE (ML) B	EMERGENCY STORAGE (ML) C	TOTAL STORAGE (ML) A+B+C
2011	9.7	18.5	2.7	4.6	1.8	9.2
2021	12.6	23.9	2.7	6.0	2.2	10.8
2031	13.6	25.9	2.7	6.5	2.3	11.5

The summary of the storage requirements for PD-18 presented in Table 4-3 above indicates that the required storage to meet demand within this planning horizon will be approximately 11.5 ML, which significantly exceeds the storage capacity proposed as part of the 2006 Master Plan (7 ML). The Master Plan report does not mention the justification for the sizing of the various infrastructure components.

However, since this storage requirement was derived using the data provided in the Master Plan, it is assumed that the decision to provide less storage than that recommended by MOECC guidelines and the City's design criteria was discussed and accepted by the City. The rationale for this decision could be the fact that to satisfy the 11.5 ML requirement, two elevated tanks would be required, and given the social and political resistance to siting a tower in Ancaster, two towers were considered unacceptable.

4.4 PROBLEM STATEMENT

The HD018 Pumping Station is equipped with four pumps: two pumps with a capacity of 22,500 m^3/d each, and two pumps each with a capacity of 11,500 m^3/d. The MOECC's *Design Guidelines for Drinking-Water Systems* recommend that the capacity of pumping stations be defined in terms of their firm capacity. Pumping station firm capacity is defined, for systems that do not have adequate floating storage and for which the pumping station is the only source of supply, as the capacity of the station with the two largest pumps out of service. The rationale for this definition is that the pumping station should be designed to be able to maintain supply to the system even during extreme emergency conditions (two pumps failing). Therefore, the firm capacity of the HD018 Pumping Station is 23,000 m^3/d.

Furthermore, the MOECC recommends that booster pumping stations servicing areas without floating storage be sized for a firm capacity able to handle peak hourly flows or maximum day plus fire flows (whichever are higher). The firm capacity of the pumping station is insufficient to meet current maximum day plus fire flow requirements.

Historically low pressure issues have been reported in the high elevation areas of Ancaster (corresponding roughly to areas northwest of Wilson Street). To address these issues, the City has modified the operation of the HD018 Pumping Station such that the pressure in the system is maintained at 667 kPa (96 PSI) on average. However, the design of the existing pumps was based on an operating pressure of 520 kPa (75 PSI). This change in operation philosophy has resulted in increased water recirculation within the station, lower pump efficiency, increased equipment wear and tear, and increased maintenance and energy costs. Overall, the feedback received from the City's operations staff suggests that the pumps at HD018 have been over-worked for the last five to 10 years, and that the pumps are now "old, inefficient, and hard to operate."

Therefore, the problem statement for this Class EA Study can be phrased as follows:

A solution is required to mitigate low pressure issues in the distribution system, to improve the operability and efficiency of the HD018 Garner Road Pumping Station, to provide redundancy and security of supply, and to meet MOECC guidelines and City design standards, while reducing energy consumption and GHG emissions in accordance with the City's Corporate Energy Policy.

5 EXISTING CONDITIONS

5.1 EXISTING INFRASTRUCTURE

As explained above, PD-18 is supplied through PD6 by pumping station HD018 and reservoir HDR18, both located on Garner Road. The zone also feeds sub-zones PD13, PD14, and PD15 through PRV's and provides a secondary feed into PD22 through Sulphur Springs Road. HD018 has an installed capacity of 45,000 m^3/d (520.8 L/s) with four pumps: two duty pumps rated each rated at 22,500 m^3/d and two standby pumps rated at 11,500 m^3/d. HDR18 has a storage capacity of 33,186 m^3 (33.2 ML).

The water distribution system in PD-18 is shown in Figure 5-1.

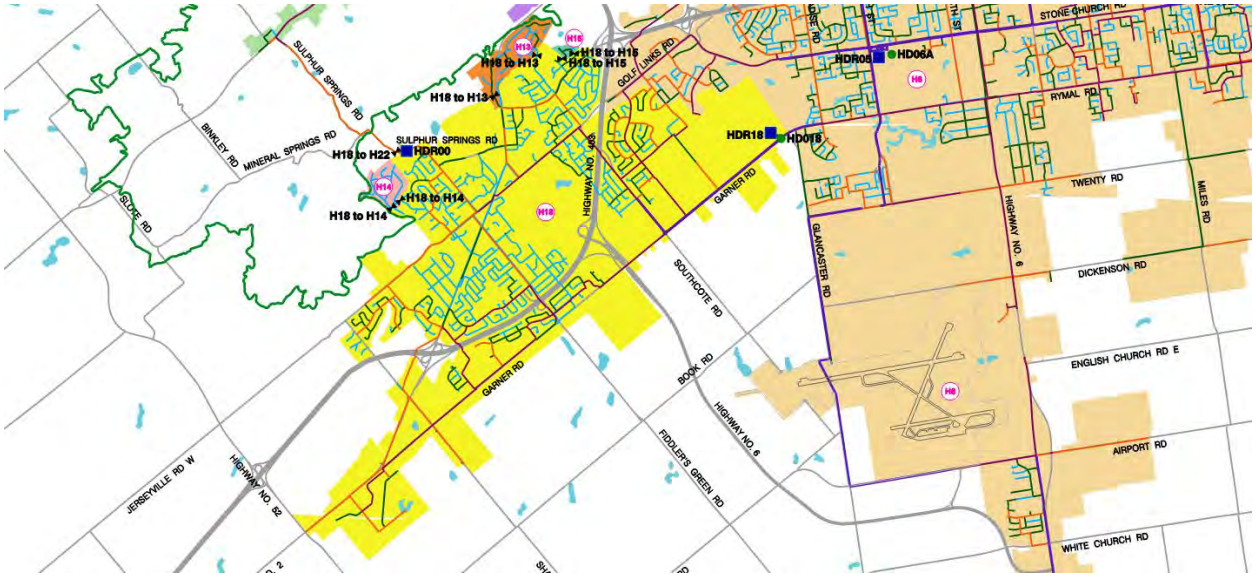


Figure 5-1 Existing Water Supply System PD-18

WSP (previously GENIVAR) completed a condition assessment of the HD018 pumping station in 2009. Although the pumping station was determined to be in average condition, some systems were in need of full rehabilitation or replacement in a 10 year period due to age. This includes equipment control panel replacements, replacement of building mechanical and electrical systems, process equipment replacement and replacement of the majority of instrumentation and control equipment.

5.2 NATURAL HERITAGE FEATURES

The City retained Azimuth Environmental Consulting Inc. to complete an evaluation of the natural heritage features within the Study Area to assist with the selection of the preferred site for the Ancaster elevated water storage facility. In 2012, Azimuth completed a screening of natural heritage features at sites one through six shown in Figure 5-2 below. Of these six sites, Site 5 and the western portion of Site 2 were found to have potential constraints given the mature vegetation that is present and the intermittent surface drainage, and additional investigation is required to determine the impact of siting the elevated tank at any of these sites. The remaining sites reviewed were not found to have any constraints from a natural heritage perspective. Site 7 was added following completion of the initial investigation; therefore, additional study is required.

Additionally, a portion of the Study Area is located within the Niagara Escarpment World Biosphere Reserve, and land use on or near the escarpment is regulated. Specifically, Site 1 (shown in Figure 5-2 below) is located in the regulated area and a permit from the Niagara Escarpment Commission may be required.

5.3 ARCHAEOLOGICAL HERITAGE FEATURES

Archaeological Services Inc. (ASI) was retained by the City to complete a Stage 1 Archaeological Assessment of sites one through six identified in Figure 5-2. The assessment discovered that 204 archaeological sites have been registered within 1 km of the Study Area. However, only Sites 1, 3, 4 and 5 retain archaeological potential. Therefore, ASI recommended that a Stage 2 Archaeological

Assessment be completed at these sites. Site 7 was added following the initial archeological investigation and therefore, additional study is required for this site, and any other that may be added in the future.

5.4 GEOTECHNICAL SITE CONDITIONS

No documentation was provided to WSP on the geotechnical conditions in the Study Area. Additional investigation of the geotechnical conditions at the various sites will need to be completed to determine the load bearing capacity of the soils as this will have an impact on the construction cost of the elevated water tank.

5.5 OTHER CONSTRAINTS

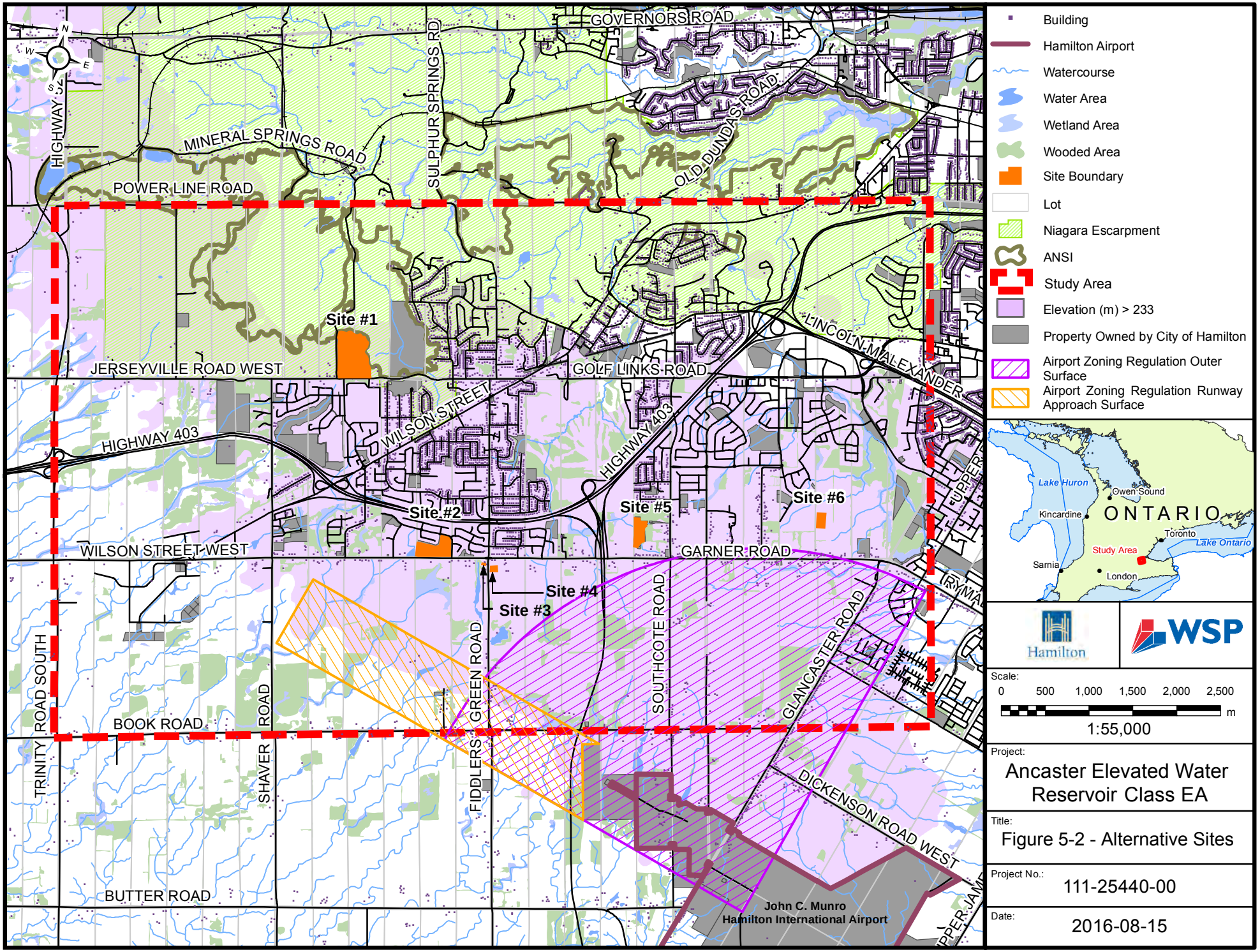
There is a desire to locate the elevated water storage facility in an area where it will not be visible to the majority of the residents in Ancaster. The previous water tower was considered an eyesore by many, and there is strong opposition to having a new elevated water tank constructed.

Due to the proximity of the Study Area to the Hamilton International Airport, if a new elevated water reservoir is constructed NAV CANADA would need to be consulted and potentially permits would be required.

Based on initial consultation with a representative from the airport, we understand that selection of potential sites for an elevated facility near the Airport Zoning Regulation will need to consider the height and elevation of the proposed structure and its proximity to the approach, outer and transitional surfaces of the airport.

Furthermore, we were advised that objects that exceed 45 m above ground level within a 4 km radius of the Airport Reference Point (N43°10’25.2” W79°56’06.2” – at 230 m elevation ASL) usually penetrate the outer surface of the airport. The height restriction for lands located under the runway approach surfaces also varies as the imaginary surface inclines at a ratio of 1 m vertically to 60 m horizontally for a distance extending 15 km horizontally from the runway strip. For example, a 60 m tall structure would need to be farther than 3.6 km away from the airport runway.

These constraints and other constraints are illustrated in Figure 5-2 below.


GOVERNORS ROAD
HIGHWAY 52
MINERAL SPRINGS ROAD
SULPHUR SPRINGS RD
OLD DUNDAS ROAD
POWER LINE ROAD
Site #1
JERSEYVILLE ROAD WEST
GOLF LINKS ROAD
LINCOLN M ALEXANDER
WILSON STREET
HIGHWAY 403
Site #2
Site #5
Site #6
WILSON STREET WEST
GARNER ROAD
Site #4
Site #3
SOUTHCOTE ROAD
GLANCASTER ROAD
GREEN ROAD
ROAD SOUTH
BOOK ROAD
SHAVER ROAD
TRINITY
FIDDLERS
DICKENSON ROAD WEST
BUTTER ROAD
John C. Munro
Hamilton International Airport
Building
Hamilton Airport
Watercourse
Water Area
Wetland Area
Wooded Area
Site Boundary
Lot
Niagara Escarpment
ANSI
Study Area
Elevation (m) > 233
Property Owned by City of Hamilton
Airport Zoning Regulation Outer Surface
Airport Zoning Regulation Runway Approach Surface
Lake Huron
Owen Sound
Kincardine
ONTARIO
Toronto
Lake Ontario
Study Area
Sarnia
London
Hamilton
WSP
Scale:
0 500 1,000 1,500 2,000 2,500 m
1:55,000
Project:
Ancaster Elevated Water Reservoir Class EA
Title:
Figure 5-2 - Alternative Sites
Project No.:
111-25440-00
Date:
2016-08-15

TECHNICAL MEMORANDUM #2

TO: City of Hamilton Technical Committee

FROM: WSP

SUBJECT: **Evaluation of Alternative Servicing Solutions – Ancaster Elevated Water Reservoir Class EA**

DATE: **February 6, 2017 (Revision)**

1 INTRODUCTION

The City of Hamilton is planning to construct a new elevated water storage facility to provide floating storage for the Pressure District 18 (PD-18) in Ancaster. The need for the elevated water storage facility was documented in the City of Hamilton's Water and Wastewater Master Plan Class Environmental Assessment Report (November 2006), which indicated an unbalanced water supply and limited ability to adequately service future system demands in the area. The project is identified as a Schedule 'B' project under the Municipal Class Environmental Assessment (EA) Process. This Class EA will include an evaluation of environmental, social and cultural conditions as well as an assessment of the technical feasibility of the alternative water storage solutions.

This technical memorandum presents the results of an evaluation of alternatives to address the problem identified as part of the ongoing Class EA. The information presented in this document will be incorporated into Phase 2 of the Class Environmental Assessment process.

2 SYSTEM OVERVIEW

Pressure District (PD) 18 is situated in Ancaster, in the southwest portion of the City of Hamilton. It is hydraulically a closed zone with no floating storage. Ground elevations in the serviced areas of the zone range between 220 m to 255 m. The zone is supplied through PD-6 by HD018 Pumping Station and HDR18 Reservoir, both located on Garner Road. The zone also feeds sub-zones PD-13, PD-14, and PD-15 through pressure reducing valves (PRVs) and provides a secondary feed into PD-22 through Sulphur Springs Road.

Pumping Station HD018 has four centrifugal pumps:

- Pump 1 rated at 11.5 ML/day, constant speed (discharge pressure regulated by PRV's)
- Pump 2 rated at 22.5 ML/day, constant speed (discharge pressure regulated by PRV's)
- Pump 3 rated at 22.5 ML/day, variable speed. In practice, however, it is run as a constant speed pump
- Pump 4 rated at 11.5 ML/day, constant speed (discharge pressure regulated by PRV's)

A design project to upgrade the pumping station is currently ongoing. Based on the most recent information provided by the City, a feasibility assessment was completed. The assessment concluded that it would not be feasible to upgrade HD018 within the existing pumping station footprint and instead, a new HD018 would be constructed on City property to the east of the reservoir. The new HD018 would have an upgraded capacity and all new process mechanical equipment, including pumps (AECOM, 2015).

The 2006 Master Plan recommended the construction of a new 500 mm watermain along Garner Road parallel to the existing 400 mm feeding the southern portion of Ancaster. This project is currently in the design phase. Once, constructed this watermain would reduce headloss and increase the capacity of the distribution system.

Figure 2-1 shows the existing water infrastructure in PD-18, and the sub-zones PD-13, PD-14 and PD-15. For the purposes of this analysis, the requirements for PD-22 were not taken into consideration. Only the pumping and storage requirements for PD-18 and the sub-zones PD-13, PD-14 and PD-15 were considered.

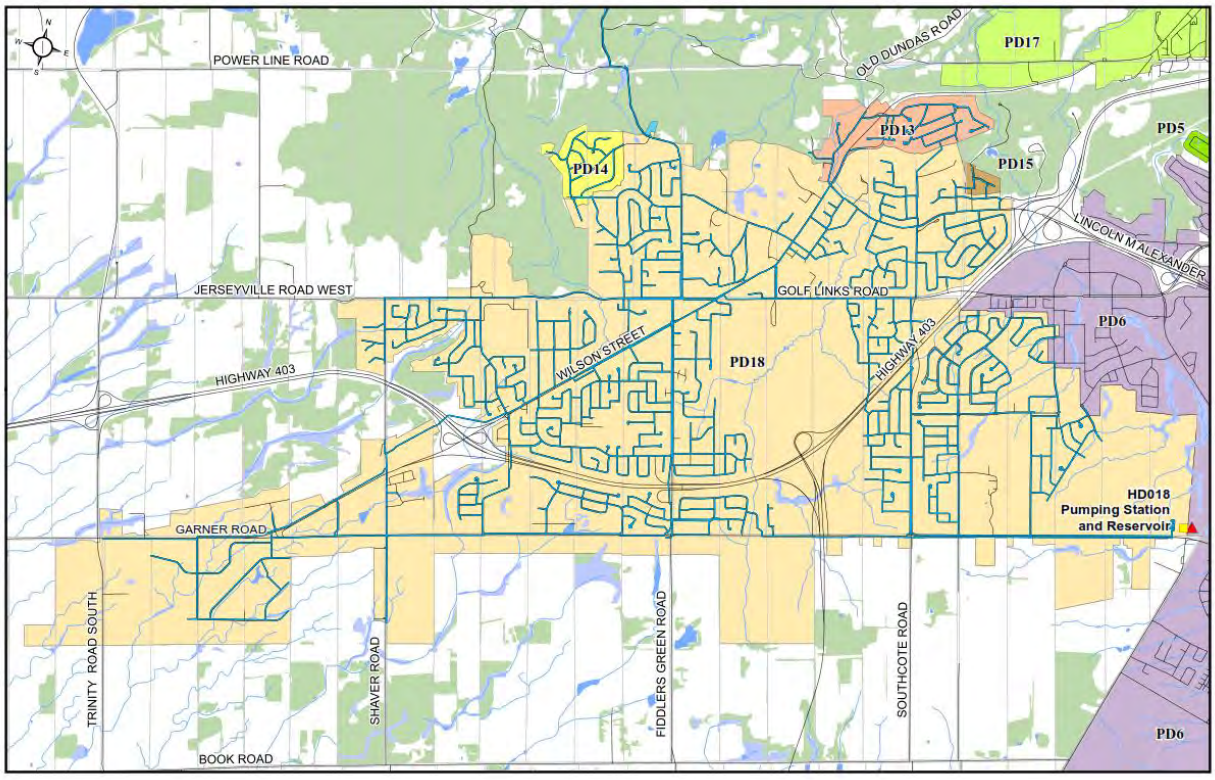


Figure 2-1 Ancaster Water Distribution System

3 DESIGN CRITERIA AND FUTURE DEMAND REQUIREMENTS

The 2006 Master Plan developed demand projections for the Study Area, summarized in the table below (KMK Consultants Ltd. , 2006).

Table 3-1 Water Demand Projections for PD-18, PD-13, PD-14 and PD-15

YEAR	AVERAGE DAY DEMANDS (m^3/d)	MAXIMUM DAY DEMANDS (m^3/d)	PEAK HOUR DEMANDS (m^3/d)
2011*	9,194	17,468	26,207
2021	11,853	22,520	33,781
2031	12,908	24,525	36,783

* 2011, 2021 and 2031 values taken from 2006 Master Plan Appendix A-1(02) Demand Projection and A-1(03) Water System Capacities.

The 2006 Master Plan indicates that the fire flow requirements used for the evaluation of alternatives are based on MOECC Guidelines. However, the MOECC Guidelines refer to the requirements set by the Fire Underwriters Survey (FUS) (Water Supply for Public Fire Protection, 1999). Fire flow requirements vary depending on building construction type, size, occupancy, sprinkler protection and proximity to adjacent buildings.

For groupings of detached one-family and small two-family dwellings not exceeding two stories in height, Fire Underwriters recommend a fire flow of 3,000 L/min for building separations of 10.1 m to 30 m, and 4,000 L/min for separations of 3 m to 10 m. For buildings with less than 3 m exposure distance, a 6,000 L/min fire flow is recommended. Therefore, the residential areas in Ancaster would potentially require fire flows up to 6,000 L/min (100 L/s) for 2 hours.

Commercial, institutional and industrial building fire flow requirements should be determined on an individual basis. However, for the purposes of this evaluation, a very high level survey of the commercial and industrial buildings in the Ancaster Business Park and Smart Centre was conducted to estimate the corresponding fire flow requirements per the FUS. Through observation the following approximate breakdown of building types was identified:

- 5% Office buildings (2-3 stories)
- 80% office buildings in front and manufacturing/warehouse in the back (cabinets, food production, steel shops, etc.)
- 5% warehouse buildings
- 5% recreational buildings (gymnastics, educational, banquet hall, karate studio and dance studio)
- 5% other (e.g. there is a local union hall in the area)

It was assumed for the purposes of this exercise that all of these buildings have fire suppression systems, and are of non-combustible construction (i.e. unprotected metal structural components, masonry or metal walls).

The formula suggested by the FUS to determine fire flow requirements can be expressed as follows:

$$F = 220 \cdot C \cdot \sqrt{A} \cdot (R_O + R_P + R_E)$$

Where F = Required fire flow in L/min (rounded up to the nearest 1,000),

C = Coefficient related to the type of construction (a factor of 0.8 is applied to non-combustible construction)

A = Total floor area in square meters (including all storeys) of the building being considered

R_O= Coefficient accounting for the fire hazard associated with different occupancy types. The majority of the buildings in the study area can be considered low hazard so a reduction factor of 0.85 can be applied.

R_P= Reduction coefficient to account for whether the building is equipped with automatic sprinkler protection.

R_E= Coefficient which considers the effect the proximity to other buildings would have on the risk of the fire spreading. The value of this coefficient ranges from 1.05 for buildings separations ranging from 30.1 to 45 m, to 1.25 for buildings with separations between 0 to 3 m. A coefficient value of 1 is applied if the nearest building is over 45 m away.

To determine the fire flow requirements for the pressure district, the largest manufacturing facility in the Business Park was considered. The building under consideration is shown in Figure 3-1. Based on the Building Data Matrix, the gross area of the building is 13,836 m^2. As noted above, a non-combustible construction is assumed corresponding to a C factor of 0.8. Based on input from the City, it is assumed that the building has a low fire hazard, and can be classified as "Limited Combustible". Therefore an R_O value of -0.15 was assigned. The building was assumed to be equipped with a fire sprinkler system compliant with NFPA 13. This reduces the fire flow requirements and thus a value of -0.3 was assigned for R_P. Lastly, given that the nearest building is located over 45 m away (the building to the west is located roughly 63 m away), then exposure is considered to not have an impact on increasing the risk of a fire. Thus, R_E is given a value of 0. Using the above formula, the resulting fire flow value is 12,000 L/min or 200 L/s. From the FUS table, a fire flow of 12,000 L/min is associated with a duration of 2.5 hours.

Thus, for the purposes of this analysis a fire flow requirement of 200 L/s (17,280 m^3/d) will be used to determine supply requirements for the Ancaster area.

Figure 3-1 Building Considered for Fire Flow Calculation

The demands used for the evaluation of alternatives are summarized below.

Table 3-2 Water Demand Design Criteria for Evaluation of Alternatives

YEAR	MAXIMUM DAY DEMANDS (m^3/d)*	PEAK HOUR DEMANDS (m^3/d)*	MAXIMUM DAY + FIRE (m^3/d)**
2011	17,468	26,207	34,748
2021	22,520	33,781	39,800
2031	24,525	36,783	41,805

* 2011, 2021 and 2031 values taken from 2006 Master Plan Appendix A-1(02) Demand Projection and A-1(03) Water System Capacities.

** Maximum day plus fire flows were calculated using the estimated fire flow of 200 L/s (17,280 m^3/d)

4 PROBLEM STATEMENT

As noted above, the HD018 Pumping Station is equipped with four pumps: two pumps with a capacity of 22,500 m^3/d each, and two pumps each with a capacity of 11,500 m^3/d. The MOECC's *Design Guidelines for Drinking-Water Systems* recommends that the capacity of pumping stations be defined in terms of their firm capacity. Pumping station firm capacity is defined, for systems that do not have adequate floating storage and for which the pumping station is the only source of supply, as the capacity of the station with the two largest pumps out of service. The rationale for this definition is that the pumping station should be designed to be able to maintain supply to the system even during extreme emergency conditions (two pumps failing). Therefore, the firm capacity of the HD018 Pumping Station is 23,000 m^3/d.

Furthermore, the MOECC recommends that booster pumping stations servicing areas without floating storage be sized for a firm capacity able to handle peak hourly flows or maximum day plus fire flows (whichever are higher). The firm capacity of the pumping station is insufficient to meet current maximum day plus fire requirements (see Table 3-2).

Furthermore, historically low pressure issues have been reported in the high elevation areas of Ancaster (corresponding roughly to areas northwest of Wilson Street). To address these issues, the City has modified the operation of the HD018 Pumping Station such that the pressure in the system is maintained at 667 kPa (96 PSI) on average. However, the design of the existing pumps was based on an operating pressure of 520 kPa (75 PSI). This change in operation has resulted in increased water recirculation within the station, lower pump efficiency, increased equipment wear and tear, and increased maintenance and energy costs. Overall, the feedback received from the City's operations staff suggests that the pumps at HD018 have been over-worked for the last five to 10 years, and that the pumps are now "old, inefficient, and hard to operate."

Therefore, a solution is required to mitigate low pressure issues in Ancaster , to improve the operability and efficiency of the HD018 Garner Road Pumping Station, to provide redundancy and security of supply, and to meet MOECC guidelines and City design standards, while reducing energy consumption and GHG emissions in accordance with the City's Corporate Energy Policy.

5 ALTERNATIVE SOLUTIONS

The following alternatives have been identified to address the low pressure issues in the distribution system servicing the study area, to improve the operability and efficiency of the HD018 Pumping Station, to provide redundancy and security of supply, and to meet MOECC guidelines and City design standards.

0. Do Nothing
1. Increase the Capacity of HD018 Garner Road Pumping Station
2. Construct a New Elevated Storage Reservoir in Ancaster
3. Construct a New Booster HD018 Garner Road Pumping Station and Increase the Capacity of HD018 Pumping Station
4. Construct a New Booster HD018 Garner Road Pumping Station and In-ground Reservoir and Increase the Capacity of HD018 Pumping Station

5.1 DO NOTHING ALTERNATIVE

This option involves maintaining the current mode of operation at the Garner Road HD018 Pumping Station. This means that the distribution system would have to be operated at an average pressure of 667 kPa (96 PSI) to ensure that the pressure at higher elevation points is within the acceptable range required by the MOECC. However, the station was originally designed for an operating pressure of 520 kPa (75 PSI). This means that the pumps need more energy to pump at the same rates given the higher pressure requirements.

Furthermore, based on feedback obtained from operators, several issues have been identified affecting the current pumping station operation, and which would not be addressed as part of the "Do Nothing" alternative:

- To maintain system pressure, pumps are run to recirculate about 5 ML/day. With longer recirculation, the water becomes stagnant and there are issues maintaining chlorine residuals.
- The pumps are old, inefficient, and hard to operate.
- During hot summers, all four pumps need to be operated at the same time to meet the demand at the higher discharge pressure settings.
- Pump 3 has a VFD (variable frequency drive) to maintain the PRV pressure demand to some areas of Ancaster with low pressure. However, operators have difficulties to get Pump 3 to work in this way.
- The pumping station is visited almost daily by an operator since there is a manual valve connecting from PD-6 that needs to be operated every day.
- There are issues with the standby generator. Once the generator is in operation, manual switchover to the main power is required once hydro supply is restored.
- The station "cannot continue to operate this way as it is on its last legs."

Upgrades to the existing pumping station are currently planned. However, for the evaluation of the "Do Nothing" approach it is assumed that these upgrades would only involve replacing the pumps in the existing HD018 building and not require construction of a new pumping station.

It is assumed that these upgrades would be completed within the next five years. Furthermore, it is assumed that these upgrades would ***not*** involve an increase to the capacity of the station. Therefore, the firm capacity of the pumping station would continue to be insufficient per MOECC Guidelines.

CAPITAL COST EVALUATION

To be able to compare between alternatives, it is important to consider not only the initial capital cost, but also the cost of upgrades/replacement required over the long term. For the purposes of this evaluation, a 60 year planning horizon was used. This was considered appropriate as it encompasses the lifecycle of

the pumping station assets and is sufficiently long to clearly differentiate the differences in operational costs between the options. However, a sensitivity analysis was conducted by evaluating the effect using a shorter (40 years) and longer (100 years) evaluation period. The results of this analysis are included in **Appendix F**.

Process mechanical equipment has a typical expected service life of 40 years. Without conducting a detailed analysis, it is not possible to accurately estimate the impact the current operation approach has had on the condition and useful life of the pumping equipment at the station. However, given that the station is currently operated to maintain a higher pressure than that for which it was designed, this is expected to reduce the useful life of the infrastructure. For the purposes of this evaluation, it is assumed that the useful life of the equipment continuously operating in conditions different to those for which the station was designed, would be 30 years. Therefore, it is assumed that equipment refurbishment at the Garner Road Pumping Station would be required every 30 years.

In 2009, WSP (formerly GENIVAR) completed a condition assessment of the HD018 Pumping Station (GENIVAR, 2009). The recommendations of the assessment included a list of upgrades and rehabilitation requirements, and provided estimates of asset replacement costs. The replacement costs recommended in the condition assessment report were used to estimate the capital costs that would be associated with the "Do Nothing" Alternative, and to determine future refurbishment costs (at the end of the service life of the equipment). The corresponding capital cost estimates for the process mechanical equipment at the station is $1,000,000 (in 2015 dollars).

The capital costs over the next 60 years for this alternative are estimated assuming initial refurbishment of the pumping station occurs in 2016. For this analysis, it is assumed that construction costs would increase by 3% annually. To estimate the net present value a discount rate of 4.5% was adopted. These values are consistent with those used for the evaluation of other capital projects in the City (e.g. the Biosolids P3 Project).

Table 5-1 Capital Cost Estimates – "Do Nothing"

ITEM	YEAR	COST (NPV)
Refurbishment of HD018 Pumping Station	2016	$1,030,000
Refurbishment of HD018 Pumping Station	2046	$638,777
Refurbishment of HD018 Pumping Station	2076	$413,978
Total Capital Cost – Do Nothing Alternative		**$2,082,754**

OPERATIONS COST EVALUATION

Based on the City's recent experience, it is expected that the HD018 Pumping Station would need to be visited by an operator every day. Thus, to estimate the operational costs for this alternative, two staff hours per day, five days a week, at $85/hr (to include staff and vehicle costs) were assumed. It is assumed that the hourly costs would increase at a rate of 2% annually (this is consistent with the value used for the Biosolids P3 Project). A planning horizon of 60 years was assumed. However, a sensitivity analysis was conducted by evaluating the effect using a shorter (40 years) and longer (100 years) evaluation period. The results of this analysis are included in **Appendix F**.

The estimated net present value of the operations cost over the 60-year period is **$1,284,593**.

ENERGY COST EVALUATION

To assist with the evaluation, the City provided historical data on the energy costs at the HD018 Pumping Station. These are shown in Table 5-2 below.

Table 5-2 HD018 PS Energy Costs (2012-2014)

YEAR	TOTAL DISCHARGED FLOWS (m^3)	TOTAL RECIRCULATED FLOWS (m^3)	TOTAL VOLUME PUMPED (m^3)	ELECTRICITY COST	AVERAGE COST PER m^3
2012	2,182,987	744,140	2,927,127	$249,342	$0.09/$m^3$
2013	1,992,008	1,505,932	3,497,940	$109,523*	$0.03/$m^3$
2014	2,048,306	402,708	2,451,014	$241,918	$0.10/$m^3$

* The 2013 electricity costs is thought to be incorrect given that the volume of flows pumped was greater than that in 2012 and 2014.

Based on the values above, it is worth noting the following:

- On average the total annual energy costs were over $200,000.
- The recirculated flows within the station are on average 30% of the total flows pumped. In other words, only 70% of the total amount pumped was conveyed to the distribution system.
- The average cost per m^3 pumped (ignoring the 2013 value) was $0.09/$m^3$.

To estimate the future energy costs (and to facilitate comparison with other alternatives) consideration was given to the fact that electricity charges depend on the time of use. Off-peak rates are lower than mid-peak and on-peak rates. In Ontario, off-peak rates are charged from 7 PM to 7 AM. In the summer, mid-peak rates are charged from 7 AM to 11 AM and from 5 PM to 7 PM, while on-peak rates are charged from 11 AM to 5 PM. In the winter, these times are slightly different. Ontario electricity rates are $0.077/kWh, $0.114/kWh, and $0.14/kWh for off-peak, mid-peak and on-peak periods, respectively (Ontario Energy Board Electricity Prices: http://www.ontarioenergyboard.ca/OEB/Consumers/Electricity/Electricity+Prices#tou).

Without floating storage, water demands in the system are satisfied by pumping. Figure 5-1 shows a typical diurnal demand curve (based on data hourly flow data for HD018 in 2014). The peak demands occur during mid-peak and on-peak hours. The electricity used to satisfy the pumping requirements during these times would have a higher cost, due to higher on-peak electricity charges at these times.

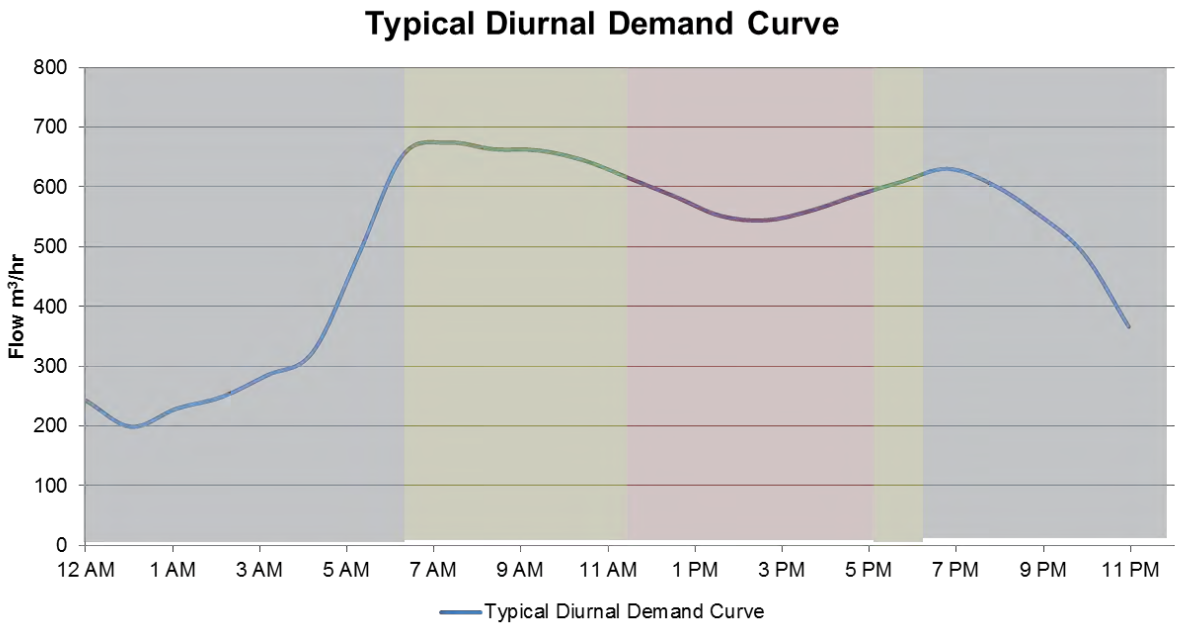


Figure 5-1 Diurnal Demand Curve

For the "Do Nothing" alternative, the pumping station would have to satisfy the demands and maintain the pressure in the system. To estimate future energy consumption corresponding to this alternative, pumped flow can be converted to power consumption by the following formula:

$$Power = \frac{Flow \times Pressure}{Pump\ Efficiency}$$

In 2012, the City retained Hydratek to conduct an assessment of the efficiency of Pumps 3 and 4 at HD018. The test reports are included in **Appendix A**. The assessment revealed that the tested pump efficiency was lower than the rated efficiency of the pump (indicating deterioration of the pump), and that the pumps were typically operating at a lower efficiency point due to them being operated at a higher pressure than originally intended. For example, for Pump 3, the efficiency at the rated best efficiency point is 84%. However, the measured efficiency at the typical operating point is 68%. Given that the new operating pressure is 667 kPa, from the pump curves developed by Hydratek, the resulting efficiency would be less than 60%.

Thus, for the purposes of this evaluation a pump efficiency value of 60% was assumed. It is assumed that the diurnal pattern shown in Figure 5-1 would remain constant throughout the planning horizon, while average demands would increase according to the projections in Table 3-2.

To account for recirculation within the pumping station, it is assumed that the pumping rates would be 30% higher than the actual demands. It is also assumed that the electricity rates and other costs would increase at a rate of 6% annually. A sensitivity analysis was conducted by evaluating the effect using an energy rate increase of 7%. The results of this analysis are included in **Appendix F**.

The corresponding estimated net present value energy costs for a 60-year planning horizon are **$19,344,659**. **Appendix B** includes the spreadsheet used for the evaluation of energy consumption costs. **Appendix F** shows the results of a sensitivity analysis on the effect of using shorter (40 years) and longer (100 years) evaluation periods.

The above approach is a simplification as it does not consider maximum daily flows, peak hour conditions, or fire conditions. Furthermore, it does not account for the impact recirculation has on low chlorine residual issues. However, this approach allows a general understanding of the energy costs and allows comparison with other alternatives.

LIFECYCLE COST EVALUATION

A summary of all the costs associated with the "Do Nothing" Alternative is included below.

Table 5-3 Net Present Value (NPV) of Lifecycle Costs – "Do Nothing"

ITEM	COST (NPV 2016)
Total PV Capital Costs	$2,082,754
Total PV Operations Costs	$1,284,593
Total PV Energy Costs	$19,344,659
Total PV Costs – Do Nothing	**$22,712,006**

It should be noted that the above costs do not include costs related to the City's inability to provide adequate fire protection to the Study Area.

GREENHOUSE GAS EMISSIONS EVALUATION

The total energy consumption associated with this alternative was multiplied by a factor of 0.110 $kgCO_2/kWh$ to estimate the amount of GHG emissions over the 60-year planning horizon. The total estimated GHG emissions resulting from this option are **12,613** tonnes of CO_2.

This is equivalent to the CO_2 emissions that 2,685 cars would produce over the 60 year period based on 4.7 tonnesCO_2/car/year (U.S. Environmental Protection Agency, 2015).

5.2 ALTERNATIVE 1 – GARNER ROAD HD018 PUMPING STATION REPLACEMENT ONLY

As noted above, there is a design project ongoing to upgrade the Garner Road HD018 Pumping Station. The feasibility review (AECOM, 2015) indicated that upgrade of the existing pumping station would only be feasible if an elevated water reservoir is constructed in PD18. Without an elevated water reservoir, the station would need to be replaced with a new HD018.

Under Alternative 1, the scope of the project would involve constructing a new pumping station adjacent to the reservoir and increasing pumping capacity to achieve a firm capacity (with the two largest pumps out of service) of 48,000 m^3/d at the higher system pressure of 667 kPa. Furthermore, the upgrades would include modifications to the existing inground reservoir as follows (AECOM, 2015):

- Twinning of feed pipes directly from PD 6 to the reservoir with bypass pipes to directly feed the pumping station
- Twinning of pipes from the HDR18 Reservoir to the pumping station
- Installation of separate feed and suction pipes in each reservoir cell
- Construction of two reservoir valve houses designated for each reservoir cell with separate feed and draw pipes
- Replacement of pipes and valves in reservoir valve house and reservoir

CAPITAL COST EVALUATION

Under Alternative 1, the existing pumping station would be demolished after constructing and commissioning the new HD018 pumping station adjacent to the reservoir.

AECOM has been retained by the City to complete the design of the HD018 Pumping Station replacement and reservoir upgrades. AECOM recently completed an independent analysis on alternatives to upgrade the pumping station, and developed detailed cost evaluations (AECOM, 2015). These values were adopted for our evaluation of alternatives (**See Appendix C**).

The estimated capital cost to replace the station is **$20,035,796** (2015 dollars).

It can be assumed that once the new station is commissioned, the process mechanical equipment would have a service life of 40 years, after which it would require refurbishment. The cost of refurbishment of the pumping equipment at the end of its service life is estimated at $5,000,000 (2015 dollars).

It is assumed that the initial upgrades of the pumping station are completed in 2016. A 3% annual increase in construction costs and a discount rate of 4.5% are assumed for the analysis. The capital costs over the next 60 years for this alternative are summarized in the table below.

Table 5-4 Capital Cost Estimates – Alternative 1

ITEM	YEAR	COST (NPV 2016)
Replace HD018 Pumping Station and Increase Pumping Capacity	2016	$20,636,870
Refurbishment of HD018 Pumping Station	2056	$2,763,938
Total NPV Capital Cost – Alternative 1		$23,400,808

A sensitivity analysis was conducted by evaluating the effect using a shorter (40 years) and longer (100 years) evaluation period. The results of this analysis are included in **Appendix F**.

OPERATIONS COST EVALUATION

Under Alternative 1, the pumping station would be upgraded to allow automatic operation. Based on the City's operating practice, it is expected that the upgraded pumping station would need to be visited by an operator once a week, at 2 hours per visit. Thus, to estimate the operational costs for this alternative, 8 staff hours per month at $85/hr (to include vehicle costs) were assumed. It is assumed that the hourly costs would increase at the rate of 2% annually. A planning horizon of 60 years was assumed. The estimated net present value of the operations cost over the 60-year period is **$256,919**.

ENERGY COST EVALUATION

To estimate the energy costs for Alternative 1 a similar approach to that followed for the "Do Nothing" alternative was adopted. The diurnal flow patterns for the average day flow were determined and projected for the planning horizon. These flows correspond to the pumping requirements of the station. Under Alternative 1 however, the new pumps would have an increased efficiency (the pumps would be selected such that their best efficiency point matches the flow and pressure requirements). Thus, for the purpose of this calculation a pump efficiency of 80% was assumed.

The upgrades would also reduce the amount of recirculation within the station relative to existing conditions. For the energy cost evaluation, it is assumed that the recirculation rates would be 5% of the

actual demands. It is also assumed that the electricity rates and other costs would increase at a rate of 6% annually.

The estimated net present value energy costs for the 60-year planning horizon for Alternative 1 are **$11,718,399**. **Appendix B** includes the spreadsheet used for the evaluation of energy consumption costs.

LIFECYCLE COST EVALUATION

A summary of all the costs associated with Alternative 1 is included below.

Table 5-5 Net Present Value (NPV) of Lifecycle Costs – Alternative 1

ITEM	COST (NPV 2016)
Total PV Capital Costs	$23,400,808
Total PV Operations Costs	$256,919
Total PV Energy Costs	$11,718,399
Total PV Costs – Alternative 1	**$35,376,126**

A sensitivity analysis evaluating the effect of shorter and longer planning horizons as well as the effect of greater annual energy increases is included in **Appendix F**.

GREENHOUSE GAS EMISSIONS EVALUATION

The total energy consumption associated with this alternative was multiplied by a factor of 0.110 $kgCO_2/kWh$ to estimate the amount of GHG emissions over the 60-year planning horizon. The total estimated GHG emissions resulting from this option are **7,515** tonnes of CO_2, which is 40% less than the Do Nothing Alternative. In other words, the emissions resulting from Alternative 1 are equivalent to reducing the number of cars on the road by 1,065 relative to the "Do Nothing" alternative (U.S. Environmental Protection Agency, 2015).

5.3 ALTERNATIVE 2 – UPGRADED GARNER ROAD HD018 PS WITH ELEVATED WATER RESERVOIR

This alternative involves the construction of an elevated storage reservoir to provide floating storage for pressure districts PD-18, PD-13, PD-14 and PD-15. The elevated storage facility is meant to provide equalization, emergency storage, and security of supply and to alleviate low pressure issues in the higher elevation areas within Ancaster.

With this option, the system would be operated such that the elevated storage reservoir would maintain adequate system pressures during normal conditions, and the pumps at the HD018 Pumping Station would be started when the water level of the elevated reservoir drops to certain preset levels. The elevated storage would be able to maintain adequate pressures across the system, and would allow the system to be optimized to minimize energy costs. Since the elevated storage reservoir would maintain the pressure in the system, HD018 would be operated at their design operating point (520 kPa) rather than at the pressure at which they are currently being operated (667 kPa). This means the pumps would operate more efficiently.

Upgrades to HD018 Pumping Station may involve the following modifications (AECOM, 2015):

- Replacement of pumps with two 12 ML/d constant speed pumps, one variable speed 24 ML/d pumps, and one constant speed 24ML/d.
- Replacement of all other process, mechanical and electrical upgrades

- Installation of an additional reservoir feed pipe with altitude valve within the pumping station
- Installation of a bypass check valve from the station suction header to discharge header
- Twinning of pipes between the pumping station and HDR18 Reservoir
- Installation of separate feed and suction pipes in each reservoir cell
- Construction of two reservoir valve houses designated for each reservoir cell with separate feed and draw pipes
- Replacement of pipes and valves in reservoir valve house and reservoir

Elevated storage is the recommended storage approach by the MOECC, as it is the most reliable method to ensure supply during emergency conditions and to reduce pumping costs. **Appendix D** includes a list of some recent elevated storage reservoir installations and some information on capital costs provided by Landmark Structures, a company specializing in the construction of elevated water storage tanks.

Section 8.4.2 of the MOECC guidelines recommend that the storage capacity requirement for water distribution systems providing fire protection be determined as follows:

$$Total\ Treated\ Water\ Storage = A + B + C$$

Where A = Fire Storage,

B = Equalization Storage (25% of maximum day demand)

C = Emergency Storage (25% of the sum of A and B)

It should be noted that the above calculation is applied to determine the storage needs for a water system capable of satisfying only the maximum day demand.

The forecasted maximum day demands for 2021 and 2031 are 22,520 m^3/d and 24,525 m^3/d, respectively (Table 3-2). The proposed firm capacity of the HD018 Pumping Station of 24,000 m^3/d (with two largest pumps out of service) would be sufficient to meet the maximum day demands forecasted to before 2031.

However, as previously noted, with the construction of an elevated storage reservoir, the firm capacity of the HD018 Pumping Station would be defined as that with the largest pump out of service. In that case, the station would be rated for 48,000 m^3/d, which would be sufficient to supply not only maximum day flows but also maximum day plus fire flows to 2031 (Refer to Table 3-2 above). Therefore, the system could be designed such that all fire flows would be supplied by the station, with no allowance for fire storage in the elevated storage facility. It should be noted however that the system would be vulnerable during maximum day plus fire flow conditions if there is a complete failure of the pumping station (e.g. standby power failure during a utility power outage).

The total capacity required for the elevated storage reservoir under this approach would be **7.66 ML**. This is illustrated in Table 5-6.

Table 5-6 Elevated Storage Requirements for PD-18, PD-13, PD-14 and PD-15

YEAR	MAX. DAY DEMAND (ML/d)	FIRE STORAGE (ML) A	BALANCING STORAGE (ML) B	EMERGENCY STORAGE (ML) C	TOTAL STORAGE (ML) A+B+C
2031	24.53	0	6.13	1.53	7.66

A rechlorination system would be installed in the elevated storage reservoir to allow operations staff to boost the chlorine residual if required.

The elevated storage reservoir would require an area of approximately 1 acre. A typical site configuration is shown in **Appendix D** and a potential location for the elevated storage reservoir is shown in Figure 5-2. Additional sites will need to be evaluated as part of the Class EA process.

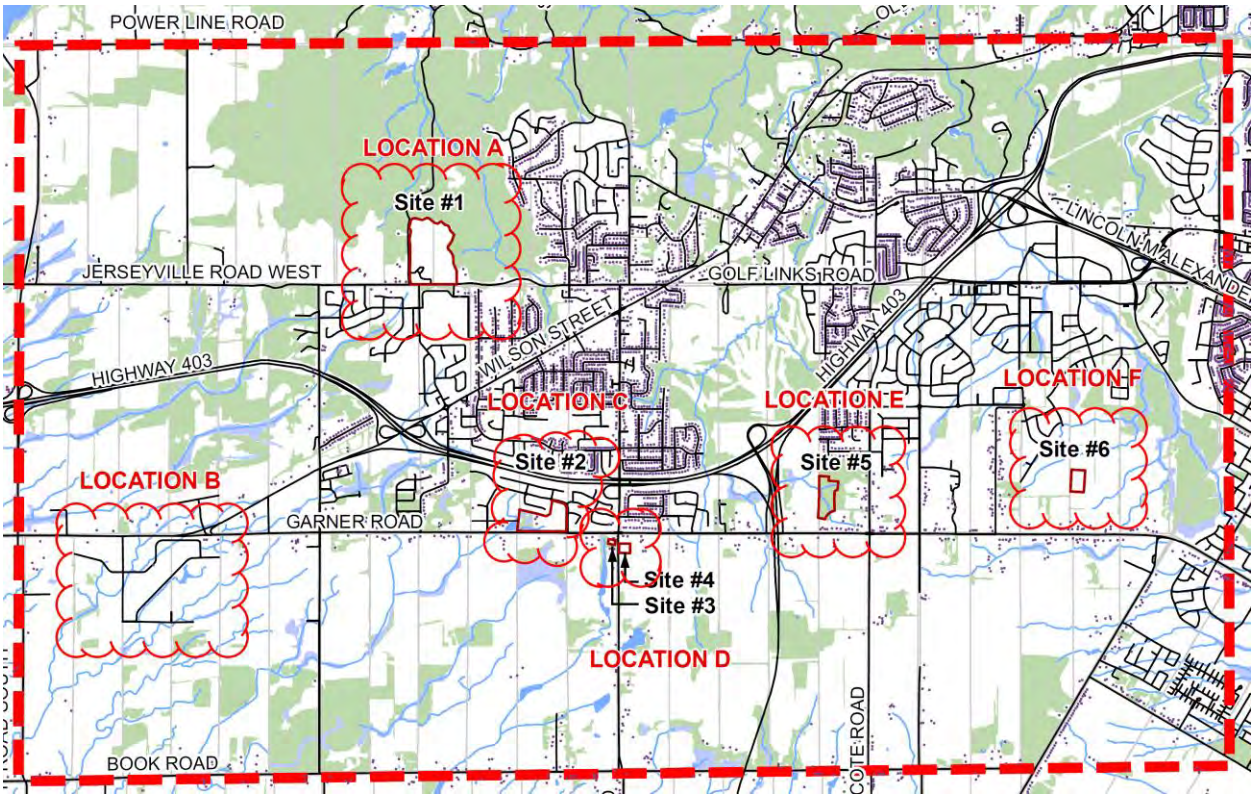


Figure 5-2 Potential Locations for New Elevated Storage Reservoir

CAPITAL COST EVALUATION

A cost estimate of the capital costs for the elevated tank is shown in Table 5-7. These values were provided by the City and were derived based on the cost per ML of $723,636/ML of the Waterdown Elevated Reservoir (8.25 ML capacity at a cost of $5.97 million). It should be noted that these costs may not be representative of the conditions in Ancaster and should be verified once the actual site has been selected and the operating levels have been defined.

Table 5-7 Capital Cost Estimates – Construction of an Elevated Storage Reservoir

ITEM	COST (2015)
Elevated Tank Construction (7.66 ML)	$5,543,054
Engineering (10% of construction cost)	$554,000
Internal Resources/Staffing (10% of the sum of construction and engineering cost)	$609,705
Land acquisition ($0.55 M/acre)	$550,000
Total Capital Cost (Rounded Up)	**$7,256,760**

The capital costs over the next 60 years for this alternative are estimated assuming the elevated tank is constructed in 2016.

It is assumed that the planned HD018 Pumping Station upgrades would take place in 2016 and that refurbishment of the station would be required every 40 years.

AECOM recently completed an independent analysis on alternatives to upgrade the pumping station, and developed detailed cost evaluations (AECOM, 2015). These values were adopted for our evaluation of alternatives (**See Appendix B**).

The estimated capital costs to upgrade the station are **$11,095,352** (2015 dollars). The cost of refurbishment of the pumping equipment at the end of its service life is estimated at $4,000,000 (2015 dollars).

It is assumed that regular recoating of the reservoir would be required every 20 years. The cost to recoat the reservoir was obtained from Landmark Structures, a leading water tower manufacturer.

Construction costs are assumed to increase 3% annually. A 4.5% discount rate is used.

Table 5-8 Capital Cost Estimates – Alternative 2

ITEM	YEAR	COST (NPV 2016)
Elevated Storage Reservoir Construction	2016	$7,474,463
Upgrades to HD018 Pumping Station	2016	$11,428,213
Recoating of Elevated Storage Reservoir	2036	$184,535
Recoating of Elevated Storage Reservoir	2056	$138,197
Refurbishment of HD018 Pumping Station	2056	$2,211,150
Recoating of Elevated Storage Reservoir	2076	$103,494
Total NPV Capital Cost – Alternative 2		**$21,540,053**

OPERATIONS COST EVALUATION

Based on the City's recent experience at the Waterdown Elevated Storage Reservoir, it is expected that the elevated reservoir would need to be visited by an operator once a month. Thus, to estimate the operational costs for this alternative, 2 staff hours per week or 8 hours per month at $85/hr (to account for staff and vehicle costs) were assumed. It is assumed that the hourly costs would increase at a rate of 2% annually. A planning horizon of 60 years was assumed. The estimated net present value of the operations cost over the 60-year period is **$256,919**.

ENERGY COST EVALUATION

Under Alternative 2, the elevated storage reservoir would reduce the pumping requirements during normal conditions, would provide a backup supply in case of a complete pump station failure, and would address the existing pressure concerns. HD018 Pumping Station would operate to fill the tank when required and also to supply fire flows.

The construction of an elevated storage facility would result in significant energy cost savings since it would allow pumping to the system during below peak electricity rate periods. This concept is illustrated in Figure 5-3 and explained below.

As discussed above, electricity charge rates depend on the time of use, with off-peak rates being lower than mid-peak and on-peak rates. In Ontario, off-peak rates are charged from 7 PM to 7 AM. In the summer, mid-peak rates are charged from 7 AM to 11 AM and from 5 PM to 7 PM, while on-peak rates

are charged from 11 AM to 5 PM. In the winter, these times are slightly different. Current electricity rates are $0.077/kWh, $0.114/kWh, and $0.14/kWh for off-peak, mid-peak and on-peak periods, respectively (Ontario Energy Board Electricity Prices: http://www.ontarioenergyboard.ca/OEB/Consumers/Electricity/Electricity+Prices#tou).

A system without elevated storage would have to satisfy the water demands (by pumping) as they occur. Figure 5-3 shows a typical diurnal demand curve (based on 2014 averages for PD-18, in blue). The daily peak demands occur during mid-peak and on-peak hours. The electricity used to satisfy the pumping requirements during these times would have a higher cost, due to higher on-peak electricity charges at these times.

If however, an elevated storage facility is constructed, the system could be optimized to allow filling of the reservoir during off-peak times, such that the reservoir can be used to supply the demands of the system during mid-peak and on-peak periods. This is illustrated by the green line, which represents the supply from HD018 Pumping Station. From 12 AM to 7 AM (off-peak), the system would pump in excess of the system demands to fill the elevated storage reservoir. Then, during the mid-peak and on-peak times, the pumps would shut off and the volume in the tank would supply the system demands until 7 PM (the beginning of the Off-Peak period) or when the volume in the tank falls below the level corresponding to the equalization storage, at which point the pumps would start to fill the elevated reservoir again.

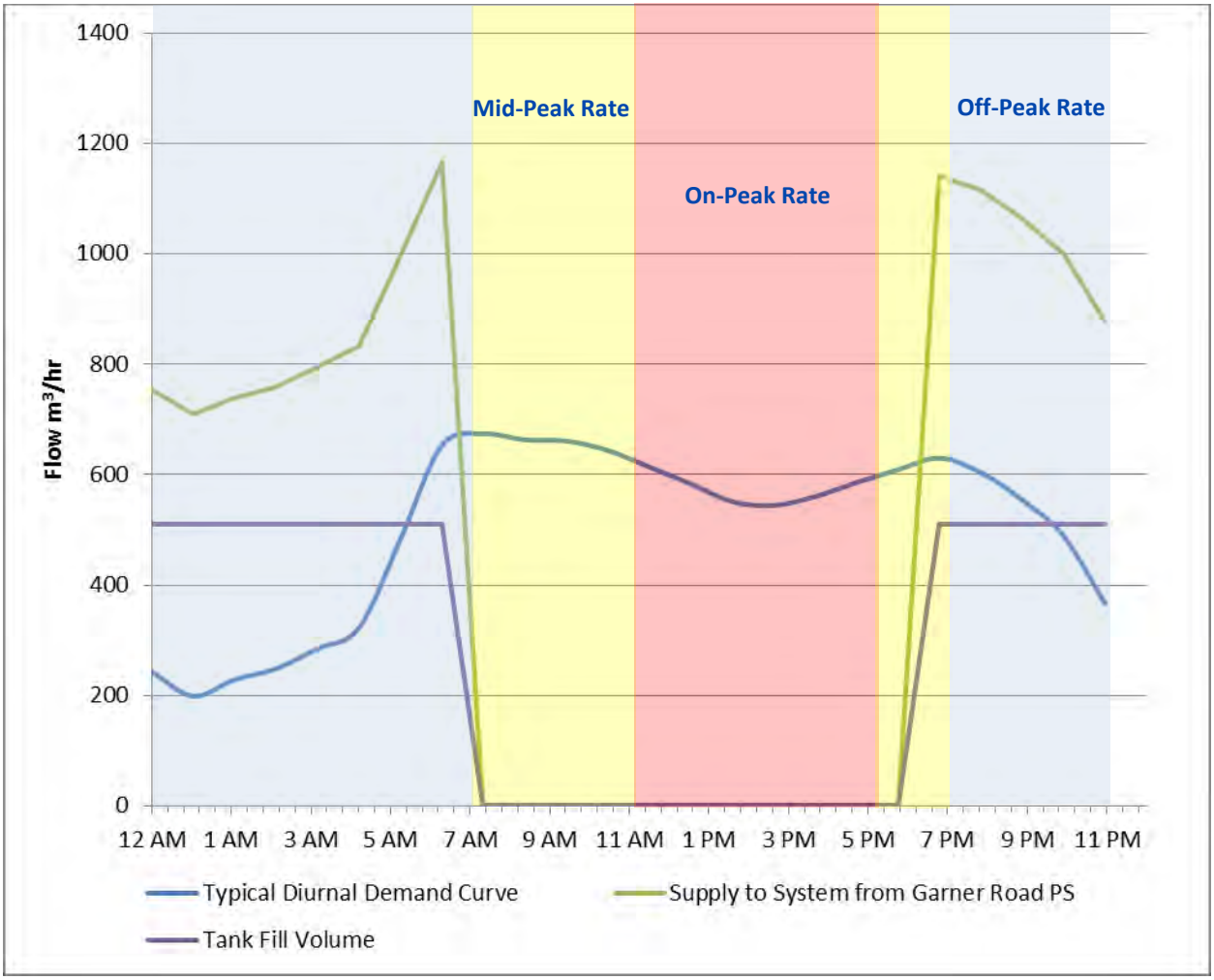


Figure 5-3 Operation of Distribution System with an Elevated Storage Reservoir

Pumped flow can be converted to power consumption by the following formula:

$$Power = \frac{Flow \times Pressure}{Pump\ Efficiency}$$

To calculate the pumping power requirements under Alternative 2, the reservoir fill rates are multiplied by the pump design operating pressure of 520 kPa at a pump efficiency of 80%. It is also assumed that the electricity rates would increase at a rate of 6% annually.

The estimated net present value energy costs for the 60-year planning horizon for Alternative 2 are **$7,175,811**. **Appendix B** includes the spreadsheet used for the evaluation of energy consumption costs.

LIFECYCLE COST EVALUATION

A summary of all the costs associated with Alternative 2 is included below.

Table 5-9 Net Present Value (NPV) of Lifecycle Costs – Alternative 2

ITEM	COST (NPV 2016)
Total PV Capital Costs	$21,540,053
Total PV Operations Costs	$256,919
Total PV Energy Costs	$7,175,811
Total PV Costs – Alternative 2	**$28,972,782**

GREENHOUSE GAS EMISSIONS EVALUATION

The total energy consumption associated with this alternative was multiplied by a factor of 0.110 kgCO_2/kWh to estimate the amount of GHG emissions over the 60-year planning horizon. The total estimated GHG emissions resulting from this option are **5,681** tonnes of CO_2, which is 55% less than the Do Nothing Alternative. This is equivalent to the CO_2 emissions that 20 cars produce (U.S. Environmental Protection Agency, 2015). In other words, the emissions resulting from Alternative 2 are equivalent to reducing the number of cars on the road by 1,485 relative to the “Do Nothing” alternative.

5.4 ALTERNATIVE 3 – REPLACE GARNER ROAD HD018 PS AND CONSTRUCT A NEW BOOSTER STATION

This alternative involves replacement of the existing HD018 with a new pumping station, in addition to construction of a second new booster pumping station to service the high elevation areas in Ancaster. This essentially would create a new pressure district (PD-26) as shown in Figure 5-4.

For the purposes of this evaluation, it was assumed that the PD-26 booster pumping station would be constructed at the site located near the intersection of Wilson Street and Meadowbrook Drive. This site is owned by the City and is in close proximity to a 300 mm diameter watermain.

This alternative would require HD018 Pumping Station to be replaced and upgraded to provide firm capacity (defined as that with the two largest pumps out of service) for PD-18, PD-13, PD-14, PD-15 and the new PD-26. That is, the Garner Road HD018 Pumping Station would have to be upgraded to have a firm capacity of 48,000 m^3/d (see Table 3-1 above). It was determined that it would not be feasible to upgrade HD018 within the existing building limits; therefore, replacement of HD018 in a new building and upgrading capacity would be required (AECOM, 2015). Given that the new booster station would satisfy the demand and pressure requirements in the new PD-26, the replacement HD018 Pumping Station would only need to pump at a lower pressure (520 kPa).

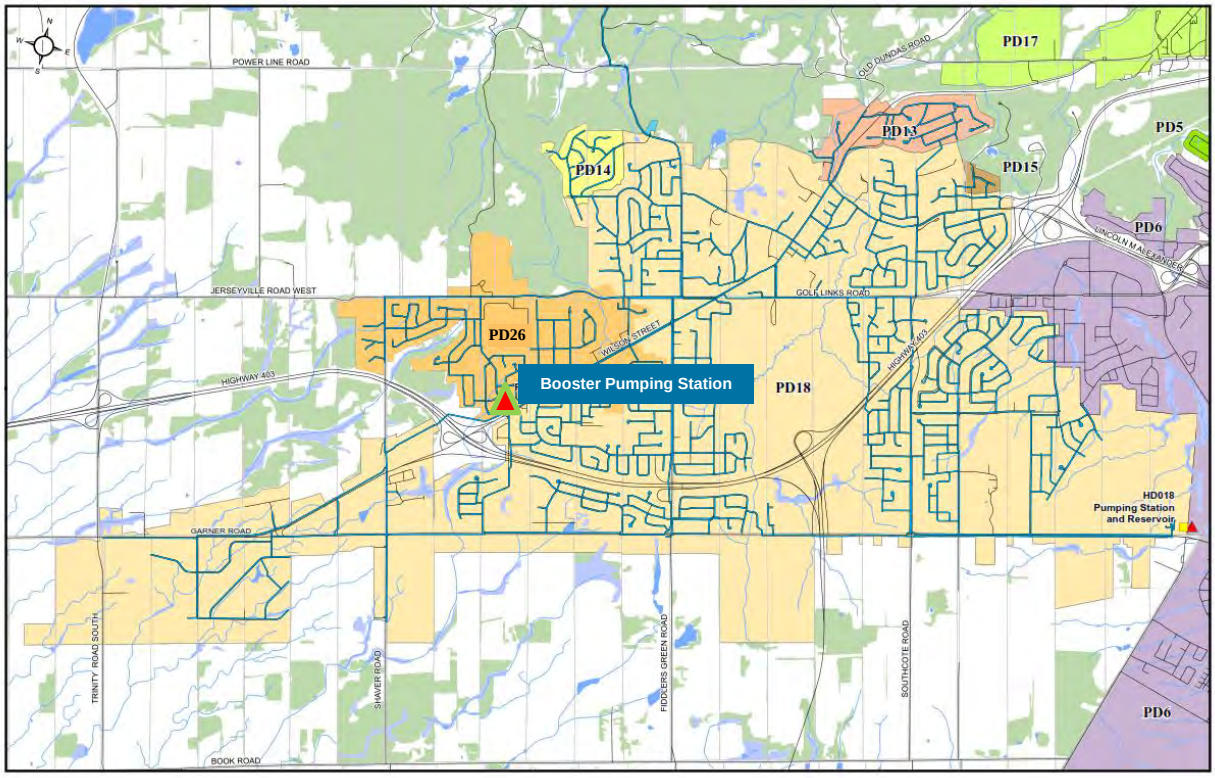


Figure 5-4 Potential Location for New PD-26 Booster Pumping Station

The new PD-26 booster pumping station would have to be sized to have a firm capacity to provide the greater of maximum day plus fire flow demands or peak hour flow within the new PD-26.

The estimated population in the new PD-26 is assumed to correspond to 10% of the residential population in PD-18 based on information provided by the City. Furthermore, it is assumed that the proportion of the residential population to be serviced by PD-26 relative to the total population in Ancaster would remain constant. The corresponding demands are shown in below. The fire flow is based on the requirements for the Ancaster High School. Thus, a fire flow of 100 L/s for 2 hours was assumed per FUS requirements (assuming the school is equipped with fire sprinklers and that it is of non-combustible construction).

Table 5-10 Demand Forecasts for PD-26

YEAR	MAXIMUM DAY DEMANDS (m^3/d)*	PEAK HOUR DEMAND (m^3/d)	MAXIMUM DAY + FIRE (m^3/d)
2011	1,673	2,510	10,313
2021	2,165	3,247	10,805
2031	2,369	3,553	11,009

* Data provided by the City of Hamilton

The firm capacity of the new PD-26 booster pumping station would therefore need to be 11,000 m^3/d (127 L/s). The pumping station would have to be provided with standby power to ensure that supply can be maintained even during power outages.

Additional hydraulic analysis would need to be completed to identify the optimal location of the booster station, to determine the impact of the check valves isolating the new PD-26 would have on the surrounding areas in PD-18, specifically to minimize the creation of dead-ends and their corresponding negative impact on water quality.

CAPITAL COST EVALUATION

A cost estimate of the capital costs for the new booster station is shown in Table 5-11.

For the purposes of the evaluation it is assumed that an area of 0.6 acres would be required for the new PD-26 pumping station site. The cost of land acquisition is included as an opportunity cost (even if the property is owned by the City).

The cost for land acquisition for replacement of the existing HD018 was not included because the value of the existing property (PS to be demolished, making the land available for other uses) was assumed to be equal to the value of property on which the replacement HD018 would be constructed.

It should be noted that these are high level budget costs that should be verified once the actual site has been selected and the specific design characteristics of the station have been defined.

Table 5-11 Capital Cost Estimates – Construction of PD-26 Booster Pumping Station

ITEM	COST (2015 $)
Pumping Station Construction	$1,300,000
Engineering (10% of construction cost)	$130,000
Internal Resources/Staffing (10% of the sum of construction and engineering cost)	$143,000
Land acquisition ($0.55 M/acre)	$330,000
Total Capital Cost (Rounded Up)	**$1,903,000**

A Class D estimate of the capital costs was developed assuming the HD018 Pumping Station is replaced in 2016 (per the scope defined for Alternative 1) and that the new PD-26 Booster Pumping Station is also constructed in 2016. It is expected that major equipment refurbishment would be required at the two stations every 40 years.

A breakdown of the net present value of the costs associated with Alternative 3 is included below. It is assumed that construction costs would increase 3% per annum. A discount rate of 4.5% was utilized.

Table 5-12 Capital Cost Estimates – Alternative 3

ITEM	YEAR	COST (NPV 2016)*
Garner Road PS Replacement and Upgrade (to 484 L/s)	2016	$20,636,870
New PD-26 Booster PS and Check Valves	2016	$1,960,090
Garner Road PS Refurbishment	2056	$2,763,938
PD-26 BPS Refurbishment	2056	$193,476
Total NPV Capital Cost – Alternative 3		**$25,554,374**

OPERATIONS COST EVALUATION

Based on the City's operating practice, it is expected that the new booster pumping station would need to be visited by an operator for two hours a week. The HD018 Pumping Station would also need to be visited once a week for four hours. Thus, to estimate the operational costs for this alternative, 16 staff

hours per month at $85/hr (to account for staff and vehicle costs) were assumed. It is assumed that the hourly costs would increase at a rate of 2% per annum. A planning horizon of 60 years was assumed. The estimated net present value of the operations cost over the 60-year period is **$513,837**.

ENERGY COST EVALUATION

To estimate the energy costs for Alternative 3 a similar approach to that followed for the previous alternatives was adopted. The diurnal flow patterns for the average day flow were determined and projected for the planning horizon both for the overall study area and for the new PD-26. These flows correspond to the pumping requirements of the stations. Under Alternative 3, it is assumed that the new pumps would have an increased efficiency (the pumps would be selected such that their best efficiency point matches the flow and pressure requirements). Thus, for the purpose of this calculation a pump efficiency of 80% was assumed.

The upgrades would also reduce the amount of recirculation within the HD018 station relative to existing conditions. For the energy cost evaluation, it is assumed that the recirculation pumping rates would be 5% of the demands. It is also assumed that the electricity rates would increase at a rate of 6% per annum.

The estimated net present value energy costs for the 60-year planning horizon for Alternative 3 are **$9,873,674**. **Appendix B** includes the spreadsheet used for the evaluation of energy consumption costs.

LIFECYCLE COST EVALUATION

A summary of all the costs associated with Alternative 3 is included below.

Table 5-13 Net Present Value (NPV) of Lifecycle Costs – Alternative 3

ITEM	COST (NPV 2016)
Total PV Capital Costs	$25,554,374
Total PV Operations Costs	$513,837
Total PV Energy Costs	$9,873,674
Total PV Costs – Alternative 3	**$35,941,885**

GREENHOUSE GAS EMISSIONS EVALUATION

The total energy consumption associated with this alternative was multiplied by a factor of 0.110 $kgCO_2/kWh$ to estimate the amount of GHG emissions over the 60-year planning horizon. The total estimated GHG emissions resulting from this option are **6,332** tonnes of CO_2, which is 50% less than the Do Nothing Alternative. This is equivalent to the CO_2 emissions that 23 cars produce (U.S. Environmental Protection Agency, 2015). In other words, the emissions resulting from Alternative 3 are equivalent to reducing the number of cars on the road by 1,305 relative to the “Do Nothing” alternative.

5.5 ALTERNATIVE 4 – REPLACE GARNER ROAD HD018 PS AND CONSTRUCT A NEW BOOSTER STATION AND IN-GROUND RESERVOIR

This alternative is a variation of Alternative 3, which involves replacement of HD018, construction of a second booster station for the higher elevation areas in PD-18 and construction of an in-ground reservoir to provide pumped storage for the new pressure district PD-26.

As for the previous alternative, it is assumed that the PD-26 booster pumping station and reservoir would be constructed on the site located near the intersection of Wilson Street and Meadowbrook Drive. This alternative is shown in Figure 5-5.

The new PD-26 booster pumping station would have to have a firm capacity of 11,000 m^3/d (127 L/s). The HD018 Pumping Station would also need to be replaced and upgraded to a firm capacity (two largest pumps out of service) of 48,000 m^3/d per Table 3-2. The reservoir would have to be sized to provide sufficient storage to allow the booster station to meet the demands in PD-26.

For the purposes of this evaluation, it is assumed that the reservoir would be sized using the storage formula provided in the MOECC guideline. The corresponding reservoir capacity requirement would be **1.64 ML**.

Table 5-14 In-Ground Storage Requirements for PD-26

YEAR	MAX. DAY DEMAND (ML/d)	FIRE STORAGE (ML) A	BALACING STORAGE (ML) B	EMERGENCY STORAGE (ML) C	TOTAL STORAGE (ML) A+B+C
2031	2.37	0.72	0.59	0.33	1.64

Given that PD-26 would be a closed zone, provisions for rechlorination in the reservoir may be required to ensure adequate water quality.

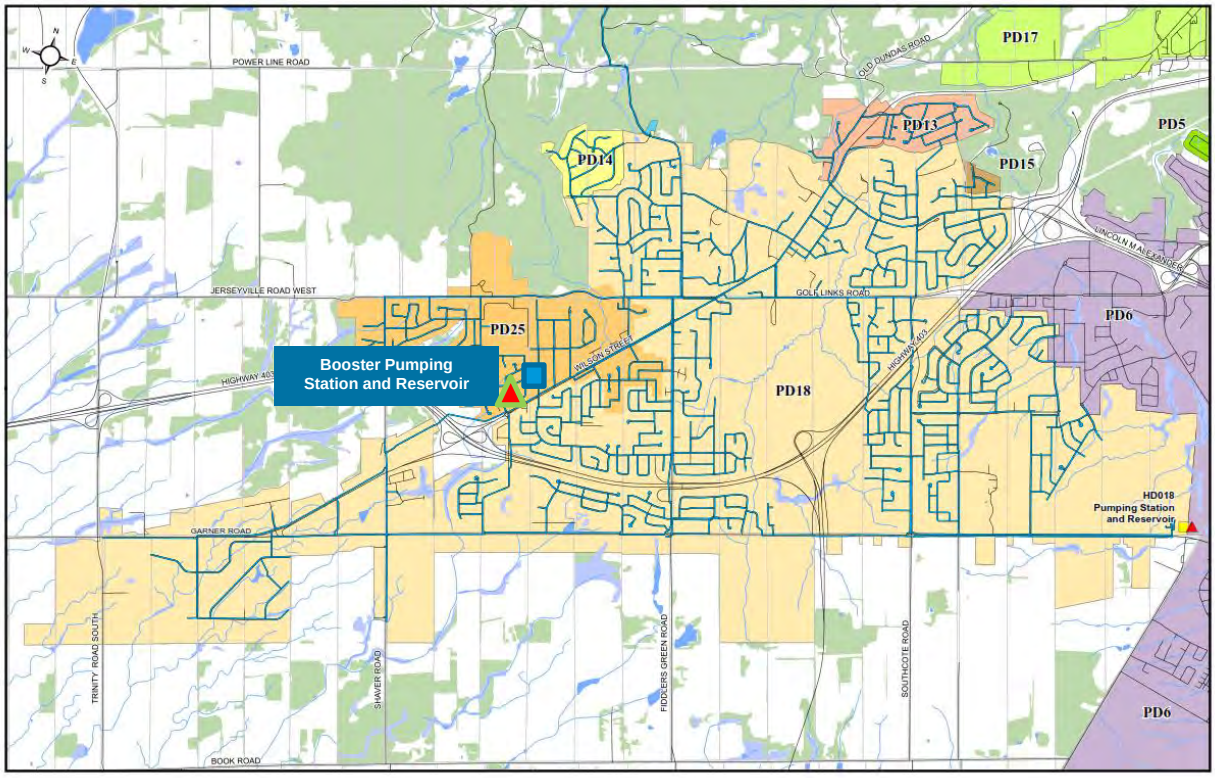


Figure 5-5 Potential Location for New PD-26 Booster Pumping Station and Reservoir

CAPITAL COST EVALUATION

The capital costs are estimated assuming the HD018 Pumping Station is replaced in 2016 and that the new PD-26 Booster Pumping Station and reservoir are also constructed in 2016. It is expected that major equipment refurbishment would be required at the two stations every 40 years.

A breakdown of all the costs associated with Alternative 4 is included below. It is assumed that construction costs would increase by 3% annually, and a 4.5% discount rate was adopted.

Table 5-15 Capital Cost Estimates – Alternative 4

ITEM	YEAR	COST (NPV 2016)
Garner Road PS Replacement and Upgrade	2016	$20,636,870
New PD-26 Booster PS and Check Valves	2016	$1,960,090
In-ground reservoir (1.6 ML)	2016	$1,563,540
Garner Road PS Refurbishment	2056	$2,763,938
PD-26 BPS Refurbishment	2056	$193,476
Total NPV Capital Cost – Alternative 4		**$27,117,914**

OPERATIONS COST EVALUATION

Based on the City's operating practice, it is expected that the new booster pumping station and reservoir and the HD018 Pumping Station would need to be visited by an operator once a week. Thus, to estimate the operational costs for this alternative, 16 staff hours per month at $85/hr (to account for staff and vehicle costs) were assumed. It is assumed that the costs per hour would increase at a rate of 2% annually. A planning horizon of 60 years was assumed. The estimated net present value of the operations cost over the 60-year period is **$513,837**.

ENERGY COST EVALUATION

The energy costs associated with Alternative 4 would be similar to those for Alternative 3. It is assumed that energy rates would increase at the rate of inflation. The estimated net present value energy costs for the 60-year planning horizon for Alternative 4 are **$9,873,674**. **Appendix B** includes the spreadsheet used for the evaluation of energy consumption costs.

LIFECYCLE COST EVALUATION

A summary of all the costs associated with Alternative 4 is included below.

Table 5-16 Net Present Value (NPV) of Lifecycle Costs – Alternative 4

ITEM	COST (2015)
Total PV Capital Costs	$27,117,914
Total PV Operations Costs	$513,837
Total PV Energy Costs	$9,873,674
Total PV Costs – Alternative 3	**$37,505,425**

GREENHOUSE GAS EMISSIONS EVALUATION

The total energy consumption associated with this alternative was multiplied by a factor of 0.110 $kgCO_2/kWh$ to estimate the amount of GHG emissions over the 60-year planning horizon. The total estimated GHG emissions resulting from this option are **6,332** tonnes of CO_2, which is 50% less than the Do Nothing Alternative. This is equivalent to the CO_2 emissions that 23 cars produce. In other words, the emissions resulting from Alternative 3 are equivalent to reducing the number of cars on the road by 1,305 relative to the "Do Nothing" alternative (U.S. Environmental Protection Agency, 2015).

The various alternatives above were compared based on their effect on system performance and reliability, their lifecycle cost, and their aesthetic impact.

The performance and reliability evaluation was based on a qualitative assessment of the expected impacts on the hydraulics of the system and water quality. The cost evaluation was based on a comparison of the capital costs and estimated energy costs associated with each alternative to determine net present values. The cost analysis was based on a 60 year period. The aesthetic evaluation was based on the size of the infrastructure and effect on cityscape.

The results of the evaluation of alternatives are presented in Table 5-17 below. A colour scheme was used to differentiate whether an alternative is “most preferred” (green), “less preferred” (orange) or “least preferred” (red).

Table 5-17 Alternative Evaluation Matrix

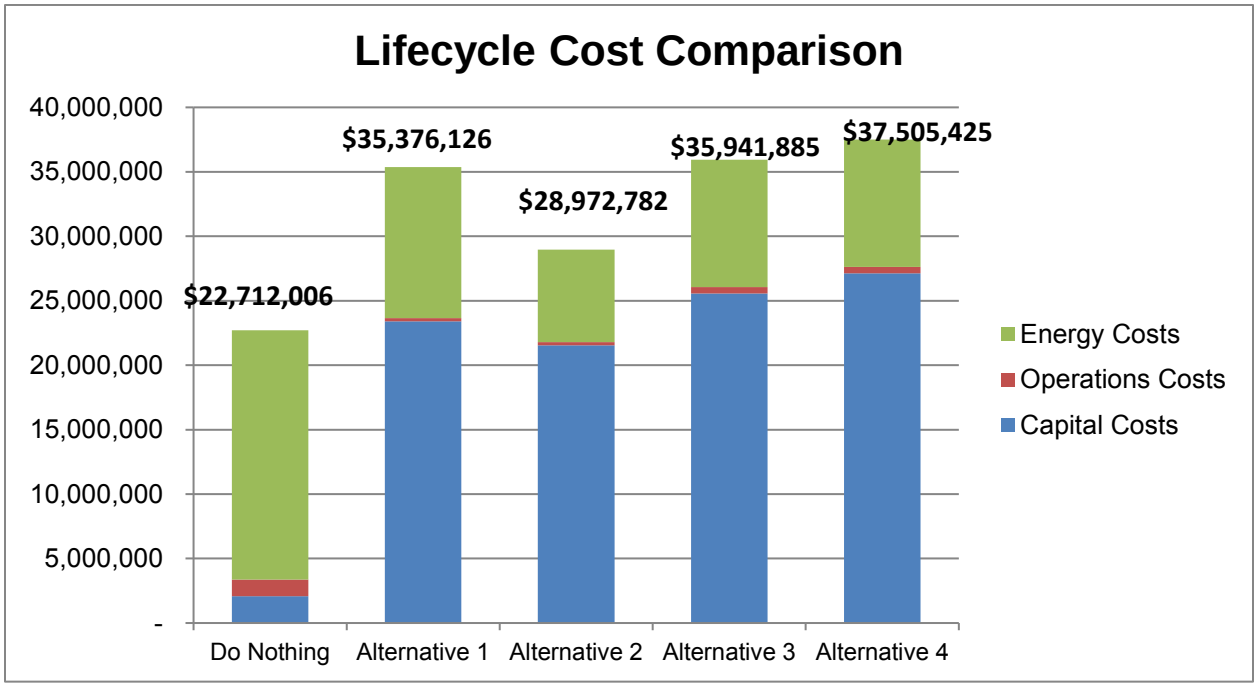
EVALUATION CRITERIA	DO NOTHING REPLACE EXISTING PUMPS AT HD018 PS	ALTERNATIVE 1 REPLACE HD018 PS	ALTERNATIVE 2 UPGRADE HD018 AND BUILD A NEW ELEVATED WATER RESERVOIR	ALTERNATIVE 3 REPLACE HD018 PS AND BUILD A NEW BOOSTER STATION	ALTERNATIVE 4 REPLACE HD018 PS AND BUILD A NEW BOOSTER STATION AND IN-GROUND RESERVOIR
	SYSTEM PERFORMANCE				
System Pressure	HD018 would continue to be operated at a higher pressure to maintain minimum pressures in high elevation areas of the Study Area.	The replacement pumping station would allow pumping at a higher pressure (with higher pump efficiencies) to maintain minimum pressures in high elevation areas of the Study Area.	Elevated water reservoir would be able to maintain adequate pressures throughout the pressure district. HD018 would be operated at a lower pressure than currently.	New PD-26 booster station would be designed to address areas of low pressure. HD018 would be replaced and operated at a lower pressure than currently.	New PD-26 booster station would be designed to address areas of low pressure. HD018 would be replaced and operated at a lower pressure than currently.
Water Quality Impacts	Excessive recirculation due to current operation challenges results in water stagnation and the need for rechlorination.	The station would be optimized to reduce recirculation.	Water age may increase. However, water quality is managed by design and operation of tower to ensure turnover inside of the elevated reservoir. Provision for rechlorination within the reservoir would be installed in the distribution system.	Isolation of new zone may create water quality issues at dead-ends. This would require flushing to maintain adequate chlorine residuals.	Check valves used to isolate the low pressure area may create water quality issues at dead-ends. Provision for rechlorination within the reservoir would be installed.
Fire Flows	The station would continue to have insufficient firm capacity to meet fire fighting requirements within the Study Area. In case of emergencies, the station would need to operate all four pumps simultaneously.	The station would be upgraded to achieve firm capacity to supply maximum day plus fire flows.	Fire flows are expected to improve as flows will be supplied from two locations which should reduce losses and increase available fire flow. The elevated storage tank would provide storage for firefighting.	Fire flow is expected to improve in areas of lower pressure, but remain about the same everywhere else in the system. The HD018 station would be upgraded to achieve firm capacity to supply maximum day plus fire flows.	Fire flow is expected to improve in areas of lower pressure, but remain about the same everywhere else in the system. The HD018 station would be upgraded to achieve firm capacity to supply maximum day plus fire flows.
Vulnerability to Pumping Station Failures	HD018 PS is equipped with a standby generator. However, given the lack of elevated storage, the system would be unable to maintain supply in case of a complete pumping station failure.	HD018 PS is equipped with a standby generator. However, given the lack of elevated storage, the system would be unable to maintain supply in case of a complete pumping station failure.	Elevated water reservoir provides service in case of a complete pumping station failure.	The area would be supplied by HD018 PS, which is equipped with a standby generator. The PD-26 booster PS would also be equipped with a standby power generator. In case of a complete failure of the HD018 PS, the entire Ancaster area would lose supply. If however, only the PD-26 booster station fails, PD-26 would be fed from PD-18 through the isolation check valves, albeit at a lower pressure.	The area would be supplied by HD018 PS, which is equipped with a standby generator. The PD-26 booster PS would also be equipped with a standby power generator. In case of a complete failure of the HD018 PS, the whole Ancaster area would lose supply. If however, only the PD-26 booster station fails, PD-26 would be fed from PD-18 through the isolation check valves, albeit at a lower pressure.
Vulnerability to Watermain Breaks	If the trunkmain across Garner Road breaks the system would be vulnerable and would be unable to maintain adequate pressures to the high elevation areas in the pressure district.	If the trunkmain across Garner Road breaks the system would be vulnerable and would be unable to maintain adequate pressures to the high elevation areas in the pressure district.	Distributed sources provide supply redundancy to the entire zone during watermain breaks.	Depending on the location, vulnerability to watermain breaks may be reduced through the installation of check valves: water that previously flowed freely will be restricted to one-way flow by check valves.	Booster reservoir would help to reduce vulnerability to watermain breaks in the booster zone. Vulnerability to watermain breaks may be reduced through the installation of check valves: water that previously flowed freely will be restricted to one-way flow by check valves.

EVALUATION CRITERIA	DO NOTHING REPLACE EXISTING PUMPS AT HD018 PS	ALTERNATIVE 1 REPLACE HD018 PS	ALTERNATIVE 2 UPGRADE HD018 AND BUILD A NEW ELEVATED WATER RESERVOIR	ALTERNATIVE 3 REPLACE HD018 PS AND BUILD A NEW BOOSTER STATION	ALTERNATIVE 4 REPLACE HD018 PS AND BUILD A NEW BOOSTER STATION AND IN-GROUND RESERVOIR
	COST				
Land Acquisition Costs	Not required.	Not required. Assumed that the required upgrades can be built within the existing site.	$550,000	$330,000	$330,000
Estimated NPV of Capital Costs	$2,082,754	$23,400,808	$21,540,053	$25,554,374	$27,117,914
Estimated NPV of Operations Costs	$1,284,593	$256,919	$256,919	$513,837	$513,837
Estimated NPV of Energy Costs	$19,344,659	$11,718,399	$7,175,811	$9,873,674	$9,873,674
NPV of Total Costs	**$22,712,006**	**$35,376,126**	**$28,972,782**	**$35,941,885**	**$37,505,425**
Greenhouse Gas Emissions (tonnes CO_2)	12,613	7,515	5,681	6,332	6,332
Operations & Maintenance Staff Requirements	Extremely high (1 operator visit per day). Maintenance required to ensure proper operation of pumps and valves. Operation of the booster station would be automatic.	Medium (1 operator visit per week). Maintenance required to ensure proper operation of pumps and valves. Operation of the booster station would be automatic.	Medium (1 operator visit per week). Maintenance required to ensure proper operation of pumps and valves. Operation of the Garner Road HD018 Pumping Station could be optimized based on water levels in the tank. Maintenance would be limited to temporary cleaning and exterior painting of the tank (every 10 years).	Medium (1 operator visit per week). Maintenance required to ensure proper operation of pumps and valves. Operation of the booster station would be automatic.	Medium (1 operator visit per week). Maintenance required to ensure proper operation of pumps and valves. Periodic cleaning and inspection of the reservoir would be required. Operation of the booster station would be automatic.
Rehabilitation and Replacement	Would require refurbishment and replacement of mechanical and electrical equipment. Given the inefficient operation of the pumps, the expected service life of the station would be reduced.	Would require refurbishment and replacement of mechanical and electrical equipment.	Minimal mechanical equipment inside elevated tank. HD018 upgrades required, limited to replacing of existing aging infrastructure. Would require refurbishment and replacement of mechanical and electrical equipment.	Would require refurbishment and replacement of mechanical and electrical equipment at HD018 and the new booster station.	Would require refurbishment and replacement of mechanical and electrical equipment at HD018 and the new booster station and reservoir.
	AESTHETICS				
Visual impact	Existing facility.	Existing facility.	Highly visible. Significant aesthetic impact on the adjacent area. However, it can be designed to blend with surroundings (See Appendix).	Design of the facility can be made to integrate architecture of surrounding area.	Design of the facility can be made to integrate architecture of surrounding area.
	OVERALL				
Summary	Unsustainable operation. Does not meet MOECC requirements for firm capacity and does not provide adequate fire protection. Current mode of operation results in extremely high operations and energy costs.	Can satisfy technical requirements. However, results in high operations and energy costs.	Water supply is uninterrupted by power outages and other emergencies within the pressure district; no reliance on mechanical equipment. Provides superior equalization of daily flow cycles and system pressures. Significantly lower operational costs than pumped storage. Permits power-saving time-of-day filling approaches. Lowest lifecycle cost.	Dependent on HD018 PS to maintain supply. Increased energy costs. Requires standby power to maintain supply during power outages. Requires greater installed capacity to ensure adequate firm capacity is available. High lifecycle costs.	Dependent on Garner Road HD018 PS to maintain supply. Increased energy costs. Requires standby power to maintain supply during power outages. Requires greater installed capacity to ensure adequate firm capacity is available. Highest lifecycle costs.
	RISK RANKING				
	5 Unsustainable. Station failure is imminent due to poor condition. Major rehabilitation would be required in addition to replacement of the pumps.	4 Increase operating efficiency. However, HD018 would remain the sole source of supply to the pressure district. Any failures in the station would result in complete loss of supply.	1 Least risky. Most robust operation. Not as vulnerable to failures in HD018. Most efficient operation. Reduced energy costs and greenhouse gas emissions.	3 Increase operating efficiency. However, HD018 would remain the sole source of supply to the pressure district. Any failures in the station would result in complete loss of supply.	2 Increase operating efficiency. However, HD018 would remain the sole source of supply to the pressure district. Any failures in the station would result in complete loss of supply. Reservoir would amount to some protection in the new pressure district.

6 CONCLUSIONS AND RECOMMENDATIONS

The elevated storage reservoir option (Alternative 2) is the preferred alternative from a system performance, reliability, and lifecycle cost standpoint. Since the Ancaster area does not currently have floating storage, it relies completely on the HD018 Pumping Station to maintain system pressure. A power failure (due to failure of the standby generator) or an instrumentation fault could result in loss of system pressure and potential water quality issues for PD-18, PD-13, PD-14 and PD-15. The construction of an elevated storage reservoir would make the system more robust and less vulnerable in case of pumping station failure. It would also result in significant operating and energy cost reductions relative to the current conditions.

The lifecycle costs of the various alternatives are shown graphically below.



A sensitivity analysis was conducted on the effect that the planning horizon and that the energy cost increases would have on the lifecycle cost of each alternative. The effect of using a shorter planning horizon (40 years) and a longer planning horizon (100 years) was evaluated. Also, the effect of using a 7% annual increase in energy costs (instead of 6%) was studied. The sensitivity analysis (summarized in **Appendix F**) shows that the shorter the planning horizon makes options with a greater initial capital investment less attractive. Conversely, a longer planning horizon makes alternatives with lower annual energy and operations and maintenance costs more attractive. Greater annual energy cost increases result in options with lower energy consumption being significantly more attractive.

The cost evaluation shows that the “Do Nothing” Alternative requires the lowest initial capital investment. However, it has the greatest operations, maintenance and energy costs. Furthermore, it is technically unsustainable and if not corrected puts the system at significant risk. The discussion above provides reasons why the “Do Nothing” Alternative should not be considered any further.

The initial capital costs associated with the elevated storage reservoir option (Alternative 2) are lower than those for the alternatives. Furthermore, the elevated storage reservoir option results in the lowest energy costs of the other options considered.

Based on the above evaluation of alternatives, construction of an elevated storage reservoir is the most appropriate solution to meet the water storage needs and to solve the current operations issues in the Ancaster area.

Further evaluation will be required to determine the preferred site for the elevated storage facility.

7 BIBLIOGRAPHY

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KMK Consultants Ltd. . (2006). *City of Hamilton Water and Wastewater Master Plan Class Environmental Assessment Report.*

U.S. Environmental Protection Agency. (2015, September 7). Greenhouse Gas Equivalencies Calculator - Calculations and References. Retrieved from http://www.epa.gov/cleanenergy/energy-resources/refs.html

Appendix A

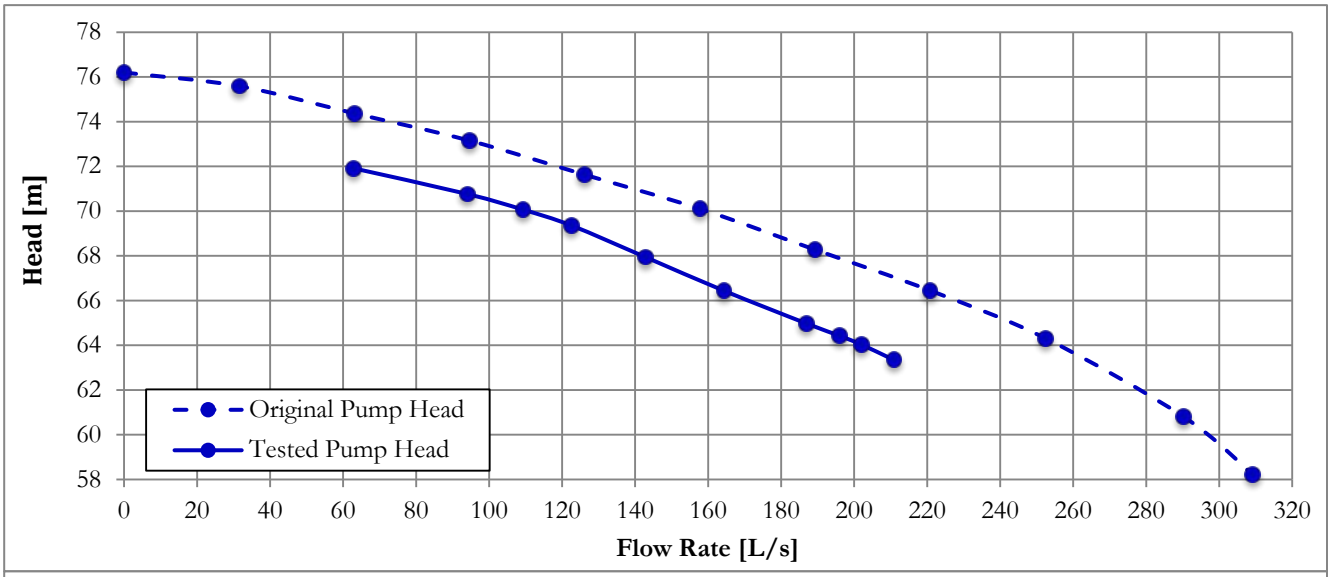
Hydratek Pump Performance Test Reports

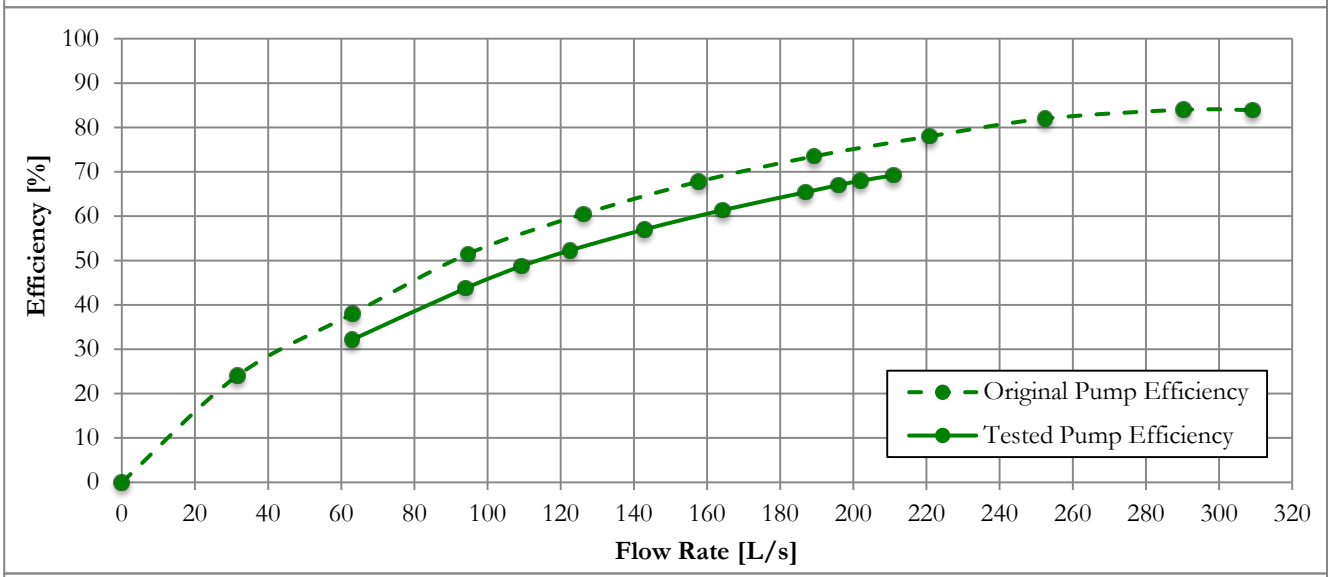
THERMODYNAMIC PUMP PERFORMANCE TEST REPORT

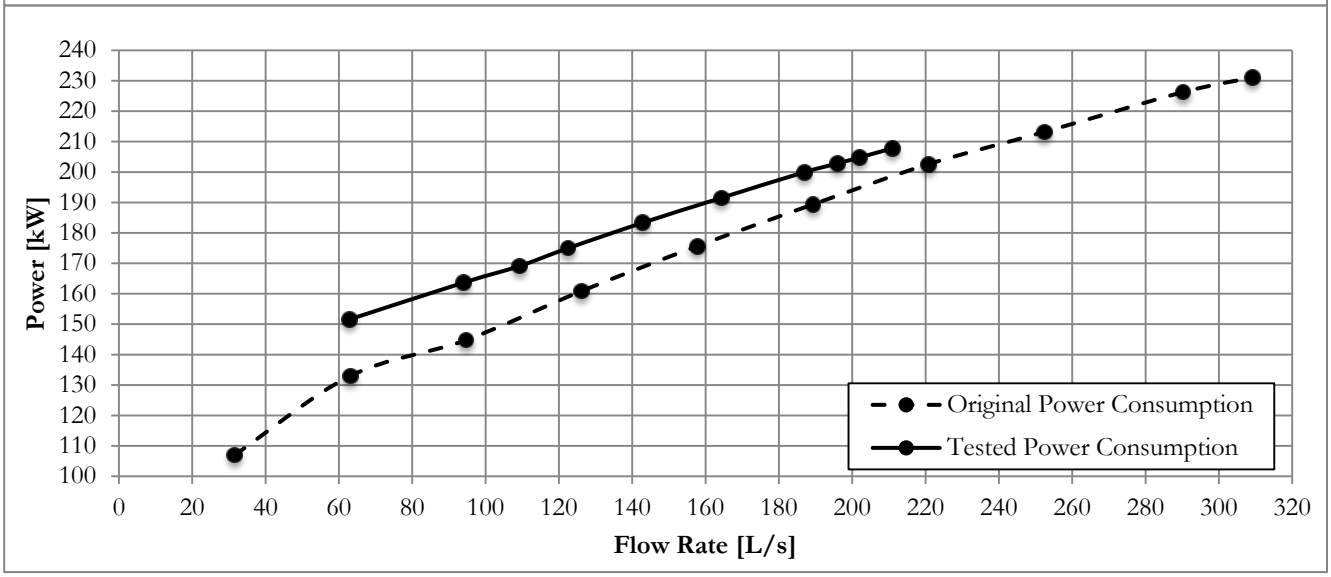
GENERAL DETAILS	
Municipality/Utility:	City of Hamilton
Site Name:	Glancaster Pumping Station (HD018)
Pump ID:	Pump 3
Pressure Zone/District:	H18
Year of Installation:	1983
Year of Previous Test:	1983
Date of Test:	22 March 2012
Test Performed By:	D. Radulj and J. Hambrey

PUMP AND DRIVE DETAILS	
Pump Manufacturer:	Worthington
Pump Model and Serial:	10LR-15 (15.25"), #60733670
Drive Type:	Horiz. Electric Motor and Mechanical Drive
Motor Manufacturer:	Westinghouse
Motor Model/Frame and Serial:	A506US, #1-17S7335
Motor Size (Rated):	300 HP (224 kW)
Speed (Maximum):	1779 RPM
Speed (Tested):	1779 RPM
Voltage (Rated):	575 V
Amperage (Rated):	273 A
Motor Efficiency (Rated):	N/A
Motor Efficiency (Assumed):	94.4%

PUMP TEST DETAILS	
Power Reading:	Automatic
Power Meter Type:	HSIANG CHENG HC6010
Power Meter Connection:	Voltage and Current on Primary
Operating Point Adjustments:	Discharge Valve Throttle
Suction Temperature Probe ID:	T322
Suction Pressure Probe ID:	P260
Discharge Temperature Probe ID:	T316
Discharge Pressure Probe ID:	P259


Head [m]
78
76
74
72
70
68
66
64
62
60
58
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320
Flow Rate [L/s]
Original Pump Head
Tested Pump Head


Efficiency [%]
100
90
80
70
60
50
40
30
20
10
0
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320
Flow Rate [L/s]
Original Pump Efficiency
Tested Pump Efficiency


Power [kW]
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320
Flow Rate [L/s]
Original Power Consumption
Tested Power Consumption

PUMP TEST RESULTS					
Valve Position	**System Condition**	**Flow (L/s)**	**Head (m)**	**Power (kW)**	**Efficiency (%)**
100%	Pump #3 & Filling	211	63.3	207.8	69.2
100%	Pump #3 only	202	64.0	204.8	68.0
100%	Pump #3 only	196	64.4	202.8	67.0
55%	Pump #3 only	187	65.0	199.9	65.4
30%	Pump #3 only	164	66.4	191.5	61.4
20%	Pump #3 only	143	67.9	183.3	57.0
12%	Pump #3 only	123	69.4	175.0	52.3
9%	Pump #3 only	109	70.1	169.1	48.7
6%	Pump #3 only	94.0	70.8	163.7	43.8
4%	Pump #3 only	62.9	71.9	151.6	32.1

ENERGY AND IMPACT ANALYSIS	
Manufacturer's Best Efficiency Point:	84.0%, 290 L/s @ 60.8 m
Tested Best Efficiency Point:	74.0%, 270 L/s @ 59.5 m *
Efficiency Loss at Best Efficiency Point:	10.0%
Typical Operating Point:	68.0%, 202 L/s @ 64.0 m
Overall Efficiency Gap:	16.0%
Operating Time Per Year (Year of Record):	8061 hours (2011)
Fraction of Time on Duty:	92.0%
Annual Energy Consumption at Typical Operating Point:	1650.6 MWh
Equivalent Annual Green House Gas Emissions at Typical Operating Point:	280.6 tonnes
Energy Consumed Per Volume of Water Pumped at Manufacturer's Best Efficiency Point:	0.217 kWh/m^3
Energy Consumed Per Volume of Water Pumped at Tested Best Efficiency Point:	0.241 kWh/m^3
Energy Consumed Per Volume of Water Pumped at Typical Operating Point:	0.282 kWh/m^3
Annual Savings with 100% Efficiency Recovery:	$18,000
Annual Savings with 50% Efficiency Recovery:	$9,200
Present Value for 100% Efficiency Recovery:	$142,700
Present Value for 50% Efficiency Recovery:	$72,900
Equivalent Annual Green House Gas Emission Savings for 100% Efficiency Recovery:	30.7 tonnes
Equivalent Annual Green House Gas Emission Savings for 50% Efficiency Recovery:	15.7 tonnes
Annual Savings from 100% Efficiency Recovery and Moving to Manufacturer's Best Efficiency Point:	$21,500

OBSERVATIONS AND RECOMMENDATIONS

- Could not move further right on the pump curve due to system conditions and constraints (i.e., due to pressure concerns arising from the closed pressure zone). As a result, the actual BEP of the pump could not be reached/tested, and the energy analysis section extrapolates the BEP based on the actual test results.

- Pump operating head is quite variable due to the closed (i.e., no storage) pressure zone, and as a result more than one point was acquired with the discharge valve in the fully open (100%) position.

- The pump operates with the use of a mechanical speed drive, and the drive was set such that the pump would operate at its maximum speed during the test. Additional information is not available for the mechanical drive, but the test results directly assume that the drive has an average efficiency of 96.5%. This assumption has a 1:1 (%) impact on the flow values only. For example, a 3% reduction in the mechanical drive efficiency would shift the test results by 3% on the flow (x) axis.

- The pump's speed of rotation was measured as 1774 RPM, and this may be slightly lower due to the presence of the mechanical speed drive.

- The pump performance and efficiency have significantly decayed over time, and given the pump's high frequency of use (i.e., >90% of the time), this pump should be considered as a priority for a retrofit and efficiency improvement, consisting of a high efficiency coating, at minimum.

- The estimated annual running cost for this pump is approximately $165,000.

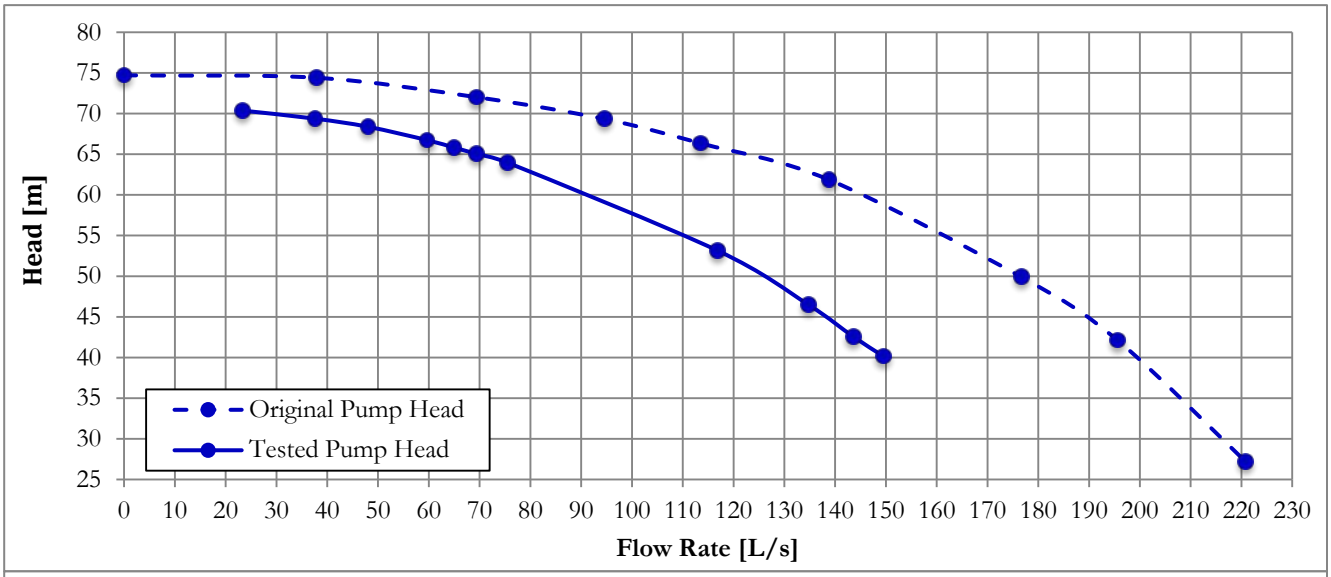
- The pump tends to operate significantly to the left of the best efficiency point, even without any other pumps in operation. Therefore, this pump does not appear to be well matched for the present day system, and the potential energy savings resulting from both a retrofit and an operational change, are financially compelling. This should be investigated further.

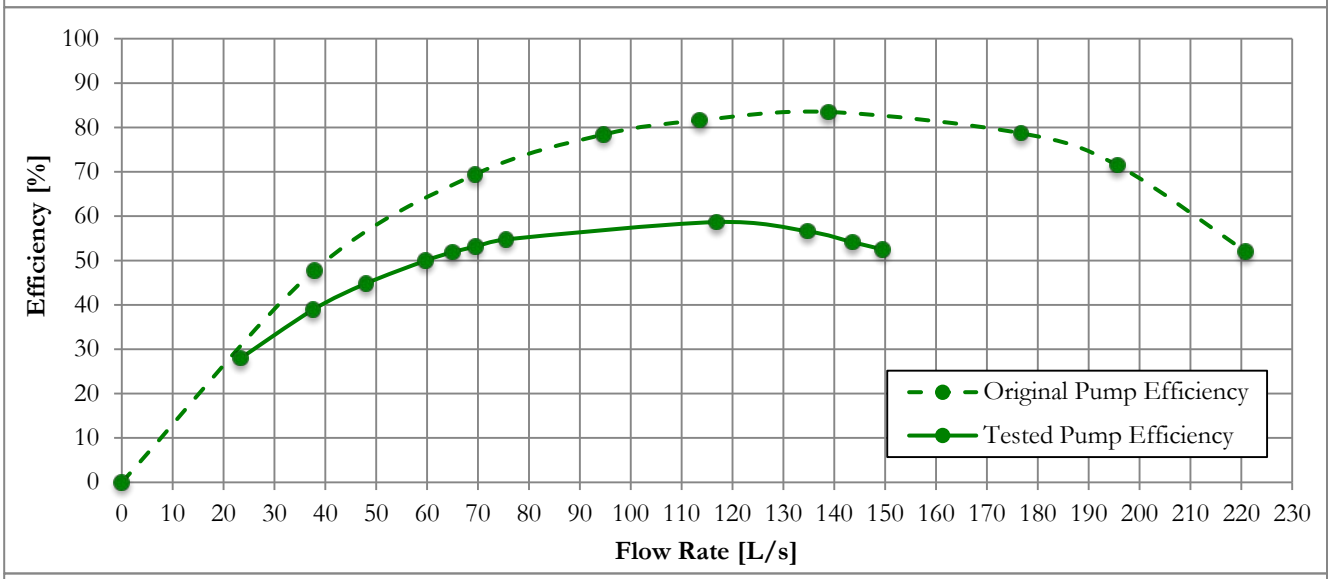
THERMODYNAMIC PUMP PERFORMANCE TEST REPORT

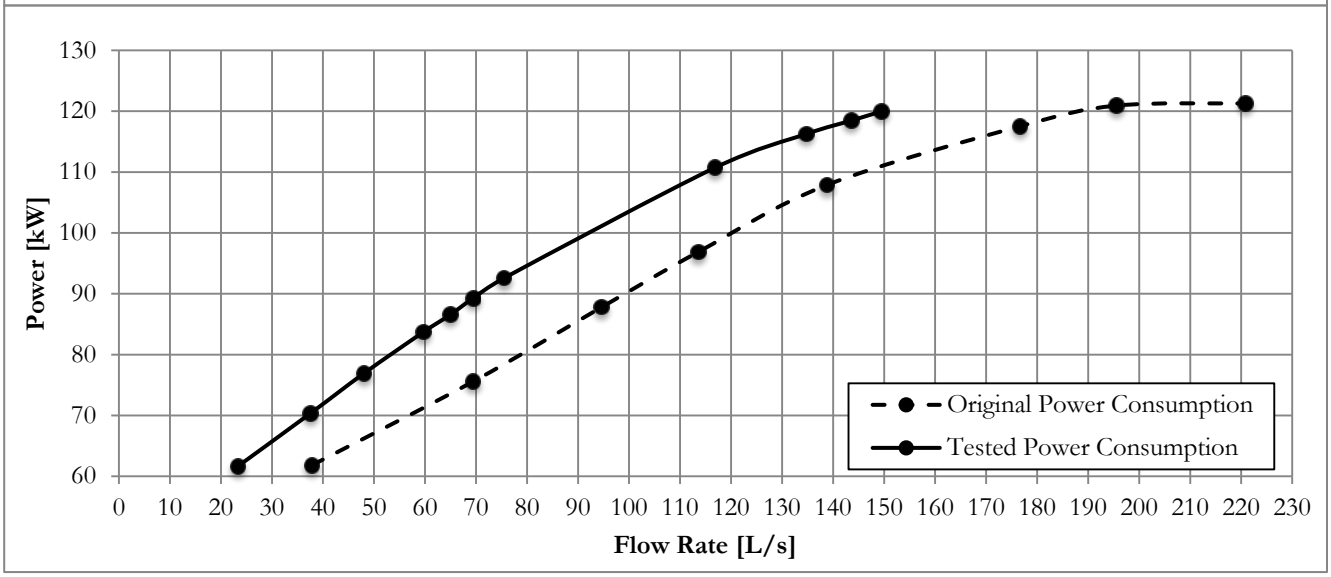
GENERAL DETAILS	
Municipality/Utility:	City of Hamilton
Site Name:	Glancaster Pumping Station (HD018)
Pump ID:	Pump 4
Pressure Zone/District:	H18
Year of Installation:	1983
Year of Previous Test:	1983
Date of Test:	22 March 2012
Test Performed By:	D. Radulj and J. Hambrey

PUMP AND DRIVE DETAILS	
Pump Manufacturer:	Worthington
Pump Model and Serial:	6LR-18 (15.25"), #60733669
Drive Type:	Constant Speed Horizontal Electric Motor
Motor Manufacturer:	Westinghouse
Motor Model/Frame and Serial:	445T, #1-38S8988
Motor Size (Rated):	150 HP (112 kW)
Speed (Maximum):	1780 RPM
Speed (Tested):	1780 RPM
Voltage (Rated):	575 V
Amperage (Rated):	135 A
Motor Efficiency (Rated):	N/A
Motor Efficiency (Assumed):	93.4%

PUMP TEST DETAILS	
Power Reading:	Automatic
Power Meter Type:	HSIANG CHENG HC6010
Power Meter Connection:	Voltage and Current on Primary
Operating Point Adjustments:	Discharge Valve Throttle and Pump Changes
Suction Temperature Probe ID:	T322
Suction Pressure Probe ID:	P260
Discharge Temperature Probe ID:	T316
Discharge Pressure Probe ID:	P259


Head [m]
Flow Rate [L/s]
Original Pump Head
Tested Pump Head


Efficiency [%]
Flow Rate [L/s]
Original Pump Efficiency
Tested Pump Efficiency


Power [kW]
Flow Rate [L/s]
Original Power Consumption
Tested Power Consumption

PUMP TEST RESULTS					
Valve Position	**System Condition**	**Flow (L/s)**	**Head (m)**	**Power (kW)**	**Efficiency (%)**
100%	Pump #4 only	149	40.2	120.0	52.5
100%	Pump #4 only	144	42.6	118.5	54.1
100%	Pump #4 only	135	46.5	116.3	56.6
100%	Pump #4 only	117	53.1	110.7	58.7
100%	Pumps #3 & #1	75.5	64.0	92.6	54.8
100%	Pumps #3 & #4	69.4	65.0	89.3	53.1
50%	Pumps #3 & #4	64.9	65.8	86.5	51.9
30%	Pumps #3 & #4	59.7	66.7	83.7	50.0
15%	Pumps #3 & #4	48.0	68.4	76.9	44.8
10%	Pumps #3 & #4	37.6	69.4	70.4	38.9
5%	Pumps #3 & #4	23.3	70.4	61.6	28.0

ENERGY AND IMPACT ANALYSIS	
Manufacturer's Best Efficiency Point:	83.5%, 139 L/s @ 61.9 m
Tested Best Efficiency Point:	58.7%, 117 L/s @ 53.1 m
Efficiency Loss at Best Efficiency Point:	24.8%
Typical Operating Point:	53.1%, 69.4 L/s @ 65.0 m
Overall Efficiency Gap:	30.4%
Operating Time Per Year (Year of Record):	3276 hours (2011)
Fraction of Time on Duty:	37.4%
Annual Energy Consumption at Typical Operating Point:	292.5 MWh
Equivalent Annual Green House Gas Emissions at Typical Operating Point:	49.7 tonnes
Energy Consumed Per Volume of Water Pumped at Manufacturer's Best Efficiency Point:	0.216 kWh/m^3
Energy Consumed Per Volume of Water Pumped at Tested Best Efficiency Point:	0.263 kWh/m^3
Energy Consumed Per Volume of Water Pumped at Typical Operating Point:	0.357 kWh/m^3
Annual Savings with 100% Efficiency Recovery:	$8,600
Annual Savings with 50% Efficiency Recovery:	$4,400
Present Value for 100% Efficiency Recovery:	$68,000
Present Value for 50% Efficiency Recovery:	$35,200
Equivalent Annual Green House Gas Emission Savings for 100% Efficiency Recovery:	14.6 tonnes
Equivalent Annual Green House Gas Emission Savings for 50% Efficiency Recovery:	7.6 tonnes
Annual Savings from 100% Efficiency Recovery and Moving to Manufacturer's Best Efficiency Point:	$7,300

OBSERVATIONS AND RECOMMENDATIONS

- Could not move further right on the pump curve due to system conditions and constraints (i.e., due to pressure concerns arising from the closed pressure zone).
- The discharge valve indicator appears to be off, and therefore the listed values should be considered as an approximation.
- Pump operating head is quite variable due to the closed (i.e., no storage) pressure zone, and as a result more than one point was acquired with the discharge valve in the fully open (100%) position.
- The pump's speed of rotation was measured as 1785 RPM.
- The motor load exceeds 100% with a fully open discharge valve and not other pumps in operation.
- The pump performance and efficiency have significantly decayed over time and are presently relatively poor. However, given the pump's low frequency of use (i.e., <40% of the time), and its relatively small size (150 HP), the potential energy savings resulting from a retrofit are only modest.
- The estimated annual running cost for this pump is approximately $29,000.
- Due to its relatively small size, this pump operates in combination with another pump, and therefore its typical operating point is left of its BEP.
- The pump tends to operate to the left of the best efficiency point, even without any other pumps in operation. Therefore, this pump does not appear to be well matched for the present day system, and the potential energy savings resulting from both a retrofit and an operational change, can become financially compelling if this pump's rate of utilization is planned to be increased. This should be investigated further.

Appendix B

Energy Use Analysis - Elevated Storage & Pumped Storage

Explanation of Terms and Formulas used During the Calculation

Hourly Flow: The hourly flow for a particular hour during the day (e.g. 10 AM) was obtained by multiplying the average hourly flow with the average factor for 10 AM.

$$Hourly\ Flow_{10AM} = Average\ Hourly\ Flow \times Average\ Factor_{10AM}$$

The average hourly flow and average factor were obtained as follows:

Average Hourly Flow: Average Day Demands for the years 2011, 2014, 2021 and 2031 were obtained from Appendix A-1 of the 2006 Water and Wastewater Master Plan. Projected Average Day Demands for all the years between 2014 and 2031 were interpolated from these values. The Average Hourly flow for each year (e.g. 2015) was calculated from Projected Average Daily Demand (2015) as follows:

$$Average\ Hourly\ Flow_{2015} = \frac{Projected\ Average\ Daily\ Demand_{2015}}{24}$$

Average Factor: Hourly flows for each day in the Year 2014 were tabulated to obtain an average flow for each hour of the day during the year (E.g. Flow for 10 AM for every day during the year 2014 were averaged). The average hourly flows were summed to obtain the average daily flow.

The average factor for 10 AM was the ratio of the average hourly flow for 10 AM to the average daily flow.

$$Average\ Factor_{10AM} = \frac{Average\ Hourly\ Flow_{10\ AM}}{Average\ Daily\ Flow}$$

Power: The Power consumption for a pump was calculated as follows:

$$Power\ (kW) = \frac{Flow\ \left(\frac{m^3}{s}\right) \times Pressure\ (kNm)}{Pump\ Efficiency}$$

Recommended Pump Rate: This is the recommended pump rate during off peak hours to meet demand and fill up the elevated storage tank (EST). The EST was assumed to be filled up at a rate such that the equalization volume was filled up equally during the off-peak hours.

$$Recommended\ Pump\ Rate = \ Hourly\ Flow + \frac{Volume\ of\ EST}{(Number\ of\ Off - Peak\ Hours)}$$

Amount Supplied by Tank: With the condition that the equalization volume of the tank was not exceeded during pumping, the on-peak hours were supplied entirely from the EST. In the event that the volume of the EST was reached during pumping, the hourly flow was met by pumping.

Energy Cost: The net present value energy cost was calculated using the future energy usage and the current electricity rates to obtain a NPV value in 2015 dollars.

$$Energy\ Cost\ (\$) = \ Energy\ Usage\ (kWh)\ \times Unit\ Cost\ (\frac{\$}{kWh})$$

Greenhouse Gas (GHG) Emissions: The GHG emissions for the 60 year period were calculated by obtaining the total energy usage during the 60 year period and applying it as follows:

$$GHG\ Emissions\ (kg\ CO_2) = \ Total\ Energy\ Cosumption\ (kWh) \times 0.110\ \left(\frac{kg}{kWh}\right)$$

Do Nothing Option
Energy Calculation

Pressure **667 kN/m2**
Efficiency **0.6**
Recirculation **30%**

YEAR				2014					2015				
AVERAGE DAY DEMAND (m3/d)				9991.38					10257.26				
AVERAGE Hourly Flow (m3/hr)				416.31					427.39				
	Rate ($/kWh)	Hour	Average Factor	Hourly Flow (m3/hour)	Flow/s (m3/s)	Power (kW)	Energy (kWh)	Energy Cost (No Storage) 2015$	Hourly Flow (m3/hr)	Flow/s (m3/s)	Power (kW)	Energy (kWh)	Energy Cost (No Storage) 2015$
Off Peak	0.077	12 AM	0.49	202.35	0.073	81.23	81.23	$ 6.25	207.73	0.075	83.39	83.39	$ 6.42
	0.077	1 AM	0.40	165.57	0.060	66.46	66.46	$ 5.12	169.97	0.061	68.23	68.23	$ 5.25
	0.077	2 AM	0.46	190.62	0.069	76.52	76.52	$ 5.89	195.69	0.071	78.56	78.56	$ 6.05
	0.077	3 AM	0.50	206.98	0.075	83.09	83.09	$ 6.40	212.49	0.077	85.30	85.30	$ 6.57
	0.077	4 AM	0.57	237.34	0.086	95.28	95.28	$ 7.34	243.65	0.088	97.81	97.81	$ 7.53
	0.077	5 AM	0.65	268.94	0.097	107.96	107.96	$ 8.31	276.09	0.100	110.83	110.83	$ 8.53
	0.077	6 AM	0.97	402.46	0.145	161.56	161.56	$ 12.44	413.17	0.149	165.86	165.86	$ 12.77
Mid-Peak	0.114	7 AM	1.31	544.19	0.197	218.46	218.46	$ 24.90	558.67	0.202	224.27	224.27	$ 25.57
	0.114	8 AM	1.35	561.44	0.203	225.38	225.38	$ 25.69	576.38	0.208	231.38	231.38	$ 26.38
	0.114	9 AM	1.33	552.21	0.199	221.68	221.68	$ 25.27	566.91	0.205	227.58	227.58	$ 25.94
	0.114	10 AM	1.32	550.50	0.199	220.99	220.99	$ 25.19	565.15	0.204	226.87	226.87	$ 25.86
	0.114	11 AM	1.29	536.38	0.194	215.32	215.32	$ 24.55	550.65	0.199	221.05	221.05	$ 25.20
On-Peak	0.14	12 PM	1.23	511.35	0.185	205.27	205.27	$ 28.74	524.96	0.190	210.74	210.74	$ 29.50
	0.14	1 PM	1.17	485.99	0.175	195.09	195.09	$ 27.31	498.93	0.180	200.29	200.29	$ 28.04
	0.14	2 PM	1.10	459.21	0.166	184.34	184.34	$ 25.81	471.43	0.170	189.25	189.25	$ 26.49
	0.14	3 PM	1.09	453.14	0.164	181.91	181.91	$ 25.47	465.20	0.168	186.75	186.75	$ 26.14
	0.14	4 PM	1.12	466.69	0.169	187.35	187.35	$ 26.23	479.11	0.173	192.33	192.33	$ 26.93
Mid-P	0.114	5 PM	1.17	487.88	0.176	195.85	195.85	$ 22.33	500.86	0.181	201.06	201.06	$ 22.92
	0.114	6 PM	1.22	507.13	0.183	203.58	203.58	$ 23.21	520.63	0.188	209.00	209.00	$ 23.83
Off Peak	0.077	7 PM	1.26	524.83	0.190	210.69	210.69	$ 16.22	538.80	0.195	216.29	216.29	$ 16.65
	0.077	8 PM	1.21	502.85	0.182	201.86	201.86	$ 15.54	516.23	0.186	207.23	207.23	$ 15.96
	0.077	9 PM	1.11	461.56	0.167	185.29	185.29	$ 14.27	473.84	0.171	190.22	190.22	$ 14.65
	0.077	10 PM	0.98	406.89	0.147	163.34	163.34	$ 12.58	417.71	0.151	167.68	167.68	$ 12.91
	0.077	11 PM	0.73	304.90	0.110	122.40	122.40	$ 9.42	313.01	0.113	125.65	125.65	$ 9.68
Total Daily						**167.12**	**4,010.89**	**$ 424.49**			**171.57**	**4,117.63**	**$ 435.78**
Total Annual Energy Cost / $								**$154,937.05**					**$159,060.07**
Total Energy Consumption /kWh							**1,463,976**					**1,502,934**	

NPV (2015)	**$11,935,112**
Total Energy Consumption (2015-75)/kWh	**114,664,310**

Alternative 1

Energy Calculation

Pressure	**667 kN/m2**
Efficiency	**0.8**
Recirculation	**5%**

YEAR				2014					2015				
AVERAGE DAY DEMAND (m3/d)				9991.38					10257.26				
AVERAGE Hourly Flow (m3/hr)				416.31					427.39				
	Rate ($/kWh)	Hour	Average Factor	Hourly Flow (m3/hour)	Flow/s (m3/s)	Power (kW)	Energy (kWh)	Energy Cost (No Storage) 2015$	Hourly Flow (m3/hr)	Flow/s (m3/s)	Power (kW)	Energy (kWh)	Energy Cost (No Storage) 2015$
Off Peak	0.077	12 AM	0.49	202.35	0.059	49.21	49.21	$ 3.79	207.73	0.061	50.52	50.52	$ 3.89
	0.077	1 AM	0.40	165.57	0.048	40.26	40.26	$ 3.10	169.97	0.050	41.33	41.33	$ 3.18
	0.077	2 AM	0.46	190.62	0.056	46.35	46.35	$ 3.57	195.69	0.057	47.59	47.59	$ 3.66
	0.077	3 AM	0.50	206.98	0.060	50.33	50.33	$ 3.88	212.49	0.062	51.67	51.67	$ 3.98
	0.077	4 AM	0.57	237.34	0.069	57.72	57.72	$ 4.44	243.65	0.071	59.25	59.25	$ 4.56
	0.077	5 AM	0.65	268.94	0.078	65.40	65.40	$ 5.04	276.09	0.081	67.14	67.14	$ 5.17
	0.077	6 AM	0.97	402.46	0.117	97.87	97.87	$ 7.54	413.17	0.121	100.47	100.47	$ 7.74
Mid-Peak	0.114	7 AM	1.31	544.19	0.159	132.33	132.33	$ 15.09	558.67	0.163	135.86	135.86	$ 15.49
	0.114	8 AM	1.35	561.44	0.164	136.53	136.53	$ 15.56	576.38	0.168	140.16	140.16	$ 15.98
	0.114	9 AM	1.33	552.21	0.161	134.29	134.29	$ 15.31	566.91	0.165	137.86	137.86	$ 15.72
	0.114	10 AM	1.32	550.50	0.161	133.87	133.87	$ 15.26	565.15	0.165	137.43	137.43	$ 15.67
	0.114	11 AM	1.29	536.38	0.156	130.44	130.44	$ 14.87	550.65	0.161	133.91	133.91	$ 15.27
On-Peak	0.14	12 PM	1.23	511.35	0.149	124.35	124.35	$ 17.41	524.96	0.153	127.66	127.66	$ 17.87
	0.14	1 PM	1.17	485.99	0.142	118.18	118.18	$ 16.55	498.93	0.146	121.33	121.33	$ 16.99
	0.14	2 PM	1.10	459.21	0.134	111.67	111.67	$ 15.63	471.43	0.137	114.64	114.64	$ 16.05
	0.14	3 PM	1.09	453.14	0.132	110.19	110.19	$ 15.43	465.20	0.136	113.13	113.13	$ 15.84
	0.14	4 PM	1.12	466.69	0.136	113.49	113.49	$ 15.89	479.11	0.140	116.51	116.51	$ 16.31
Mid-P	0.114	5 PM	1.17	487.88	0.142	118.64	118.64	$ 13.53	500.86	0.146	121.80	121.80	$ 13.89
	0.114	6 PM	1.22	507.13	0.148	123.32	123.32	$ 14.06	520.63	0.152	126.60	126.60	$ 14.43
Off Peak	0.077	7 PM	1.26	524.83	0.153	127.63	127.63	$ 9.83	538.80	0.157	131.02	131.02	$ 10.09
	0.077	8 PM	1.21	502.85	0.147	122.28	122.28	$ 9.42	516.23	0.151	125.54	125.54	$ 9.67
	0.077	9 PM	1.11	461.56	0.135	112.24	112.24	$ 8.64	473.84	0.138	115.23	115.23	$ 8.87
	0.077	10 PM	0.98	406.89	0.119	98.95	98.95	$ 7.62	417.71	0.122	101.58	101.58	$ 7.82
	0.077	11 PM	0.73	304.90	0.089	74.14	74.14	$ 5.71	313.01	0.091	76.12	76.12	$ 5.86
Total Daily						101.24	2,429.68	$ 257.14			103.93	2,494.33	$ 263.98
Total Annual Energy Cost / $								$93,856.10					$96,353.70
Total Energy Consumption /kWh							886,831.57					910,431.03	

NPV (2015)	**$7,229,924**
Total Energy Consumption (2015-75)/kWh	**68,314,420**

Alternative 2
Energy Calculation

Pressure	**520 kPa/kNm**
Efficiency	**0.8**
Recirculation	**0%**

				2014							2015						
YEAR																	
AVERAGE DAY DEMAND (m3/d)				9991.38							10257.26						
AVERAGE Hourly Flow (m3/hr)				416.31							427.39						
	Rate ($/kWh	Hour	Average Factor	Hourly Flow (m3/hr)	Recommended Pumping Rate (m3)	Amount Supplied by Tank (m3)	Flow/s (m3/s)	Power (kW)	Energy (kWh)	Energy Cost	Hourly Flow (m3/hr)	Recommended Pumping Rate (m3)	Amount Supplied by Tank (m3)	Flow/s (m3/s)	Power (kW)	Energy (kWh)	Energy Cost
Off Peak	0.077	12 AM	0.49	202.35	713	0.00	0.198	128.79	128.79	$ 9.92	207.73	679	0.00	0.189	122.66	122.66	$ 9.45
	0.077	1 AM	0.40	165.57	677	0.00	0.188	122.15	122.15	$ 9.41	169.97	642	0.00	0.178	115.85	115.85	$ 8.92
	0.077	2 AM	0.46	190.62	702	0.00	0.195	126.67	126.67	$ 9.75	195.69	667	0.00	0.185	120.49	120.49	$ 9.28
	0.077	3 AM	0.50	206.98	718	0.00	0.199	129.62	129.62	$ 9.98	212.49	684	0.00	0.190	123.52	123.52	$ 9.51
	0.077	4 AM	0.57	237.34	748	0.00	0.208	135.10	135.10	$ 10.40	243.65	715	0.00	0.199	129.15	129.15	$ 9.94
	0.077	5 AM	0.65	268.94	780	0.00	0.217	140.81	140.81	$ 10.84	276.09	748	0.00	0.208	135.01	135.01	$ 10.40
	0.077	6 AM	0.97	402.46	913	0.00	0.254	164.92	164.92	$ 12.70	413.17	885	0.00	0.246	159.75	159.75	$ 12.30
Mid-Peak	0.114	7 AM	1.31	544.19		544.19	0.000	0.00	0.00	$ -	558.67	1030	0.00	0.286	186.03	186.03	$ 21.21
	0.114	8 AM	1.35	561.44		561.44	0.000	0.00	0.00	$ -	576.38		576.38	0.000	0.00	0.00	$ -
	0.114	9 AM	1.33	552.21		552.21	0.000	0.00	0.00	$ -	566.91		566.91	0.000	0.00	0.00	$ -
	0.114	10 AM	1.32	550.50		550.50	0.000	0.00	0.00	$ -	565.15		565.15	0.000	0.00	0.00	$ -
	0.114	11 AM	1.29	536.38		536.38	0.000	0.00	0.00	$ -	550.65		550.65	0.000	0.00	0.00	$ -
On-Peak	0.14	12 PM	1.23	511.35		511.35	0.000	0.00	0.00	$ -	524.96		524.96	0.000	0.00	0.00	$ -
	0.14	1 PM	1.17	485.99		485.99	0.000	0.00	0.00	$ -	498.93		498.93	0.000	0.00	0.00	$ -
	0.14	2 PM	1.10	459.21		459.21	0.000	0.00	0.00	$ -	471.43		471.43	0.000	0.00	0.00	$ -
	0.14	3 PM	1.09	453.14		453.14	0.000	0.00	0.00	$ -	465.20		465.20	0.000	0.00	0.00	$ -
	0.14	4 PM	1.12	466.69		466.69	0.000	0.00	0.00	$ -	479.11		479.11	0.000	0.00	0.00	$ -
Mid-P	0.114	5 PM	1.17	487.88		487.88	0.000	0.00	0.00	$ -	500.86		500.86	0.000	0.00	0.00	$ -
	0.114	6 PM	1.22	507.13		507.13	0.000	0.00	0.00	$ -	520.63		520.63	0.000	0.00	0.00	$ -
Off Peak	0.077	7 PM	1.26	524.83	1036	0.00	0.288	187.01	187.01	$ 14.40	538.80	1010	0.00	0.281	182.44	182.44	$ 14.05
	0.077	8 PM	1.21	502.85	1014	0.00	0.282	183.04	183.04	$ 14.09	516.23	988	0.00	0.274	178.36	178.36	$ 13.73
	0.077	9 PM	1.11	461.56	972	0.00	0.270	175.59	175.59	$ 13.52	473.84	945	0.00	0.263	170.71	170.71	$ 13.14
	0.077	10 PM	0.98	406.89	918	0.00	0.255	165.72	165.72	$ 12.76	417.71	889	0.00	0.247	160.58	160.58	$ 12.36
	0.077	11 PM	0.73	304.90	816	0.00	0.227	147.30	147.30	$ 11.34	313.01	785	0.00	0.218	141.67	141.67	$ 10.91
Total Daily								**75.28**	**1,806.72**	**$ 139.12**					**80.26**	**1,926.21**	**$ 155.20**
Total Annual Energy Cost / $										**$50,777.97**							**$56,648.54**
Total Energy Consumption /kWh									**659,454**							**703,068**	

NPV (2015)	**$4,418,163**
Total Energy Consumption (2015-75)/kWh	**51,641,674**

Alternative 3 & 4

Energy Calculation

HD018		PD 26	
Pressure	520 kPa/kNm	Pressure	420 kPa/kNm
Efficiency	0.8	Efficiency	0.8
Recirculation	5%	Recirculation	0%

YEAR				2014									2015								
AVERAGE DAY DEMAND (m3/d)				9991.38									10257.26								
AVERAGE Hourly Flow (m3/hr)				416.31									427.39								
	Rate ($/kW	Hour	Average Factor	Hourly Flow 2014 (m3/hr)	HD 018 Flow/s (m3/s)	HD 018 Power (kW)	HD 018 Energy (kWh)	PD 26 Flow/s (m3/s)	PD 26 Power (kW)	PD 26 Energy (kWh)	Total Energy kWh (HD018 + PD25)	Total Energy Cost $ (HD018 + PD25)	Hourly Flow (m3/hr)	HD 018 Flow/s (m3/s)	HD 018 Power (kW)	HD 018 Energy (kWh)	PD 26 Flow/s (m3/s)	PD 26 Power (kW)	PD 26 Energy (kWh)	Total Energy kWh (HD018 + PD25)	Total Energy Cost $ (HD018 + PD25)
Off Peak	0.077	12 AM	0.49	202.35	0.059	38.36	38.36	0.0059	3.10	3.10	41.46	$3.19	207.73	0.061	39.38	39.38	0.0061	3.18	3.18	42.56	$3.28
	0.077	1 AM	0.40	165.57	0.048	31.39	31.39	0.0048	2.54	2.54	33.92	$2.61	169.97	0.050	32.22	32.22	0.0050	2.60	2.60	34.83	$2.68
	0.077	2 AM	0.46	190.62	0.056	36.14	36.14	0.0056	2.92	2.92	39.06	$3.01	195.69	0.057	37.10	37.10	0.0057	3.00	3.00	40.10	$3.09
	0.077	3 AM	0.50	206.98	0.060	39.24	39.24	0.0060	3.17	3.17	42.41	$3.27	212.49	0.062	40.28	40.28	0.0062	3.25	3.25	43.54	$3.35
	0.077	4 AM	0.57	237.34	0.069	45.00	45.00	0.0069	3.63	3.63	48.63	$3.74	243.65	0.071	46.19	46.19	0.0071	3.73	3.73	49.92	$3.84
	0.077	5 AM	0.65	268.94	0.078	50.99	50.99	0.0078	4.12	4.12	55.10	$4.24	276.09	0.081	52.34	52.34	0.0081	4.23	4.23	56.57	$4.36
	0.077	6 AM	0.97	402.46	0.117	76.30	76.30	0.0117	6.16	6.16	82.46	$6.35	413.17	0.121	78.33	78.33	0.0121	6.33	6.33	84.66	$6.52
Mid-Peak	0.114	7 AM	1.31	544.19	0.159	103.17	103.17	0.0159	8.33	8.33	111.50	$12.71	558.67	0.163	105.91	105.91	0.0163	8.55	8.55	114.47	$13.05
	0.114	8 AM	1.35	561.44	0.164	106.44	106.44	0.0164	8.60	8.60	115.04	$13.11	576.38	0.168	109.27	109.27	0.0168	8.83	8.83	118.10	$13.46
	0.114	9 AM	1.33	552.21	0.161	104.69	104.69	0.0161	8.46	8.46	113.15	$12.90	566.91	0.165	107.48	107.48	0.0165	8.68	8.68	116.16	$13.24
	0.114	10 AM	1.32	550.50	0.161	104.36	104.36	0.0161	8.43	8.43	112.79	$12.86	565.15	0.165	107.14	107.14	0.0165	8.65	8.65	115.80	$13.20
	0.114	11 AM	1.29	536.38	0.156	101.69	101.69	0.0156	8.21	8.21	109.90	$12.53	550.65	0.161	104.39	104.39	0.0161	8.43	8.43	112.83	$12.86
On-Peak	0.14	12 PM	1.23	511.35	0.149	96.94	96.94	0.0149	7.83	7.83	104.77	$14.67	524.96	0.153	99.52	99.52	0.0153	8.04	8.04	107.56	$15.06
	0.14	1 PM	1.17	485.99	0.142	92.14	92.14	0.0142	7.44	7.44	99.58	$13.94	498.93	0.146	94.59	94.59	0.0146	7.64	7.64	102.23	$14.31
	0.14	2 PM	1.10	459.21	0.134	87.06	87.06	0.0134	7.03	7.03	94.09	$13.17	471.43	0.137	89.37	89.37	0.0137	7.22	7.22	96.59	$13.52
	0.14	3 PM	1.09	453.14	0.132	85.91	85.91	0.0132	6.94	6.94	92.85	$13.00	465.20	0.136	88.19	88.19	0.0136	7.12	7.12	95.32	$13.34
	0.14	4 PM	1.12	466.69	0.136	88.48	88.48	0.0136	7.15	7.15	95.62	$13.39	479.11	0.140	90.83	90.83	0.0140	7.34	7.34	98.17	$13.74
Mid-P	0.114	5 PM	1.17	487.88	0.142	92.49	92.49	0.0142	7.47	7.47	99.96	$11.40	500.86	0.146	94.96	94.96	0.0146	7.67	7.67	102.63	$11.70
	0.114	6 PM	1.22	507.13	0.148	96.14	96.14	0.0148	7.77	7.77	103.91	$11.85	520.63	0.152	98.70	98.70	0.0152	7.97	7.97	106.67	$12.16
Off Peak	0.077	7 PM	1.26	524.83	0.153	99.50	99.50	0.0153	8.04	8.04	107.54	$8.28	538.80	0.157	102.15	102.15	0.0157	8.25	8.25	110.40	$8.50
	0.077	8 PM	1.21	502.85	0.147	95.33	95.33	0.0147	7.70	7.70	103.03	$7.93	516.23	0.151	97.87	97.87	0.0151	7.90	7.90	105.77	$8.14
	0.077	9 PM	1.11	461.56	0.135	87.50	87.50	0.0135	7.07	7.07	94.57	$7.28	473.84	0.138	89.83	89.83	0.0138	7.26	7.26	97.09	$7.48
	0.077	10 PM	0.98	406.89	0.119	77.14	77.14	0.0119	6.23	6.23	83.37	$6.42	417.71	0.122	79.19	79.19	0.0122	6.40	6.40	85.59	$6.59
	0.077	11 PM	0.73	304.90	0.089	57.80	57.80	0.0089	4.67	4.67	62.47	$4.81	313.01	0.091	59.34	59.34	0.0091	4.79	4.79	64.13	$4.94
Total Daily											**2,047**	**$217**								**2,102**	**$222**
Total Annual Energy Cost / $												**$79,081**									**$81,186**
Total Energy Consumption /kWh											**747,225**									**767,110**	

NPV (2015)	**$6,091,780**
Total Energy Consumption (2015-75)/kWh	**57,560,276**

Appendix C

AECOM Report: *Pumping Station Upgrade Feasibility Review*

Capability

City of Hamilton

Garner Road (HD018) Pumping Station Upgrade Feasibility Review

Prepared by:

105 Commerce Valley Drive West, Floor 7
Markham, ON, Canada L3T 7W3
www.aecom.com

905 886 7022 tel
905 886 9494 fax

Project Number:

60339486

Date:

July 28, 2015

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AECOM: 2012-01-06

AECOM
105 Commerce Valley Drive West, Floor 7 905 886 7022 tel
Markham, ON, Canada L3T 7W3 905 886 9494 fax
www.aecom.com

July 28, 2015

Mr. Bill Docherty
Project Manager
77 James Street North, Suite 400
Hamilton, ON, L8H 6P4

Dear Mr. Docherty:

Project No: 60339486
Regarding: Garner Road (HD018) Pumping Station Upgrade Feasibility Review

We are pleased to submit the Garner Road (HD018) Pumping Station Upgrade Feasibility Review Report.

Should you have any comments, please do not hesitate to contact the undersigned.

Sincerely,
AECOM Canada Ltd.

Brian Sahely, M.A.Sc., P.Eng.
Senior Process Engineer/Project Manager, Water
brian.sahely@aecom.com

HE:BS
Encl.
cc: Hassan Erfanirad, Senior Project Engineer

Distribution List

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6	1	Bill Docherty, City of Hamilton

Revision Log

Revision #	Revised By	Date	Issue / Revision Description

AECOM Signatures

Report Prepared By:

Hassan Erfanirad, P.Eng.
Senior Project Engineer

Brian Sahely, M.A.Sc., P.Eng.
Senior Process Engineer/Project Manager

Report Reviewed By:

Joe Gemin, P.Eng.
Senior Consultant

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1. Introduction

1.1 Background

The Garner Road HD018 Pumping Station (PS) is located at 1131 Rymal Road (Garner Road/Highway 53) in former municipality of Ancaster (west of mountain lands). This pumping station draws water from Pressure District 6 (PD 6) and pumps to Pressure District 18 (PD 18) to keep the required pressure and water supply to this pressure zone. An in-ground Water Reservoir, HDR18, is located at the same site and provides storage water to PD 18 when required especially during high demand, emergency and fire. A process flow diagram of the HD018 PS can be found in **Appendix A**. This appendix also shows a schematic of the entire City of Hamilton water distribution system, inclusive of PD 6 and PD 18, along with elevations.

The HD018 PS was built originally in 1979 with two pumps (P1& P2) at the station. In 1983, a water reservoir HDR18 was constructed at the site and two newer pumps (P3 & P4) were installed inside the PS. This water reservoir and related pumps replaced the old Ancaster well water supply systems.

Current pumps, equipment, valves and watermains are passed their life expectancy and there is no adequate back-up and redundancy for all watermains, system components and control valves which trigger high risks to PD 18 water supply.

In May 2009, Genivar completed a *Facility Condition Report* for this PS. The report recommended immediate, intermediate, long term and future upgrade needs along with cost estimates. This report was limited to rehabilitation of the PS. Following this report in March 30, 2015, WSP completed a technical memorandum entitled *Ancaster Water Servicing Feasibility Study – Evaluation of Alternatives*. This technical memorandum discussed different alternatives for upgrades to the water supply system to PD 18 and its sub-zones. Findings and recommendations under this technical memorandum are discussed in later sections of this report.

The City of Hamilton has retained AECOM to provide a high level feasibility review of station upgrade alternatives.

This report provides a brief review of the existing system along with upgrade alternatives to the current systems to address city's concerns and risks on water supply to PD 18, as well as other pressure districts.

1.2 Objectives of this Report

The objectives of this report are as follows:

- To review the existing HD018 PS and HDR18 reservoir, including issues and risks related to these infrastructure
- To describe in detail the evaluation approach intended to be used for the development and assessment of upgrade alternatives suitable for the HD018 PS and HDR18 reservoir
- To present a review of viable treatment alternatives for this project, a detailed description of the results of the benefits evaluation, economic evaluation and cost benefit analysis
- To present the preferred upgrade alternative along with associated costs

This report excludes the costs for the construction of a new elevated tank since this is discussed further in the report by WSP, dated March30, 2015 and entitled *Ancaster Water Servicing Feasibility Study – Evaluation of Alternatives*.

1.3 Report Outline

The outline of this document is shown in Table 1.

Table 1 Report Outline

Section No.	Description
1	Presents the project background and objectives, and an outline of this report.
2	Presents a description of the existing system for Pressure District (PD) 18.
3	Presents the design criteria for PD 18 in terms of pumping and storage.
4	Presents a risk analysis of HD018 pumping station (PS) and reservoir, HDR18.
5	Presents the project objectives.
6	Presents the decision matrix and evaluation approach to be used when reviewing various alternatives for upgrading the existing PS.
7	Presents an overview of the various alternatives to be considered on this project.
8	Presents the preliminary screening of the alternatives that would be suitable.
9	Develops the screened alternatives to be further considered for detailed evaluation.
10	Presents the results of the cost evaluation of the alternatives.
11	Presents the results of the benefit evaluation of the alternatives.
12	Presents the cost benefit results and the preferred alternative.
13	Presents the sensitivity analysis and its results.
14	Presents the conclusion and recommendations along with total estimated cost for the preferred alternative.
15	Presents references for this report.

2. Description of Existing System

2.1 Distribution Hydraulics

Pumping Station HD018 (former W-H18) is designed for a hydraulic grade of 294.1 m at the station to provide a water pressure of 25 m (35.38 Psig) at the highest grade elevation of 258.1m based on an 11m calculated friction losses at a maximum hourly flow rate. As per station design report, this will provide a reasonable number of areas below 40 psig and above 100 psig (refer to Station W-H18 report prepared by Fenco Consultants Ltd. Dec 1978).

Appendix A shows a schematic of the entire distribution system in the City of Hamilton. As shown, the HD018 PS is fed directly from PD 6 and pumps directly into PD 18, which also feeds the following pressure districts:

- PD 13
- PD 14
- PD 15
- PD 22 (via HDR 00)

2.2 Site Layout

The site contains a pumping station and an in-ground water storage reservoir, HDR18, along with a valve house as show in Figure 1.

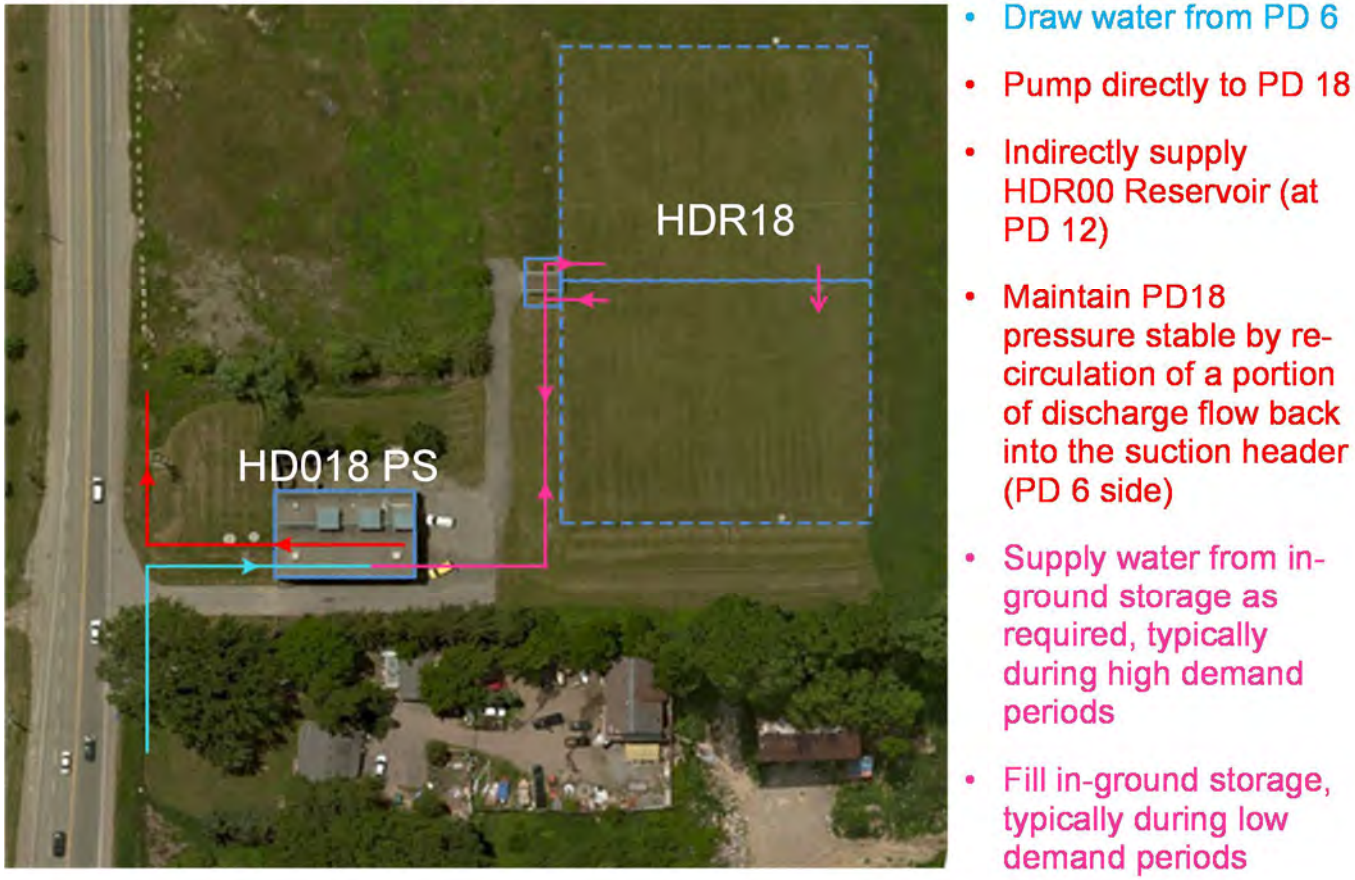


Figure 1 Site Layout of HD018 PS and HDR18

2.3 Process Schematic

Figure 2 General Process Schematic of HD018 PS and HDR18

shows a general process schematic of the single-storey, two level masonry PS and underground two-celled reservoir; while, **Appendix A** provides a detailed process schematic for the PS.

Figure 2 General Process Schematic of HD018 PS and HDR18

2.4 High Lift Pumps

HD018 PS is equipped with four (4) horizontal split case centrifugal pumps, with each pump discharge pipe containing a check valve and a motorized discharge valve **(**Figure 3). Design data of the pumps are shown in Table 2.

Given the current operation of PD 18 as a closed system, the firm capacity of HD018 is based on the two largest pumps being out-of-service, i.e., 23 ML/d.

Figure 2 shows pumps P1 and P2 to be fed by a much higher pressure (fed from PD06) to that for pumps P3 and P4, which are fed by a much lower pressure equivalent to the reservoir level. This results in two ``zones`` of high lift pumps, which adds complexity to the operation of HD018 PS, as well as produces various degrees of risks to PD 18 if there is a failure of a single component that feeds either ``zone`` of pumps, e.g., failure of the feed from PD 06 to HD018PS will result in pumps P1 and P2 to be out-of-service, thus leaving only pumps P3 and P4 in operation.

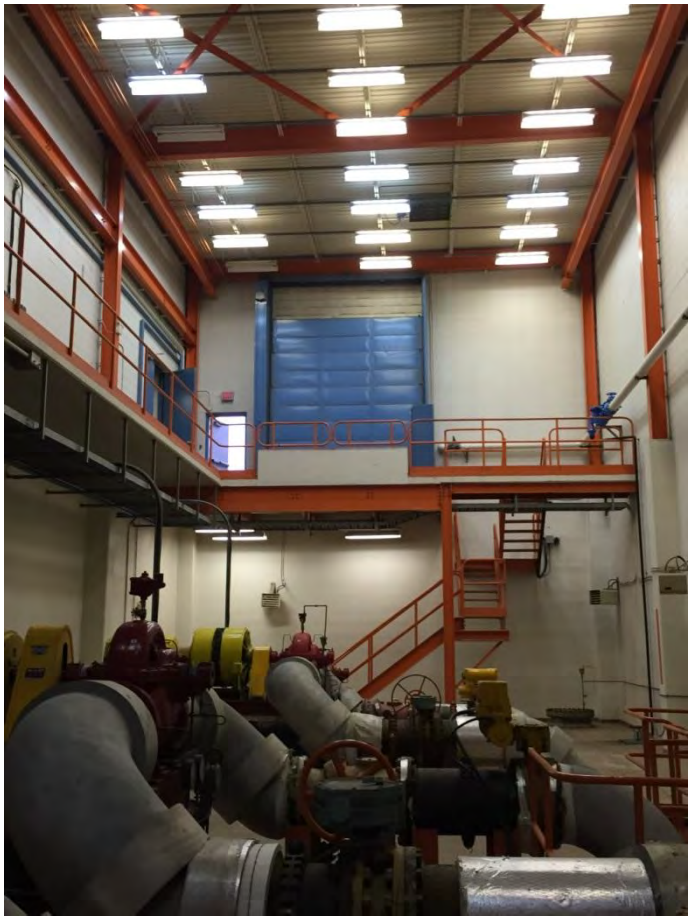



Figure 3 Pictures of HD018 Pumping Station (left) and High Lift Pumps (right)

Table 2 HD018 High Lift Pumps Design Data

Pump No.	Power	Speed		Duty Point	
	(HP)	(KW)	(rpm)	Head (m)	Flow MLD (L/s)
1	63.3	47.3	1780	33.5[1]	11.5 (130)
2	126.2	94.1	1775	25.0[1]	22.5 (260)
3 (VFD)	300	225.0	1780	58.0[1]	22.5 (260)
4	150	112.5	1780	50.0[1]	11.5 (130)

Notes:
1. Source: GENIVAR report entitled *The West Dundas Water Supply Investigation*, dated May 2009.

2.5 Station Piping and Control Valves

Two 750 mm (30 in) diameter buried watermains (one suction and discharge) extend from the building envelope to the valve chamber at the street.

HDR18 reservoir has a common fill/ draw header connected to a common suction header for all pump. Within the PS, the common fill header is equipped with an altitude valve and a motorized butterfly valve (Figure 4), with the motorized butterfly valve being operated whenever the altitude valve is not functioning properly. One small and one large pump (P1 &P2) are located on the PD-06 (higher pressure) side of the suction and the other two pumps

(P3&P4) are located on the reservoir side of the suction header, operating at a much lower pressure, as shown in Figure **2**.

Within the PS, the concrete encased pump suction header diameter is 900mm; while, the concrete encased discharge header diameter is 750mm.

Two 300mm diameter pressure reducing valves (PRVs) (Figure 4) are connected (in parallel) from the discharge header to the suction header, with both valves originally functioning as surge relief valves (SRVs). One of these PRVs has since been converted by operations staff to a flow control modulating/ pressure sustaining valve, since the speed control on pump P3 is not functioning fast enough with a sudden pressure change (also, it is the only pump with speed control).

Figure 4 Pictures of Reservoir Fill Header Motorized Butterfly Valve (left) and Altitude Valve (middle) and Station Discharge Header PRVs (right)

2.6 Standby Power

One 750 kW diesel generator provides standby power to the 600V service when a failure occurs in the power feed from the station transformer. An automatic transfer switch (ATS) starts the engine and initiates a transfer without operator intervention in the event of a power failure. The standby power system consists of a diesel generator, ATS exterior underground bulk diesel storage tank and interior diesel day tank (Figure 5).

Figure 5 Pictures of 750 kW Generator (Left), Underground Bulk Diesel Storage (Middle) and Day Tank (right)

2.7 Rechlorination System

There is a sodium hypochlorite storage tank and pump metering panel within the PS that was installed in 2005. Given residual ammonia in the water reaching the PS, sodium hypochlorite is dosed to top up the chloramine residual leaving the PS.

Figure 6 Pictures of Sodium Hypochlorite Storage Tank (left) and Pump Metering System (right)

2.8 Water Reservoir

There is an in-ground reservoir, with two cells, each having dimensions 46m (W) X 57m (L) x 6.4m (D), to give a total storage capacity of 33.2ML. Given the altitude valve opening at 3.8m and closing at 5.2m, the operating volume of the reservoir is 7.3 ML.

As discussed above, there is an altitude valve and motorized butterfly valve located on the reservoir fill header within the pumping station to control the supply of water to the reservoir – opening during low demand periods and closing during high demand periods.

There is a valve house containing a feed/draw pipe to/from each reservoir cell, with each pipe containing a manual butterfly valve and a check valve as shown in Figure 2Figure 2 General Process Schematic of HD018 PS and HDR18

above and Figure 7 below. There is also an interconnecting sluice gate between the reservoir cells. To maintain stable chloramine residuals within the water supply to PD018, the original design intent was for the north reservoir cell to be filled, with the water then flowing to the south reservoir cell via this interconnecting sluice gate, and then through the draw pipe to the PS. However, this design results in the entire reservoir system being out-of-service if any reservoir cell of valve on the feed/draw pipe was out-of-service. As a result, City operations staff has removed the function of each check valve to allow each reservoir cell to be filled and drawn from, with City operations staff stating that there has not been any issues with chloramine residuals leaving the PS.

Figure 7 Pictures of Fill/Draw Pipes and Valves Feeding the North Reservoir Cell (left) and South Reservoir Cell (right)

2.9 System operation and Process Control

The PS draws water from PD 6 and maintains water pressure for PD 18. Normal system control is provided by an Allen-Bradley CompactLogix Process Automation Controller (PAC) within the PS. This PAC is monitored and controlled automatically through the City's SCADA system, with central monitoring located at the Woodward Avenue Wastewater Treatment Plant.

The reservoir level is controlled by an altitude valve or motorized butterfly valve on the common fill header within the PS. When either valve is closed, pumps P3 and P4 draw water from the reservoir. When either valve is opened, pumps P3 and P4 draw water from PD 6 (after the pressure is reduced by the altitude valve). Pumps P1 and P2 draw water only from PD 6, thus acting as booster pumps. During periods of high demand, water is drawn from HDR18. During periods of low demand, HDR18 is filled. The operator may choose which reservoir level transmitter is used for the control of the pumps. If not, the PAC will automatically control from the level that is less.

Pumps P1, P2 and P4 are constant speed pumps; while, pump P3 is equipped with variable speed drive. All four high lift pumps are available and are operated based on downstream PD 18 pressure feedback.

During period of low demand, one of the PRVs on the discharge header modulates to maintain a constant pressure on the discharge header – this PRV discharges water back to the station suction header. There is also a PRV that acts as a surge relief valve to discharge surges back to the station suction header.

3. Design Criteria

3.1 Pumping Requirements

Table 3Error! Reference source not found. shows the water demand requirements for HD018 PS given the *Hamilton Water and Wastewater Master Plan*, dated 2006 and completed by KMK Consultants Limited.

Table 3 Water Demand Requirements for HD018 PS given 2006 Master Plan

Parameter	2001		2011		2021		2031	
	L/S	MLD	L/S	MLD	L/S	MLD	L/S	MLD
Average Day (Calculated)	82.3	7.11	96.8	8.37	125.3	10.82	137.1	11.8
Max. Day	164.6	14.2	193.6	16.7	250.6	21.7	274.2	23.7
Peak Hour	246.9	21.3	290.5	25.1	375.8	32.5	411.2	35.5
Fire Flow (per MOECC)	250.0	21.6	250.0	21.6	250.0	21.6	250.0	21.6
Max. Day + Fire Flow	**414.58**	**35.8**	**443.63**	**38.3**	**500.6**	**43.3**	**524.2**	**45.3**
Notes: 1. **Data from *Hamilton W & WW Master Plan (EA)* - KMK, 2006.**								

The Master Plan demands were calculated given fire flows per MOECC, and excluded PD 15 water demands.

A Technical Memorandum entitled *"Ancaster Water Servicing Feasibility Study – Evaluation of Alternatives"* dated March 30, 2015 (prepared by WSP) has calculated fire flows to be 200L/s as per Fire Underwriters Survey (FUS) versus 250 L/s recommended by MOECC.

Below Table 4 listed demand forecast for PD18 plus sub-zones of PD-13, PD14 and PD15 with a 200L/s fire flow.

Table 4 Water Demand Requirements for HD018 PS given Revised Design Data from 2006 Master Plan (including. PD13, PD14 and PD15)

Parameter	2011		2021		2031	
	L/S	MLD	L/S	MLD	L/S	MLD
Max. Day	202.18	17.67	260.65	22.52	283.85	24.53
Peak Hour	303.32	26.21	390.98	33.78	427.73	36.78
Fire Flow (calculated per Fire Underwriters Survey)	200	17.28	200	17.28	200	17.28
Max. Day + Fire Flow	402.18	34.75	460.65	39.80	483.85	41.81
Notes: 1. Data from *Ancaster Water Servicing Feasibility Study Technical Memorandum dated March 30, 2015*.						

Table 4 above shows the 2031 pumping requirement from HD018 to be 41.81 ML/d. As stated previously, the firm capacity of HD018 PS given a "closed" distribution system is approximately 23 ML/d with the two largest pumps out-of-service. This means that the existing HD018 PS currently does not meet the required water demands for 2031 or even 2011.

As part of Wastewater Master Plan, a study report entitled *Hamilton Airport Employment Growth District - Phase 2, dated June 2011*, was completed by Dillon-AECOM. The recommended alternative was to service future growth in this pressure zone by providing water supply from HD018 PS, along with a new elevated tank as floating storage and equalization flow for both future Growth at Ancaster and Airport. If this elevated tank was to be constructed within the distribution system, this would make PD 18 operate as an "open" distribution system. Under this scenario, the firm capacity of HD018 PS will be approximately 45.5 ML/d with the largest pump out-of-service. This pumping capacity will then be able to meet the 2031 pumping requirements of maximum day and fire flows at 41.8 ML/d per Table 4.

3.2 Storage Requirements

Table 5**Error! Reference source not found.** shows the storage requirements for PD 18. As shown, the 2031 storage requirement is 12.85 ML, which is much less than the current storage capacity of HDR18 of 33.2 ML.

Table 5 Storage Requirements for PD 18

PD 18 - Storage	2011	2021	2031
Equalization (ML)	4.42	5.63	6.13
Fire Storage (ML)	1.80	1.80	1.80
Emergency (ML)	1.56	1.86	1.98
Total (ML)	**7.78**	**9.29**	**9.91**
Notes: 1. **Fire storage is based on 200 L/s and 2.5 hours per *Ancaster Water Servicing Feasibility Study Tech Memo dated March 30, 2015*. This fire storage volume is less than suggested 4 hours storage of 250 L/s by MOECC Guidelines.**			

The storage requirement for an elevated tank (if installed and operated along with pumping station HD018) may not include fire storage as proposed by *Ancaster Water Servicing Feasibility Study - Evaluation of Alternatives Tech Memo*. The storage requirement without fire flow and for elevated tank sizing will be as per Table 6.

Table 6 Storage Requirements for the PD 18 Future Elevated Tank

PD 18 - Future Elevated Tank Storage	2031
Equalization (ML)	6.13
Fire Storage (ML)	1.80
Emergency (ML)	1.98
Total (ML)	**9.91**
Notes: 1. **Data from *Ancaster Water Servicing Feasibility Study – Evaluation of Alternatives Tech Memo* dated March 30, 2015 and completed by WSP.**	

4. Risk Analysis

A *risk register* records details of all the risks identified at the beginning and during the life of a project, their grading in terms of likelihood of occurring and seriousness of impact on the project, initial plans for mitigating each high level risk, the costs and responsibilities of the prescribed mitigation strategies and subsequent results.

A risk registry includes:

- A unique identifier for each risk
- A description of each risk and how it will affect the project
- An assessment of the likelihood it will occur and the possible seriousness/impact if it does occur (low, medium, high)
- A grading of each risk according to a risk assessment table
- Who is responsible for managing the risk
- An outline of proposed mitigation actions (preventative and contingency).

Mitigation actions are typically included in a risk register and include such things as:

- Preventative actions - planned actions to reduce the likelihood of a risk occurring and/or reduce the seriousness should it occur (What should you do now?)
- Contingency actions - planned actions to reduce the immediate seriousness of the risk if it does occur (What should you do when?)
- Recovery actions - planned actions taken once a risk has occurred to allow you to move on (What should you do after?)

Table 7 provides a description of the rating process of the identified risks.

Table 7 Rating Process for Risks

Rating for Likelihood and Seriousness for each risk			
L	Rated as Low	E	Rated as Extreme (Used for Seriousness only)
M	Rated as Medium	NA	Not Assessed
H	Rated as High		

Grade: Combined effect of Likelihood/Seriousness					
	Seriousness				
Likelihood		low	medium	high	EXTREME
	low	N	D	C	A
	medium	D	C	B	A
	high	C	B	A	A

Recommended actions for grades of risk	
Grade	**Risk mitigation actions**
A	Mitigation actions, to reduce the likelihood and seriousness, to be identified and implemented as soon as the project commences as a priority.
B	Mitigation actions, to reduce the likelihood and seriousness, to be identified and appropriate actions implemented during project execution.
C	Mitigation actions, to reduce the likelihood and seriousness, to be identified and costed for possible action if funds permit.
D	To be noted - no action is needed unless grading increases over time.
N	To be noted - no action is needed unless grading increases over time.

Change to Grade since last assessment			
NEW	New risk	↓	Grading decreased
—	No change to Grade	↑	Grading increased

Consequence Scale				
Project Objective	**MI (Minimal)**	**MO (Moderate)**	**HI (High)**	**SI (Severe)**
Capital Cost	<10% cost increase	10 –20% cost increase	20 –40% cost increase	>40% cost increase
Engineering Cost	<10% cost increase	10 –20% cost increase	20 –40% cost increase	>40% cost increase
Time	<5% time increase	5 –10% time increase	10 –20% time increase	>20% time increase
Scope	Minor areas of scope affected	Major areas of scope affected	Scope reduction unacceptable	Final design cannot be used
Quality	Minor quality degradation not affecting process treatment	Quality reduction requires client approval	Quality reduction unacceptable	Final design cannot be used

A simplified risk register (**Appendix B**) was developed for HD018 PS and HDR18 to better understand any risks associated with PD 18. The Risk Register was included in a PowerPoint Presentation and presented to the City in a Workshop on February 10, 2015. A copy of this Presentation can be found in **Appendix B** with comments incorporated into the presentation.

Appendix C provides an updated simplified risk register along with means of reducing the level of risk. Note that these risks are separate to the following:

- Risks associated with the age of all components within HD018 PS and HDR18 that were accessed in a *Facility Condition Assessment* report, dated May 2009, and completed by GENIVAR in May 2009, which identified like for like replacement requirements.

- *Risks associated with the fact that the current firm capacity of HD018 PS cannot meet current and future water demands (maximum day and fire flows), with the two largest pumps out-of-service, as explained earlier.*

5. Project Objectives

The main objectives of this project are to provide a water supply solution for PD 18 that:

1. Provides reliable (non-aged) equipment that have an extended life span
2. Ensures some level of redundancy for all components
3. Provides maximum day and fire flows at all times given the required level of redundancy of pumps at HD018 PS – either from HD018 PS/HDR18 alone, or from a combination of HD018 PS/HDR18 and an elevated tank
4. Reduces risks associated with PD 18
5. Allows an elevated tank to be constructed either now or in the future without any ``waste of any capital upgrades``

6. Evaluation Approach

6.1 Overview of the Evaluation Approach

The evaluation methodology is essential to guiding the decision making process; therefore, a well-structured and comprehensive evaluation methodology provides the basis for a decision making that is sound, defensible, traceable and in this case, consistent with the project objectives for the upgrades.

The evaluation methodology proposed is a one tier evaluation to select the preferred option. An overview of the steps that will be undertaken to identify the preferred option is outlined in Figure 8 below and described in subsequent sections of this report.

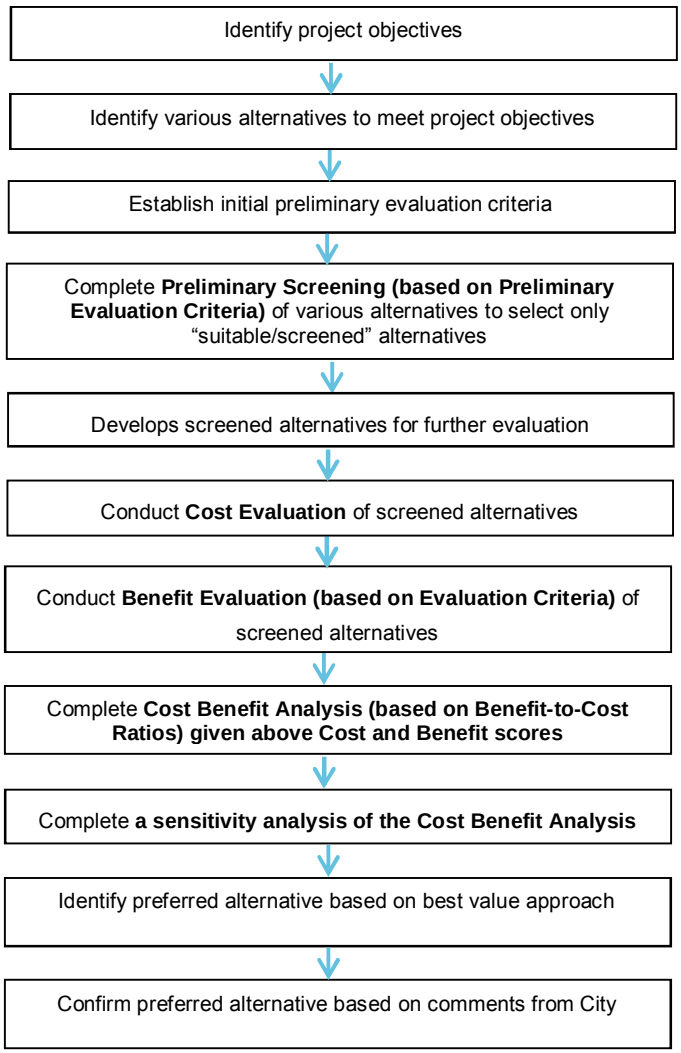


Figure 8 Overview of Evaluation Approach

6.2 Evaluation Process

Experience in other projects of similar nature has shown that development of a systematic, step-wise method for making decision at the start of the project helps to focus and clarify decision-making. The purpose of the preliminary screening is to identify only those alternatives that are considered "feasible" for this project and eliminate those that are not given the operational requirements of this project. This first step in the evaluation process helps to avoid the need to carry unrealistic alternatives when developing alternatives and further completing the detailed evaluation of the alternatives.

Alternative upgrades will then be subjected to a detailed evaluation using a weighting and ranking system that enables a systematic, rational and reproducible comparison of alternative s and identification of the preferred alternative.

As the selection of the preferred approach will need to strike a balance between cost and non-cost factors, the proposed methodology for the detailed evaluation step is four-fold:

- A decision model will be constructed including consideration of all factors or criteria not directly related to cost. Each of these factors/criteria will be expressed in a positive way, so that each alternative is rated against this model. If an alternatives rates well against that factor, it effectively measures a relative benefit offered by that option compared to others. In other words, decision modeling will be used to rate the “Benefits” offered by each option.
- In parallel, conceptual level capital and operations and maintenance (O&M) costs will be generated for each option, which in turn will be used to develop Life Cycle Costs for each option;
- Thirdly, the Benefits Score generated by the decision model will be divided by the Life Cycle Costs, to produce a “Benefit-to-Cost Ratio”. It is recommended that the option which scores the highest benefit-to-cost ratio will be the preferred option;
- Lastly, sensitivity analyses are performed on both the decision model, and the cost estimates, to check that the results wouldn’t change if changes in scoring or costs are made. This effectively verifies that any decisions made using this process are robust and defensible.

7. Identification of Various Alternatives

Table 8 identifies various alternatives initially considered to meeting the project objectives. This includes construction of a new elevated tank as an alternative as this will eliminate water supply failure risks significantly with additional flexibility, and provide water supply for future growth of Ancaster and Airport areas.

The actual feasibility of meeting these objectives will be discussed in the next section with preferred alternatives screened from this list.

Table 8 Various Alternatives to Meeting the Project Objectives

Alt. No.	Upgrades to PS	Addition of ET	Distribution System Type[1]	Spare Pumps	Pumps at HD018	No. of VFDs	Comments[2,3]
1	X		Closed Only	2/PS	4x24 ML/d	4	• Achieves firm MDF + FF w/ 2 standby pumps • Allows for no standby pumps if 1 "zone" is out-of-service
2		X	Open Only	Varies/ PS	4x12 ML/d	0	• Achieves firm MDF w/ 2 standby pumps with elevated tank to handle PHF and fire flows • Achieves firm PHF w/ 1 standby pump • Allows for no standby pump if 1 "zone" is out-of-service • Does not provide MDF+FF when the elevated tank in out-of-service and a pump is out-of-service
3	X	X	Open/ Closed	1/zone or 2/PS	4x24ML/d	2, or 4 to allow for Alt. 1	• Achieves firm MDF per "zone" • Achieves firm MDF + FF w/ 2 standby pumps • Allows for new elevated tank to be taken out-of-service with only concern being no standby pump if 1 "zone" is out-of-service
4	X	X	Open/ Closed	Varies/ PS	2x12 ML/d 2x24 ML/d	2	• Achieves firm MDF w/ 2 standby pumps with elevated tank to handle PHF and fire flows • Achieves firm PHF w/ 1 standby pump • Achieves firm MDF + FF w/ 1 standby pump • Allows for new elevated tank to be taken out-of-service with MDF+FF be achieved when one pump is out-of-service, with only concern being no standby pump if 1 "zone" is out-of-service
5	X	X	Open/ Closed	Varies/ PS	4x18 ML/d	2	• Achieves firm MDF + FF w/ 1 standby pump • Achieves firm PHF w/ 2 standby pumps • Allows for new elevated tank to be taken out-of-service with only concern being no standby pump if 1 "zone" is out-of-service

Notes:
1. Closed distribution system defined as a distribution system containing no floating storage (e.g., elevated tank); while, open distribution system defined as a distribution system containing floating storage in addition to a pumping station (with storage upstream of pumps).
2. Per **Table 4**:
    a. Maximum day flow (MDF) = 24.53 ML/d
    b. Peak hour flow (PHF) = 36.78 ML/d
    c. Fire flow (FF) = 17.28 ML/d
    d. MDF + FF = 41.81 ML/d
3. "Zone" defined as a set of pumps on different suction pressure ratings. Currently, the HD018 PS contains pumps P1 and P2 being fed water directly from PD 6 distribution pressure, and pumps P3 and P4 being fed directly from the static pressure created by HDR18 water level. Hence, if a zone is out-of-service, either P1 and P2 or P3 and P4 will be out-of-service. This adds complexity to the understanding of the redundancy of the existing HD018 PS w.r.t. pumps.

The *"Ancaster Water Servicing Feasibility Study – Evaluation of Alternatives Tech Memo dated March 30, 2015"* indicated that one of major problems of the existing system is the lack of adequate pressure at the ends of system in the high elevation areas of Ancaster (i.e. areas northwest of Wilson Street). This Tech Memo concluded that the HD018 Pumping Station cannot maintain pressures within the required range (40 to 100 psi) at the highest elevation areas located farthest from the pumping station with flows above max day demand; while low elevation areas are at risk of overs pressurization during average day demand conditions. Based on this tech memo, the low pressure issue will be mitigated by construction of a new 500 mm watermain along Garner Road parallel to the existing 400 mm feeding the southern portion of Ancaster as per 2006 Master Plan but, not resolved.

Given these stated conditions, this tech memo proposed a new booster pumping station and a new pressure district of PD25 on alternatives 3 and 4. Both of alternatives 3 and 4 were found not feasible due to high costs and alternative 1 was also not recommended by this tech memo. The Tech memo recommended alternative 2 which includes an elevated water reservoir at PD 18 as an open system similar to alternative 4 on Table **8** above.

The incapability of HD018 providing sufficient pressure to the high end locations noted by WSP Tech Memo is not detailed adequately and neither confirmed by City. Given the existing pumps are de-rated as per *Facility Condition Assessment* report (dated May 2009), pump replacements will improve the existing pumping conditions.

8. Preliminary Screening

8.1 Preliminary Evaluation Criteria

As described previously, a preliminary screening of available alternatives in **Table 8** will be carried out. Preliminary screening will be accomplished by assessing the applicability of each alternative with respect to the following preliminary evaluation criteria:

- Operation of equipment with minimal risks/maintenance requirements/hydraulic inefficiencies
- Constructability of alternative and replacement of aging existing/future equipment, while providing sufficient flows/pressure in PD 18 at all times
- Feasibility with providing some level of redundancy for all components
- An alternative is considered to be similar to another alternative that is considered to be more beneficial

If implementation of an alternative cannot be achieved due to its inability to meet any of the preliminary evaluation criteria identified above, the alternative will be eliminated from further consideration. Additionally, variations of alternatives will be allowed if this permits an alternative to proceed further.

8.2 Preliminary Screening Results

8.2.1 Operation of Equipment with Minimal Risks/Maintenance Requirements/Hydraulic Inefficiencies

Prior to reviewing operation of the alternatives with minimal risks/maintenance requirements/hydraulic inefficiencies, it is critical to understand the diameter of the suction and discharge pipes to/from the high lift pumps that are tied into the common suction and discharge headers that are concrete encased (note the difference between the pump suction and discharge pipes and the pump inlet and outlet which are typically less in diameter to that of the pump suction and discharge pipes and sized by the pump supplier). **Table 9** summarizes these diameters and the various velocities at various pump flowrates.

Table 9 Diameters and Velocities of Pump Suction and Discharge Pipes

Pumps	Pump Suction Pipe				Diameter of Pump Discharge Pipe			
	Diam. (mm)	Velocities (m/s) @ Various Flowrates			Diam. (mm)	Velocities (m/s) @ Various Flowrates		
		12 ML/d	18 ML/d	24 ML/d		12 ML/d	18 ML/d	24 ML/d
1 & 4	300	1.21	1.82	2.42	250	1.75	2.62	3.49
2 & 3	450	0.54	0.81	1.08	400	0.68	1.02	1.36

Pump suction pipes are typically designed for a maximum velocity of 1.5 m/s; while, pump discharge pipes are typically designed for a maximum velocity of 2.5 m/s. Even though these velocities for a 300 mm diameter suction pipe and 250 mm diameter discharge pipe are exceeded at a pump flowrate of 18 ML/d, they may be considered acceptable; however, these velocities at a pump flowrate of 24 ML/d are not acceptable. These high velocities increases the risk of the pumps and valves to failure and hence maintenance requirements, creation of surges upon pump shutdown and an increase in energy costs due to higher pumping requirements.

To upsize the pump suction and discharge pipes will require chipping of the concrete encased suction and discharge headers, which can pose a risk to the building structural integrity given the vibration from the chipping required. Moreover, this work will require the HD018 PS to be out-of-service for weeks given that the discharge header will need to be isolated to allow this work to be done. *As a result, alternatives 1 and 3 that require four 24 ML/d pumps, are eliminated unless these alternatives assume that a new pumping station is being constructed.*

8.2.2 Constructability of Alternative and Replacement of Aging Existing/Future Equipment, while Providing Sufficient Flows/Pressure in PD 18 at All Times

Replacing any of the valves on the pump discharge pipes will require the entire PS to be shut down which is not allowed. This results in the elimination of alternative 1, unless a new pumping station is being constructed. For all other alternatives that involve an elevated tank, the elevated tank will first need to be constructed prior to any upgrades to the existing pumping station.

8.2.3 Feasibility with Providing Some Level of Redundancy for All Components

Alternative 2 does not provide MDF+FF when the elevated tank is out-of-service and one pump is out-of-service, hence this alternative is eliminated.

There is limited space on City owned land for the installation of watermains and bypass valve chambers to provide redundancy for feed pipes to the reservoir cells, feed pipes to the pumping station from the reservoir cells, but most importantly to eliminate a two “zone” pump suction pressure system within the pumping station, which is considered a risk to PD 18 if a zone is out-of-service. As a result, unless a new pumping station is being constructed at the location of the City owned land next to the existing reservoir, an elevated tank will need to be constructed. Even if the elevated tank is to be constructed, redundancy should be provided for as many components as possible, given that the elevated tank will need to be serviced in the future, and hence will be out-of-service for an extended period of time.

8.2.4 An Alternative is considered to be Similar to Another Alternative that is considered to be more Beneficial

Alternative 5 is similar to alternative 4 given that both alternatives include an elevated tank. However, alternative 4 contains pumps at more acceptable velocities than alternative 5 (when pumps are operating at full capacity). This would avoid the issues discussed previously regarding higher velocities. *As a result, for the purpose of evaluating various alternatives in further detail, alternative 5 would be eliminated.* Nevertheless, if alternative 4 is considered to be the preferred alternative, alternative 5 should be reviewed again during detailed design.

As discussed above, alternatives 1 and 3 should be further reviewed only if a new pumping station is to be constructed (given the high velocities in the pumps suction and discharge pipes for four 24 ML/d pumps). *Given the cost impacts of constructing a new pumping station and elevated tank, alternative 3 should be eliminated*.

8.2.5 Summary

Table **10** summarizes the preliminary screening results of the various alternatives. As shown, Alternative 1 (new pumping station with no elevated tank) and Alternative 4 (new elevated tank with upgrades to existing pumping station) will be reviewed further.

Table 10 Summary of Preliminary Screening Results of Various Alternatives

Alt. No.	Upgrades to PS	Addition of ET	Distribution System Type[1]	Pumps at HD018	Preliminary Results	Shortlisted?
1	X		Closed Only	4x24 ML/d	Proceed only if new pumping station is constructed	Yes if new PS constructed
2		X	Open Only	4x12 ML/d	Eliminate since alternative does not provide MDF+FF when the elevated tank is out-of-service and one pump is out-of-service	No
3	X	X	Open/ Closed	4x24ML/d	• Considered further only if new pumping station is constructed • However, given high costs of constructing new pumping station and elevated tank, this alternative is eliminated	No
4	X	X	Open/ Closed	2x12 ML/d 2x24 ML/d	Proceed, but elevated tank will need to be constructed first prior to staging of numerous work in PS	Yes, but need detailed staging plan for work in PS
5	X	X	Open/ Closed	4x18 ML/d	Similar to alternative 4, with alternative 4 preferred given lower pipe velocities when pumps operate at full capacity, so eliminate for further analysis in this report, but reconsider during detailed design if alternative 4 is preferred	No

9. Development of Screened Alternatives

9.1 Overview

This section presents the alternatives that have been established for further consideration in the process. The alternatives presented in this section have been developed under the premise that each alternative is able to consistently meet and/or exceed the project objectives. It is expected that one of these alternatives would allow a higher overall level of performance than the other one; however, this will be examined and evaluated in detail in the succeeding sections of this memo.

9.2 Alternative A (Alternative 1 in Previous Section) - Replacement of Existing HD018 PS with a New Pumping Station and no Elevated Tank (Closed System)

This alternative will include the following:

- **New Pumping station (PS)**
  - Located on City owned land allocated for a future reservoir **(Figure 9)**
  - PS to contain four 24 ML/d variable speed pumps. With two pumps out-of-service, this station will be able to provide a firm capacity that meets MDD + FF.
  - PS to be designed in accordance with the *City of Hamilton Water Outstation Design Manual (Pumping and Storage),* dated January 15, 2015, including twinned feed and discharge headers
  - With this alternative, consideration will need to be given to connecting to the existing discharge watermain that may require a shutdown duration of up to 8 hours.
  - PS will operate only as a closed system.

- **Upgrades to the Existing Reservoir (similar concept to Figure 10)**
  - Twinning of feed pipes directly from PD 6 to the reservoir, with bypass pipes to directly feed the PS
  - Twinning of pipes from the reservoir to the PS
  - Installation of separate feed and suction pipes in each reservoir cell to provide proper recirculation within each reservoir cell with either one cell in service or two reservoir cells in service. Construction of two reservoir valve houses designated for each reservoir cell with separate feed and draw pipes.

- Replacement of pipes and valves in reservoir valve house and reservoir

Figure 9 Alternative A – Site Location of New Pumping Station

9.3 Alternative B (4 in Previous Section) – Upgrades to Existing HD018 PS along with New Elevated Tank (Open/Closed System)

This alternative will include the following:

- **New Elevated Tank (ET)**
  - Refer to *Ancaster Water Servicing Feasibility Study – Evaluation of Alternatives* Tech Memo, dated March 30, 2015, and completed by WSP for a 7.66 ML elevated tank

- **Upgrades to Existing Pumping station (PS) – refer to Figure 10 for General Schematic**
  - Replace pumps with two 12 ML/d constant speed pumps, one constant speed 24 ML/d pump and one variable speed 24 ML/d pump. With one pump out-of-service, this station will be able to provide a firm capacity that meets MDD + FF.
  - Replacement of all other process, mechanical and electrical upgrades within PS and any architectural upgrades to existing building envelope.
  - Install an additional reservoir feed pipe with altitude valve within the PS (in parallel to existing pipe).
  - Install a bypass check valve from the station suction header to discharge header to accommodate surges when the station is operating as a “booster pumping station” only
  - PS will operate primarily as an open system and secondarily as a closed system.

- **Upgrades to the Existing Reservoir**
  - Twinning of pipes between PS and reservoir

- Installation of separate feed and suction pipes in each reservoir cell to provide proper recirculation within each reservoir cell with either one cell in service or two reservoir cells in service. Construction of two reservoir valve houses designated for each reservoir cell with separate feed and draw pipes.
- Replacement of pipes and valves in reservoir valve house and reservoir

Figure 10 Alternative B - Proposed General Schematic for Upgraded Pumping Station

10. Cost Evaluation of Alternatives

10.1 Cost Assumptions

The following general assumptions were made for the alternatives:

- All equipment and material will be purchased by 2015.
- Estimates of probable capital costs have been developed based on prices obtained from suppliers and from data in AECOM's possession from projects of similar nature and scope. However, the cost estimates presented in this report may be significantly affected by a number of factors which cannot be readily forecast which include amongst others, volume of work in hand or in prospect for contractors or suppliers at the time of the tender calls, future labour contract settlements, inflation and market escalation. For this reason, the actual costs may be different from those presented in this report. However, for the purpose of a relative economic evaluation amongst all alternatives under consideration, it should be highlighted that costs for all alternatives were

calculated under the same assumptions and rationale, thus, should prices change over time, the changes would apply proportionally for all alternatives and the results of the comparative cost evaluation would remain unaltered. Additionally, all common facilities are excluded from the comparative analysis. These include site maintenance and other works

- Capital costs for the elevated tank has been excluded as this is covered by a separate scope of works discussed in a separate Tech Memo entitled *Ancaster Water Servicing Feasibility Study – Evaluation of Alternatives* dated March 30, 2015 and completed by WSP.
- This project is expected to be tendered in 2015. Inflation and escalation to account for actual expected prices at the time of tendering cannot be accounted for at this time.
- Operation and maintenance costs are considered similar for both alternatives in this evaluation, given the following:
  - Alternative B should have less operation and maintenance costs at the pumping station given the ability to pump during period of low electricity costs (filling the elevated tank) and stop pumping during period of high electricity costs (draining from the elevated tank). All other costs at the pumping station should be similar. It is difficult to calculate the amount of savings that can be recognized from this practice given that it is difficult to estimate exactly how City operations staff will operate the pumps given a priority being to maintain a certain water level within the elevated tank and supply water to PD 13, 14, 15, 18 and 22, that tends to take priority over energy rates.
  - Alternative B should have operation and maintenance costs associated with the elevated tank that is not applicable to Alternative A, i.e., costs associated with labour, heating and ventilation, lights, maintenance of equipment/valves/instruments/pipes, etc.
- All taxes (including the 13% HST) have been excluded.
- Life cycle costs have been estimated based on:
  - A 20-year amortization period
  - An inflation rate of 2% and an interest rate of 6% to give a market/discount rate of 4%.

10.2 Capital Cost Estimates

Table 11 summarizes capital cost estimates for the two alternatives.

Table 11 Capital Cost Estimate

Division	Description	Alternative A New PS w/o Elevated Tank	Alternative B Upgrades to Ex. PS (Elevated Tank Costs Excluded)
1	General Requirements (Division 1) (10% of Total Tender Sub-total minus Division 1) (excludes elevated tank Division 1)	$1,059,000	$591,000
2	Site Work including. Yard Piping and VCs	$2,321,000	$1,037,000
3-9, 15	Building (incl. Concrete Works, HVAC & Plumbing)	$3,270,800	$662,600
11	Process Equipment and Piping	$2,882,000	$2,012,000
14	Conveying Equipment	$156,000	$130,000
13, 16	Electrical & Control (incl. Emergency Gen-Set)	$1,965,000	$2,025,000
	Total Tender Sub-total	**$11,653,800**	**$6,453,600**
	Tender Provision, Cash Allowances and Contingency (15% of Tender Sub-total)	$1,748,070	$968,040
	Estimate Level of Accuracy (30% of Tender Sub-total, Provision, Cash Allowances and Contingency)	$4,020,561	$2,226,492
	Total Tender Estimate	**$17,422,431**	**$9,648,132**
	Engineering – Design and Construction (15% of above)	$2,613,365	$1,447,220
	Total Project Cost Estimate	**$20,035,796**	**$11,095,352**

10.3 Operation and Maintenance (O&M) Cost Estimates

Above explains that for comparative purposes, the operation and maintenance costs for both alternatives will be considered to be similar.

10.4 Life Cycle Cost Estimates

Given above, the 20-year life cycle cost estimates (net present value) will be identical to the capital cost estimates. This is summarized in Table 12.

Table 12 Net Present Value

Alternative No.	Upgrade Option Description	Capital Costs 2015 $Millions	O&M Costs 2015 $Millions[1]	Net Present Value 2015 $Millions
A	Replacement of Existing HD018 PS with a New PS and no Elevated Tank	$20,035,796	-	$20,035,796
B	Upgrades to Existing HD018 PS along with New Elevated Tank	$11,095,352	-	$11,095,352

Notes:

1. **Operations and maintenance (O&M) costs considered to be similar for this project as explained above.**

11. Benefit Evaluation of Alternatives

11.1 Overview

This section describes the results of the detailed benefits evaluation of the screened alternatives.

11.2 Evaluation Criteria and Weights

Two alternatives will be assessed relative to each other and evaluated against a set of pertinent criteria or factors that include constructability and operational flexibility. These factors or criteria are considered influential in the decision making. Each criterion has been weighed with a factor of 1 to 100 reflecting its perceived importance in the decision making process. The sum of all weighing totals 100. The performance of each option against each criterion is then assigned a score on a 0 to 100 basis and keeping in mind a relative comparison of the alternatives under consideration.

The proposed evaluation criteria and weighting factors to be used for the detailed evaluation of alternatives are shown in Table 13.

Table 13 Evaluation Criteria and Weights

Criteria	Weight
Comply with City's Master Plan and Future Needs	20
Constructability and Impact To Existing Operation During Construction	20
Ease of Operation and Operational Flexibility	25
Water Supply Security	30
Maintains Space for Future Reservoir on Existing Site	5
Total Maximum Score	**100**

11.3 Benefits Evaluation

The detailed evaluation process followed in this step is consistent with the evaluation methodology developed for this project and explained in detail in Section 6.2.

In general, alternatives have been assessed relative to each other and evaluated against a set of criteria intended to represent all aspects or factors of importance to identifying the preferred option. The evaluation criteria for the upgrade alternatives included five different categories (with no sub-categories).

The evaluation criteria as well as the weighting factors representing the degree of importance within the overall evaluation scheme were previously assigned based on project team judgment and past experiences in similar projects. The proposed evaluation criteria and weighting factors were presented in Table 13.

It is important to note that the decision model was constructed including consideration of all factors not directly related to costs. As such, economic considerations (capital and operations & maintenance costs) were not included as part of the evaluation criteria; however, they have been developed separately for every alternative and used during the cost benefit analysis, with results presented in succeeding sections of this report.

The evaluation methodology has been used as a basis to compare the features of each option, relative to each other, and their ability to perform under each evaluation criterion. Each option has been assessed under each criterion and a score out of 100 has been assigned against each of the evaluation criteria in the model. The assigned score represents how well the specific upgrade option meets the criterion under consideration; therefore, the alternatives have been rated such that the higher the ability to perform or meet the criterion, the higher the score assigned. The upgrade option that scored the highest has been selected as the option that provides the most "benefits" to this project.

A summary of the benefit scoring for the alternatives is shown in Table 14, and graphically represented in Figure 11. Details of the complete evaluation of the upgrade alternatives as well as the rationale upon which the scores have

been relatively assigned are presented in Table 15. The individual scores for each option were preliminarily assigned by AECOM, but will need to be reviewed and refined by City staff.

Table 14 Summary of Benefit Scores

Alternative No.	Upgrade Option Description	Benefit Score (Points out of 100)	Ranking
A	Replacement of Existing HD018 PS with a New PS and no Elevated Tank	56.0	2
B	Upgrades to Existing HD018 PS along with New Elevated Tank	82.5	1

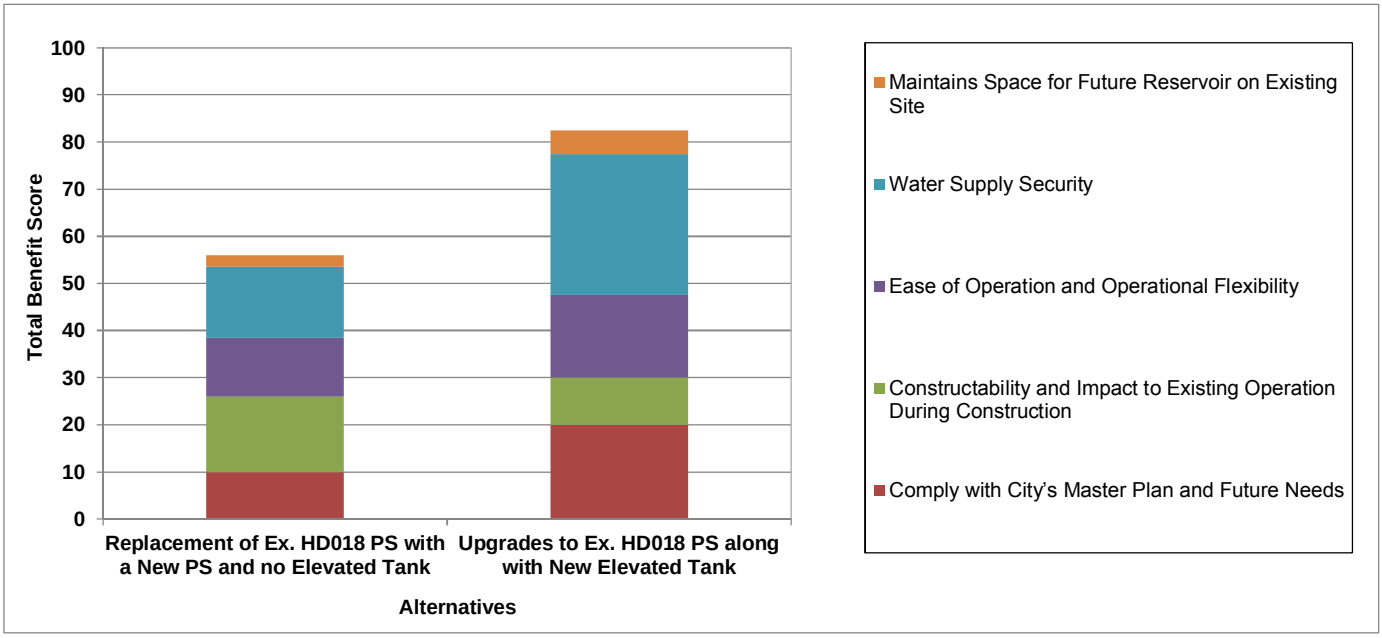


Figure 11 Benefit Evaluation Scoring Results

Table 15 Detailed Benefits Evaluation Scoring and Results

	Alternative	Comply with City's Master Plan and Future Needs			Constructability and Impact to Existing Operation During Construction			Ease of Operation and Operational Flexibility			Water Supply Security			Maintains Space for Future Reservoir on Existing Site			Total Maximum Score	Ranking
		RATIONALE	SCORE OUT OF 100	WEIGHT	RATIONALE	SCORE OUT OF 100	WEIGHT	RATIONALE	SCORE OUT OF 100	WEIGHT	RATIONALE	SCORE OUT OF 100	WEIGHT	RATIONALE	SCORE OUT OF 100	WEIGHT		
	TOTAL WEIGHT	**20**			**20**			**25**			**30**			**5**			**100**	
A	**Replacement of Existing HD018 PS with a New PS and no Elevated Tank**	Supply for future needs is limited on this alternative. This alternative is not a recommended water servicing alternative for the future growth in Ancaster and Airport area under the *Master plan and Airport Employment Growth District Report (Dillon/AECOM, 2011).*	**50**	**10**	This alternative will have the least shutdowns on the existing pumping station, as shut-downs to the existing pumping station will be limited to tie-ins of the supply and discharge watermains, which will have some challenges when connecting to the discharge watermain. Shutdowns will also be required for the existing reservoir.	**80**	**16**	This alternative will provide higher operational flexibility than the existing station by adding redundancy on major watermains and valves. Pumps will need to operate at all times and may result in recirculation (wasted energy) under low demand periods. At no time is the pumping station allowed to be shut down. The pumping station will need to operate in pressure or recirculation mode at all times. This provides more operational complexity than alternative B which requires the pumps to operate simply on elevated tank level mode. During a power outage, there is no elevated tank to provide water supply if the standby generator at the pumping station was also out-of-service.	**50**	**12.5**	This alternative will provide higher supply security than the existing station by adding redundancy on major watermains and valves. However the supply security is still limited since PD18 and other districts are dependent on the availability and operation of the pumping station.	**50**	**15**	This alternative requires construction on the existing site where a future reservoir is to be constructed. However, there is a very low probability that this reservoir will need to be constructed on-site given the existing oversize reservoir.	**50**	**2.5**	**56.0**	**2**
B	**Upgrades to Existing HD018 PS along with New Elevated Tank**	This alternative is a recommended water servicing alternative for future needs of PD 18 as well as growth in Airport area under the *Master plan and Airport Employment Growth District Report (Dillon/AECOM, 2011).*	**100**	**20**	This alternative requires numerous shutdowns of the existing pumping station. This requires the elevated tank to be constructed first, prior to certain upgrades occurring within the pumping station. Many of these upgrades (such as redundant altitude valve) will be challenging to construct.	**50**	**10**	This alternative will allow the pumps in the pumping station to simply operate on elevated tank level mode with the elevated tank providing the balancing of pressures throughout the distribution system. This alternative allows the pumping station to be shut down at any time for servicing of any component. It also allows the elevated tank to be serviced while achieving sufficient maximum day and fire flows at all times even when one pump is out-of-service. During a power outage, the elevated tank will provide immediate water supply, even if the standby generator at the pumping station was also out-of-service. Finally, this alternative requires additional operation and maintenance of another facility – an elevated tank.	**70**	**17.5**	This option will provide maximum water supply security, given a dual supply source of water through an elevated tank and pumping station. An elevated tank also reduces the potential and level of surge within the distribution system.	**100**	**30**	This alternative does not require construction or a new reservoir on the existing site.	**100**	**5**	**82.5**	**1**

12. Cost Benefit Results

The cost benefit analysis is a value analysis tool that provides an alternative means to include costs in the evaluation process. The cost benefit analysis is carried out as follows:

- A 20-year life cycle cost or Net Present Value (NPV) is calculated for each alternative. The calculated NPV for each alternative has been presented in Section 10.4 and is used for the purpose of the cost benefit analysis exercise.
- Total benefit score obtain for each alternative, as presented in Section 11.3, is carried forward.
- Total benefit scores are divided by the calculated life cycle costs, resulting in a value indicator measured in "points achieved per dollar spent". This value indicator is also referred to as benefit-to-cost ratio.

The results of the cost benefit analysis are shown in Table 16, and graphically represented in Figure 12.

Table 16 Cost Benefit Analysis Results

Alternative No.	Upgrade Option Description	Net Present Value 2015 $Millions	Total Benefit Score (Points out of 100)	Benefit-to-Cost Ratio (Points/ $Million)
A	Replacement of Existing HD018 PS with a New PS and no Elevated Tank	$20.0	56.0	2.8
B	Upgrades to Existing HD018 PS along with New Elevated Tank	$11.1	82.5	7.4

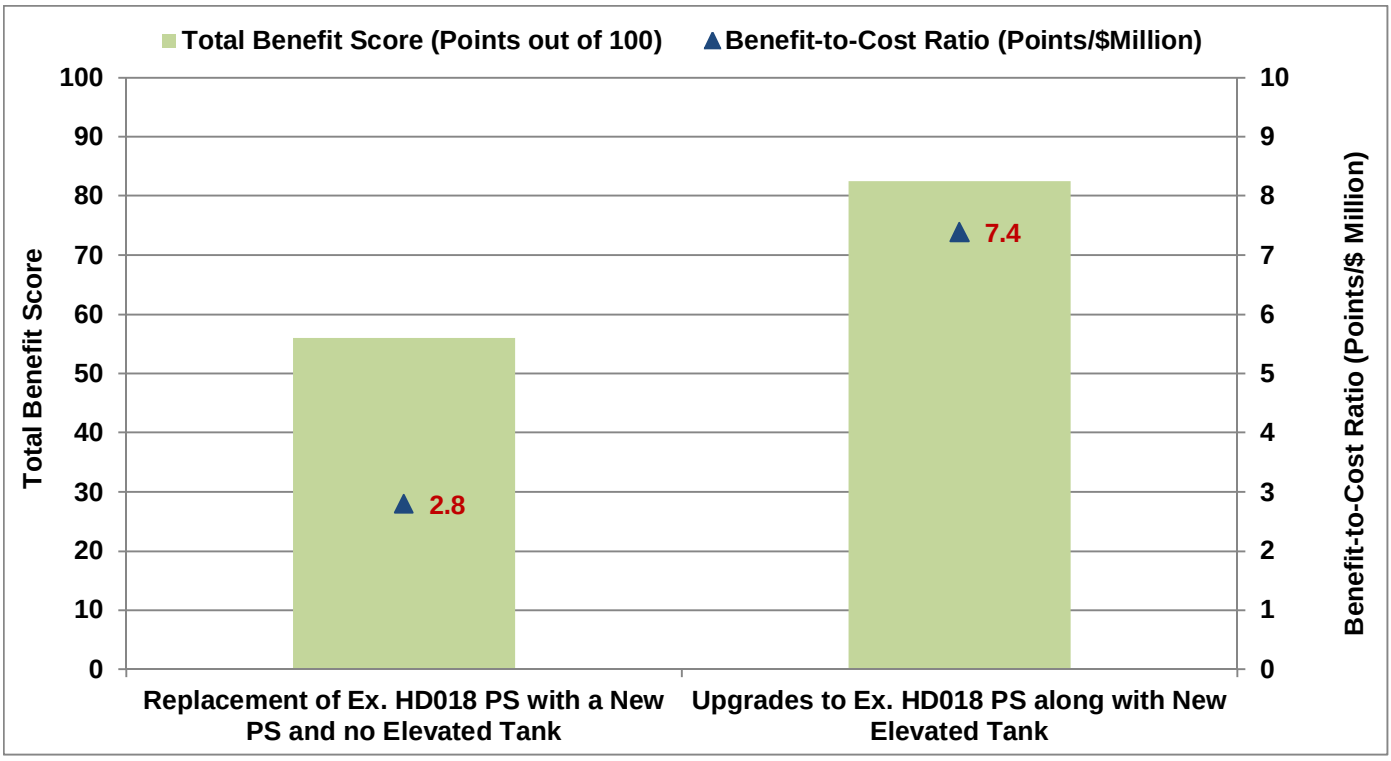


Figure 12 Cost Benefit Analysis Results

Based on the results of the cost benefit analysis presented in Table 16 and Figure 12, it is noted that **Alternative 2 – Upgrades to Existing HD018 PS along with New Elevated Tank** offers the highest benefit per dollar spent. The main advantages of Alternative 2 are:

- This alternative is a recommended water servicing alternative for future needs of PD 18 as well as growth in Airport area under the *Master plan and Airport Employment Growth District Report (Dillon/AECOM, 2011).*
- It allows for an alternative that minimizes the shutdowns required for the existing pumping station
- It provides maximum operational flexibility for operation of the pumps at low flows/electricity demands as well as during a power outage
- It reduces the potential and level of surge within the distribution system
- It provides maximum water supply security for PD13, 14, 15, 18 and 22 if the pumping station was out-of-service
- It maintains the space next to the existing reservoir for a future reservoir (even though the chance of needing this additional reservoir is highly unlikely)
- It allows the existing pumping station to be reused (however, under Alternative A, the City may wish to rehabilitate the existing pumping station as a storage facility)

13. Sensitivity Analysis

13.1 Overview

The decision model incorporated a sensitivity analysis exercise that helps examining how changing the criteria weight affects the overall scoring results. This analysis helped to assess the impacts of significant changes to the weighting of the criteria and establish whether the alternatives with the highest benefit-to-cost ratios remained the highest scoring alternatives once criteria weighting factors were purposely altered.

The model was run for additional scenarios that had different benefit weighting factors applied to different groups of evaluation criteria. The new scenarios were set up so that they reflect conditions very different to what was originally developed. This allowed the project team to observe whether the changes had an effect on the original results, which in turn provide a good indication of whether the originally preliminary preferred option favours one set of criteria over the other.

13.2 Sensitivity Analysis Results given Different Evaluation Criteria Weights

The original and additional scenarios under which the sensitivity analysis was run for the upgrade alternatives is described in Table **17**.

Table 17 Benefit Criteria Weights for Sensitivity Analysis

Primary Criteria Group	Scenario No.1 – Original	Scenario No.2	Scenario No.3
	Original Weighting	Tipped Weighting	Tipped Weighting
Comply with City's Master Plan and Future Needs	20	5	15
Constructability and Impact To Existing Operation During Construction	20	10	15
Ease of Operation and Operational Flexibility	25	40	35
Water Supply Security	30	40	35
Reliance on Pumping	5	5	0
Total Maximum Score	**100**	**100**	**100**

The alternate weights for scenarios No. 2 and No. 3, as shown in Table 17, were applied to the benefit scores presented in Table 15. The NPV previously calculated for these alternatives as shown in Table **12** were used for the calculation of the revised Benefit-to-Cost ratio, with results tabulated in Table 18 and graphically represented in Figure 13.

Table 18 Sensitivity Analysis Results - Benefits-to-Cost Ratio Results

Alternative No.	Upgrade Option	Scenario No.1 (Original Weighting)				Scenario No.2				Scenario No.3			
		Net Present Value 2015 $Millions	Total Benefit Score (Points out of 100)	Benefit-to-Cost Ratio (Points/$ Million)	Overall Ranking	Net Present Value 2015 $Millions	Total Benefit Score (Points out of 100)	Benefit-to-Cost Ratio (Points/$ Million)	Overall Ranking	Net Present Value 2015 $Millions	Total Benefit Score (Points out of 100)	Benefit-to-Cost Ratio (Points/$ Million)	Overall Ranking
A	Replacement of Existing HD018 with a New Pumping Station and no Elevated Tank	$20.0	56.0	2.8	2	$20.0	53.0	2.6	2	$20.0	54.5	2.7	2
B	Upgrades to Existing HD018 PS along with New Elevated Tank	$11.1	82.5	7.4	1	$11.1	83.0	7.5	1	$11.1	82.0	7.4	1

.

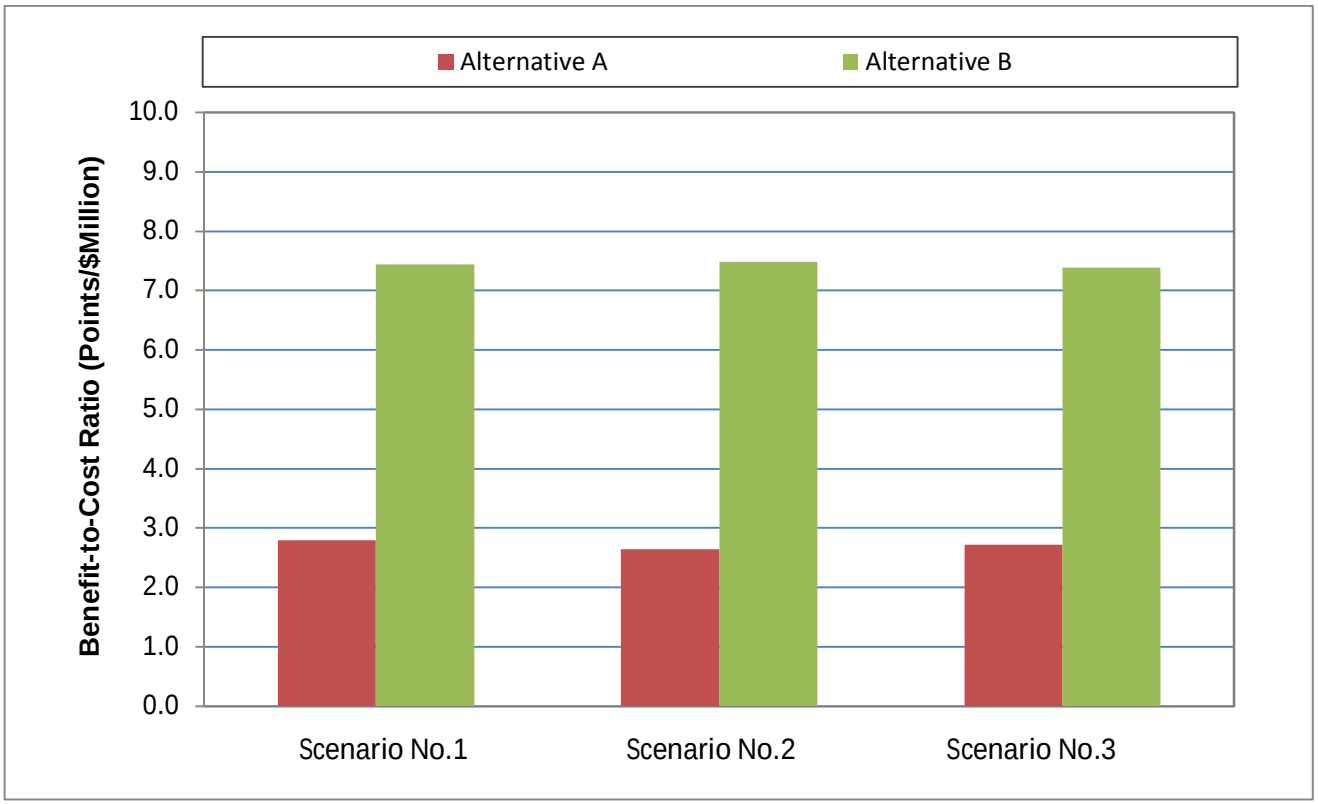


Figure 13 Sensitivity Analysis Results – Benefits-to-Cost Ratio Results (50% Technical/50% Cost)

From the results obtained in the sensitive analysis exercise, it can be concluded that under any of the three different scenarios, the preferred alternative is **Alternative B - Upgrades to Existing HD018 PS along with New Elevated Tank**, which tends to have a much higher Benefit-to-Cost ratio when operational flexibility and water supply security weightings increase.

13.3 Sensitivity Analysis with 80% Technical and 20% Cost Weight

Above benefit-to-cost analysis was conducted by simply dividing the benefit scores by the NPV. This results in an evaluation closely based on equal technical and cost weights, i.e., 50% technical and 50% cost weight. This is similar to how the City of Hamilton conducts engineering request for proposals (RFPs).

Various municipalities in Ontario conduct RFP evaluations and equipment pre-selection/pre-purchase evaluations based on 80% technical and 20% cost weight, recognizing the fact that technical value can exceed cost impacts. A sensitivity analysis with this weight difference was conducted with the results plotted in Figure 14. As shown, Alternative B was still considered the preferred alternative.

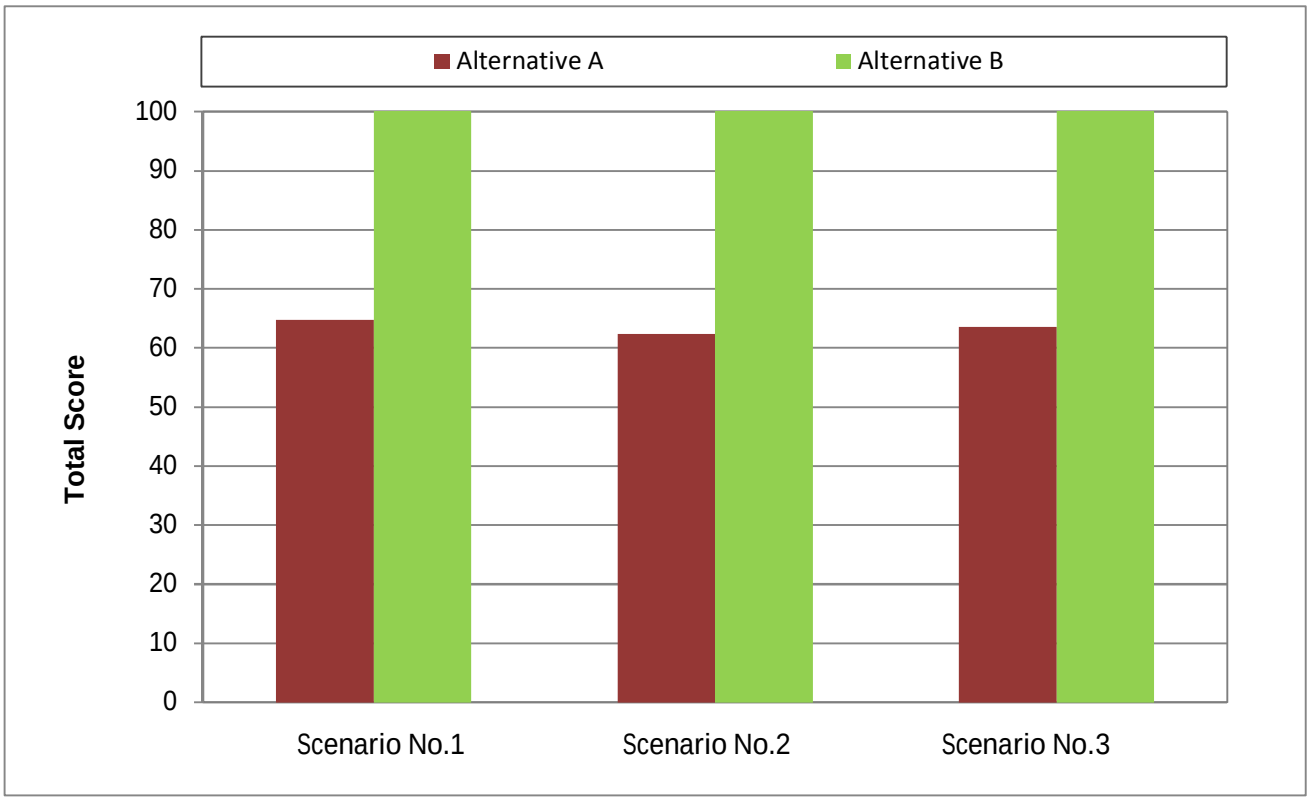


Figure 14 Sensitivity Analysis Results – Benefits-to-Cost Ratio Results (80% Technical/20% Cost)

13.4 Summary

The results of the sensitivity analysis show that the preferred alternative is **Alternative B - Upgrades to Existing HD018 PS along with New Elevated Tank**.

14. Conclusions & Recommendations with Costs

14.1 Conclusion and Recommendations

A detailed review and evaluation of upgrade alternatives were conducted for the HD018 PS upgrades. The evaluation results concluded the following:

- The preferred alternative is Alternative B - Upgrades to Existing HD018 PS along with New Elevated Tank.
- The second preferred alternative is Alternative A - Replacement of Existing HD018 with a New Pumping Station and no Elevated Tank.

With HD018 PS being a critical source of water supply to PD13, 14, 15, 18 and 22 and future growth of Airport Areas, it is recommended that one of these alternatives proceed to reduce risks of various failures in this system.

It should be noted that if alternative B is to proceed further, then additional detailed investigations, along with a constructability review of upgrades on the existing site should be conducted. This includes the following:

- Level of redundancy to be provided for suction and discharge headers, etc., considering space limitations on-site, the suction and discharge headers are at the same elevations and the capability to connect a twinned discharge header to the discharge watermain without shutting down the pumping station
- Location of new valve houses

14.2 Cost

Table **11** provided a breakdown of the capital cost for alternative B, with the total cost estimate to be approximately **$11.1 million**, which excludes the cost for a new elevated tank (covered in Tech Memo entitled Ancaster Water Servicing Feasibility Study – Evaluation of Alternatives, WSP, March 30, 2015) and excludes taxes.

15. References

The following documents and drawings were referenced in this briefing document:

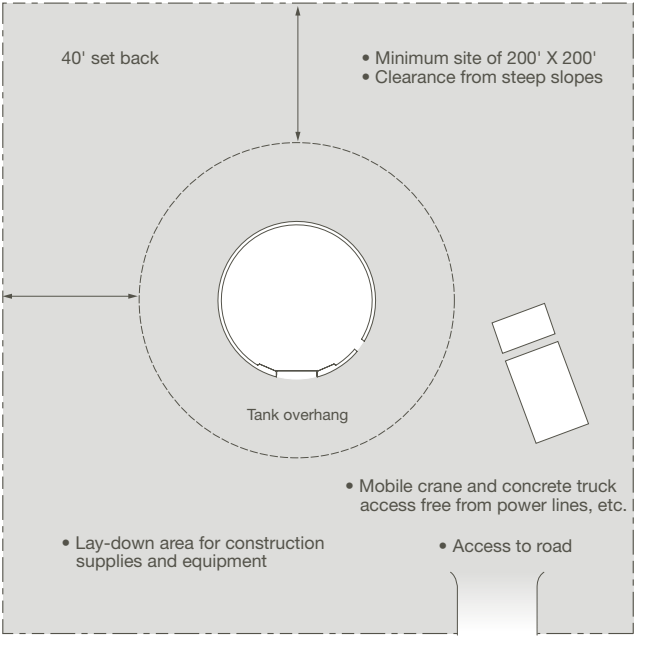
1. Preliminary Engineering Report- Pumping Station W-H18, Fenco Consultants Ltd, Dec 1978.
2. Garner Road HD018 Pumping Station- Facility Condition Assessment, Genivar, May 2009.
3. Ancaster Water Servicing Feasibility Study – Evaluation of Alternatives Technical Memorandum, WSP, March 30, 2015.

Appendix D

Typical Lot Size Requirements for an Elevated Water Reservoir & List of Recent Elevated Water Reservoir Projects

Siting

A preferred site size is in the range of 200 feet square. This provides adequate room for delivery, material storage and set-up of equipment such as cranes. Smaller sites are feasible, but require specific consideration of access, grades, trees, overhead restrictions, adjacent land use and existing facilities, etc.



LANDMARK STRUCTURES CO.
LIST OF COMPOSITE ELEVATED WATER STORAGE PROJECTS
SUCCESSFULLY COMPLETED IN THE PAST FIVE YEARS

Location	Year Bid	Size	Owner	Consulting Engineer	Substantial Completion Date
Riverview, NB ***Elevated Storage Tank***	2006	0.99 MIG	**Town of Riverview** 30 Honour House Court Riverview, NB E1B 3Y9 Tel: (506) 387-2020 Fax: (506) 387-2033 Mike Ouellet, Project Engineer mouellet@town.riverview.nb.ca	**Touchie Engineering** 860 Main Street, Suite 801 Moncton, NB E1C 1G2 Tel: (506) 857-8525 Fax: (506) 858-5972 Bruce Buchanan, P. Eng. bbuchanan@touchieengineering.nb.ca	04/07
Tilbury, ON ***Elevated Water Storage Tank***	2006	1.360 MIG	**Chatham-Kent PUC** P.O. Box 640, 315 King St. W. Chatham, ON N7M 5K8 Tel: (519) 360-1998 Fax: (519) 352-3432 Rob Bernardi robbe@chatham-kent.ca	**Totten Sims Hubicki Associates** 300 Water St. Whitby, ON L1N 9J2 Tel: (905) 668-9363 Fax: (905) 668-0221 Joe Peristy, P. Eng. jperisty@tsh.ca	08/07
Saugeen, ON ***Elevated Storage Reservoir***	2006	0.250	**Saugeen First Nation** 6493 Highway #21, R. R. 1 Southampton, ON N0H 2L0 Tel: (519) 797-2781 Fax: (519) 797-2978 Richard Nacarrow, Project Manager mancarrow@bmts.com	**First Nations Engineering Services** 1786 Chiefswood Road Ohsweken, ON N0A 1M0 Tel: (519) 445-0040 Fax: (519) 445-4254 Justin Gee, P.Eng. / Claudio Micelli jgee@fnesl.ca cmicelli@fnesl.ca	11/07
East Woodstock, ON ***Elevated Water Tower***	2007	1.166	**County of Oxford** 21 Market Square, P. O. Box 397 Woodstock, ON N4S 7Y3 Tel: (519) 539-9800 Fax: (519) 421-2207 Dadean Assam, P. Eng., Const. Manager dassam@county.oxford.on.ca	**R. V. Anderson Associates Limited** 557 Southdale Road East, Suite 200 London, ON N6E 1A2 Tel: (519) 681-9916 Fax: (519) 681-0899 David M. Evans, P. Eng., Project Manager devans@rvanderson.com	05/08
Plattsville, ON ***Elevated Water Tower***	2007	0.402	**County of Oxford** 21 Market Square, P. O. Box 397 Woodstock, ON N4S 7Y3 Tel: (519) 539-9800 Fax: (519) 421-2207 Dadean Assam, P. Eng., Const. Manager dassam@county.oxford.on.ca	**R. J. Burnside & Associates Limited** 292 Speedvale Avenue West, Unit 7 Guelph, ON N1H 1C4 Tel: (519) 823-4995 Fax: (519) 836-5477 David Paetz, P. Eng. david_paetz@rjburnside.com	09/08
North Richmond Hill ***Elevated Tank*** ***Bloomington Road West***	2007	1.661	**Regional Municipality of York** 17250 Yonge Street Newmarket, ON L3Y 6Z1 Tel: (905) 895-1231 Fax: (905) 895-3768 Shivan Narine, Project Manager shivan.narine@york.ca	**UMA Engineering Ltd.** 1099 Kingston Road, Suite 200 Pickering, ON L1V 1B5 Tel: (905) 837-0314 Fax: (905) 837-0553 Matthew Bennett, Sr. Project Inspector matthew.bennett@uma.aecom.com	09/08

LANDMARK STRUCTURES CO.
LIST OF COMPOSITE ELEVATED WATER STORAGE PROJECTS
SUCCESSFULLY COMPLETED IN THE PAST FIVE YEARS

Location	Year Bid	Size	Owner	Consulting Engineer	Substantial Completion Date
Kindersley, SK ***Water Tower***	2007	0.726	**Town of Kindersley** 106-5th Ave. E., P.O. Box 1269 Kindersley, SK S0L 1S0 Tel: (306) 463-2675 Fax: (306) 463-4577 Ed Haubrich ed.h@kindersley.ca	**Associated Engineering Ltd.** 1-2225 Northridge Drive Saskatoon, SK S7L 6X6 Tel: (306) 653-4969 Fax: (306) 242-4904 Eric Gaudet gaudete@ae.ca	6/09
Sudbury, ON ***Onaping/Levack Elevated Water Storage Tower***	2008	0.528	**City of Greater Sudbury** 200 Brady Street Sudbury, ON P3A 5P3 Tel: (705) 674-4455 Fax: (705) 673-5171 Richard Legault, Projects Design Section richard.legault@greatersudbury.ca	**Dennis Consultants** 436 Westmount Avenue, Unit 6 Sudbury, ON P3A 5Z8 Tel: (705) 560-5555 Fax: (705) 560-5822 Shawn Scott, P. Eng. sscott@rvanderson.com	11/09
Oromocto, NB ***Elevated Water Storage Tank***	2008	0.350	**Town of Oromocto** 4 Doyle Drive Oromocto, NB E3E 2V1 Tel: (506) 357-4400 Fax: (506) 357-2266 R. W. McPhail, Public Works Supt. rwmcphail@oromocto.ca	**Project Engineering Ltd.** 778 King Street Fredericton, NB E3B 1G2 Tel: (506) 450-2930 Fax: (506) 451-0415 Gaylon R. Giggie. P.Eng. ggiggie@projectengineering.ca	03/09
Tracadie Sheila, NB ***New Water Reservoir***	2008	0.530	**Town of Tracadie-Sheila** 3620 Principal Street Tracadie-Sheila, NB E1X 1G5 Tel: (506) 394-4020 Fax: (506) 394-4025 Denis Poirier	**Roy Consultants Group** 3655 Principal Street Tracadie-Sheila, NB E1X 1G5 Tel: (506) 395-6166 Fax: (506) 395-1123 Bruce Comeau, P.Eng. bruce.comeau@grouperoy.com	10/09
Moncton, NB ***North West Zone Elevated Water Storage Tank***	2008	1.238	**City of Moncton, Engineering Dept.** 655 Main Street Moncton, NB E1C 1E8 Tel: (506) 853-3525 Fax: (506) 853-3543 Ensor Nicholson, P. Eng., Dir. Water Systems ensor.nicholson@moncton.ca	**Crandall Engineering Ltd.** 1077 St. George Blvd., Suite 400 Moncton, NB E1E 4C9 Tel: (506) 857-2777 Fax: (506) 857-2753 Joe Kileel, P. Eng. jik@crandallengineering.ca	10/09
Kapuskasing, ON ***Water Storage Tower***	2008	1.000	**Corporation of the Town of Kapuskasing** 88 Riverside Drive Kapuskasing, ON P5N 1B3 Tel: (705) 335-2341 Fax: (705) 337-1741 Yves Labelle, Public Works Director/CBO ydlabelle@ntl.sympatico.ca	**Gabel Engineering** 6 Circle Street Kapuskasing, ON P5N 1T3 Tel: (705) 335-5450 Fax: (705) 335-5451 Richard Gabel, P.Eng. gabeleng@ntl.sympatico.ca	11/09

LANDMARK STRUCTURES CO.
LIST OF COMPOSITE ELEVATED WATER STORAGE PROJECTS
SUCCESSFULLY COMPLETED IN THE PAST FIVE YEARS

Location	Year Bid	Size	Owner	Consulting Engineer	Substantial Completion Date
Port Hope, ON ***Elevated Water Storage Tank***	2008	0.660	**Municipality of Port Hope** 56 Queen Street, P. O. Box 117 Port Hope, ON L1A 3V9 Tel: (905) 885-4544 Fax: (905) 883-7698 Ed Symons, Water Distribution Supt.	**R. V. Anderson** 2001 Sheppard Avenue East, Ste 400 Toronto, ON M2J 4Z8 Tel: (416) 497-8600 Fax: (416) 497-0342 Ken Collicott, P.E. kcollicott@rvanderson.com	11/09
Caledon, ON ***Mayfield West Elevated Tank***	2008	2.000	**Region of Peel** 10 Peel Centre Drive Brampton, ON L6T 3Y3 Tel: (905) 791-7800 Fax: William Turner, Project Manager turnerw@peelregion.ca	**Genivar Ontario Inc.** 606 Cochrane Drive, Suite 500 Markham, ON L3R 5K3 Tel: (905) 475-7270 Fax: (905) 475-5994 Brian Barber, P. E. bbarber@macviro.com	05/10
Bayfield, ON ***Elevated Water Storage Tank***	2008	0.880	**Municipality of Bluewater** 14 Mill Avenue, Box 250 Zurich, ON N0M 2T0 Tel: (519) 236-4351 Fax: (519) 565-5317 Jim Bryson, General Manager, Mun. Services j.bryson@town.bluewater.on.ca	**B. M. Ross and Associates Limited** 62 North Street Goderich, ON N7A 2T4 Tel: (519) 524-2641 Fax: (519) 524-4403 Richard Anderson, P. Eng. randerson@bmross.net	02/10
Waterdown, ON ***Waterdown North Elevated Water Storage Tank***	2009	1.760	**MC2 Homes Inc.** 1700 Langstaff Road, Suite 2003 Concord, ON L4K 3S3	**J & M Structural** 34 Cammay Ave. Dundas, ON L9H 6M5 Tel: (905) 628-0484 Fax: (905) 628-8349 Jan Hudoba, P. Eng.	09/10
Petawawa, ON ***Water Storage Reservoir CFB Petawawa***	2009	1.000	**Defence Construction** S/Sgt McLaughlin Bldg S-111 C Block, Rm -152, Menin Road CFB Petawawa, Petawawa, ON K8H 2X3 Tel: (613) 687-5511 x 6987 Fax: (613) 588-6448 Myles A. Wagner, Contract Coordinator Myles.Wagner@dcc-cdc.gc.ca	**Jp2g Consultants Inc.** 12 International Drive Pembroke, ON K8A 6W5 Tel: (613) 735-2507 Fax: (613) 735-4513 Ardon Erel, P. Eng. Ardon@jp2g.com	12/10
Woodstock, ON ***North West Elevated Water Reservoir***	2009	0.800	**County of Oxford** 21 Reeve Street, P. O. Box 1614 Woodstock, ON N4S 7Y3 Tel: (519) 539-9800 Fax: (519) 421-4711 Dadean Assam, Const. Manager dassam@oxfordcounty.ca	**R. J. Burnside & Associates Limited** 15 Townline Orangeville, ON L9W 3R4 Tel: (519) 941-5331 Fax: (519) 941-8120 Darrell Pink, C.E.T. darrell.pink@rjburnside.com	08/10

LANDMARK STRUCTURES CO.
LIST OF COMPOSITE ELEVATED WATER STORAGE PROJECTS
SUCCESSFULLY COMPLETED IN THE PAST FIVE YEARS

Location	Year Bid	Size	Owner	Consulting Engineer	Substantial Completion Date
Sackville, NB ***Elevated Storage Tank***	2009	0.550	**Town of Sackville** 110 Main Street Sackville, NB Tel: (800) 249-2020 Fax: (506) 364-4978 George Woodburn, Dir. Of Eng. & Public Work engineer@sackville.com	**Touchie Engineering** 860 Main Street, Suite 801 Moncton, NB E1C 1G2 Tel: (506) 857-8525 Fax: (506) 858-5972 Bruce Buchanan, P. Eng. bbuchanan@touchieengineering.nb.ca	07/10
Grand Falls, NB ***New Elevated***	2009	0.500	**Town of Grand Falls** 131 Pleasant Street, Suite 200 Grand Falls, NB E3Z 1G6 Tel: (506) 475-7777 Fax: (506) 475-7779 Peter Michaud, General Director tgf@nbnet.nb.ca	**Roy Consultants Ltd.** 45, 34th Avenue Edmundston, NB E3V 2T3 Tel: (506) 737-9730 Fax: (506) 737-9737 Georges Roy, P. Eng. georges.roy@grouperoy.com	10/10
New Maryland, NB ***Elevated Water Storage Reservoir***	2009	0.500	**Village of New Maryland** 584 New Maryland Highway New Maryland, NB E3C 1K1 Tel: (506) 451-8508 Fax: (506) 450-1605 Cynthia Geldhart, CAO/Clerk cynthia.geldhart@vonm.ca	**Opus International Consultants** 80 Bishop Drive Fredericton, NB E3C 1B2 Tel: (506) 451-1442 Fax: (506) 450-4838 Gaylon R. Giggie, P. Eng. gaylon.giggie@opusinternational.ca	01/11
Richmond Hill, ON ***PD 9 Elevated Tank No. 2 Coon's Road***	2009	1.660	**Regional Municipality of York** 17250 Yonge Street Newmarket, ON L3Y 6Z1 Tel: (905) 830-4444, ext 5011 Fax: (905) 830-6927 John Mabira, P. Eng., Project Manager john.mabira@york.ca	**Conestoga-Rovers & Associates** 651 Colby Drive Waterloo, ON N2V 1C2 Tel: (519) 884-0510 Fax: (519) 884-5256 Chris Hunter, P. Eng., PMP chunter@craworld.com	08/11
Moose Deer Point ***Elevated Storage Tank***	2009	0.160	**Moose Deer Point First Nation** P. O. Box 119, 3719 Twelve Mile Bay Road Mactier, ON P0C 1H0	**Neegan Burnside** 15 Townline Orangeville, ON L9W 3R4 Tel: (519) 941-1161 Fax: (519) 941-8120 Jeff Paznar jeff.paznar@jburnside.com	11/10
South Huron, ON ***Huron Park Elevated Tank***	2009	0.594	**Municipality of South Huron** 322 Main Street South, Box 759 Exeter, ON N0M 1S0 Tel: (519) 235-0310 Fax: (519) 235-3304 Don Giberson, Environmental Services Dir. d.giberson@town.southhuron.on.ca	**Gamsby and Mannerow Limited** 255 Woodlawn Road West, Suite 210 Guelph, ON N1H 8J1 Tel: (519) 824-8150 Fax: (519) 824-8089 Colin Wiebe, MaSc. cwiebe@gamsby.com	12/10

LANDMARK STRUCTURES CO.
LIST OF COMPOSITE ELEVATED WATER STORAGE PROJECTS
SUCCESSFULLY COMPLETED IN THE PAST FIVE YEARS

Location	Year Bid	Size	Owner	Consulting Engineer	Substantial Completion Date
Minden, ON ***Elevated Tank*** ***Phase 2***	2010	0.330	**Township of Minden Hills** 7 Milne Street Minden, ON K0M 2K0 Tel: (705) 286-1260 Fax: (705) 286-4917 Peter Brown, CET	**D. M. Wills Associates Limited** 150 Jameson Drive Peterborough, ON K9J 0B9 Tel: (705) 742-2297 Fax: (705) 741-3568 John Sayles, Construction Manager jsayles@dmwills.com	09/11
Clarence-Rockland, ON ***Cheney Water Storage Tank***	2010	0.330	**City of Clarence-Rockland** 1560 Laurier Street Rockland, ON K4K 1P7 Tel: (613) 446-6022 Fax: (613) 446-1497 Yves Rousselle, Director of Physical Services yrouselle@clarence-rockland.com	**CH2m Hill** 1101 Prince of Wales Drive, Suite 330 Ottawa, ON K2C 3W7 Tel: (613) 723-8700 Fax: Andre Bourque, P. Eng. andre.bourque@ch2m.com	09/11
Glencoe, ON ***Elevated Tank***	2010	0.800	**Municipality of Southwest Middlesex** 153 McKeller Street Glencoe, ON N0L 1M0 Tel: (519) 287-2015 Fax: (519) 287-2359 Jaime Francisco, Public Works Manager jfrancisco@southwestmiddlesex.ca	**The Thompson Rosemount Group** 1-367 Woodlawn Road West Guelph, ON N1H 7K9 Tel: (519) 827-1453 Fax: (519) 827-1483 James Witherspoon, P. Eng. jwspoon@trg.ca	TBA
Alexandria, ON ***Water Tower***	2010	0.660	**Township of North Glengarry** 90 Main Street South Alexandria, ON K0C 1A0 Tel: (613) 525-1110 Fax: (613) 525-1649 Andre Bachand, Public Works Manager	**The Greer-Galloway Group** 1620 Wallbridge-Loyalist Road Belleville, ON K8N 4Z5 Tel: (613) 966-3068 Fax: (613) 966-3087 Tony Guerrera, P. Eng. tguerrera@greergalloway.com	07/11
Fergus, ON ***North Sector Water Tower***	2010	0.750	**Township of Centre Wellington** 1 MacDonald Square, P. O. Box 10 Elora, ON N0B 1S0 Tel: (519) 846-9691 Fax: (519) 846-2825 Wesley Snarr	**Triton Engineering Services Limited** 105 Queen Street West, Unit 14 Fergus, ON N1M 1S6 Tel: (519) 843-3920 Fax: (519) 843-1943 Oz DiCarlo, P. Eng., Project Engineer odicarlo@tritoneng.on.ca	08/11

Gustavo Arvizu

From: Cardwell, Ken [kcardwell@teamlandmark.com]
Sent: Friday, January 25, 2013 10:58 AM
To: Gustavo Arvizu
Subject: RE: ET Information

Categories: Useful Stuff

See below

From: Gustavo Arvizu [mailto:Gustavo.Arvizu@genivar.com]
Sent: Friday, January 25, 2013 10:35 AM
To: Cardwell, Ken
Subject: RE: ET Information

Thank you Ken.

For the tree tanks you listed, do you have the heights?

Thanks again.

From: Cardwell, Ken [mailto:kcardwell@teamlandmark.com]
Sent: Friday, January 25, 2013 10:28 AM
To: Gustavo Arvizu
Subject: RE: ET Information

Gustavo, I looked up some recent bid results of tanks of similar sizes.

Take this info for what it is worth (not much really) as each job and location is so different.

No 2 jobs are identical and no 2 job have the same infrastructure requirements and costs.

Waterdown, ON	2009	1.760 IG	$ 5.640 M	112 ft
Kingsville, ON	2010	1.500 IG	$ 5.600 M	121 ft
Waterloo, ON	2011	1.580 IG	$ 6.836 M	136 ft

The city of Hamilton has numerous elevated tanks(Waterdown, Binbrook, Carlisle, Freelton) and have additional future elevated tanks on the books for Binbrook East and Waterdown South.

I have a hard time thinking they would do anything different than an elevated tank in Ancaster.

If aesthetics is the issue you can consider:

- Exterior paint color to match neighboring structures
- Logos and lettering
- Night lighting
- Architectural enhancements to the tank
- Pedestal rustications or not?
- Concrete profile

- Tank geometry

We can go on and I can provide photos of previous installations.

Hope this helps.

From: Gustavo Arvizu [mailto:Gustavo.Arvizu@genivar.com]
Sent: Monday, January 21, 2013 10:28 AM
To: Cardwell, Ken
Subject: ET Information

Good morning Ken,

As discussed, we would like to get a list of recent tank installations Landmark has done in Ontario including the capital cost, capacity, height and any other information that you consider relevant to understanding the difference in capital cost. The Ancaster tank is going to be in the 8 to 9 ML range so please make sure you include info on a range of sizes including your largest installations.

Also, a client is looking to update their asset management plan and he is looking for the historical capital costs for the Embrun ET (built 1984), the Russell ET (1988) and the Marionville ET (built 1990s). He thinks these were built by Landmark. Would you be able to provide these costs?

If you can get this information by the end of this week, that would be great.

Thank you,

Gustavo

GENIVAR
Gustavo Arvizu, P. Eng., M. Eng., LEED® AP | Project Manager - Infrastructure Management and Planning
GENIVAR
Direct: (905) 475-8727 ext. 18346
Cell: (416) 272-1519 | www.GENIVAR.com
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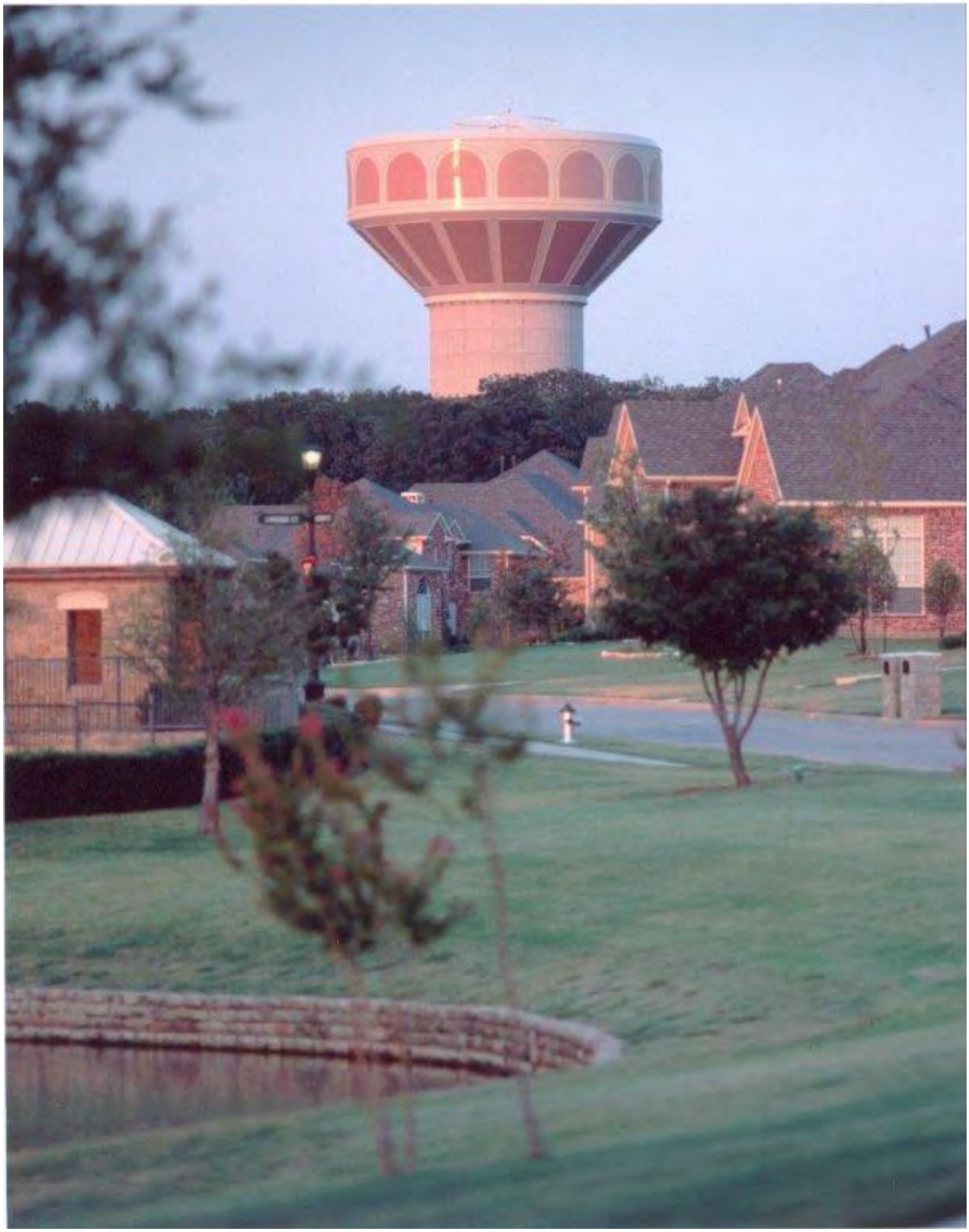



TILBURY
A Community of Chatham-Kent

TECHNICAL MEMORANDUM #3

TO: City of Hamilton Technical Committee

FROM: WSP

SUBJECT: **Elevated Water Reservoir Location – Ancaster Elevated Water Reservoir Class EA**

DATE: **October 19, 2016**

1 INTRODUCTION

The purpose of this Class EA study is to identify the preferred solution to address the long-term water storage needs in Pressure Districts 13, 14, 15 and 18 in the Ancaster area, and to mitigate pressure and operational issues in the system. The preferred solution would improve system security and reliability, provide operations and maintenance savings, and alleviate pressure issues.

This project is classified as a Schedule 'B' Class EA and is being undertaken in accordance with Phases 1 and 2 of the Municipal Class Environmental Assessment process.

Technical Memorandum # 2 (WSP, 2017) presented an evaluation of alternative servicing strategies and identified the construction of an elevated water reservoir as the preferred approach to address the issues in the study area.

This technical memorandum focuses on the evaluation of alternative sites for the location of an elevated storage reservoir. This evaluation considers the environmental, social and cultural conditions as well as the technical feasibility and capital costs for the various sites.

2 ALTERNATIVE ELEVATED WATER RESERVOIR LOCATIONS

Based on preliminary hydraulic modelling of the distribution system, the proposed elevated water reservoir would have high water level (HWL) of 294 m. To minimize pedestal height, only areas with minimum ground elevation of 233 m were considered.

The Study Area was examined visually to identify feasible locations for the Elevated Storage Reservoir. Table 1 and Figure 1 show the sites under consideration in this study.

Table 1 Potential Elevated Water Reservoir Sites

SITE	NEAREST INTERSECTION	GROUND ELEVATION (m)	HEIGHT (m)
1	Jerseyville Rd. W & Martin Rd.	251	44
2	Garner Rd. W & Braithwaite Ave.	247	48
3, 4, 7 to 12	Fiddlers Green Rd. & Garner Rd. E	248	47
5	Garner Rd. E & Southcote Rd.	245	50
6	Garner Rd. E & Raymond Rd.	240	55

3 NATURAL HERITAGE PROPERTY SCREENING

The City retained Azimuth Environmental Consulting Inc. to complete an evaluation of the natural heritage features within the Study Area to assist with the selection of the preferred site for the Ancaster Elevated Water Reservoir. In May 2012, Azimuth completed a review of six sites (sites 1 through 6). In 2016, Azimuth completed an evaluation of the other six potential sites (site 7 through 12) that have been identified south of Garner Rd. at the Fiddler's Green Rd. intersection

Detailed field assessment was limited to areas that were not on private property or that were visible from the City's right-of-way.

The evaluation of the sites (Sites 7 through 12) generally showed no natural heritage constraints, though all properties were located within close proximity to features identified as components of the City's Natural Heritage System (NHS). These sites may potentially be Species at Risk (SAR) habitat for Butternut and Barn Swallow and further study is required to ensure development of the land does not negatively impact SAR or SAR habitat. Therefore, additional study is recommended to mitigate potential impacts to natural features and functions of the NHS.

4 STAGE 1 ARCHEOLOGICAL ASSESSMENT

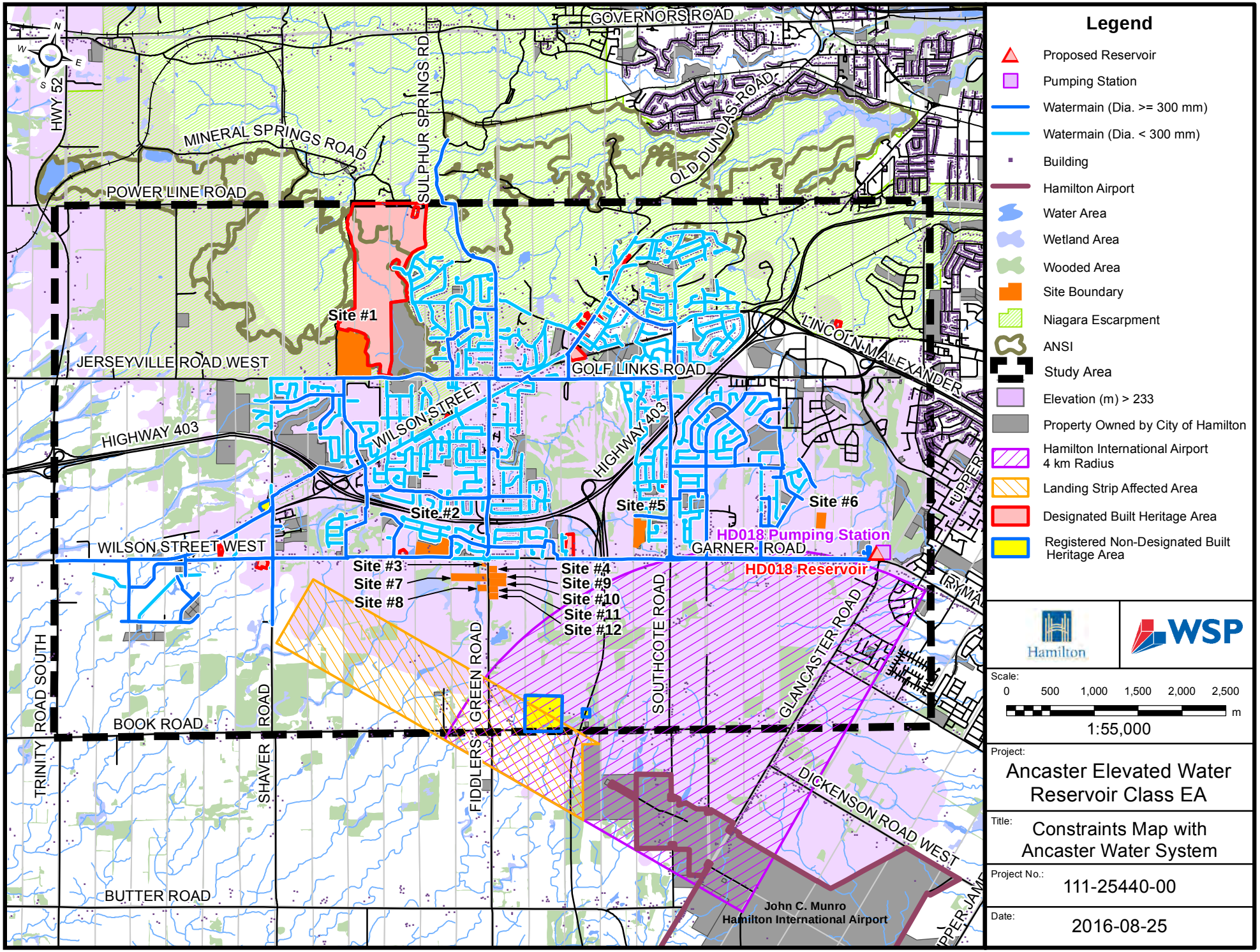
Archaeological Services Inc. (ASI) was retained in 2012 by the City to complete a Stage 1 Archaeological Assessment of Sites 1 through 6. The assessment discovered that 204 archaeological sites have been registered within 1 km of the Study Area. However, only Sites 1, 3, 4 and 5 retain archaeological potential. Therefore, ASI recommended that a Stage 2 Archaeological Assessment be completed at these sites.

In 2016, Archaeological Research Associates Ltd. (ARA) was retained by the City to complete a Stage 1 Archaeological Assessment for Sites 7 through 12. The assessment discovered that 11 previously registered or known archaeological resources were found within a 1 km radius of the sites. All six of the assessed sites were determined to have archaeological potential. ARA has recommended that a Stage 2 Archaeological Assessment be completed at these sites.

5 BUILT HERITAGE AND CULTURAL HERITAGE ASSESSMENT

Archaeological Services Inc. was obtained by the City of Hamilton to conduct a Cultural Heritage Resource Assessment with the 12 sites being considered. Preliminary data collection (desktop study) indicated that there were 11 previously identified cultural heritage resources. These sites were either listed on the inventory of buildings of architectural and/or historical interest, or have a Part IV Heritage Designation. ASI noted that there is potential for for additional cultural heritage resources in the area.

ASI recommended that a field review be completed prior to detailed design to photograph and confirm the location and integrity of previously identified cultural heritage resources, to identify additional cultural heritage resources, and to obtain information to accurately map above-ground cultural heritage resources. The findings of the field review would then be used to identify potential impacts and mitigation measures related to siting of the elevated water reservoir.



Legend

- Proposed Reservoir
- Pumping Station
- Watermain (Dia. >= 300 mm)
- Watermain (Dia. < 300 mm)
- Building
- Hamilton Airport
- Water Area
- Wetland Area
- Wooded Area
- Site Boundary
- Niagara Escarpment
- ANSI
- Study Area
- Elevation (m) > 233
- Property Owned by City of Hamilton
- Hamilton International Airport 4 km Radius
- Landing Strip Affected Area
- Designated Built Heritage Area
- Registered Non-Designated Built Heritage Area

Hamilton

WSP

Scale:

0 500 1,000 1,500 2,000 2,500 m

1:55,000

Project:

Ancaster Elevated Water Reservoir Class EA

Title:

Constraints Map with Ancaster Water System

Project No.:

111-25440-00

Date:

2016-08-25

6 GEOTECHNICAL ASSESSMENT

The City has completed several geotechnical assessments within the study area and for various purposes. However, none of the previously completed geotechnical assessments provide adequate information for purposes of siting an elevated water reservoir.

Additional geotechnical assessment is required prior to detailed design to confirm the loading capacity of the ground at the preferred site(s).

For the purposes of this evaluation a 30% cost contingency allowance was included to account for the lack of geotechnical information.

7 HYDRAULIC ANALYSIS

A hydraulic model of the Ancaster water system was run with an elevated water reservoir located at each of the potential sites. The analysis was based on a steady state model running maximum day and maximum day plus fire flow scenarios.

Site 1 is located within the highest elevation area of the pressure district in close proximity to the western area of the pressure district that is more likely to experience low pressures. This site is located the farthest away from the pumping station. Site 1 is serviced by 300 mm diameter watermains which would result in greater pressure losses in the system relative to locations in close proximity to one of the district's trunk mains (>400mm). The combination of the pipe sizes and distance from the pumping station results in lower system pressures than some of the other reservoir sites.

Sites 2 to 5 and Sites 7 to 12, located near Garner Road and Fiddlers Green Road, are the most preferred hydraulically. These sites result in the highest pressures in the district when operated under gravity (no pumps running) and are in close proximity to the existing 400 mm diameter trunk main along Garner Road. These sites are also located in close proximity to the future trunk watermain that is planned along Garner Road.

Site 6, closest to the pumping station, is the least preferred hydraulically due to its distance to the west side of the pressure district which is more likely to experience low pressures. The model shows that during the maximum day demand scenario, pressures within the district fall below 40 psi when operating under gravity (without pumps running) if the reservoir is not close to full. This makes it less feasible to operate pumps on off-peak hydro hours to fill the reservoir and servicing the district by gravity during the day. In addition, the reservoir site is serviced by 300mm diameter watermains which is less preferred than being in close proximity to one of the districts trunk mains (>400mm).

8 POTENTIAL ECONOMIC IMPACTS

8.1 CAPITAL COSTS

Capital costs for each potential site of the Ancaster Elevated Water Reservoir were estimated, as detailed below.

ELEVATED WATER RESERVOIR

Budgetary capital cost estimates were obtained from Landmark Structures for a 7.6 ML elevated water reservoir at varying pedestal heights. Estimates ranged from $4.16 M (251 m ground elevation and shorter pedestal) to $4.32 M (240 m ground elevation and taller pedestal). The estimates do not include site works, a reservoir mixing system, storage floor, security and surveillance, and testing and inspection.

RECHLORINATION AND RECIRCULATION SYSTEM

A rechlorination and recirculation system, if required, is estimated to cost an additional $0.18 M. This includes a mixing system, centrifugal recirculation pump, and chemical feed system.

WATERMAIN EXTENSION

Sites 1, 2, and 5 are located in close proximity to an existing 300 mm diameter or larger watermain. Therefore, we have assumed that a watermain extension to the elevated water reservoir will not be required for these sites, and that the cost to connect to the existing watermain can be covered in the contingency allowance.

The remaining sites, however, would require a connection to the existing nearest 300 mm or larger watermain. A cost of $500 per metre of watermain was assumed and has been included in the capital cost estimate.

LAND ACQUISITION

Sites 1, 2, 5, and 6 are owned by the City of Hamilton and no additional costs are required to acquire these properties. Sites 3, 4, and 7 to 12 are privately owned and the preferred site would need to be purchased by the City of Hamilton. The purchase price would vary depending on market conditions at the time of negotiations. However, for purposes of this study, a cost of $0.55 M per acre was assumed.

The elevated water reservoir would require approximately 1.5 acres (0.6 ha), equating to approximately $0.82 M.

ENGINEERING AND INTERNAL RESOURCES

An allowance for engineering and approval costs of 10% of the capital cost was assumed. Also an allowance of 10% of the sum of the construction and engineering costs was assumed for the City's internal administration costs.

CONTINGENCY

A contingency allowance of 30% of the capital and engineering costs for each site has been assumed. The contingency amount includes costs for site restoration and landscaping, site piping and appurtenances, security and surveillance, testing and inspection, etc.

SUMMARY

Table 2 below outlines the total estimated capital costs of the sites evaluated.

Table 2 – Capital Cost Comparison of Elevated Water Reservoir Sites

	SITE #1	SITE #2	SITE #3, #4, #7 TO #12	SITE #5	SITE #6
	North-East corner of Martin Rd. and Jerseyville Rd. W. In the Robert E Wade Ancaster Community Park	West of Fiddler's Green Rd. and Garner Rd. W In James Smith Park	South-West corner of Fiddler's Green Rd. and Garner Rd. W.	North-West of Southcote Rd. and Garner Rd. E.	North-East of Raymond Rd. and Rymal Rd. W.
Elevated Water Reservoir	$4,160,000	$4,220,000	$4,210,000	$4,240,000	$4,320,000
Rechlorination and Recirculation System	$180,000	$180,000	$180,000	$180,000	$180,000
Watermain Extension	$0	$0	$240,000	$0	$170,000
Engineering (10% of construction costs)	$434,000	$440,000	$463,000	$442,000	$467,000
Internal Resources/Staffing (10% of the sum of construction and engineering cost)	$477,400 M	$484,000	$509,300	$486,200	$513,700
Land Acquisition ($0.55 M/acre)	$0	$0	$820,000	$0	$0
Contingency (30% of total)	$1,580,000	$1,600,000	$1,930,000	$1,600,000	$1,700,000
Total (Rounded Up)	**$6,830,000**	**$6,920,000**	**$8,340,000**	**$6,940,000**	**$7,340,000**

9 EVALUATION

The evaluation of the potential sites was completed by an evaluation matrix. Considerations for the technical, economic, natural environment and social & cultural environment were all included as criteria for the evaluation. The results of the evaluation matrix are presented in the table below. A colour scheme was used to differentiate whether an alternative is “most preferred” (green), “less preferred” (orange) or “least preferred” (red).

Evaluation Criteria	Site #1 North-East corner of Martin Rd. and Jerseyville Rd. W.	Site #2 West of Fiddler's Green Rd. and Garner Rd. W In James Smith Park	Site #3, #4, #7 to #12 South-West corner of Fiddler's Green Rd. and Garner Rd. W.	Site #5 North-West of Southcote Rd. and Garner Rd. E.	Site #6 North-East of Raymond Rd. and Rymal Rd. W.
	Natural Environment Considerations				
Proximity to Environmentally Sensitive Areas	In Niagara Escarpment	Identified as Provincially Significant Wetland by City. Sections of previously disturbed areas. No natural features of note.	No significant natural features were identified, although there is the City's Natural Heritage System and unevaluated wetlands within close proximity. Further investigation is required.	American Chestnut and Significant Woodlands located within the site.	No environmentally sensitive areas within the site.
	Social & Cultural Environment Considerations				
Proximity to Built Heritage Areas	Near Designated Built Heritage Area	Near Designated Built Heritage Area	Areas listed in the City's inventory of Buildings of Architectural and/or Historical Interest.	Not in the proximity of any Built Heritage Areas	Not in the proximity of any Built Heritage Areas
Proximity to Archaeological and Cultural Heritage Areas	Several sections appear undisturbed and retain archaeological potential. A Stage 2 Archaeological Assessment is required.	Area disturbed by grading and heavy landscaping. Previously assessed in 1995 and 1997. No archaeological potential found.	Several sections appear undisturbed and retain archaeological potential. A Stage 2 Archaeological Assessment is required. A portion of the area within the sites has been identified as Cultural Heritage Resources.	Several sections appear undisturbed and retain archaeological potential. A Stage 2 Archaeological Assessment is required.	Area disturbed by grading and heavy landscaping. Previously assessed in 2004. No archaeological potential found.
Aesthetic Impact	High, in the Niagara Escarpment	High, within residential areas	Low, south of Garner Rd.	High, within residential areas	High, within residential areas
Land Ownership	Owned by the City	Owned by the City	Privately Owned	Owned by the City	Owned by the City
Noise, Traffic, and Dust Impacts Disrupting Surrounding Area During Construction	High, near residential areas. High traffic impact on Jerseyville Rd. W.	High, within residential areas. High traffic impact on Garner Rd.	Low, south of residential areas. High traffic impact on Fiddler's Green Rd.	High, within residential areas. Low traffic impact on local roads	High, within residential areas. Low traffic impact on local roads
	Economic Considerations				
Capital Cost including Land Acquisition ($M)	$6.8	$6.9	$8.3	$6.9	$7.3
	Technical Considerations				
Tower Height	49 m	53 m	52 m	55 m	60 m
Constructability and Site Access	Accessible by urban local road Jerseyville Rd. W.	Accessible by minor arterial road Garner Rd.	Accessible by minor arterial road Fiddler's Green Rd.	Accessible by urban local road Bookjans Dr.	Accessible by urban local road Vinton Rd.
System Reliability and Hydraulic Performance	Located within the highest elevation area of the pressure district, near the areas more likely to experience low pressures. The distance from the pumping station and the size of the pipe feeding the site results in greater pressure losses.	Most preferred hydraulically. Highest pressures in the district when operated under gravity. In close proximity to the existing 400mm diameter trunk main along Garner Rd.	Most preferred hydraulically. Highest pressures in the district when operated under gravity. In close proximity to the existing 400mm diameter trunk main along Garner Rd.	Most preferred hydraulically. Highest pressures in the district when operated under gravity. In close proximity to the existing 400mm diameter trunk main along Garner Rd.	This Site is the least preferred hydraulically due to the distance to the west side of the pressure district, which is more likely to experience low pressures. Low pressure during maximum day condition. In addition, the reservoir location is serviced by 300mm diameter pipes.
Summary	Located within the Niagara Escarpment and near a built heritage area. Contains archaeological potential. Owned by the City. High aesthetic impact on the Escarpment and high impact during construction. Reduced reservoir height. Accessible by urban local roads. Less preferred hydraulically.	Located beside a designated built heritage area and in a Provincially Significant Wetland. No archaeological potential. High impact during construction due to being within a major residential area. Owned by the City. Reduced reservoir height. Accessible by minor arterial road. Most preferred hydraulically.	Not near any environmentally sensitive areas or built heritage areas. Contains archaeological potential. Privately owned. Is not near major residential areas and will have low construction impact. Reduced reservoir height. Accessible by minor arterial road. Most preferred hydraulically.	Located within the American Chestnut and Woodlands area. Not near any built heritage areas. Owned by the City. High impact during construction due to being within a major residential area. Reservoir is required to be taller due to lower ground height. Accessible only by urban local roads. Most preferred hydraulically.	Not located near any environmentally sensitive areas or built heritage areas. No archaeological potential. Large aesthetic and construction noise impact on the residential area. Owned by the City. Reservoir is required to be taller due to lower ground height. Accessible only by urban local roads. Least preferred hydraulically.
Rank	Least preferred	Less preferred	Most preferred	Less preferred	Less preferred

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10 CONCLUSIONS AND RECOMMENDATIONS

Sites 3, 4 and 7 through 12 are the preferred sites of the elevated water reservoir. The specific location will depend on property acquisition negotiations. Initial consultation with the John C. Munro Airport has concluded that all sites being evaluated would have no impact on the airport, although further investigation and consultation is required.

These sites will have minimal impact on environmentally sensitive areas and built heritage areas. There will also be minimal noise and dust impacts during construction as the sites are south of the major residential areas. These sites are preferred because they are south of Garner Rd. and not near major residential areas.

These sites result in superior hydraulic performance due to their proximity to the trunk watermain on Gardner Road and their central location in the water supply network.

TECHNICAL MEMORANDUM #4

TO: City of Hamilton Technical Committee

FROM: WSP

SUBJECT: Conceptual Design – Ancaster Elevated Water Reservoir Class EA

DATE: February 24, 2017 (Revised)

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1 INTRODUCTION

The City of Hamilton is planning to construct a new elevated water reservoir to provide floating storage for Pressure Districts (PD) 13, 14, 15 and 18 in Ancaster. The need for the elevated water reservoir was documented in the City of Hamilton's Water and Wastewater Master Plan Class Environmental Assessment Report (November 2006), which indicated an unbalanced water supply and limited ability to adequately service future system demands in the area. The project was identified as a Schedule 'B' project under the Municipal Class Environmental Assessment (EA) Process. This Class EA included an evaluation of environmental, social and cultural conditions as well as an assessment of the technical feasibility of the alternative water storage solutions, documented in the Project File report.

The Class EA for the proposed Ancaster Water Storage Facility presented alternative solutions and alternative site locations. The preferred location for the elevated water reservoir was south of the Fiddlers Green Road and Garner Road intersection. This location was determined to have minimal impact on environmentally sensitive areas and built heritage areas. It is anticipated that there will also be minimal noise and dust impacts during construction as the location is south of the major residential areas. This location results in superior hydraulic performance due to the proximity to the trunk watermain on Garner Road and its central location in the water supply network.

Initial consultation with the John C. Munro Airport has concluded that all sites being evaluated would have no impact on the airport, although further investigation and consultation are required.

The specific site will depend on property acquisition negotiations.

This technical memorandum provides conceptual design considerations for the elevated water reservoir location.

1.1 PURPOSE OF THE CONCEPTUAL DESIGN

This technical memorandum provides a summary of design considerations for the future design of the Ancaster Elevated Water Reservoir. Once property has been acquired for the preferred site, it is recommended that a preliminary design report be completed to confirm elevations and reservoir parameters and to refine the design basis.

It is anticipated that the elevated water reservoir will be tendered as a design-build contract; as such, the design-build proponent will be responsible for confirming and establishing all detailed design parameters.

1.2 GENERAL SCOPE OF PROJECT

The scope of work for construction will include the:

- Elevated water reservoir
- Process mechanical, building mechanical, electrical, control and instrumentation equipment
- Site works

The related site works include:

- Supply and installation of watermain along Fiddlers Green Road, including valves and appurtenances
- Supply and installation of hydro and telephone/communications services
- Site grading, sanitary sewer, and access road construction
- Storm water management
- Landscaping and plantings
- Complete site restoration

1.3 DESIGN STANDARDS AND GUIDELINES

The following design standards and guidelines are relevant to the design of the elevated water reservoir:

- City of Hamilton Engineering Guidelines for Servicing Land Under Development Applications
- City of Hamilton Design Water Outstation Design Manual
- City of Hamilton Water Station Security Standards
- Ontario Provincial Standard Drawings and Specifications
- MOECC Design Guidelines for Drinking-Water Systems
- AWWA Standards and Specifications

2 GENERAL

The proposed Ancaster Elevated Water Reservoir will be located in Pressure District (PD) 18 and serve Pressure Districts 13, 14, 15 and 18. These pressure districts do not currently have floating storage and are pressurised by the Garner Road Pumping Station (HD018). HD018 is located at the site of the Garner Road Reservoir (HDR18) in the southeast end of Ancaster.

2.1 DETERMINATION OF STORAGE REQUIREMENTS

Water treatment plants and pumping stations are typically designed to satisfy maximum day demands, with peak demands supplied from “floating system storage”. Generally, pumping stations fill the floating storage at night during off-peak hydro hours, and the storage volume is utilized to meet high demands during the day.

Storage within a pressure district is generally used to provide fire protection, equalization, and emergency storage. Elevated storage, specifically, provides the added benefit of improved operational flexibility, lower operating costs and system reliability.

The storage requirements for the Ancaster Water Tower are based upon the *MOECC Guidelines for the Design of Water Storage Facilities*, where:

Total Storage Requirement, S = A + B + C

Where: A = Fire Storage
B = Equalization Storage = 25% of Maximum Day Demand
C = Emergency Storage = 25% of (A + B)

It should be noted that the above calculation is applied to determine the storage needs for a water system capable of satisfying only the maximum day demand.

The forecasted maximum day demands in the service area for 2021 and 2031 are 22,520 m^3/d and 24,525 m^3/d, respectively. The Master Plan (KMK Consultants Limited, 2006) proposed a required pumping capacity of 29,200 m^3/d for the HD018 Pumping Station. This would be sufficient to meet the maximum day demands forecasted to 2031.

The required fire flow is 17,280 m^3/d (200 L/s) for 2.5 hours.

Therefore, the total storage capacity under this approach would be **9.91 ML**, as summarized in the table below.

Table 2-1 Elevated Storage Requirements for PD-18, PD-13, PD-14 and PD-15

YEAR	MAX. DAY DEMAND (ML/D)	FIRE STORAGE (ML) A	BALANCING STORAGE (ML) B	EMERGENCY STORAGE (ML) C	TOTAL STORAGE (ML) A+B+C
2031	24.53	1.80	6.13	1.98	9.91

However, with the construction of an elevated water reservoir, PD18 would become a closed system with floating storage. Therefore, the firm capacity of HD018 Pumping Station would be defined as that with the largest single pump out of service. In this case, the station would have a firm capacity of 48,000 m^3/d, which would be sufficient to supply not only maximum day flows but also maximum day plus fire flows to 2031. Therefore, the system could be designed such that all fire flows would be supplied by the station, with no allowance for fire storage in the elevated storage facility. It should be noted however that the system would be vulnerable during maximum day plus fire conditions if there is a complete failure of the pumping station (e.g. standby power failure during a utility power outage).

The total capacity required for the elevated storage reservoir under this approach would be **7.66 ML**. This is summarized in Table 2-2.

Table 2-2 Elevated Storage Volume without Fire Storage for PD-18, PD-13, PD-14 and PD-15

YEAR	MAX. DAY DEMAND (ML/D)	FIRE STORAGE (ML) A	BALANCING STORAGE (ML) B	EMERGENCY STORAGE (ML) C	TOTAL STORAGE (ML) A+B+C
2031	24.53	0	6.13	1.53	7.66

The difference between the two reservoir sizes lies only in the capital cost. The location and impacts to the natural and built environments would be the same.

2.2 PERMITS AND APPROVALS

Review and approvals from the following agencies will be required prior to construction:

- Ministry of the Environment and Climate Change (MOECC):
  - Drinking Water Works Permit (DWWP) Amendment
  - DWWP Schedule 'C' for watermain extension
  - Environmental Compliance Approvals for standby generator and sewer extension

- City of Hamilton
  - Building Permit
  - Site Plan Approval
  - Zoning Bylaw Variance
- NAV Canada Notification
- John C. Munroe International Airport Notification
- Transport Canada Notification

Approvals from or notification to Horizon Utilities, Bell Canada, and Rogers may also be required and should be determined at the detailed design stage.

3 SITE WORKS

The preferred site for the Ancaster Elevated Water Reservoir is south of the Garner Road and Fiddlers Green Road intersection. The exact location with depend on property acquisition negotiations.

3.1 ACCESS AND PARKING

Vehicular access driveway design and routing to the elevated water reservoir will depend on the specific property selected.

Parking should be provided in accordance with the Zoning Bylaw and would depend on the outcome of the Zoning Bylaw Variance. At a minimum, four standard parking spaces (variable depending on the City's needs and Zoning Bylaw) should be provided for operations and maintenance workers. In addition, one accessible parking space should be provided, per the Integrated Accessibility Standards (O.Reg. 191/11) "Type A" (2400 mm wide).

3.2 STORMWATER MANAGEMENT

Stormwater management for the site should be designed in accordance with City design standards.

3.3 OVERFLOW DRAINAGE

The site will need an overland drainage area for any dechlorinated water discharging from the dechlorination chamber. Details, such as size and infiltration characteristics, are to be determined at the detailed design stage.

3.4 SECURITY

It is recommended that the site be fenced and well-lit. All applicable provisions in the City Water Station Security Standards shall also be followed.

3.5 WATERMAIN CONNECTION AND WATER SERVICING

A 400 mm diameter watermain (size to be verified during detailed design) will be used to connect the reservoir to the existing distribution system. Water servicing for use in the rechlorination process, washroom, and eyewash/shower will be provided from an internal water service connection complete with backflow preventer. Tepid water to be provided to shower.

3.6 SANITARY SERVICING

The proposed sites do not currently have sanitary servicing. However, a connection to the sanitary system is recommended in order to avoid the need for a septic system. The nearest sanitary sewer is located along Garner Road.

3.7 UTILITIES

Proposed utilities include 600 Volt, 3-phase hydro (to be verified during detailed design stage) and fibre optic telecommunications lines.

No natural gas services are planned for the site. Hot water would be provided by electric water heaters.

A standby generator with automatic transfer switch (ATS) is recommended for emergencies in case of loss of hydro power.

3.8 TOWER-MOUNTED CELLULAR ANTENNA

The City may wish to consider letting portions of the roof of the elevated water reservoir for cellular antenna installation (by others). This would require that the roof be designed for future antenna attachment. The site would also need provision for access to the antenna for maintenance by the lessee.

This would provide the City with potential revenue in exchange for use of the space.

Provision for attachment of a future antenna can be established at the detailed design stage.

4 ENVIRONMENTAL PROTECTION MEASURES

The construction of the proposed Ancaster Elevated Water Reservoir is not expected to create any significant environmental impacts. The proposed works should be constructed in such a manner that, to the fullest possible extent, adverse impacts on the cultural and natural environment of the project area would be minimized. All recommendations for mitigation made in natural environment, archeological, and cultural heritage reports should be followed, as detailed in the Class EA Project File Report.

The mitigation measures outlined in the following sections are recommended to ensure that any short-term disturbances are managed by the best available methods.

4.1 SEDIMENTATION/RUNOFF CONTROLS

The potential for sediment related impacts is highest where construction activities occur near watercourses (i.e. swales, roadside ditches, creeks, etc.). Specific mitigation measures should be incorporated in the Contract Drawings and Specifications to prevent sediments from travelling overland. Other measures should include the supply, installation and maintenance of temporary sediment control fencing surrounding the site and temporary stockpile areas. The ditches and swales should also be provided with temporary strawbale check dams during construction and permanent rock check dams where necessary.

In addition, the Contractor should be required to follow the practices described in the “Erosion and Sediment Control Guidelines for Urban Construction”, December 2006, prepared by the Greater Golden Horseshoe Area Conservation Authorities.

4.2 CONTAMINATION OF SOIL THROUGH SPILLS AND LEAKS

It is recommended that an environmental site assessment (ESA) be completed on the selected site prior to or during property acquisition negotiations to ensure no existing soil or groundwater contamination. Soil and/or groundwater contamination would require costly removal and disposal measures.

During construction and operation, site contamination can be avoided by ensuring that the fuel storage, refuelling and maintenance of equipment is handled properly and not allowed in or adjacent to drainage swales on site, or roadside ditches. No storage of fuel during construction activities shall be permitted. However, fuel shall be permitted to be delivered for construction equipment refuelling only and not for storage.

A Spill Prevention Plan should be developed, implemented, and maintained to ensure that construction activities do not increase the risk of a release of fuel, oils, or other hazardous materials to the environment. The Contractor should be required to submit a detailed response and action plan for dealing with the containment and cleanup of any spills during construction, and also maintain a spill response kit on-site at all times during construction.

Provisions should be included in the Contract Specifications for addressing contaminated soils, if encountered during the excavation for the watermain/sewer or elevated water reservoir foundation.

4.3 DUST, NOISE AND VIBRATION

There will be potential for dust, noise and vibration during construction of the elevated water reservoir and site works including the access road and yard piping.

Water should be used by the Contractor as necessary to control dust along the access road. The Contractor should be responsible for cleaning mud from the adjacent surface of Fiddlers Green Road or Garner Road, as required, for the duration of the Contract. A mud mat would also be constructed at the entrance to the access road to minimize mud tracking onto Fiddlers Green Road during material hauling.

Construction activities should be restricted to normal working hours, in accordance with local noise by-laws.

Vibration is not expected to have any significant effect on the properties adjacent to the water reservoir site. If necessary, the Contractor should be required to monitor all construction activities and maintain vibration levels to acceptable levels.

4.4 CONSTRUCTION TRAFFIC

Impacts on local traffic during construction should be minimized by requiring that the contractor provide adequate illuminated warning signs and a properly constructed access road off Fiddlers Green Road prior to commencing work on the elevated water reservoir. The access driveway would be connected to Fiddlers Green Road and therefore there could be potential traffic disruptions for truck turning and site servicing.

Watermain and turning taper construction within Fiddlers Green Road would require appropriate MTO – Book 7 traffic control measures to be implemented to protect the safety of the workers and the public. The Contractor should be required to submit a detailed Traffic and Pedestrian Management Plan for the City's approval, prior to commencing any work within Fiddlers Green Road.

5 PROCESS MECHANICAL

5.1 GENERAL PIPING AND VALVING

A 400 mm diameter watermain would be constructed to connect the elevated water reservoir to the existing distribution system, complete with butterfly valves for isolation and other appurtenances. All sizing should be verified at the detailed design stage.

Separate 400 mm diameter inlet and outlet riser pipes would be provided into the storage cell from the single 400 mm diameter inlet/outlet line in the valve room of the elevated water reservoir, as shown in the conceptual design drawings. This piping arrangement allows for improved circulation of water in the storage cell to maintain water quality.

A bi-directional electromagnetic flowmeter would be installed on the 400 mm common inlet/outlet header to monitor and record both reservoir inflow and outflow rates and volumes. The flow signal from the bi-directional flowmeter would also be utilized for disinfection dosing.

A modulating butterfly valve with motorized actuator would be provided on the reservoir inlet to facilitate reservoir filling and emptying. The valve would be controlled by SCADA and operated in response to system pressures dictating whether to fill or empty the tank.

Piping and valving in the valve room should be insulated.

5.2 OVERFLOW PIPING

Overflow piping would be provided to prevent filling and over-pressurizing of the storage cell and direct excess water away from the structure. A 400 mm diameter overflow pipe (size to be verified at detailed design) would be provided inside the storage cell.

In the event of an overflow emergency, an overflow alarm would be triggered, which would be automatically relayed to the SCADA system and Woodward Water Treatment Plant control room.

5.3 ELEVATED WATER RESERVOIR DRAINAGE

Isolation valves would permit isolation of the Ancaster Elevated Water Reservoir from the rest of the pressure district and allow the reservoir to be completely drained, permitting access for regular inspection and maintenance purposes. Water can be discharged through the Overflow piping to the dechlorination chamber/drainage area on the elevated water reservoir site.

5.4 PRESSURE RELIEF

A pressure relief valve (PRV) for system surcharges is provided at the HD018 Pumping Station. Adequacy of the HD018 PRV for surge relief should be verified at detailed design.

5.5 RESERVOIR CIRCULATION

5.5.1 HYDRODYNAMIC MIXING SYSTEM

In addition to the separate inlet and outlet riser pipes, a multi-port hydrodynamic mixing system should be installed inside of the reservoir to promote mixing, minimize loss of disinfectant residual and mitigate ice formation due to short-circuiting and water stagnation in the tank.

5.5.2 CIRCULATION PUMP

A circulation pump, pump control valve for throttling, and associated piping would enable water to be pumped from the outlet piping into the inlet piping to promote mixing of the water stored inside the elevated reservoir during periods of low system demands and increase water movement to reduce the formation of ice inside the reservoir during winter operation. The pump would also provide adequate

mixing of disinfectant injected into the riser piping for top-up chlorination, if necessary. A water heater will be provided for use in winter months to further prevent ice formation.

The circulation pump should be sized to provide sufficient flow to displace the riser pipe contents and to mix the reservoir contents completely within 8 to 10 hours. The circulation pump would be operated at operator-adjustable intervals to promote mixing of water inside the tank.

5.6 CHEMICAL FEED/DISINFECTION SYSTEM

A rechlorination system should be installed at the Ancaster Elevated Water Reservoir.

The purpose of the chlorination disinfection system would be to dose chlorine to water flowing into the elevated water reservoir, in the event that low free chlorine residual is measured.

The chlorination system would be installed in a separate chemical room located inside the support shaft. The chemical room would be equipped with a chemical containment area, a separate exterior entrance, wash-down hose, chemical flushing line, sample and slop sinks, exhaust fans, and a tepid water line to an emergency eyewash/shower.

5.7 MONITORING CHLORINE RESIDUAL

Two sets of on-line chlorine residual analyzers would be provided at the elevated water reservoir with a range of 0 to 5 ppm. Analyzer Set #1 would draw a continuous sample from the inlet riser to measure the free and total chlorine residual of water entering the main storage cell of the tank. Analyzer Set #2 would draw a continuous sample from the outlet pipe to measure the free and total chlorine residual of water leaving the reservoir and entering the distribution system.

Alarm contacts would be provided from each analyzer for high free and total chlorine residual, low free and total chlorine residual and analyzer fault alarms. In the event of low free or total chlorine residual, an audible alarm and beacon alarm would be activated at the tank. The alarms would also be automatically relayed to the SCADA system and to the Woodward WTP central control room. The electrically-actuated reservoir isolation valve could also be programmed to automatically close to prevent water from entering the distribution system in the event of a low free chlorine residual event.

5.8 DECHLORINATION FACILITIES

An inline dechlorination chamber would be provided on the overflow/drain piping to permit the Operators to manually introduce dechlorination chemicals during reservoir overflow or draining operations, prior to release to the environment. The overflow/drain pipe would discharge to the property. Details of the dechlorination chamber, such as location and size, shall be established at detailed design.

6 OPERATIONAL STRATEGY

6.1 GENERAL

The proposed elevated water reservoir is intended to provide water equalization, fire and emergency storage in the Ancaster Pressure District No. 18. The proposed reservoir would be filled from HDR18 with the water level in the elevated water reservoir determining discharge control valve open/close status.

The control strategy is discussed in the following subsection. A Process Narrative providing a more detailed description of the control strategy should be developed during detailed design, once the preferred operational strategy is confirmed and the hydraulic modelling of the reservoir and system has been completed.

6.2 RESERVOIR LEVEL CONTROL

The Ancaster Elevated Water Reservoir would form an integral part of the Ancaster distribution system providing pressure equalization as well as fire and emergency storage.

The facility would be designed to maintain pressure in the distribution system within prescribed operating limits while providing required equalization, emergency, and fire storage capacity. Water levels in the reservoir would be maintained within the desired working range through the operation of the control valve at HD018, the Garner Road Pumping Station.

During periods of low supply pressure, the elevated water reservoir would feed water into the distribution system. When the water level in the reservoir drops below a set-point value, the automated control system would initiate filling the reservoir by opening the inlet pipe and starting the pumps at HD018.

The level in the elevated water reservoir would be measured by a pressure transmitter located at the outlet pipe supplying a continuous 4-20 mA input signal to the reservoir PLC. Operations would be able to use the level signal feedback to remotely adjust the intake valve and start or stop the pumps at HD018.

During normal operation, the working level in the elevated reservoir would be set between 286.20 m and 294.00 m (adjustable and to be confirmed during detailed design).

When the level measured falls below a setpoint (to be determined at detailed design), the reservoir would be filled to its high water level (HWL) of 294.00 m. When the HWL is reached, the modulating valve at the elevated water reservoir would close and the HDR18 reservoir and HD018 pumping station would continue to supply the distribution system to meet demands.

The flow leaving HD018 must first satisfy the requirements of the distribution system. If the pumped flow rate is less than the distribution system demand, the water level in the elevated reservoir would continue to fall.

If the water level in the elevated water reservoir continues to fall and reaches the bottom capacity level setpoint, an alarm would be annunciated at the SCADA HMI.

When supply from HD018 exceeds demand, the surplus water would be directed into the elevated water reservoir and the level would rise until the HWL is reached.

7 STRUCTURAL DESIGN

7.1 GEOTECHNICAL INFORMATION

As discussed in Technical Memorandum #3, the City has completed several geotechnical assessments within the study area and for various purposes. However, none of the previously completed geotechnical assessments provide adequate information for purposes of siting an elevated water reservoir. Additional geotechnical assessment is required prior to detailed design to confirm the loading capacity of the ground at the preferred location(s).

7.2 STRUCTURAL DESIGN LOADS

The structural design would have to take into account all loads including dead load, water and ice loads, wind and earthquake forces and all secondary forces due to temperature, moisture, creep and shrinkage

effects. The design will conform to all applicable sections of AWWA D100 and AWWA D107, and design and construction requirements of the National and Ontario Building Codes. In addition, the effects of movements and loads from surface and wall ice thrusts would be considered in conjunction with rapid drawdown of stored water.

Contractors would be required to submit a design brief and drawings stamped by a Professional Engineer licensed in Ontario with their tender for evaluation. The successful Contractor would be required to submit complete foundation, shoring, reservoir construction, and erection shop drawings including all design calculations bearing the stamp of a Professional Engineer licensed in Ontario and experienced in the design of water storage facilities to the Consultant for review prior to fabrication. The design would be based on Limit States Design (LSD) principles as applicable, with foundation design addressing both Ultimate Limit States (ULS) and Serviceability Limit States (SLS).

7.3 FOUNDATION AND SUPPORT STRUCTURE

The design and construction of the foundation and support structure for the elevated water reservoir must be in strict accordance to the Ontario Building Code and CSA Specification CAN3 A23.3 latest edition for reinforced concrete structures.

7.4 STEEL RESERVOIR REQUIREMENTS

The stored water would be contained within a welded steel tank. All steel plates should be Grade 300W and conform to CAN3-G40 series, latest revision. A corrosion allowance of a minimum 1.6 mm (1/16") should be provided in accordance to AWWA D100 – Welded Carbon Steel Tanks for Water Storage and AWWA D107 – Composite Elevated Tanks for Water Storage.

All welds, materials and welding equipment would conform to CSA Specification W59 and W47, latest revisions, with all welding carried out by companies certified to Division 1 or 2 of CSA W47.1, latest revision. Reservoir erection procedures and general requirements would conform to AWWA D100 and AWWA D107, including “Inspection and Testing”. An independent Inspection Agency will inspect both shop and field welds including radiographic, vacuum, and ultrasonic testing.

8 BUILDING SERVICES AND SYSTEMS

8.1 GENERAL

The elevated water reservoir would include an office and washroom for City staff use. The washroom should be accessible and in compliance with the Accessibility for Ontarians with Disabilities Act. An electric water heater would be provided to supply hot water to the washroom and emergency shower.

8.2 BUILDING SECURITY

The building security system will consist of:

- Door Switches/Contacts installed on all exterior doors.
- Illegal Entry Keyed Switch in the PLC panel
- Door switches to be tied into one alarm signal that is relayed to the PLC/SCADA.

A security camera should also be installed on the reservoir pedestal with monitoring at the Woodward WTP central control room. Additional security requirements may be established at the detailed design stage and in accordance with the City of Hamilton Water Station Security Standards.

8.3 HEATING AND VENTILATION

The heating and ventilation systems within the elevated water reservoir would be designed and installed in accordance with the Ontario Building Code. All heating, ventilation, and air conditioning (HVAC) equipment should be equipped with direct drive motors; belt driven units shall not be acceptable.

In each room, the ventilation system intake and exhaust fans should be interlocked with the room light switch. All louvers and vents would have bird and insect screens which can be removed for periodic cleaning.

Electric unit heaters should be provided in each room to maintain temperatures above 10°C during the winter months. The respective unit heaters would be provided with built in thermostats. The support shaft would not be heated.

The riser pipes should be insulated and heat traced.

A cooling system may be required for the Electrical and Control Room to maintain temperatures within manufacturer recommended ranges. The City may also wish to cool manned spaces.

8.4 PLUMBING

Floor drains connecting to a main header would drain by gravity to the sanitary sewer. Wastewater from the following sources would also drain to the header:

- Washroom
- Condensate from the storage cell access tube and valve room piping and dehumidifier
- Emergency shower/eyewash
- Sample sink and slop sink
- Chlorine residual analyzers discharge
- Backflow preventers, air release valves and other process equipment discharge

8.5 FIRE PROTECTION

Fire protection will be provided in accordance with the Ontario Building Code. No overhead sprinklers or fire hose would be provided. Portable fire extinguishers suitable for the proposed structure and conforming to requirements of the Fire Code and local Fire Marshall would be provided in the Valve Room, Electrical and SCADA Room and Atrium.

Each room would also be fitted with smoke/heat detectors and low temperature switches with common alarm signals. All conduit openings in the Electrical and SCADA Room would be sealed with a fire stop mastic.

8.6 OBSTRUCTION BEACON

The elevated water reservoir should be equipped with an obstruction beacon located on the top of the tank, typical of any obstruction beacon on radio towers, etc., to warn aircraft. The beacon would feature automatic switchover of duty/standby lamps, in the event of a failure. Failure of the obstruction beacon would generate an alarm to the RPU. Due to the proximity to the John C. Munro International Airport, additional requirements may need to be met.

9 ELECTRICAL AND CONTROL & INSTRUMENTATION

9.1 GENERAL

All electrical equipment would be housed indoors, with exception of the standby generator.

The Electrical and Control room would house the motor control centre (MCC), programmable logic controller (PLC) and remote processing unit (RPU), power distribution panels, lighting panels, security system panel, and other electrical support equipment. This room will have security features, including signage and restricted key/card access, to limit access to authorized individuals. The Pump Control Panel, Flowmeter Display Panel, and Motorized Valve Control Panel shall be located in the Valve Room. All enclosures shall follow NEMA ratings appropriate to the installation location, to be verified at detailed design.

Lightning protection shall be required to prevent damage to the electrical, instrumentation, and control equipment.

A Grounding Study, Arc Flash Hazard Assessment, and Coordination Study may be required and it is recommended that the need be assessed during detailed design.

9.2 ELECTRICAL DESIGN STANDARDS

The detailed design of the elevated water reservoir electrical and control & instrumentation components should conform to the latest revisions of the following minimum standards:

- Canadian Electrical Safety Code
- Ontario Electrical Safety Code, and all bulletins
- Ontario Hydro Power Commission Requirements
- Building Code of Ontario, O. Reg. 350/06
- Local applicable codes and regulations (City of Hamilton and Horizon Utilities)
- Grounding to CSA C22.3
- City Design Standards
- City SCADA Standards

9.3 HYDRO SERVICING

Permanent power consisting of 600V/3-phase/60 Hz supply (to be verified during detailed design) to the site and a service entrance should be extended to the facility via poles and underground wiring in directly buried rigid PVC ducts. The Contractor would be responsible for supplying and installing a temporary power service on-site to suit the construction phase.

All work on transformation of the primary power supply should be coordinated with Horizon Utilities.

The hydro meter would be installed on the exterior wall of the elevated reservoir, in a lockable, weather-proof enclosure, as per Horizon Utilities requirements.

9.4 STANDBY POWER

It is recommended that an Uninterruptible Power Supply (UPS) be used to provide power to the PLC, RPU, and Security System. The UPS would also provide temporary standby power to essential instrumentation such as the flow meter, pressure transmitters and chlorine residual analyzers.

A permanent standby diesel power generator would be installed at this facility, to be sized to power all equipment and building services. This unit would be located outside in a noise attenuating weatherproof enclosure complete with a double walled diesel fuel reservoir sized to operate the generator for 24 hours. The generator would provide power to the entire, normal electrical load in the elevated water reservoir, including all instrumentation and control equipment, PLC Panel, wide area network (WAN) box, and motorized valves. The maximum load scenario for elevated reservoir operation using standby power is described as:

- Water chlorination system is operating
- Circulation pump is operating
- All heating equipment and heat tracing in the station is running
- All building lighting in the station is energized
- All security features are operating
- Any emergency equipment is operating
- All other essential loads are running, such as control and instrumentation

The generator would be equipped with an integral control panel that includes controls for the generator, a protection relay, a circuit breaker and a battery charger. The start/stop control of the generator would be directed by the automatic transfer switch (ATS) located in the Electrical and Control Room.

The generator is subject to applicable approvals, such as air and noise. Approvals and any associated additional studies are to be completed at the design stage.

9.5 SCADA INTEGRATION

All necessary SCADA programming required to operate the elevated water reservoir remotely from the City of Hamilton Woodward WTP central control room would be included in the construction contract.

The PLC/SCADA architecture for monitoring and control would be based on the City's latest Design Standards. The PLC would be responsible for automatically monitoring and controlling equipment and instruments and perform such functions as data acquisition, automatic program control, supervisory set-point control, and all signal conditioning.

Communication with the SCADA network, including HD018 and Woodward WTP would be via fibre optic cable, DSL connection, or telephone line in accordance with current City standards and practices.

Remote SCADA monitoring should include flow rates, valve position, chlorine residuals and reservoir level based on pressure. Remote control of the circulation pump would be possible via the SCADA system. The chlorine residual levels would be displayed and recorded on the Operator Interface Terminal (OIT) located in the Electrical and SCADA Room. All alarms would be automatically relayed via the SCADA network to the Woodward WTP central control room.

9.6 HEAT TRACING

In order to ensure that the inlet and outlet riser pipes do not freeze, each pipe would be heat traced and insulated. The heat tracing system would be supplied with a dual-tracing microprocessor control and monitoring system complete with alarm annunciation capability. Heat tracing would consist of series resistance mineral insulated (MI) cable with two resistive heater elements installed parallel to the pipe. Two duty heat trace cables would be installed at 180 degrees apart without spiralling with standby heater cables installed 90 degrees to duty cables on each riser pipe. Each dual microprocessor control unit would operate a set of duty and standby cables on each of the riser pipes.

The heat tracing control system would be entirely operator-adjustable and have continuous temperature outputs and auxiliary dry contacts for the purpose of alarm monitoring.

9.7 CATHODIC PROTECTION

An impressed current cathodic protection system would be provided for the protection of the submerged interior protective reservoir coating system. The cathodic protection system would be designed, set-up and calibrated in accordance with the latest AWWA Standard D104 – Automatically Controlled, Impressed-Current Cathodic Protection for the Interior of Steel Water Tanks, to provide continuous year-

round operation and maintain polarized steel structure potentials and continuous current output of at least 200 micro-amperes per square foot of coated steel. The anodes and reference electrodes would be designed for 10 years' service life. A current source (Rectifier) would be provided to automatically adjust current output to accommodate changing water level within the reservoir and changing chemical/physical parameters of the water/storage cell interface.

10 PRELIMINARY CONSTRUCTION COST ESTIMATE

A preliminary construction cost estimate (Class D) is presented in the following table.

Table 10-1: Preliminary Construction Cost Estimate

DESCRIPTION	AMOUNT
Elevated Water Reservoir (9.9 ML)	$5,100,000
Rechlorination and Recirculation System	$180,000
Other Process and Electrical Works	$800,000
Site Works	$500,000
Watermain Extension	$240,000
Engineering (10% of construction costs)	$682,000
Internal Resources/Staffing (10% of the sum of construction and engineering cost)	$751,000
Land Acquisition ($0.55 M/acre)	$550,000
Utility and Testing Allowances	$300,000
Contingency (30%)	$2,730,900
Total	**$9,103,000 to $11,833,900**

Appendix B

NATURAL HERITAGE ASSESSMENT

Natural Environment Assessment
Existing Conditions, Screening and Assessment

Ancaster Water Tower Class
Environmental Assessment Schedule B

City of Hamilton

Prepared for:
Hamilton Water, Public Works Department, City of Hamilton

Prepared by:
Azimuth Environmental
Consulting, Inc.

December 2016

AEC 10-230a

AZIMUTH ENVIRONMENTAL CONSULTING, INC.
Environmental Assessments & Approvals

December 12, 2016 AEC 10-230a

Infrastructure Planning & Systems Design Section
Hamilton Water, Public Works Department, City of Hamilton
77 James Street North, Suite 400,
Hamilton, ON
L8R 2K3

Attention: Winston Wang, M.A. Sc., P Eng.

Re: **Natural Environment Assessment – Existing Conditions, Screening and Assessment**
Ancaster Water Tower Schedule B
Municipal Class Environmental Assessment for
City of Hamilton

Dear Mr. Wang:

Azimuth Environmental Consulting, Inc. (Azimuth) has prepared this Natural Heritage Environment Assessment (NEA) to evaluate site alternatives being investigated as part of an Environmental Assessment for the location of a water tower in Ancaster, Ontario. This NEA report identifies the existing natural heritage features and functions associated with the study area, including Species at Risk and Significant Wildlife Habitat through characterization of vegetation communities, fish and fish habitat, and wildlife. The assessment is based on a review of background natural heritage information and site-specific information collected during field surveys of the study area in 2012 and 2016. The information presented in this report is to assist the project team in the selection of a preferred location for the water tower. Please do not hesitate to contact us if you have questions or concerns regarding the contents of this report.

Yours truly,
AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Melissa Fuller, H. B.Sc.
Terrestrial Ecologist

642 Welham Rd., Barrie, Ontario L4N 9A1
telephone: (705) 721-8451 • fax: (705) 721-8926 • info@azimuthenvironmental.com • www.azimuthenvironmental.com

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1.0 INTRODUCTION

Azimuth Environmental Consulting, Inc. (Azimuth) was retained by the City of Hamilton to conduct a Natural Environment Assessment (NEA) as part of a Municipal Class Environmental Assessment (EA) - Schedule B for site selection and construction of a water tower in the community of Ancaster. This NEA identifies natural heritage features and functions associated with the potential sites, including Species at Risk (SAR) and candidate Significant Wildlife Habitat (SWH) through preliminary characterization of the vegetation communities, wildlife and fish and fish habitat. The NEA also presents an assessment of environmental constraints potentially associated with the proposed site options.

2.0 STUDY APPROACH

2.1 Study Area

The Study Area has undergone numerous adjustments during the life time of the project. Site selection has been largely driven by the suitability of the location to supply water to the system with minimal mechanical assistance, with secondary consideration given to natural heritage features and constraints. In 2012, Azimuth completed a natural heritage review of a variety of properties, and provided the City with a summary letter identifying preliminary concerns and constraints of the selected sites (Azimuth, 2012). In August 2016, two of the 2012 properties (Properties 3 and 4) were carried forward for consideration, and four additional properties were added. At this time, the project footprint encompasses 6 privately owned properties extending along Fiddlers Greens Rd, south of Garner Rd. East (Figure 1), referred to herein as the Study Area. The Study Area lies within Ecoregion 7E and there are no Areas of Natural and Scientific Interest (ANSI) in the region (Appendix A).

2.2 Background Data

A review of background documents provided information on site characteristics, habitat, wildlife, SAR and natural heritage features and ecological function of the study area. Background information review and gap analysis included data from:

- Aerial imagery (Google Earth);
- Ministry of Natural Resources and Forestry (MNRF)'s NHIC Make-A-Map: Natural Heritage Areas application [website];
- MNRF SAR Information Request
    - NHIC Data application [website];
    - Atlas of the Breeding Birds of Ontario (OBBA) [website];
- MNRF's SAR in Ontario list (updated June 2016);

- Government of Canada's Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Annual Report 2014-2015;
- The Grand River Conservation Authority`s (GRCA) information request and Natural Feature Mapping;
- The City's Official Plan Land Use Designation Schedule A [website];

2.3 Vegetation Community Mapping and Plant Surveys

The Ecological Land Classification for Southern Ontario (ELC, Lee *et al*., 1998) was used as a general guide to classify vegetation community types, given the urbanized/disturbed nature of the sites (Figure 2). Vegetation community types were classified according to ELC and vascular plant species identified on November 8, 2011, July 13, 2012, and September 25, 2012 for Properties 3 and 4 of the Study Area. In 2016, additional properties were identified, and a roadside vegetation survey was completed on September 6, 2016 to confirm conditions observed in previously surveyed areas, obtain preliminary vegetation data for the new properties. The 2016 surveys were completed using road-side surveys due to absence of permission to enter the properties. All species observed are presented in Table 1.

2.4 Wildlife Surveys

Two dawn breeding bird surveys were conducted within Property 4, only, of the Study Area on June 8 and June 22, 2012 (Figure 2). No dawn breeding bird surveys have been completed on the 2016 properties due to project schedule. These surveys were based on point count (5 minutes duration) and survey methodology, according to the Ontario Breeding Bird Atlas Guide for Participants (OBBA, 2001). Where the point count was established, all birds identified through visual or auditory confirmation were recorded for a total of five minutes. Variables recorded include species present and general behavioural observations (e.g. male singing/territoriality, breeding behaviour, evidence of nesting). Results of the survey are presented in Table 2.

Survey conditions were as follows:

Survey #1: June 8, 2012; Time 06:09 - 06:20; Temperature +20°C; Wind B0; Cloud Cover 30%; Precipitation Null;
Survey#2: June 22, 2012; Start Time 07:02 - 07:15; Temperature +22°C; Wind B1; Cloud Cover 30%; Precipitation Null

Formal amphibian, reptile and mammal surveys were not conducted within the Study Area but incidental observations indicating evidence for the presence of amphibians and/or suitable anuran habitat and other wildlife were recorded during all site visits.

SAR/habitat screening for reptiles, birds and mammals identified as being present on-site historically was also performed.

2.5 Fish and Fish Habitat Surveys

No fish and fish habitat surveys have been completed at this time.

2.6 Species at Risk

The MNRF was contacted in 2012 and 2016 to request background information regarding known species of concern and/or areas of natural heritage sensitivity related to the Study Area. A list of at risk plants, arthropods, reptiles, birds and mammals known to have been present historically within the Study Area and/or surrounding area derived from Ontario Breeding Bird Atlas (10km 17NH78 square) and NHIC database queries (Appendix A and B) was submitted to the MNRF. A desktop analysis of the habitat requirements of those species with the potential to occur within the Study Area, relative to existing conditions, was completed, as a component of this assessment.

3.0 PLANNING CONTEXT

This section of the report summarizes the various federal, provincial, regional, and local planning policies and regulations related to natural heritage that apply to the proposed development for the purpose of the NEA.

3.1 Provincial Policy Statement

The Provincial Policy Statement, 2014 (PPS) outlines policies related to natural heritage features (Section 2.1) and water resources (Section 2.2). The *Planning Act* requires that planning decisions shall be consistent with the PPS.

Section 2.1.1 requires that natural features and areas shall be protected for the long term.

Section 2.1.2 requires that the diversity and connectivity of the natural features in an area and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.

Section 2.1.3 indicates that natural heritage systems shall be identified in Ecoregions 6E & 7E, recognizing that natural heritage systems will vary in size and form in settlement area, rural areas, and prime agricultural areas.

According to the PPS development and site alteration shall not be permitted in:

- Significant wetlands (in coastal areas or in Ecoregions 5E, 6E and 7E), and
- Significant coastal wetlands.

Unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions, development and site alteration shall not be permitted in:

- Significant woodlands (south and east of the Canadian Shield),
- Significant valley lands (south and east of the Canadian Shield),
- Significant wildlife habitat (SWH),
- Significant Areas of Natural and Scientific Interest (ANSI), and
- Coastal wetlands not considered to be significant.

According to the Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005 (MNR, 2010) SWH includes:

- Habitats of seasonal concentrations of animals;
- Rare vegetation communities or specialized habitat for wildlife;
- Habitat of species of conservation concern; and
- Animal movement corridors.

Similarly, no development and site alteration will be permitted on lands adjacent to the areas defined above unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated there will be no negative impacts on the natural features and ecological functions. The PPS defines no negative impact as "degradation that threatens the health and integrity of the natural features or ecological functions for which the area is identified due to single, multiple or successive development or site alteration activities". The Natural Heritage Reference Manual (OMNR, 2010) defines ecological integrity as "the condition of an ecosystem in which (a) the structure, composition and function are unimpaired by stresses from human activity, (b) natural ecological processes are intact and self-sustaining and (c) ecosystem evolution is occurring naturally and that ecological integrity includes hydrological integrity".

Development and site alteration shall not be permitted in habitat of Endangered (END) species and Threatened (THR) species, except in accordance with provincial and federal requirements.

Development in fish habitat is not permitted except in accordance with provincial and federal requirements.

3.2 Endangered Species Act (Ontario)

Ontario's Endangered Species Act, 2007 (ESA) provides regulatory protection to END and THR species and prohibits harassment, harm and/or killing of individuals and destruction of their habitats. Habitat is described as the area that a species requires directly or indirectly, to carry out its life processes including reproduction, rearing of young, hibernation, migration or feeding. Some species have habitat that has been identified and prescribed by a regulation within the ESA.

The various schedules of the ESA identify SAR in Ontario. These include species listed as Extirpated (EXP), END, THR and Special Concern (SC). As noted above, only species listed as END and THR receive protection from harm and destruction to habitat on which they depend.

3.3 City of Hamilton

The majority of the Study Area is located within the Rural Hamilton Official Plan Area (City, 2012; Appendix C). The remainder of the Study Area is within Rural and Mineral Aggregate Resource Extraction Areas (Schedule D).

Permitted uses within the Rural designation include:

a) Conservation use such as forest, wildlife and fisheries management provided it complies with natural heritage system policies of the plan;
b) Transportation facilities and existing electrical facilities used directly for the generation and distribution of electric power, natural gas pipeline lines and new facilities and approved under the Environmental Assessment Act and other relevant statutes;
c) Municipal infrastructure such as water system facilities, sanitary and storm water facilities, except for sanitary land fill sites; and
d) Mineral aggregate resource operations provided the proposed mineral aggregate extraction use complies with the applicably policies.

Mineral Aggregate Resource Extraction Areas have been identified for the long term protection of aggregate resources in Ontario. Permitted uses (Chapter D, Policy 6.4) of the Rural Official Plan) within this designation include:

a) The extraction of mineral aggregate resources, prescribed under the Aggregate Resources Act from licensed sand and gravel pits, quarries, and wayside pits and quarries;
b) Accessory uses related to extraction, such as aggregate storing, aggregate recycling facilities, crushing and screening, washing, stockpiling, concrete batching plants, storage of vehicles, vehicle maintenance, repair and

fuelling facilities, parking and office facilities, subject to Aggregate Resources Act licensing;

In addition to the above, the following uses are permitted, provided they do not interfere with or detract from the permitted uses:

a) Archaeological activities;
b) Agriculture and agricultural operations;
c) Forest, fisheries and wildlife management;
d) Watershed and source water management, flood or erosion control facilities and uses carried out or supervised by a public authority;
e) Utility facilities; and
f) Activities associated with uses prescribed by the Aggregate Resources Act for rehabilitation of extracted areas.

Mapping available from the City indicates that the Study Area contains features which are considered to be Core Areas within the City's Natural Heritage System (NHS; Schedule B), and includes such features as Significant Woodland (Schedule B-2), Lake and Littoral Zones (Schedule B-5), and Streams (Schedule B-8). The schedules provided are drawn at a large scale and thus difficult to interpret to the finer scale of the Study Area. Thus, Azimuth has delineated the limits of the NHS based on the City's description of the protected features and interpretation of aerial photography. Azimuth's interpretation of the NHS is shown on Figure 2b of this report. The NHS has been designated to 'protect and restore features and their natural functions as a permanent environmental resource for the community (Chapter C.2 of the Rural Official Plan; City, 2012). Specifically, the policy goal is to:

a) Protect and enhance biodiversity and ecological functions;
b) Achieve a healthy, functional ecosystem;
c) Conserve the natural beauty and distinctive character of Hamilton’s landscape;
d) Maintain and enhance the contribution made by the Natural Heritage System to the quality of life of Hamilton’s residents;
e) Restore and enhance connections, quality and amount of natural habitat;
f) Provide opportunities for recreational and tourism uses where they do not impact natural heritage features; and
g) Monitor and periodically assess the condition of Hamilton’s natural environment.

Policy 2.3.3 of Chapter C states that "any development or site alteration within or adjacent to Core Areas shall not negatively impact their environmental features or ecological functions" (City, 2012). Policy 2.3.4 of the same chapter goes on to state that

"new development or site alteration shall not be permitted within provincially significant wetlands, significant coastal wetlands, or significant habitat of threatened or endangered species, except in accordance with applicable provincial and federal regulations with respect to significant habitat of threatened or endangered species" (City, 2012).
Permitted uses include:

a) Existing agricultural uses;
b) Forest, fish and wildlife management;
c) Conservation, and flood or erosion control projects by a public authority demonstrated to be necessary in the public interest;
d) Existing uses, in accordance with Section F.1.12, Non-Conforming and Non Complying Uses of the Plan;
e) Passive recreation uses and small scale structures for recreation uses (such as boardwalks, footbridges, fences, docks, and picnic facilities); and
f) Infrastructure projects, in accordance with Section C.5.0, Infrastructure of the Plan.

Policy 2.4.10 of Chapter C states that core features shall be protected with a self-sustaining Vegetation Protection Zone (VPZ) that is of sufficient width to protect the feature and its function. Policy 2.4.11 outlines minimum vegetation protection zones for each of the natural heritage and hydrologic features comprising the Natural Core Area.

3.4 Grand River Conservation Authority

A portion of the Study Area is located within lands subject to Regulation 150/06 by the GRCA (Appendix D). These areas are regulated due to the presence of seasonal drainage features. A permit will be required prior to any development and/or site alteration in regulated areas.

4.0 EXISTING CONDITIONS

4.1 Land Use

4.1.1 Study Area

The Study Area consists of a number of privately owned lands along Fiddlers Green Road in Ancaster (Figure 2). At the time of the site investigations, the majority of the lands were under commercial and/or residential land use. Two of the properties are actively farmed with row crops, and the remaining properties contain a deciduous forest with wetland/riparian vegetation.

4.1.2 Adjacent Lands

The Study Area is located within a mixed rural and commercial area adjacent to Fiddler's Green Road. The majority of the lands have been disturbed, however, remnant forest and wetland patches remain part of the broader landscape.

4.2 Vegetation

Vegetation communities were classified utilizing ELC protocol, as described in Section 2.3. Classification occurred during four site visits over a period of four years. The ELC system was used as a general guide to the classification of the vegetation community types present within the Study Area. Only two traditional ELC vegetation communities were observed within the Study Area: a Deciduous Forest (FOD) and a Cultural Meadow (CUM). A small pocket of deciduous swamp/meadow marsh may occur within the western FOD unit. Delineation and inventory of the wetland was not completed by Azimuth due to inability to access the lands, however, the available background mapping from the GRCA (Appendix C) illustrates the approximate extent of wetland habitat, and defines the feature as an unevaluated wetland (Figure 2b). The remainder of the lands have been classified using land use observed on the property. All communities and land uses have been illustrated in Figure 2a. A complete list of all vascular plants identified within each respective vegetation community is presented in Table 1.

The Study Area is comprised of highly disturbed terrestrial communities containing a high proportion of invasive plant species commonly found within pioneer and early successional communities. A total of 58 vascular plant species were identified. Of the 58 species identified, 24 (41%) are exotic species within Ontario.

One provincially rare (S1, S2, S3) species was observed during the surveys:

i. Honey-locust

Given the location of this individual within the right-of-way of Fiddlers Green Rd, the individual may be a cultivar of the native Honey-locust.

None of the vegetation communities or species documented are of federal or provincial conservation concern (NHIC, 2015).

4.3 Wildlife

The wildlife community is primarily composed of open country and habitat generalist species. Field investigations documented the occurrence of 12 species of birds, 1 species of mammal and no amphibians during the course of the field program.

4.3.1 Birds

A total of 12 bird species were observed during the surveys and are listed in Table 2. Breeding evidence was assessed based on the criteria of the OBBA (2001).

One SAR, Barn Swallow (Threatened) and was identified during the surveys. The occurrence is further discussed in Section 4.5 below.

4.3.2 Amphibians

There is evidence that portions of the Study Area contain standing water in the early spring (the unevaluated wetland, and the pond), however, no amphibian surveys have been conducted in these locations to confirm habitat use. There is reasonable expectation that these features could be used by local amphibian populations.

4.3.3 Mammals

One incidental mammalian observation occurred during the course of site investigations and included Gray Squirrel (*Sciurus carolinensis*). We expect that given the rural and commercial land use in the area, Coyote (*Canis latrans*), Raccoon (*Procyon lotor*), Red Fox (*Vulpes vulpes*), and White-tailed Deer (*Odocoileus virginianus*) would also be present. No provincially or regionally rare species were documented within the Study Area.

4.3.4 Candidate Significant Wildlife Habitat Functions

Candidate SWH was identified, where applicable, as outlined within the SWH Technical Guideline Ecoregion 7E Criterion Schedule (MNRF, 2015). The SWH habitat assessment is presented in Table 3. In summary, the following candidate SWH may occur within and adjacent to the Study Area:

- Seasonal Concentration of Animals;
    - Waterfowl stopover and staging area (aquatic);
    - Turtle Wintering Areas;
    - Colonially Nesting Bird Breeding Habitat (Tree/Shrub);
- Specialized Habitats of Wildlife considered SWH;
    - Seeps and Springs;
    - Amphibian Breeding Habitat (Woodland);
    - Amphibian Breeding Habitat (Wetlands);
- Habitats for Species of Conservation Concern considered SWH;
    - Marsh Breeding Bird Habitat;
    - Terrestrial Crayfish; and
    - Special Concern and Rare Wildlife Species.

4.4 Fish and Fish Habitat

One drainage feature was identified as occurring within the Study Area, associated with the unevaluated wetland habitat and a pond feature located west of Fiddlers' Green Rd (Figures 2a and 2b). The wetland unit appeared to be comprised of a deciduous swamp and cattail meadow marsh, though the aquatic features were not inspected or delineated in detail during the completion of this report due to inability to access the lands.

A review of available background information and aerial photography indicates that the feature is located within the upper reaches of the Big Creek Subwatershed and contributes to the Lower Grand reach of the Grand River. The Fisheries Management Plan prepared by the GRCA and Ministry of Natural Resources (GRCA and MNR, 2001) states that the Lower Grand provides habitat for mixed and warmwater fish.

4.5 Species At Risk

4.5.1 Ontario Breeding Bird Atlas

The Ontario Breeding Bird Atlas (OBBA, 2009, Appendix B) was consulted to identify sensitive bird species that could be utilizing the area for breeding purposes. A full species list for this square has been provided in Appendix B. Twelve SAR were identified as occurring within the square: Red-Headed Woodpecker, Whip-poor-will, Chimney Swift, Acadian Flycatcher, Golden-winged Warbler, Cerulean Warbler, Canada Warbler, Bank Swallow, Barn Swallow, Eastern Meadowlark, Wood Thrush, Eastern Wood-Pewee. Table 3 presents a habitat assessment for the species, as it relates to the property.

4.5.2 Additional Species

A preliminary search for Butternut was conducted during the site visit. No individuals were observed on or adjacent (25m) to Properties 3 and 4 (Figure 2b). No detailed surveys occurred on the remainder of the properties.

Snapping Turtle is known to occur within the region and is considered here given the proximity of a permanent watercourse and rural agricultural land use.

An information request was forwarded to the Guelph District MNRF requesting additional information regarding SAR known to occur within the broader landscape of the Study Area. The MNRF responded on October 6, 2016 (Appendix A), indicating that Butternut is a species should be considered within the SAR screening for the project. They also provided a list of SAR species known to occur in the City of Hamilton. This list has been appended to the report, and the pertinent species carried over to Table 3 for the purpose of habitat assessment.

4.5.2 Species at Risk Habitat Assessment Summary

It was determined through assessment of the existing habitat that the following species are potentially associated with the Study Area:

- Jefferson Salamander (END);
- Green Dragon (SC);
- Short-eared Owl (SC);
- American Chestnut (END);
- Chimney Swift (END);
- Common Nighthawk (SC)
- Eastern Wood-pewee (SC);
- Eastern Flowering Dogwood (END);
- Monarch Butterfly (SC);
- Eastern-Hognosed Snake (THR);
- Yellow Breasted Chat (END);
- Butternut (END);
- Woodland Vole (SC);
- Red Mulberry (END);
- Little Brown Myotis (END);
- Northern Myotis (END);
- American Ginseng (END);
- Tri-coloured Bat (END);
- Broad Beech Fern (SC);
- West Virginia White (SC);
- American Badger (END);
- Eastern Ribbonsnake (SC);
- Barn Owl (END);
- Golden-winged Warbler (SC);
- Barn Swallow (THR); and
- Snapping Turtle (SC).

5.0 NATURAL HERITAGE FEATURES AND FUNCTIONS

It has been determined that the following components of the City's NHS are associated with the Study Area:

- Wetlands (Other);
- Woodlands;
- Potential Habitat for Endangered, rare or Threatened species;
- Fisheries and Fish Habitat;

In addition to this, the Study Area may contain candidate SWH, as defined by the PPS and guidance documents prepared by MNRF (2015).

6.0 PRELIMINARY SITE ASSESSMENT

At this time, Azimuth has completed a preliminary assessment and characterization of the existing natural heritage conditions of the Study Area, based on review of available background information from the City, GRCA and MNRF as well as data obtained during site specific field surveys. Based on the available information, Azimuth has identified three different categories within the Study Area to demonstrate the level of natural heritage constraint associated with developing within and/or adjacent to the natural features. These areas have been mapped on Figure 3 and are defined in Table 5, below.

Table. 5 Constraints and Rationale for Site Selection

Constraint Category	Level of Sensitivity	Recommended for Development (Y/N)	Additional Study Required (Y/N)	Rationale
Low Constraint	Medium Sensitivity	Y	Y	These areas have historically been significantly altered from natural habitat and are currently being maintained in a permanently altered state with ongoing anthropogenic influence. There are concerns that the existing land use (i.e. buildings, structures, gravel lots, agricultural fields) may provide habitat for SAR known to occur in the area including Barn Swallow, Common Night Hawk, and Chimney Swift. If development is proposed within and/or adjacent to these areas, additional species specific field surveys will be required to fully characterize the potential SAR habitat.

Constraint Category	Level of Sensitivity	Recommended for Development (Y/N)	Additional Study Required (Y/N)	Rationale
Medium Constraint	Medium Sensitivity	N	Y	These areas have historically been altered, but have been permitted to re-naturalize and are now contributing to the overall function of the NHS. There is potential for SWH and SAR to be associated with this constraint area. If development is proposed within and/or adjacent to these areas, additional field surveys will be required to fully characterize the existing species diversity and ecological function of the feature(s).
High Constraint	High Sensitivity	N	Y	These areas have been mapped as a component of the City's NHS and provide ecological value and function to the area. The features of the NHS, as well as a 30m Vegetation Protection Zone, has been incorporated into this constraint area. If development is proposed within and/or adjacent to these areas, additional field surveys will be required to fully characterize the existing species diversity and ecological function of the feature(s), specifically regarding impact to candidate SWH and SAR.

7.0 RECOMMENDATIONS AND PRELIMINARY MITIGATION MEASURES

The following identifies mitigation measures that would assist with mitigating the impact of the construction and operation of the water tower. Please note that this list is not exhaustive and will be finalized once the preferred site is selected and a development plan is prepared.

7.1 Construction Mitigation and Post Construction

1. Sediment and Erosion Control Plans should be developed prior to the proposed works. Any requirement for dewatering should include the use of envirobags and sediment traps (or equivalent) located an adequate distance from a water course and proper overland flow paths atop stable vegetation to ensure that proper filtration of discharge water occurs prior to returning to the receiving drain. Runoff should be directed away from exposed soil surfaces to mitigate the potential for soil mobilization;
2. Diligent application of sediment and erosion controls is recommended surrounding the proposed development to alleviate the risk of sediment migration or erosion into adjacent natural features (e.g., erosion and sediment control fencing).
3. Vegetation removal should occur outside of the sensitive breeding bird window, to prevent interruption of the avian life cycle. Typically the timing window typically falls between April 1 and July 31, but is dependent on seasonal variation. If, due to timing constraints associated with the development, vegetation removal must occur within this time frame, the area can be assessed immediately prior to site alteration to ensure that the activities are not in contravention of the *Migratory Birds Convention Act, 1992* or the ESA.
4. The proponent must ensure that appropriate actions are taken to protect the SAR and related habitat during construction. All workers on site should be informed of the potential for SAR to occur within the Study Area. MNRF should be contacted to determine the appropriate actions to protect the species if SAR are observed within the active work area.
5. Native plants should be used for re-vegetation efforts post development. Invasive species, which have a tendency to create a monocultural stand and outcompete native species, should especially be avoided.
6. A naturalized setback should be implemented adjacent to all components of the City's NHS. All disturbed lands to be included within the naturalized buffer should be planted with native species, as required.

7.2 Additional Surveys

Azimuth has identified the potential requirement for additional field surveys, dependant on site selection and sensitivity. Please note that this is not an exhaustive list and may require modification based on Agency comments and the preferred site selection:

- Three season vegetation survey to inventory existing vegetation communities and search for SAR that may be associated with the preferred site.;
- Dawn and nocturnal breeding bird surveys to determine if SAR birds are utilizing the preferred site.;
- Nocturnal owl surveys to determine if SAR owl species are utilizing the preferred site.;
- Bat Maternity Roosting surveys to determine if woodland habitat meets the criteria to be classified as roosting habit for SAR bat species;
- Butterfly surveys to determine if SAR Butterflies are utilizing the preferred site;
- Fish habitat assessment and fish community survey if appropriate habitat is present within/adjacent to the preferred site.

8.0 CONCLUSION

A variety of land uses have been identified within the Study Area, ranging from agricultural fields and commercial development to deciduous forest and wetland habitat. Azimuth has prepared a graduated site characterization to assist the project team with selection of the preferred site. Depending on the outcome of the site selection process, additional field surveys may be required for completion of the Environmental Impact Assessment of the construction and operation of the proposed water tower.

9.0 REFERENCES

Bird Studies Canada, Environment Canada's Canadian Wildlife Service, Ontario Nature, Ontario Field Ornithologists and Ontario Ministry of Natural Resources (BSC). 2006. Ontario Breeding Bird Atlas Website. http://www.birdsontario.org/atlas/index.jsp

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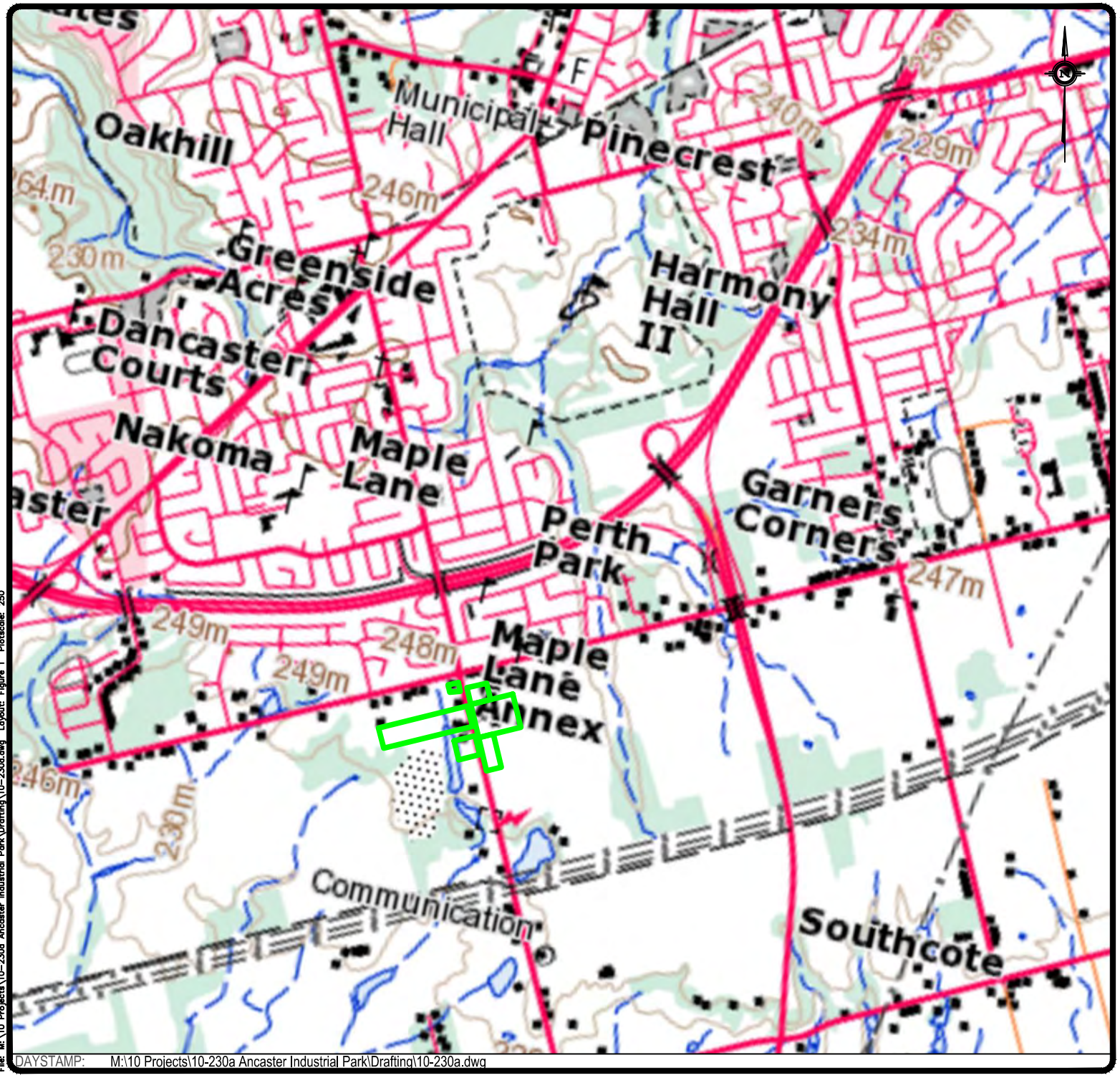
Ontario Ministry of Natural Resources and Forestry (MNRF). 2015. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E. January 2015.



LEGEND:

Study Area Limit

250m 0 750m

HORIZONTAL SCALE 1: 25,000

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Study Area Location

Ancaster Industrial Park
Ancaster, ON

DATE ISSUED: *October 2016*	Figure No.
CREATED BY: *JLM*	
PROJECT NO.: *10-230a*	1
REFERENCE: *Gazetteer Maps*	

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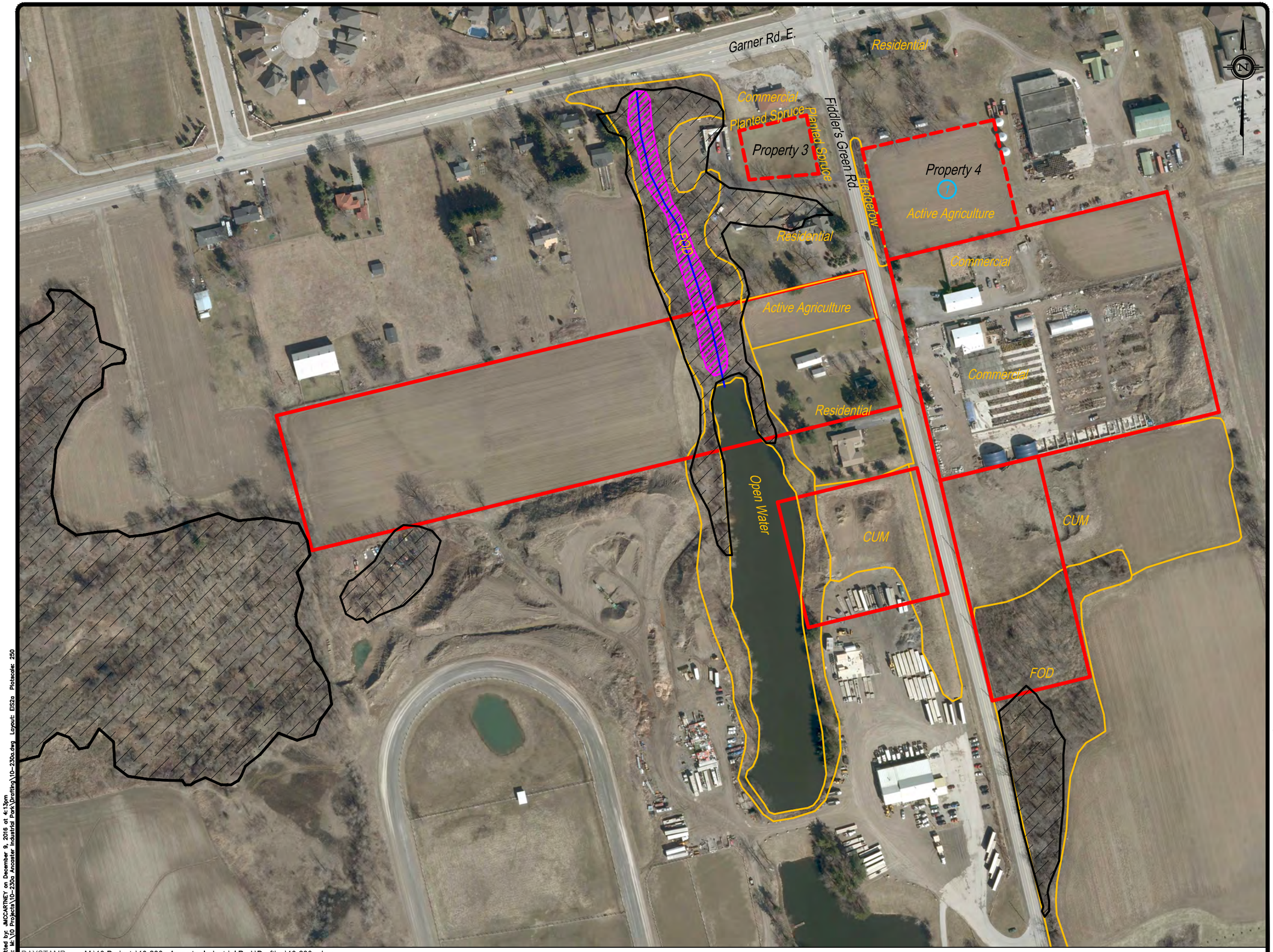

LEGEND:

- Approx. 2016 Study Areas
- Approx. 2012 Study Areas
- Drainage Feature
- Unevaluated Wetland
- MNR Woodlands (City of Hamilton)
- Birding Station
- Vegetation Communities/Land Use
- CUM Cultural Meadow
- FOD Deciduous Forest

25m 0 75m

HORIZONTAL SCALE 1:2,500

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Environmental Features

Ancaster Industrial Park
Ancaster, ON

DATE ISSUED:	August 2016	Figure No.
CREATED BY:	JLM	2a
PROJECT NO.:	10-230a	
REFERENCE:	First Base Solutions	

Plotted by: JMCCARTNEY on December 9, 2016 at 4:13pm
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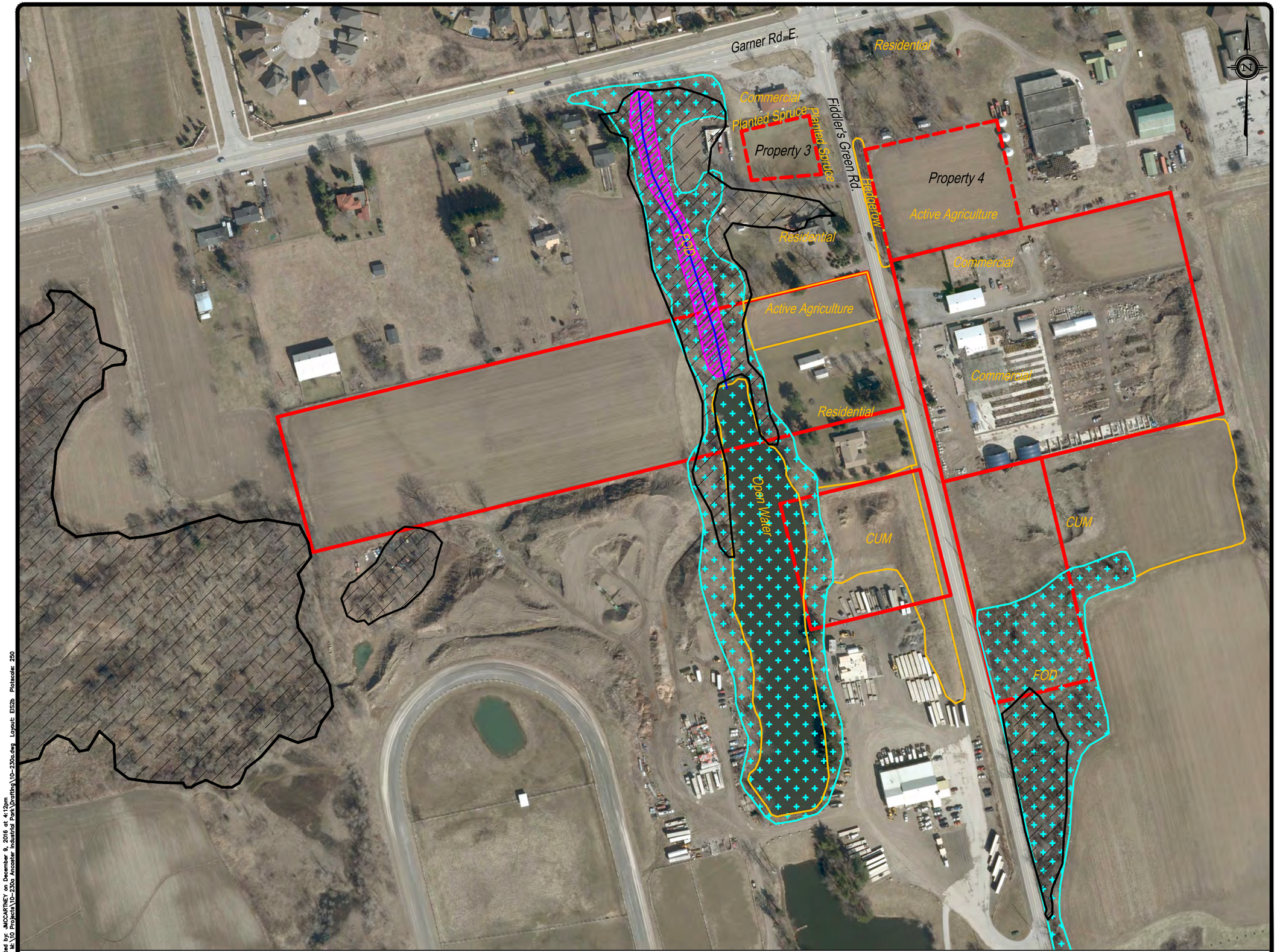

LEGEND:

- *Approx. 2016 Study Areas*
- *Approx. 2012 Study Areas*
- *Drainage Feature*
- *Unevaluated Wetland*
- *City of Hamilton Natural Heritage System*
- *MNR Woodlands (City of Hamilton)*
- *Vegetation Communities*
  - CUM *Cultural Meadow*
  - FOD *Deciduous Forest*

25m 0 75m

HORIZONTAL SCALE 1:2,500

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

City of Hamilton Natural Heritage System

Ancaster Industrial Park
Ancaster, ON

DATE ISSUED:	*September 2016*	Figure No. 2b
CREATED BY:	*JLM*	
PROJECT NO.:	*10-230a*	
REFERENCE:	*First Base Solutions*	

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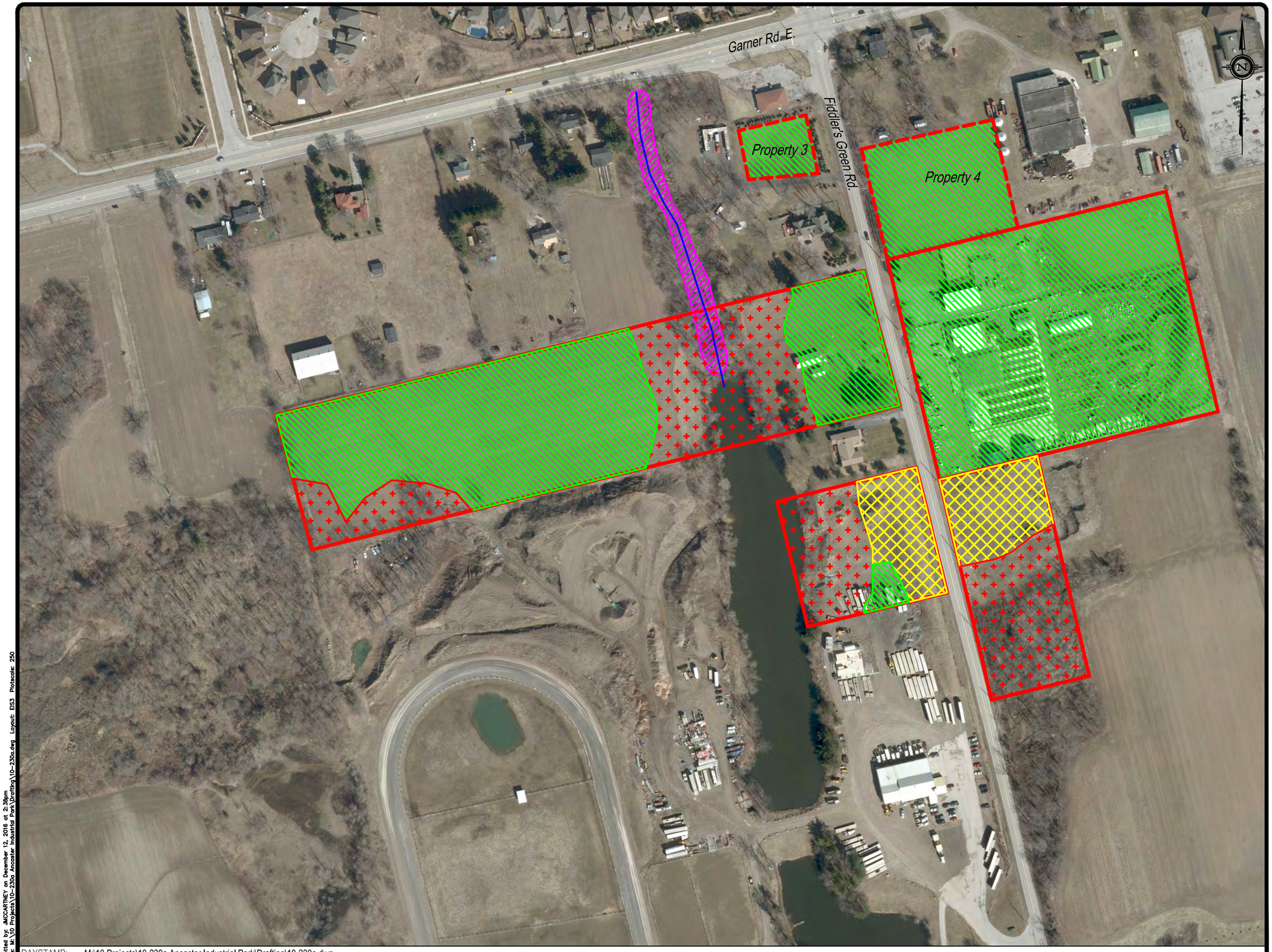

LEGEND:

- *Approx. 2016 Study Areas*
- *Approx. 2012 Study Areas*
- *Drainage Feature*
- *Unevaluated Wetland*
- *High Constraint*
- *Medium Constraint*
- *Low Constraint*

25m 0 75m

HORIZONTAL SCALE 1:2,500

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Study Area Constraints

Ancaster Industrial Park
Ancaster, ON

DATE ISSUED:	*October 2016*	Figure No.
CREATED BY:	*JLM*	3
PROJECT NO.:	*10-230a*	
REFERENCE:	*First Base Solutions*	

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File: M:\10 Projects\10-230a Ancaster Industrial Park\Drafting\10-230a.dwg Layout: EIS3 Plotscale: 250

Table 1. Vascular plant species list - Hamilton Water Tower

			Vegetation Community[1]				Coservation Rank[2]							
FAMILY	**SCIENTIFIC NAME**	**COMMON NAME**	**Residential/ Commercial**	**Hedgerow**	**CUM1-1**	**FOD**	**GRANK**	**SRANK**	**COSEWIC**	**MNRF**	TRACK	Coeff Conserv	Coeff Wetness	Coeff Weed
Aceraceae	*Acer platanoides*	Norway Maple	X				GNR	SE5			N		5	-3
Aceraceae	*Acer saccharinum*	Silver Maple				X	G5	S5			N	5	-3	
Aceraceae	*Acer saccharum*	Sugar Maple		X		X	G5	S5			N	4	3	
Anacardiaceae	*Rhus typhina*	Staghorn Sumac	X	X			G5	S5			N	1	5	
Apiaceae	*Daucus carota*	Wild Carrot	X	X	X		GNR	SE5			N		5	-2
Apocynaceae	*Apocynum androsaemifolium*	Spreading Dogbane		X			G5	S5			N	3	5	
Asclepiadaceae	*Asclepias syriaca*	Common Milkweed		X			G5	S5			N	0	5	
Asteraceae	*Achillea millefolium*	Common Yarrow			X		G5	SE			N			-1
Asteraceae	*Ambrosia artemisiifolia*	Annual Ragweed	X		X		G5	S5			N	0	3	
Asteraceae	*Arctium minus*	Common Burdock	X				GNR	SE5			N		5	-2
Asteraceae	*Cichorium intybus*	Chicory	X		X		GNR	SE5			N		5	-1
Asteraceae	*Cirsium arvense*	Canada Thistle	X				GNR	SE5			N		3	-1
Asteraceae	*Lactuca biennis*	Tall Blue Lettuce		X			G5	S5			N	6	0	
Asteraceae	*Leucanthemum vulgare*	Oxeye Daisy	X				GNR	SE5			N		5	-1
Asteraceae	*Solidago altissima*	Eastern Late Goldenrod	X	X	X	X	GNR	S5			N	1	3	
Asteraceae	*Solidago canadensis*	Canada Goldenrod	X		X		G5T5	S5			N	1	3	
Asteraceae	*Sonchus arvensis*	Field Sow-thistle	X				GNRTNR	SE5			N		1	-1
Asteraceae	*Symphyotrichum lanceolatum*	Panicled Aster	X				G5T5	S5			N	3	-3	
Asteraceae	*Symphyotrichum novae-angliae*	New England Aster	X				G5	S5			N	2	-3	
Asteraceae	*Taraxacum officinale*	Common Dandelion		X		X	G5	SE5			N		3	-2
Asteraceae	*Tussilago farfara*	Colt's-foot	X				GNR	SE5			N		3	-2
Brassicaceae	*Brassica rapa*	Field Mustard			X		GNR	SE5			N		5	-1
Caprifoliaceae	*Lonicera tatarica*	Tartarian Honeysuckle		X			GNR	SE5			N		3	-3
Cucurbitaceae	*Echinocystis lobata*	Wild Mock-cucumber				X	G5	S5			N	3	-2	
Cupressaceae	*Thuja occidentalis*	Eastern White Cedar	X				G5	S5			N	4	-3	
Fabaceae	*Gleditsia triacanthos*	Honey-locust		X			G5	S2			Y	3	0	
Fabaceae	*Medicago lupulina*	Black Medic	X				GNR	SE5			N		1	-1
Fabaceae	*Melilotus albus*	White Sweet-clover			X		G5	SE5			N		3	-3
Fabaceae	*Trifolium pratense*	Red Clover	X				GNR	SE5			N		2	-2
Fabaceae	*Vicia cracca*	Tufted Vetch	X				GNR	SE5			N		5	-1
Juglandaceae	*Juglans nigra*	Black Walnut		X			G5	S4			N	5	3	
Lamiaceae	*Clinopodium vulgare*	Field Basil		X			G5	S5			N	4	5	
Liliaceae	*Hemerocallis lilioasphodelus*	Yellow Daylily		X			GNR	SE4			N		5	-1
Malvaceae	*Althaea officinalis*	Common Marsh-mallow	X				GNR	SE1			N		0	-1
Oleaceae	*Fraxinus americana*	White Ash				X	G5	S4			N	4	3	
Oleaceae	*Fraxinus pennsylvanica*	Green Ash				X	G5	S4			N	3	-3	
Oleaceae	*Syringa vulgaris*	Common Lilac		X			GNR	SE5			N		5	-2
Pinaceae	*Picea abies*	Norway Spruce		X			G5	SE3			N		5	-1
Pinaceae	*Picea pungens*	Blue Spruce	X				G5	SE1			N		5	
Pinaceae	*Pinus strobus*	Eastern White Pine	X				G5	S5			N	4	3	
Plantaginaceae	*Plantago major*	Common Plantain	X				G5	S5			N		-1	-1
Poaceae	*Alopecurus pratensis*	Field Foxtail			X		GNR	SE5			N		-3	-1
Poaceae	*Bromus inermis*	Awnless Brome	X	X			G5TNR	SE5			N		5	-3

Table 1. Vascular plant species list - Hamilton Water Tower

			Vegetation Community[1]				Coservation Rank[2]							
FAMILY	**SCIENTIFIC NAME**	**COMMON NAME**	**Residential/ Commercial**	**Hedgerow**	**CUM1-1**	**FOD**	**GRANK**	**SRANK**	**COSEWIC**	**MNRF**	TRACK	Coeff Conserv	Coeff Wetness	Coeff Weed
Poaceae	*Dactylis glomerata*	Orchard Grass		X			GNR	SE5			N		3	-1
Poaceae	*Phleum pratense*	Common Timothy	X		X		GNR	SE5			N		3	-1
Poaceae	*Phragmites australis*	European Reed	X			X	G5T5	SE5			N		-4	
Polygonaceae	*Rumex crispus*	Curly Dock	X		X		GNR	SE5			N		-1	-2
Asteraceae	Tragopogon pratensis	Meadow Goat's-beard		X			GNR	SE5			N			-1
Rosaceae	*Rubus idaeus*	Common Red Raspberry	X			X	G5T5	SE1			N		5	
Rosaceae	*Sorbus americana*	American Mountain-ash		X			G5	S5			N	8	-1	
Salicaceae	*Populus tremuloides*	Trembling Aspen				X	G5	S5			N	2	0	
Salicaceae	*Salix euxina*	Crack Willow	X			X	GNR	SE			N			-3
Salicaceae	*Salix nigra*	Black Willow				X	G5	S4?			N	6	-5	
Scrophulariaceae	*Verbascum thapsus*	Common Mullein	X				GNR	SE5			N		5	-2
Typhaceae	*Typha angustifolia*	Narrow-leaved Cattail				X	G5	SE5			N		-5	
Typhaceae	*Typha latifolia*	Broad-leaved Cattail				X	G5	S5			N	3	-5	
Vitaceae	*Parthenocissus quinquefolia*	Virginia Creeper	X	X			G5	S4?			N	6	1	
Vitaceae	*Vitis riparia*	Riverbank Grape	X	X		X	G5	S5			N	0	-2	

[1]See Figure 1 for vegetation community location

[2]S Rank - "Sub-national Rank/provincial rank" (S Rank 1, 2 & 3 considered provincially rare); G RANK - "Global Rank" (G Rank 1, 2 & 3 considered globally rare), "SNA" - sub-national rank not assigned (general indicates non-native species); SARO - designation as Species at Risk in Ontario (Endangered, Threatened or Special Concern);

Table 2. Bird List - Hamilton Water Tower

					Conservation Ranks[D]			
FAMILY	**SCIENTIFIC NAME**	**COMMON NAME**	**Survey Data[A,B]**	**Breeding Evidence[C]**	**GRANK**	**SRANK**	**COSEWIC**	**SARO**
Bombycillidae	Bombycilla cedrorum	Cedar Waxwing	,S	Possible	G5	S5B		
Mimidae	Mimus polyglottos	Northern Mockingbird	,S	Possible	G5	S4		
Corvidae	Corvus brachyrhynchos	American Crow	FO	Observed	G5	S5B		
Laridae	Larus delawarensis	Ring-billed Gull	FO, FO	Observed	G5	S5B,S4N		
Hirundinidae	Hirundo rustica	Barn Swallow	H, H	Possible	G5	S4B	THR	THR
Paridae	Poecile atricapillus	Black-capped Chickadee	S,	Possible	G5	S5		
Hirundinidae	Tachycineta bicolor	Tree Swallow	S,	Possible	G5	S4B		
Sturnidae	Sturnus vulgaris	European Starling	S,	Possible	G5	SNA		
Turdidae	Turdus migratorius	American Robin	S,	Possible	G5	S5B		
Cardinalidae	Cardinalis cardinalis	Northern Cardinal	S,	Possible	G5	S5		
Emberizidae	Spizella passerina	Chipping Sparrow	S,S	Probable	G5	S5B		
Emberizidae	Melospiza melodia	Song Sparrow	S,S	Probable	G5	S5B		

Surveys Conditions:

[A]June 08, 2012; Start Time 0609hr/ End Time 0620hr; Temperature +20°C; Wind B0; Cloud Cover 00%; Precipitation Nil; Observer M. Fuller

[B]June 22, 2012; Start Time 07020hr/ End Time 0715hr; Temperature 22°C; Wind B1; Cloud Cover 30%; Precipitation Nil; Observer M. Fuller

[C]OBBA Breeding Evidence Codes:

OBSERVED

FO - Fly Over

X - Species observed in its breeding season (no breeding evidence)

POSSIBLE

H - Species observed in its breeding season in suitable nesting habitat

S - Singing male present, or breeding calls heard, in suitable nesting habitat in nesting season.

PROBABLE

A - Agitated behaviour or anxiety calls of an adult.

N - Nest building or excavation of nest hole.

P -Pair observed in suitable nesting habitat in nesting season.

T - Permanent territory presumed trhough registration of territorial behaviour (e.g. song) on at least two days, a week or more apart, at the same place.

CONFIRMED

DD - Distraction display or injury feigning.

FY - Recently fledged young or downy young, including incapable of sustained flight.

[D]Conservation Rank - from OMNRF, NHIC and SARO Lists 2014

S-rank - S1 - Extremely Rare, S2 - Very Rare, S3 - Rare to Uncommon, S4 - Common, S5 - Very Common

G-Rank - G1 - Critically Imperiled, G2 - Imperiled, G3 - Vulnerable, G4 - Apparently Secure, G5 - Secure

SARO - EXP (Extirpated), END (Endangered), THR (Threatened), SC (Special Concern)

Table 3. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E - Hamilton Water Tower

SEASONAL CONCENTRATION AREAS OF ANIMALS					
Wildlife Habitat	**Wildlife Species**	**CANDIDATE SWH**		**CONFIRMED SWH**	**Assessment**
		ELC Ecosite Codes	**Habitat Criteria and Information Sources**	**Defining Criteria**	
Waterfowl Stopover and Staging Areas (Terrestrial) **<u>Rationale:</u>** Habitat important to migrating waterfowl.	American Black Duck Northern Pintail Gadwall Blue-winged Teal Green-winged Teal American Wigeon Northern Shoveler Tundra Swan	CUM1 CUT1 • Plus evidence of annual spring flooding from melt water or run-off within these Ecosites. • Fields with seasonal flooding and waste grains in the Long Point, Rondeau, Lk. St. Clair, Grand Bend and Pt. Pelee areas may be important to Tundra Swans.	Fields with sheet water during Spring (mid-March to May). • Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl. • Agricultural fields with waste grains are commonly used by waterfowl, these are not considered SWH unless they have spring sheet water available. <u>Information Sources</u> • Anecdotal information from the landowner, adjacent landowners or local naturalist clubs may be good information in determining occurrence. • Reports and other information available from Conservation Authorities • Sites documented through waterfowl planning processes (eg. EHJV implementation plan) • Field Naturalist Clubs • Ducks Unlimited Canada • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” • Any mixed species aggregations of 100 or more individuals required. • The flooded field ecosite habitat plus a 100-300m radius, dependant on local site conditions and adjacent land use is the significant wildlife habitat. • Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates). • SWH MIST Index #7 provides development effects and mitigation measures.	Unlikely that habitat is present within the Study Area given the existing land conditions. No early spring site visits have been completed to confirm presence of absence of this SWH habitat type.
Waterfowl Stopover and Staging Areas (Aquatic) **<u>Rationale:</u>** Important for local and migrant waterfowl populations during the spring or fall migration or both periods combined. Sites identified are usually only one of a few in the eco-district	Canada Goose Cackling Goose Snow Goose American Black Duck Northern Pintai Northern Shoveler American Wigeon Gadwall Green-winged Teal Blue-winged Teal Hooded Merganser Common Merganser Lesser Scaup Greater Scaup Long-tailed Duck Surf Scoter White-winged Scoter Black Scoter Ring-necked Duck Common Goldeneye Bufflehead Redhead Ruddy Duck Red-breasted Merganser Brant Canvasback Ruddy Duck	MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7	• Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. Sewage treatment ponds and storm water ponds do not qualify as a SWH, however a reservoir managed as a large wetland or pond/lake does qualify. • These habitats have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water <u>Information Sources</u> • Environment Canada • Naturalist clubs often are aware of staging/stopover areas. • OMNRF Wetland Evaluations indicate presence of locally and regionally significant waterfowl staging. • Sites documented through waterfowl planning processes (eg. EHJV implementation plan) • Ducks Unlimited projects • Element occurrence specification by Nature Serve: http://www.natureserve.org • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of: • Aggregations of 100 or more of listed species for 7 days, results in > 700 waterfowl use days. • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH • The combined area of the ELC ecosites and a 100m radius area is the SWH • Wetland area and shorelines associated with sites identified within the SWHTG Appendix K are significant wildlife habitat. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” • Annual Use of Habitat is Documented from Information Sources or Field Studies (Annual can be based on completed studies or determined from past surveys with species numbers and dates recorded). • SWH MIST Index #7 provides development effects and mitigation measures.	**One pond is present within the Study Area, which is potentially man made and functioning as a storm water pond. Further investigation of this feature, during the appropriate time of year, is required to assess for significance.**
Shorebird	Greater Yellowlegs	BBO1	• Shorelines of lakes, rivers and wetlands, including seasonally	Studies confirming:	No potential habitat present within the Study

Table 3. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E - Hamilton Water Tower

SEASONAL CONCENTRATION AREAS OF ANIMALS					
Wildlife Habitat	**Wildlife Species**	**CANDIDATE SWH**		**CONFIRMED SWH**	**Assessment**
		ELC Ecosite Codes	**Habitat Criteria and Information Sources**	**Defining Criteria**	
Migratory Stopover Area **<u>Rationale:</u>** High quality shorebird stopover habitat is extremely rare and typically has a long history of use.	Lesser Yellowlegs Marbled Godwit Hudsonian Godwit Black-bellied Plover American Golden Plover Semipalmated Plover Solitary Sandpiper Spotted Sandpiper Semipalmated Sandpiper Pectoral Sandpiper White-rumped Sandpiper Baird's Sandpiper Least Sandpiper Purple Sandpiper Stilt Sandpiper Short-billed Dowitcher Red-necked Phalarope Whimbrel Ruddy Turnstone Sanderling Dunlin	BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2 MAM3 MAM4 MAM5	flooded, muddy and un-vegetated shoreline habitats. • Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. • Sewage treatment ponds and storm water ponds do not qualify as a SWH. <u>Information Sources</u> • Western hemisphere shorebird reserve network. • Canadian Wildlife Service (CWS) Ontario Shorebird Survey. • Bird Studies Canada • Ontario Nature • Local birders and naturalist clubs • Natural Heritage Information Centre (NHIC) Shorebird Migratory Concentration Area	• Presence of 3 or more of listed species and > 1000 shorebird use days during spring or fall migration period. (shorebird use days are the accumulated number of shorebirds counted per day over the course of the fall or spring migration period) • Whimbrel stop briefly (<24 hours) during spring migration, any site with >100 Whimbrel used for 3 years or more is significant. • The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100m radius area • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #8 provides development effects and mitigation measures.	Area.
Raptor Wintering Area **<u>Rationale:</u>** Sites used by multiple species, a high number of individuals and used annually are most significant	Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl **<u>Special Concern:</u>** Short-eared Owl Bald Eagle	<u>Hawks/Owls:</u> Combination of ELC Community Series; need to have present one Community Series from each land class; Forest: FOD, FOM, FOC. Upland: CUM; CUT; CUS; CUW. <u>Bald Eagle:</u> Forest community Series: FOD, FOM, FOC, SWD, SWM or SWC on shoreline areas adjacent to large rivers or adjacent to lakes with open water (hunting area).	• The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. • Raptor wintering (hawk/owl) sites need to be > 20 ha with a combination of forest and upland. • Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands • Field area of the habitat is to be wind swept with limited snow depth or accumulation. • Eagle sites have open water and large trees and snags available for roosting <u>Information Sources:</u> • OMNRF Ecologist or Biologist • Naturalist clubs • Natural Heritage Information Centre (NHIC) Raptor Winter Concentration Area • Data from Bird Studies Canada • Results of Christmas Bird Counts • Reports and other information available from Conservation Authorities.	Studies confirm the use of these habitats by: • One or more Short-eared Owls or; One of more Bald Eagles or; At least10 individuals and two of the listed hawk/owl species • To be significant a site must be used regularly (3 in 5 years) for a minimum of 20 days by the above number of birds. • The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #10 and #11 provides development effects and mitigation measures.	Potentially suitable habitat within the Study Area does not meet the size criteria for SWH.
Bat Hibernacula	Big Brown Bat Tri-coloured Bat	Bat Hibernacula may be found in these ecosites:	• Hibernacula may be found in caves, mine shafts, underground foundations and Karsts.	• All sites with confirmed hibernating bats are SWH.	No potential habitat present within the Study Area.

Table 3. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E - Hamilton Water Tower

SEASONAL CONCENTRATION AREAS OF ANIMALS					
Wildlife Habitat	**Wildlife Species**	**CANDIDATE SWH**		**CONFIRMED SWH**	**Assessment**
		ELC Ecosite Codes	**Habitat Criteria and Information Sources**	**Defining Criteria**	
Rationale: Bat hibernacula are rare habitats in all Ontario landscapes.		CCR1 CCR2 CCA1 CCA2 (Note: buildings are not considered to be SWH)	• Active mine sites should not be considered as SWH • The locations of bat hibernacula are relatively poorly known. Information Sources • OMNRF for possible locations and contact for local experts • Natural Heritage Information Centre (NHIC) Bat Hibernaculum • Ministry of Northern Development and Mines for location of mine shafts. • Clubs that explore caves (eg. Sierra Club) • University Biology Departments with bat experts.	• The area includes 200m radius around the entrance of the hibernaculum for most development types and 1000m for wind farms. • Studies are to be conducted during the peak swarming period (Aug. – Sept.). Surveys should be conducted following methods outlined in the “Bats and Bat Habitats: Guidelines for Wind Power Projects” • SWH MIST Index #1 provides development effects and mitigation measures.	
Bat Maternity Colonies **Rationale:** Known locations of forested bat maternity colonies are extremely rare in all Ontario landscapes.	Big Brown Bat Silver-haired Bat	Maternity colonies considered SWH are found in forested Ecosites. All ELC Ecosites in ELC Community Series: FOD FOM SWD SWM	• Maternity colonies can be found in tree cavities, vegetation and often in buildlings (buildings are not considered to be SWH). • Maternity roosts are not found in caves and mines in Ontario. • Maternity colonies located in Mature deciduous or mixed forest stands with >10/ha large diameter (>25cm dbh) wildlife trees • Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3 or class 1 or 2 • Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred Information Sources • OMNRF for possible locations and contact for local experts • University Biology Departments with bat experts	• Maternity Colonies with confirmed use by; • >10 Big Brown Bats • >5 Adult Female Silverhaired Bats • The area of the habitat includes the entire woodland or a forest stand ELC Ecosite or an Ecoelement containing the maternity colonies • Evaluation methods for maternity colonies should be conducted following methods outlined in the “Bats and Bat Habitats: Guidelines for Wind Power Projects” • SWH MIST Index #12 provides development effects and mitigation measures.	Potentially suitable habitat within and adjacent to the Study Area does not meet the size criteria for SWH.
Turtle Wintering Areas **Rationale:** Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	Midland Painted Turtle **Special Concern:** Northern Map Turtle Snapping Turtle	Snapping and Midland Painted Turtles; ELC Community Classes; SW, MA, OA and SA, ELC Community Series; FEO and BOO Northern Map Turtle; Open Water areas such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat.	• For most turtles, wintering areas are in the same general area as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates. • Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen • Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH. Information Sources • EIS studies carried out by Conservation Authorities. • Field Naturalists Clubs • OMNRF Ecologist or Biologist • Natural Heritage Information Centre (NHIC)	• Presence of 5 over-wintering Midland Painted Turtles is significant. • One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland is significant. • The mapped ELC ecosite area with the over wintering turtles is the SWH. If the hibernation site is within a stream or river, the deepwater pool where the turtles are over wintering is the SWH. • Over wintering areas may be identified by searching for congregations (Basking Areas) of turtles on warm, sunny days during the fall (Sept. – Oct.) or spring (Mar. – May). Congregation of turtles is more common where wintering areas are limited and therefore significant. • SWH MIST Index #28 provides development effects and mitigation measures for turtle wintering habitat.	**Potential habitat is present within the pond feature.**
Reptile Hibernaculum **Rationale**:	**Snakes:** Eastern Gartersnake Northern Watersnake Northern Red-bellied	For all snakes, habitat may be found in any ecosite other than very wet ones. Talus, Rock	• For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural or naturalized locations. The existence of features that go below frost line; such as rock piles or slopes, old stone fences, and abandoned	Studies confirming: • Presence of snake hibernacula used by a minimum of five individuals of a snake sp. or; individuals of two or more snake spp.	No potential habitat present within the Study Area.

Table 3. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E - Hamilton Water Tower

SEASONAL CONCENTRATION AREAS OF ANIMALS					
Wildlife Habitat	**Wildlife Species**	**CANDIDATE SWH**		**CONFIRMED SWH**	**Assessment**
		ELC Ecosite Codes	**Habitat Criteria and Information Sources**	**Defining Criteria**	
Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	Snake Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake **<u>Special Concern</u>**: Milksnake Eastern Ribbonsnake	Barren, Crevice, Cave, and Alvar sites may be directly related to these habitats. Observations or congregations of snakes on sunny warm days in the spring or fall is a good indicator.	crumbling foundations assist in identifying candidate SWH. • Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line. • Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. <u>Information Sources</u> • In spring, local residents or landowners may have observed the emergence of snakes on their property (e.g. old dug wells). • Reports and other information available from Conservation Authorities. • Field Naturalist Clubs • University herpetologists • Natural Heritage Information Centre (NHIC)	• Congregations of a minimum of five individuals of a snake sp. <u>or</u>; individuals of two or more snake spp. near potential hibernacula (eg. foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct) • <u>Note:</u> If there are Special Concern Species present, then site is SWH • <u>Note:</u> Sites for hibernation possess specific habitat parameters (e.g. temperature, humidity, etc.) and consequently are used annually, often by many of the same individuals of a local population (i.e. strong hibernation site fidelity). Other critical life processes (e.g. mating) often take place in close proximity to hibernacula. The feature in which the hibernacula is located plus a 30 m radius area is the SWH • SWH MIST Index #13 provides development effects and mitigation measures for snake hibernacula.	
Colonially - Nesting Bird Breeding Habitat (Bank and Cliff) **<u>Rationale:</u>** Historical use and number of nests in a colony make this habitat significant. An identified colony can be very important to local populations. All swallow population are declining in Ontario.	Cliff Swallow Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies)	Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles Cliff faces, bridge abutments, silos, barns. Habitat found in the following ecosites: CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1	• Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area. • Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. • Does not include a licensed/permitted Mineral Aggregate Operation. <u>Information Sources</u> • Reports and other information available from Conservation Authorities. • Ontario Breeding Bird Atlas • Bird Studies Canada; *NatureCounts* http://www.birdscanada.org/birdmon/ • Field Naturalist Clubs	Studies confirming: • Presence of 1 or more nesting sites with 8cxlix or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season. • A colony identified as SWH will include a 50m radius habitat area from the peripheral nests • Field surveys to observe and count swallow nests are to be completed during the breeding season. Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” • SWH MIST Index #4 provides development effects and mitigation measures	No potential habitat present within the Study Area.
Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs) **<u>Rationale;</u>** Large colonies	Great Blue Heron Black-crowned Night Heron Great Egret Green Heron	SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7 FET1	• Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. • Most nests in trees are 11 to 15 m from ground, near the top of the tree. <u>Information Sources</u> • Ontario Breeding Bird Atlas, colonial nest records.	Studies confirming: • Presence of 2 or more active nests of Great Blue Heron or other listed species. • The habitat extends from the edge of the colony and a minimum 300m radius or extent of the Forest Ecosite containing the colony or any island <15.0ha with a colony is the SWH • Confirmation of active heronries are to be	**Potential habitat is present within the pond feature. Additional surveys during the appropriate season will be required to complete SWH assessment.**

Table 3. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E - Hamilton Water Tower

SEASONAL CONCENTRATION AREAS OF ANIMALS					
Wildlife Habitat	**Wildlife Species**	**CANDIDATE SWH**		**CONFIRMED SWH**	**Assessment**
		ELC Ecosite Codes	**Habitat Criteria and Information Sources**	**Defining Criteria**	
are important to local bird population, typically sites are only known colony in area and are used annually.			• Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNRF). • Natural Heritage Information Centre (NHIC) Mixed Wader Nesting Colony • Aerial photographs can help identify large heronries. • Reports and other information available from Conservation Authorities. • MNRF District Offices. • Field Naturalist Clubs.	achieved through site visits conducted during the nesting season (April to August) or by evidence such as the presence of fresh guano, dead young and/or eggshells • SWH MIST Index #5 provides development effects and mitigation measures.	
Colonially - Nesting Bird Breeding Habitat (Ground) **<u>Rationale:</u>** Colonies are important to local bird population, typically sites are only known colony in area and are used annually.	Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird	Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1;50,000 NTS map). Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird) MAM1 – 6; MAS1 – 3; CUM CUT CUS	• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands. <u>Information Sources</u> • Ontario Breeding Bird Atlas, rare/colonial species records. • Canadian Wildlife Service • Reports and other information available from Conservation Authorities. • Natural Heritage Information Centre (NHIC) Colonial Waterbird Nesting Area • MNRF District Offices. • Field Naturalist Clubs.	• Studies confirming: Presence of > 25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern • Presence of 5 or more pairs for Brewer's Blackbird • Any active nesting colony of one or more Little Gull, and Great Black-backed Gull is significant • The edge of the colony and a minimum 150m radius area of habitat, or the extent of the ELC ecosites containing the colony or any island <3.0ha with a colony is the SWH • Studies would be done during May/June when actively nesting. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #6 provides development effects and mitigation measures.	No potential habitat present within the Study Area.
Migratory Butterfly Stopover Areas **<u>Rationale:</u>** Butterfly stopover areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter	Painted Lady Red Admiral <u>Special Concern</u> Monarch	Combination of ELC Community Series; need to have present one Community Series from each landclass: <u>Field:</u> CUM CUT CUS <u>Forest:</u> FOC FOD FOM CUP Anecdotally, a candidate site for butterfly stopover will have a history of butterflies being observed.	A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Erie or Lake Ontario • The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south • The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat • Staging areas usually provide protection from the elements and are often spits of land or areas with the shortest distance to cross the Great Lakes <u>Information Sources</u> • MNRF District Offices Natural Heritage Information Centre (NHIC) • Agriculture Canada in Ottawa may have list of butterfly experts. • Field Naturalist Clubs • Toronto Entomologists Association • Conservation Authorities	Studies confirm: • The presence of Monarch Use Days (MUD) during fall migration (Aug/Oct). MUD is based on the number of days a site is used by Monarchs, multiplied by the number of individuals using the site. Numbers of butterflies can range from 100-500/day, significant variation can occur between years and multiple years of sampling should occur • Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD. • MUD of >5000 or >3000 with the presence of Painted Ladies or Red Admiral's is to be considered significant. • SWH MIST Index #16 provides development effects and mitigation measures.	Study Area is not located with 5km of Lake Ontario.

Table 3. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E - Hamilton Water Tower

SEASONAL CONCENTRATION AREAS OF ANIMALS					
Wildlife Habitat	**Wildlife Species**	**CANDIDATE SWH**		**CONFIRMED SWH**	**Assessment**
		ELC Ecosite Codes	**Habitat Criteria and Information Sources**	**Defining Criteria**	
Landbird Migratory Stopover Areas **<u>Rationale:</u>** Sites with a high diversity of species as well as high numbers are most significant.	All migratory songbirds. Canadian Wildlife Service Ontario website: http://www.ec.gc.ca/nature/default.asp?lang=En&n=42 1B7A9D-1 All migrant raptors species: Ontario Ministry of Natural Resources: Fish and Wildlife Conservation Act, 1997. Schedule 7: Specially Protected Birds (Raptors)	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD	• Woodlots >5 ha in size and within 5 km of Lake Erie and Lake Ontario. If woodlands are rare in an area of shoreline, woodland fragments 2-5ha can be considered for this habitat • If multiple woodlands are located along the shoreline those Woodlands <2km from Lake Erie and Lake Ontario are more significant • Sites have a variety of habitats; forest, grassland and wetland complexes • The largest sites are more significant • Woodlots and forest fragments are important habitats to migrating birds these features located along the shore and located within 5km of Lake Erie and Lake Ontario are Candidate SWH <u>Information Sources</u> • Bird Studies Canada • Ontario Nature • Local birders and field naturalist clubs • Ontario Important Bird Areas (IBA) Program	Studies confirm: • Use of the habitat by >200 birds/day and with >35 spp with at least 10 bird spp. recorded on at least 5 different survey dates. This abundance and diversity of migrant bird species is considered above average and significant. • Studies should be completed during spring (Mar to May) and fall (Aug to Oct) migration using standardized assessment techniques. Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” • SWH MIST Index #9 provides development effects and mitigation measures.	Study Area is not located with 5km of Lake Ontario.
Deer Winter Congregation Areas **<u>Rationale</u>**: Deer movement during winter in the southern areas of Ecoregion 7E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands to reduce or avoid the impacts of winter conditions	White-tailed Deer	All Forested Ecosites with these ELC Community Series; FOC FOM FOD SWC SWM SWD Conifer plantations much smaller than 50 ha may also be used.	• Woodlots >100 ha in size or if large woodlots are rare in a planning area woodlots>50ha • Deer movement during winter in the southern areas of Ecoregion 7E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands • Large woodlots > 100ha and up to 1500 ha are known to be used annually by densities of deer that range from 0.1-1.5 deer/ha • Woodlots with high densities of deer due to artificial feeding are not significant <u>Information Sources</u> • MNRF District Offices. • LIO/NRVIS	Studies confirm: • Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF • Use of the woodlot by whitetailed deer will be determined by MNRF, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNRF • Studies should be completed during winter (Jan/Feb) when >20cm of snow is on the ground using aerial survey techniques, ground or road surveys, or a pellet count deer density survey • SWH MIST Index #2 provides development effects and mitigation measures.	No potential habitat present within the Study Area.

Table 3. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E - Hamilton Water Tower

RARE VEGETATION COMMUNITIES					
Rare Vegetation Community	**CANDIDATE SWH**			**CONFIRMED SWH**	**Assessment**
	ELC Ecosite Code	**Habitat Description**	**Detailed Information and Sources**	**Defining Criteria**	
Cliffs and Talus Slopes **Rationale:** Cliffs and Talus Slopes are extremely rare habitats in Ontario.	Any ELC Ecosite within Community Series: TAO CLO TAS CLS TAT CLT	A Cliff is vertical to near vertical bedrock >3m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris	Most cliff and talus slopes occur along the Niagara Escarpment. Information Sources • The Niagara Escarpment Commission has detailed information on location of these habitats. • OMNRF Districts • Natural Heritage Information Centre (NHIC) has location information available on their website • Field Naturalist Clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes • SWH MIST Index #21 provides development effects and mitigation measures.	No potential habitat present within the Study Area.
Sand Barren **Rationale:** Sand barrens are rare in Ontario and support rare species. Most Sand Barrens have been lost due to cottage development and forestry	ELC Ecosites: SBO1 SBS1 SBT1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicketlike (SBS1), or more closed and treed (SBT1). Tree cover always ≤ 60%.	Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. Usually located within other types of natural habitat such as forest or savannah. Vegetation can vary from patchy and barren to tree covered, but less than 60%.	A sand barren area >0.5ha in size. Information Sources • OMNRF Districts. • Natural Heritage Information Centre (NHIC) has location information available on their website. • Field Naturalist Clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Sand Barrens • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.) • SWH MIST Index #20 provides development effects and mitigation measures.	No potential habitat present within the Study Area.
Alvar **Rationale**: Alvars are extremely rare habitats in Ecoregion 7E.	ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2 **Five Alvar Indicator Species:** 1) *Carex crawei* 2) *Panicum philadelphicum* 3) *Eleocharis compressa* 4) *Scutellaria parvula* 5) *Trichostema brachiatum*	An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plants. Undisturbed alvars can be phyto- and zoogeographically	An Alvar site > 0.5 ha in size. Alvar is particularly rare in Ecoregion 7E where the only known sites are found in the western islands of Lake Erie. Information Sources • Alvars of Ontario (2000), Federation of Ontario Naturalists • Ontario Nature – Conserving Great Lakes Alvars • Natural Heritage Information Centre (NHIC) has location information available on their website. • OMNRF Staff. • Field Naturalist Clubs. • Conservation Authorities	Field studies that identify four of the five **Alvar Indicator Species** at a Candidate Alvar site is Significant. • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.) • The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses • SWH MIST Index #17 provides development effects and mitigation measures	No potential habitat present within the Study Area.

Table 3. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E - Hamilton Water Tower

RARE VEGETATION COMMUNITIES					
Rare Vegetation Community	**CANDIDATE SWH**			**CONFIRMED SWH**	**Assessment**
	ELC Ecosite Code	**Habitat Description**	**Detailed Information and Sources**	**Defining Criteria**	
	These indicator species are very specific to Alvars within Ecoregion 7E	diverse, supporting many uncommon or are relict plant and animals species. Vegetation cover varies from patchy to barren with a less than 60% tree cover			
Old Growth Forest **<u>Rationale:</u>** Due to historic logging practices and land clearance for agriculture, old growth forest is rare in Ecoregion 7E.	Forest Community Series: FOD FOC FOM SWD SWC SWM	Old Growth forests are characterized by heavy mortality or turnover of overstorey trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris.	Woodland area is >0.5ha <u>Information Sources</u> • OMNRF Forest Resource Inventory mapping • OMNRF Districts. • Field Naturalist Clubs • Conservation Authorities • Sustainable Forestry Licence (SFL) companies will possibly know locations through field operations. • Municipal forestry departments	Field Studies will determine: • If dominant trees species of the are >140 years old, then the area containing these trees is Significant Wildlife Habitat • The forested area containing the old growth characteristics will have experienced no recognizable forestry activities (cut stumps will not be present) • The area of forest ecosites combined or an eco-element within an ecosite that contain the old growth characteristics is the SWH. • Determine ELC vegetation types for the forest forest area containing the old growth characteristics • SWH MISTcxlix Index #23 provides development effects and mitigation measures.	No potential habitat present within the Study Area.
Savannah **<u>Rationale:</u>** Savannahs are extremely rare habitats in Ontario.	TPS1 TPS2 TPW1 TPW2 CUS2	A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%. In ecoregion 7E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario).	No minimum size to site. Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. <u>Information Sources</u> • Natural Heritage Information Centre (NHIC) has location data available on their website. • OMNRF Districts. • Field Naturalists Clubs. • Conservation Authorities.	Field studies confirm one or more of the Savannah indicator species listed in Appendix N should be present. Note: Savannah plant spp. list from Ecoregion 7E should be used • Area of the ELC Ecosite is the SWH. • Site must not be dominated by exotic or introduced species (exotic sp.). • SWH MIST Index #18 provides development effects and mitigation measures.	No potential habitat present within the Study Area.
Tallgrass Prairie **<u>Rationale:</u>** Tallgrass Prairies are extremely rare habitats in Ontario.	TPO1 TPO2	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover. In ecoregion 7E, known Tallgrass Prairie and	No minimum size to site. Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. <u>Information Sources</u> • OMNRF Districts. • Natural Heritage Information Centre (NHIC) has location information available on their website.	Field studies confirm one or more of the Prairie indicator species listed in Appendix N should be present. Note: Prairie plant spp. list from Ecoregion 7E should be used • Area of the ELC Ecosite is the SWH. • Site must not be dominated by exotic or introduced species (50% vegetative cover are	No potential habitat present within the Study Area.

Table 3. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E - Hamilton Water Tower

RARE VEGETATION COMMUNITIES					
Rare Vegetation Community	**CANDIDATE SWH**			**CONFIRMED SWH**	**Assessment**
	ELC Ecosite Code	**Habitat Description**	**Detailed Information and Sources**	**Defining Criteria**	
		savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario).	• Field Naturalists Clubs. • Conservation Authorities.	exotic sp.) • SWH MIST Index #19 provides development effects and mitigation measures.	
Other Rare Vegetation Communities **<u>Rationale:</u>** Plant communities that often contain rare species which depend on the habitat for survival.	Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG. Any ELC Ecosite Code that has a possible ELC Vegetation Type that is Provincially Rare is Candidate SWH	Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps.	ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in appendix M. The OMNRF/NHIC will have up to date listing for rare vegetation communities. <u>Information Sources</u> • Natural Heritage Information Centre (NHIC) has location information available on their website. • OMNRF Districts. • Field Naturalists Clubs. • Conservation Authorities.	Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTG • Area of the ELC Vegetation Type polygon is the SWH. • SWH MIST Index #37 provides development effects and mitigation measures.	No potential habitat present within the Study Area.

Table 3. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E - Hamilton Water Tower

SPECIALIZED HABITATS OF WILDLIFE CONSIDERED SWH					
Specialized Wildlife Habitat	**Wildlife Species**	**CANDIDATE SWH**		**CONFIRMED SWH**	**Assessment**
		ELC Ecosite Codes	**Habitat Criteria and Information Sources**	**Defining Criteria**	
Waterfowl Nesting Area **<u>Rationale:</u>** Important to local waterfowl populations, sites with greatest number of species and highest number of individuals are significant.	American Black Duck Northern Pintail Northern Shoveler Gadwall Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SWT1 SWT2 SWD1 SWD2 SWD3 SWD4 **Note: includes adjacency to Provincially Significant Wetlands**	A waterfowl nesting area extends 120 m from a wetland (> 0.5 ha) or a wetland (>0.5ha) and any small wetlands (0.5ha) within 120m or a cluster of 3 or more small (>0.5ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur. • Upland areas should be at least 120 m wide so that predators such as racoons, skunks, and foxes have difficulty finding nests. • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40cm dbh) in woodlands for cavity nest sites. <u>Information Sources</u> • Ducks Unlimited staff may know the locations of particularly productive nesting sites. • OMNRF Wetland Evaluations for indication of significant waterfowl nesting habitat. • Reports and other information available from Conservation Authorities.	Studies confirmed: • Presence of 3 or more nesting pairs for listed species excluding Mallards, or; • Presence of 10 or more nesting pairs for listed species including Mallards. • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April - June). Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” • A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120 m from the wetland and will provide enough habitat for waterfowl to successfully nest. • SWH MIST Index #25 provides development effects and mitigation measures.	No potential habitat present within the Study Area.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat **<u>Rationale:</u>** Nest sites are fairly uncommon in Ecoregion 7E and are used annually by these species. Many suitable nesting locations may be lost due to increasing shoreline development pressures and scarcity of habitat.	Osprey **Special Concern** Bald Eagle	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree’s canopy. • Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms). <u>Information Sources</u> • Natural Heritage Information Centre (NHIC) compiles all known nesting sites for Bald Eagles in Ontario. • MNRF values information (LIO/NRVIS) will list known nesting locations. Note: data from NRVIS is provided as a point and does not represent all the habitat. • Nature Counts, Ontario Nest Records Scheme data. • OMNRF District. • Check the Ontario Breeding Bird Atlas or Rare Breeding Birds in Ontario for species documented • Reports and other information available from Conservation Authorities. • Field Naturalists clubs	Studies confirm the use of these nests by: • One or more active Osprey or Bald Eagle nests in an area • Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH. • For an Osprey, the active nest and a 300 m radius around the nest or the contiguous woodland stand is the SWH, maintaining undisturbed shorelines with large trees within this area is important • For a Bald Eagle the active nest and a 400-800 m radius around the nest is the SWH. Area of the habitat from 400-800m is dependent on site lines from the nest to the development and inclusion of perching and foraging habitat • To be significant a site must be used annually. When found inactive, the site must be known to be inactive for ≥ 3 years or suspected of not being used for >5 years before being considered not significant. • Observational studies to determine nest site use, perching sites and foraging areas need to be done from early March to mid August. • Evaluation methods to follow “Bird and Bird	No potential habitat present within the Study Area.

Table 3. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E - Hamilton Water Tower

SPECIALIZED HABITATS OF WILDLIFE CONSIDERED SWH					
Specialized Wildlife Habitat	**Wildlife Species**	**CANDIDATE SWH**		**CONFIRMED SWH**	**Assessment**
		ELC Ecosite Codes	**Habitat Criteria and Information Sources**	**Defining Criteria**	
				Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #26 provides development effects and mitigation measures	
Woodland Raptor Nesting Habitat **<u>Rationale:</u>** Nests sites for these species are rarely identified; these area sensitive habitats are often used annually by these species.	Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3	All natural or conifer plantation woodland/forest stands >30ha with >4ha of interior habitat Interior habitat determined with a 200m buffer • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small off-shore islands. • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest. <u>Information Sources</u> • OMNRF Districts. • Check the Ontario Breeding Bird Atlas or Rare Breeding Birds in Ontario for species documented. • Check data from Bird Studies Canada. • Reports and other information available from Conservation Authorities.	Studies confirm: • Presence of 1 or more active nests from species list is considered significant • Red-shouldered Hawk and Northern Goshawk – A 400m radius around the nest or 28 ha area of habitat is the SWH. (the 28 ha habitat area would be applied where optimal habitat is irregularly shaped around the nest) • Barred Owl – A 200m radius around the nest is the SWH • Broad-winged Hawk and Coopers Hawk,– A 100m radius around the nest is the SWH • Sharp-Shinned Hawk – A 50m radius around the nest is the SWH • Conduct field investigations from early March to end of May. The use of call broadcasts can help in locating territorial (courting/nesting) raptors and facilitate the discovery of nests by narrowing down the search area. • SWH MIST Index #27 provides development effects and mitigation measures.	No potential habitat present within the Study Area.
Turtle Nesting Areas **<u>Rationale:</u>** These habitats are rare and when identified will often be the only breeding site for local populations of turtles.	Midland Painted Turtle <u>Special Concern</u> Northern Map Turtle Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100m) or within the following ELC Ecosites: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO1 FEO1	• Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. • For an area to function as a turtle nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. • Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used. <u>Information Sources</u> • Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (welldrained sands and fine gravels). • Check the Ontario Herpetofaunal Summary Atlas records or other similar atlases for uncommon turtles; location information may help to find potential nesting habitat for them. • Natural Heritage Information Centre (NHIC) • Field Naturalist Clubs	Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles • One or more Northern Map Turtle or Snapping Turtle nesting is a SWH • The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30-100m around the nesting area dependant on slope, riparian vegetation and adjacent land use is the SWH. • Travel routes from wetland to nesting area are to be considered within the SWH as part of the 30-100m area of habitat. • Field investigations should be conducted in prime nesting season typically late spring to early summer. Observational studies observing the turtles nesting is a recommended method. • SWH MIST Index #28 provides development effects and mitigation measures for turtle nesting habitat.	No potential habitat present within the Study Area**.**
Seeps and Springs	Wild Turkey Ruffed Grouse Spruce Grouse	Seeps/Springs are areas where ground water comes to the	Any forested area (with headwaters of a stream or river system • Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and	Field Studies confirm: • Presence of a site with 2 or more seeps/springs should be considered SWH. • The area of a	**Potential habitat is present within the woodland vegetation communities.**

Table 3. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E - Hamilton Water Tower

SPECIALIZED HABITATS OF WILDLIFE CONSIDERED SWH					
Specialized Wildlife Habitat	**Wildlife Species**	**CANDIDATE SWH**		**CONFIRMED SWH**	**Assessment**
		ELC Ecosite Codes	**Habitat Criteria and Information Sources**	**Defining Criteria**	
Rationale: Seeps/Springs are typical of headwater areas and are often at the source of coldwater streams	White-tailed Deer Salamander spp.	surface. Often they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	animal species Information Sources • Topographical Map. • Thermography. • Hydrological surveys conducted by Conservation Authorities and MOE. • Field Naturalists Clubs and landowners. • Municipalities and Conservation Authorities may have drainage maps and headwater areas mapped	ELC forest ecosite or an ecoelement within ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat • SWH MIST Index #30 provides development effects and mitigation measures	
Amphibian Breeding Habitat (Woodland). **Rationale:** These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Wood Frog	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to reduced risk to migrating amphibians	• Presence of a wetland, pond or woodland pool (including vernal pools) >500m2 (about 25m diameter) within or adjacent (within 120m) to a woodland (no minimum size). Some small wetlands may not be mapped and may be important breeding pools for amphibians. • Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat Information Sources • Ontario Herpetofaunal Summary Atlas (or other similar atlases) for records • Local landowners may also provide assistance as they may hear spring-time choruses of amphibians on their property. • OMNRF Districts and wetland evaluations • Field Naturalist clubs • Canadian Wildlife Service Amphibian Road Call Survey • Ontario Vernal Pool Association: http://www.ontariovernalpools.org	Studies confirm; • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog species with at least 20 individuals (adults or eggs masses) or 2 or more of the listed frog species with Call Level Codes of 3. • A combination of observational study and call count surveys will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetlands. • The habitat is the wetland area plus a 230m radius of woodland area. If a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is to be included in the habitat. • SWH MIST Index #14 provides development effects and mitigation measures.	**Potential habitat is present within the woodland vegetation communities.**
Amphibian Breeding Habitat (Wetlands) **Rationale:** Wetlands supporting breeding for these amphibian species are extremely important and fairly rare within Central Ontario landscapes.	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	ELC Community Classes SW, MA, FE, BO, OA and SA. Typically these wetland ecosites will be isolated (>120m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (e.g. Bull Frog) may be adjacent to woodlands.	• Wetlands>500m2 (about 25m diameter) supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats • Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. • Bullfrogs require permanent water bodies with abundant emergent vegetation. Information Sources • Ontario Herpetofaunal Summary Atlas (or other similar atlases) • Canadian Wildlife Service Amphibian Road Surveys and Backyard Amphibian Call Count. • OMNRF Districts and wetland evaluations. • Reports and other information available from Conservation Authorities	Studies confirm: • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog/toad species with at least 20 individuals (adults or eggs masses) or 2 or more of the listed frog/toad species with Call Level Codes of 3. **or**; Wetland with confirmed breeding Bullfrogs are significant. • The ELC ecosite wetland area and the shoreline are the SWH. • A combination of observational study and call count surveys will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands. • If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule.	**Potential habitat is present within the pond feature.**

Table 3. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E - Hamilton Water Tower

SPECIALIZED HABITATS OF WILDLIFE CONSIDERED SWH					
Specialized Wildlife Habitat	**Wildlife Species**	**CANDIDATE SWH**		**CONFIRMED SWH**	**Assessment**
		ELC Ecosite Codes	**Habitat Criteria and Information Sources**	**Defining Criteria**	
				• SWH MIST Index #15 provides development effects and mitigation measures.	
Woodland Area-Sensitive Bird Breeding Habitat **<u>Rationale:</u>** Large, natural blocks of mature woodland habitat within the settled areas of Southern Ontario are important habitats for area sensitive interior forest song birds	Yellow-bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler Ovenbird Scarlet Tanager Winter Wren Pileated Woodpecker **Special Concern:** Cerulean Warbler Canada Warbler	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD	• Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha. • Interior forest habitat is at least 200 m from forest edge habitat. <u>Information Sources</u> • Local birder clubs. • Canadian Wildlife Service (CWS) for the location of forest bird monitoring. • Bird Studies Canada conducted a 3-year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to determine what forests were of greatest value to interior species • Reports and other information available from Conservation Authorities.	Studies confirm: • Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. • Note: any site with breeding Cerulean Warblers or Canada Warblers is to be considered SWH. • Conduct field investigations in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” • SWH MIST Index #34 provides development effects and mitigation measures.	No potential habitat present within the Study Area.

Table 3. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E - Hamilton Water Tower

HABITATS FOR SPECIES OF CONSERVATION CONCERN CONSIDERED SWH					
Wildlife	**Species**	**CANDIDATE SWH**		**CONFIRMED SWH**	**Assessment**
		ELC Ecosite	**Habitat Criteria and Information Sources**	**Defining Criteria**	
Marsh Breeding Bird Habitat **Rationale:** Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	American Bittern Virginia Rail Sora Common Moorhen American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Green Heron Trumpeter Swan **Special Concern:** Black Tern Yellow Rail	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites.	• Nesting occurs in wetlands. • All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present • For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water. Information Sources • OMNRF District and wetland evaluations. • Field Naturalist clubs • • Natural Heritage Information Centre (NHIC) Records. • Reports and other information available from Conservation Authorities. • Ontario Breeding Bird Atlas.	Studies confirm: • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or breeding by any combination of 4 or more of the listed species • Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH • Area of the ELC ecosite is the SWH. • Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” • SWH MIST Index #35 provides development effects and mitigation measures	**Potential habitat is present within the pond feature. Additional surveys during the appropriate season will be required to complete SWH assessment.**
Open Country Bird Breeding Habitat **Rationale:** This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow **Special Concern** Short-eared Owl	CUM1 CUM2	• Large grassland areas (includes natural and cultural fields and meadows) >30 ha • Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years) • Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older. • The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species. Information Sources • Agricultural land classification maps, Ministry of Agriculture. • Local bird clubs. • Ontario Breeding Bird Atlas • EIS Reports and other information available from Conservation Authorities.	Field Studies confirm: • Presence of nesting or breeding of 2 or more of the listed species. • A field with 1 or more breeding Short-eared Owls is to be considered SWH. • The area of SWH is the contiguous ELC ecosite field areas. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” • SWH MIST Index #32 provides development effects and mitigation measures	No potential habitat present within the Study Area.
Shrub/Early Successional Bird Breeding Habitat **Rationale:** This wildlife habitat is declining throughout Ontario and North America. The Brown Thrasher has declined significantly over the past 40 years based on CWS (2004) trend records.	Indicator Spp: Brown Thrasher Clay-coloured Sparrow Common Spp. Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher **Special Concern:** Yellow-breasted Chat Golden-winged Warbler	CUT1 CUT2 CUS1 CUS2 CUW1 CUW2 Patches of shrub ecosites can be complexed into a larger habitat for some bird species	Large field areas succeeding to shrub and thicket habitats>10h in size. • Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. no rowcropping, haying or livestock pasturing in the last 5 years) • Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species • Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands. Information Sources • Agricultural land classification maps, Ministry of Agriculture. • Local bird clubs. • Ontario Breeding Bird Atlas • Reports and other information available from Conservation Authorities.	Field Studies confirm: • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species. • A habitat with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat. • The area of the SWH is the contiguous ELC ecosite field/thicket area. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects” • SWH MIST Index #33 provides development	No potential habitat present within the Study Area.

Table 3. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E - Hamilton Water Tower

HABITATS FOR SPECIES OF CONSERVATION CONCERN CONSIDERED SWH					
Wildlife	**Species**	**CANDIDATE SWH**		**CONFIRMED SWH**	**Assessment**
		ELC Ecosite	**Habitat Criteria and Information Sources**	**Defining Criteria**	
				effects and mitigation measures.	
Terrestrial Crayfish **<u>Rationale:</u>** Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare	Chimney or Digger Crayfish; (<u>Fallicambarus fodiens</u>) Devil Crayfish or Meadow Crayfish; (<u>Cambarus Diogenes</u>)	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SWD SWT SWM CUM1 with inclusions of above meadow marsh ecosites can be used by terrestrial crayfish.	Wet meadow and edges of shallow marshes (no minimum size) should be surveyed for terrestrial crayfish. • Constructs burrows in marshes, mudflats, meadows, the ground can't be too moist. Can often be found far from water. • Both species are a semiterrestrial burrower which spends most of its life within burrows consisting of a network of tunnels. Usually the soil is not too moist so that the tunnel is well formed. <u>Information Sources</u> • Information sources from "Conservation Status of Freshwater Crayfishes" by Dr. Premek Hamr for the WWF and CNF March 1998	Studies Confirm: • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable meadow marsh, swamp or moist terrestrial sites • Area of ELC ecosite or an ecoelement area of meadow marsh or swamp within the larger ecosite area is the SWH. • Surveys should be done April to August in temporary or permanent water. Note the presence of burrows or chimneys are often the only indicator of presence, observance or collection of individuals is very difficult • SWH MIST Index #36 provides development effects and mitigation measures.	**Potential habitat is present within the pond feature. Additional surveys during the appropriate season will be required to complete SWH assessment.**
Special Concern and Rare Wildlife Species **<u>Rationale:</u>** These species are quite rare or have experienced significant population declines in Ontario.	All Special Concern and Provincially Rare (S1-S3, SH) plant and animal species. Lists of these species are tracked by the Natural Heritage Information Centre (NHIC).	All plant and animal element occurrences (EO) within a 1 or 10km grid. Older element occurrences were recorded prior to GPS being available, therefore location information may lack accuracy	When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites <u>Information Sources</u> • Natural Heritage Information Centre (NHIC) will have Special Concern and Provincially Rare (S1-S3, SH) species lists with element occurrences data. • NHIC Website "Get Information" : http://nhic.mnr.gov.on.ca • Ontario Breeding Bird Atlas • Expert advice should be sought as many of the rare spp. have little information available about their requirements.	Studies Confirm: • Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable. • The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs be easily mapped and cover an important life stage component for a species e.g. specific nesting habitat or foraging habitat. SWH MIST Index #37 provides development effects and mitigation measures.	**Potential habitat is present within Study Area. Additional surveys during the appropriate season will be required to complete SWH assessment.**

Table 3. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E - Hamilton Water Tower

ANIMAL MOVEMENT CORRIDORS					
Habitat	**SPECIES**	**CANDIDATE SWH**	**CONFIRMED SWH**		**Assessment**
		ELC Eco-sites	**Habitat Criteria and Information Sources**	**Defining Criteria**	
Amphibian Movement Corridors **<u>Rationale</u>**: Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	Corridors may be found in all ecosites associated with water. • Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1	Movement corridors between breeding habitat and summer habitat. • Movement corridors must be determined when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2 (Amphibian Breeding Habitat –Wetland) of this Schedule <u>Information Sources</u> • MNRF District Office. • Natural Heritage Information Centre (NHIC). • Reports and other information available from Conservation Authorities. • Field Naturalist Clubs.	• Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites. • Corridors should consist of native vegetation, with several layers of vegetation. Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant • Corridors should have at least 15m of vegetation on both sides of waterway or be up to 200m wide of woodland habitat and with gaps <20m • Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat • SWH MIST Index #40 provides development effects and mitigation measures	No potential habitat present within the Study Area.

SIGNIFICANT WILDLIFE HABITAT EXPECTATIONS FOR ECODISTRICTS WITHIN ECOREGION 7E						
EcoDistrict	**Wildlife Habitat and Species**	**Candidate SWH**			**Confirmed SWH**	**Assessment**
		Ecosites	**Habitat Description**	**Habitat Criteria and Information**	**Defining Criteria**	
7E-2	**Bat Migratory Stopover Area** **Rationale:** Stopover areas for long distance migrant bats are important during fall migration. Hoary Bat Eastern Red Bat Silver-haired Bat	No specific ELC types.		• Long distance migratory bats typically migrate during late summer and early fall from summer breeding habitats throughout Ontario to southern wintering areas. Their annual fall migration may concentrate these species of bats at stopover areas. • This is the only known bat migratory stopover habitats based on current information. <u>Information Sources</u> • OMNRF for possible locations and contact for local experts • University of Waterloo, Biology Department	• Long Point (42°35'N, 80°30'E, to 42°33'N, 80°03'E) has been identified as a significant stop-over habitat for fall migrating Silver-haired Bats, due to significant increases in abundance, activity and feeding that was documented during fall migration • The confirmation criteria and habitat areas for this SWH are still being determined. • SWH MIST Index #38 provides development effects and mitigation measures	**Sufficient information regarding habitat criteria is not available to assess the Study Area.**

Table 4. Species at Risk Habitat Assessment - Hamilton Water Tower

Latin Name	Common Name	Provincial Status (ESA)	Habitat Preference[1]	Observed on Site (Y/N)	Habitat Present On-Site
Ambystoma jeffersonianum	Jefferson Salamander	Endangered	Inhabits deciduous and mixed deciduous forests with suitable breeding areas which generally consist of ephemeral (temporary) bodies of water that are fed by spring runoff, groundwater, or springs.	N	Potential habitat present.
Ammodramus henslowii	Henslow's Sparrow	Endangered	Generally found in old fields, pastures and wet meadows. They prefer areas with dense, tall grasses, and thatch, or decaying plant material	N	No habitat
Arisaema dracontium	Green Dragon	Special Concern	Generally grows in damp deciduous forests and along streams.	N	Potential habitat present.
Asio flammeus	Short-eared Owl	Special Concern	Generally prefers a wide variety of open habitats, including grasslands, peat bogs, marshes, sand-sage concentrations, old pastures and agricultural fields	N	Potential habitat present.
Caprimulgus vociferus	Whip-poor-will	Threatened	Dry, open, deciduous woodlands of small to medium trees; oak or beech with lots of clearings and shaded leaf litter; wooded edges, forest clearings with little herbaceous growth; pine plantations; associated with >100 ha forests; may require 500 to 1000 ha to maintain population	N	No habitat present.
Cardellina canadensis	Canada Warbler	Special Concern	Generally prefers wet coniferous, decidiuous and mixed forest types, with a dense shrub layer. Nests on the ground, on logs or hummocks, and uses dense shrub layer to conceal the nest.	N	No habitat
Castanea dentata	American Chestnut	Endangered	Found in deciduous forest communities; this tree prefers arid forests with acid and sandy soils	N	Potential habitat present.
Chaetura pelagica	Chimney Swift	Threatened	Historically found in deciduous and coniferous, usually wet forest types, all with a well developed, dense shrub layer; now most are found in urban areas in large uncapped chimneys	N	Potential foraging habitat present.
Chelydra serpentina	Snapping Turtle	Special Concern	Permanent, semi-permanent fresh water; marshes, swamps or bogs; rivers and streams with soft muddy banks or bottoms; often uses soft soil or clean dry sand on south-facing slopes for nest sites; may nest at some distance from	N	Potential habitat is present within the pond.

Table 4. Species at Risk Habitat Assessment - Hamilton Water Tower

Latin Name	Common Name	Provincial Status (ESA)	Habitat Preference[1]	Observed on Site (Y/N)	Habitat Present On-Site
			water; often hibernate together in groups in mud under water; home range size ~28 ha		
Chordeiles minor	Common Nighthawk	Special Concern	Open ground; clearings in dense forests; ploughed fields, gravel beaches or barren areas with rocky soils, open woodlands; flat gravel roofs	N	Potential Habitat Present
Contopus virens	Eastern Wood-Pewee	Special Concern	Open, deciduous, mixed or coniferous forest; predominated by oak with little understory; forest clearings, edges; farm woodlots, parks	N	Potential habitat is present within forest features.
Cornus florida	Eastern Flowering Dogwood	Endangered	Generally grows in deciduous and mixed forests, in the drier areas of its habitat, although it is occasionally found in slightly moist environments; Also grows around edges and hedgerows	N	Potential habitat present.
Danaus plexippus	Monarch Butterfly	Special Concern	Exist primarily wherever milkweed and wildflowers exist; abandoned farmland, along roadsides, and other open spaces	N	Potential habitat present.
Dolichonyx Oryzivorus	Bobolink	Threatened	Large, open expansive grasslands with dense ground cover; hayfields, meadows or fallow fields; marshes; requires tracts of grassland >50 ha.	N	No habitat present.
Empoidonax virescens	Acadian Flycatcher	Endangered	Mature, shady, deciduous forests; heavily wooded ravines; creek bottoms or river swamps; availability of good quality habitat is limiting factor; needs at least 30 ha of forest	N	No habitat present.
Falco peregrinus	Peregrine Falcon	Special Concern	Generally nest on tall, steep cliff ledges adjacent to large waterbodies; some birds adapt to urban environments and nest on ledges of tall buildings, even in densely populated downtown areas	N	No habitat present
Frasera caroliniensis	American Columbo	Endangered	Most commonly associated with open deciduous forested slopes, thickets and clearings; grows in a variety of relatively stable habitats as well as on a wide variety of soils.	N	No habitat present .
Haliaeetus	Bald Eagle	Special	Prefers deciduous and mixed deciduous forest; and habitat	N	No habitat

Table 4. Species at Risk Habitat Assessment - Hamilton Water Tower

Latin Name	Common Name	Provincial Status (ESA)	Habitat Preference[1]	Observed on Site (Y/N)	Habitat Present On-Site
leucocephalus		Concern	close to water bodies such as lakes and rivers. They roost in super canopy trees such as Pine		present.
Heterodon platirhinos	Eastern-Hognosed Snake	Threatened	Generally prefer habitats with sandy, well-drained soil and open vegetative cover, such as open woods, brushland, fields, forest edges and disturbed sites. The species is often found near water	N	Potential habitat present.
Hirundo rustica	Barn Swallow	Threatened	Farmlands or rural areas; cliffs, caves, rock niches; buildings or other man-made structures for nesting; open country near bodies of water.	Y	Potential habitat is present within the pond. Potential nesting habitat is associated with outbuildings.
Hylocichla mustelina	Wood Thrush	Special Concern	Carolinian and Great Lakes-St. Lawrence forest zones; undisturbed moist mature deciduous or mixed forest with deciduous sapling growth; near pond or swamp; hardwood forest edges; must have some trees higher than 12 m	N	No habitat present.
Icteria virens	Yellow-breasted Chat	Endangered	Generally prefer dense thickets around wood edges, riparian areas, and in overgrown clearings	N	Potential habitat present.
Juglans cinerea	Butternut	Endangered	Shade intolerant and prefer rich, moist, well-drained soils and gravel sites where limestone is present. Butternut is often found in open areas such as shallow valleys, edges of streams and rivers, fence lines or fields.	N	Potential habitat present.

Table 4. Species at Risk Habitat Assessment - Hamilton Water Tower

Latin Name	Common Name	Provincial Status (ESA)	Habitat Preference[1]	Observed on Site (Y/N)	Habitat Present On-Site
Melanerpes carolinus	Red-Headed Woodpecker	Special Concern	Open, deciduous forest with little understory; fields or pasture lands with scattered large trees; wooded swamps; orchards, small woodlots or forest edges; groves of dead or dying trees; feeds on insects and stores nuts or acorns for winter; loss of habitat is limiting factor; requires cavity trees with at least 40 cm dbh; require about 4 ha for a territory	N	No habitat present.
Microtus pinetorum	Woodland Vole	Special Concern	Generally associated with deciduous forests in areas of soft, friable, often sandy soil beneath deep humus, where it can burrow easily.	N	Potential habitat present.
Morus rubra	Red Mulberry	Endangered	Generally grows in moist forest habitats. In Ontario, these include slopes and ravines of the Niagara Escarpment, and sand spits and bottom lands; Can grow in open areas such as hydro corridors	N	Potential habitat present.
Myotis leibii	Eastern Small-footed Myotis	Endangered	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius Maternal Roosts: primarily under loose rocks on exposed rock outcrops, crevices and cliffs, and occasionally in buildings, under bridges and highway overpasses and under tree bark.	N	No habitat
Myotis lucifugus	Little Brown Myotis	Endangered	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius Maternal Roosts: Often associated with buildings (attics, barns etc.). Occasionally found in trees (25-44 cm dbh).	N	Potential maternal roosting habitat present. No overwintering habitat.
Myotis septentrionalis	Northern Myotis	Endangered	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius Maternal Roosts: Often asssociated with cavities of large diameter trees (25-44 cm dbh). Occasionally found in	N	Potential maternal roosting habitat

Table 4. Species at Risk Habitat Assessment - Hamilton Water Tower

Latin Name	Common Name	Provincial Status (ESA)	Habitat Preference[1]	Observed on Site (Y/N)	Habitat Present On-Site
			structures (attics, barns etc.)		present. No overwintering habitat.
Panax quinquefolius	American Ginseng	Endangered	Grows in rich, moist, undisturbed and relatively mature deciduous woods in areas of neutral soil (such as over limestone or marble bedrock).	N	Potential habitat present.
Perimyotis subflavus	Tri-coloured Bat	Endangered	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius Maternal Roosts: Can be in trees or dead clusters of leaves or arboreal lichens on trees. May also use barns or similar structures.	N	Potential maternal roosting habitat present. No overwintering habitat.
Phegopteris hexagonoptera	Broad Beech Fern	Special Concern	Generally inhabits shady areas of beech and maple forests where the soil is moist or wet	N	Potential habitat present.
Pieris virginiensis	West Virginia White	Special Concern	Generally prefer moist, deciduous woodlands. The larvae feed only on the leaves of the two-leaved toothwort (*Cardamine diphylla*), which is a small, spring-blooming plant of the forest floor.	N	Potential habitat present.
Riparia riparia	Bank Swallow	Threatened	Sand, clay or gravel river banks or steep riverbank cliffs; lakeshore bluffs of easily crumbled sand or gravel; gravel pits, road-cuts, grassland or cultivated fields that are close to water; nesting sites are limiting factor for species presence	N	No habitat available for the species.
Setophaga cerulea	Cerulean Warbler	Threatened	Generally found in mature deciduous forests with an open understorey; also nests in older, second-growth deciduous forests.	N	No habitat
Sturnella magna	Eastern Meadowlark	Threatened	Open, grassy meadows, farmland, pastures, hayfields or grasslands with elevated singing perches; cultivated land and weedy areas with trees; old orchards with adjacent, open grassy areas >10 ha in size	N	No habitat available for the species.
Taxidea taxus	American Badger	Endangered	Generally prefers open habitats, whether natural (grasslands) or manmade (agricultural fields, road rightof-ways, golf	N	Potential habitat

Table 4. Species at Risk Habitat Assessment - Hamilton Water Tower

Latin Name	Common Name	Provincial Status (ESA)	Habitat Preference[1]	Observed on Site (Y/N)	Habitat Present On-Site
			courses).		present.
Thamnophis sauritus	Eastern Ribbonsnake	Special Concern	Generally occur along the edges of shallow ponds, streams, marshes, swamps, or bogs bordered by dense vegetation that provides cover. Abundant exposure to sunlight is also required, and adjacent upland areas may be used for nesting.	N	Potential habitat present.
Tyto alba	Barn Owl	Endangered	Generally prefer low-elevation, open country; often associated with agricultural lands, especially pasture. Nests are located in buildings, hollow trees and cavities in cliffs	N	Potential habitat present.
Vermivora chrysoptera	Golden-winged Warbler	Special Concern	Generally prefer areas of early successional vegetation, found primarily on field edges, hydro or utility right-of-ways, or recently logged areas.	N	Potential habitat present.

Ministry of Natural Resources – Fish and Wildlife Branch. 2000. Significant Wildlife Habitat Technical Guide.

Ministry of Natural Resource and Forestry. 2015. Significant Wildlife Habitat Criteria Schedules For Ecoregion 6E. Ontario Ministry of Natural Resources and Forestry, Regional Operations Division: Southern Region Resources Section, 300 Water Street, 4th Floor South, Peterborough, Ontario, Canada, K9J 8M5.

APPENDICES

Appendix A: MNRF Background Data and Correspondence
Appendix B: Ontario Breeding Bird Atlas
Appendix C: City of Hamilton Official Plan Schedules
Appendix D: GRCA Mapping and Correspondence

APPENDIX A

MNRF Background Data and Correspondence

Melissa Fuller

From: ESA Guelph (MNRF) [ESAGUELPH@ontario.ca]
Sent: October-06-16 4:52 PM
To: Melissa Fuller
Subject: RE: Information Request for Ancaster, Ontario
Attachments: Guelph_Information_Request_FillableForm.pdf; SAR List City of Hamilton - Oct 6 2016.pdf

Hi Melissa

The Ministry of Natural Resources and Forestry (MNRF), Guelph District Office, has reviewed the natural heritage information available for the study area **located south of Garner Road along Fiddlers Green Road in the City of Hamilton. We understand that this information is required as part of a Schedule B – Municipal Class Environmental Assessment for a proposed Ancaster Water Tower.**

Please be advised that for all future natural heritage information requests, you must complete and submit the attached Guelph District Natural Heritage Information Request Form to esa.guelph@ontario.ca.

The Ministry notes that the study area includes unevaluated wetlands.

We also note that there are records in the area for the for the following species at risk (SAR): Butternut (endangered). Please be advised, however, that because the province has not been surveyed comprehensively for the presence of listed species, the absence of a record is not an appropriate indicator for the absence of SAR/SAR habitat from an area.

To determine the presence of SAR for a given study area, the District's recommended approach includes the following:

I. Habitat Inventory

MNRF staff recommends undertaking a comprehensive botanical inventory of the entire area that may be subject to direct and indirect impacts from the proposed activity. The vegetation communities should be classified as per the "Ecological Land Classification (ELC) for Southern Ontario" system, to either the "Ecosite" or "Vegetation Type" level. With respect to aquatic habitats in the study area, we recommend you collect data on the physical characteristics of the waterbodies and inventory the riparian zone vegetation, so that these habitats can be classified as per the Aquatic Ecosites described in the ELC manual.

II. Potential Species at Risk within the Study Area

A list of SAR that have the potential to occur in the area can be produced by cross-referencing the ecosites described during the habitat inventory with the habitat descriptions of SAR known to occur within the planning area. The list of SAR known to occur in **the City of Hamilton** is attached for your reference. The species-specific COSEWIC status reports (www.cosewic.gc.ca) are a good source of information on habitat needs and will be helpful in determining the suitability of the study areas ecosites for a given species.

Please note that the Species at Risk in Ontario list (SARO) is a living document and is amended periodically as a result of species assessment and re-assessments conducted by the Committee on the Status of Species at Risk in Ontario (COSSARO). The SARO list can be accessed on the webpage https://www.ontario.ca/environment-and-energy/species-risk-ontario-list.

COSSARO also maintains a list of species to be assessed in the future. It is recommended to take COSSARO's list of anticipated assessments into consideration, especially when the proposed start date of the activity is more than 6 months away, or the project will be undertaken over a period greater than 6 months. The list can be viewed at http://www.ontario.ca/environment-and-energy/help-protect-species-risk.

SAR habitat prescribed under regulation can be accessed on the Environmental Registry and searching for postings related to Ontario Regulation 242/08 under the *Endangered Species Act*.

III. Species at Risk Surveys

Ministry staff are of the opinion that each SAR identified under Step II should be surveyed for, regardless of whether or not the species has been previously recorded in the area. The survey report should describe how each SAR was surveyed for, and provide a rationale for why certain species were not afforded a survey (e.g., habitat within the study area is not suitable for a specific SAR). Please note that some targeted surveys may require provincial authorizations.

We additionally recommend contacting the municipality and the conservation authority to determine if they have any additional information or records of interest for the study area.

I trust the above information is of assistance.

Best regards,

Anne Marie

_____
Anne Marie Laurence
Management Biologist
Ministry of Natural Resources & Forestry
Guelph District
(519) 826-4132

From: ESA Guelph (MNRF)
Sent: September-27-16 1:35 PM
To: 'MFuller@Azimuthenvironmental.Com'
Subject: RE: Information Request for Ancaster, Ontario

Hi Melissa – in order to process your request, can you kindly complete the attached form and submit to esa.guelph@ontario.ca?

Thank you!

From: Melissa Fuller [mailto:MFuller@Azimuthenvironmental.Com]
Sent: September-12-16 3:10 PM
To: Buck, Graham (MNRF)
Subject: Information Request for Ancaster, Ontario

Graham,

Azimuth Environmental Consulting (Azimuth) has been retained to complete the natural heritage component of the Schedule B - Municipal Class Environmental Assessment, for a proposed Ancaster Water Tower (see attached mapping for potential site locations). The purpose of this letter is to request information regarding Species at Risk that could potentially be utilizing the selected properties and adjacent lands.

A search of the NHIC database indicated that multiple Element Occurrences occur within 1km of the properties. Please find a NHIC Species at Risk report detailing the species, provided as attached. In addition, multiple sensitive natural areas have been identified within 1km of the selected properties, as indicated on the attached NHIC report.

The Ontario Breeding Bird Atlas was also consulted to determine the potential for avian Species at Risk to be utilizing the property. Squares 17NH78 were queried and it was determined that Chimney Swift, Red-Headed Woodpecker, Common Nighthawk, Whip-poor-will, Chimney Swift, Acadian Flycatcher, Golden-winged Warbler, Cerulean Warbler, Canada Warbler, Barn Swallow, Eastern Meadowlark, Wood Thrush, Eastern Wood-Pewee and Bobolink have been observed within the 100km^2 data square.

The purpose of this letter is to request additional information regarding information on Species at Risk and sensitive areas associated with the Study Area, aside from those identified above.

Thank you very much for your assistance in this matter. If you have any questions regarding this project please do not hesitate to contact us.

Regards,

Melissa Fuller H. B.Sc.

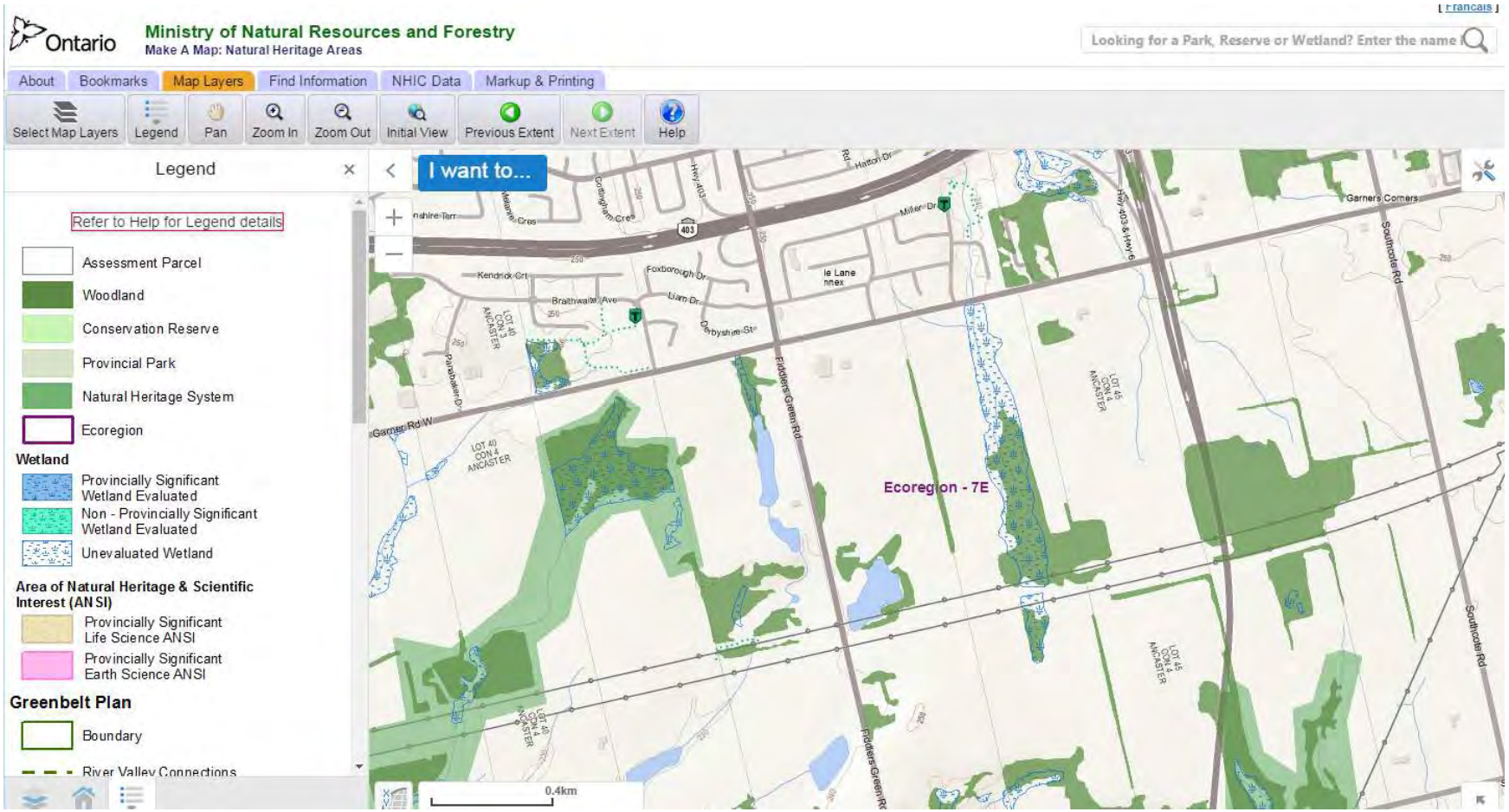
Terrestrial Ecologist, ISA Certified Arborist

Please note, our office has moved:
Azimuth Environmental Consulting, Inc
642 Welham Street
Barrie, ON, L4N 9A1

office: (705) 721-8451 ext. 216
fax: (705) 721-8926
cell: 705-795-8451
mfuller@azimuthenvironmental.com

Providing services in hydrogeology, terrestrial and aquatic ecology & environmental engineering

10-230a NHIC Mapping



[Francais]

UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :21253

Element Type :SPECIES
Scientific Name : Castanea dentata
Common Name : American Chestnut
SRank :S2
COSEWIC Status :END
COSSARO Status :END
Last Observation Date :1993-08-09
Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :21077
Element Type :SPECIES
Scientific Name : Colinus virginianus
Common Name : Northern Bobwhite
SRank :S1
COSEWIC Status :END
COSSARO Status :END
Last Observation Date :1904
Extirpated :Y
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :21187
Element Type :SPECIES
Scientific Name : Castanea dentata
Common Name : American Chestnut
SRank :S2
COSEWIC Status :END
COSSARO Status :END
Last Observation Date :1976-PRE
Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :13355
Element Type :SPECIES
Scientific Name : Icteria virens
Common Name : Yellow-breasted Chat
SRank :S2B
COSEWIC Status :END
COSSARO Status :END
Last Observation Date :1971-06-28
Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :32861
Element Type :SPECIES
Scientific Name : Microtus pinetorum
Common Name : Woodland Vole
SRank :S3?
COSEWIC Status :SC
COSSARO Status :SC
Last Observation Date :1950-07-30
Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :34859
Element Type :SPECIES
Scientific Name : Microtus pinetorum
Common Name : Woodland Vole
SRank :S3?
COSEWIC Status :SC
COSSARO Status :SC
Last Observation Date :1950

Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :34860
Element Type :SPECIES
Scientific Name : Microtus pinetorum
Common Name : Woodland Vole
SRank :S3?
COSEWIC Status :SC
COSSARO Status :SC
Last Observation Date :1951
Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :2222
Element Type :SPECIES
Scientific Name : Carya glabra
Common Name : Pignut Hickory
SRank :S3
COSEWIC Status :
COSSARO Status :
Last Observation Date :1957-09-19
Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :2482
Element Type :SPECIES
Scientific Name : Polygonum erectum
Common Name : Erect Knotweed
SRank :SH

COSEWIC Status :
COSSARO Status :
Last Observation Date :1897-10
Extirpated :Y
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :3239
Element Type :SPECIES
Scientific Name : Uvularia perfoliata
Common Name : Perfoliate Bellwort
SRank :S1
COSEWIC Status :
COSSARO Status :
Last Observation Date :1962-05-14
Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :3068
Element Type :SPECIES
Scientific Name : Trichophorum clintonii
Common Name : Clinton's Club-rush
SRank :S2S3
COSEWIC Status :
COSSARO Status :
Last Observation Date :1954-05-24
Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :3380
Element Type :SPECIES

Scientific Name : Dichanthelium dichotomum
Common Name : Forked Panicgrass
SRank :S2
COSEWIC Status :
COSSARO Status :
Last Observation Date :1954-07-03
Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :3489
Element Type :SPECIES
Scientific Name : Sphenopholis nitida
Common Name : Shiny Wedge Grass
SRank :S1
COSEWIC Status :
COSSARO Status :
Last Observation Date :1957-06-17
Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :2546
Element Type :SPECIES
Scientific Name : Crataegus pruinosa var. dissona
Common Name : Northern Hawthorn
SRank :S3
COSEWIC Status :
COSSARO Status :
Last Observation Date :1974-06-02
Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :33282
Element Type :SPECIES
Scientific Name : Euonymus atropurpureus
Common Name : Eastern Burning Bush
SRank :S3
COSEWIC Status :
COSSARO Status :
Last Observation Date :1894-06-25
Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :59792
Element Type :SPECIES
Scientific Name : Gillenia trifoliata
Common Name : Bowman's-root
SRank :SX
COSEWIC Status :
COSSARO Status :
Last Observation Date :
Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :60293
Element Type :SPECIES
Scientific Name : Aureolaria pedicularia
Common Name : Fern-leaved Yellow False Foxglove
SRank :S2?
COSEWIC Status :
COSSARO Status :
Last Observation Date :1888-09-19
Extirpated :

Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :60140
Element Type :SPECIES
Scientific Name : Pterospora andromedea
Common Name : Woodland Pinedrops
SRank :S2
COSEWIC Status :
COSSARO Status :
Last Observation Date :1902-07-01
Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :60268
Element Type :SPECIES
Scientific Name : Monarda didyma
Common Name : Scarlet Beebalm
SRank :S3
COSEWIC Status :
COSSARO Status :
Last Observation Date :1950-07
Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :59241
Element Type :SPECIES
Scientific Name : Carex albicans var. albicans
Common Name : White-tinged Sedge
SRank :S3
COSEWIC Status :

COSSARO Status :
Last Observation Date :1980-05-17
Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :60410
Element Type :SPECIES
Scientific Name : Hieracium paniculatum
Common Name : Panicled Hawkweed
SRank :S2?
COSEWIC Status :
COSSARO Status :
Last Observation Date :1956-08-08
Extirpated :
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :17355
Element Type :SPECIES
Scientific Name : Crotalus horridus
Common Name : Timber Rattlesnake
SRank :SX
COSEWIC Status :EXP
COSSARO Status :EXP
Last Observation Date :1950
Extirpated :Y
Details Link :
Comment : To requests details, contact CAMBRIDGE MNR District or nhicrequests@ontario.ca

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UTM 1KM Grid ID :17NH8283
Occurence ID (EO_ID) :18525
Element Type : Natural Areas
Scientific Name :

Common Name :GRAND RIVER
SRank :
COSEWIC Status :
COSSARO Status :
Last Observation Date :
Extirpated :
Details Link :
http://nhic.mnr.gov.on.ca/natural_areas/areas.php?source=MaMNHA&feature=NA&areaid=18525
Comment : Canadian Heritage River

Hamilton

Date Generated: October-06-16

Amphibian	SARO	Protection	Habitat Information	Timing Windows	Survey Protocol
Jefferson Salamander *Ambystoma jeffersonianum*	END	Species Protection and Habitat Regulation	Inhabits deciduous and mixed deciduous forests with suitable breeding areas which generally consist of ephemeral (temporary) bodies of water that are fed by spring runoff, groundwater, or springs.	Active: March – October Hibernates: October – March Breeding: Late March - Mid April	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol

Bird	SARO	Protection	Habitat Information	Timing Windows	Survey Protocol
Acadian Flycatcher *Empidonax virescens*	END	Species Protection and General Habitat Protection	Generally requires large areas of mature, undisturbed forest; avoids the forest edge; often found in well wooded swamps and ravines.	Migrate South before Winter	Follow Breeding Bird Survey Protocol
Bald Eagle *Haliaeetus leucocephalus*	SC	N/A	Prefers deciduous and mixed-deciduous forest; and habitat close to water bodies such as lakes and rivers. They roost in super canopy trees such as Pine.	Breed and Nest - April or May Some Migrate South when waterbodies freeze over	Follow Breeding Bird Survey Protocol
Bank Swallow *Riparia riparia*	THR	Species Protection and General Habitat Protection	It nests in a wide variety of naturally and anthropogenically created vertical banks, which often erode and change over time including aggregate pits and the shores of large lakes and rivers.	Migrate South before Winter	Follow Breeding Bird Survey Protocol. Colony and Roost information should be recorded and submitted using Bird Studies Canada's Ontario Bank Swallow Project data forms (2010).
Barn Owl *Tyto alba*	END	Species Protection and Habitat Regulation	Generally prefer low-elevation, open country; often associated with agricultural lands, especially pasture. Nests are located in buildings, hollow trees and cavities in cliffs.	Active Year Round Some leave for the Winter	Follow Breeding Bird Survey Protocol Night surveys may be helpful as they are very vocal
Barn Swallow *Hirundo rustica*	THR	Species Protection and General Habitat Protection	Prefers farmland; lake/river shorelines; wooded clearings; urban populated areas; rocky cliffs; and wetlands. They nest inside or outside buildings; under bridges and in road culverts; on rock faces and in caves etc.	Migrate South before Winter	Follow Breeding Bird Survey Protocol

Black Tern *Chlidonias niger*	SC	N/A	Generally prefer freshwater marshes and wetlands; nest either on floating material in a marsh or on the ground very close to water	Migrate South for the Winter	Follow Breeding Bird Survey Protocol
Bobolink *Dolichonyx oryzivorus*	THR	Species Protection and General Habitat Protection	Generally prefers open grasslands and hay fields. In migration and in winter uses freshwater marshes and grasslands	Migrate South for the Winter	Contact MNR Guelph District Management Biologist to obtain a copy of the protocol
Canada Warbler *Cardellina canadensis*	SC	N/A	Generally prefers wet coniferous, decidiuous and mixed forest types, with a dense shrub layer. Nests on the ground, on logs or hummocks, and uses dense shrub layer to conceal the nest.	Arrive in Early May Migrate South for the Winter	Follow Breeding Bird Survey Protocol
Cerulean Warbler *Setophaga cerulea*	THR	Species Protection and General Habitat Protection	Generally found in mature deciduous forests with an open understorey; also nests in older, second-growth deciduous forests.	Migrate South for the Winter	Follow Breeding Bird Survey Protocol
Chimney Swift *Chaetura pelagica*	THR	Species Protection and General Habitat Protection	Historically found in deciduous and coniferous, usually wet forest types, all with a well developed, dense shrub layer; now most are found in urban areas in large uncapped chimneys	Nesting - Late April to Mid-May Migrate South in September or Early October	Chimney Swift Monitoring Protocol. Bird Studies Canada, March 2009
Common Nighthawk *Chordeiles minor*	SC	N/A	Generally prefer open, vegetation-free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. This species also inhabits mixed and coniferous forests. Can also be found in urban areas (nest on flat roof-tops).	Migrate South for the Winter	Contact MNR Guelph District Management Biologist to obtain a copy of the protocol

Eastern Meadowlark *Sturnella magna*	THR	Species Protection and General Habitat Protection	Generally prefers grassy pastures, meadows and hay fields. Nests are always on the ground and usually hidden in or under grass clumps.	Migrate South for the Winter	Contact MNR Guelph District Management Biologist to obtain a copy of the protocol
Eastern Whip-poor-will *Caprimlugus vociferus*	THR	Species Protection and General Habitat Protection	Generally prefer semi-open deciduous forests or patchy forests with clearings; areas with little ground cover are also preferred; In winter they occupy primarily mixed woods near open areas.	Nesting: May - July	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol
Eastern Wood-Pewee *Contopus virens*	SC	N/A	Associated with deciduous and mixed forests. Within mature and intermediate age stands it prefers areas with little understory vegetation as well as forest clearings and edges.	Migrate South for the Winter	Follow Breeding Bird Survey Protocol
Golden-winged Warbler *Vermivora chrysoptera*	SC	N/A	Generally prefer areas of early successional vegetation, found primarily on field edges, hydro or utility right-of-ways, or recently logged areas.	Migrate South for the Winter	Follow Breeding Bird Survey Protocol
Henslow's Sparrow *Ammodramus henslowii*	END	Species Protection and General Habitat Protection	Generally found in old fields, pastures and wet meadows. They prefer areas with dense, tall grasses, and thatch, or decaying plant material	Migrate South for the Winter	Follow Breeding Bird Survey Protocol
King Rail *Rallus elegans*	END	Species Protection and General Habitat Protection	Generally this species requires large marshes with open shallow water that merges with shrubby areas	Breed from Late April to mid-May Migrate South for the Winter	Follow Marsh Monitoring Protocol.
Least Bittern *Ixobrychus exilis*	THR	Species Protection and General Habitat Protection	Generally located near pools of open water in relatively large marshes and swamps that are dominated by cattail and other robust emergent plants	Migrate South for the Winter	Follow Marsh Monitoring Protocol; 10 day window of male calling (variable timing). Does not respond well to playback. Very difficult to detect.

Louisiana Waterthrush *Seiurus motacilla*	SC	N/A	Generally inhabits mature forests along steeply sloped ravines adjacent to running water. It prefers clear, cold streams and densely wooded swamps	Migrate South for the Winter	Follow Breeding Bird Survey Protocol
Peregrine Falcon *Falco peregrinus*	SC	N/A	Generally nest on tall, steep cliff ledges adjacent to large waterbodies; some birds adapt to urban environments and nest on ledges of tall buildings, even in densely populated downtown areas.	Active Year Round - Lay Eggs around Easter Hatching occurs around Mother's Day Young fledge around Father's	Visit ideal habitat locations and listen/look for individuals in the vicinity.
Prothonotary Warbler *Protonotaria citrea*	END	Species Protection and General Habitat Protection	Generally found in the dead trees of flooded woodlands or deciduous swamp forests; Carolinia Zone	Migrate South for the Winter Eggs are laid from Late May - Early July	Follow Breeding Bird Survey Protocol
Red-Headed Woodpecker *Melanerpes erythrocephalus*	SC	N/A	Generally prefer open oak and beech forests, grasslands, forest edges, orchards, pastures, riparian forests, roadsides, urban parks, golf courses, cemeteries, as well as along beaver ponds and brooks	Active from May to September	Follow Breeding Bird Survey Protocol
Short-eared Owl *Asio flammeus*	SC	N/A	Generally prefers a wide variety of open habitats, including grasslands, peat bogs, marshes, sand-sage concentrations, old pastures and agricultural fields	Active Year Round	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol
Wood Thrush *Hylocichla mustelina*	SC	N/A	Nests mainly in second-growth and mature deciduous and mixed forests, with saplings and well-developed understory layers. Prefers large forest mosaics, but may also nest in small forest fragments.	Migrate South for the Winter Arrive in Ontario in mid to late spring	Follow Breeding Bird Survey Protocol
Yellow-breasted Chat *Icteria virens*	END	Species Protection and General Habitat Protection	Generally prefer dense thickets around wood edges, riparian areas, and in overgrown clearings	Migrate South for the Winter Arrive in Ontario Early May	Follow Breeding Bird Survey Protocol

Fish	SARO	Protection	Habitat Information	Timing Windows	Survey Protocol
American Eel *Anguilla rostrata*	END	Species Protection and General Habitat Protection	All fresh water, estuaries and coastal marine waters that are accessible to the Atlantic Ocean; 12-mile Creek watershed and Lake Ontario	Active Year Round	Electrofishing For information please contact your local MNRF office, CA or DFO
Grass Pickerel *Esox americanus vermiculatus*	SC	N/A	Generally occur in wetlands with warm, shallow water and an abundance of aquatic plants; occur in the St. Lawrence River, Lake Ontario, Lake Erie, and Lake Huron	Spawn from late March to early May	For information please contact your local MNRF office, CA and/or DFO
Redside Dace *Clinostomus elongatus*	END	Species Protection and Habitat Regulation	Generally found in pools and slow-moving areas of small headwater streams with a moderate to high gradient	Spawning occurs in May	Contact MNR Guelph District Management Biologist to obtain a copy of the protocol
Silver Shiner *Notropis photogenis*	THR	Species Protection and General Habitat Protection	Generally prefer moderate to large, deep, relatively clear streams with swift currents, and moderate to high gradients	Spawning occurs in May and June	For information please contact your local MNRF office, CA and/or DFO
Insect	**SARO**	**Protection**	**Habitat Information**	**Timing Windows**	**Survey Protocol**
Monarch Butterfly *Danaus plexippus*	SC	N/A	Exist primarily wherever milkweed and wildflowers exist; abandoned farmland, along roadsides, and other open spaces	Usually migrate south in late September and October	Watch for adults along roadsides and in open fields. Caterpillars feed on milkweeds: Common milkweed grows in open disturbed habitats (fields, roadsides, etc) and swamp milkweed grows in wet habitats (along streams, lakes, marshes) Adults can be spotted from a distance; caterpillars must be looked for carefully on the host plant.
Mottled Duskywing *Erynnis martialis*	END	Species Protection and General Habitat Protection	Generally inhabits a range of grassland, shrubland, and savanna habitats that contain well drained soils and the presence of its host plants Prairie Redroot (Ceanothus herbaceus) or New Jersey Tea (Ceanothus americanus).	Adult butterfly emerges from pupa in late March and early April	Watch for adults near host plants or search for caterpillars on the host plant Adults can be spotted from a distance; caterpillars must be looked for carefully on the host plant.

West Virginia White *Pieris virginiensis*	SC	N/A	Generally prefer moist, deciduous woodlands. The larvae feed only on the leaves of the two-leaved toothwort (Cardamine diphylla), which is a small, spring-blooming plant of the forest floor.	Adult butterfly emerges from pupa in late March; flies only in April and May	Watch for adults within moist, deciduous woodlands Caterpillars feed on the two-leaved toothwort: Toothwort grows in damp, open, rich hardwood woodlands and blooms from April to June. Adults can be spotted from a distance; caterpillars must be searched for carefully by checking host plant
Mammal	**SARO**	**Protection**	**Habitat Information**	**Timing Windows**	**Survey Protocol**
American Badger *Taxidea taxus*	END	Species Protection and Habitat Regulation	Generally prefers open habitats, whether natural (grasslands) or man-made (agricultural fields, road right-of-ways, golf courses).	Breed: Late Summer Semi-dormant over Winter	Determine if soils are suitable (sandy or loamy) Dens and Woodchuck burrows should be surveyed for use
Eastern Small-footed Myotis *Myotis leibii*	END	Species Protection and General Habitat Protection	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius Maternal Roosts: primarily under loose rocks on exposed rock outcrops, crevices and cliffs, and occasionally in buildings, under bridges and highway overpasses and under tree bark.	Hibernates in caves and mines during winter	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol
Little Brown Myotis *Myotis lucifugus*	END	Species Protection and General Habitat Protection	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius Maternal Roosts: Often associated with buildings (attics, barns etc.). Occasionally found in trees (25-44 cm dbh).	Hibernates during winter	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol
Northern Myotis *Myotis septentrionalis*	END	Species Protection and General Habitat Protection	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius Maternal Roosts: Often asssociated with cavities of large diameter trees (25-44 cm dbh). Occasionally found in structures (attics, barns etc.)	Hibernates during winter	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol

Tri-coloured Bat *Perimyotis subflavus*	END	Species Protection and General Habitat Protection	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius Maternal Roosts: Can be in trees or dead clusters of leaves or arboreal lichens on trees. May also use barns or similar structures.	Hibernates during winter	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol
Woodland Vole *Microtus pinetorum*	SC	N/A	Generally associated with deciduous forests in areas of soft, friable, often sandy soil beneath deep humus, where it can burrow easily.	Active Year Round	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol
Mollusc	**SARO**	**Protection**	**Habitat Information**	**Timing Windows**	**Survey Protocol**
Eastern Pondmussel *Ligumia nasuta*	END	Species Protection and General Habitat Protection	Generally inhabit sheltered areas of lakes or slow streams in substrates of fine sand and mud	Active Year Round	Please reference: Mackie, G, T.J Morris, and D Ming. "Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario Great Lakes Area (OGLA)." Fisheries and Oceans Canada. (2008).
Lilliput *Taxolasma parvum*	END	Species Protection and General Habitat Protection	Found in a variety of habitats including small to large rivers, wetlands, shallows of lakes, ponds and reservoirs. They are common in soft substrates with over 50% of the substrate type comprised of sand and a mud/muck/silt combination. Typically occur with or near Green Sunfish, Bluegill, White Crappie, and Johnny Darter	Active Year Round	Please reference: Mackie, G, T.J Morris, and D Ming. "Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario Great Lakes Area (OGLA)." Fisheries and Oceans Canada. (2008): Print.
Rainbow Mussel *Villosa iris*	THR	Species Protection and General Habitat Protection	Most abundant in shallow, well-oxygenated reaches of small- to medium-sized rivers and sometimes lakes, on substrates of cobble, gravel, sand and occasionally mud	Active Year Round	Please reference: Mackie, G, T.J Morris, and D Ming. "Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario Great Lakes Area (OGLA)." Fisheries and Oceans Canada. (2008): Print.
Plant	**SARO**	**Protection**	**Habitat Information**	**Timing Windows**	**Survey Protocol**

American Chestnut *Castanea dentata*	END	Species Protection and General Habitat Protection	Found in deciduous forest communities; this tree prefers arid forests with acid and sandy soils.	Flowers occur in Late Spring and Early Summer	Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species Perform detailed floristic inventory Look for distinictive fruits on the ground
American Columbo *Frasera caroliniensis*	END	Species Protection and General Habitat Protection	Most commonly associated with open deciduous forested slopes, thickets and clearings; grows in a variety of relatively stable habitats as well as on a wide variety of soils.	Germination and development of the rosette begin in early spring Flowers open in May Fruit production continues	Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species Look for spikes from last years flowers
American Ginseng *Panax quinquefolius*	END	Species Protection and General Habitat Protection	Grows in rich, moist, undisturbed and relatively mature deciduous woods in areas of neutral soil (such as over limestone or marble bedrock).	Flowering begins in June and continues until August The fruit develop from July to August and ripen in August and September	Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species
Broad Beech Fern *Phegopteris hexagonoptera*	SC	N/A	Generally inhabits shady areas of beech and maple forests where the soil is moist or wet	The frond of the Broad Beech Fern appears towards the end of May	Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species
Butternut *Juglans cinerea*	END	Species Protection and General Habitat Protection	Generally grows in rich, moist, and well-drained soils often found along streams. It may also be found on well-drained gravel sites, especially those made up of limestone. It is also found, though seldomly, on dry, rocky and sterile soils. In Ontario, the Butternut generally grows alone or in small groups in deciduous forests as well as in hedgerows	Flowers from April to June. Fruits reach maturity during the month of September or October	Walk slowly and systematically in grid fashion through suitable habitat pausing every 30 meters for a detailed scan of trees within sight. Areas with dense foliage or many saplings will require a more intensive survey to detect sapling butternut. Use Butternut Health Assessment Protocol if planning on removing trees.
Eastern Flowering Dogwood *Cornus florida*	END	Species Protection and Habitat Regulation	Generally grows in deciduous and mixed forests, in the drier areas of its habitat, although it is occasionally found in slightly moist environments; Also grows around edges and hedgerows	Flowering occurs in mid-May, just as the leaves begin to develop. Fruit turns red at the end of summer.	Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species Easiest to detect during Spring when in flower Also look for distinctive bark

Few-flowered Club-rush *Trichophorum planifolium*	END	Species Protection and Habitat Regulation	Generally found in Dry Fresh Oak deciduous forests and Dry Fresh Oak-Maple-Hickory deciduous forests (only found on RBG property).	Plants flower early before the forest canopy	Seaches for this species should only be done in March or April, when the species is most visible Walk slowly and systematically in grid fashion, pausing to scan for plants every 1 meters Distinguishing this species from similar species is difficult
Green Dragon *Arisaema dracontium*	SC	N/A	Generally grows in damp deciduous forests and along streams.	Flowering occurs in May and June	Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species
Hoary Mountain-mint *Pycnanthemum incanum*	END	Species Protection and General Habitat Protection	Oak savannas and prairies, dry sites.	Flowering occurs in July	Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species
Red Mulberry *Morus rubra*	END	Species Protection and General Habitat Protection	Generally grows in moist forest habitats. In Ontario, these include slopes and ravines of the Niagara Escarpment, and sand spits and bottom lands; Can grow in open areas such as hydro corridors	Flowering occurs when leaves emerge in late spring. Fruit emerges in Mid-July.	Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from the similar White Mulberry Distinguishing Red Mulberry and the hybrid Red and White Mulberry will require the collection of leaves for generic testing, which requires a 17(2)(b) permit
Spotted Wintergreen *Chimaphila maculata*	END	Species Protection and General Habitat Protection	Generally grow in sandy habitats in dry-mesic oak-pine woods.	Flowering occurs in late July to early August	Watch for the distinct evergreen leaves in suitable habitat May be easiest to search in fall and spring
White Wood Aster *Eurybia divaricata*	THR	Species Protection and General Habitat Protection	Generally grows in open, dry, deciduous forests. It has been suggested that it may benefit from some disturbance, as it often grows along trails.	Flowering occurs in early September, and sets fruit later in the month	Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species
Reptile	**SARO**	**Protection**	**Habitat Information**	**Timing Windows**	**Survey Protocol**

Blanding's Turtle *Emydoidea blandingii*	THR	Species Protection and General Habitat Protection	Generally occur in freshwater lakes, permanent or temporary pools, slow-flowing streams, marshes and swamps. They prefer shallow water that is rich in nutrients, organic soil and dense vegetation. Adults are generally found in open or partially vegetated sites, and juveniles prefer areas that contain thick aquatic vegetation including sphagnum, water lilies and algae. They dig their nest in a variety of loose substrates, including sand, organic soil, gravel and cobblestone. Overwintering occurs in permanent pools that average about one metre in depth, or in slow-flowing streams.	Eggs are laid in June, with hatchlings emerging in late September and early October.	Contact MNR Guelph District Management Biologist to obtain a copy of the protocol
Eastern Hog-nosed Snake *Heterodon platirhinos*	THR	Species Protection and General Habitat Protection	Generally prefer habitats with sandy, well-drained soil and open vegetative cover, such as open woods, brushland, fields, forest edges and disturbed sites. The species is often found near water.	Mating occurs in spring and in August and early September. Eggs are laid in June. Hatching occurs in late August or early September	In early spring, look for individuals near ideal hibernation sites During egg-laying period (June), look for nesting females in sandy areas in early morning and late evening. Rest of the season, survey intensively and systematically by flipping rocks
Eastern Ribbonsnake *Thamnophis sauritus*	SC	N/A	Generally occur along the edges of shallow ponds, streams, marshes, swamps, or bogs bordered by dense vegetation that provides cover. Abundant exposure to sunlight is also required, and adjacent upland areas may be used for nesting.	Hibernate: October - April Mating: Early Spring Hatching: Early Fall (September)	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol
Northern Map Turtle *Graptemys geographica*	SC	N/A	Generally inhabits both lakes and rivers, showing a preference for slow moving currents, muddy bottoms, and abundant aquatic vegetation. These turtles need suitable basking sites (such as rocks and logs) and exposure to the sun for at least part of the day.	Active: At night Hibernate: October - April Hatching: Late August - Early September	Scan shoreline in spring and partially submerged logs/rocks in summer for basking turtles Be aware that map turtles do not allow as close of approach as other turtles before leaving a basking site Snorkel in desired aquatic habitat

Snapping Turtle *Chelydra serpentina*	SC	N/A	Generally inhabit shallow waters where they can hide under the soft mud and leaf litter. Nesting sites usually occur on gravely or sandy areas along streams. Snapping Turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits.	Nesting: Late May and June Hibernate: October - April	Scan offshore rocks and logs for basking turtles (10am-2pm) Snorkel in desired aquatic habitat Nesting Season: Search known or preferred nesting habitat areas for females
Spiny Softshell *Apalone spinifera*	THR	Species Protection and General Habitat Protection	Generally prefer marshy creeks, swift-flowing rivers, lakes, impoundments, bays, marshy lagoons, ditches and ponds near rivers	Lay eggs in June or July Hibernate over winter	Best time to survey is during nesting season when females are active laying eggs Visual searches should be conducted in appropriate habitat

APPENDIX B

Ontario Breeding Bird Atlas

Square Summary (17NH78)

#species (1st atlas)				#species (2nd atlas)				#hours		#pc done	
poss	prob	conf	total	poss	prob	conf	total	1st	2nd	road	offrd
20	28	56	104	14	28	63	105	110	190	26	22

Region summary (#15: Hamilton)

#squares	#sq with data		#species		#pc done	target #pc
	1st	2nd	1st	2nd		
31	31	31	157	169	1454	775

Target number of point counts in this square: 23 road side, 2 off road (1 in deciduous forest, 1 in mixed forest). Please try to ensure that each off-road station is located such that the entire 100m radius circle is within the prescribed habitat.

SPECIES	Code		%	
	1st	2nd	1st	2nd
Canada Goose	NE	FY	83	100
Mute Swan ‡		FY	6	22
Trumpeter Swan †			0	9
Wood Duck	FY	FY	74	80
Gadwall			19	9
American Wigeon ‡			9	0
American Black Duck	H		38	9
Mallard	FY	FY	100	100
Blue-winged Teal	FY		74	35
Northern Shoveler ‡			6	3
Northern Pintail ‡			0	3
Green-winged Teal ‡			0	12
Redhead †			0	3
Hooded Merganser ‡	H	FY	9	22
Gray Partridge ‡	H		25	3
Ring-necked Pheasant	S	T	58	51
Ruffed Grouse	FY		70	45
Wild Turkey		P	0	80
Northern Bobwhite †			9	0
Pied-billed Grebe ‡			16	16
Red-necked Grebe †			0	3
Double-crest Cormorant ‡§			3	6
American Bittern ‡	T		32	12

SPECIES	Code		%	
	1st	2nd	1st	2nd
Bald Eagle †			0	12
Northern Harrier	H	CF	80	74
Sharp-shinned Hawk		AE	0	48
Cooper's Hawk	T	CF	9	58
Northern Goshawk ‡			0	6
Red-should Hawk †			6	0
Broad-winged Hawk ‡	H	CF	6	16
Red-tailed Hawk	FY	AE	96	96
American Kestrel	FY	H	100	87
Peregrine Falcon †			0	9
Virginia Rail	T	S	67	48
Sora	D	S	64	45
Common Moorhen ‡			32	19
American Coot ‡			29	9
Coot/Moorhen ‡			0	0
Killdeer	DD	DD	100	100
Rock Dove	NY	NY	93	96
Spotted Sandpiper	P	FY	96	100
Upland Sandpiper		P	87	61
Common Snipe	P		77	51
American Woodcock	D	D	96	80
Ring-billed Gull ‡§			6	9
Herring Gull ‡§			16	6

SPECIES	Code		%	
	1st	2nd	1st	2nd
Black/Yell-billed Cuckoo			0	25
Black-billed Cuckoo	S	S	77	93
Barn Owl †			6	3
Eastern Screech-Owl	FY	A	90	90
Great Horned Owl	FY		93	83
Long-eared Owl ‡			22	6
Short-eared Owl †			9	16
North Saw-whet Owl ‡			3	3
Common Nighthawk ‡			29	16
Whip-poor-will ‡	T		35	6
Chimney Swift	NY		77	58
Ruby-thr Hummingbird	A	AE	90	87
Belted Kingfisher	NY	CF	83	77
Red-headed Woodpecker †	CF		77	48
Red-bell Woodpecker		A	32	90
Yellow-bellied Sapsucker ‡			6	0
Downy Woodpecker	FY	NY	96	96
Hairy Woodpecker	P	CF	87	93
Northern Flicker	FY	AE	96	100
Pileated Woodpecker	T	T	35	35
Eastern Wood-Pewee	P	AE	96	96
Acadian Flycatcher †	S	T	9	3
Alder Flycatcher		S	54	54

Least Bittern †			19	9
Great Blue Heron §	H	NY	87	80
Green Heron §	H	FY	93	83
Black-crown N.-Heron † §			9	12
Turkey Vulture	P	NY	96	87
Osprey ‡			6	22

Great Black-backed Gull †			0	0
Caspian Tern †			3	3
Black Tern † §			22	0
Common Tern ‡§			6	6
Mourning Dove	NU	AE	100	100
Yellow-billed Cuckoo	S	S	48	58

Willow Flycatcher	T	A	96	100
Least Flycatcher	S		70	83
Eastern Phoebe	NY	NY	74	93
Gr Crested Flycatcher	A	AE	96	96
Eastern Kingbird	FY	FY	96	96
Yellow-throated Vireo	A	S	51	41

next page >>

Ontario Breeding Bird Atlas - Summary Sheet for Square 17NH78 (page 2 of 3)

SPECIES	Code		%	
	1st	2nd	1st	2nd
Blue-headed Vireo ‡			0	3
Warbling Vireo	T	CF	96	100
Red-eyed Vireo	FY	T	96	93
Blue Jay	FY	CF	100	100
American Crow	FY	FY	100	100
Horned Lark	S	T	96	96
Purple Martin	AE		93	80
Tree Swallow	AE	CF	93	100
North Rgh-wing Swallow	FY	S	93	96
Bank Swallow §	NY	H	61	64
Cliff Swallow §	H	H	38	54
Barn Swallow	NY	NY	96	100
Black-capped Chickadee	CF	AE	100	96
Tufted Titmouse †		S	12	61
Red-breast Nuthatch		FY	12	32
White-breast Nuthatch	FY	T	96	93
Brown Creeper	H	P	35	35
Carolina Wren			19	58
House Wren	NY	CF	96	100
Winter Wren		FY	9	19

SPECIES	Code		%	
	1st	2nd	1st	2nd
Northern Mockingbird		NB	35	87
Brown Thrasher	CF	A	96	90
European Starling	NY	NY	100	100
Cedar Waxwing	N	NB	100	100
Blue-winged Warbler	FY	T	45	61
Golden-winged Warbler	FY	H	51	22
Blue/Gold-wing Warbler			0	19
Lawrence's Warbler †			3	9
Brewster's Warbler †			12	19
Nashville Warbler	T		19	6
Yellow Warbler	FY	CF	96	100
Chestn-sided Warbler	NY	NY	51	51
Magnolia Warbler ‡			0	6
Black-thr Blue Warbler ‡			0	9
Yellow-rumped Warbler ‡			0	3
Black-thr Green Warbler ‡	S	S	9	16
Blackburnian Warbler ‡			0	3
Pine Warbler	T	T	9	22
Prairie Warbler †			0	0
Cerulean Warbler †		S	38	9

SPECIES	Code		%	
	1st	2nd	1st	2nd
Hooded Warbler †	S	NE	3	19
Canada Warbler	S		19	6
Yellow-breast Chat †		T	25	9
Eastern Towhee	NY	T	87	87
Chipping Sparrow	NY	CF	96	100
Clay-colored Sparrow ‡			3	16
Field Sparrow	FY	CF	96	96
Vesper Sparrow	FY	T	96	90
Savannah Sparrow	CF	T	96	96
Grasshopper Sparrow			77	58
Henslow's Sparrow †			0	0
Song Sparrow	NE	CF	100	100
Swamp Sparrow	FY	CF	77	83
White-throat Sparrow ‡			0	6
Scarlet Tanager	FY	NB	77	87
Northern Cardinal	T	FY	100	100
Rose-breast Grosbeak	A	A	96	100
Indigo Bunting	A	A	96	93
Dickcissel †			0	0
Bobolink	P	FY	96	96

Sedge Wren ‡		FY	19	25	Black-white Warbler ‡			6	16	Red-wing Blackbird	NE	NY	100	100
Marsh Wren			45	54	American Redstart	D	AE	80	67	Eastern Meadowlark	CF	CF	96	96
Golden-crown Kinglet ‡			3	6	Prothonotary Warbler †			6	6	Western Meadowlark ‡			12	3
Blue-gr Gnatcatcher		T	54	77	Ovenbird	NE	NB	83	83	Common Grackle	NY	NY	100	100
Eastern Bluebird	AE	CF	38	80	North Waterthrush			19	29	Brown-head Cowbird	NY	FY	100	100
Veery	A	T	67	54	Louis Waterthrush †			9	9	Orchard Oriole	S	P	58	83
Wood Thrush	CF	AE	96	96	Kentucky Warbler †		A	0	3	Baltimore Oriole	FY	FY	96	100
American Robin	NY	CF	100	100	Mourning Warbler	A	CF	22	29	Purple Finch ‡			6	6
Gray Catbird	CF	CF	96	100	Common Yellowthroat	A	CF	96	96	House Finch		T	58	100

Ontario Breeding Bird Atlas - Summary Sheet for Square 17NH78 (page 3 of 3)

SPECIES	Code		%	
	1st	2nd	1st	2nd
Pine Siskin ‡			0	0
American Goldfinch	NE	A	96	100
House Sparrow	NY	NB	100	100

This list includes all species found during the Ontario Breeding Bird Atlas (1st atlas: 1981-1985, 2nd atlas: 2001-2005) in the region #15 (Hamilton). Underlined species are those that you should try to add to this square. They have not yet been reported during the 2nd atlas, but were found during the 1st atlas in this square or have been reported in more than 50% of the squares in this region during the 2nd atlas so far. In the species table, "BE 2nd" and "BE 1st" are the codes for the highest breeding evidence for that species in square 17NH78 during the 2nd and 1st atlas respectively. The % columns give the percentage of squares in that region where that species was reported during the 2nd and 1st atlas (this gives an idea of the expected chance of finding that species in region #15). Rare/Colonial Species Report Forms should be completed for species marked: § (Colonial), ‡ (regionally rare), or † (provincially rare). Current as of 23/11/2011. An up-to-date version of this sheet is available from http://www.birdsontario.org/atlas/summaryform.jsp?squareID=17NH78

LEGEND

Special Concern

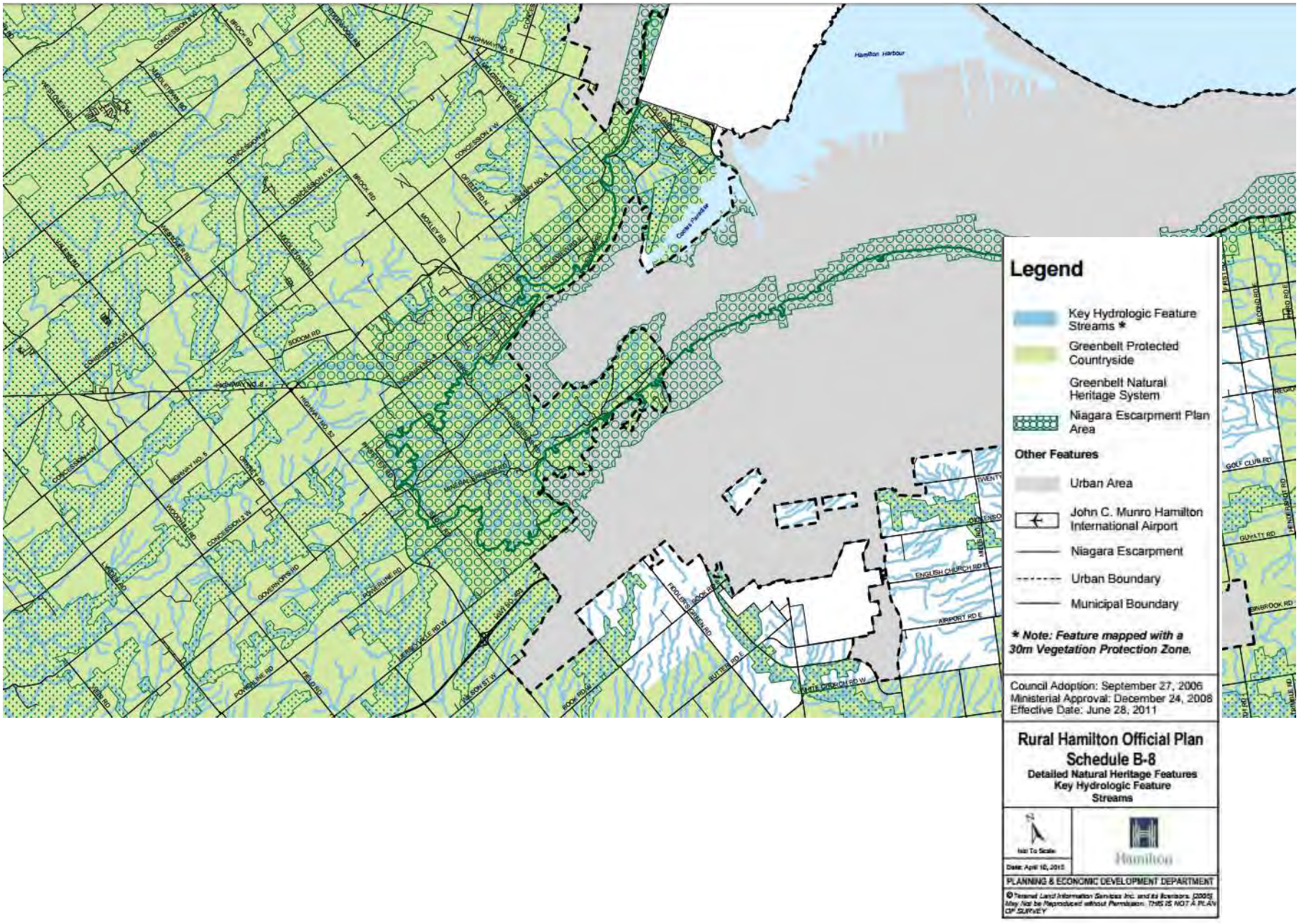
Threatened

Endangered

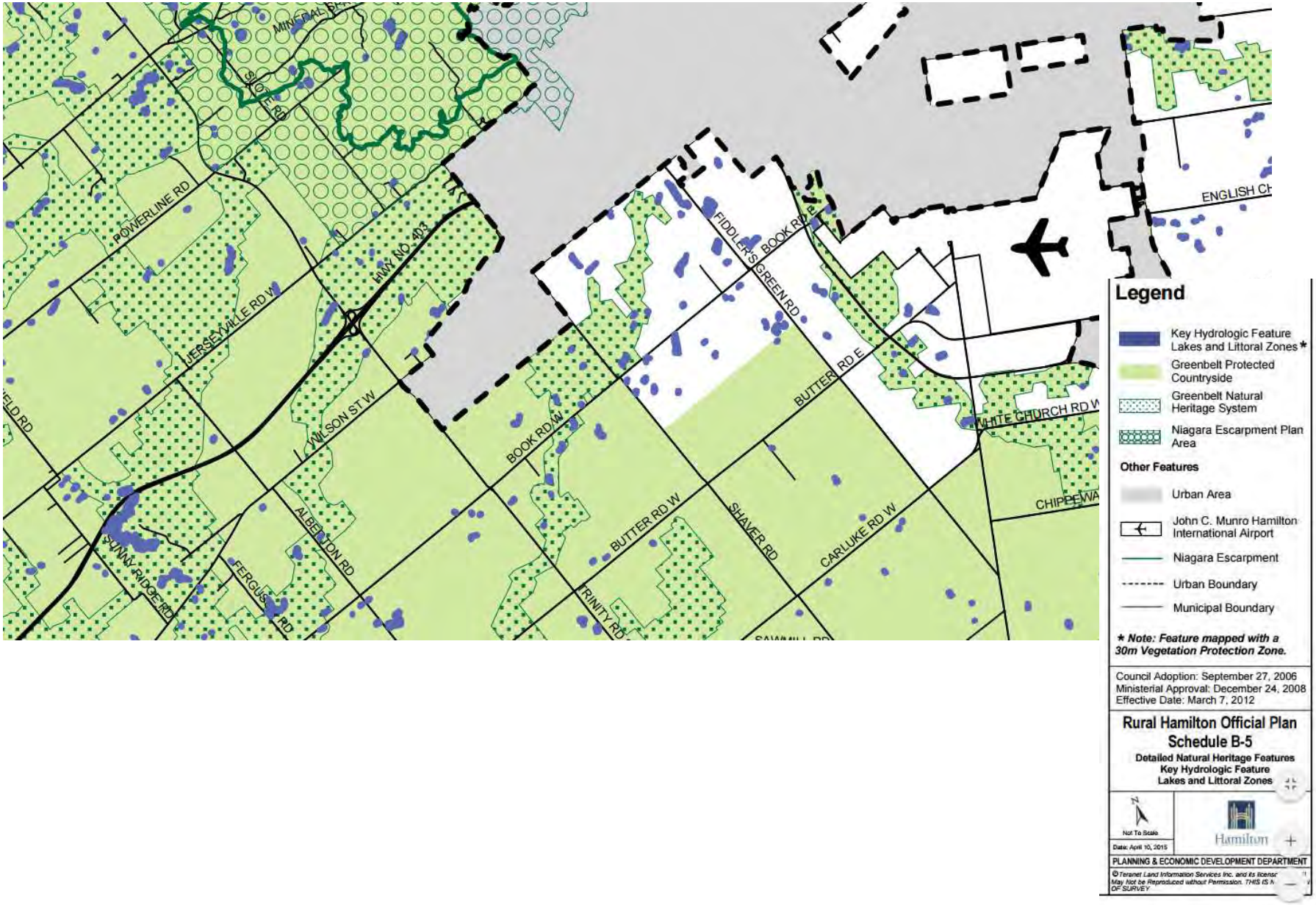
APPENDIX C

City of Hamilton Official Plan Schedules

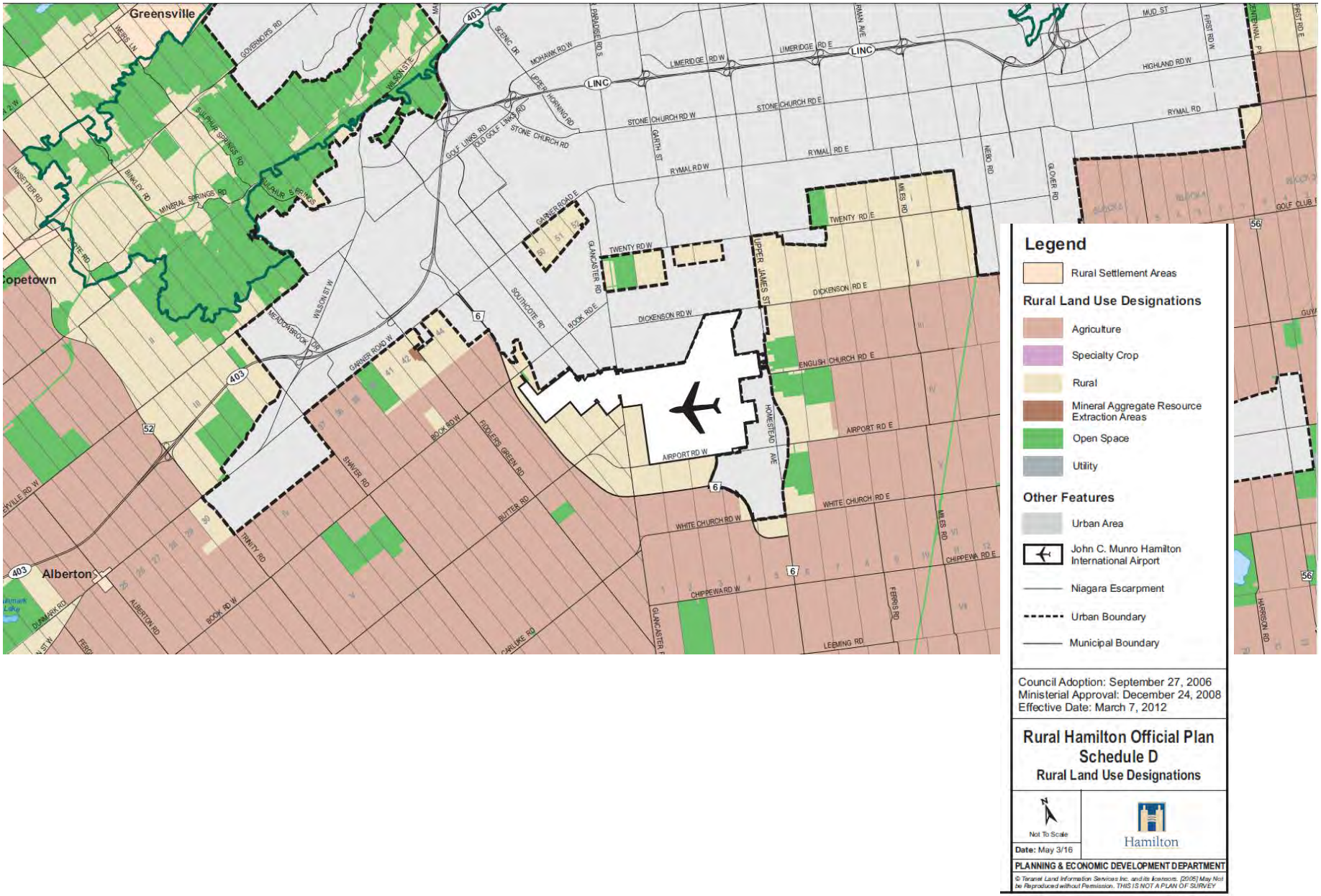
Rural Hamilton Official Plan Schedule B-8 - Natural Heritage Features Key Hydrologic Feature - Streams



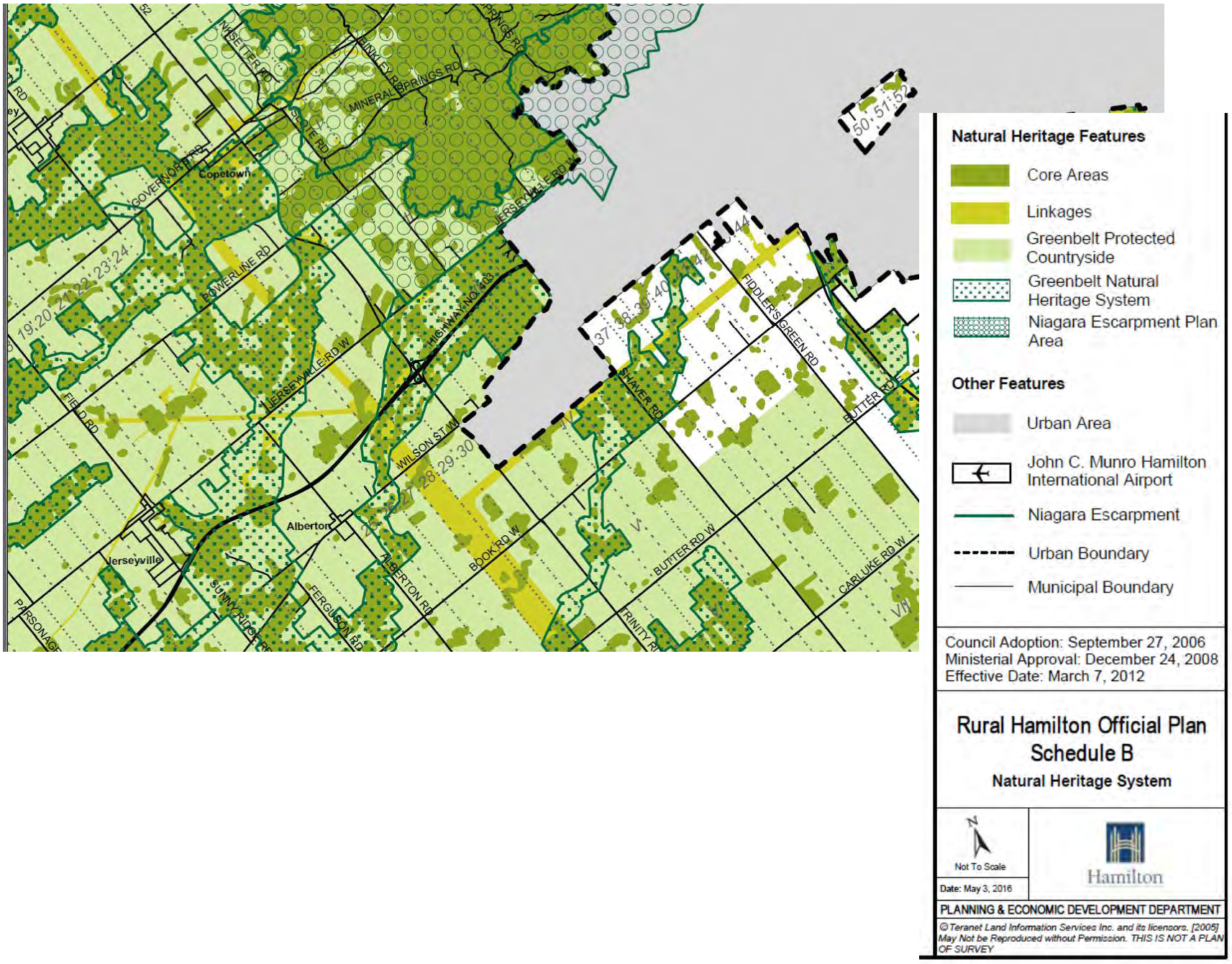
Rural Hamilton Official Plan Schedule B-5 - Natural Heritage Features Key Hydrologic Features Lakes and Littoral Zones



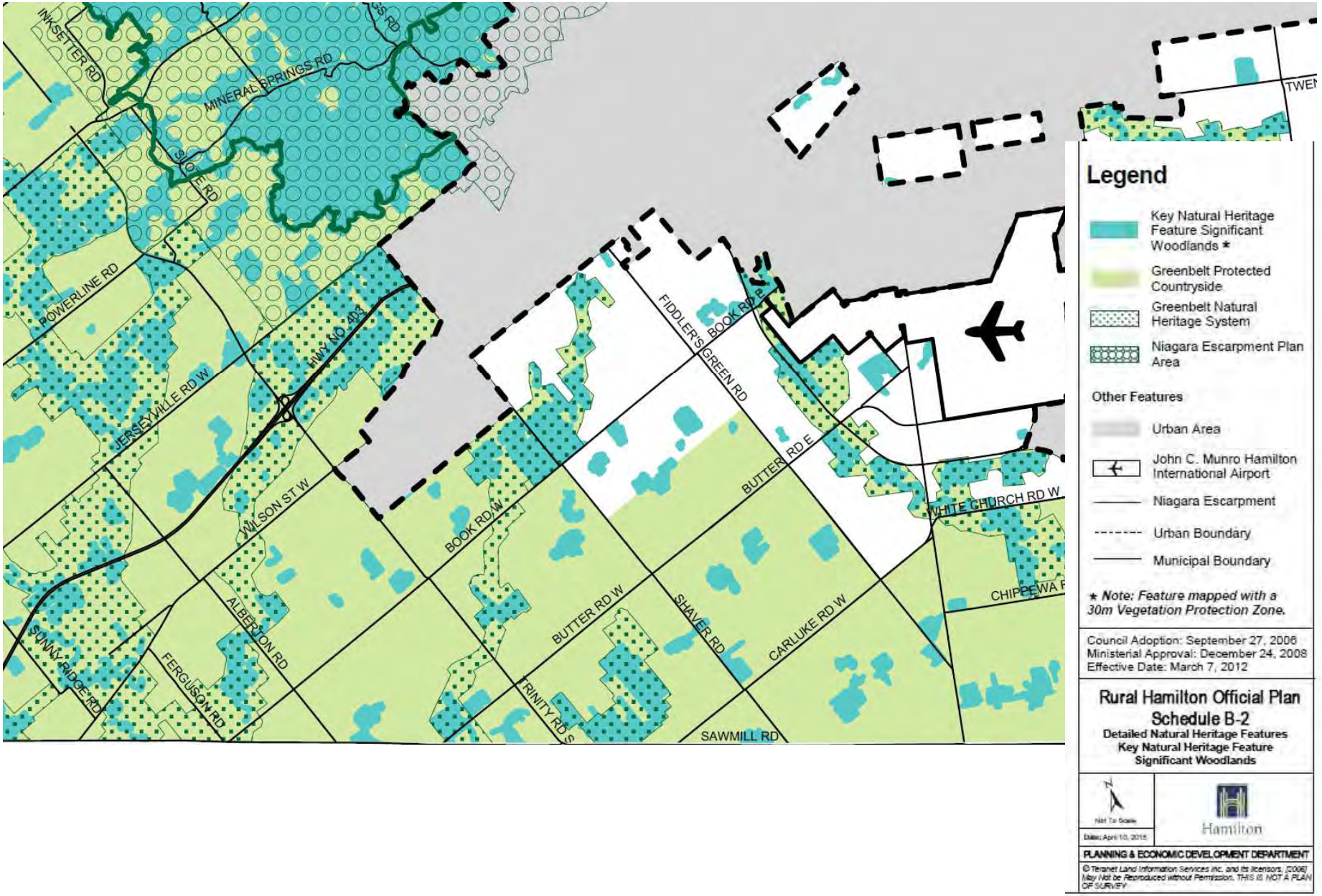
Rural Hamilton Official Plan Schedule D - Rural Landuse Designations



Rural Hamilton Official Plan Schedule B - Natural Heritage System



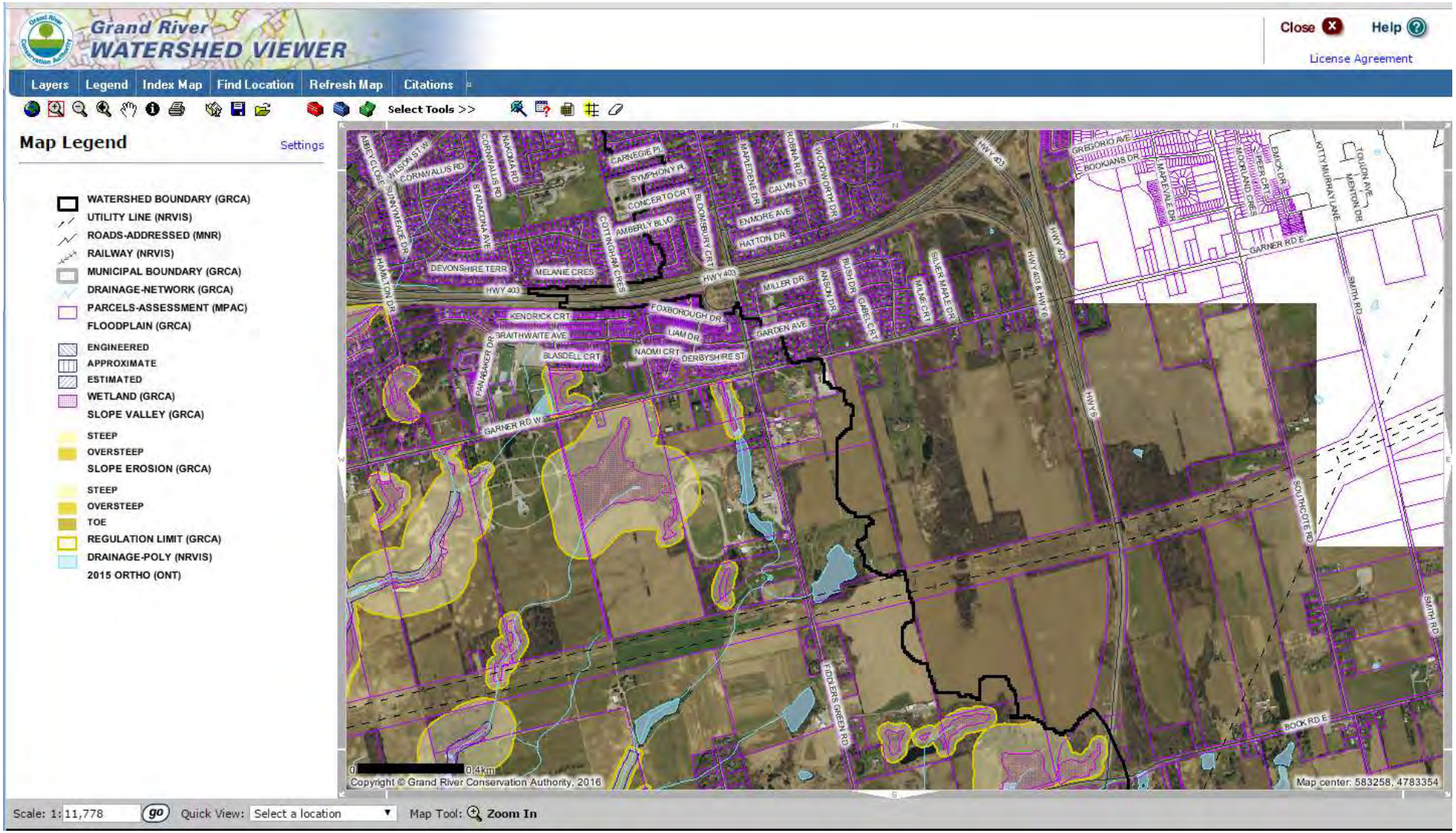
Rural Hamilton Official Plan Schedule B-2

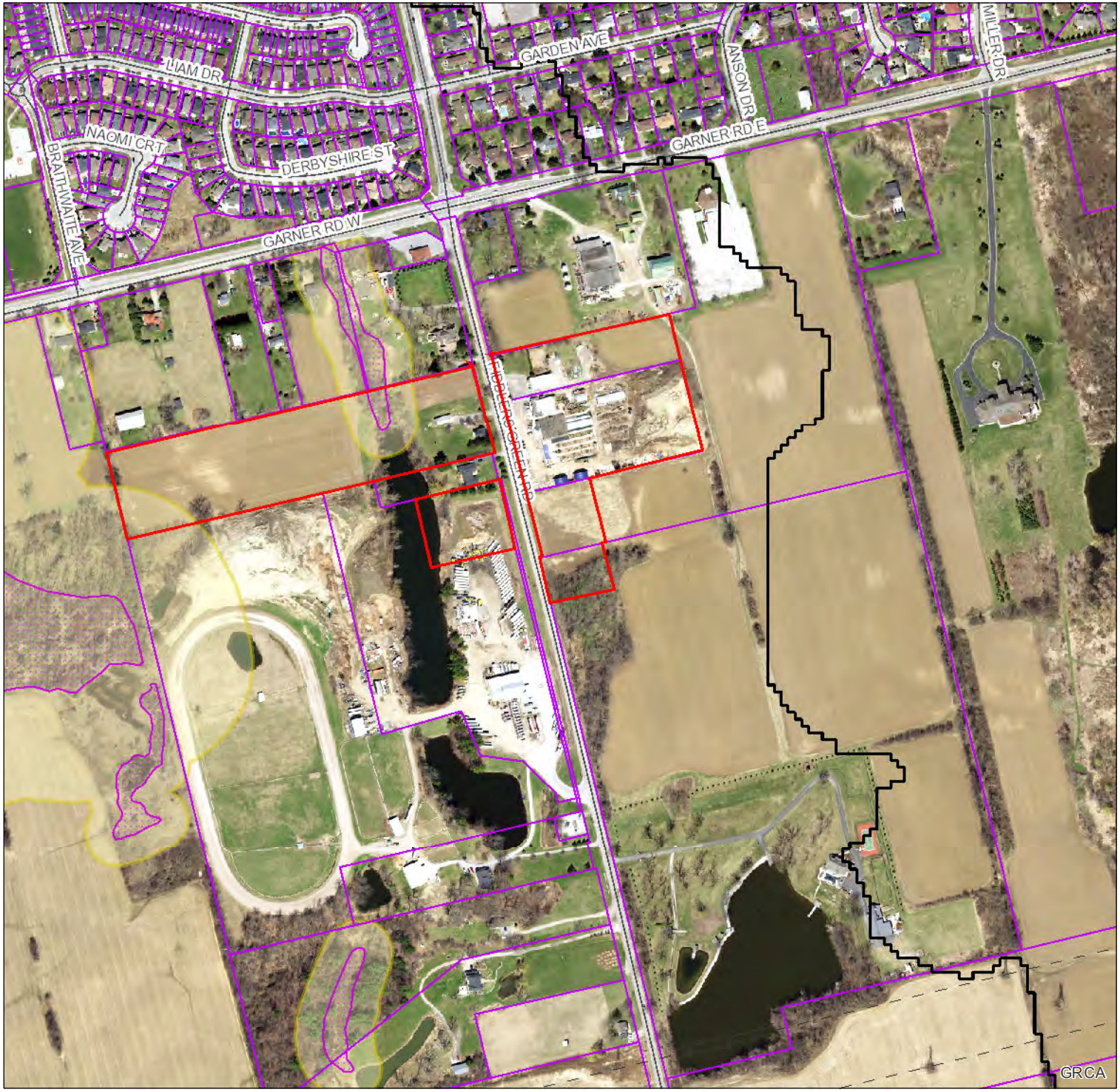


APPENDIX D

GRCA Mapping and Correspondence

GRCA Regulation - August 2016





Grand River Conservation Authority

Date: Sep 07, 2016

Fiddler's Green Sites

Notes

Legend

- Municipal Boundary (GRCA)
- Parcel - Ownership (MGCS/Teranet)

Floodplain (GRCA)

- Engineered
- Estimated
- Approximate
- Wetland (GRCA)
- Park - Local (GRCA)
- Regulation Limit (GRCA)

0 35 70 140 210 Metres

N

Map Centre (UTM NAD83 z17): 582,790.93 4,783,346.84

This map is not to be used for navigation

NAD 1983 UTM Zone 17N

Scale: 6,130

Melissa Fuller

From: Fred Natolochny [fnatolochny@grandriver.ca]
Sent: September-07-16 10:10 AM
To: Melissa Fuller
Cc: Drew Cherry
Subject: RE: Information Query - Hamilton Water Tower
Attachments: Fiddler's Green sites.pdf

Hello Melissa;

731, 591, 587 Fiddler's Green and 70 Garner have no features of interest to the GRCA identified in our mapping.

588 Fiddler's Green has a small portion of an unevaluated wetland that extends north from the pond that is on 588 and 658 Fiddler's Green Road. My belief is that the pond was man made and has limited functional connectivity with the features to the south west of this area. The wetland and pond are shown on attached mapping.

We do not provide ANSI information as it is a provincial designation. We have not undertaken sampling or assessments on these features/properties.

The work described appears to be adequate for the purpose of general site selection for the Environmental Assessment. I would not suggest it would be adequate for the design phase without completion of the assessment.

If there is anything else we can help with, please let Drew or myself know.

From: Melissa Fuller [mailto:MFuller@Azimuthenvironmental.Com]
Sent: Tuesday, September 6, 2016 3:39 PM
To: Fred Natolochny
Subject: Information Query - Hamilton Water Tower

Good afternoon Mr. Natolochny,

Azimuth Environmental Consulting Inc. (Azimuth) was retained in 2012 the City of Hamilton (City) to complete the Natural Heritage Assessment component of the Ancaster Water Tower Schedule B Municipal Class Environmental Assessment (EA). The project was put on hold for the past 4 years, but has recently been revived. Since our initial contact with the Authority, additional locations have been identified for assessment (mapping attached).

Given the project timeline and lack of permission to enter these properties, we are currently restricted to completing of the following task items as part of our field assessment:

- Evaluate vegetation communities, using protocols of the Ecological Land Classification for Southern Ontario (Lee et al. 1998. Ecological land classification for southern Ontario: first approximation and its applications. SCSS Field Guide FG-02);
- Conduct a roadside survey of vascular plants in the fall.;
- Conduct a Species at Risk Screening for the properties;
- Record other wildlife observations and assess wildlife habitat function of the property.

I would also like to take this opportunity to request any data you may have for the area that would assist in the completion of the natural environment assessment of these properties including digital files indicating the location of Area's of Natural and Scientific Interest and Provincially and Locally Significant Wetlands and any fisheries data that you may have for the area.

I trust that this work will satisfy the Authority's requirements for the completion of the Natural Environment Assessment for the proposed water tower. Please do not hesitate to contact me if you have any questions or concerns regarding this project.

Melissa Fuller H. B.Sc.

Terrestrial Ecologist, ISA Certified Arborist

Please note, our office has moved:
Azimuth Environmental Consulting, Inc
642 Welham Street
Barrie, ON, L4N 9A1

office: (705) 721-8451 ext. 216
fax: (705) 721-8926
cell: 705-795-8451
mfuller@azimuthenvironmental.com

Providing services in hydrogeology, terrestrial and aquatic ecology & environmental engineering

Melissa Fuller H. B.Sc.

Terrestrial Ecologist, ISA Certified Arborist

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AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Environmental Assessments & Approvals

September 28, 2016 AEC 10-230a

Infrastructure Planning & Systems Design Section
Hamilton Water, Public Works Department,
City of Hamilton
77 James St. North, Suite 400
Hamilton, ON
L8R 3K3

Attn: Winston Wang, M.A. Sc., P Eng., Project Manager, Water & Wastewater Planning

Re: 2016 Natural Heritage Property Screening for Ancaster Water Tower Schedule B - Municipal Class Environmental Assessment City of Hamilton

Dear Mr. Wang:

Azimuth Environmental Consulting Inc. (Azimuth) has been retained by the City of Hamilton (City) to complete the Natural Heritage component of the Ancaster Water Tower Schedule B Municipal Class Environmental Assessment (EA). A grouping of potentially suitable properties located east and west of Fiddlers Green Rd were identified in 2012, and updated in 2016 (Figure 1). A background assessment, including queries to the Grand River Conservation Authority (GRCA), Ministry of Natural Resources and Forestry (MNRF) and a review of municipal planning schedules has been completed in order to obtain background information for all identified properties. Flora and fauna surveys (vegetation surveys, amphibian surveys, dawn breeding bird surveys) were completed on the 2012 sites (Properties 3 and 4, Figure 2). The project schedule did not allow for the completion of detailed surveys on the 2016 properties, however, one site visit was completed in September 2016 to confirm the existing land use, prepare a preliminary vegetation inventory and characterize potential Species at Risk (SAR)habitat. The 2016 properties have been identified as “Properties East of Fiddlers Green Rd." and "Properties West of Fiddlers Green Rd." for ease of reference within this letter.

The information available at this time is sufficient to identify potential environmental constraints and opportunities that may assist in the selection of alternatives from an

environmental perspective. This letter details our initial natural heritage assessment of the preliminary alternatives to assist the City in establishing preferred alternative sites.

PROPERTY 3

Property 3 is currently privately owned and fronts on Fiddler's Green Rd., between a convenience store and a residential property (Figure 2). The property is undeveloped and is currently maintained as lawn. Two spruce hedgerows border the property to the north and east. No surface water drainage was evident during the site visit. An unevaluated wetland and deciduous forest has been identified west of this property (Figure 2) and comprise portions of the City's Natural Heritage System (NHS).

This lot is suitable for development as no wildlife habitat exists within the property limits, and no drainage features are present. Therefore, from a natural heritage perspective, this site appears to be suitable for the location of the Ancaster Water Tower. Further investigation is required to determine appropriate mitigation measures to the NHS to ensure that development in this location will not negatively impact the feature.

PROPERTY 4

Property 4 is located on the west side of Fiddler's Green Rd., between a residential and commercial property (Figure 2) and is currently under cash crop production. No drainage features were observed within the limits of this property. A hedgerow lies adjacent to Fiddler's Green Rd. Observed species within the hedgerow included Honey-Locust (*Gleditsia triacanthos*), Garlic Mustard (*Alliaria petiolata*), Tartarian Honeysuckle (*Lonicera tatarica*), Sugar Maple (*Acer saccharum*), Tall Goldenrod (*Solidago canadensis*) and Coltsfoot (*Tussilago farfara*). The Honey-Locust has a small natural range (Niagara Region and Essex County) and is considered to be a rare species (S2) within the province of Ontario, if the individual is naturally occurring. Trees observed outside of this range are likely cultivars and have been planted. Given the location of the trees within the road right of way, it is likely that the individuals observed are cultivars. No Butternut trees were observed within the hedgerow.

Given the general disturbance of this property, and the lack of suitable habitat for both terrestrial and aquatic species, this property appears to be a suitable alternative for the location of the Ancaster Water Tower from a natural heritage perspective.

PROPERTIES WEST OF FIDDLER'S GREEN RD.

These properties are privately owned, thus, a detailed field assessment was not completed during the September 2016 site visit, and only lands immediately adjacent to Fiddler's Green Rd. were assessed. All of the lands immediately adjacent to Fiddler's Green Rd have been subject to varying degrees of anthropogenic influence; the lands consist of active agriculture, a residential dwelling and a partially mown cultural meadow (Figure 2). Development within these areas will not likely directly affect natural heritage functions of the properties.

Both western properties also contain features that have been identified as part of the City's NHS, including Woodland, Stream and Lake and Littoral Zones (Schedule B-2, B-5, and B-8 of the City's Official Plan; Figure 3). Further site investigations will be required to fully characterize the function of these features, and determine appropriate mitigation measures if future development is proposed within and/or adjacent to these features. In addition to this, further study will be required to characterize potential impact to SAR known to utilize the habitat present, and that have known occurrences [*i.e.* Butternut (Endangered) and Barn Swallow (Threatened)] within the area.

The larger of the two properties extends west of the NHS (Figure 2). No site investigations have been completed in this location, however, it appears (from interpretation of aerial photography) that this portion of the property is also actively farmed. Thus, we do not anticipate that development in this location will result in negative impact to the NHS, provided that appropriate mitigation measures are implemented during and post construction and that the access route to the development is constructed such that the function of the NHS is maintained post development. Site specific investigations should occur concurrently with detail design to confirm that no SAR or SAR habitat will be impacted by development in this location, should this property be selected as the preferred location of the water tower.

PROPERTIES EAST OF FIDDLER'S GREEN RD.

These properties are privately owned, thus a detailed field assessment was not completed during the September 2016 site visit, and only lands immediately adjacent to Fiddler's Green Rd were assessed.

The northern property contains lands under commercial use. The lack of usable habitat within these lands and the frequent anthropogenic disturbance associated with the commercial land use makes these properties low priority for natural heritage and development in this location will not likely directly affect natural heritage function of the

property. Further study will be required to characterize potential impact to SAR known to utilize the habitat present, and that have known occurrences [Barn Swallow (Threatened)] within the area.

The property south of this area is comprised of cultural meadow and deciduous forest (Figure 2). The woodland has been identified as a feature within the City's NHS (Figure 3). Though not identified as part of the NHS, the cultural meadow provides supporting habitat to the woodland. Thus, further site investigations will be required to fully characterize the natural heritage function of these features, and determine appropriate mitigation measures if future development is proposed within and/or adjacent to these features. In addition to this, further study will be required to characterize potential impact to SAR known to utilize the habitat present, and that have known occurrences [*i.e.* Butternut (Endangered) and Barn Swallow (Threatened)] within the area.

CONCLUSION

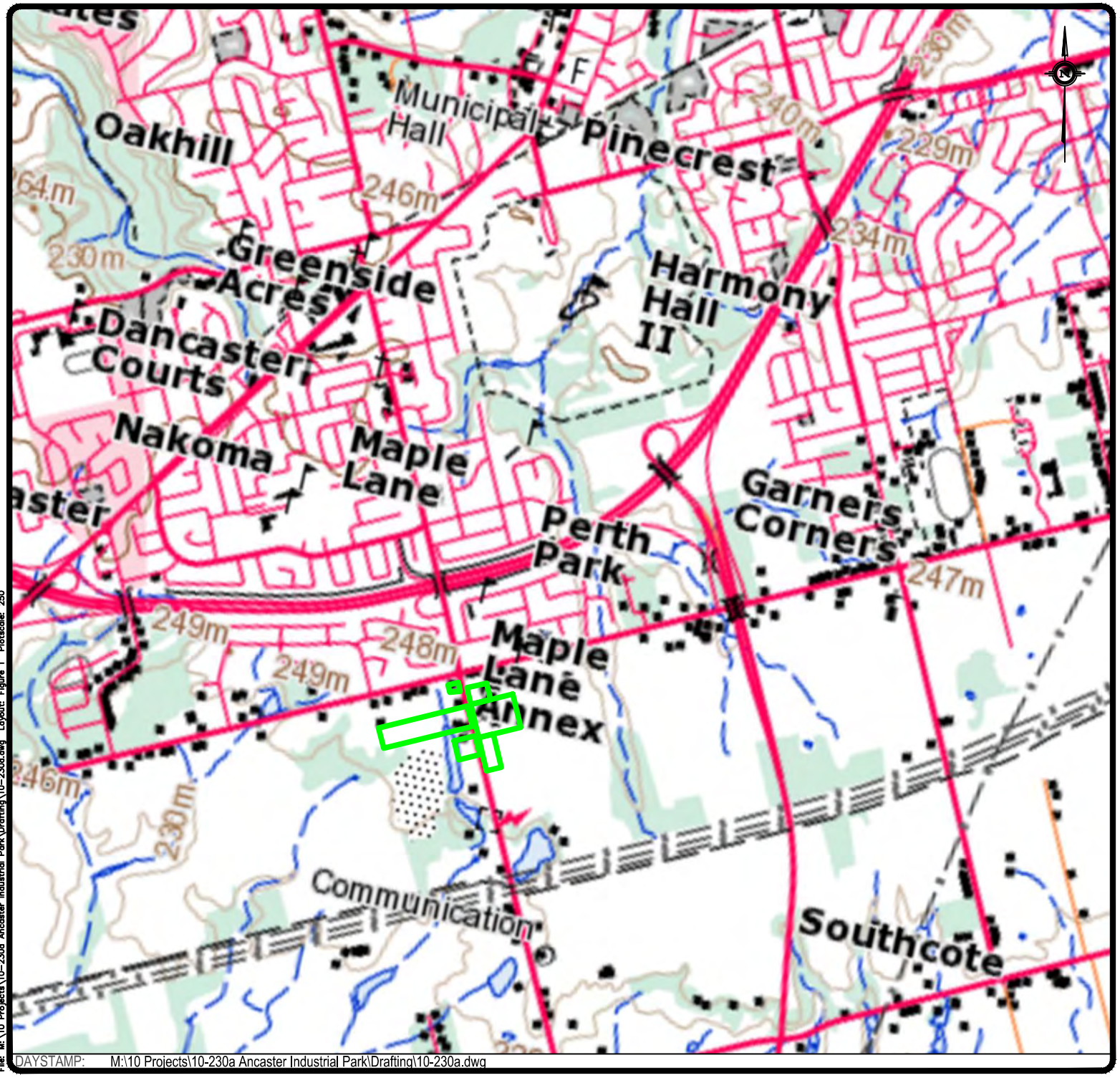
Azimuth has visited all properties identified in 2016 as preliminary alternative sites for the Ancaster Water Tower and has conducted a preliminary assessment of the natural heritage features of the properties to define potential constraints and opportunities for development. The results of the assessment indicate that Properties 3, 4, the lands immediately adjacent to Fiddler's Green Rd. in the west, and the commercial lands east of Fiddler's Green Rd., lack significant constraints. That said, all properties are located within close proximity to features identified as components of the City's NHS and further studies are require to ensure that development of the preferred site does not negatively impact the features and functions of the NHS, SAR or habitat of SAR.

If you have any questions or concerns regarding this correspondence, please do not hesitate to contact me.

Yours truly,
AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Melissa Fuller, B.Sc.
Terrestrial Ecologist

Attach: Figures 1-3



LEGEND:

Study Area Limit

250m 0 750m

HORIZONTAL SCALE 1: 25,000

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

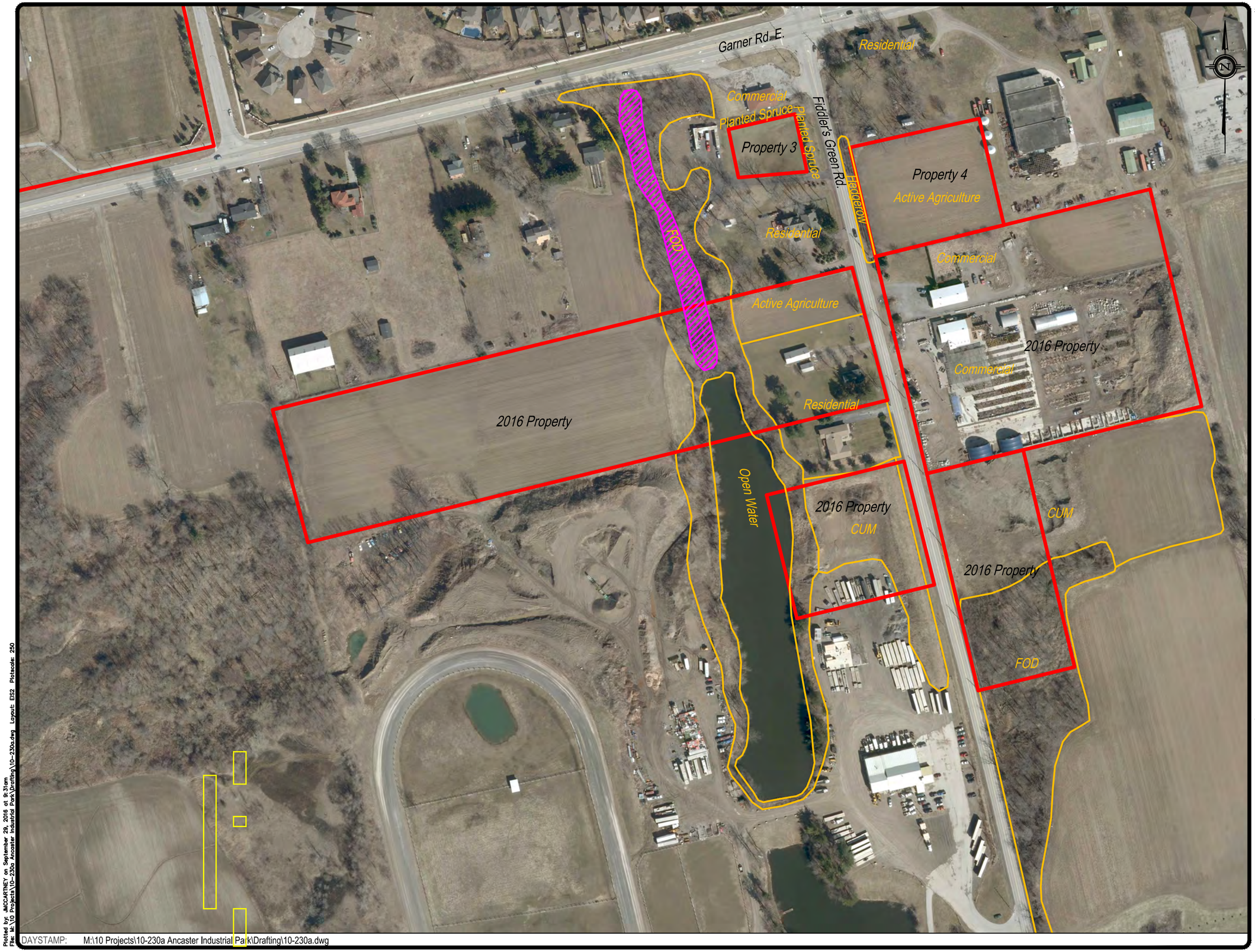
Study Area Location

Ancaster Industrial Park
Ancaster, ON

DATE ISSUED: *October 2016*	Figure No.
CREATED BY: *JLM*	
PROJECT NO.: *10-230a*	1
REFERENCE: *Gazetteer Maps*	

DAYSTAMP: M:\10 Projects\10-230a Ancaster Industrial Park\Drafting\10-230a.dwg

Plotted by: JMCCARTNEY on November 7, 2016 at 11:16am
File: M:\10 Projects\10-230a Ancaster Industrial Park\Drafting\10-230a.dwg Layout: Figure 1 Plotscale: 250



LEGEND:

- Approx. Study Areas
- Unevaluated Wetland
- Vegetation Communities
- CUM Cultural Meadow
- FOD Deciduous Forest

25m 0 75m

HORIZONTAL SCALE 1:2,500

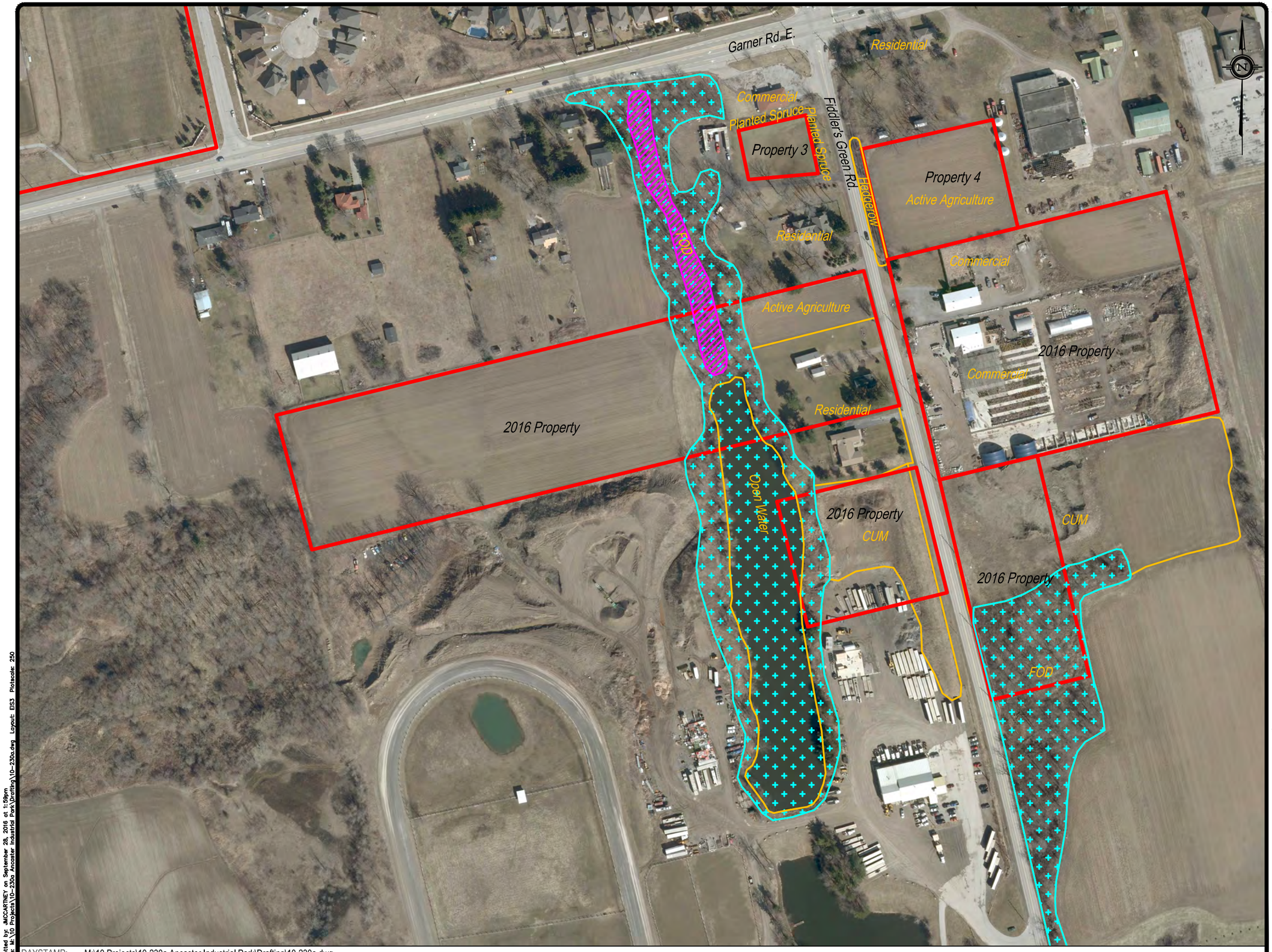
AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Environmental Features

Ancaster Industrial Park
Ancaster, ON

DATE ISSUED:	August 2016	Figure No.
CREATED BY:	JLM	2
PROJECT NO.:	10-230a	
REFERENCE:	First Base Solutions	

Plotted by: JMCCARTNEY on September 29, 2016 at 9:31am
File: M:\10 Projects\10-230a Ancaster Industrial Park\Drafting\10-230a.dwg Layout: ES2 Plotscale: 250



LEGEND:

- Approx. Study Areas
- Unevaluated Wetland
- City of Hamilton Natural Heritage System
- Vegetation Communities
- CUM Cultural Meadow
- FOD Deciduous Forest

25m 0 75m

HORIZONTAL SCALE 1:2,500

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Environmental Features

Ancaster Industrial Park
Ancaster, ON

DATE ISSUED:	September 2016	Figure No.
CREATED BY:	JLM	3
PROJECT NO.:	10-230a	
REFERENCE:	First Base Solutions	

DAYSTAMP: M:\10 Projects\10-230a Ancaster Industrial Park\Drafting\10-230a.dwg

Plotted by: JMCCARTNEY on September 28, 2016 at 1:59pm
File: M:\10 Projects\10-230a Ancaster Industrial Park\Drafting\10-230a.dwg Layout: EIS3 Plotscale: 250

Appendix C

ARCHAEOLOGICAL ASSESSMENT

ORIGINAL

Stage 1 Archaeological Assessment
Background Study and Property Inspection

Ancaster Water Tower
Class Environmental Assessment Study

Former Township of Ancaster, Wentworth County
City of Hamilton, Ontario

Prepared for:

City of Hamilton
77 James Street North, Suite 400
Hamilton, Ontario, L8R 2K3
Tel: 905-546-2424
Fax: 905-546-4491
Winston.wang@hamilton.ca
www.hamilton.ca

Archaeological Licence P094 (Lisa Merritt)
MTC PIF P094-111-2011
ASI File 11EA-282

January 12, 2012

Archaeological Services Inc.
528 Bathurst St.
Toronto, Ontario
Canada, M5S 2P9
T 416-966-1069
F 416-966-9723
info@iASI.to/www.iASI.to

Stage 1 Archaeological Assessment
Background Study and Property Inspection

Ancaster Water Tower
Class Environmental Assessment Study

Former Township of Ancaster, Wentworth County
City of Hamilton, Ontario

EXECUTIVE SUMMARY

Archaeological Services Inc (ASI) was contracted by the City of Hamilton to conduct a Stage 1 Archaeological Assessment as part of the proposed Ancaster Water Tower Class Environmental Assessment (EA). The goal of the project is to assess the impacts of adding a new elevated water storage tank in Ancaster. This project is evaluating four separate sites in the Ancaster Business Park, located between Shaver and Trinity Church Roads, north and south of Wilson Street. All four sites are included in this assessment.

The Stage 1 background study determined that 26 archaeological sites have been registered within 1 km of the study area. A review of the geography of the study area suggested that the study area has potential for the identification of Aboriginal and Euro-Canadian archaeological resources.

The Stage 1 property inspection determined that while the majority of the Ancaster Water Tower study area does not retain archaeological potential due to previous construction activity, two sections in Site 2 of the study area retain archaeological potential.

In light of these results, ASI makes the following recommendations:

1. Archaeological potential exists in Site 2 of the study area. These lands will require a Stage 2 Property Assessment, which will be conducted by test pit survey. A test pit survey will include the systematic excavation of small test pits by hand at 5 m intervals and must be conducted as ploughing in not feasible in this area;

2. Due to extensive and deep land alterations that have severely damaged the integrity of any potential archaeological resources, Sites 1, 3, and 4 of study do not require further archaeological assessment; and,

3. Should the proposed work extend beyond the current Ancaster Water Tower study area then further Stage 1 assessment must be conducted to determine the archaeological potential of the surrounding lands.

ARCHAEOLOGICAL SERVICES INC.
ENVIRONMENTAL ASSESSMENT DIVISION

PROJECT PERSONNEL

Senior Project Manager and Project Director (licensee):	Lisa Merritt, MSc [MTC license P094] *Senior Archaeologist, Assistant Manager, Environmental Assessment Division*
Project Manager/Archaeologist:	Sarah Jagelewski, Hon. BA *Research Archaeologist*
Project Coordinator:	Sarah Jagelewski
Field Director:	Lisa Merritt
Report Writer and Graphics:	Heidy Schopf, MES *Research Archaeologist*
Graphics	Jonas Fernandez, MSc *GIS Technician*
	Blake Williams, MLitt *GIS Technician*
Report Reviewer:	Lisa Merritt

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1.0 PROJECT CONTEXT

Archaeological Services Inc (ASI) was contracted by the City of Hamilton to conduct a Stage 1 Archaeological Assessment as part of the proposed Ancaster Water Tower Class Environmental Assessment (EA). The goal of the project is to assess the impacts of adding a new elevated water storage tank in Ancaster. This project is evaluating four separate sites in the Ancaster Business Park, located between Shaver and Trinity Church Roads, north and south of Wilson Street. All four sites are included in this assessment (Figure 1).

This assessment was conducted under the project management of Sarah Jagelewski and senior project management of Lisa Merritt, both of ASI; Ms. Merritt was also the licensee for the project (PIF P094-108-2011).

The objectives of this report are:

- To provide information about the geography, history, previous archaeological fieldwork and current land condition of the study area;
- To evaluate in detail the archaeological potential of the study area which can be used, if necessary, to support recommendations for Stage 2 Archaeological Assessment for all or parts of the property; and
- To recommend appropriate strategies for Stage 2 Archaeological Assessment, if necessary.

This report describes the Stage 1 assessment that was conducted for this project and is organized as follows: Section 1.0 describes the project context and summarizes the background study that was conducted to provide the archaeological and historical context for the project study area; Section 2.0 describes the field methods used during the assessment and summarizes the results of the property inspection; Section 3.0 provides an analysis of the assessment results and evaluates the archaeological potential of the study area; Section 4.0 provides recommendations for the next assessment steps; and the remaining sections contain other report information that is required by the Ministry of Tourism and Culture's (MTC) 2011 *Standards and Guidelines for Consultant Archaeologists (S&G)*, e.g., advice on compliance with legislation, works cited, mapping and photo-documentation.

1.1 Development Context

All work has been undertaken as required by *Environmental Assessment Act*, RSO (1990) and regulations made under the Act, and are therefore subject to all associated legislation. This project is being conducted under Schedule 'B' of the Municipal Class Environmental Assessment process.

All activities carried out during this assessment were completed in accordance with the terms of the *Ontario Heritage Act* (2005) and the *Standards and Guidelines for Consultant Archaeologists* (MTC 2011).

Permission to access the study area and to carry out all activities necessary for the completion of the assessment was granted by the City of Hamilton on November 28, 2011.

1.2 Archaeological Context

This section provides background research pertaining to previous archaeological fieldwork conducted within and in the vicinity of the Ancaster Water Tower study area, its environmental characteristics (including drainage, soils or surficial geology and topography, etc.), and current land use and field conditions. Three sources of information were consulted to provide information about previous archaeological research in the study area; the site record forms for registered sites housed at the MTC; published and unpublished documentary sources; and the files of ASI.

The Stage 1 property inspection was conducted by Lisa Merritt (P094), ASI, on December 8, 2011. The study area falls within the Ancaster Business Park and includes four sites, which total approximately 10 ha (City of Hamilton 2010a). The 2010 City of Hamilton's land use plan for the Ancaster Business Park identifies the current designations of the four sites. Site 1 is designated as non-developable and utility lands, Site 2 as utility lands, Site 3 as institutional lands, and Site 4 as vacant land (City of Hamilton 2010b). Mapping of the developable lands within the Ancaster Business Park identified that conservation authority hazard lands exist with the Site 2 and Site 4 boundaries (City of Hamilton 2010c).

1.2.1 Previous Archaeological Research

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

According to the OASD (email communication, Robert von Bitter, MTC Data Coordinator, January 4, 2012), 26 identified archaeological sites are located within 1 km of the study area. Details of the registered sites are summarized in Table 1.

Table 1: List of previously registered within 1 km of the study area

Borden #	Site Name	Cultural Affiliation	Site Type	Researcher
AhHa-1	Bradt	Historic, Neutral, Iroquois	Village	John Bradt
AhHa-2	Bradt Ossuary	Neutral, Historic	Burial, Osuary	George Parkin
AhHa-4	Muskrat Pond	Historic, Iroquois, Neutral	Hamlet	Ian Kenyon, Arthur F. Howley
AhHa-19	Bradt 2	Historic, Neutral, Iroquois	Village	Ian Kenyon
AhHa-45	UG Kirkwall 20	Prehistoric, Neutral	Findspot	Mayer, Pihl, Poulton & Assoc. (MPP)
AhHa-46	UG Kirkwall 21	-	Findspot	MPP
AhHa-49	Shaver 1	Archaic	Campsite	Arthur Howley
AhHa-64	Mist	Undetermined	Campsite	MPP

Borden #	Site Name	Cultural Affiliation	Site Type	Researcher
AhHa-87	Big Clearing	Early-Middle Woodland, Princess Point	Findspot	Paul A. Lennox
AhHa-103	Muskrat Creek	Archaic	Campsite	MPP
AhHa-105	Val	Early Archaic	Findspot	MPP
AhHa-106	Sarah	Early Archaic	Findspot	MPP
AhHa-107	Muskrat Hill	-	Findspot	MPP
AhHa-111	Muskrat Gulch	Archaic	Findspot	MPP
AhHa-126	Shaver Sawmill	Euro-Canadian	Scatter	MPP
AhHa-164	Blue Skies West	Late Archaic, Small Point	Undetermined	Gary Warrick, MTO
AhHa-165	Blue Skies	Undetermined	Undetermined	Gary Warrick, MTO
AhHa-208	-	Pre-Contact	Lithic scatter	ASI
AhHa-209	**-**	**Pre-Contact**	**Campsite, Lithic scatter**	**ASI**
AhHa-227	Trustwood 1	Late Archaic, Lamoka	Campsite	Philip Woodley
AhHa-228	-	Middle Archaic	Findspot	Philip Woodley
AhHa-229	Trustwood 2	Late Woodland, Iroquoian	Lithic scatter, Ceramic scatter	Philip Woodley
AhHa-230	-	Early Archaic, Pre-Contact	Findspot	Paul O'Neal
AhHa-231	-	Pre-Contact	Lithic scatter	Paul O'Neal
AhHa-232	-	Pre-Contact, Early Archaic	Findspot	Paul O-Neal
AhHa-233	-	Pre-Contact	Lithic scatter	Paul O'Neal

* Sites in bold are located in the immediate vicinity of the Ancaster Water Tower study area

AhHa-209 is located within 50 m of Site 1 of the study area. The AhHa-209 site is located at the southwest corn of Tradewind Drive and Cormorant Road. The site was a former bulldozed agricultural field in close proximity to Big Creek and its tributaries. The site was determined to be a pre-contact lithic scatter, which yielded a total of 49 artifacts. ASI researched the site in 2006 and recommended further work if the site could not be protected from further disturbance.

1.2.2 Geography

In addition to the known archaeological sites, the state of the natural environment is an important predictor of archaeological potential. Accordingly, a description of the physiography and soils are briefly discussed for the study area.

Section 1.3.1 of the *S&G* stipulates that primary water sources (lakes, rivers, streams, creeks, etc.), secondary water sources (intermittent streams and creeks, springs, marshes, swamps, etc.), ancient water sources (glacial lake shorelines indicated by the presence of raised sand or gravel beach ridges, relic river or stream channels indicated by clear dip or swale in the topography, shorelines of drained lakes or marshes, cobble beaches, etc.), as well as accessible or inaccessible shorelines (high bluffs, swamp or marsh fields by the edge of a lake, sandbars stretching into marsh, etc.) are characteristics that indicate archaeological potential.

Water has been identified as the major determinant of site selection and the presence of potable water is the single most important resource necessary for any extended human occupation or settlement. Since water sources have remained relatively stable in Ontario after the Pleistocene era, proximity to water can be regarded as a useful index for the evaluation of archaeological site

potential. Indeed, distance from water has been one of the most commonly used variables for predictive modeling of site location.

Section 1.3.1 of the *S&G* also lists other geographic characteristics that can indicate archaeological potential including: elevated topography (eskers, drumlins, large knolls, plateaux), pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground, distinctive land formations that might have been special or spiritual places, such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases. There may be physical indicators of their use, such as burials, structures, offerings, rock paintings or carvings. Resource areas, including; food or medicinal plants (migratory routes, spawning areas) are also considered characteristics that indicate archaeological potential.

The study area is situated in the Norfolk Sand Plain and Haldimand Clay Plain physiographic regions of southern Ontario. The Norfolk Sand Plain is a wedge shaped plain with a broad, curved based along the shore of Lake Erie that tapers northward to a point at Brantford on the Grand River (Chapman and Putnam 1984:153). The sands and silts of this region were deposited as a delta in glacial Lakes Whittlesey and Warren (Chapman and Putnam 1984:145). The drainage is through small rivers flowing to Lake Erie, with the exception of a small area in the northern limits of the region where the rivers act as a tributary to the Grand River.

The Haldimand Clay Plain is located between the Niagara Escarpment and Lake Erie. It occupies all of the Niagara Peninsula except the fruit belt below the escarpment, and has an area of about 1,350 square 3,496 kilometres (Chapman and Putnam 1984:156). The Haldimand clay plain can be described as falling into a series of parallel belts which direct the drainage of the region eastward in parallel streams. In general, the soils of this region have a heavy texture and poor drainage but irregular areas of better-drained soils do exist.

Soils in the study area consist of Brantford silt loam, Grimsby sandy loam, and Alberton silt loam (Presant, Wicklund, and Matthews 1965). Brantford soils developed on well drained locations on lacustrine deposits of silt clay loam and silty clay. These soils are extensively distributed throughout the southwestern part of Wentworth County and have exhibit moderately sloping topography. Brantford soils are ideally suited for many crops including forage crops, spring and fall grains, grain corn and canning crops (Presant, Wicklund, and Matthews 1965:38).

A small section of Grimsby sandy loam appears in the study area. Grimsby soils developed on well-drained medium and fine sandy loam and are of alluvial and lacustrine origin (Presant, Wicklund, and Matthews 1965:40). The topography of this soil group is gently to moderately sloping. In terms of agriculture, Grimsby soils can support general crops such as forages, grain corn, spring grains and fall wheat. Grimsby soils can also support specialized crops such as sweet corn, tomatoes, strawberries, and to a lesser extent, fruit trees. This soil group is susceptible to erosion and droughtiness.

Alberton soils are present in parts of the study area. Alberton soils include alluvial silt loam and silty loam sediments of variable drainage, which have been deposited into most of the stream valleys of Ancaster, Glanford and Binbrook. Alberton soils are fairly recent and were most likely laid down during flood periods, when erosion processes are active. Alberton soils are imperfectly drained and are subject to periodic flooding since they mostly occur in valleys. Given its imperfect drainage and periodic flooding, Alberton soils are not generally used for agriculture although they are sometimes used to grow corn.

Surficial geology information for the study area is mapped and presented in Figure 2. Soil drainage information is mapped and presented in Figure 3.

The study area falls within the Big Creek watershed (City of Hamilton.2005). Numerous unnamed streams and creeks run through the study area.

1.3 Historical Context

This section provides a brief summary of historic research for the study area. A review of available primary and secondary source material was undertaken to produce a contextual overview, including a general description of settlement and historic land use. Historically, the study area is located in Concession III, Lots 33, 34 and Concession IV, Lots 32-34 in the former township of Ancaster, Wentworth County.

1.3.1 Contact Period

The first record of a European visit to southern Ontario was made in 1615 by Samuel de Champlain, who reported that a group of Iroquoian-speaking people situated between the New York Iroquois and the Huron were at peace and remained "la nation neutre". In subsequent years the French visited and traded among the Neutral, but the first documented visit was not until 1626, when the Recollet missionary Joseph de la Roche Daillon recorded his visit to the villages of the Attiwandaron, whose name in the Huron language meant "those who speak a slightly different tongue" (the Neutral apparently referred to the Huron by the same term). Like the Huron, Petun and New York Iroquois, the Neutral people were settled village horticulturalists. The Neutral territory included discrete settlement clusters in the lower Grand River, Fairchild-Big Creek, Upper Twenty Mile Creek, Spencer-Bronte Creek drainages, Milton, Grimsby, Eastern Niagara Escarpment and Onondaga Escarpment areas.

Between 1647 and 1651, the villages of the Neutral were destroyed by the New York Iroquois, who subsequently settled along strategic trade routes on the north shore of Lake Ontario for a brief period during the late 17th-century. One French explorer who is known to have entered the Burlington Bay area during this period was Rene-Robert Cavalier de La Salle, who left Montreal with a flotilla of nine canoes and eventually reached the head of Lake Ontario in September of 1669. After landing, de La Salle's group travelled to the Seneca village of Tinaouataoua, the exact location of which is open to speculation (ASI 2004:13-14) , and his explorations in the area may have utilized the Humber Trail (MPP 1986:42)

During the late 17th and early 18th centuries, the former Neutral territory came to be occupied by the Mississauga, an Algonquian-speaking southeastern Ojibwa people whose subsistence economy was based on garden farming, as well as hunting, fishing and gathering wild plants. The Mississauga and other Ojibwa groups began expanding southward from their homelands in the upper Great Lakes in the late 17th century, coming into occasional conflict with the New York Iroquois who had established themselves in southern Ontario (although alliances between the two groups were occasionally established as well). The colonial government recognized the Mississauga as the "owners" of the north shore of Lake Ontario and entered into negotiations for additional tracts of land as the need arose to facilitate European settlement (ASI 2004:14).

1.3.2 Township Survey and Settlement

The land within Ancaster Township was acquired by the British from the Mississaugas in 1784. The first township survey was undertaken in 1793, and the first legal settlers occupied their land holdings two years later. The township is said to have been named after a town in Lincolnshire, England. Ancaster was initially settled by disbanded soldiers, mainly Butler's Rangers, and other Loyalists following the end of the American Revolutionary War. In 1805, Boulton noted that this township contained both excellent and indifferent soils. By the 1840s, the township was noted for its fine farms (Boulton 1805:79; Smith 1846:6; Armstrong 1985:141; Rayburn 1997:11).

Ancaster was originally a "thriving" post office town that was situated on part Lots 44 and 45 in Concession 2, Ancaster Township. During the nineteenth century, several historic roadways converged here such as Sulphur Springs Road, the Old Dundas Road, the Mohawk Road and Wilson/Main Street (Highway 2). It was first settled by Jean Baptiste Rousseau and James Wilson in the late 1790s. Wilson built a mill, after which the settlement was known as "Wilson's Mills," but it was later known as "Rousseau's Mills" after Wilson was bought out by his partner. Around 1800, the village was named Ancaster after a place in Lincolnshire, England. In July 1814, Ancaster witnessed the treason trials which became known as the "Bloody Assizes." Registered plans of subdivision for this village exist from 1867. In 1875, the village contained the Town Hall, four churches, two cemeteries, three hotels, one school, one blacksmith shop, "an extensive knitting factory," iron foundry, carding and woollen mills, an agricultural implement factory, several stores and a telegraph office. The population was about 600 (Crossby 1873:19; Winearls 1991:598; Scott 1997:12; Rayburn 1997:11-12; Fischer and Harris 2007:148).

The study area is located in close proximity to Duff's Corner. Duff's Corner had its beginning is 1799 when William Vanderlip built a hotel on Lot 34, Concession III in Ancaster Township. When Mr. Vanderlip died in 1844 the hotel was sold to Adam Duff and the community that grew up around it became known as Duff's Corner (Mika and Mika.1977:584). It should be noted that sites 2 and 3 of the study area are located in close proximity to Duff's Corner.

1.3.3 Historic Map Review

The 1875 *Illustrated Historical Atlas of the Counties of Wentworth* was reviewed to determine the potential for the presence of historic archaeological resources within the study area during the nineteenth century (Figure 4). It should be noted, however, that not all features of interest were mapped systematically in the Ontario series of historical atlases, given that they were financed by subscription, and subscribers were given preference with regard to the level of detail provided on the maps. Moreover, not every feature of interest would have been within the scope of the atlases.

Historically, the study area is located in Concession III, Lots 33, 34 and Concession IV, Lots 32-34 in the former township of Ancaster, Wentworth County. Table 2 provides a summary of historical land owners/tenants associated with the affected lots.

There are a number of historic features illustrated on the nineteenth century mapping. Farm houses, orchards and a blacksmith shop are all depicted in addition to the identified property owners and/or tenants. The historic mapping also demonstrates that Wilson Street West and Garner Road West are historically surveyed roads. While not labelled on the 1875 map, it should be noted that the hotel owned by Adam Duff (built in 1799) was located in Concession III, Lot

34; adjacent to both Site 2 and 3 of the study area. As discussed in Section 1.3.2 of this report, the current community Duff's corner is named after Adam Duff and the community that grew up around the Duff hotel.

Table 2: Nineteenth century property owners/tenants

Con #	Lot #	Property Owner/Tenant	Historic Feature(s)
III	33	O.L. House, A. Bradshaw	Farmsteads (4), Orchards (2), Blacksmith Shop
	34	Duff Hrs.	Farmstead, Orchard
IV	32	N. Young	-
	33	F. Duffy	Farmstead, Orchard
	34	F. Bradshaw	Farmstead, Orchard

For the Euro-Canadian period, the majority of early nineteenth century farmsteads (i.e., those which are arguably the most potentially significant resources and whose locations are rarely recorded on nineteenth century maps) are likely to be captured by the basic proximity to the water model outlined in Section 1.2.2 of this report since these occupations were subject to similar environmental constraints.

Section 1.3.1 of the *S&G* stipulates that that areas of early Euro-Canadian settlement (pioneer homesteads, isolated cabins, farmstead complexes), early wharf or dock complexes, pioneer churches and early cemeteries, are considered to have archaeological potential. Early historical transportation routes (trails, passes, roads, railways, portage routes), properties listed on a municipal register or designated under the *Ontario Heritage Act* or a federal, provincial, or municipal historic landmark or site are also considered to have archaeological potential.

2.0 FIELD METHODS

A property inspection was conducted by Lisa Merritt (P094), ASI, on December 8, 2011 in order to gain first-hand knowledge of the geography, topography, and current conditions of the Ancaster Water Tower study area as per Section 1.2 of the *S&G*. A property inspection is a visual inspection only and does not include excavation or collection of archaeological resources.

Where applicable, Section 1.2, Standards 1-5 of the *S&G* were met as follows during the course of the property inspection:

- The Ancaster Water Tower study area was inspected systematically during optimal weather conditions which permitted good visibility of land features;
- Weather conditions were 2^{o}C, clear and sunny, with no snow or precipitation;
- Coverage was sufficient to identify previously identified features of archaeological potential and additional features not visible on mapping; and,
- Additional features were documented as well as any features that will affect assessment strategies.

The property inspection found that parts of the study area retained archaeological potential. Field observations are compiled onto a map of the study area in Section 7.0 (Figure 5) and associated photography is presented in Section 8.0 (Plates 1-15).

3.0 ANALYSIS AND CONCLUSIONS

The archaeological and historical context was analyzed to help determine the archaeological potential of the study area. A summary of the archaeological potential of the Ancaster Water Tower study area is presented in Section 3.1 of this report and an evaluation of the property inspection results is presented in Section 3.2.

3.1 Analysis of Archaeological Potential

Section 1.3.1 of the *S&G* lists characteristics that indicate where archaeological resources are most likely to be found, and archaeological potential is confirmed when one or more features of archaeological potential are present. Accordingly, the Ancaster Water Tower study area meets the following criteria used for determining archaeological potential:

- Previously known archaeological sites (e.g. Muskrat Pond *AhHa-4*)
- Water source: primary, secondary, or past water source (e.g. Unnamed streams)
- Pockets of well-drained sandy soil (e.g. Brantford silt loam)
- Early historical transportation routes (e.g. Wilson Street West)
- Areas of early Euro-Canadian settlement (e.g. farmsteads)
- Property that local histories or informants have identified with possible archaeological sites, historical events, activities, or occupations (Duff's Corner hotel)

These criteria characterize the study area as having potential for the identification of Aboriginal and Euro-Canadian archaeological resources.

3.2 Analysis of Property Inspection Results

As mentioned in Section 1.0 of this report, the goal of the project is to assess the impacts of adding a new elevated water storage tank at four separate sites in Ancaster. The study area includes four separate sites located at the Ancaster Business Park, located between Shaver and Trinity Church Roads, north and south of Wilson Street. The field results for each site location will be discussed separately below.

Part of the Ancaster Water Tower study area is comprised of a right-of-way (ROW). Typically, the ROW can be divided into two areas: the disturbed ROW, and ROW lands beyond the disturbed ROW. The typically disturbed ROW extends outwards from either side of the centerline of the traveled lanes, and it includes the traveled lanes and shoulders and extends to the toe of the fill slope, the top of the cut slope, or the outside edge of the drainage ditch, whichever is furthest from the centerline. Subsurface disturbance within these lands may be considered extreme and pervasive, thereby negating any archaeological potential for such lands.

ROW construction disturbance may be found to extend beyond the typical disturbed ROW area, and this generally includes additional grading, cutting and filling, additional drainage ditching, watercourse alteration or channelization, servicing, removals, intensive landscaping, and heavy construction traffic. Areas beyond the typically disturbed ROW generally require archaeological assessment in order to determine archaeological potential relative to the type or scale of

disturbances that may have occurred in these zones.

3.2.1 Site 1

Site 1 of the study area is located south of the intersection of Comorant Road and Osprey Drive. The site features two storm water retention ponds, road ways, and a Commercial Water Station (Plates 1, 3, 4, 5). Site 1 has been heavily disturbed by previous construction activities that have severely damaged the integrity of any archaeological resources. This determination is in accordance with Section 1.3.2 of the *S&G*, which states that survey is not required on om areas were archaeological potential has been removed by deep and extensive land alterations. Therefore, due to infrastructure development, Site 1 of the study area does not retain archaeological potential (Figure 5: areas marked in yellow).

3.2.2 Site 2

Site 2 of the study area is located north of Wilson Drive and west of Mason Drive. Site 2 is situated outside the Wilson Drive ROW on a lot that is currently used by the City of Ancaster as a works yard to store snow plough equipment. The topography of Site 2 is uneven with a low/wet area at the centre and raised knolls on both the north and south. Despite nearby disturbances, Site 2 retains archaeological potential due to the presence of relatively undisturbed knolls in an otherwise low/wet area (Figure 5: areas marked in green; Plates 6-8). This determination is made in accordance with Section 1.3.1 of the *S&G*, which states that areas with elevated topography are indicators of archaeological potential.

3.2.3 Site 3

Site 3 of the study area is located south of Sandhill Drive near the intersection of Garner Road and Wilson Drive. The site features a building, roads, parking lots, and a landscaped lawn (Plates 9-11). Site 3 has been heavily disturbed by previous construction activity that has severely damaged the integrity of any archaeological resources that may have been present (Figure 5: area marked in yellow). Site 3 does not retain archaeological potential and does not require further work. Therefore, due to previous construction activity, Site 3 of the study area does not retain archaeological potential.

3.2.4 Site 4

Site 4 of the study area is located north of Comorant Road and is bordered by agricultural fields on the east. Extensive infrastructure development and grading of the site in preparation for future development within the Ancaster Business Park has disturbed the entire area (Plates 12-15). These disturbances have deeply impacted the site and have damaged the integrity of any archaeological resources (Figure 5: areas marked in yellow).

3.3 Conclusions

The Stage 1 Archaeological Assessment was conducted to assist with the Ancaster Water Tower EA. The assessment determined that 26 archaeological sites have been registered within 1 km of the study area. A review of the geography of the study area suggested that the study area has potential for the identification of Aboriginal and Euro-Canadian archaeological resources. The property inspection determined that while the majority of the Ancaster Water Tower study area does not retain archaeological potential due to previous construction activity, sections within Site 2 of the study area retain archaeological potential.

4.0 RECOMMENDATIONS

In light of the results of the background research and property inspection undertaken for the Stage 1 Archaeological Assessment of the Ancaster Water Tower study area, ASI makes the following recommendations:

1. Archaeological potential exists in Site 2 of the study area (Figure 5 areas marked in green). These lands will require a Stage 2 Property Assessment, which will be conducted by test pit survey. A test pit survey will include the systematic excavation of small test pits by hand at 5 m intervals and must be conducted as ploughing in not feasible in this area;

2. Due to extensive and deep land alterations that have severely damaged the integrity of any potential archaeological resources, Sites 1, 3, and 4 of study do not require further archaeological assessment (Figure 5: areas marked in yellow); and,

3. Should the proposed work extend beyond the current Ancaster Water Tower study area then further Stage 1 assessment must be conducted to determine the archaeological potential of the surrounding lands.

Notwithstanding the results and recommendations presented in this study, Archaeological Services Inc. notes that no archaeological assessment, no matter how thorough or carefully completed, can necessarily predict, account for, or identify every form of isolated or deeply buried archaeological deposit. In the event that archaeological remains are found during subsequent construction activities, the consultant archaeologist, approval authority, and the Cultural Programs Unit of the Ministry of Tourism and Culture should be immediately notified.

5.0 ADVICE ON COMPLIANCE WITH LEGISLATION

ASI advises compliance with the following legislation:

- This report is submitted to the Minister of Tourism and Culture as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, 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 and Culture, 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;

- 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 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 Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

- Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with sec. 48 (1) of the *Ontario Heritage Act*; and

- The *Cemeteries Act*, 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.

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7.0 MAPS

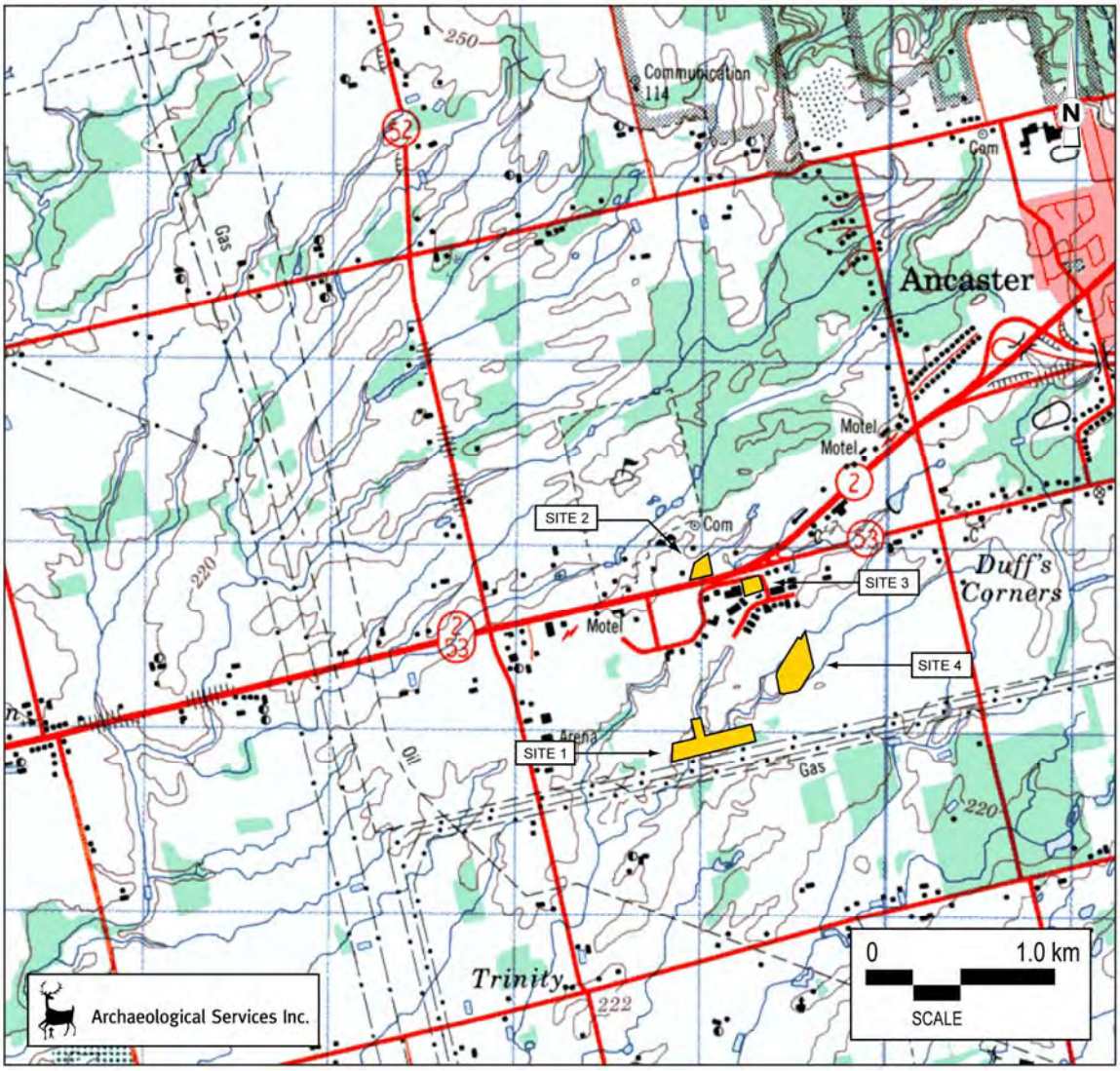


Figure 1: Location of the study area

Base Map: NTS Sheet 40 P/01 (Brantford)

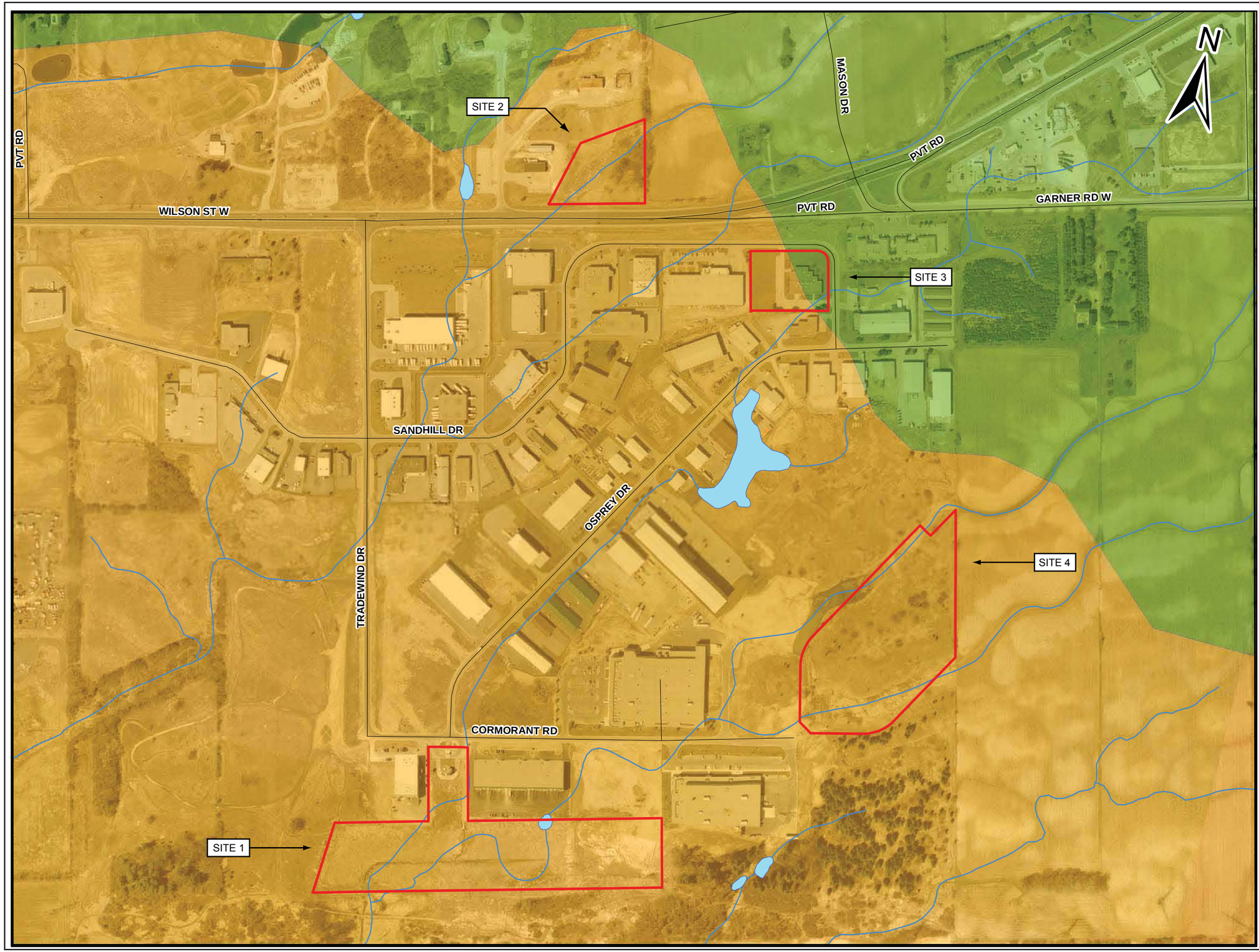
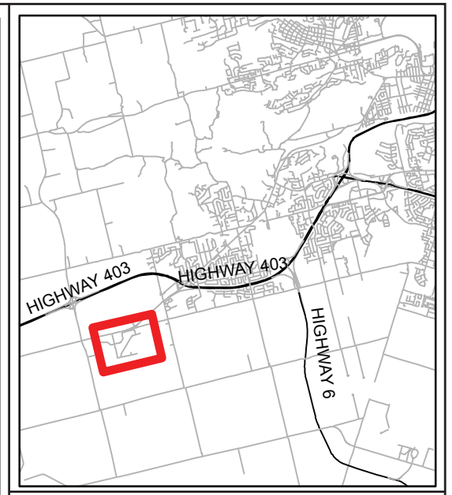


Figure 2: Surficial Geology in the Study Area



LEGEND

Study Area

SOIL DRAINAGE

Imperfectly

Well

BASE: Guelph Geomatics Services, Ontario Ministry of Agriculture and AgriFood

0 250

Meters

ASI PROJECT NO.: 11EA-282
DATE: Jan 5, 2012

DRAWN BY: JF
FILE: 11EA282_drain

Archaeological Services Inc.
528 Bathurst St.
Toronto, Ontario
Canada, M5S 2P9
T 416-966-1069
F 416-966-9723
info@iASI.to/www.iAS±.to

Figure 3: Soil Drainage in the Study Area

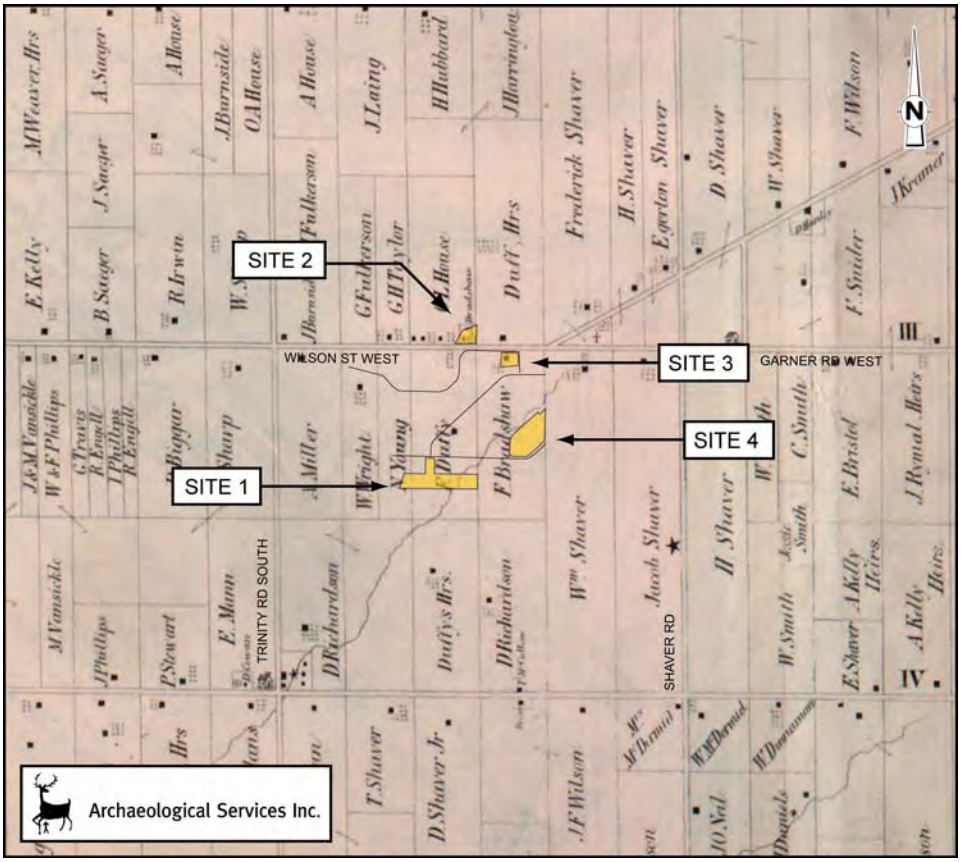


Figure 4: The study area overlaid on the 1875 map of the Township of Ancaster
Base Map: Illustrated Historical Atlas of Wentworth County (Page & Smith 1875)

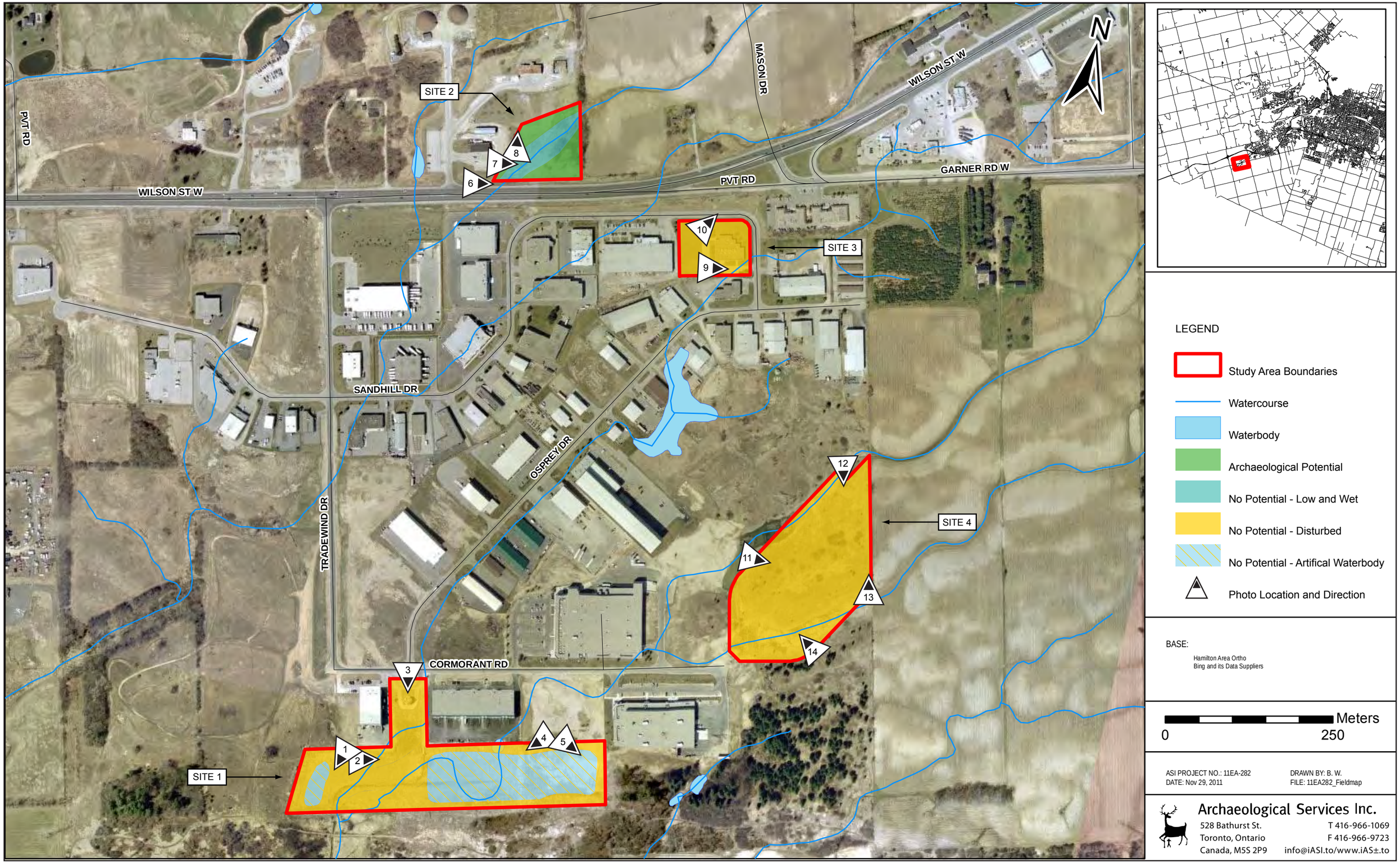


Figure 5: Ancaster Water Tower - Results of Stage 1 Archaeological Assessment

8.0 IMAGES

8.1 Ancaster Water Tower: Site 1

Plate 1: South-southwest view of stormwater management pond. All disturbed and no potential.

Plate 2: East-northeast view of road and storm water management area. Disturbed and no potential.

Plate 3: South-southeast view of Commercial Water Station. Area is paved and disturbed. No potential.

Plate 4: Southwest view of stormwater management pond. All disturbed and no potential.

Plate 5: East-southeast view of stormwater rmanagement pond. All disturbed and no potential.

8.2 Ancaster Water Tower: Site 2

Plate 6: East-northeast view of study area. ROW is disturbed and has no potential. Potential in study area beyond ROW.

Plate 7: East-northeast view of study area. Foreground and knoll in distance have potential. Low and wet section in middle with no potential.

Plate 8: North view of study area. Low and wet on right. Potential in raised, level areas.

8.3 Ancaster Water Tower: Site 3

Plate 9: East-northeast view of study area. All disturbed and no potential.

Plate 10: North-northeast view of study area. Paving, utilities, and extensive landscaping. No potential.

8.4 Ancaster Water Tower: Site 4

Plate 11: East view of study area. All disturbed and no potential.

Plate 12: South-southeast view of study area. New road – area paved and disturbed. No potential.

Plate 13: North-northeast view of the study area. Utilities and disturbance from road construction on left. Potential in field beyond study area on right.

Plate 14: West-northwest view across new road. No potential due to recent road construction and utility installation.

ORIGINAL

Stage 1 Archaeological Assessment
Background Study and Property Inspection

Ancaster Water Towers (Six Sites)
Class Environmental Assessment Study

Former Township of Ancaster, Wentworth County
City of Hamilton, Ontario

Prepared for:

City of Hamilton
77 James Street North, Suite 320
Hamilton, Ontario, L8R 2K3
Tel: 905-546-2424
Fax: 905-546-4491
Winston.wang@hamilton.ca
www.hamilton.ca

Archaeological Licence P094 (Lisa Merritt)
MTCS PIF P094-144-2012
ASI File 12EA-091

June 29, 2012

Archaeological Services Inc.
528 Bathurst St.
Toronto, Ontario
Canada, M5S 2P9
T 416-966-1069
F 416-966-9723
info@iASI.to/www.iASI.to

Stage 1 Archaeological Assessment
Background Study and Property Inspection

Ancaster Water Towers (Six Sites)
Class Environmental Assessment Study

Former Township of Ancaster, Wentworth County
City of Hamilton, Ontario

EXECUTIVE SUMMARY

Archaeological Services Inc (ASI) was contracted by the City of Hamilton to conduct a Stage 1 Archaeological Assessment as part of the Ancaster Water Towers Municipal Class Environmental Assessment (EA). The goal of the project is to assess the impacts of adding a new elevated water storage tank at six separate sites in the Ancaster area.

The Stage 1 background study determined that 204 archaeological sites have been registered within 1 km of the study area. A review of the geography and history of the area suggested that the study area has potential for the identification of Aboriginal and Euro-Canadian archaeological resources.

The Stage 1 property inspection found that parts of the Ancaster Water Towers study area do not retain archaeological potential due to previous disturbances, low and wet conditions, and steeply sloped lands. The property inspection also found that parts of the study areas retained archaeological potential.

In light of these results, ASI makes the following recommendations:

1. Archaeological potential exists in the study area. These lands require a Stage 2 Archaeological Assessment, which will be conducted by pedestrian survey and/or test pit survey. A test pit survey includes the systematic excavation of small test pits by hand at 5 m intervals and can only be conducted when ploughing for pedestrian survey is not feasible;

2. Sites 2 and 6 of the study area have been previously assessed. These areas can be considered clear of archaeological concern and do not require further archaeological assessment;

3. Due to extensive and deep land alterations that have severely damaged the integrity of any potential archaeological resources, low/wet conditions, and steeply sloping lands the remainder of the study areas do not require further archaeological assessment; and,

4. Should the proposed work extend beyond the current study area then further Stage 1 assessment must be conducted to determine the archaeological potential of the surrounding lands.

ARCHAEOLOGICAL SERVICES INC.
ENVIRONMENTAL ASSESSMENT DIVISION

PROJECT PERSONNEL

Senior Project Manager and Project Director (licensee):	Lisa Merritt, MSc [MTCS license P094] *Senior Archaeologist, Assistant Manager, Environmental Assessment Division*
Project Manager	Heidy Schopf, MES *Research Archaeologist*
Project Coordinator:	Sarah Jagelewski, Hon. BA [MTCS license R405] *Staff Archaeologist*
Field Director:	Peter Carruthers, MA, CAHP [MTCS license P163] *Senior Associate*
Report Writer and Graphics:	Heidy Schopf
Graphics:	Shady Abbas, Hon. BSc *GIS Technician*
Report Reviewer:	Lisa Merritt

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1.0 PROJECT CONTEXT

Archaeological Services Inc (ASI) was contracted by the City of Hamilton to conduct a Stage 1 Archaeological Assessment as part of the Ancaster Water Towers Municipal Class Environmental Assessment (EA). The goal of the project is to assess the impacts of adding a new elevated water storage tank at six separate sites in Ancaster (Figure 1). The locations of the six sites include:

- Site 1: North of Jerseyville Road West and east of Martin Road
- Site 2: North of Garner Road West and west of Braithwaite Avenue
- Site 3: Part of 558 Fiddlers Green Road, between residential properties
- Site 4: Part of 44 Garner Road East, east of Fiddlers Green Road
- Site 5: North of Garner Road East, west of Southcote Road and south of Harmony Hall Drive
- Site 6: North of Garner Road East, in a field southeast of Fair Street

This assessment was conducted under the project management of Heidy Schopf and senior project management of Lisa Merritt, both of ASI; Ms. Merritt was also the licensee for the project (PIF P094-144-2012).

The objectives of this report are:

- To provide information about the geography, history, previous archaeological fieldwork and current land condition of the study area;
- To evaluate in detail the archaeological potential of the study area which can be used, if necessary, to support recommendations for Stage 2 Archaeological Assessment for all or parts of the property; and
- To recommend appropriate strategies for Stage 2 Archaeological Assessment, if necessary.

This report describes the Stage 1 assessment that was conducted for this project and is organized as follows: Section 1.0 describes the project context and summarizes the background study that was conducted to provide the archaeological and historical context for the project study area; Section 2.0 describes the field methods used during the assessment and summarizes the results of the property inspection; Section 3.0 provides an analysis of the assessment results and evaluates the archaeological potential of the study area; Section 4.0 provides recommendations for the next assessment steps; and the remaining sections contain other report information that is required by the Ministry of Tourism, Culture and Sport's (MTCS) *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011), e.g., advice on compliance with legislation, works cited, mapping and photo-documentation.

1.1 Development Context

All work has been undertaken as required by *Environmental Assessment Act*, RSO (1990) and regulations made under the Act, and are therefore subject to all associated legislation. This project is being conducted under Schedule B of the Municipal Class Environmental Assessment process. All activities carried out during this assessment were completed in accordance with the terms of the *Ontario Heritage Act* (2005) and the *Standards and Guidelines for Consultant Archaeologists (S&G)*.

Permission to carry out all activities necessary for the completion of the assessment was granted by the City of Hamilton on May 23, 2012.

1.2 Archaeological Context

This section provides background research pertaining to previous archaeological fieldwork conducted within and in the vicinity of the Ancaster Water Towers study area, its environmental characteristics (including drainage, soils or surficial geology and topography, etc.), and current land use and field conditions. Three sources of information were consulted to provide information about previous archaeological research in the study area; the site record forms for registered sites housed at the MTCS; published and unpublished documentary sources; and the files of ASI.

1.2.1 Current Land Use and Field Conditions

The Stage 1 property inspection was conducted by Peter Carruthers (P163) ASI, on May 31, 2012. The study area is comprised of six separate sites, of which each have a different land use. The current land use and field conditions of each site area summarized below.

- Site 1: Currently used as a park and includes baseball diamonds, parking, soccer fields, and an arena. Heavily landscaped except around the periphery of the site.

- Site 2: Currently used as a park and storm water management pond. The park land includes tennis courts, a baseball diamond and soccer fields. The stormwater management pond is surrounded by a forested area that is elevated and relatively level.

- Site 3: Currently in use as privately owned green space.

- Site 4: In use as an actively cultivated agricultural field.

- Site 5: Currently a natural area with shrubby low/wet areas and forested higher ground. This site supports a wide range of wildlife and plant species.

- Site 6: Currently an open/green space in the middle of a new subdivision. The site is surrounded by recent residential development and new road networks.

A property inspection consists of a visit to the subject property to gain first-hand knowledge of its geography, topography, and current condition, and to evaluate and map archaeological potential. It is a visual inspection only and does not include the excavation or collection of archaeological

resources. The Ancaster Water Towers property inspection was conducted in accordance with Section 1.2 of the *S&G*.

1.2.2 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 sites registered within the Borden system. Under the Borden system, Canada has been divided into grid blocks based on latitude and longitude. A Borden block is approximately 13 km east to west, and approximately 18.5 km north to south. Each Borden block is referenced by a four-letter designator, and sites within a block are numbered sequentially as they are found. The study area under review is located in Borden blocks *AhHa* and *AhGx*.

According to the OASD (email communication, Robert von Bitter, MTCS Data Coordinator, May 30, 2012), 204 identified archaeological sites are located within 1 km of the study area. Details of the sites located within 1 km of the study area are provided in Appendix A. A list of reports documenting previous work within 1 km of the study area is provided in Appendix B.

It should be noted that Sites 2 and 6 of the study area have been previously assessed by ASI. Site 2 was subject to Stage 1-3 archaeological assessment by ASI between 1995 and 1997. These assessments were conducted as part of a larger parcel for a subdivision development that took place in the area.

Site 6 of the study area was previously assessed by ASI in 2004 (2004a, 2004c). This work was conducted as part of a larger survey to assess lands that were to be impacted by the construction of a new subdivision.

Of the 204 known archaeological sites registered within 1 km of the six Ancaster Water Tower sites, four are located within 50 m or within the limits of Sites 2 and 6 of the study area. These sites are briefly discussed below.

AhGx-380 is located within the limits of Site 2 of the Ancaster Water Towers study area; 28 m north of Highway 53, and west of Fiddlers Green Road. The site was very close to the Ancaster Creek Headwaters and was situated on a plateau east of a steep slope that led down to a permanent wetland. The site consisted of a lithic scatter that dates to the Early Archaic period. A total of 26 artifacts were recovered during the archaeological assessment of the site. ASI researched this site in 1995 and 1997, respectively. No further work was recommended following the Stage 3 archaeological assessment (ASI 1997).

AhGx-546 is located within the limits of Site 6 of the Ancaster Water Towers study area, and both AhGx-547 and AhGx-548 are located within 50 m of Site 6. AhGx-546 is located 400 m north of Garner Road in a ploughed field. The site was a findspot that yielded one Meadowood point base and one chert flake. The site was researched in 2004 by ASI and no further work was recommended (2004a).

The Dusty Site (AhGx-547) is located with 50 m of Site 6 of the current study area; 485 m north of Garner Road and 520 m east of Fair Street. The site was adjacent to the Ancaster Creek/Tiffany Creek Headwater and several tributaries of Tiffany Creek flow across the area. The

site is a camp that dates between the Early Archaic and Late Woodland periods. A total of 4,977 artifacts were recovered during the Stage 3 and Stage 4 assessment of the site. ASI researched the site in 2004 and no further work was recommended (2004c).

AhGx-548 is located within 50 m of Site 6 of the Ancaster Water Towers study area; 435 north of Garner Road and 425 m east of Fair Street. The site consisted of a lithic scatter that yielded a total of 17 artifacts. ASI researched the site in 2004 and no further work was recommended (2004c).

1.2.3 Geography

In addition to the known archaeological sites, the state of the natural environment is an important predictor of archaeological potential. Accordingly, a description of the study area physiography and soils is provided below.

Section 1.3.1 of the *S&G* stipulates that primary water sources (lakes, rivers, streams, creeks, etc.), secondary water sources (intermittent streams and creeks, springs, marshes, swamps, etc.), ancient water sources (glacial lake shorelines indicated by the presence of raised sand or gravel beach ridges, relic river or stream channels indicated by clear dip or swale in the topography, shorelines of drained lakes or marshes, cobble beaches, etc.), as well as accessible or inaccessible shorelines (high bluffs, swamp or marsh fields by the edge of a lake, sandbars stretching into marsh, etc.) are characteristics that indicate archaeological potential.

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

Section 1.3.1 of the *S&G* also lists other geographic characteristics that can indicate archaeological potential including: elevated topography (eskers, drumlins, large knolls, plateaux), pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground, distinctive land formations that might have been special or spiritual places, such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases. Physical indicators of use may be present, such as burials, structures, offerings, rock paintings or carvings. Resource areas, including; food or medicinal plants (migratory routes, spawning areas) are also considered characteristics that indicate archaeological potential.

The study area is situated in the Norfolk Sand Plain and Haldimand Clay Plain physiographic regions of southern Ontario. The Norfolk Sand Plain is a wedge shaped plain with a broad, curved based along the shore of Lake Erie that tapers northward to a point at Brantford on the Grand River (Chapman and Putnam 1984:153). The sands and silts of this region were deposited as a delta in glacial Lakes Whittlesey and Warren (Chapman and Putnam 1984:145). The drainage is through small rivers flowing to Lake Erie, with the exception of a small area in the northern limits of the region where the rivers act as a tributary to the Grand River.

The Haldimand Clay Plain is located between the Niagara Escarpment and Lake Erie. It occupies all of the Niagara Peninsula except the fruit belt below the escarpment, and has an area of about

1,350 square 3,496 kilometres (Chapman and Putnam 1984:156). The Haldimand clay plain can be described as falling into a series of parallel belts which direct the drainage of the region eastward in parallel streams. In general, the soils of this region have a heavy texture and poor drainage but irregular areas of better-drained soils are present in some areas.

Soils in the study area consist of Grimsby sandy loam – Brant silt loam soil complex, Springvale sandy loam, Brant silt loam, and Beverly silt loam (Presant, Wicklund, and Matthews 1965). The Grimsby – Brant complex is generally located westward from the Ancaster and Springvale soils at the head of the Dundas Valley. The topography of this soil complex is steeply sloping near the Dundas Valley but gently sloping on the Flamborough Plain (Presant, Wicklund, and Matthews 1965: 46). Common crops for this soil include forage crops, small grain crops, fruit trees, field corn and canning crops. This complex can be droughty at times and is susceptible to erosion.

Springvale sandy loam is comprised of well-drained sandy soils and generally has 12-36 inches of sand overlying coarse gravel (Presant, Wicklund, and Matthews 1965:41). Springvale soils usually occur on plateau-like areas of level to gently sloping topography. This soil group is used extensively for potato production and also for growing fruit trees, corn, small grains, and forages.

Beverly silt loam is an imperfectly drained soil that developed on level to very gently sloping areas of lacustrine silty clay loam and silty loam in southwestern Wentworth County (Presant, Wicklund, and Matthews 1965:39). Beverly soils are used for the production of forage crops, spring and fall grains, grain corn, and canning crops.

Brant soils are well-drained soils that developed on lacustrine silt loams and fine sandy loams in Ancaster Township near the Dundas Valley (Presant, Wicklund, Matthews 1965: 37). Brant soils have a high agricultural value for growing common forage and row crops. This soil also supports specialized crops such as grain corn, sweet corn, and strawberries. Brant soils have good drainage but erode easily.

Surficial geology information for the study area is mapped and presented in Figure 2. Soil drainage information is mapped and presented in Figure 3.

The study area falls within the Ancaster Creek subwatershed, which is 13.7 km^2 and is comprised of six catchment basins (Hamilton Conservation Authority 2008). The headwaters of the Ancaster Creek subwatershed originate south of the Ancaster Village and flow north towards Cootes Paradise. The Ancaster Creek is a cold water system with over 34 km of streams. Other water sources in close proximity to the study area include Sulpher Creek, Tiffany Creek, and the Mineral Springs.

Background research indicates that all six sites feature indicators of archaeological potential, particularly considering the high number of registered sites in the study area and the documented use of the area by aboriginal groups for over 10,000 years.

1.3 Historical Context

This section provides a brief summary of historic research for the study area. A review of available primary and secondary source material was undertaken to produce a contextual overview, including a general description of settlement and historic land-use. Historically, the

study area is located the former township of Ancaster, Wentworth County in the following lots and concessions:

- Site 1: Concession 2, Lots 38 and 39
- Site 2: Concession 3, Lot 41
- Site 3: Concession 4, Lot 42
- Site 4: Concession 4, Lot 43
- Site 5: Concession 3, Lot 47
- Site 6: Concession 3, Lot 52

1.3.1 Contact Period

The first record of a European visit to southern Ontario was made in 1615 by Samuel de Champlain, who reported that a group of Iroquoian-speaking people situated between the New York Iroquois and the Huron were at peace and remained "la nation neutre". In subsequent years the French visited and traded among the Neutral, but the first documented visit was not until 1626, when the Recollet missionary Joseph de la Roche Daillon recorded his visit to the villages of the Attiwandaron, whose name in the Huron language meant "those who speak a slightly different tongue" (the Neutral apparently referred to the Huron by the same term). Like the Huron, Petun and New York Iroquois, the Neutral people were settled village horticulturalists. The Neutral territory included discrete settlement clusters in the lower Grand River, Fairchild-Big Creek, Upper Twenty Mile Creek, Spencer-Bronte Creek drainages, Milton, Grimsby, Eastern Niagara Escarpment and Onondaga Escarpment areas.

Between 1647 and 1651, the villages of the Neutral were destroyed by the New York Iroquois, who subsequently settled along strategic trade routes on the north shore of Lake Ontario for a brief period during the late 17th-century. One French explorer who is known to have entered the Burlington Bay area during this period was Rene-Robert Cavalier de La Salle, who left Montreal with a flotilla of nine canoes and eventually reached the head of Lake Ontario in September of 1669. After landing, de La Salle's group travelled to the Seneca village of Tinaouataoua, the exact location of which is open to speculation (ASI 2004:13-14), and his explorations in the area may have utilized the Humber Trail (MPP 1986:42)

During the late 17th and early 18th centuries, the former Neutral territory came to be occupied by the Mississauga, an Algonquian-speaking southeastern Ojibwa people whose subsistence economy was based on garden farming, as well as hunting, fishing and gathering wild plants. The Mississauga and other Ojibwa groups began expanding southward from their homelands in the upper Great Lakes in the late 17th century, coming into occasional conflict with the New York Iroquois who had established themselves in southern Ontario (although alliances between the two groups were occasionally established as well). The colonial government recognized the Mississauga as the "owners" of the north shore of Lake Ontario and entered into negotiations for additional tracts of land as the need arose to facilitate European settlement (ASI 2004:14).

1.3.2 Township Survey and Settlement

The land within Ancaster Township was acquired by the British from the Mississaugas in 1784. The first township survey was undertaken in 1793, and the first legal settlers occupied their land holdings two years later. The township is said to have been named after a town in Lincolnshire, England. Ancaster was initially settled by disbanded soldiers, mainly Butler's Rangers, and other Loyalists following the end of the American Revolutionary War. In 1805, Boulton noted that this township contained both excellent and indifferent soils. By the 1840s, the township was noted for its fine farms (Boulton 1805:79; Smith 1846:6; Armstrong 1985:141; Rayburn 1997:11).

Ancaster was originally a "thriving" post office town that was situated on part of Lots 44 and 45 in Concession 2, Ancaster Township. During the nineteenth century, several historic roadways converged here such as Sulphur Springs Road, the Old Dundas Road, the Mohawk Road and Wilson/Main Street (Highway 2). It was first settled by Jean Baptiste Rousseau and James Wilson in the late 1790s. Wilson built a mill, after which the settlement was known as "Wilson's Mills," but it was later known as "Rousseau's Mills" after Wilson was bought out by his partner. Around 1800, the village was named Ancaster after a place in Lincolnshire, England.

Registered plans of subdivision for this village exist from 1867. By 1875, the village contained the Town Hall, four churches, two cemeteries, three hotels, one school, one blacksmith shop, "an extensive knitting factory," iron foundry, carding and woollen mills, an agricultural implement factory, several stores and a telegraph office. The population was about 600 (Crossby 1873:19; Winearls 1991:598; Scott 1997:12; Rayburn 1997:11-12; Fischer and Harris 2007:148).

One of the sites is in close proximity to Garner's Corners, which is a small historic settlement. The Garner's Corner cemetery dates to the 1830s when a deed written on a sheepskin parchment was drawn up between Israel Dawdy and the Canadian Wesleyan Methodists for a plot of land at the northwest corner of present day Southcote and Garner Roads (City of Hamilton 2005b). By the 1840s the church was owned by a group of New Connexion Methodists, who renamed it the Zion Methodist. The first burial in the cemetery took place in 1842 for a woman named Chirsteen Jarvis. The church closed in 1889 and its lumber was used by Leonard Black, who re-used the materials to build a barn. The cemetery is still in use by the City of Hamilton.

1.3.3 Historic Map Review

The 1875 *Illustrated Historical Atlas of the County of Wentworth* was reviewed to determine the potential for the presence of historic archaeological resources within the study area during the nineteenth century (Figure 4). It should be noted, however, that not all features of interest were mapped systematically in the Ontario series of historical atlases, given that they were financed by subscription, and subscribers were given preference with regard to the level of detail provided on the maps. Moreover, not every feature of interest would have been within the scope of the atlases.

Historically, the study area is located in the former Township of Ancaster, Wentworth County. Details of property owners and historic features found in the study area are listed in Table 2.

Table 1: Nineteenth century property owners/tenants

Site	Con #	Lot #	Property Owner/Tenant	Historic Feature(s)
1	II	38	R. Heslop	Orchard
		39	Jno. Heslop	Farmstead, Orchard
2,5,6	III	41	J. SmitH	Farmstead, Orchard
		47	S, Olmstead	Farmstead, Orchards (3), Church, Cemetery
		52	Lampman Heris	Farmstead, Orchard
3	IV	42	Albert Smith	Farmstead, Orchard
4		43	Jas. Smith, G. Clink	Farmsteads (3), Orchard, Blacksmith shop

The 1875 map demonstrates that Martin Road, Jerseyville Road, Wilson Street, Garner Road, Fiddlers Green Road, Southcote Road, and Glancaster Road are all historically surveyed roads. The map also demonstrates that a number of historic features are located within or in close proximity to the six study area locations. Most notably, a farmstead and orchard were located within the limits of Site 2, and Sites 3 and 4 are both adjacent to farmsteads, orchards, and other historic features. A church and cemetery were located approximately 200 m southeast of Site 5.

For the Euro-Canadian period, the majority of early nineteenth century farmsteads (i.e., those which are arguably the most potentially significant resources and whose locations are rarely recorded on nineteenth century maps) are likely to be captured by the basic proximity to the water model outlined in Section 1.2.2 of this report since these occupations were subject to similar environmental constraints.

Section 1.3.1 of the *S&G* stipulates that areas of early Euro-Canadian settlement (pioneer homesteads, isolated cabins, farmstead complexes), early wharf or dock complexes, pioneer churches and early cemeteries, are considered to have archaeological potential. Early historical transportation routes (trails, passes, roads, railways, portage routes), properties listed on a municipal register or designated under the *Ontario Heritage Act* or a federal, provincial, or municipal historic landmark or site are also considered to have archaeological potential.

Given the evidence of intensive use by aboriginal peoples since at least the contact period and the early settlement of the area by Euro-Canadian peoples, particularly in the area of Garner's corners, the project area lands have the potential for both prehistoric and historic resources.

2.0 FIELD METHODS

A property inspection was conducted in order to gain first-hand knowledge of the geography, topography, and current conditions of the Ancaster Water Towers study area as per Section 1.2 of the *S&G*. A property inspection is a visual inspection only and does not include excavation or collection of archaeological resources.

Where applicable, Section 1.2, Standards 1-5 of the *S&G* were met as follows during the course of the property inspection:

- The Ancaster Water Towers study area was inspected systematically during optimal weather conditions which permitted good visibility of land features;
- Weather conditions were overcast and 21°C with a mix of sun and cloud;
- Coverage was sufficient to identify previously identified features of archaeological potential and additional features not visible on mapping; and,
- Additional features were documented as well as any features that will affect assessment strategies.

Field observations are compiled onto a map of the study area in Section 7.0 (Figures 5-10) and associated photography is presented in Section 8.0 (Plates 1-17).

3.0 ANALYSIS AND CONCLUSIONS

The archaeological and historical context was analyzed to help determine the archaeological potential of the study area. A summary of the archaeological potential of the Ancaster Water Towers study area is presented in Section 3.1 of this report and an evaluation of the property inspection results is presented in Section 3.2.

3.1 Analysis of Archaeological Potential

Section 1.3.1 of the *S&G* lists characteristics that indicate where archaeological resources are most likely to be found, and archaeological potential is confirmed when one or more features of archaeological potential are present. Accordingly, the Ancaster Water Towers study area meets the following criteria used for determining archaeological potential:

- Previously known archaeological sites (e.g. Palmer *AlGs-442*)
- Water source: primary, secondary, or past water source (e.g. Ancaster Creek)
- Pockets of well-drained sandy soil (e.g. Springvale sandy loam)
- Areas of Early-Canadian settlement (e.g. farmsteads)
- Early historical transportation routes (e.g. Garner Road)

These criteria characterize the study area as having potential for the identification of Aboriginal and Euro-Canadian archaeological resources.

3.2 Analysis of Property Inspection Results

As mentioned in Section 1.0 of this report, the goal of this project is to assess the impacts of adding a new elevated water storage tank at six separate sites in Ancaster, Ontario. The field results for each site are discussed separately below, in sections 3.2.1-3.2.6 of this report.

Parts of the study area are comprised of a right-of-way (ROW). Typically, the ROW can be divided into two areas: the disturbed ROW, and ROW lands beyond the disturbed ROW. The typically disturbed ROW extends outwards from either side of the centerline of the traveled lanes, and it includes the traveled lanes and shoulders and extends to the toe of the fill slope, the top of the cut slope, or the outside edge of the drainage ditch, whichever is furthest from the centerline. Subsurface disturbance within these lands may be considered extreme and pervasive, thereby negating any archaeological potential for such lands.

ROW construction disturbance may be found to extend beyond the typical disturbed ROW area, and this generally includes additional grading, cutting and filling, additional drainage ditching, watercourse alteration or channelization, servicing, removals, intensive landscaping, and heavy construction traffic. Areas beyond the typically disturbed ROW generally require archaeological assessment in order to determine archaeological potential relative to the type or scale of disturbances that may have occurred in these zones.

3.2.1 Site 1

Site 1 of the study area is located north of Jerseyville Road West and east of Martin Road. The site features paved pathways, parking lots, baseball diamonds, recreation facility buildings and infrastructure. The majority of Site 1 has been heavily disturbed by previous construction activities and extensive landscaping that has severely damaged the integrity of any archaeological resources (Plates 1-6). Therefore, due to previous construction activities and low/wet conditions, the majority of Site 1 does not retain archaeological potential (Figure 5: areas marked in yellow).

Several sections of Site 1 appear relatively undisturbed and, therefore, retain archaeological potential (Plate 3). These lands will require further archaeological assessment should they be impacted by the proposed work (Figure 5: areas marked in green).

3.2.2 Site 2

Site 2 of the study area is located north of Garner Road West and west of Braithwaite Avenue. Part of the area is currently used as a park that features baseball diamonds, parking spaces, tennis courts, a soccer field, and paved pathways. Part of the site is also comprised of a storm water detention pond, sloped lands, and wooded areas.

The lands included in Site 2 of the Ancaster Water Towers study area were previously assessed by ASI in 1995 and 1997 (Figure 6: areas marked in black hatching; Plates 7 and 8). Accordingly, Site 2 of the study area can be considered clear of archaeological potential as per the recommendations in these two reports.

3.2.3 Site 3

Site 3 of the study area is located west of Fiddler's Green Road in an open green space between two houses. The site consists of relatively open green space and is surrounded by a series of berms. Site 3 of the study area retains archaeological potential and will require further archaeological assessment should it be impacted by the proposed work. (Figure 7: areas marked in green; Plates 9 and 10).

3.2.4 Site 4

Site 4 of the study area is located east of Fiddler's Green Road in an actively cultivated agricultural field. Site 4 of the study area retains archaeological potential and will require further archaeological assessment should it be impacted by the proposed work (Figure 8: areas marked in green; Plate11).

3.2.5 Site 5

Site 5 of the study area is located north of Garner Road East and west of Southcote Road. This site is comprise of shrubby/forested wetland with numerous watercourses and elevated/forested lands. Archaeological potential is not retained in the low and wet areas of Site 5 (Figure 9: areas marked in blue; Plates 12, 13, and 15). This determination is made in accordance with Section 2.1, Section 2 of the *S&G*.

Parts of Site 5 are relatively undisturbed and retain archaeological potential. These areas occur in the elevated and flat portions of the site and will require further archaeological assessment should they be impacted by the proposed work (Figure 9: areas marked in green; Plate 14).

3.2.6 Site 6

Site 6 of the study area is located north of Garner Road East in the middle of a new residential subdivision. The study area is surrounded by recent residential development and a new road network that has deeply disturbed the landscape. The site features undulating topography with a series of seasonal watercourses and accompanying slopes.

The lands included in Site 6 of the Ancaster Water Towers study area were previously assessed by ASI (2004a, 2004c) (Figure 10: areas marked in black hatching; Plates 16 and 17). Accordingly, Site 6 of the study area can be considered clear of archaeological potential as per the recommendations in these two reports.

3.3 Conclusions

The Stage 1 Archaeological Assessment was conducted to assist with the Ancaster Water Towers Class EA. The assessment determined that 204 archaeological sites have been registered within 1 km of the study area. A review of the geography and history of the study area suggested that the study area has potential for the identification of Aboriginal and Euro-Canadian archaeological

resources. The property inspection determined that parts of the Ancaster Water Towers study area do not retain archaeological potential due to previous disturbances, low and wet conditions, and steeply sloped lands. The property inspection also found that parts of the study areas retained archaeological potential.

4.0 RECOMMENDATIONS

In light of the results of the background research and property inspection undertaken for the Stage 1 Archaeological Assessment of the Ancaster Water Towers Class EA, ASI makes the following recommendations:

1. Archaeological potential exists in the study area (Figures 5, 7-9: areas marked in green). These lands require a Stage 2 Archaeological Assessment, which will be conducted by pedestrian survey and/or test pit survey. A test pit survey includes the systematic excavation of small test pits by hand at 5 m intervals and can only be conducted when ploughing for pedestrian survey is not feasible;

2. Sites 2 and 6 of the study area have been previously assessed (Figures 6 and 10: areas marked in black hatching). These areas can be considered clear of archaeological concern and do not require further archaeological assessment;

3. Due to extensive and deep land alterations that have severely damaged the integrity of any potential archaeological resources, low/wet conditions, and steeply sloping lands the remainder of the study areas do not require further archaeological assessment (Figure 8: areas marked in yellow, blue, orange); and,

4. Should the proposed work extend beyond the current study area then further Stage 1 assessment must be conducted to determine the archaeological potential of the surrounding lands.

Notwithstanding the results and recommendations presented in this study, Archaeological Services Inc. notes that no archaeological assessment, no matter how thorough or carefully completed, can necessarily predict, account for, or identify every form of isolated or deeply buried archaeological deposit. In the event that archaeological remains are found during subsequent construction activities, the consultant archaeologist, approval authority, and the Cultural Programs Unit of the Ministry of Tourism, Culture and Sport should be immediately notified.

5.0 ADVICE ON COMPLIANCE WITH LEGISLATION

ASI advises compliance with the following legislation:

- This report is submitted to the Minister of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI 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;

- 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 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 Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

- Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with sec. 48 (1) of the *Ontario Heritage Act*; and

- The *Cemeteries Act*, 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.

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7.0 MAPS

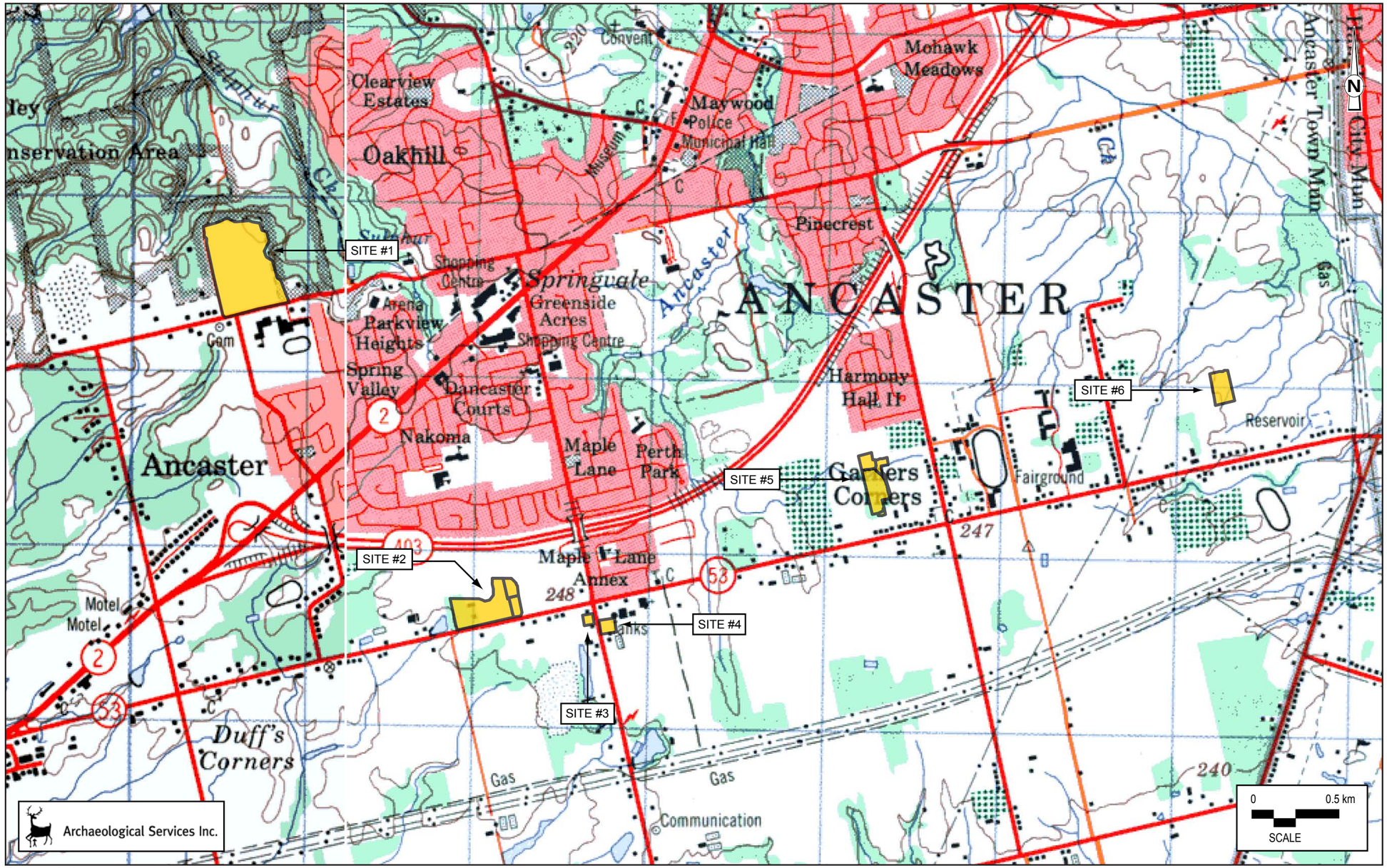
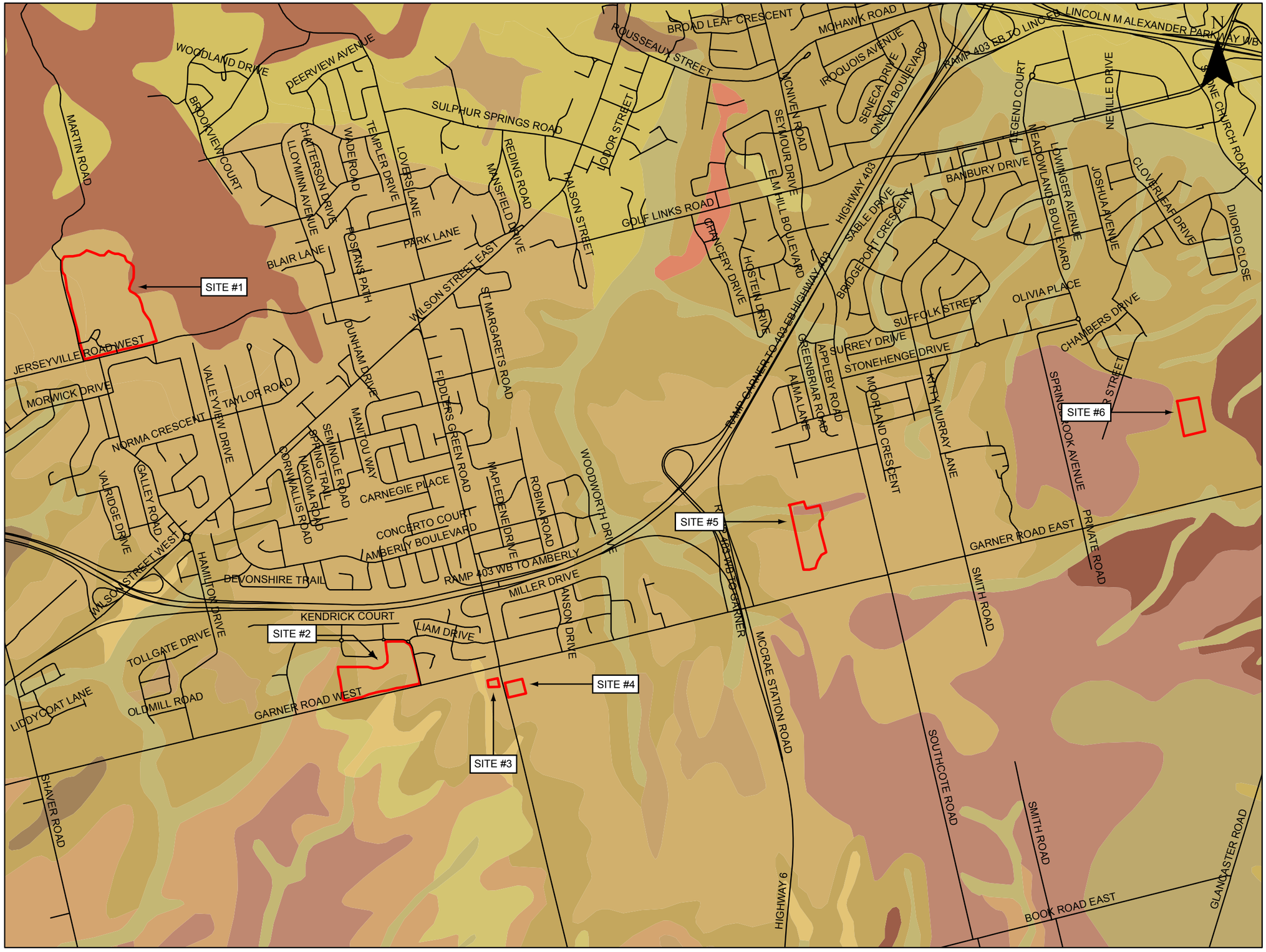
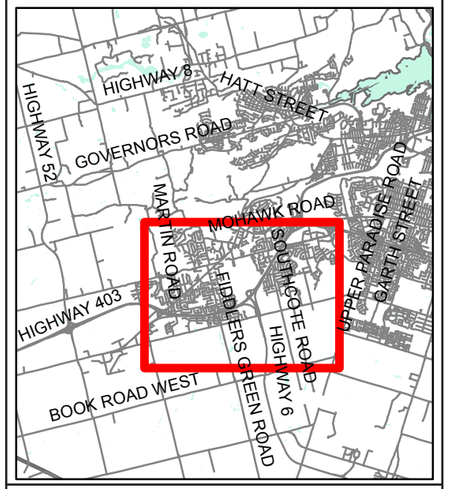


Figure 1: Location of the study area

Base Map: NTS Sheet 40 P/01 (Brantford) and 30 M/04 (Hamilton-Grimsby)





SURFICIAL GEOLOGY
SINGLE PRIMARY DEPOSIT

- Alberton Silt Loam
- Ancaster Silt Loam
- Beverly Silt Loam
- Brant Silt Loam
- Brantford Silt Loam
- Colwood Silt Loam
- Grimsby Sandy Loam
- Muck
- Springvale Sandy Loam
- Toledo Silt Loam
- Ravine
- Stream Course
- Toledo Silty Clay Loam
- Tuscola Silt Loam

BASE: Surficial Geology
Dataset produced by the Ontario Geological Survey, Ministry of Northern Development and Mines, © Queen's Printer for Ontario, 2003

Land Information Ontario
Ontario Ministry of Natural Resources

0 — 1.0 km
SCALE

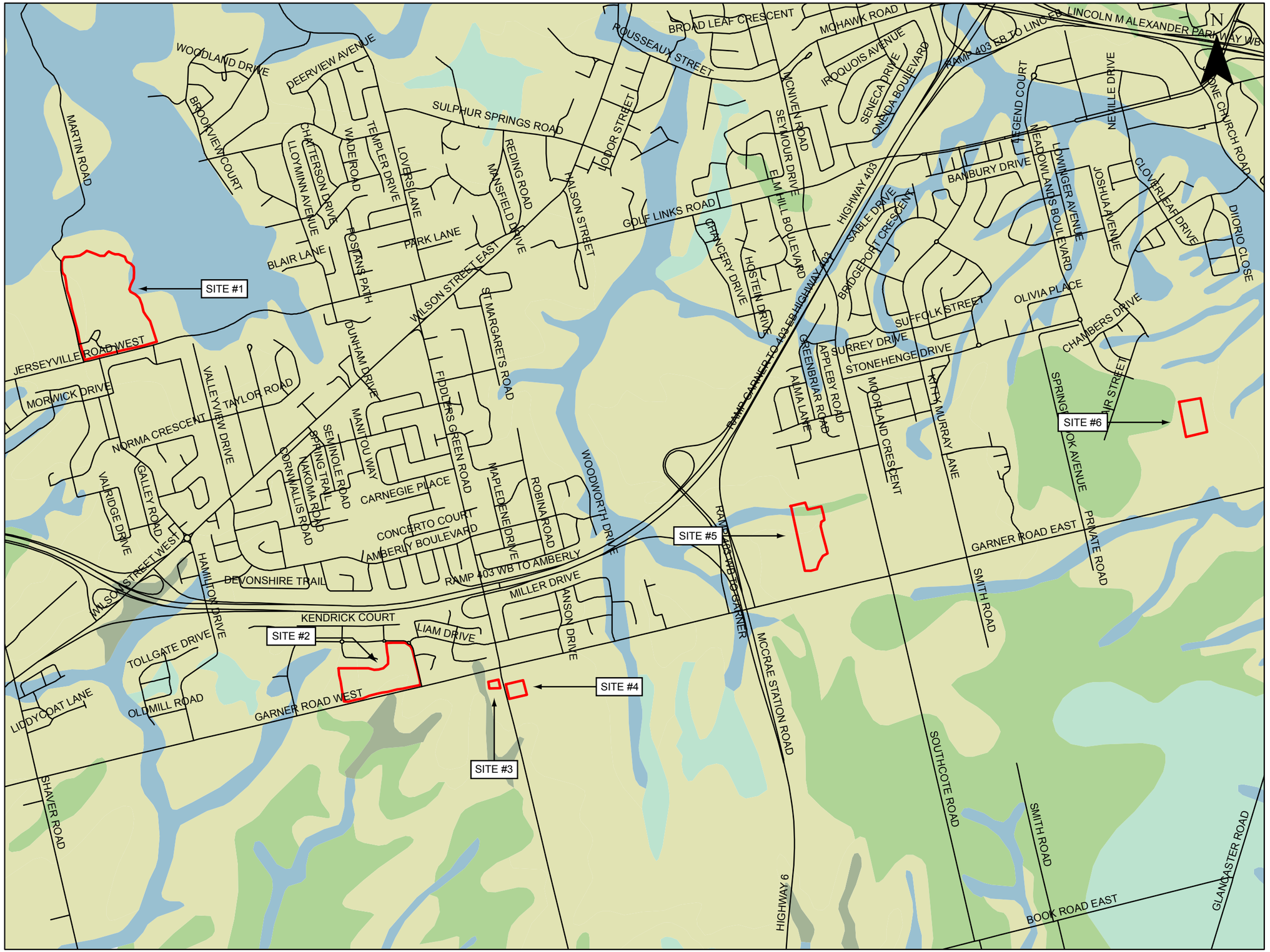
ASI PROJECT NO.: 12EA-091
DATE: May 28, 2012

DRAWN BY: SA
FILE:12EA-091_SGU_All

Archaeological Services Inc.
528 Bathurst St.
Toronto, Ontario
Canada, M5S 2P9
T 416-966-1069
F 416-966-9723
info@iASI.to/www.iAS±.to

Figure 2: Surficial geology in the study area

X:\2012 Projects\EA\12EA-091 Ancaster Water Tower\Views\SoilMaps\12EA-091_SGU_All.mxd



LEGEND

Study Area

SOIL DRAINAGE

- Not Applicable
- Imperfectly
- Moderately Well
- Poorly
- Very Poorly
- Well

BASE: Surficial Geology
Dataset produced by the Ontario Geological Survey, Ministry of Northern Development and Mines, © Queen's Printer for Ontario, 2003

Land Information Ontario
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0 1.0 km
SCALE

ASI PROJECT NO.: 12EA-091
DATE: May 28, 2012

DRAWN BY: SA
FILE:12EA-091_SGU_Drainage

Archaeological Services Inc.
528 Bathurst St.
Toronto, Ontario
Canada, M5S 2P9
T 416-966-1069
F 416-966-9723
info@iASI.to/www.iAS±.to

Figure 3: Soil drainage in the study area

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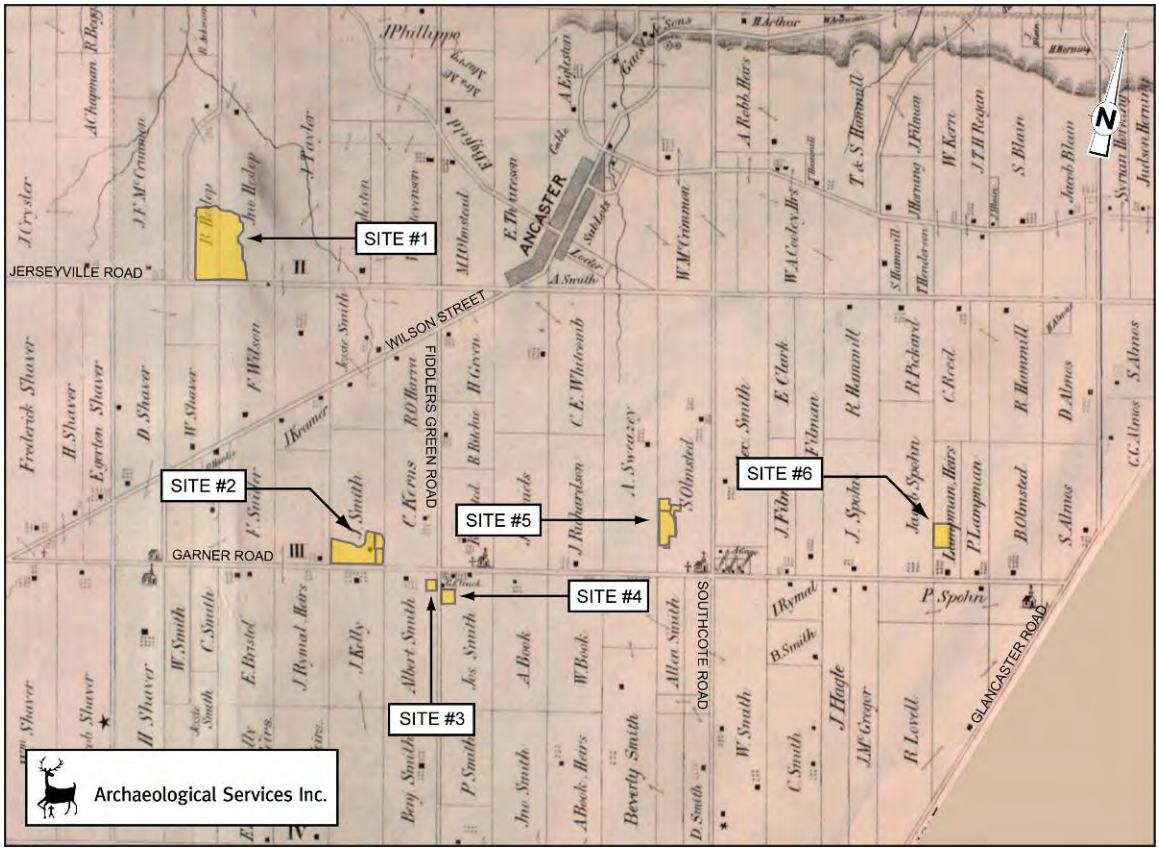

Figure 4: The study area overlaid on the 1875 map of Ancaster Township
Base Map: Illustrated historical atlas of the county of Wentworth, Ontario (Page & Smith 1875)

Archaeological Services Inc.
528 Bathurst St. T 416-966-1069
Toronto, Ontario F 416-966-9723
Canada, M5S 2P9 info@iASI.to/www.iAS±.to

LEGEND

Study Area | Archaeological Potential | No Potential - Disturbed | Photo Location and Direction

BASE:

Land Information Ontario
Ontario Ministry of Natural Resources

Bing Maps
(c) 2010 Microsoft Corporation and its data suppliers

0 25 50 100 Metres

ASI PROJECT NO.: 12EA-091
DATE: May 25, 2012

DRAWN BY: SA
FILE: 12EA_FieldMaps_Site1

Figure 5: Ancaster Water Towers (Site 1) - Results of Stage 1 Archaeological Assessment

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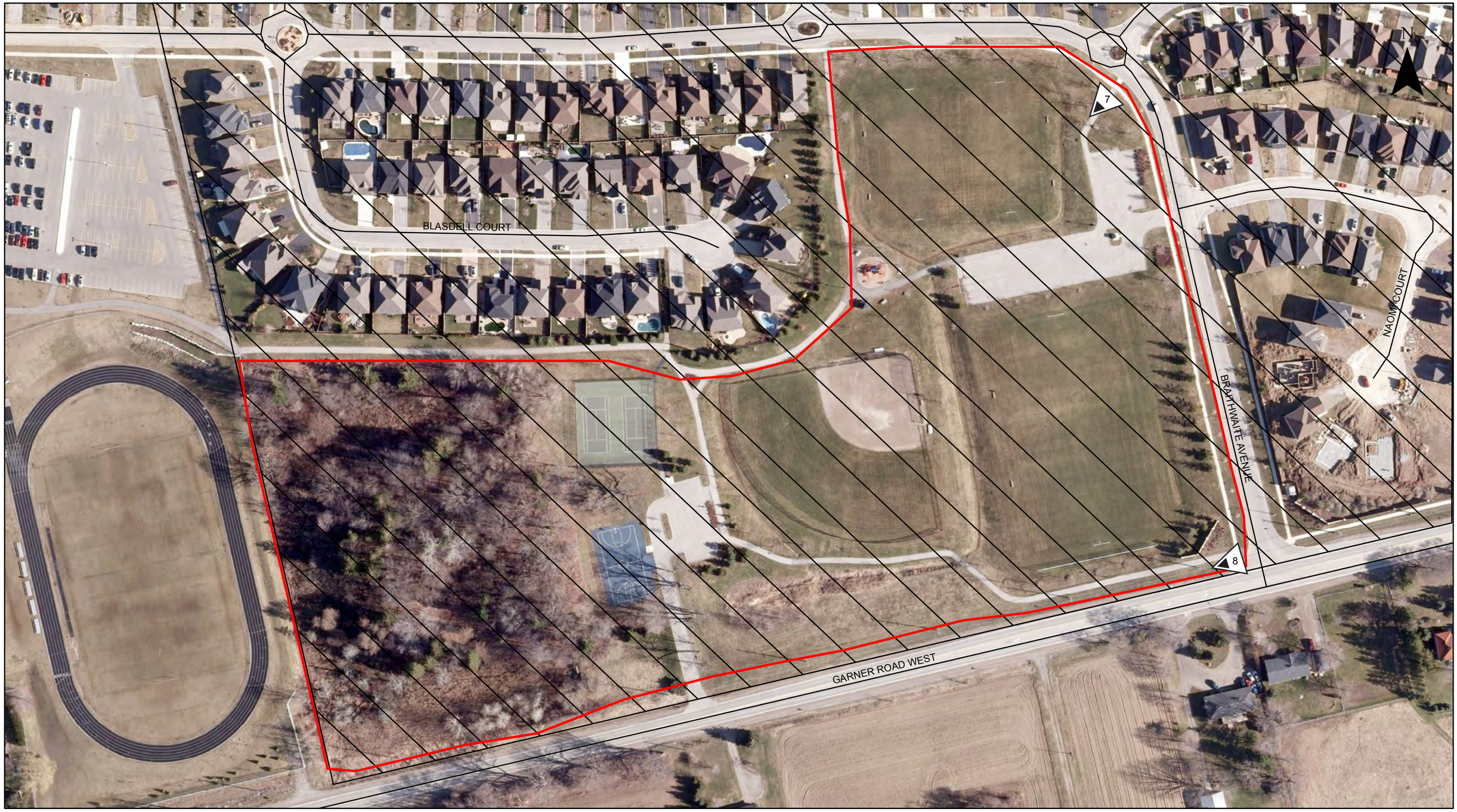

Archaeological Services Inc.
528 Bathurst St. T 416-966-1069
Toronto, Ontario F 416-966-9723
Canada, M5S 2P9 info@iASI.to/www.iAS±.to

LEGEND

Study Area

Previously Assessed (ASI 1995, 1997)

Photo Location and Direction

BASE:

Land Information Ontario
Ontario Ministry of Natural Resources

Bing Maps
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0 15 30 60 Metres

ASI PROJECT NO.: 12EA-091 DRAWN BY: SA
DATE: May 25, 2012 FILE: 12EA_FieldMaps_Site2

Figure 6: Ancaster Water Towers (Site 2) - Results of Stage 1 Archaeological Assessment

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528 Bathurst St. T 416-966-1069
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LEGEND

Study Area

Archaeological Potential

Photo Location and Direction

BASE:

Land Information Ontario
Ontario Ministry of Natural Resources

Bing Maps
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0 5 10 20 Metres

ASI PROJECT NO.: 12EA-091
DATE: May 25, 2012

DRAWN BY: SA
FILE: 12EA_FieldMaps_Site3

Figure 7: Ancaster Water Towers (Site 3) - Results of Stage 1 Archaeological Assessment

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528 Bathurst St. T 416-966-1069
Toronto, Ontario F 416-966-9723
Canada, M5S 2P9 info@iASI.to/www.iAS±.to

LEGEND

Study Area

Archaeological Potential

Photo Location and Direction

BASE:

Land Information Ontario
Ontario Ministry of Natural Resources

Bing Maps
(c) 2010 Microsoft Corporation and its data suppliers

0 5 10 20 Metres

ASI PROJECT NO.: 12EA-091
DATE: May 25, 2012

DRAWN BY: SA
FILE: 12EA_FieldMaps_Site4

Figure 8: Ancaster Water Towers (Site 4) - Results of Stage 1 Archaeological Assessment

X:\2012 Projects\EA\12EA-091 Ancaster Water Tower\Output\12EA-091_FieldMaps_Site4.mxd

Archaeological Services Inc.
528 Bathurst St.
Toronto, Ontario
Canada, M5S 2P9
T 416-966-1069
F 416-966-9723
info@iASI.to/www.iAS±.to

LEGEND

Study Area

Archaeological Potential

No Potential - Wet

Photo Location and Direction

BASE:

Land Information Ontario
Ontario Ministry of Natural Resources

Bing Maps
(c) 2010 Microsoft Corporation and its data suppliers

0 20 40 80 Metres

ASI PROJECT NO.: 12EA-091
DATE: May 25, 2012

DRAWN BY: SA
FILE: 12EA_FieldMaps_Site5

Figure 9: Ancaster Water Tower (Site 5) - Results of Stage 1 Archaeological Assessment

X:\2012 Projects\EA\12EA-091 Ancaster Water Tower\Output\12EA-091_FieldMaps_Site5.mxd

Archaeological Services Inc.
528 Bathurst St. T 416-966-1069
Toronto, Ontario F 416-966-9723
Canada, M5S 2P9 info@iASI.to/www.iAS±.to

LEGEND

Study Area

Previously Assessed (ASI 2004a, 2004c)

Photo Location and Direction

BASE:

Land Information Ontario
Ontario Ministry of Natural Resources

Bing Maps
(c) 2010 Microsoft Corporation and its data suppliers

0 30 60 120 Metres

ASI PROJECT NO.: 12EA-091
DATE: May 25, 2012

DRAWN BY: SA
FILE: 12EA_FieldMaps_Site5

Figure 10: Ancaster Water Towers (Site 6) - Results of Stage 1 Archaeological Assessment

X:\2012 Projects\EA\12EA-091 Ancaster Water Tower\Output\12EA-091_FieldMaps_Site5.mxd

8.0 IMAGES

8.1 Site 1

Plate 1: North-northwest view on the corner of Martin Road and Jerseyville Road West. All disturbed and no potential.

Plate 2: North-northeast view of park. All graded and disturbed. No potential – all disturbed.

Plate 3: East view across northern margin of study area. Potential along edge of field due to close proximity of escarpment edge. Otherwise graded and disturbed.

Plate 4: Southwest view across study area. Baseball diamonds and fields are all graded and disturbed. No potential.

Plate 5: North-northwest view behind the Morgan Firestone Arena. All disturbed and no potential.

Plate 6: North-northwest view of the southeast corner of the study area. All graded and disturbed. No potential.

8.2 Site 2

Plate 7: Southwest view across park. All graded and heavily landscaped. No potential – all disturbed.

Plate 8: West-southwest view along Garner Road West. Graded, utilities, and ROW. All disturbed and no potential.

8.3 Site 3

Plate 9: Southwest view across property. Appears to retain archaeological potential.

Plate 10: Northwest view of Site 3 property. Potential in green space beyond road and berms.

8.4 Site 4

Plate 11: Southeast view of Site 4 property. Field retains archaeological potential.

8.5 Site 5

Plate 12: South-southeast of Site 5. Shrubby wetland. No potential due to low and wet conditions.

Plate 13: East-northeast view into wetland. No potential due to low and wet conditions.

Plate 14: East-northeast view of Site 5. Potential on elevated and level ground.

Plate 15: Southeast view along watercourse. No potential in low/wet areas.

8.6 Site 6

Plate 16: South-southeast view along western edge of Site 6. All disturbed by recent construction.

Plate 17: North-northwest view along eastern boundary of Site 6. Potential on level ground.

APPENDIX A

Details of Archaeological Sites within 1 km of the study area

APPENDIX A: Details of archaeological sites registered within 1 km of the study area

Borden #	Site Name	Cultural Affiliation	Site Type	Researcher
AhGx-24	Pickard	Archaic, Euro-Canadian	Campsite, house	Howey (1977, 1990)
AhGx-44	Smith 3	Undetermined	Campsite	Dodd (1986)
AhGx-62	Freeland	Undetermined	Find spot	Ambrose (1985; 1986), Wilson (1997)
AhGx-63	Dundana	Undetermined	Find spot	Ambrose (1986)
AhGx-71	Roselot 1	Early-Middle Archaic	Undetermined, multi-component	Ambrose (1986), ASI (2006), Fisher Archaeological Consulting (2007)
AhGx-72	Rosalot 2	Archaic	Undetermined	Ambrose (1986)
AhGx-77	UG Kirkwall 8	-	Campsite	MPP and Associates (1986)
AhGx-78	UG Kirkwall 25	Early Woodland	Campsite	MPP (1988)
AhGx-79	UG Kirkwall 27	-	Campsite	MPP (1988)
AhGx-80	UG Kirkwall 28	Middle Archaic, Laurentian	Campsite	MPP and Associates (1986)
AhGx-81	UG Kirkwall 29	-	-	MPP (1988)
AhGx-90	UG Kirkwall 26	Late Archaic	Campsite	MPP and Associates (1986)
AhGx-110	Springbrook 1	Archaic, Woodland	Undetermined	ASI (1988), Woodley (2001; 2004; 2007)
AHGx-111	Springbrook 2	Historic	House, midden	Howey (1987; 1990), ASI (1988),
AhGx-114	Redeemer College	Woodland, Early Iroquoian	Campsite, village	Howey (1987), Woodley (1999; 2001; 2002)
AhGx-115	Whaley 1	Late Archaic	Campsite, house	Howey 1987), Woodley (2001)
AhGx-116	Whaley 2	Archaic, historic	Undetermined	Howey (1987), Woodley (2001)
AhGx-117	Whaley 3	Late Archaic	Campsite, house	Howey (1987), Woodley (1999; 2001)
AhGx-118	-	Archaic	Undetermined	ASI (1987)
AhGx-119	-	-	Undetermined	ASI (1987)
AhGx-120	-	-	Undetermined	ASI (1987)
AhGx-121	-	-	Undetermined	ASI (1987)
AhGx-122	-	-	Undetermined	ASI (1987)
AhGx-123	-	-	Undetermined	ASI (1987)
AhGx-124	-	-	Find spot	ASI (1987)
AhGx-125	-	-	Undetermined	ASI (1987)
AhGx-126	-	-	Undetermined	ASI (1987)
AhGx-127	-	-	Undetermined	ASI (1987)
AhGx-128	-	-	Undetermined	ASI (1987)
AhGx-129	-	-	Undetermined	ASI (1987)
AhGx-130	-	-	Undetermined	ASI (1987)
AhGx-131	-	-	Undetermined	ASI (1987)
AhGx-132	-	-	Find spot	ASI (1987)
AhGx-133	-	-	Undetermined	ASI (1987)

Borden #	Site Name	Cultural Affiliation	Site Type	Researcher
AhGx-134	-	-	Undetermined	ASI (1987)
AhGx-135	-	-	Undetermined	ASI (1987)
AhGx-136	-	-	Find spot	ASI (1987)
AhGx-137	-	-	Undetermined	ASI (1987)
AhGx-138	-	-	Undetermined	ASI (1987)
AhGx-139	-	-	Find spot	ASI (1987)
AhGx-140	-	-	Undetermined	ASI (1987)
AhGx-141	-	-	Find spot	ASI (1987)
AhGx-142	-	-	Undetermined	ASI (1987)
AhGx-142	-	-	Undetermined	ASI (1987)
AhGx-144	-	-	Undetermined	ASI (1987)
AhGx-145	-	-	Undetermined	ASI (1987)
AhGx-146	-	-	Undetermined	ASI (1987)
AhGx-151	-	-	Lithic scatter	ASI (1987)
AhGx-162	-	Early Woodland, Meadowood	Find spot	ASI (1987)
AhGx-169	-	-	Undetermined	ASI (1987)
AhGx-170	-	-	Undetermined	ASI (1987)
AhGx-171	-	Middle Woodland	Undetermined	ASI (1987)
AhGx-172	-	-	Undetermined	ASI (1987)
AhGx-173	-	-	Undetermined	ASI (1987)
AhGx-174	-	-	Find spot	ASI (1987)
AhGx-175	-	-	Undetermined	ASI (1987)
AhGx-176	-	-	Undetermined	ASI (1987)
AhGx-177	-	-	Undetermined	ASI (1987)
AhGx-178	-	-	Undetermined	ASI (1987)
AhGx-179	-	-	Undetermined	ASI (1987)
AhGx-180	-	-	Find spot	ASI (1987)
AhGx-181	-	-	Undetermined	ASI (1987)
AhGx-194	-	-	Undetermined	ASI (1987)
AhGx-195	-	-	Find spot	ASI (1987)
AhGx-196	-	-	Undetermined	ASI (1987)
AhGx-197	-	-	Undetermined	ASI (1987)
AhGx-198	-	-	Undetermined	ASI (1987)
AhGx-202	-	-	Find spot	ASI (1987)
AhGx-203	-	-	Undetermined	ASI (1987)
AhGx-204	-	-	Undetermined	ASI (1987)
AhGx-207	-	-	Undetermined	ASI (1987)
AhGx-208	-	-	Undetermined	ASI (1987)
AhGx-209	-	-	Undetermined	ASI (1987)
AhGx-210	-	-	Find spot	ASI (1987)
AhGx-211	-	-	Find spot	ASI (1987)
AhGx-222	-	-	Undetermined	ASI (1987)
AhGx-244	Glancaster Road	Archaic	Campsite	MPP (1988)
AhGx-247	-	Undetermined	Find spot	MPP and Associates (1988)
AhGx-259	Beef	Archaic	Campsite	Hagerty and Murphy (1996), Poulton (1993)

Borden #	Site Name	Cultural Affiliation	Site Type	Researcher
AhGx-260	Hooked	Middle-Late Archaic	Camp	Warrick (1989; 1993; 1994)
AhGx-272	Hornet	Archaic	-	ASI (1991)
AhGx-307	-	Prehistoric	Undetermined	ASI (1992)
AhGx-308	-	Prehistoric	Undetermined	ASI (1992)
AhGx-309	-	Late Archaic	Lithic scatter	ASI (1992; 2004)
AhGx-310	-	Prehistoric	Find spot	ASI (1992)
AhGx-311	-	Pre-Contact	Lithic scatter	ASI (1992; 2004)
AhGx-312	-	Prehistoric	Undetermined	ASI (1992; 2004)
AhGx-313	-	Pre-Contact	Lithic scatter	ASI (1992; 2004)
AhGx-314	-	Prehistoric	Find spot	ASI (1992)
AhGx-315	Past Picnic	Pre-Contact	Ceramic and lithic scatter	ASI (1992; 2004)
AhGx-316	-	Pre-Contact	Lithic scatter	ASI (1992; 2004)
AhGx-318	Toad	Woodland, Pre-Contact	Ceramic and lithic scatter	ASI (1992; 2004)
AhGx-319	Rez	Pre-Contact	Lithic scatter	ASI (1992; 2004)
AhGx-320	-	Prehistoric	Undetermined	ASI (1992)
AhGx-324	-	Prehistoric	Undetermined	ASI (1992)
AhGx-331	-	Prehistoric	Undetermined	ASI (1992)
AhGx-332	Harvest	Prehistoric	-	Warrick (1992)
AhGx-333	Mitsu	Prehistoric	Undetermined	Warrick (1992)
AhGx-334	Spy	Prehistoric	Undetermined	Warrick (1992)
AhGx-335	Golden	Prehistoric	Undetermined	Warrick (1992)
AhGx-336	Crab	Prehistoric	Undetermined	Warrick (1992)
AhGx-337	Snow	Prehistoric	Undetermined	Warrick (1992)
AhGx-338	MacIntosh	Prehistoric	Undetermined	Warrick (1992)
AhGx-339	Cider	Prehistoric	Undetermined	Warrick (1992)
AhGx-340	Courtland	Prehistoric	Undetermined	Warrick (1992)
AhGx-341	Winter	Prehistoric	Undetermined	Warrick (1993)
AhGx-342	Spartan	Prehistoric	Undetermined	Warrick (1993)
AhGx-343	Core	Prehistoric	Undetermined	Warrick (1993)
AhGx-344	Core	Prehistoric	Undetermined	Warrick (1993)
AhGx-345	Red	Prehistoric	Undetermined	Warrick (1993)
AhGx-346	Blossom	Late Archaic, Early Woodland	Undetermined	Warrick (1993)
AhGx-347	Butter	Prehistoric	Undetermined	Warrick (1993)
AhGx-348	Northern	Prehistoric	Undetermined	Warrick (1993)
AhGx-349	Anchor	Prehistoric	Undetermined	Warrick (1993)
AhGx-350	Line	Prehistoric	Undetermined	Warrick (1993)
AhGx-351	Rosea lot IV	Middle-Late Archaic, Early-Late Woodland, Euro-Canadian	Undetermined, Multi-component	Warrick (1993), ASI (2006), Fisher Archaeological Consulting (2007)
AhGx-352	Rosea lot III	Early-Late Archaic	Undetermined	Warrick (1993), ASI (2006)
AhGx-356	Arthur	Middle Archaic	Camp	Woodley (2000)
AhGx-360	John Ryan	Early Woodland	Lithic scatter	ASI (1995)
AhGx-364	Bad Apple	Pre-Contact	Undetermined	Warrick (1997)

Borden #	Site Name	Cultural Affiliation	Site Type	Researcher
AhGx-370	Conners	Pre-Contact, Euro-Canadian, Multi-Component	Find spot, Farmstead	Warrick (1995), ASI (2006; 2007)
AhGx-371	Golden Arm	Late Archaic, Middle Archaic	Campsite	ASI (2006), Dolling (2002)
AhGx-372	Starflite	Pre-Contact	Campsite	Warrick (1995), Dolling (2002), ASI (2006)
AhGx-373	Bites	Pre-Contact	Campsite	Dolling (2002)
AhGx-374	Rusty Nail	Pre-Contact	Campsite	Dolling (2002), ASI (2006)
AhGx-375	Dragon's Breath	Late Archaic, Innes, Euro-Canadian, Multi-Component	Campsite	Dolling (2002), ASI (2006)
AhGx-376	Blistering Butte	Late Archaic, Early Woodland, Innes	Campsite	Dolling (2002), ASI (2006)
AhGx-377	Last Spike	Middle Woodland, Chesser Notched	Campsite	Warrick (1995), ASI (2006)
AhGx-378	Satellite	Pre-Contact	Campsite	Warrick (1995), ASI (2006)
AhGx-379	-	Pre-Contact	Campsite	ASI (1995)
AhGx-380	**-**	**Early Archaic**	**Campsite**	**ASI (1995)**
AhGx-381	-	Pre-Contact	Lithic scatter	ASI (1995)
AhGx-382	Bitter	Pre-Contact	Campsite	Warrick (1995), Dolling (2002)
AhGx-383	-	Middle Archaic, Brewerton	Find spot	Warrick (1995), Dolling (2002)
AhGx-384	-	Late Woodland, Neutral, Late Iroquoian	Find spot	Warrick (1995), Dolling (2002)
AhGx-385	-	Middle Archaic, Brewerton	Find spot	Warrick (1995), Dolling (2002)
AhGx-386	-	Late Archaic, Genesse	Find spot	Warrick (1995), Dolling (2002)
AhGx-387	-	Early Archaic, Nettling	Find spot	Warrick (1995), Dolling (2002)
AhGx-388	-	Paleo-Indian	Find spot	Warrick (1995), Dolling (2002)
AhGx-389	-	Early Woodland, Meadowood	Find spot	Warrick (1995), Dolling (2002)
AhGx-391	-	Late Woodland, Levanna, Early Iroquoian	Find spot	Warrick (1995), Dolling (2002)
AhGx-400	Marshall Estates	Late Archaic, Narrow Point	Campsite	Morrison (1998), Northeastern Arch. (1998)
AhGx-403	John Faber	Early Archaic, Bifurcate	Campsite	Howey (1997), Woodley (2002)
AhGx-404	Marshall South	Middle Archaic, Late Archaic, Late Woodland	Campsite	Morrison (1998; 1999)

Borden #	Site Name	Cultural Affiliation	Site Type	Researcher
AhGx-405	Marshall North	Late Archaic, Late Woodland, Lamoka	Campsite	Morrison (1998; 1999)
AhGx-406	-	Early Woodland	Lithic scatter	Woodley (1999)
AhGx-419	New Spring	Late Archaic, Middle Iroquoian	Camp	Woodley (2001; 2004)
AhGx-440	-	Pre-Contact, Late Archaic, Broad Point	Find spot	Warrick (1995), Dolling (2002)
AhGx-497	Paradise Gardens I	Pre-Contact	Lithic scatter	Archaeological Assessment Ltd. (2003)
AhGx-498	Paradise Gardens II	Late Archaic, Lamoka	Find spot	Archaeological Assessments Ltd (2003)
AhGx-538	-	Pre-Contact	Find spot	ASI (2004)
AhGx-539	Birch	Early Archaic, Nettling Point	Lithic scatter	ASI (2004)
AhGx-540	-	Pre-Contact	Find spot	ASI (2004)
AhGx-541	-	Pre-Contact	Find spot	ASI (2004)
AhGx-542	-	Pre-Contact	Find spot	ASI (2004)
AhGx-543	Copernicus	Early Archaic	Lithic scatter	ASI (2004)
AhGx-544	-	Pre-Contact	Lithic scatter	ASI (2004)
AhGx-545	-	Pre-Contact	Find spot	ASI (2004)
AhGx-546	**-**	**Pre-Contact**	**Find spot**	**ASI (2004)**
AhGx-547	**Dusty**	**Early Archaic, Late Woodland**	**Camp**	**ASI (2004)**
AhGx-548	**-**	**Pre-Contact**	**Lithic scatter**	**ASI (2004)**
AhGx-549	Paletta	Middle Iroquoian	Village	ASI (2004)
AhGx-557	-	Early Archaic, Kirk Nettling	Find spot	Woodley (2004)
AhGx-562	-	Pre-Contact	Lithic scatter	ASI (2004)
AhGx-569	-	Pre-Contact	Lithic scatter	ASI (2004)
AhGx-618	-	Aboriginal	Find spot	ASI (2006)
AhGx-619	-	Aboriginal	Find spot	ASI (2006)
AhGx-620	Aboriginal	Find spot	Find spot	ASI (2006)
AhGx-621	-	Aboriginal	Find spot	ASI (2006)
AhGx-622	-	Aboriginal	Find spot	ASI (2006)
AhGx-623	-	Aboriginal	Lithic scatter	ASI (2006)
AhGx-624	-	Euro-Canadian	Homestead	ASI (2006)
AhGx-641	Lloyminn	Early-Late Archaic	Campsite	Woodley (2007; 2008)
AhGx-643	Gage	Euro-Canadian	Homestead	ASI (2007; 2008; 2008)
AhGx-646	Kitty Murray	Pre-Contact	Lithic scatter	Woodley (2007)
AhHa-11	Smith	Late Paleo-Indian, Early-Middle Archaic	Lithic scatter	Leslie (1977)
AhHa-18	Somerville 1	Archaic, Early Woodland	Undetermined	Leslie (1978)
AhHa-22	Meadowbrook South	Early-Late Archaic, Late Woodland	Campsite	Leslie (1978), Northe AA (1995)
AhHa-23	Sommerville 3	-	-	Leslie (1978)
AhHa-51	Snyder 2	Archaic	Campsite	Howey (1987)
AhHa-61	Shaver Road	Neutral, Late Woodland	Undetermined	Lennox (1988)

Borden #	Site Name	Cultural Affiliation	Site Type	Researcher
AhHa-62	Westview	Prehistoric, Middle Archaic	Lithic scatter	Lennox (1988), Warrick (1994)
AhHa-88	Shaver Koll	Archaic	-	Lennox (1988; 1991)
AhHa-89	Old Shed	Prehistoric	-	Lennox (1988)
AhHa-118	Walker 2	Pre-Contact, historic	-	Lennox (1993)
AhHa-146	Little Shaver	Middle Archaic, Early Woodland	Campsite	Lennox (1991)
AhHa-166	Scraper Knoll	Archaic	Find spot	Warrick (1993)
AhHa-167	Meadowbrook Knoll	Middle-Late Archaic	Campsite	Jackson (1994)
AhHa-186	Swamp Edge	Late Archaic, Early Iroquoian	Camp	Woodley (2002)
AhHa-187	Second	Late Archaic	Camp	Woodley (2002)
AhHa-188	Tag	Middle-Late Archaic, Middle Woodland, Early Iroquoian	Camp	Woodley (2002)
AhHa-189	Dogwood	Archaic, Late Archaic	Camp	Woodley (2002; 2003)
AhHa-191	The Berm Site	Archaic	-	Wilson (2002)
AhHa-197	Sam's Estate 1	Aboriginal	Campsite	Woodley (2005; 2007)
AhHa-198	-	Pre-Contact	Undetermined	Woodley (2005)
AhHa-199	Sam's Estate II	Late Archaic (Smallpoint)	Campsite	Woodley (2005; 2007)
AhHa-200	-	Pre-Contact	Undetermined	Woodley (2005)
AhHa-201	Big Creek Estates I	Woodland	Undetermined	Woodley (2005; 2006)
AhHa-202	Big Creek Estates II	Middle Woodland	Campsite	Woodley (2005; 2006)
AhHa-203	Crouch	Pre-Contact, Middle Archaic	Scatter	Martelle (2005)
AhHa-204	Leslie	Pre-Contact	Scatter	Martelle (2005), TMHC (2005)
AhHa-205	Catty	Pre-Contact	Scatter	Martelle (2005)
AhHa-206	Bush	Pre-Contact	Scatter	Martelle (2005)
AhHa-207	Corner	Pre-Contact	Scatter	Martelle (2005)

Note: Sites in bold are within 50 m of the study area

APPENDIX B

List of reports documenting previous work

APPENDIX B: List of reports documenting previous work

Ambrose, Mary

1986 Archaeological Survey of Hwy 6 New from Hwy 403 to Greens Road, R.M. of Hamilton-Wentworth and Haldimand Norfolk.

Archaeological Assessment Ltd.

2003 Stage 4 Excavation of the Paradise Gardens Site (AhGx-497), Paradise Gardens Property, Part of Lot 21, Concession 8, Geographic Township of Barton, Coty of Hamilton, Regional Municipality of Hamilton-Wentworth.

Archaeological Services Inc. (ASI)

1988 An ARA of Cloverleaf Village, Town of Ancaster, Ontario. Phase 1 Survey Report.

1991 Archaeological Sites Requiring Further Investigation Meadowlands Estate, 25T-88025, Parts of Lot 49, 50, and 51 Concession 3, Geographic Township of Ancaster.

1992 An ARA for Class EA of Glancaster Road, Stone Church Road and Susan Drive Extensions, Town of Ancaster, Stoney Creek, R.M. of Hamilton-Wentworth.

1995a Stage 3 A.R.A. of John Ryan Site (AhGx-360) Proposed Subdivision 25T-92001, Town of Ancaster, Regional Municipality of Hamilton-Wentworth.

1995b Archaeological Assessment of Twin Gables Estates, Lot 41, Concession 3 (25T-95003), Town of Ancaster, R.M. of Hamilton-Wentworth.

1997 Stage 3Arcaheologcial Resource Assessment of Sites AhGx-379-381, Twin Gables Estates, Subdivision, Lot 41, Concession 3 (25T-94003), Town of Ancaster, Regional Municipality of Hamilton-Wentworth, Ontario.

2004a Stage 1 & 2 Archaeological Assessment of Paletta Lands Subdivision, Meadowlands IV Secondary Plan, Part of Lots 51, 52, 53, Con. 3, Geographic Township of Ancaster, City of Hamilton, Ontario.

2004b Stage 3 Archaeological Assessment of Sites AhGx-307, 308, 309, 311, 312, 313, and 562 (Phase 9 Lands 25T-200501) and Stage 3 and 4 Salvage Excavation of Site AhGs-569 (Phase 8 Lands 25T-200410) Within Meadowlands of Ancaster Neighbourhood 4.

2004c Stage 3 Testing of Sites AhGx-315, -316, -317, -318, -319, -539, -543, -544, -547, -548, -549, and Stage 4 Salvage excavation of the Toad Site (AhGx-318), Site P19 (AhGx-544), the Dusty Site(AhGx-547), and the Paletta site (AhGx-549), Propos.

2006a Stage 1 & 2 Archaeological Assessment of the Proposed Subdivision of Meadowlands – Phase 10 25T2005-19, Part of Lot 50, Concession 3, Geographic Township of Ancaster, City of Hamilton.

2006b Stage 3 Archaeological Assessment of the Roselot I (AhGx-71), Roselot III (AhGx-352), Roselot IV (AhGx-351), Conners (AhGx-370), Golden Arm (AhGx-371), Starflite (AhGx-372), Rusty Nail (AhGx-374), Dragon's Breath (AhGx-375), Blistering Butte (

2007a Stage 1 & 2 Archaeological Assessment of the Ancaster Fairgrounds, Part of Lot 48, Concession 3, Geographic Township of Ancaster, City of Hamilton, December 2007.

2007b Stage 3 Archaeological Assessment of Site AhGx-623, Located within Meadowlands – Phase 10, Draft Plan of Subdivision 25T-200519, Part of Lot 50, Concession 3, Geographic Township of Ancaster, City of Hamilton.

2008a Stage 3 Archaeological Assessment of the Gage Site (AhGx-643) Draft Plan of Subdivision 25T-200711 Part of Lot 48, Concession 3 Geographic Township of Ancaster, Coty of Hamilton.

2008b Stage 4 Mitigative Excavation of the Gage Site (ShGx-643) Draft Plan of Subdivision 25T-200711, Part of Lot 48, Concession 3, Geographic Township of Ancaster, City of Hamilton.

Dolling, J.

2002 Stages 1 and 2 A.A. of Proposed Earth Barrow Source for Highway 6 (New), Town of Ancaster, R.M. Hamilton-Wentworth.

Fisher Archaeological Consulting (FAC)

2007a Archaeological Stage 4: Excavation of the Conners Site (AhGx-370) Part of the Garner Road and Hwy 6 Bypass Property. Project Number D71236. Final Report.

2007b Archaeological Stage 4: Excavation of Roselot IV Site (AhGx-351). Part of Garner Road & Hwy 6 By-Pass Property Project D71236 Final Report.

Hagerty, 1994 Archaeological Test Excavation of Sites in the Hwy 6 (New) ROW (Hwy 403 – Hwy 53 IC), Town of Ancaster.

1996 Archaeological Assessment of Hwy 6 New Ancaster to Caledonia (1985-1993 Fieldwork).

Howey, A.F.

1997 The Ontario Heritage Act Annual Report.

Jackson, L.

1994 A.A. of Meadowbrook Manors – Part Lot 38, Conc. 3, Town of Ancaster -25T-9003.

Lennox, P.
1988 An Archaeological Survey of the Proposed 403 R.O.W., Ancaster to Brantford, W.P. 65-67-00.

Lennox, P.
1993 Highway 403, Brantford to Ancaster (W.P. #65-67-00) – Trinity Road (AhHa-83); Walker II AhHa-118)' Indian Line (AhHa-72); Dunmark Knoll (AhHa-75); Kuner (AhHa-82); Plafchak (AhHa-120); Makwyko (AhHa-23); Three Pines (AdHa-73).

Lennox, P. and B. Morrison
1991 The Shaver Knoll Site: Archaic Components in Wentworth County, Ontario.

Leslie, S.
1978 An Archaeological Survey of Wentworth County (File #1503).

Martelle, Holly
2005 Stage 1 & 2 Archaeological Assessment Ontario realty Corporation Property, Part of Lots 37 & 38, Conc. 3, Town of Ancaster, R.M. of Hamilton-Wentworth.

Mayer HCI
1997 Archaeological Assessment (Stage 1 to 3), MTO W.P. 09-91-00 & 20-91-00, Consultant Agreement 9720-2497, Hwy 6 (New) Between Hwy 53 and Existing Hwy 6).

Mayer, Pihl, Poulton and Associates Inc. (MPP)
1986 London/Kirkwall Valve Sites to the Hamilton Gates Station No. 3

1988 An ARA of the Union Gas Kirkwall Ancaster Line, RM of Hamilton-Wentworth.

Ministry of Transportation (MTO)
1991 The Little Shaver Site: Exploring Site Structure and Excavation Methodology on a Site in the Region of Hamilton-Wentworth, Ontario (W.P. 65-67-00).

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ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Stage 1 Archaeological Assessment
Ancaster Elevated Water Reservoir
(formerly Ancaster Water Tower)
Municipal Class Environmental Assessment
and Conceptual Design
City of Hamilton
Part of Lots 42–43, Concession 4
Geographic Township of Ancaster
Former Wentworth County, Ontario

Prepared for
City of Hamilton
77 James Street North, Suite 400
Hamilton, ON L8R 2K3
Tel: (905) 546-2424
&
The Ministry of Tourism, Culture and Sport

Licenced under
P.J. Racher, M.A.
MTCS Licence #P007
PIF #P007-0769-2016
ARA File #2016-0285

27/10/2016

Original Report

219 - 900 Guelph Street, Kitchener, ON N2H 5Z6
P - 519.804.2291 F - 519.286.0493
arch-research.com

EXECUTIVE SUMMARY

Under a contract awarded in August 2016, Archaeological Research Associates Ltd. carried out a Stage 1 archaeological assessment of six parcels under consideration for the proposed Ancaster Elevated Water Reservoir in the City of Hamilton, Ontario. The assessment was completed as a component of a Schedule B Municipal Class Environment Assessment, which has been initiated to address water supply issues in Pressure District 18 within the Ancaster area through the addition of a new elevated water reservoir. The new elevated water reservoir will meet local water service requirements, provide water distribution system security and operational flexibility, as well as help address low water pressure issues. This report documents the background research and fieldwork involved in the assessment, and presents conclusions and recommendations pertaining to archaeological concerns within the project lands. Six other parcels under consideration for the project were subject to Stage 1 assessment in May 2012 under PIF #P094-144-2012 (ASI 2012).

The Stage 1 assessment was conducted in September 2016 under PIF #P007-0769-2016. The assessment encompassed the entirety of the six additional parcels under consideration for the project. All field observations were made from accessible public areas; accordingly, no permissions were required for property access. At the time of assessment, the study area consisted of parts of several commercial, residential and agricultural properties, and comprised a mixture of agricultural lands, wooded areas, maintained lawns, driveways and part of a tributary of Big Creek.

The Stage 1 assessment determined that the study area comprised a mixture of areas of archaeological potential, areas of no archaeological potential and areas of indeterminate potential that require further on-site documentation. Archaeological Research Associates Ltd. recommends that the identified areas of archaeological potential that could be impacted by the project be subject to a Stage 2 property assessment, and that the areas of indeterminate potential be subject to a visual inspection to determine whether further assessment is required. The identified areas of no archaeological potential are not recommended for further assessment. It is requested that this report be entered into the *Ontario Public Register of Archaeological Reports*, as provided for in Section 65.1 of the *Ontario Heritage Act*.

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GLOSSARY OF ABBREVIATIONS

ARA – Archaeological Research Associates Ltd.
ASI – Archaeological Services Inc.
MPPA – Mayer, Pihl, Poulton & Associates Inc.
MTC – (Former) Ministry of Tourism and Culture
MTCS – Ministry of Tourism, Culture and Sport
PIF – Project Information Form
ROW – Right-of-Way
S&Gs – Standards and Guidelines for Consultant Archaeologists
SD – Supplementary Documentation

PERSONNEL

Project Director: P.J. Racher, M.A. (#P007)
Project Managers: V. Cafik (#R437), P. Epler (#R418), C.J. Gohm, M.A.
Field Director: S. Clarke (#R446)
Cartographer: K. Brightwell, P.G. (GIS) (#R341)
Technical Writer: C.J. Gohm

1.0 PROJECT CONTEXT

1.1 Development Context

Under a contract awarded in August 2016, ARA carried out a Stage 1 archaeological assessment of lands with the potential to be impacted by the proposed Ancaster Elevated Water Reservoir in the City of Hamilton, Ontario. The assessment was completed as a component of a Schedule B Municipal Class Environment Assessment, which has been initiated to address water supply issues in Pressure District 18 within the Ancaster area through the addition of a new elevated water reservoir. The new elevated water reservoir will meet local water service requirements, provide water distribution system security and operational flexibility, as well as help address low water pressure issues. This report documents the background research and fieldwork involved in the assessment, and presents conclusions and recommendations pertaining to archaeological concerns within the project lands. Six other parcels under consideration for the project were subject to Stage 1 assessment in May 2012 under PIF #P094-144-2012 (ASI 2012).

The subject study area consists of a six rectangular parcels with a total area of 9.58 ha in the south-central part of the City of Hamilton (see Map 1). These parcels include 587, 588, 591, 658 and 731 Fiddlers Green Road and 70 Garner Road East, which are generally bounded by agricultural lands and wooded areas on either side of Fiddlers Green Road. The assessment encompassed the entirety of the six additional parcels under consideration for the project. In legal terms, the study area falls on part of Lots 42–43, Concession 4 in the Geographic Township of Ancaster (former Wentworth County).

The Stage 1 assessment was conducted in September 2016 under PIF #P007-0769-2016. All field observations were made from accessible public areas; accordingly, no permissions were required for property access. In compliance with the objectives set out in Section 1.0 of the *S&Gs* (MTC 2011:13–23), this investigation was carried out in order to:

- Provide information concerning the geography, history and current land condition of the study area;
- Determine the presence of known archaeological sites in the study area;
- Present strategies to mitigate project impacts to such sites, if they are located;
- Evaluate in detail the archaeological potential of the study area; and
- Recommend appropriate strategies for Stage 2 archaeological assessment, if some or all of the study area has archaeological potential.

The MTCS is asked to review the results and recommendations presented in this report and express their satisfaction with the fieldwork and reporting through a *Letter of Review and Entry into the Ontario Public Register of Archaeological Reports*.

1.2 Historical Context

After a century of archaeological work in southern Ontario, scholarly understanding of the historic usage of the area has become very well-developed. With occupation beginning in the Palaeo-Indian period approximately 11,000 years ago, the greater vicinity of the study area comprises a complex chronology of Pre-Contact and Euro-Canadian histories. Section 1.2.1 provides an overview of the region's settlement history, and Section 1.2.2 summarizes the past and present land use of the study area. One other archaeological report containing relevant background information (influencing the choice of fieldwork strategy or recommendations) was identified and consulted. This report documents the Stage 1 assessment of six other parcels under consideration for the project conducted under PIF #P094-144-2012 (ASI 2012).

1.2.1 Settlement History

1.2.1.1 Pre-Contact

The Pre-Contact history of the region is lengthy and rich, and a variety of Aboriginal groups inhabited the landscape. Archaeologists generally divide this vibrant history into three main periods: Palaeo-Indian, Archaic and Woodland. Each of these periods comprises a range of discrete sub-periods characterized by identifiable trends in material culture and settlement patterns, which are used to interpret indigenous lifeways. The principal characteristics of these sub-periods are summarized in Table 1.

Table 1: Pre-Contact Settlement History
(Wright 1972; Ellis and Ferris 1990; Warrick 2000; Munson and Jamieson 2013)

Sub-Period	Timeframe	Characteristics
Early Palaeo-Indian	9000–8400 BC	Gainey, Barnes and Crowfield traditions; Small bands; Mobile hunters and gatherers; Utilization of seasonal resources and large territories; Fluted projectiles
Late Palaeo-Indian	8400–7500 BC	Holcombe, Hi-Lo and Lanceolate biface traditions; Continuing mobility; Campsite/Way-Station sites; Smaller territories are utilized; Non-fluted projectiles
Early Archaic	7500–6000 BC	Side-notched, Corner-notched (Nettling, Thebes) and Birfurcate Base traditions; Growing diversity of stone tool types; Heavy woodworking tools appear (e.g., ground stone axes and chisels)
Middle Archaic	6000–2500 BC	Stemmed (Kirk, Stanly/Neville), Brewerton side- and corner-notched traditions; Reliance on local resources; Populations increasing; More ritual activities; Fully ground and polished tools; Net-sinkers common; Earliest copper tools
Late Archaic	2500–900 BC	Narrow Point (Lamoka), Broad Point (Genesee) and Small Point (Crawford Knoll) traditions; Less mobility; Use of fish-weirs; True cemeteries appear; Stone pipes emerge; Long-distance trade (marine shells and galena)
Early Woodland	900–400 BC	Meadowood tradition; Crude cord-roughened ceramics emerge; Meadowood cache blades and side-notched points; Bands of up to 35 people
Middle Woodland	400 BC–AD 600	Saugeen tradition; Stamped ceramics appear; Saugeen projectile points; Cobble spall scrapers; Seasonal settlements and resource utilization; Post holes, hearths, middens, cemeteries and rectangular structures identified

Sub-Period	Timeframe	Characteristics
Middle/Late Woodland Transition	AD 600–900	Princess Point tradition; Cord roughening, impressed lines and punctate designs on pottery; Adoption of maize horticulture at the western end of Lake Ontario; Oval houses and 'incipient' longhouses; First palisades; Villages with 75 people
Late Woodland (Early Iroquoian)	AD 900–1300	Glen Meyer tradition; Settled village-life based on agriculture; Small villages (0.4 ha) with 75–200 people and 4–5 longhouses; Semi-permanent settlements
Late Woodland (Middle Iroquoian)	AD 1300–1400	Uren and Middleport traditions; Classic longhouses emerge; Larger villages (1.2 ha) with up to 600 people; More permanent settlements (30 years)
Late Woodland (Late Iroquoian)	AD 1400–1600	Pre-Contact Neutral tradition; Larger villages (1.7 ha); Examples up to 5 ha with 2,500 people; Extensive croplands; Also hamlets, cabins, camps and cemeteries; Potential tribal units; Fur trade begins ca. 1580; European trade goods appear

1.2.1.2 Post-Contact

The arrival of the European explorers and traders at the beginning of the 17th century triggered widespread shifts in Aboriginal lifeways and set the stage for the ensuing Euro-Canadian settlement process. Documentation for this period is abundant, ranging from the first sketches of Upper Canada and the written accounts of early explorers to detailed township maps and lengthy histories. The Post-Contact period can be effectively discussed in terms of major historical events, and the principal characteristics associated with these events are summarized in Table 2.

Table 2: Post-Contact Settlement History
(Smith 1846; Coyne 1895; Lajeunesse 1960; DVSA 1971; Woodhouse 1973; Ellis and Ferris 1990; Surtees 1994; AO 2015)

Historical Event	Timeframe	Characteristics
Early Contact	Early 17th century	Brûlé explores the area in 1610; Champlain visits in 1613 and 1615/1616; Iroquoian-speakers (Huron, Petun and Neutral) and Algonkian-speakers (Anishinabeg) encountered; European goods begin to replace traditional tools
Five Nations Invasion	Mid-17th century	Haudenosaunee (Five Nations) invade ca. 1650; Neutral, Huron and Petun Nations are defeated/removed; vast Iroquoian hunting territory established in the second half of the 17th century; Explorers continue to document the area
Anishnabeg Influx	Late 17th and early 18th century	Ojibway, Odawa and Potawatomi expand into Haudenosaunee lands in the late 17th century; Nanfan Treaty between Haudenosaunee and British in 1701; Anishnabeg occupy the area and trade directly with the French and English
Fur Trade Development	Early and mid-18th century	Growth and spread of the fur trade; Peace between the French and English with the Treaty of Utrecht in 1713; Ethnogenesis of the Métis; Hostilities between French and British lead to the Seven Years' War in 1754; French surrender in 1760
British Control	Mid-18th century	*Royal Proclamation* of 1763 recognizes the title of the First Nations to the land; Numerous treaties arranged by the Crown; First acquisition is the Seneca surrender of the west side of the Niagara River in August 1764
Loyalist Influx	Late 18th century	United Empire Loyalist influx after the American Revolutionary War (1775–1783); British develop interior communication routes and acquire additional lands; *Constitutional Act* of 1791 creates Upper and Lower Canada

Historical Event	Timeframe	Characteristics
County Development	Late 18th and early 19th century	Became part of Lincoln County's 'First Riding' in July 1792; Lands acquired in the second 'Between the Lakes Purchase' in December 1792; Became part of Wentworth County (Gore District) in 1816; Extent of Wentworth County redefined after the abolition of the district system in 1849
Township Formation	Early 19th century	Ancaster first settled by United Empire Loyalist squatters in 1789; Surveyed by Augustus Jones in 1793; Traversed by the Governor's Road (Dundas Street) in 1794; Military veterans granted reserve lots along the road; Remainder settled by a mixture of Loyalists, army officers and officials, Presbyterians from Scotland, Methodists from New Jersey, and Methodists from New York and Pennsylvania; Population reached approximately 200 in 1800 and 1,000 in 1817
Township Development	Mid-19th and early 20th century	Population reached 2,930 by 1841; 16,949 ha taken up by 1846, with 7,271 ha under cultivation; Two grist mills and six saw mills in operation at that time; Bypassed by the Great Western Railway (1853), which impacted exports; Traversed by the Toronto, Hamilton & Buffalo Railway (1895); Communities at Dundas, Ancaster, Jerseyville, Copetown, Alberton, Renforth and Carluke

1.2.2 Past and Present Land Use

During Pre-Contact and Early Contact times, the vicinity of the study area would have comprised a mixture of coniferous trees, deciduous trees and open areas. It seems clear that the First Nations managed the landscape to some degree, but the extent of such management is unknown. During the late 18th and early 19th centuries, Euro-Canadian settlers arrived in the area and began to clear the forests for agricultural and settlement purposes. The vicinity of the study area was relatively well-settled for the remainder of the Euro-Canadian period.

In an attempt to reconstruct the historic land use of the study area, ARA examined one patent plan, two historical maps that documented past residents, structures (e.g., homes, businesses and public buildings) and features during the 19th century, and one aerial image from the 20th century. Specifically, the following resources were consulted:

- The *Ancaster Township* Patent Plan (Date Unknown) at a scale of 40 chains to 1 inch (AO 2015);
- H. Gregory's *Map of the County of Wentworth, Canada West* (1859) at a scale of 50 chains to 1 inch (OHCMP 2016);
- The *Map of Township of Ancaster* from Page & Smith's *Illustrated Historical Atlas of the County of Wentworth, Ont.* (1875) at a scale of 2 inches to 1 mile (McGill University 2001); and
- An aerial image from 1960 (McMaster University 2016).

The limits of the study area are shown on georeferenced versions of the consulted historical resources in Map 2–Map 5. These resources indicate that the surrounding lands were well-settled by the mid-19th century. A variety of properties, structures and features are visible, and numerous landowners are identified (see Table 3).

Table 3: Occupational History and Past Land Uses

Lot	Concession	Patentee	1859	1875	1960
42	4	Steven Smith	Part of William M. Smith's property; no structures indicated	Part of Albert Smith's property; Smith farmhouse to the north	Agricultural lands west of tributary and southwest of road; homestead and orchard west of road
43	4	Nathaniel Pettit	Part of Joseph Smith's property; no structures indicated	Part of Joseph Smith's property; Smith farmhouse to the north; blacksmith shop at intersection	Agricultural lands throughout, save for wooded area in south adjacent to road

The current land use can be classified as a mixture of residential, agricultural and commercial.

1.3 Archaeological Context

The Stage 1 assessment was conducted on September 15, 2016 under PIF #P007-0769-2016. ARA utilized a Garmin eTrex 20 high-sensitivity WAAS-enabled GPS receiver with an accuracy of +/- 5 m (UTM17/NAD83) during the investigation. The limits of the study area within the accessible ROW were confirmed using project-specific GIS data translated into GPS points for reference in the field, in combination with georeferenced aerial imagery showing natural formations in relation to the project lands. The limits of the private properties could not be verified using the GPS, and were estimated based on the aerial imagery and natural formations.

The archaeological context of a given study area must be informed by the general condition of the property (Section 1.3.1), summaries of any previous archaeological work conducted within 50 m (Section 1.3.2) and whether there are any registered or known archaeological sites within 1 km (Section 1.3.3).

1.3.1 Condition of the Property

The study area lies within the deciduous forest, which is the southernmost forest region in Ontario and is dominated by agricultural and urban areas. This region generally has the greatest diversity of tree species, while at the same time having the lowest proportion of forest. It has most of the tree and shrubs species found in the Great Lakes–St. Lawrence forest (e.g., eastern white pine, red pine, eastern hemlock, white cedar, yellow birch, sugar and red maple, basswood, red oak, black walnut, butternut, tulip, magnolia, black gum, and many types of oaks and hickories), and also contains black walnut, butternut, tulip, magnolia, black gum, many types of oaks, hickories, sassafras and red bud (MNRF 2015).

Physiographically, the study area lies within the region known as the Haldimand Clay Plain, which consists of a series of parallel clay belts deposited during the time of glacial Lake Warren. This region occupies all of the Niagara Peninsula above the escarpment, and covers an area of roughly 3,500 sq. km. Although it was all once

submerged, the till is not entirely buried by the stratified clay and comes to the surface on the low morainic ridges in the north (Chapman and Putnam 1984:156–157). The soils within the study area consist of Muck (M) along the tributary of Big Creek and Springvale sandy loam (Sp) throughout the remainder of the parcels. Muck consists of organic soils that are very poorly drained, whereas Springvale sandy loam is a Grey-Brown Podzolic made up of sand over outwash gravel that is well-drained (Presant et al. 1965:Soil Map).

In terms of local watersheds, the subject lands fall within the Big Creek drainage basin, which forms part of the Grand River Conservation Authority (GRCA 2016). Specifically, the study area is traversed by an unnamed wetland, an unnamed waterbody and a tributary of Big Creek, and is located 42 m northeast of another unnamed wetland and 184 m northeast of another tributary of Big Creek.

At the time of assessment, the study area consisted of parts of several commercial, residential and agricultural properties, and comprised a mixture of agricultural lands, wooded areas, maintained lawns, driveways and part of a tributary of Big Creek. Field conditions were ideal during the assessment, with high ground surface visibility. No unusual physical features were encountered that affected the results of the Stage 1 assessment.

1.3.2 Previous Archaeological Work

The Ontario Archaeological Sites Database and the Ontario Public Register of Archaeological Reports were consulted to determine whether any archaeological assessments had been previously conducted within the limits of, or immediately adjacent to the study area. Specifically, reports documenting 1) assessments previously conducted within the project lands and 2) assessments that resulted in the discovery of archaeological sites that could extend onto the project lands were sought. As a result of this investigation, it was determined that there is one report on record documenting previous fieldwork within a 50 m radius. In accordance with the requirements set out in Section 7.5.8 of the S&Gs (MTC 2011:125), the relevant assessment and its associated recommendations are summarized below.

Six other parcels under consideration for the project were subject to Stage 1 assessment in May 2012 under PIF #P094-144-2012 (ASI 2012). The locations included Site 1 (north of Jerseyville Road West and east of Martin Road), Site 2 (north of Garner Road West and west of Braithwaite Avenue), Site 3 (part of 558 Fiddlers Green Road, between residential properties), Site 4 (part of 44 Garner Road East, east of Fiddlers Green Road), Site 5 (north of Garner Road East, west of Southcote Road and south of Harmony Hall Drive) and Site 6 (north of Garner Road East, in a field southeast of Fair Street). Site 3 and Site 4 are located immediately north of the subject study area, and are illustrated in the subject report mapping. The assessed parcels were found to comprise a mixture of areas of archaeological potential, areas of no archaeological potential and previously assessed areas. It was recommended that all of the identified areas of archaeological potential (including the entirety of Sites 3 and 4) be subject to a Stage 2 assessment (ASI 2012:12).

1.3.3 Registered or Known Archaeological Sites

The Ontario Archaeological Sites Database and the Ontario Public Register of Archaeological Reports were also consulted to determine whether any registered or known archaeological resources occur in the greater vicinity of the study area. As a result of this investigation, it was determined that there are 11 previously identified archaeological sites located within a 1 km radius. The characteristics of these sites are summarized in Table 4.

Table 4: Registered or Known Archaeological Sites within 1 km

Borden No.	Site Name (Identifier)	Time Period	Site Type	Assessment History	Assessment Results
AhGx-77	UG Kirkwall 8	Pre-Contact	Campsite	1986 (MPPA)	Assessment: Lithic scatter with 3 loci (Locus A: 25 x 10 m, Locus B: 35 x 15 m, Locus C: 45 x 10 m), 10 artifacts observed, further CHVI
AhGx-78	UG Kirkwall 25	Early Woodland	Campsite	1986 (MPPA)	Assessment: 35 x 20 m sparse lithic scatter, 8 artifacts observed, further CHVI
AhGx-79	UG Kirkwall 27	Pre-Contact	Campsite	1986 (MPPA)	Assessment: Scatter of unknown size, 12 artifacts observed, further CHVI
AhGx-90	UG Kirkwall 26	Late Archaic	Campsite	1986 (MPPA)	Assessment: 35 x 25 m sparse lithic scatter, 14 artifacts observed, further CHVI
AhGx-360	John Ryan	Early Woodland	Scatter	1995 (ASI)	Stage 3: 6,000 m sq. area, 87 artifacts observed (1 Meadowood point), no further CHVI
AhGx-379	N/A (P1)	Pre-Contact	Campsite	1995 (ASI)	Assessment: 600 sq. m area, 10 artifacts observed, further CHVI
AhGx-380	N/A (P4)	Early Archaic	Campsite	1995 (ASI)	Assessment: 200 sq. m area, 5 artifacts observed (1 Corner-Notched Horizon point), further CHVI
AhGx-381	N/A (P5)	Pre-Contact	Scatter	1995 (ASI)	Assessment: 400 sq. m area, 6 artifacts observed, further CHVI
AhGx-400	Marshall Estates	Late Archaic	Campsite	1994 (Jackson & Ariss)	Stage 1-3: 3 lithic scatters, unknown number of artifacts observed (Narrow Point Horizon point), further CHVI
				1998 (Jackson)	Stage 4: 280 one-metre units excavated, 2,000 artifacts observed, no further CHVI
AhGx-404	Marshall South	Middle and Late Archaic; Late Woodland	Campsite	Morrison (1998)	Stage 1–3: Small lithic and ceramic concentration, test unit excavation, unknown number of artifacts observed, further CHVI
				Morrison (1999)	Stage 4: All of the site has been excavated, 866 lithics and ceramics observed, no further CHVI within assessed area, but major portion remains on adjoining property

Borden No.	Site Name (Identifier)	Time Period	Site Type	Assessment History	Assessment Results
AhGx-405	Marshall North	Late Archaic, Middle Woodland	Campsite	Morrison (1998)	Stage 1–3: Small lithic and ceramic concentration, test unit excavation, unknown number of artifacts observed, further CHVI
				Morrison (1999)	Stage 4: All of the site has been excavated, 78 lithics and ceramics observed (2 Lamoka points), no further CHVI within assessed area, but major portion remains on adjoining property

None of these identified archaeological sites are located within or immediately adjacent to the project lands; accordingly, they have no potential to traverse the study area. AhGx-360 and AhGx-380 are located within 300 m of the study area, however, and must be considered as relevant features of archaeological potential. The presence of 11 previously identified sites in the vicinity of the study area demonstrates the desirability of this locality for early settlement.

2.0 STAGE 1 BACKGROUND STUDY

2.1 Background

The Stage 1 assessment involved background research to document the geography, history, previous archaeological fieldwork and current land condition of the study area. This desktop examination included research from both archival sources as well as current academic/archaeological publications. It also included the analysis of modern topographic maps, aerial photographs, satellite imagery, and historical maps/atlases of the most detailed scale available. The results of the research conducted for the background study are summarized below.

With occupation beginning approximately 11,000 years ago, the greater vicinity of the study area comprises a complex chronology of Pre-Contact and Post-Contact histories (see Section 1.2). Artifacts associated with Palaeo-Indian, Archaic, Woodland and Early Contact traditions are well-attested in the City of Hamilton, and Euro-Canadian archaeological sites dating to pre-1900 and post-1900 contexts are likewise common. The presence of 11 previously identified archaeological sites in the vicinity of the study area demonstrates the desirability of this locality for early settlement (see Section 1.3.3).

The natural environment of the study area would have been attractive to both Pre-Contact and Euro-Canadian populations as a result of proximity to the tributary of Big Creek. The well-drained soils would have been ideal for agriculture, and the diverse local vegetation would also have encouraged settlement throughout Ontario's lengthy history. Euro-Canadian populations would have been particularly drawn to Fiddlers Green Road and Garner Road, both of which were historically-surveyed thoroughfares.

In summary, the Stage 1 assessment included an up-to-date listing of sites from the MTCS's Ontario Archaeological Sites Database (within at least a 1 km radius), the consideration of previous local archaeological fieldwork (within at least a 50 m radius), the analysis of topographic and historic maps (at the most detailed scale available), and the study of aerial photographs/satellite imagery. In this manner, the standards for background research set out in Section 1.1 of the *S&Gs* (MTC 2011:14–15) were met.

2.2 Field Methods (Property Inspection)

In order to gain first-hand knowledge of the geography, topography and current condition of the study area, a property inspection was conducted on September 15, 2016. Environmental conditions were ideal during the inspection, with partly cloudy skies, a high of 17 °C and excellent lighting. ARA therefore confirms that fieldwork was carried out under weather and lighting conditions that met the requirements set out in Section 1.2 Standard 2 of the *S&Gs* (MTC 2011:16).

The study area was subjected to random spot-checking in accordance with the requirements set out in Section 1.2 of the *S&Gs* (MTC 2011:15–17). Specifically, the inspection began alongside 587 Fiddlers Green Road and progressed clockwise around the limits of the municipal ROW, terminating at 588 Fiddlers Green Road. The visually inspected areas were examined under ideal weather and lighting conditions with high ground surface visibility. Given that the observations were made from accessible public areas, additional areas of no archaeological potential may be identified within the private properties during on-site documentation.

The visual inspection confirmed that all surficial features of archaeological potential (e.g., historically-surveyed roadways, etc.) were present where they were previously identified, and did not result in the identification of any additional features of archaeological potential not visible on mapping (e.g., relic water channels, patches of well-drained soils, etc.). The inspection confirmed that parts of the study area were significantly disturbed by past construction activities. No other features (e.g., permanently wet lands, sloped lands, overgrown vegetation, heavier soils than expected, etc.) or significant built features (e.g., heritage structures, landscapes, plaques, monuments, cemeteries, etc.) that would affect assessment strategies were identified within the visually inspected area. Although it is clear that some of the lands along the tributary of Big Creek are permanently wet, the extent of the wet area could not be confirmed from the accessible public areas.

2.3 Analysis and Conclusions

In addition to relevant historical sources and the results of past archaeological assessments, the archaeological potential of a property can be assessed using its soils, hydrology and landforms as considerations. Section 1.3.1 of the *S&Gs* (MTC 2011:17–18) recognizes the following features or characteristics as indicators of archaeological potential: previously identified sites, water sources (past and present), elevated topography, pockets of well-drained sandy soil, distinctive land formations, resource areas, areas of Euro-Canadian settlement, early transportation routes, listed or designated properties, historic landmarks or sites, and areas that local histories or informants have identified with possible sites, events, activities or occupations.

The Stage 1 assessment resulted in the identification of numerous features of archaeological potential in the vicinity of the study area (see Map 6). The closest and most relevant indicators of archaeological potential (i.e., those that would directly affect survey interval requirements) include two primary water sources (two tributaries of Big Creek and two unnamed waterbodies), two secondary water sources (two unnamed wetlands), two historic roadways (Fiddlers Green Road and Garner Road), two registered archaeological sites (AhGx-360 and AhGx-380) and several historic structure localities visible in the *Map of Township of Ancaster* from Page & Smith's *Illustrated Historical Atlas of the County of Wentworth, Ont.* (1875). Hamilton's *Archaeology Management Plan* (City of Hamilton 2016:Appendix A-1) also indicates that the entire study area has archaeological potential (see Map 7). However, it should be noted that this modelling was not the result of a property-specific assessment and therefore does not fully account for land-use history and current conditions.

Although proximity to a feature of archaeological potential is a significant factor in the potential modelling process, current land conditions must also be considered. Section 1.3.2 of the *S&Gs* (MTC 2011:18) emphasizes that 1) quarrying, 2) major landscaping involving grading below topsoil, 3) building footprints and 4) sewage or infrastructure development can result in the removal of archeological potential, and Section 2.1 of the *S&Gs* (MTC 2011:28) states that 1) permanently wet areas, 2) exposed bedrock and 3) steep slopes (> 20°) can also be considered as having no archaeological potential.

ARA's visual inspection, coupled with the analysis of aerial photographs, satellite imagery, topographic mapping and digital environmental data, resulted in the identification of several areas of no archaeological potential within the visually inspected area. The identified areas of no archaeological potential can be summarized as follows:

- Deep land alterations have resulted in the removal of archaeological potential from 1) the western edge of 591 Fiddlers Green Road along the entrance to the Acer Garden Centre and 2) the western edge of 731 Fiddlers Green Road along the edge of the roadway. These areas had all clearly been impacted by past earth-moving/construction activities, resulting in the disturbance of the original soils to a significant depth (see Image 1–Image 2).

The remainder of the assessed area either has potential for Pre-Contact and Euro-Canadian archaeological materials, requires test pit survey to confirm the presence/extent of any subsurface disturbances, or must be subject to additional on-site documentation to confirm whether any areas of archaeological potential exist (see Image 3–Image 10). Background research did not identify any features indicating that the study area has potential for deeply buried archaeological materials.

The Stage 1 assessment determined that the study area comprised a mixture of areas of archaeological potential, areas of no archaeological potential and areas of indeterminate potential that require further on-site documentation. At the time of assessment, 45.63% (4.37 ha) of the study area had archaeological potential and fell within agricultural or plough-accessible areas, 31.29% (3.00 ha) had archaeological potential and fell within wooded or grassed areas located < 300 m from a feature of archaeological potential, 16.95% (1.62 ha) was likely disturbed but retains archaeological potential until such time as disturbance can be confirmed, 4.80% (0.46 ha) was likely permanently wet but requires visual inspection to confirm the extent of any wet areas and 1.33% (0.13 ha) was identified as disturbed. The identified areas of archaeological potential and areas of no archaeological potential are depicted in Map 8. The extent of the project lands ('study area') is depicted as a layer in this map, and a property parcel map is included in the submission package.

3.0 RECOMMENDATIONS

The Stage 1 assessment determined that the study area comprised a mixture of areas of archaeological potential, areas of no archaeological potential and areas of indeterminate potential that require further on-site documentation. ARA recommends that the identified areas of archaeological potential that could be impacted by the project be subject to a Stage 2 property assessment, and that the areas of indeterminate potential be subject to a visual inspection to determine whether further assessment is required.

The Stage 2 assessment must be conducted in accordance with Section 2.1 of the *S&Gs* (MTC 2011:28–39). Given that the areas of archaeological potential consist of both agricultural and non-agricultural lands, it is recommended that both the pedestrian survey and test pit survey methods be utilized to complete the assessment. Specifically, the following assessment strategies should be utilized:

- For recently cultivated or actively cultivated lands, the assessment must be conducted using the pedestrian survey method at an interval of ≤ 5 m. All ground surfaces must be recently ploughed (typically within the month prior to assessment), weathered by one heavy rainfall or several light rains, and provide at least 80% visibility. If archaeological materials are encountered, the transect interval must be decreased to 1 m and a close inspection of the ground must be conducted over a minimum of a 20 m radius around the find. This interval must be continued until the full extent of the scatter has been defined.
- For lands where ploughing is not possible or viable (i.e., the maintained lawns and wooded areas), the assessment must be conducted using the test pit survey method. A test pit survey interval of ≤ 5 m will be required due to the proximity of the lands to the identified features of archaeological potential. Each test pit must be excavated into at least the first 5 cm of subsoil, and the resultant pits must be examined for stratigraphy, potential features and/or evidence of fill. The soil from each test pit must be screened through mesh with an aperture of no greater than 6 mm and examined for archaeological materials. If archaeological materials are encountered, all PTPs must be documented and intensification may be required.
- Given the likelihood that the existing driveways, structural footprints and high-traffic commercial areas have been impacted by past construction activities, a combination of visual inspection and test pit survey should be utilized to confirm the extents of any disturbed areas in accordance with Section 2.1.8 of the *S&Gs* (MTC 2011:38). If disturbance cannot be confirmed, then test pit survey must occur as outlined above.
- The lands in the vicinity of the tributary of Big Creek must be subject to a visual inspection in accordance with the requirements set out in Section 1.2 of the *S&Gs* (MTC 2011:15–17) to determine the extent of any wet areas (these lands were not visible from the accessible public areas). If wet areas are not identified, then test pit survey must occur as outlined above.

The identified areas of no archaeological potential are not recommended for further assessment. It is requested that this report be entered into the *Ontario Public Register of Archaeological Reports*, as provided for in Section 65.1 of the *Ontario Heritage Act*.

4.0 ADVICE ON COMPLIANCE WITH LEGISLATION

Section 7.5.9 of the *S&Gs* requires that the following information be provided for the benefit of the proponent and approval authority in the land use planning and development process (MTC 2011:126–127):

- This report is submitted to the Minister of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI 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 MTCS, 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.
- 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 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 Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.
- 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*.
- The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 requires that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

5.0 IMAGES

Image 1: Disturbed Lands
(September 15, 2016; Facing Northeast)

Image 2: Disturbed Lands
(September 15, 2016; Facing Northwest)

Image 3: Field Conditions
(September 15, 2016; Facing Southeast)

Image 4: Field Conditions
(September 15, 2016; Facing East)

Image 5: Field Conditions
(September 15, 2016; Facing Northeast)

Image 6: Field Conditions
(September 15, 2016; Facing Southeast)

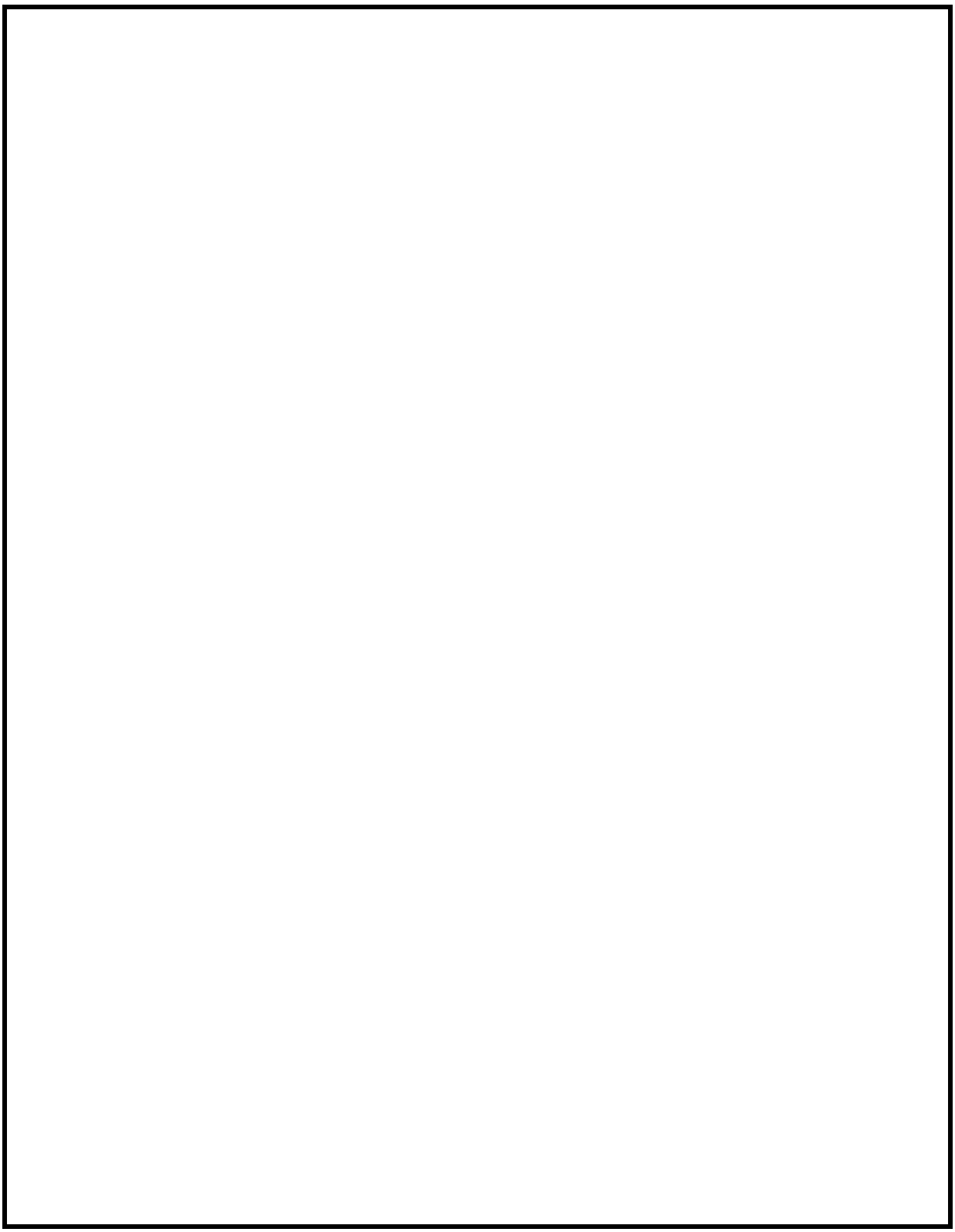
Image 7: Field Conditions
(September 15, 2016; Facing Northwest)

Image 8: Field Conditions
(September 15, 2016; Facing West)

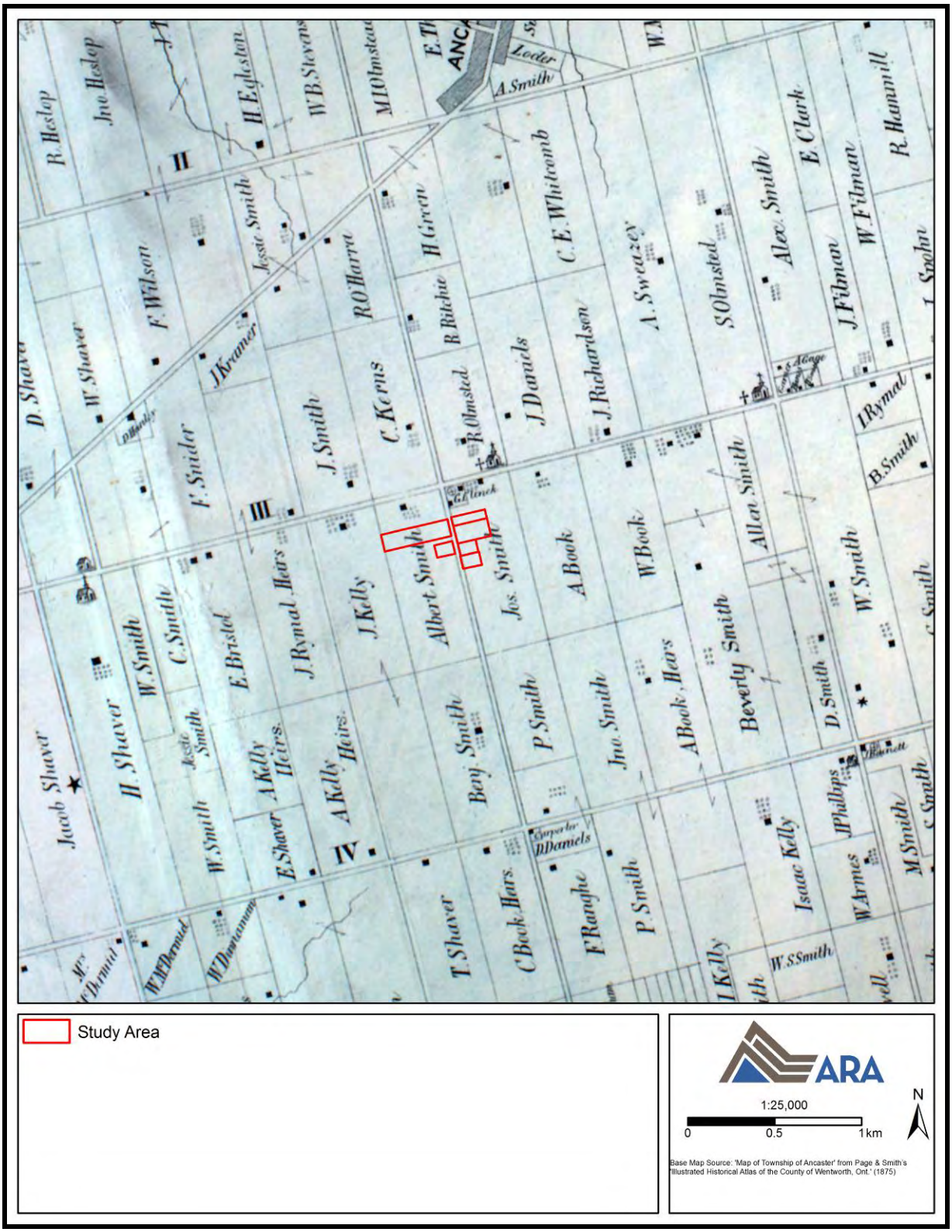
Image 9: Field Conditions
(September 15, 2016; Facing Northwest)

Image 10: Field Conditions
(September 15, 2016; Facing Southwest)

6.0 MAPS



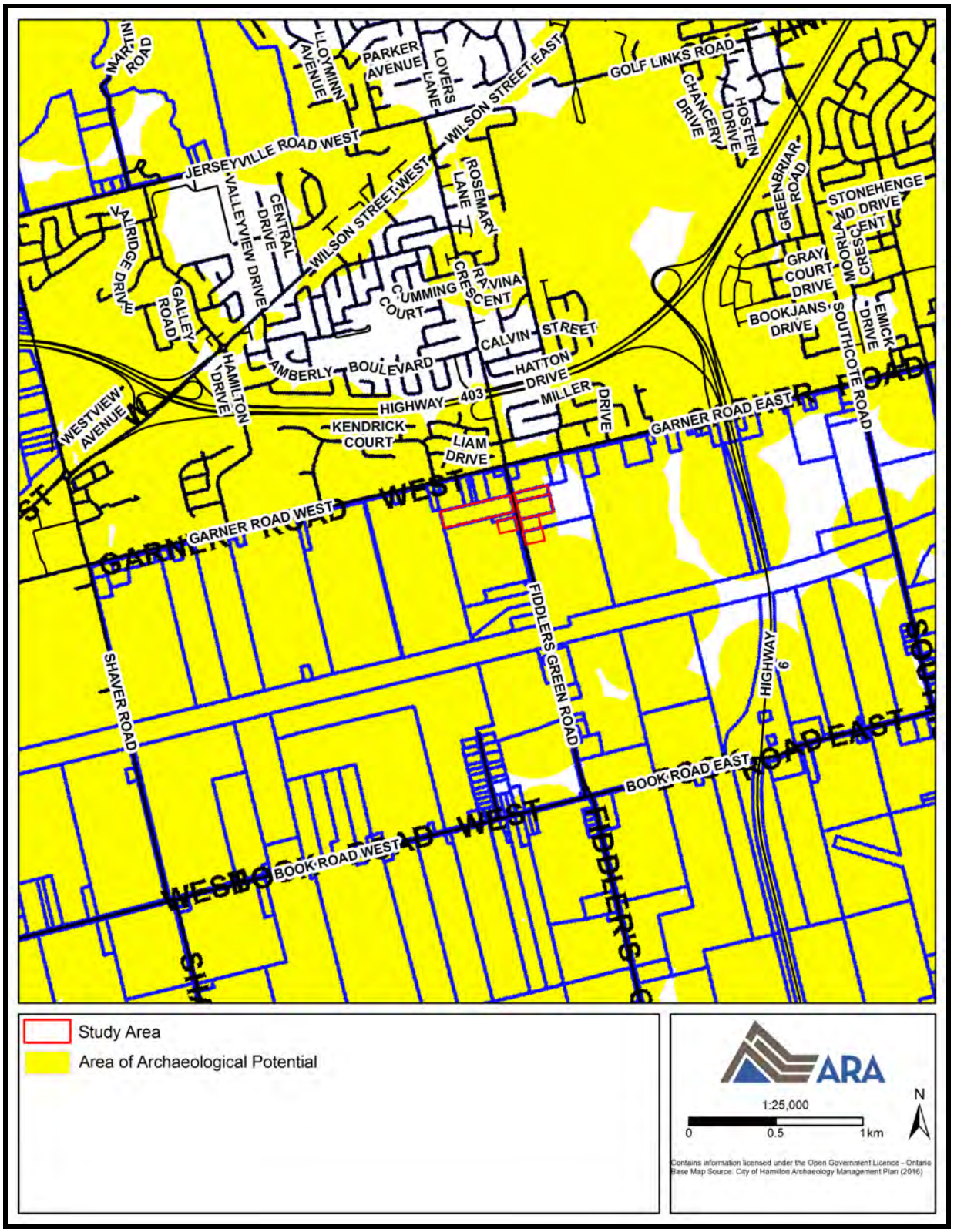
Map 1: Location of the Study Area
(Produced by ARA under licence using ArcGIS® software by Esri, © Esri)



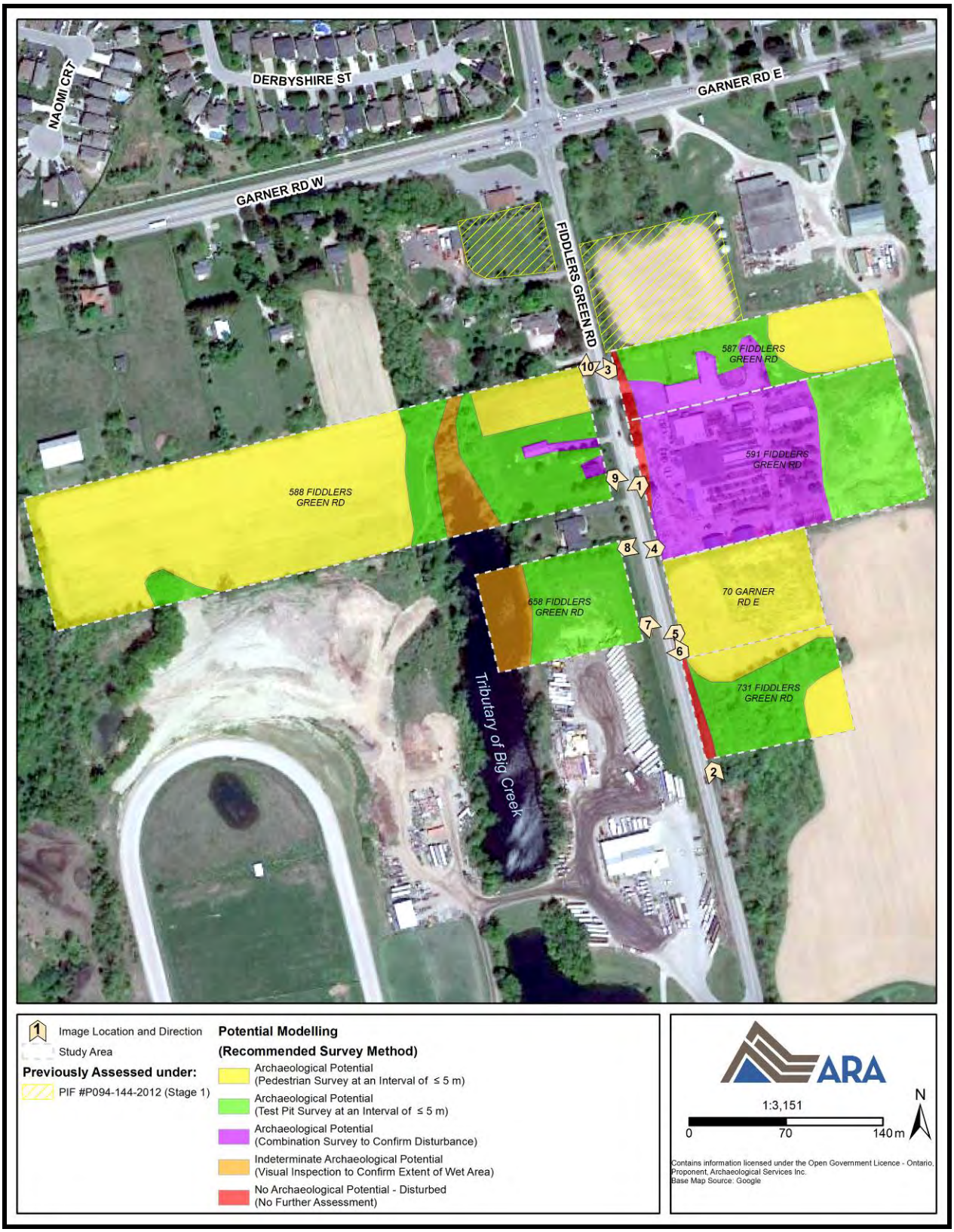
Map 4: Detail of the *Map of Township of Ancaster* from Page & Smith's *Illustrated Historical Atlas of the County of Wentworth, Ont.* (1875), Showing the Study Area
(Produced by ARA under licence using ArcGIS® software by Esri, © Esri; McGill University 2001)

Map 5: Aerial Image (1960), Showing the Study Area
(Produced by ARA under licence using ArcGIS® software by Esri, © Esri; McMaster University 2016)

Map 6: Features of Potential
(Produced by ARA under licence using ArcGIS® software by Esri, © Esri)



Map 7: Detail from Hamilton's *Archaeology Management Plan* (2016), Showing the Study Area
(Produced by ARA under licence using ArcGIS® software by Esri, © Esri; City of Hamilton 2016:Appendix A-1)



Map 8: Potential Modelling
(Produced by ARA under licence using ArcGIS® software by Esri, © Esri)

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Appendix D

CULTURAL AND BUILT HERITAGE ASSESSMENT

PRELIMINARY CULTURAL HERITAGE RESOURCE ASSESSMENT: BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES

EXISTING CONDITIONS – IMPACT ASSESSMENT

ANCASTER ELEVATED WATER RESERVOIR MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT CITY OF HAMILTON, ONTARIO

Prepared for:

Hamilton Water, Public Works Department, City of Hamilton
77 James Street North, Suite 400
Hamilton, ON L8R 2K3

ASI File: 16EA-248

September 2016 (Revised November 2016)

ASI Archaeological & Cultural Heritage Services
528 Bathurst Street Toronto, ONTARIO M5S 2P9
T 416-966-1069 F 416-966-9723 ASIheritage.ca

PRELIMINARY CULTURAL HERITAGE RESOURCE ASSESSMENT:
BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES

EXISTING CONDITIONS – IMPACT ASSESSMENT

ANCASTER ELEVATED WATER RESERVOIR
MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT
CITY OF HAMILTON, ONTARIO

EXECUTIVE SUMMARY

ASI was contracted by the City of Hamilton to conduct a Cultural Heritage Resource Assessment (CHRA) as part of the Ancaster Elevated Water Reservoir Municipal Class Environmental Assessment (EA). The purpose of this Class EA is to determine the preferred location to construct an elevated water reservoir within the study area. The study area is comprised of 12 potential site locations for the elevated water reservoir:

Site 1	Robert E. Wade Ancaster Community Park, 385 Jerseyville Road West
Site 2	James Smith Park, 50 Braithwaite Avenue
Site 3	Fiddlers Inn Property, 558 Fiddlers Green Road
Site 4	44 Garner Road East
Site 5	Municipal woodlot, 15 Maplevale Drive
Site 6	Proposed Ancaster Meadows Park on Vinton Road
Site 7	588 Fiddlers Green Road
Site 8	587 Fiddlers Green Road
Site 9	70 Garner Road East
Site 10	591 Fiddlers Green Road
Site 11	731 Fiddlers Green Road
Site 12	658 Fiddlers Green Road

The background research, data collection, and field review conducted for the study area determined that 11 cultural heritage resources are located within or adjacent to the 12 potential site locations for the Ancaster Elevated Water Reservoir. Based on the results of the assessment, the following recommendations have been developed.

1. Site selection for the proposed Ancaster Elevated Water Reservoir Class EA should be planned to avoid impacts to identified cultural heritage resources.

2. Should Site 3, 4 or 7 be selected as the preferred site for the elevated water reservoir, there is potential for direct and indirect impacts to CHR 7 (Site 3), CHR 8 (Site 4) and CHR 9 (Site 7). Further work should be undertaken to determine the heritage attributes that are associated with these heritage properties and how they may be impacted by the proposed elevated water reservoir. A property-specific Heritage Impact Assessment (HIA) by a qualified heritage consultant is recommended at the earliest stage possible, and should be used to inform selection of the proposed elevated water reservoir site. The HIA should follow the City of Hamilton's Terms of Reference for completing HIAs and the City of Hamilton should be consulted to confirm the scope of the HIA. The HIA must be submitted to municipal heritage staff for review, comment, and approval.

3. Should future work require an expansion of the study area, then a qualified heritage consultant should be contacted in order to confirm the impacts of the proposed work on potential cultural heritage resources.

4. This report should be submitted to heritage staff at the City of Hamilton and the Ministry of Tourism, Culture, and Sport for review and comment.

ASI

ARCHAEOLOGICAL SERVICES INC.
CULTURAL HERITAGE DIVISION

PROJECT PERSONNEL

Senior Project Manager:	Lindsay Graves, MA, CAHP *Cultural Heritage Specialist* *Assistant Manager, Cultural Heritage Division*
Project Coordinator:	Sarah Jagelewski, Hon. BA *Staff Archaeologist* *Assistant Manager, Environmental Assessment Division*
Project Administrator:	Carol Bella, Hon. BA *Research Archaeologist and Administrative Assistant*
Report Preparation:	Lindsay Graves John Sleath, MA *Cultural Heritage Assistant*
Graphics Preparation:	Blake Williams, MA *Geomatics Specialist*
Report Reviewer:	Katie Hull, PhD *Acting Manager, Cultural Heritage Division*

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1.0 INTRODUCTION

ASI was contracted by the City of Hamilton to conduct a Cultural Heritage Resource Assessment (CHRA) as part of the Ancaster Elevated Water Reservoir Municipal Class Environmental Assessment (EA). The purpose of this Class EA is to determine the preferred location to construct an elevated water reservoir within the study area (Figure 1). The study area is comprised of 12 potential site locations for the elevated water reservoir:

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Site 11	731 Fiddlers Green Road
Site 12	658 Fiddlers Green Road

The purpose of this report is to present a built heritage and cultural landscape inventory of cultural heritage resources, identify existing conditions of the study area, identify impacts to cultural heritage resources, and propose appropriate mitigation measures. This research was conducted under the senior project management of Lindsay Graves, ASI.

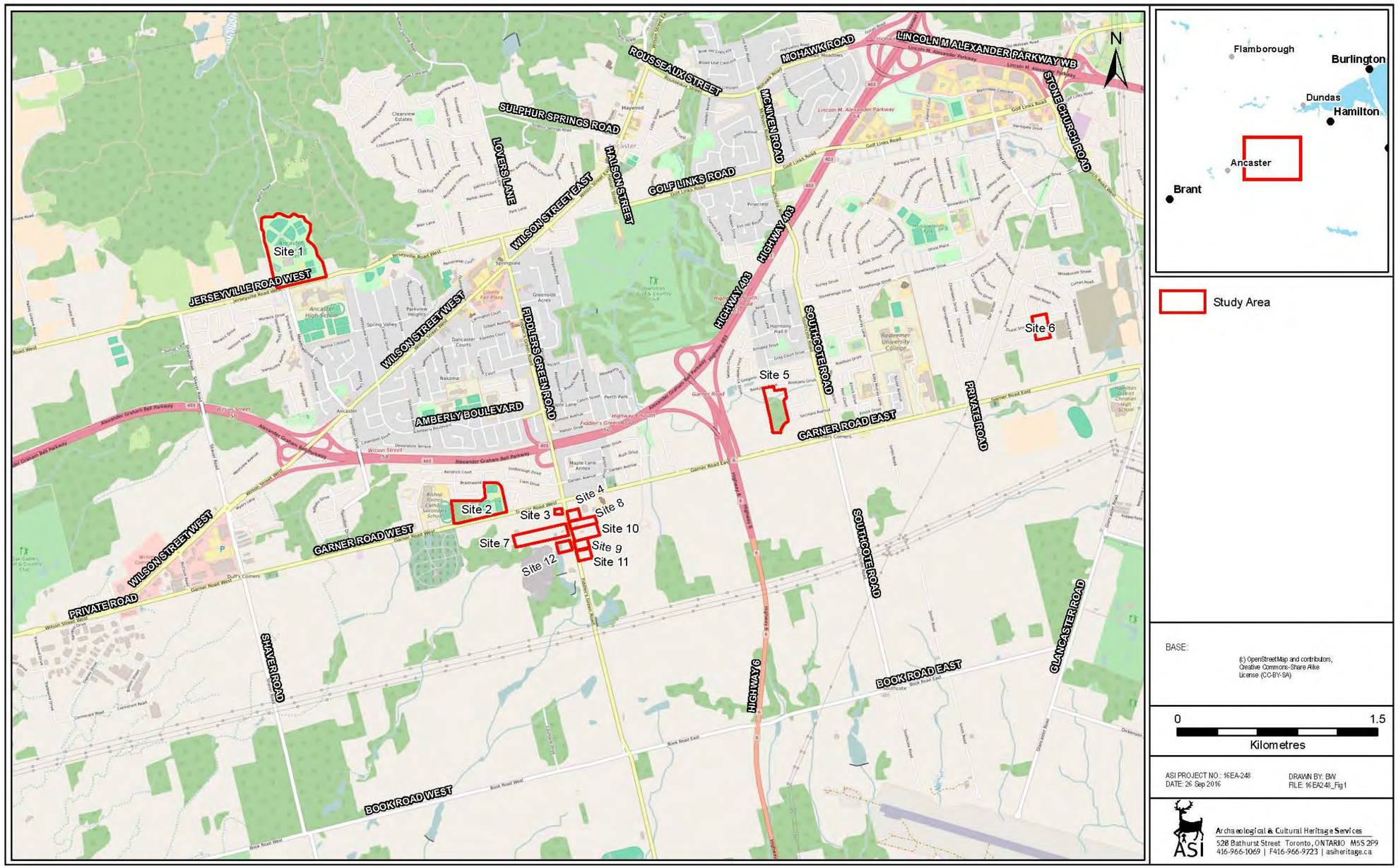

Figure 1: Location of the study area

Base Map:©OpenStreetMap and contributors, Creative Commons-Share Alike License (CC-BY-SA)

2.0 BUILT HERITAGE RESOURCE AND CULTURAL HERITAGE LANDSCAPE ASSESSMENT CONTEXT

2.1 Legislation and Policy Context

This cultural heritage assessment considers cultural heritage resources in the context of improvements to specified areas, pursuant to the *Environmental Assessment Act*. This assessment addresses above ground cultural heritage resources over 40 years old. Use of a 40 year old threshold is a guiding principle when conducting a preliminary identification of cultural heritage resources (Ministry of Transportation 2006; Ministry of Transportation 2007; Ontario Realty Corporation 2007). While identification of a resource that is 40 years old or older does not confer outright heritage significance, this threshold provides a means to collect information about resources that may retain heritage value. Similarly, if a resource is slightly younger than 40 years old, this does not preclude the resource from retaining heritage value.

For the purposes of this assessment, the term cultural heritage resources was used to describe both cultural heritage landscapes and built heritage resources. A cultural landscape is perceived as a collection of individual built heritage resources and other related features that together form farm complexes, roadscapes and nucleated settlements. Built heritage resources are typically individual buildings or structures that may be associated with a variety of human activities, such as historical settlement and patterns of architectural development.

The analysis throughout the study process addresses cultural heritage resources under various pieces of legislation and their supporting guidelines. Under the *Environmental Assessment Act* (1990) environment is defined in Subsection 1(c) to include:

- cultural conditions that influence the life of man or a community, and;
- any building, structure, machine, or other device or thing made by man.

The Ministry of Tourism, Culture and Sport is charged under Section 2 of the *Ontario Heritage Act* with the responsibility to determine policies, priorities and programs for the conservation, protection and preservation of the heritage of Ontario and has published two guidelines to assist in assessing cultural heritage resources as part of an environmental assessment: *Guideline for Preparing the Cultural Heritage Resource Component of Environmental Assessments* (1992), and *Guidelines on the Man-Made Heritage Component of Environmental Assessments* (1981). Accordingly, both guidelines have been utilized in this assessment process.

The *Guidelines on the Man-Made Heritage Component of Environmental Assessments* (Section 1.0) states the following:

> When speaking of man-made heritage we are concerned with the works of man and the effects of his activities in the environment rather than with movable human artifacts or those environments that are natural and completely undisturbed by man.

In addition, environment may be interpreted to include the combination and interrelationships of human artifacts with all other aspects of the physical environment, as well as with the social, economic and cultural conditions that influence the life of the people and communities in Ontario. The *Guidelines on the Man-Made Heritage Component of Environmental Assessments* distinguish between two basic ways of visually experiencing this heritage in the environment, namely as cultural heritage landscapes and as cultural features.

Within this document, cultural heritage landscapes are defined as the following (Section 1.0):

> The use and physical appearance of the land as we see it now is a result of man's activities over time in modifying pristine landscapes for his own purposes. A cultural landscape is perceived as a collection of individual man-made features into a whole. Urban cultural landscapes are sometimes given special names such as townscapes or streetscapes that describe various scales of perception from the general scene to the particular view. Cultural landscapes in the countryside are viewed in or adjacent to natural undisturbed landscapes, or waterscapes, and include such land uses as agriculture, mining, forestry, recreation, and transportation. Like urban cultural landscapes, they too may be perceived at various scales: as a large area of homogeneous character; or as an intermediate sized area of homogeneous character or a collection of settings such as a group of farms; or as a discrete example of specific landscape character such as a single farm, or an individual village or hamlet.

A cultural feature is defined as the following (Section 1.0):

> …an individual part of a cultural landscape that may be focused upon as part of a broader scene, or viewed independently. The term refers to any man-made or modified object in or on the land or underwater, such as buildings of various types, street furniture, engineering works, plantings and landscaping, archaeological sites, or a collection of such objects seen as a group because of close physical or social relationships.

The Minister of Tourism, Culture, and Sport has also published *Standards and Guidelines for Conservation of Provincial Heritage Properties* (April 2010; Standards and Guidelines hereafter). These Standards and Guidelines apply to properties the Government of Ontario owns or controls that have cultural heritage value or interest. They are mandatory for ministries and prescribed public bodies and have the authority of a Management Board or Cabinet directive. Prescribed public bodies include:

- Agricultural Research Institute of Ontario
- Hydro One Inc.
- Liquor Control Board of Ontario
- McMichael Canadian Art Collection
- Metrolinx
- The Niagara Parks Commission.
- Ontario Heritage Trust
- Ontario Infrastructure Projects Corporation
- Ontario Lottery and Gaming Corporation
- Ontario Power Generation Inc.
- Ontario Realty Corporation
- Royal Botanical Gardens
- Toronto Area Transit Operating Authority
- St. Lawrence Parks Commission

The Standards and Guidelines provide a series of definitions considered during the course of the assessment:

A provincial heritage property is defined as the following (14):

> Provincial heritage property means real property, including buildings and structures on the property, that has cultural heritage value or interest and that is owned by the Crown in right of Ontario or by a prescribed public body; or that is occupied by a ministry or a prescribed public body if the terms of the occupancy agreement are such that the ministry or public body is entitled to make the alterations to the property that may be required under these heritage standards and guidelines.

A provincial heritage property of provincial significance is defined as the following (14):

> Provincial heritage property that has been evaluated using the criteria found in Ontario Heritage Act O.Reg. 10/06 and has been found to have cultural heritage value or interest of provincial significance.

A built heritage resource is defined as the following (13):

> …one or more significant buildings (including fixtures or equipment located in or forming part of a building), structures, earthworks, monuments, installations, or remains associated with architectural, cultural, social, political, economic, or military history and identified as being important to a community. For the purposes of these Standards and Guidelines, "structures" does not include roadways in the provincial highway network and in-use electrical or telecommunications transmission towers.

A cultural heritage landscape is defined as the following (13):

> … a defined geographical area that human activity has modified and that has cultural heritage value. Such an area involves one or more groupings of individual heritage features, such as structures, spaces, archaeological sites, and natural elements, which together form a significant type of heritage form distinct from that of its constituent elements or parts. Heritage conservation districts designated under the Ontario Heritage Act, villages, parks, gardens, battlefields, mainstreets and neighbourhoods, cemeteries, trails, and industrial complexes of cultural heritage value are some examples.

Additionally, the *Planning Act* (1990) and related *Provincial Policy Statement* (*PPS*), which was updated in 2014, make a number of provisions relating to heritage conservation. One of the general purposes of the *Planning Act* is to integrate matters of provincial interest in provincial and municipal planning decisions. In order to inform all those involved in planning activities of the scope of these matters of provincial interest, Section 2 of the *Planning Act* provides an extensive listing. These matters of provincial interest shall be regarded when certain authorities, including the council of a municipality, carry out their responsibilities under the *Act*. One of these provincial interests is directly concerned with:

> 2.(d) the conservation of features of significant architectural, cultural, historical, archaeological or scientific interest

Part 4.7 of the *PPS* states that:

> The official plan is the most important vehicle for implementation of this Provincial Policy Statement. Comprehensive, integrated and long-term planning is best achieved through official plans.

> Official plans shall identify provincial interests and set out appropriate land use designations and policies. To determine the significance of some natural heritage features and other resources, evaluation may be required.
>
> Official plans should also coordinate cross-boundary matters to complement the actions of other planning authorities and promote mutually beneficial solutions. Official plans shall provide clear, reasonable and attainable policies to protect provincial interests and direct development to suitable areas.
>
> In order to protect provincial interests, planning authorities shall keep their official plans up-to-date with this Provincial Policy Statement. The policies of this Provincial Policy Statement continue to apply after adoption and approval of an official plan.

Those policies of particular relevance for the conservation of heritage features are contained in Section 2- Wise Use and Management of Resources, wherein Subsection 2.6 - Cultural Heritage and Archaeological Resources, makes the following provisions:

> 2.6.1 Significant built heritage resources and significant cultural heritage landscapes shall be conserved.

A number of definitions that have specific meanings for use in a policy context accompany the policy statement. These definitions include built heritage resources and cultural heritage landscapes.

A *built heritage resource* is defined as: "a building, structure, monument, installation or any manufactured remnant that contributes to a property's cultural heritage value or interest as identified by a community, including an Aboriginal community" (PPS 2014).

A *cultural heritage landscape* is defined as "a defined geographical area that may have been modified by human activity and is identified as having cultural heritage value or interest by a community, including an Aboriginal community. The area may involve features such as structures, spaces, archaeological sites or natural elements that are valued together for their interrelationship, meaning or association" (PPS 2014). Examples may include, but are not limited to farmscapes, historic settlements, parks, gardens, battlefields, mainstreets and neighbourhoods, cemeteries, trailways, and industrial complexes of cultural heritage value.

In addition, significance is also more generally defined. It is assigned a specific meaning according to the subject matter or policy context, such as wetlands or ecologically important areas. With regard to cultural heritage and archaeology resources, resources of significance are those that are valued for the important contribution they make to our understanding of the history of a place, an event, or a people (*PPS* 2014).

Criteria for determining significance for the resources are recommended by the Province, but municipal approaches that achieve or exceed the same objective may also be used. While some significant resources may already be identified and inventoried by official sources, the significance of others can only be determined after evaluation (*PPS* 2014).

Accordingly, the foregoing guidelines and relevant policy statement were used to guide the scope and methodology of the cultural heritage assessment.

2.2 Data Collection

In the course of the cultural heritage assessment, all potentially affected cultural heritage resources are subject to inventory. Short form names are usually applied to each resource type, (e.g. barn, residence). Generally, when conducting a preliminary identification of cultural heritage resources, three stages of research and data collection are undertaken to appropriately establish the potential for and existence of cultural heritage resources in a particular geographic area.

Background historical research, which includes consultation of primary and secondary source research and historic mapping, is undertaken to identify early settlement patterns and broad agents or themes of change in a study area. This stage in the data collection process enables the researcher to determine the presence of sensitive heritage areas that correspond to nineteenth and twentieth-century settlement and development patterns. To augment data collected during this stage of the research process, federal, provincial, and municipal databases and/or agencies are consulted to obtain information about specific properties that have been previously identified and/or designated as retaining cultural heritage value. Typically, resources identified during these stages of the research process are reflective of particular architectural styles, associated with an important person, place, or event, and contribute to the contextual facets of a particular place, neighbourhood, or intersection.

A field review is then undertaken to confirm the location and condition of previously identified cultural heritage resources. The field review is also utilised to identify cultural heritage resources that have not been previously identified on federal, provincial, or municipal databases.

Several investigative criteria are utilised during the field review to appropriately identify new cultural heritage resources. These investigative criteria are derived from provincial guidelines, definitions, and past experience. During the course of the environmental assessment, a built structure or landscape is identified as a cultural heritage resource if it is considered to be 40 years or older, and if the resource satisfies at least one of the following criteria:

Design/Physical Value:

- It is a rare, unique, representative or early example of a style, type, expression, material or construction method.
- It displays a high degree of craftsmanship or artistic merit.
- It demonstrates a high degree of technical or scientific achievement.
- The site and/or structure retains original stylistic features and has not been irreversibly altered so as to destroy its integrity.
- It demonstrates a high degree of excellence or creative, technical or scientific achievement at a provincial level in a given period.

Historical/Associative Value:

- It has a direct association with a theme, event, belief, person, activity, organization, or institution that is significant to: the City of Hamilton; the Province of Ontario; or Canada.
- It yields, or has the potential to yield, information that contributes to an understanding of the history of the: the City of Hamilton; the Province of Ontario; or Canada.
- It demonstrates or reflects the work or ideas of an architect, artist builder, designer, or theorist who is significant to: the City of Hamilton; the Province of Ontario; or Canada.
- It represents or demonstrates a theme or pattern in Ontario's history.
- It demonstrates an uncommon, rare or unique aspect of Ontario's cultural heritage.

- It has a strong or special association with the entire province or with a community that is found in more than one part of the province. The association exists for historic, social, or cultural reasons or because of traditional use.
- It has a strong or special association with the life or work of a person, group or organization of importance to the province or with an event of importance to the province.

Contextual Value:

- It is important in defining, maintaining, or supporting the character of an area.
- It is physically, functionally, visually, or historically linked to its surroundings.
- It is a landmark.
- It illustrates a significant phase in the development of the community or a major change or turning point in the community's history.
- The landscape contains a structure other than a building (fencing, culvert, public art, statue, etc.) that is associated with the history or daily life of that area or region.
- There is evidence of previous historic and/or existing agricultural practices (e.g. terracing, deforestation, complex water canalization, apple orchards, vineyards, etc.)
- It is of aesthetic, visual or contextual important to the province.

If a resource meets one of these criteria it will be identified as a cultural heritage resource and is subject to further research where appropriate and when feasible. Typically, detailed archival research, permission to enter lands containing heritage resources, and consultation is required to determine the specific heritage significance of the identified cultural heritage resource.

When identifying cultural heritage landscapes, the following categories are typically utilized for the purposes of the classification during the field review:

Farm complexes:	comprise two or more buildings, one of which must be a farmhouse or barn, and may include a tree-lined drive, tree windbreaks, fences, domestic gardens and small orchards.
Roadscapes:	generally two-lanes in width with absence of shoulders or narrow shoulders only, ditches, tree lines, bridges, culverts and other associated features.
Waterscapes:	waterway features that contribute to the overall character of the cultural heritage landscape, usually in relation to their influence on historic development and settlement patterns.
Railscapes:	active or inactive railway lines or railway rights of way and associated features.
Historical settlements:	groupings of two or more structures with a commonly applied name.
Streetscapes:	generally consists of a paved road found in a more urban setting, and may include a series of houses that would have been built in the same time period.

Historical agricultural landscapes:	generally comprises a historically rooted settlement and farming pattern that reflects a recognizable arrangement of fields within a lot and may have associated agricultural outbuildings, structures, and vegetative elements such as tree rows.
Cemeteries:	land used for the burial of human remains.

Results of the desktop data collection are contained in Sections 3.0. Once fieldwork has been undertaken further sections will provide recommendations with respect to potential impacts of the undertaking on identified cultural heritage resources.

3.0 BUILT HERITAGE RESOURCE AND CULTURAL HERITAGE LANDSCAPE ASSESSMENT

3.1 Introduction

This section provides a brief summary of historic research and a description of identified above ground cultural heritage resources that may be affected by the proposed undertaking. A review of available primary and secondary source material was undertaken to produce a contextual overview of the study area, including a general description of Euro-Canadian settlement. Historically, the study area is located in the former Township of Ancaster, County of Wentworth.

3.2 Historical Euro-Canadian Land Use: Township Survey and Settlement

The land within Ancaster Township was acquired by the British from the Mississauga First Nation in 1784. The first township survey was undertaken in 1793, and the first legal settlers occupied their land holdings two years later. The township is said to have been named after a small market town in the County of Lincolnshire, England. Ancaster was one of the largest townships at the Head-of-the-Lake and was quickly settled due to the vast expanse of good land suitable for farming. Ancaster was initially settled by disbanded soldiers, mainly Butler's Rangers, and other Loyalists following the end of the American Revolutionary War. Many early land grants were made in payment to men who had been militia members in the war however one large group of twenty-two families, known as "James Wilson and Associates", had cleared and settled on lands within Ancaster four years before the land surveyors had arrived. After appealing to the Land Board they were allowed to retain these properties. In 1805, Boulton (1805) noted that this township contained both excellent and indifferent soils. By the 1840s, the township was noted for its fine farms and was populated by a number of industries in the latter part of the nineteenth century, including the Ancaster Knitting Factory. By 1875, Ancaster was famous for mineral springs found in the township, the waters from which were considered therapeutic and medicinal. Ancaster remained a rural township until the mid-twentieth century, when housing subdivision construction began to take up farmland and increase the population. The Town of Ancaster became part of the City of Hamilton in 2001 (Armstrong 1985:141; Boulton 1805:79; Fraser 1930:38; Kernighan 1875:8; Rayburn 1997:11; Smith 1846:6).

3.3 Review of Historic Mapping

The *1875 Illustrated Atlas of the County of Wentworth* were examined to determine the presence of historic features within the study area during the nineteenth century (Figures 2 - 5). Details of historic property owners and historic features in the study area are listed in Table 1.

It should be noted, however, that not all features of interest were mapped systematically in the Ontario series of historical atlases, given that they were financed by subscription, and subscribers were given preference with regard to the level of detail provided on the maps. Moreover, not every feature of interest would have been within the scope of the atlases.

Table 1: Nineteenth-century property owner(s) and historical features(s)

			1875	
Site #	**Con #**	**Lot #**	**Property Owner(s)**	**Historical Feature(s)**
1	II	39	Jno. Heslop	Farmhouse and orchard
2	III	41	J. Smith	Farmhouse and orchard
3	IV	42	Albert Smith	Farmhouse and orchard
4	IV	43	Jos. Smith	Farmhouse and orchard
5	III	47	S. Obinsted	Farmhouse and several orchards, church and cemetery at southwest corner
6	III	52	Lampman, Heirs	Farmhouse and orchard
7	IV	42	Albert Smith	Farmhouse and orchard
8	IV	42	Albert Smith	Farmhouse and orchard
9	IV	43	Jos. Smith	Farmhouse and orchard
10	IV	43	Jos. Smith	Farmhouse and orchard
11	IV	43	Jos. Smith	Farmhouse and orchard
12	IV	43	Jos. Smith	Farmhouse and orchard

A review of twentieth-century mapping (Figures 6 – 9) provides a more details illustration of dwellings, roads, settlements, and other features such as bridges, trails, and community features such as schools, churches and cemeteries.

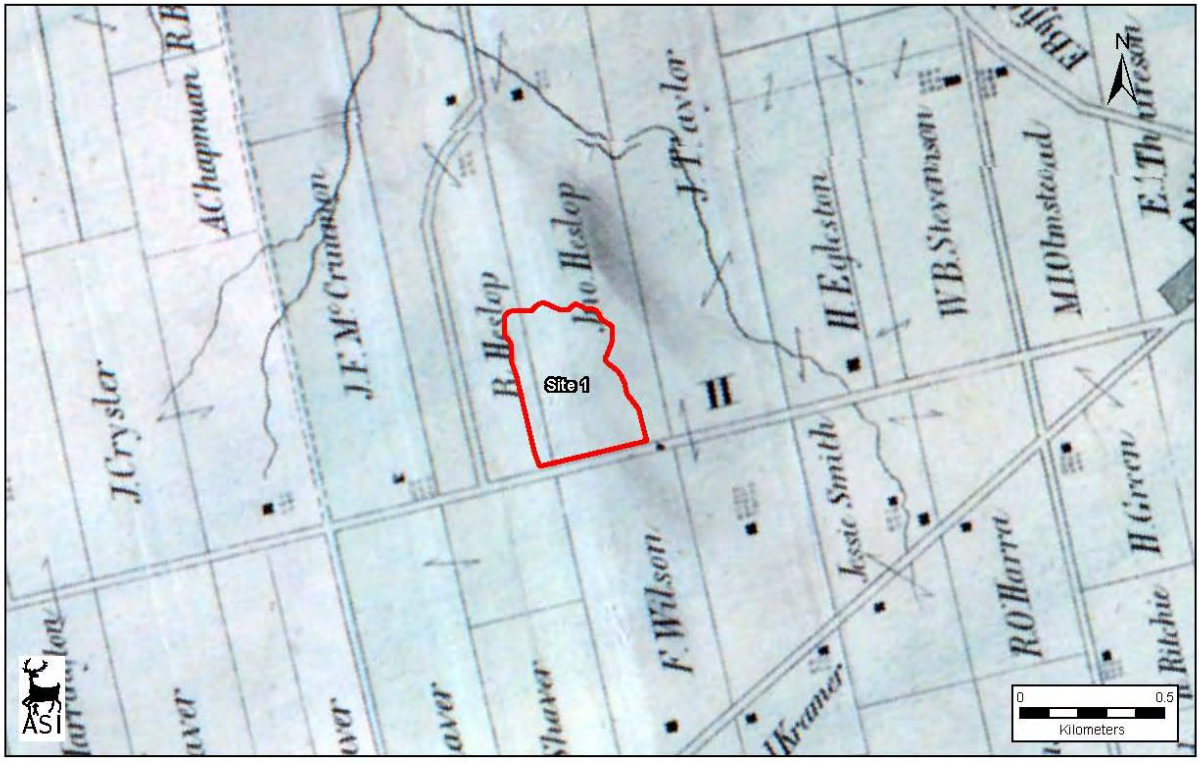

Figure 2: Location of Site 1 overlaid on the 1875 map of the County of Wentworth
Source: Page & Smith 1875

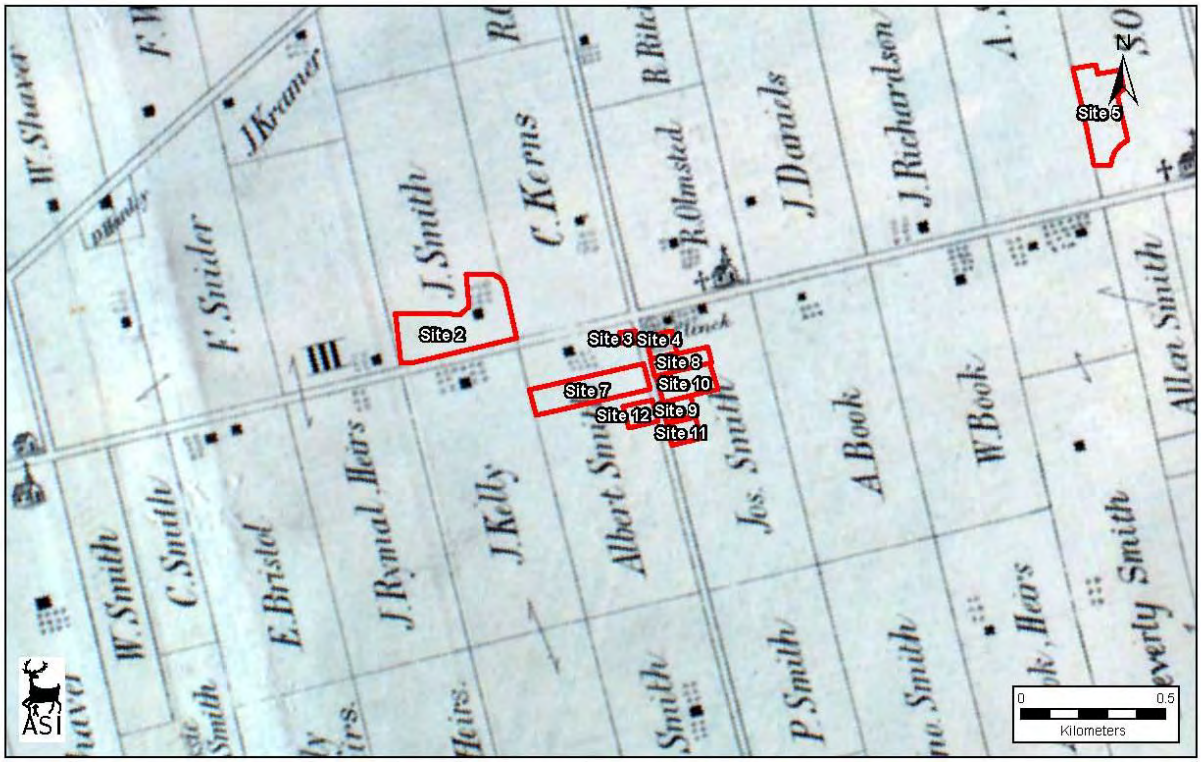

Figure 3: Location of Sites 2 -4 and 7 - 12 overlaid on the 1875 map of the County of Wentworth
Source: Page & Smith 1875

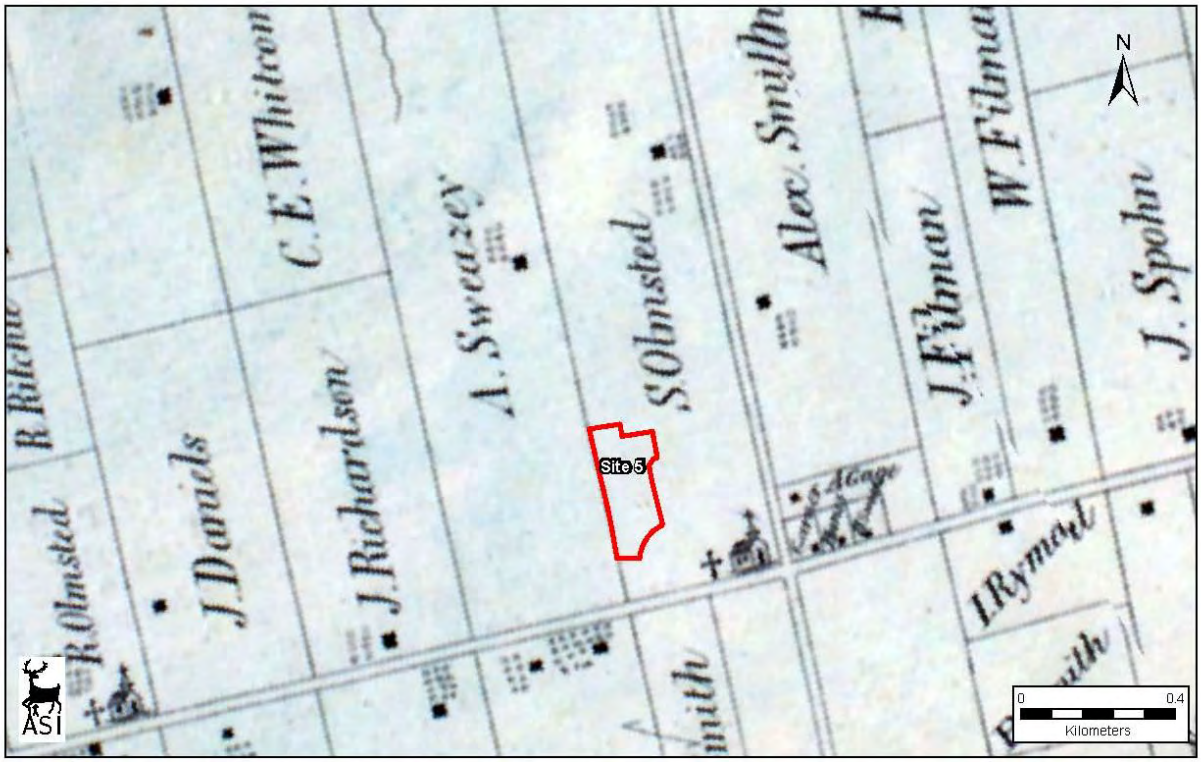

Figure 4: Location of Site 5 overlaid on the 1875 map of the County of Wentworth
Source: Page & Smith 1875

Figure 5: Location of Site 6 overlaid on the 1875 map of the County of Wentworth
Source: Page & Smith 1875

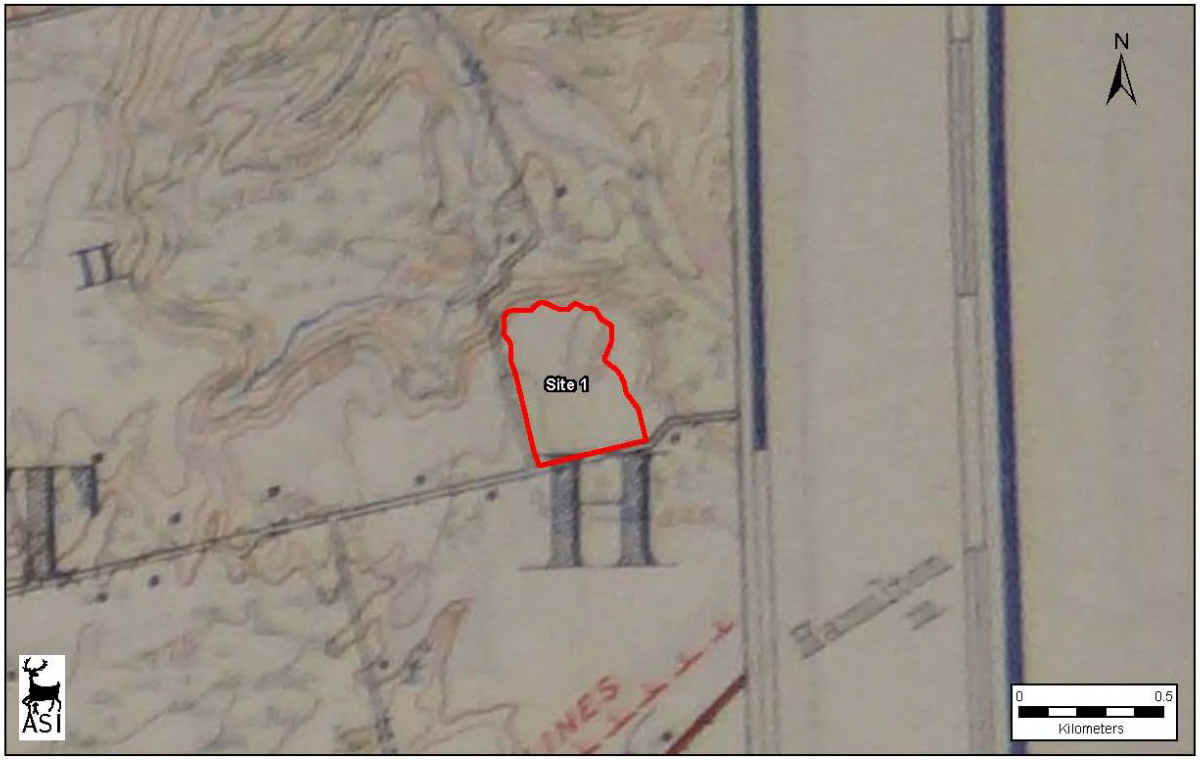

Figure 6: Location of Site 1 on 1934 topographic mapping
Source: Department of National Defence Brantford Sheet 1934

Figure 7: Location of Site 1 on 1930 topographic mapping
Source: Department of National Defence Grimsby Sheet 1930

Figure 8: Location of Site 1 on 1930 topographic mapping
Source: Department of National Defence Grimsby Sheet 1930

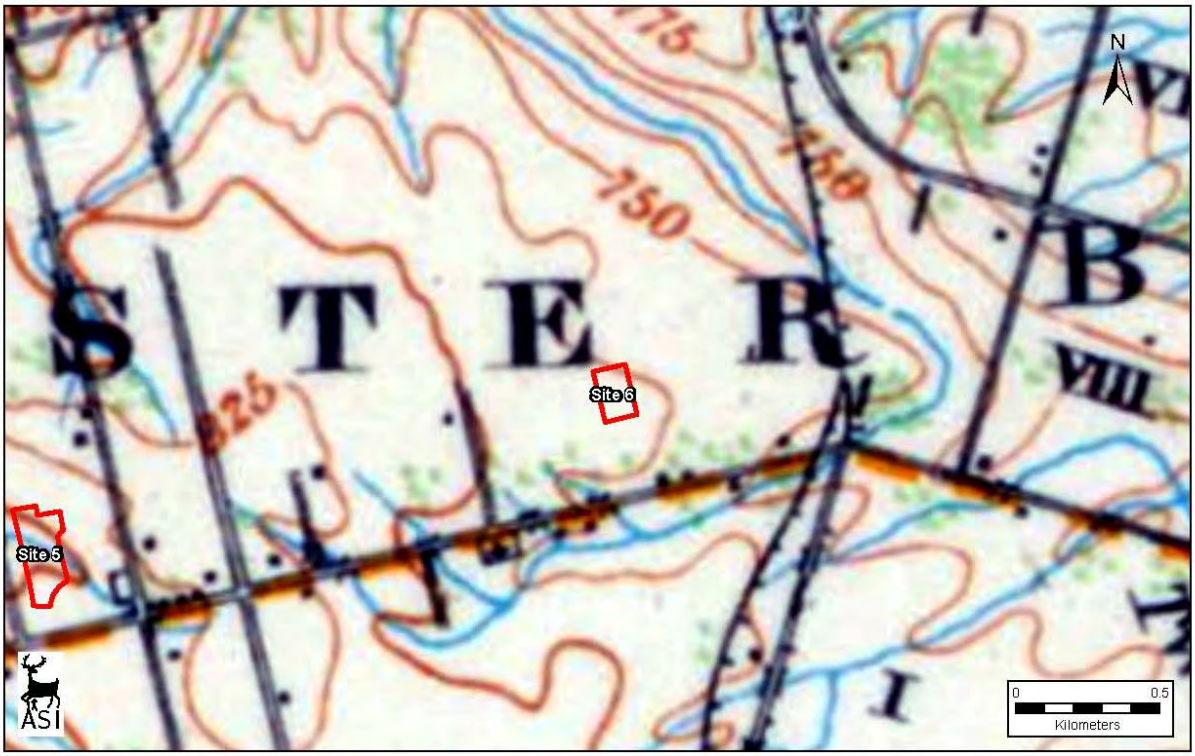

Figure 9: Location of Site 1 on 1930 topographic mapping
Source: Department of National Defence Grimsby Sheet 1930

3.4 Existing Conditions

In order to make a preliminary identification of existing cultural heritage resources within the study area, the following resources were consulted:

- The City of Hamilton's Heritage Volumes, providing information about properties designated under Parts IV and V of the *Ontario Heritage Act*, properties listed in the municipal heritage inventory, the Canadian Inventory of Historic Buildings, and information about Hamilton's bridges;
- City of Hamilton heritage staff provided initial comments on this report and identified a number of properties that were currently in the process of being added to the heritage inventory or where municipal addresses have changed (via email, September 28, 2016);
- Park's Canada's *Canada's Historic Places* website: available online, the searchable register provides information on historic places recognized for their heritage value at the local, provincial, territorial and national levels; and
- Park's Canada's *Directory of Federal Heritage Designation,* a searchable on-line database of National Historic Sites, National Historic Events, National Historic People, Heritage Railway Stations, Federal Heritage Buildings, and Heritage Lighthouses.

A review of available federal, provincial and municipal heritage registers and inventories revealed that there are 11 cultural heritage resources previously identified by the City of Hamilton within or adjacent to the study area.

A field review was undertaken by Lindsay Graves of ASI on 01 November 2016, to document the existing conditions of the study area. The field review was preceded by a review of available, current and historic, aerial photographs and maps (including online sources such as Bing and Google maps). These large-scale maps were reviewed for any potential cultural heritage resources which may be extant in the study area. The existing conditions of the 12 potential site locations for the Ancaster Elevated Water Reservoir are described in Section 3.4.1. Identified cultural heritage resources are described in Section 3.4.2 and Section 8.0. The location of the 12 potential elevated water reservoir sites and the location of the 11 identified cultural heritage resources and are mapped in Section 9.0 of this report.

3.4.1 Description of Study Area

Site 1 is located at 385 Jerseyville Road West on the north side of Jerseyville Road West and east of Martin Road (Plate 1). The property is comprised of the Robert E. Wade Ancaster Community Centre, parking areas, and outdoor athletic fields. The property can be accessed by both Martin Road and Jerseyville Road West. The property is surrounded by a large wooded area with recreational trails that is owned by the Hamilton Conservation Authority. There are no known or potential cultural heritage resources identified on the property associated with Site 1. There is one adjacent heritage property that shares the northern and eastern property boundaries with the community park (CHR 1).

Site 2 is located at 50 Braithwaite Avenue on the north side of Garner Road West and west of Braithwaite Avenue (Plate 2). Known as James Smith Park, the property is comprised of outdoor athletic fields, parking areas, tennis courts, pathways linking the park to the surrounding neighbourhood, and a wooded area towards the west end of the property. There are no known or potential cultural heritage resources identified on the property associated with Site 2. There are two heritage properties located nearby to the west and southwest of Site 2 (CHR 2 and CHR 3).

Site 3 is located at 558 Fiddlers Green Road. It is the former Fiddlers Inn Property (Plate 3). The property is comprised of a nineteenth-century brick farmhouse surrounded by mature vegetation and lawns, a work/storage area towards the northwest part of the property, and an open green space surrounded by evergreen trees at the northeast part of the property. Site 3 is located within the open green space surrounded by evergreen trees. The property at 558 Fiddlers Green Road is a previously identified heritage property (CHR 7).

Site 4 is located at 44 Garner Road East (Plate 4). The property is comprised of the Jerome Brothers Farm and Market. It includes a large warehouse set back from the road, brick and frame outbuildings, a nineteenth-century farmhouse set closer to the road, a mid-twentieth-century residence at the northwest corner of the property, parking area and lawns in front of the warehouse, and cultivated fields at the southwest part of the property. Site 4 is located within the cultivated fields in the southwest part of the property, closer to Fiddlers Green Road. The property at 44 Garner Road East is a previously identified heritage property (CHR 8).

Site 5 is located at 15 Maplevale Drive (Plate 5), and is bounded by Bookjans Drive to the north and Mapleview Drive to the east. It is comprised of a wooded area that is surrounded by a modern residential subdivision on the north and east, a subdivision currently under construction to the west, and mid to late twentieth-century residential properties to the south that front on to Garner Road East. There are no known or potential cultural heritage resources identified on the property associated with Site 5. Further, there are no known or potential cultural heritage resources located adjacent to Site 5.

Site 6 is located on the proposed Ancaster Meadows Park on Vinton Road (Plate 6). The property is comprised of undeveloped vacant land in the western half, and a school currently under construction on the east half. There are no known or potential cultural heritage resources identified on the property associated with Site 6. There is one previously identified heritage property located nearby to the south of Site 6 (CHR 11).

Site 7 is located at 588 Fiddlers Green Road (Plate 7). The property is comprised of a nineteenth-century residence, an outbuilding, mature vegetation, landscaped lawns, cultivated fields, wooded areas and part of a pond. The entire property parcel is identified as Site 7. The property at 588 Fiddlers Green Road is a previously identified heritage property (CHR 9).

Site 8 is located at 587 Fiddlers Green Road (Plate 8). The property is comprised of a single warehouse and associated parking and storage areas. There are no known or potential cultural heritage resources identified on the property associated with Site 8. There are two adjacent heritage properties: CHR 8 to the north; and CHR 10 to the east.

Site 9 is located at 70 Garner Road East (Plate 9). The property is comprised of the Ancaster Christian Reformed Church, which fronts on to Garner Road East, and cultivated fields. Site 9 is located in an area of cultivated fields that is adjacent to Fiddlers Green Road, at the southwest corner of the property. The property at 70 Garner Road East is a previously identified heritage property (CHR 10). In addition, there are three adjacent heritage properties: CHR 5 to the north; CHR 6 to the east; and CHR 8 to the west.

Site 10 is located at 591 Fiddlers Green Road (Plate 10). The property is comprised of a garden centre and nursery, and associated parking and storage/showcase areas. There are no known or potential cultural heritage resources identified on the property associated with Site 10. There is one adjacent heritage property: CHR 10 to the east and south.

Site 11 is located at 731 Fiddlers Green Road (Plate 11). The property is comprised of cultivated fields and a wooded area along Fiddlers Green Road. The proposed area for Site 11 within this property is at the northwest corner, which is a wooded area surrounded by cultivated fields. There are no known or potential cultural heritage resources identified on the property associated with Site 11. There is one adjacent heritage property: CHR 10 to the north.

Site 12 is located at 658 Fiddlers Green Road (Plate 12). The property is owned by a transportation company and features a warehouse and storage areas for trucks and containers. The property is also comprised of a pond, which extends northerly into Site 7. The proposed area for Site 12 within this property is located at the northeast corner, which is surrounded by berms and was not visible from the public right-of-way. It appears to be vacant land on recent aerial imagery. There are no known or potential cultural heritage resources identified on the property associated with Site 12. There are two adjacent heritage properties: CHR 9 to the north; and CHR 10 to the east.


Plate 1: North elevation of the community centre.


Plate 2: View of James Smith Park from the southeast corner.


Plate 3: View of Site 3 located at the north end of 558 Fiddlers Green Road.


Plate 4: View of Site 4 at the southwest corner of 44 Garner Road East.

Plate 5: View of the wooded area at Site 5, looking south from Bookjans Drive.

Plate 6: View of an undeveloped open space at Site 6, looking southeast from Vinton Road.

Plate 7: Front elevation of house located at Site 7.

Plate 8: View of Site 8, looking east from the road.

Plate 9: View of Site 9, looking east from the road.

Plate 10: View of Site 10, looking east from the road.

Plate 11: View looking south towards the wooded Site 11.

Plate 12: View looking west from Fiddlers Green Road to Site 12.

3.4.2 Identified Cultural Heritage Resources

Based on the results of the background research and field review, 11 cultural heritage resources were identified within and/or adjacent to the study area (Table 2). A detailed inventory of these cultural heritage resources is presented in Section 8.0 and mapping of these features is provided in Section 9.0 of this report.

Table 2: Summary of cultural heritage resources (CHR) within and/or adjacent to the study area

Feature	Location/Name	Recognition	Description/Comments
CHR 1	838 Mineral Springs Road	Part IV Designation, By-law No. 79-26	"Woodend", located adjacent to Site 1
CHR 2	245 Garner Road West (formerly Hwy 53 West)	Part IV Designation, By-law No. 04-065	"Marshall House", located near Site 2
CHR 3	254 Garner Road West (formerly Hwy 53 West)	Inventory of Buildings of Architectural and/or Historical Interest	Located near Site 2
CHR 4	4 Garner Road East (formerly Hwy 53 East)	Inventory of Buildings of Architectural and/or Historical Interest	Located near Sites 3 and 4
CHR 5	99 Garner Road East (formerly Hwy 53 East)	Inventory of Buildings of Architectural and/or Historical Interest	"White Brick Church and Cemetery", located near Site 4
CHR 6	114 Garner Road East (formerly Hwy 53 East)	Inventory of Buildings of Architectural and/or Historical Interest	Located near Site 4
CHR 7	558 Fiddlers Green Road	Inventory of Buildings of Architectural and/or Historical Interest	Located at Site 3
CHR 8	44 Garner Road East (formerly Hwy 53 East)	Inventory of Buildings of Architectural and/or Historical Interest	Located at Site 4
CHR 9	588 Fiddlers Green Road	Inventory of Buildings of Architectural and/or Historical Interest	Located at Site 7
CHR 10	70 Garner Road	Volume 7A – Places of Worship	Located at Site 9

Table 2: Summary of cultural heritage resources (CHR) within and/or adjacent to the study area

Feature	Location/Name	Recognition	Description/Comments
CHR 11	East 1021 Garner Road East	Heritage Inventory Inventory of Buildings of Architectural and/or Historical Interest	Located near Site 6. "Lampman Stone House", currently in process of being listed to the Heritage Register.

4.0 SCREENING FOR POTENTIAL IMPACTS

To assess the potential impacts of the undertaking, identified cultural heritage resources are considered against a range of possible impacts as outlined in the document entitled *Screening for Impacts to Built Heritage and Cultural Heritage Landscapes* (MTC November 2010) which include:

- Destruction, removal or relocation of any, or part of any, significant heritage attribute or feature (III.1).
- Alteration which means a change in any manner and includes restoration, renovation, repair or disturbance (III.2).
- Shadows created that alter the appearance of a heritage attribute or change the exposure or visibility of a natural feature or plantings, such as a garden (III.3).
- Isolation of a heritage attribute from its surrounding environment, context, or a significant relationship (III.4).
- Direct or indirect obstruction of significant views or vistas from, within, or to a built or natural heritage feature (III.5).
- A change in land use such as rezoning a battlefield from open space to residential use, allowing new development or site alteration to fill in the formerly open spaces (III.6).
- Soil disturbance such as a change in grade, or an alteration of the drainage pattern, or excavation, etc (III.7)

A number of additional factors are also considered when evaluating potential impacts on identified cultural heritage resources. These are outlined in a document set out by the Ministry of Culture and Communications (now Ministry of Tourism, Culture and Sport) and the Ministry of the Environment entitled *Guideline for Preparing the Cultural Heritage Resource Component of Environmental Assessments* (October 1992) and include:

- Magnitude: the amount of physical alteration or destruction which can be expected;
- Severity: the irreversibility or reversibility of an impact;
- Duration: the length of time an adverse impact persists;
- Frequency: the number of times an impact can be expected;
- Range: the spatial distribution, widespread or site specific, of an adverse impact; and
- Diversity: the number of different kinds of activities to affect a heritage resource.

For the purposes of evaluating potential impacts of development and site alteration, MTC (2010) defines "adjacent" as: "contiguous properties as well as properties that are separated from a heritage property by narrow strip of land used as a public or private road, highway, street, lane, trail, right-of-way, walkway, green space, park, and/or easement or as otherwise defined in the municipal official plan."

4.1 Potential Impacts to Cultural Heritage Resources

The following table (Table 3) considers the impacts of the 12 potential elevated water reservoir site locations on identified cultural heritage resources. The impacts are based on the Ministry of Tourism and Culture document entitled *Screening for Impacts to Built Heritage and Cultural Heritage Landscapes* (November 2010). Table 3 also recommends mitigation strategies.

Table 3: Impacts to identified cultural heritage resources and recommended mitigation strategies

Resource	Impacts	Recommendations
CHR 1	Following field review a review of the Part IV Designation By-law and list of heritage attributes associated with this heritage property, it was determined that there will be no direct or indirect impacts resulting from Site 1 on this adjacent heritage property.	There are no further concerns.
CHR 2	Following field review and a review of the Part IV Designation By-law and list of heritage attributes associated with this heritage property, it was determined that there will be no direct or indirect impacts resulting from Site 2 on this heritage property. It was noted during field review that this property is visually and physically separated from Site 2 by vegetative screening and a sport field associated with a nearby school.	There are no further concerns.
CHR 3	This property is located to the southwest of Site 2, on the south side of Garner Road West. Following field review and preliminary evaluation of cultural heritage values associated with this property, it was determined that there will be no direct or indirect impacts from Site 2 on this property.	There are no further concerns.
CHR 4	This property is located immediately north of Site 4. While Site 4 is on an adjacent property, it is in close proximity to the heritage property. Following field review and preliminary evaluation of cultural heritage values associated with this property, it was determined that there will be no direct or indirect impacts from Site 4 on this property.	There are no further concerns.
CHR 5	This property is located northeast of Site 4, Site 8 and Site 10, on the north side of	There are no further concerns.

Table 3: Impacts to identified cultural heritage resources and recommended mitigation strategies

Resource	Impacts	Recommendations
	Garner Road East. It was noted during field review that this property is visually and physically separated from Site 4, 8 and 10 by several properties, buildings and vegetative screening. Following field review and preliminary evaluation of cultural heritage values associated with this property, it was determined that there will be no direct or indirect impacts from Site 4, 8 and 10 on this property.	
CHR 6	This property is located east of Site 4, Site 8 and Site 10, on the south side of Garner Road East. It was noted during field review that this property is visually and physically separated from Site 4, 8 and 10 by several properties, buildings and vegetative screening. Following field review and preliminary evaluation of cultural heritage values associated with this property, it was determined that there will be no direct or indirect impacts from Site 4, 8 and 10 on this property.	There are no further concerns.
CHR 7	Site 3 is located on the northeastern part of this property. It has the potential to directly and indirectly impact this cultural heritage resource through alterations (III.2) and the creation of shadows (III.3).	Further work should be undertaken to determine the heritage attributes that are associated with this property, and how they may be impacted by the proposed elevated water reservoir. A property-specific Heritage Impact Assessment is recommended.
CHR 8	Site 4 is located on the western part of this property. While the elevated water reservoir would be sited at a distance from any buildings on the property, it still has the potential to directly impact this cultural heritage resource through alterations (III.2) to the property.	Further work should be undertaken to determine the heritage attributes that are associated with this property, and how they may be impacted by the proposed elevated water reservoir. A property-specific Heritage Impact Assessment is recommended.
CHR 9	Site 7 encompasses this entire property. It has the potential to directly and indirectly impact this cultural heritage resource through alterations (III.2), the creation of shadows (III.3) and the obstruction of significant views or vistas (III.4).	Further work should be undertaken to determine the heritage attributes that are associated with this property, and how they may be impacted by the proposed elevated water reservoir. A property-specific Heritage Impact Assessment is recommended.
CHR 10	Site 9 is located on the western part of this property. Specifically, it will be situated on fields associated with this property. Given that the cultural heritage value of this property is associated with the Ancaster Christian Reformed Church,	There are no further concerns.

Table 3: Impacts to identified cultural heritage resources and recommended mitigation strategies

Resource	Impacts	Recommendations
	which is located at a great distance from Site 9, and not with the surrounding fields which do not have any relationship to the Church, it was determined that there will be no direct or indirect impacts from Site 9 on this property. Site 8, Site 10 and Site 11 are also located adjacent to this property, and more specifically, adjacent to fields associated with CHR 10. Given that these cultivated fields are not associated with the Church, it was determined that there will be no direct or indirect impacts from Site 8, Site 10 and Site 11 on this property.	
CHR 11	This property is located to the south of Site 6, on the north side of Garner Road East. The property is separated from Site 6 by a couple of fields which are likely to become developed as part of the surrounding residential subdivision development. Following field review and preliminary evaluation of cultural heritage values associated with this property, it was determined that there will be no direct or indirect impacts from Site 6 on this property.	There are no further concerns.

5.0 CONCLUSIONS

The results of background historic research and a review of secondary source material, including historic mapping, revealed that the general study area has a long rural history of agricultural development. A total of 11 cultural heritage resources were identified within, or adjacent to, the 12 potential site locations for the Ancaster Elevated Water Reservoir. The following provides a summary of the assessment results:

- All 11 cultural heritage resources have previously been identified as heritage properties. Of these, two are Part IV Heritage Designations (CHR 1 and CHR 2);

- Of the 11 cultural heritage resources, three are former farmhouses/farmsteads (CHR 1, CHR 2, CHR 3); one is a farmstead (CHR 8); five are residences (CHR 4, CHR 6, CHR 7, CHR 9, and CHR 11); one is a nineteenth-century church and cemetery (CHR 5); and one is a late twentieth-century church (CHR 10); and

- Identified cultural heritage resources are historically, architecturally, and contextually associated with early nineteenth to mid twentieth-century land use patterns in the former Township of Ancaster.

The following summarizes potential impacts of the 12 potential elevated water reservoir site locations on identified cultural heritage resources:

- Eight of the 11 cultural heritage resources will not be directly or indirectly impacted (CHR 1, CHR 2, CHR 3, CHR 4, CHR 5, CHR 6, CHR 10 and CHR 11), and three of the 11 cultural heritage resources will potentially be directly or indirectly impacted (CHR 7, CHR 8, and CHR 9);

- More specifically:
    - Site 1: no impacts to identified CHRs;
    - Site 2: no impacts to identified CHRs;
    - Site 3: potential direct/indirect impacts to CHR 7;
    - Site 4: potential direct/indirect impacts to CHR 8;
    - Site 5: no impacts to identified CHRs;
    - Site 6: no impacts to identified CHRs;
    - Site 7: potential direct/indirect impacts to CHR 9;
    - Site 8: no impacts to identified CHRs;
    - Site 9: no impacts to identified CHRs;
    - Site 10: no impacts to identified CHRs;
    - Site 11: no impacts to identified CHRs; and
    - Site 12: no impacts to identified CHRs.

6.0 RECOMMENDATIONS

The background research, data collection, and field review conducted for the study area determined that 11 cultural heritage resources are located within or adjacent to the 12 potential site locations for the Ancaster Elevated Water Reservoir. Based on the results of the assessment, the following recommendations have been developed.

1. Site selection for the proposed Ancaster Elevated Water Reservoir Class EA should be planned to avoid impacts to identified cultural heritage resources.

2. Should Site 3, 4 or 7 be selected as the preferred site for the elevated water reservoir, there is potential for direct and indirect impacts to CHR 7 (Site 3), CHR 8 (Site 4) and CHR 9 (Site 7). Further work should be undertaken to determine the heritage attributes that are associated with these heritage properties and how they may be impacted by the proposed elevated water reservoir. A property-specific Heritage Impact Assessment (HIA) by a qualified heritage consultant is recommended at the earliest stage possible, and should be used to inform selection of the proposed elevated water reservoir site. The HIA will follow the City of Hamilton's Terms of Reference for completing HIAs and the City of Hamilton should be consulted to confirm the scope of the HIA. The HIA must be submitted to municipal heritage staff for review, comment, and approval.

3. Should future work require an expansion of the study area, then a qualified heritage consultant should be contacted in order to confirm the impacts of the proposed work on potential cultural heritage resources.

4. This report should be submitted to heritage staff at the City of Hamilton and the Ministry of Tourism, Culture, and Sport for review and comment.

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8.0 CULTURAL HERITAGE RESOURCE INVENTORY

Table 4: Inventory of cultural heritage resources (CHR) in the study area

Resource	Type	Address/Location	Recognition	Description	Photos
CHR 1	Former farmhouse, presently part of a recreational park.	838 Mineral Springs Road Located adjacent to Site 1	Part IV Designation, By-law. 79-26 (See Appendix A for full list of heritage attributes) Known as “Woodend”	Historical: - The farmhouse on this property, known as “Woodend”, was built in 1862 for Ancaster’s first Reeve and Warden of the County, John Heslop - It was later bought by George Donald in 1958, who restored the house - It was donated to the Hamilton Region Conservation Authority in 1971 and continues to be used by the Authority as their headquarters Design: - An excellent example of the Victorian Gothic Revival style, as illustrated by the three-gabled front facade, steep gable roof, pointed windows, tall chimneys, bargeboard and brackets - Stone construction - Surrounded by open space - The original Laing garden layout is intact (according to Designation By-law) - It has a large modern extension to the west Context: - Sited on elevated land overlooking Mineral Springs Road, which is in keeping with the picturesque landscape-architecture principles of the day - The farmhouse is approximately 2 km north of Site 1, between which there are a network of recreational trails and streams through a hilly, wooded landscape	 Northeast elevation of the former farmhouse Source: www.conservationhamilton.ca
CHR 2	Former farmhouse, presently a private school	245 Garner Road West (formerly Hwy 53 West) Located near Site 2	Part IV Designation, By-law No. 04-065 (See Appendix A for full list of heritage attributes) Known as “Marshall House”	Historical: - Associated with the Rymal and Marshall families, and with early agricultural development in Ancaster Design: - Rare surviving example of Pre-Confederation stone construction - Two-storey, vernacular interpretation of the Italianate architectural style, as illustrated by the hipped roof, symmetrical arrangement of front facade featuring three bays with central projecting bay, and central front door with transom and sidelights and arched second floor window above, tall chimneys, and wood fascia and eaves with wood brackets - Landscape features noted in the Designation By-law include: front and side yards with grassy open space; existing grades and topography; driveway leading to the west side of the house; and coniferous tree in the front yard Context: - Sited prominently on elevated land overlooking Garner Road West - No longer associated with agricultural fields or agricultural outbuildings	 South (front) elevation of the former farmhouse, looking across Garner Road Source: ASI

Resource	Type	Address/Location	Recognition	Description	Photos
CHR 3	Former farmhouse, presently an office for a cemetery	254 Garner Road West (formerly Hwy 53 West) Located near Site 2	Inventory of Buildings of Architectural and/or Historical Interest	Historical: - Associated with the Rymal family, and with early agricultural development in Ancaster Design: - One-and-a-half storey brick Ontario Gothic farmhouse on stone foundations - Features gable roof with gable dormers, one-over-one pane windows with stone sills and segmentally-arched brick voussoirs - Front facade faces west and is comprised of a three-bay arrangement with central entrance flanked by windows and second storey window and central gable dormer - Frame porch on side elevation facing the road - Likely has been altered following conversion into office space for the surrounding cemetery, as evidenced by the boarding up of the main and side entrances on the west and north elevations Context: - Sited on elevated land overlooking Garner Road West - No longer associated with agricultural fields or agricultural outbuildings	 Northwest elevation of the former farmhouse, from Garner Road Source: ASI
CHR 4	Residence	4 Garner Road East (formerly Hwy 53 East) Located near Sites 3 and 4	Inventory of Buildings of Architectural and/or Historical Interest	Historical: - Associated with the G. Clinck family, who owned 2 acres of land at the corner of Garner Road and Fiddlers Green Road in 1875 Design: - One-and-a-half storey brick Ontario Gothic farmhouse on stone foundations - The front facade faces north towards Garner Road and is comprised of a three-bay arrangement with central projecting frontispiece, gable roof, and central wood-panelled door with transom and sidelight surrounds - Modern dormer on the west elevation - The house is hidden by overgrown vegetation and more details regarding the house design are not visible from the public right-of-way Context: - The house is situated very close to the road - The property extends further back, no other buildings or landscape features of potential historical interest were noted	 Oblique view of the north elevation of the residence at 4 Garner Road East Source: ASI

Resource	Type	Address/Location	Recognition	Description	Photos
CHR 5	White Brick Church and Cemetery	99 Garner Road East (formerly Hwy 53 East) Located near Site 4	Inventory of Buildings of Architectural and/or Historical Interest	Historical: - Present church was built in 1857 on land donated by John Rymal - Cemetery internment are largely from the nineteenth century Design: - The church features a front-facing gable roof, wood fascia and return eaves, white brick exterior, stone foundations, gothic window and front door opening, and large wood panel double door on the front elevation - Concrete steps with four risers lead from a grassy open space in front of the church - Gravestones are located to the north and west of the church, and the property is surrounded by modern post-and-wire fencing - A wooded area is located to the east of church Context: - The church and cemetery are located in close proximity to Garner Road East at the corner of Anson Drive - The property serves as a distinctive community and historical landmark	 Oblique view of the north elevation of the residence at 4 Garner Road East Source: ASI
CHR 6	Residence	114 Garner Road East (formerly Hwy 53 East) Located near Site 4	Inventory of Buildings of Architectural and/or Historical Interest	Historical: - Associated with the Book family, and with early agricultural development in Ancaster Design: - This is a one-and-a-half storey frame house with gable roof, board-and-batten siding, and foundations covered with concrete - The house has new windows, doors, and siding - The overall massing and scale of the house is indicative of a late nineteenth-century vernacular farmhouse - The house is surrounding by grassy open space, mature vegetation, and is linked to Garner Road East by a long gravel driveway - No barns or agricultural outbuildings were noted on the property Context: - It is located across the road from the White Brick Church and Cemetery - Sited on elevated land overlooking Garner Road East - No longer associated with agricultural fields or agricultural outbuildings	 North (front) elevation of the residence at 114 Garner Road East Source: ASI

Resource	Type	Address/Location	Recognition	Description	Photos
CHR 7	Residence	558 Fiddlers Green Road Located at Site 3	Inventory of Buildings of Architectural and/or Historical Interest	Historical: - The property is located on land owned by Albert Smith in 1875, however, the present farmhouse (and property) is not depicted on 1875 historic mapping Design: - A one-and-a-half storey frame house with brick veneer with a gable roof - Front facade features a three-bay arrangement with central projecting frontispiece with gable roof and decorative bargeboard, central door with sidelights and transom, and decorative buff brick quoining and window surrounds - Wrap-around frame porch, foundations were not visible - Rear extension - The house is surrounded by grassy open areas, mature vegetation, gardens, and circulation routes - No substantial outbuildings (i.e. barn) were observed Context: - Fronts on to Fiddlers Green Road - Contributes to the surrounding rural context	 East (front) elevation of the residence at 558 Fiddlers Green Road Source: ASI

CHR 8	Farmstead	44 Garner Road East (formerly Hwy 53 East)
		
		Located at Site 4
			Inventory of Buildings of Architectural and/or Historical Interest	Historical:
				- Associated with the Joseph Smith family and early agricultural development in Ancaster
				
				Design:
				- The property features two residences, a warehouse, and several frame outbuildings
				  - A one-and-a-half storey frame and stucco Ontario Gothic farmhouse with gable roof, original chimneys at gable ends, stone foundations, and one-storey side additions (to east and west elevations)
				  - A one storey brick and stucco house at the northwest corner of the property features concrete an asymmetrical front facade, internally-bracketed brick chimney, large window openings and large eaves overhang
				  - One-and-a-half storey frame outbuilding with brick and metal veneers, casement windows, gable roof with metal sheeting
				  - Large concrete warehouse and marketplace
				  - Additional outbuildings are visible on aerial photography but were not visible from the public right-of-way
				
				Context:
				- This is a large property with multiple buildings, residences, circulation routes, and is associated with cultivated fields
					
					Northwest elevation of the residence at 44 Garner Road East
					Source: ASI

Resource	Type	Address/Location	Recognition	Description	Photos
CHR 9	Residence	588 Fiddlers Green Road Located at Site 7	Inventory of Buildings of Architectural and/or Historical Interest	Historical: - The property is located on land owned by Albert Smith in 1875, however, the present farmhouse (and property) is not depicted on 1875 historic mapping Design: - One-and-a-half storey frame house with cross-gable roof, gable dormer, vinyl siding and stone foundations - Projecting bay features a bay window on the first storey - The house has been altered through the addition of an external brick chimney, replacement of windows with modern glass and fake muntins, and replacement of the original porch - Property also retains a concrete block garage or outbuilding with shed roof, grassy open spaces with a variety of vegetation, circulation routes, and cultivated fields Context: - Fronts on to Fiddlers Green Road - Contributes to the surrounding rural context	 East (front) elevation of the residence at 588 Fiddlers Green Road Source: ASI
CHR 10	Church	70 Garner Road East Located at Site 9	Volume 7A – Places of Worship Heritage Inventory	Historical: - The Ancaster Christian Reformed Church was established on this property in 1976 Design: - The church features an octagonal footprint with brick construction and hipped roof - The church is surrounded by parking area and grassy open spaces Context: - The remainder of the property appears to be cultivated fields that are likely leased to neighbouring farmers and are not associated with the church	 Northwest elevation of the church at 70 Garner Road East Source: ASI

Resource	Type	Address/Location	Recognition	Description	Photos
CHR 11	Residence	1021 Garner Road East Located near Site 6	Inventory of Buildings of Architectural and/or Historical Interest "Lampman Stone House", currently in process of being listed to the Heritage Register	Historical: - Built c.1854 by John Lampman - Associated with early agricultural development in Ancaster Design: - One-and-a-half storey stone farmhouse with neo-classical features, including three-bay symmetrical front facade, central entrance with transom and sidelights, gable roof, brick chimney, and large decorative stone quoining - Rear one-storey addition and modern rear shed dormer - Front portico is also a modern addition - Landscape features include U-shaped driveway and mature vegetation Context: - Set back from the road - No longer associated with agricultural fields or agricultural outbuildings	 Southeast elevation of the residence at 1021 Garner Road East Source: ASI

9.0 CULTURAL HERITAGE RESOURCE LOCATION MAPPING

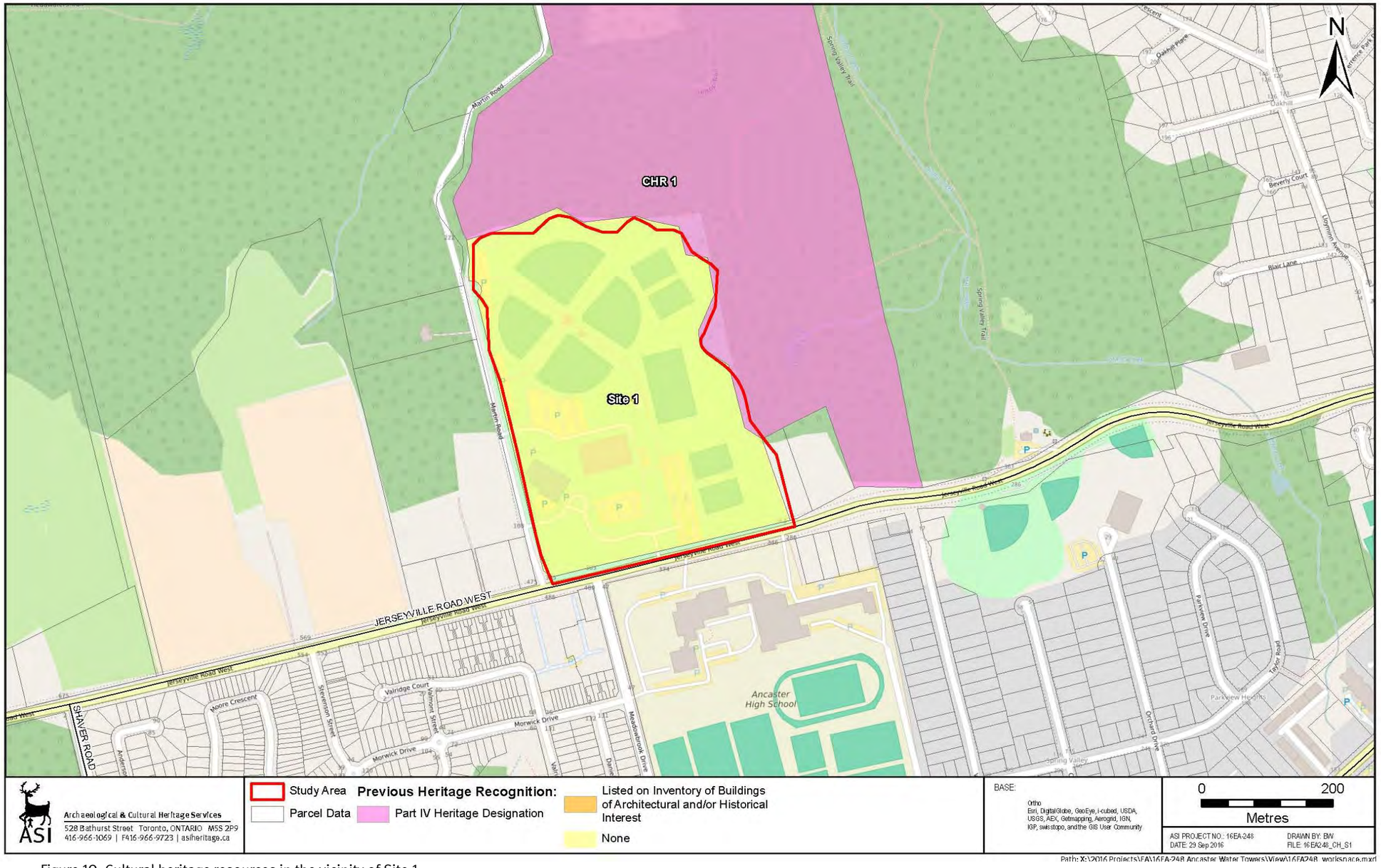


Figure 10: Cultural heritage resources in the vicinity of Site 1.

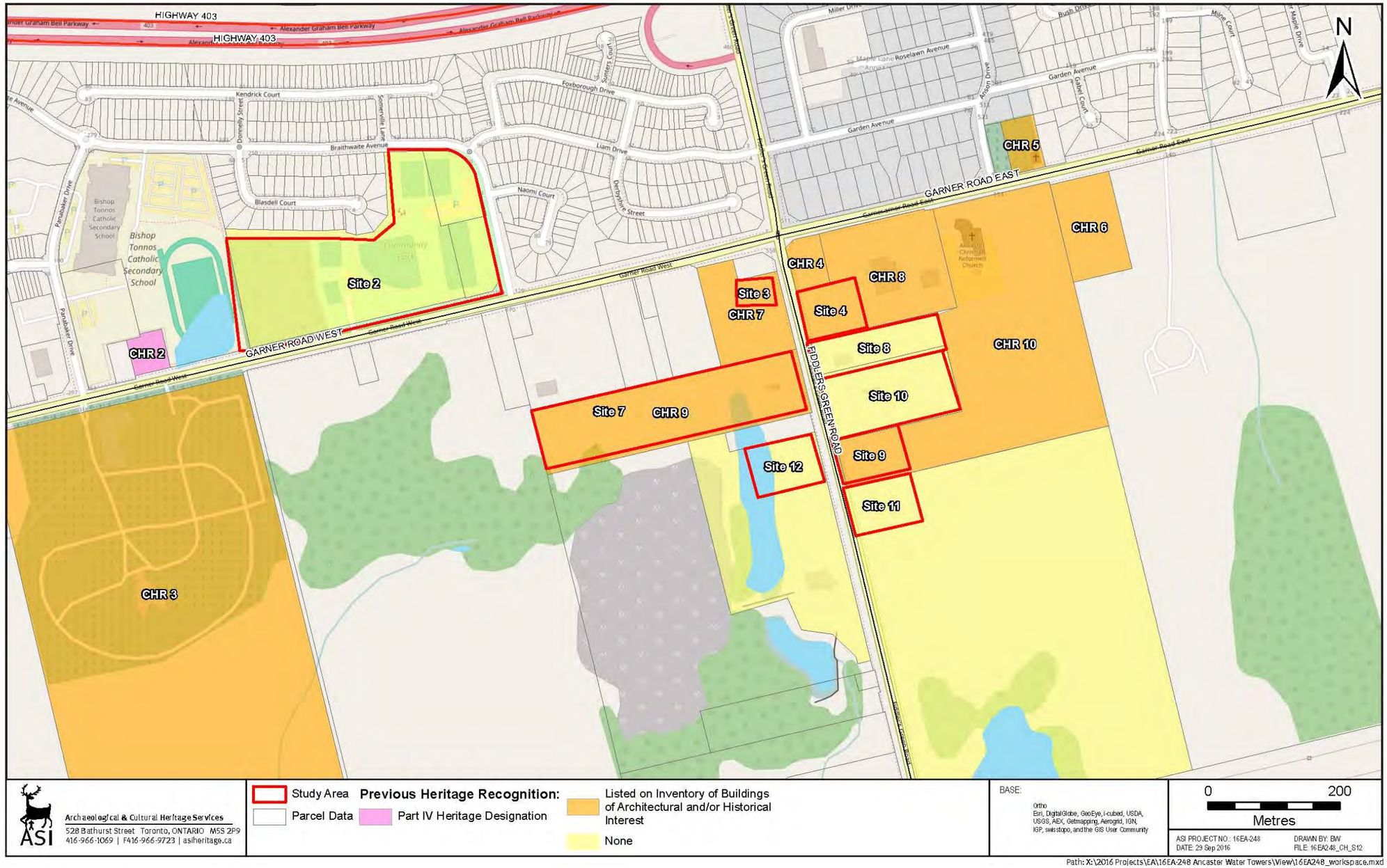


Figure 11: Cultural heritage resources in the vicinity of Sites 2 to 4 and 7 to 12.

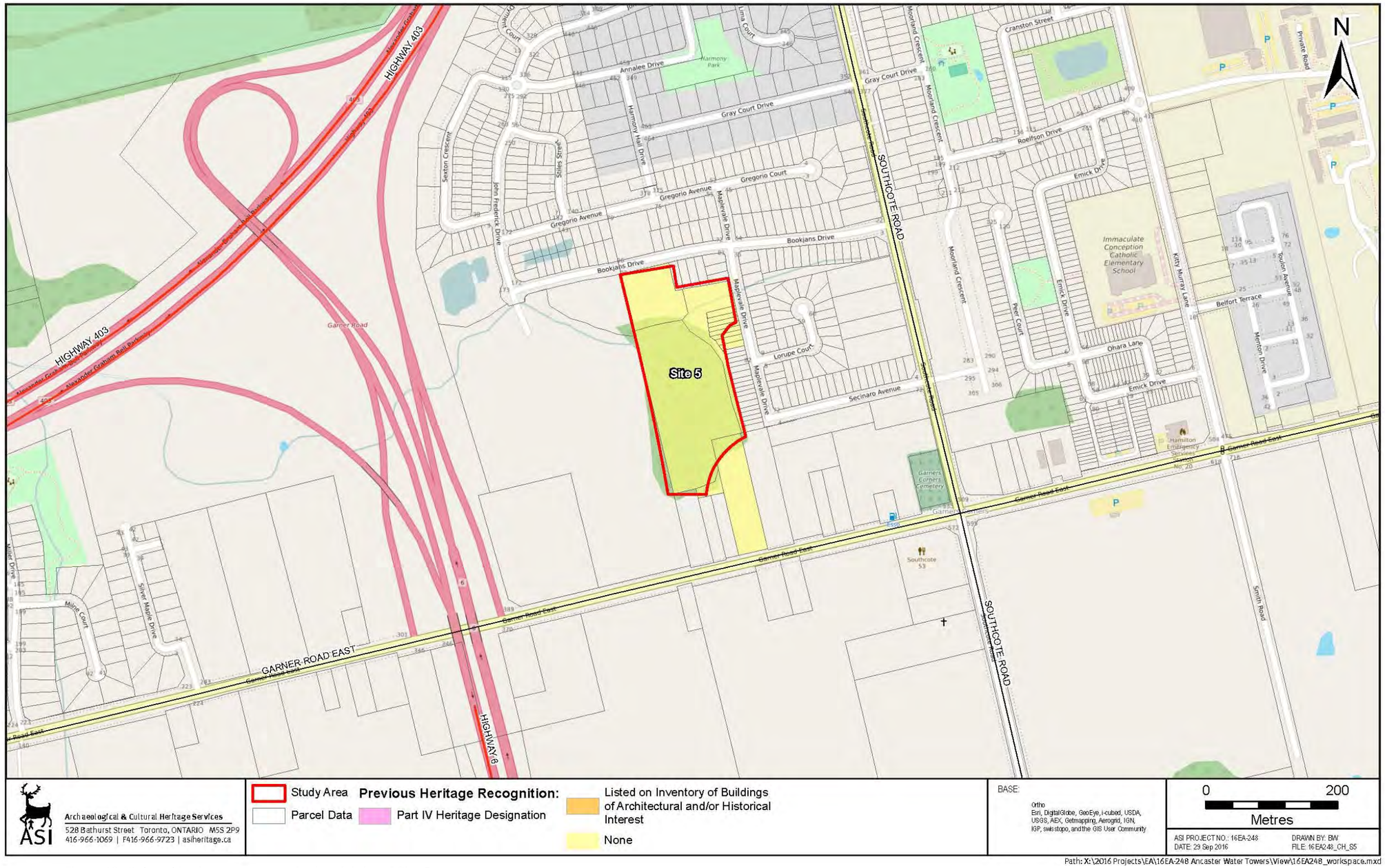


Figure 12: Cultural heritage resources in the vicinity of Site 5.

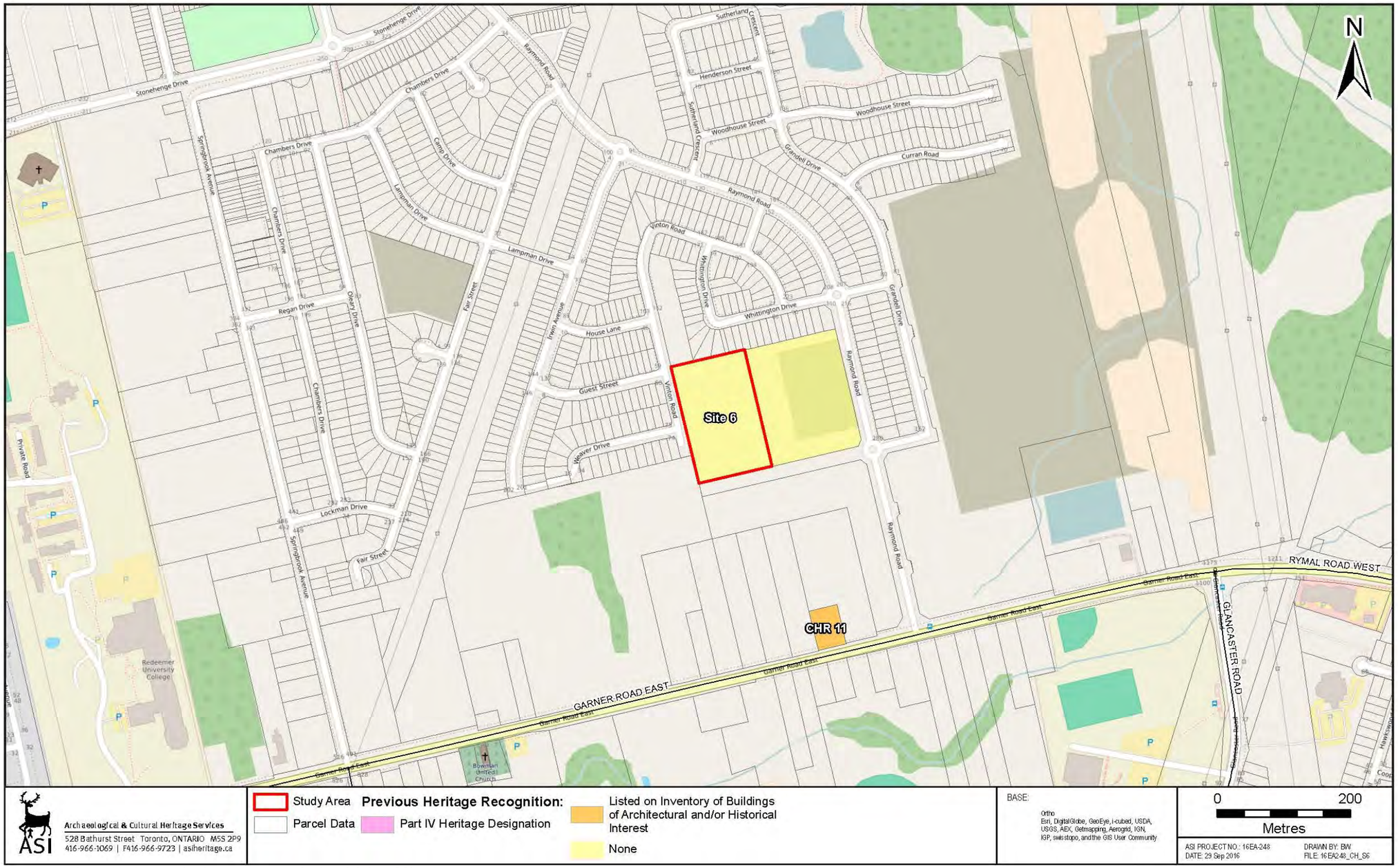


Figure 13: Cultural heritage resources in the vicinity of Site 6.

APPENDIX A: DESIGNATION BY-LAWS

THE CORPORATION OF THE TOWN OF ANCASTER

BY-LAW NO. 79-26

To Designate the Lands and Building Municipally known as 838 Mineral Springs Road, in the Town of Ancaster, as Lands and Building of Historic Value, Architectural Value and Interest

WHEREAS this Council is empowered under sub-section (6) of Section 29 of The Ontario Heritage Act to enact By-laws to designate real property, including buildings and structures thereon, as described in Schedule "A" attached hereto to be of historic or architectural value or interest, and

WHEREAS this Council has caused to be served upon the owners of the lands and premises known municipally as 838 Mineral Springs Road, in the Town of Ancaster, and upon the Ontario Heritage Foundation notice of intention to so designate the described property and has caused such notice of intention to be published in a newspaper having a general circulation in this Municipality once for each of three consecutive weeks, and

WHEREAS no notice of objection to the proposed designation of the described property has been served on the Clerk of this Municipality within the time prescribed by the said Statute, and

WHEREAS this Council's reasons for the proposed designation are as set forth in Schedule "B" attached hereto.

NOW, THEREFORE, THE COUNCIL OF THE CORPORATION OF THE TOWN OF ANCASTER ENACTS AS FOLLOWS:

1. In this By-law the word "property" means real property and includes all buildings and structures thereon.

2. There is hereby designated as being of historic value, architectural value and interest the property known municipally as 838 Mineral Springs Road, in the Town of Ancaster, and more particularly described in Schedule "A" attached hereto.

3. YATES and YATES are hereby authorized and directed to cause a copy of this By-law to be registered against the property described in Schedule "A" attached hereto in the Land Registry Office for the Registry Division of Wentworth.

4. The Clerk is hereby authorized and directed to cause a copy of this By-law to be served upon the owners of the property and upon the Ontario Heritage Foundation and to cause notice of this By-law to be published in a newspaper having general circulation in the Town of Ancaster.

ENACTED AND PASSED THIS 12th DAY OF FEBRUARY 1979.

Mayor

Clerk

SCHEDULE "A"

Description of Lands

ALL AND SINGULAR that certain parcel or tract of land and premises situate, lying and being a part of Lots 39 and 40, Concession 1, and part of the road allowance between Concessions 1 and 2, in front of Lots 39 and 40, in the Town of Ancaster, in the Regional Municipality of Hamilton-Wentworth (formerly in the Township of Ancaster, in the County of Wentworth) and Province of Ontario, containing 15.000 acres and shown as Part 1 on a compiled plan by A. T. McLaren, O.L.S., dated April 29th, 1971, more particularly described as follows:

PREMISING that bearings are astronomic in nature and are referred to the meridian through the Southwest corner of Lot 34, Concession 1, in the Township of Ancaster and relating all bearings herein thereto:

COMMENCING at an iron bar in a line joining the Southeast corner of the said Lot 39, Concession 1, to a stone monument at the Northeast corner of Lot 39, Concession 2, distant fifteen and twelve one-hundredths feet (15.12') measured South nine degrees and twenty-one minutes East (S. 9° 21' E.) from the said Southeast corner of the said Lot 39, Concession 1:

THENCE South nine degrees and twenty-one minutes East (S. 9° 21' E.) along the said joining line, fifty-one feet (51.00') to the said stone monument;

THENCE South seventy-seven degrees and twelve minutes West (S. 77° 12' W.) along the Southerly limit of the said road allowance between Concessions 1 and 2 as closed by By-law No. 169 (Registered September 1876 as Instrument No. 2294) seven hundred and thirty-one and sixty-four one-hundredths feet (731.64');

THENCE North six degrees and twenty-four minutes and ten seconds West (N. 6° 24' 10" W.) one thousand, one hundred and twenty-five and forty-three one-hundredths feet (1125.43') to an iron bar in the Southerly limit of the Mineral Springs Road;

THENCE following an old post and wire fence defining the Southerly and Southwesterly limit of the said Mineral Springs Road, the following 11 courses; South fifty-eight degrees and twenty-nine minutes East (S. 58° 29' E.) two hundred and twenty-six and eighteen one-hundredths feet (226.18') to an iron bar; South sixty degrees and twenty-one minutes East (S. 60° 21' E.) one hundred and forty-two

and fifty-one one-hundredths feet (142.51') to an iron bar; South seventy-nine degrees and thirty-four minutes East (S. 79° 34' E.) eighty and thirty-three one-hundredths feet (80.33') to an iron bar; North eighty-six degrees and six minutes and ten seconds East (N. 86° 06' 10" E.) ninety-nine and nine one-hundredths feet (99.09') to an iron bar; South eighty-one degrees and fifty-five minutes and ten seconds East (S. 81° 55' 10" E.) fifty-six and sixty-two one-hundredths feet (56.62') to an iron bar; South seventy-one degrees and forty-six minutes and ten seconds East (S. 71° 46' 10" E.) forty-five and twenty-one one-hundredths feet (45.21') to an iron bar; South forty-eight degrees and thirty-three minutes and forty seconds East (S. 48° 33' 40" E.) fifty and two one-hundredths feet (45.21') to an iron bar; South forty-eight degrees and thirty-three minutes and forty seconds East (S. 48° 33' 40" E.) fifty and two one-hundredths feet (50.02') to an iron bar; South thirty-eight degrees and forty-nine minutes and fifty seconds East (S. 38° 33' 40" E.) eighty and one one-hundredth feet (80.01') to an iron bar; South twenty-seven degrees and twenty-eight minutes and twenty seconds East (S. 27° 28' 20" E.) four hundred and thirty-four and forty-seven one-hundredths feet (434.47') to an iron bar;

South forty-nine degrees and six minutes and ten seconds East (S. 49° 06' 10" E.) one hundred and eighty-eight and seven-tenths feet (188.70') to an iron bar; South forty-nine degrees and twenty-four minutes East (S. 49° 24' E.) twenty-eight and sixty-five one-hundredths feet (28.65') to an iron bar;

THENCE South seventy-three degrees and twenty-three minutes West (S. 73° 23' W.) two hundred and twenty-four and sixty-seven one-hundredths feet (224.67') to the point of commencement.

SUBJECT TO an easement 33 feet in perpendicular width for a wood pole transmission line, and an easement 66 feet in perpendicular width for a steel tower transmission line, in favour of the Hydro Electric Power Commission of Ontario, registered as Instrument No. 22381 and shown on a plan attached thereto.

SCHEDULE "B"

Reasons for Designation of 838 Mineral Springs Road, in the Town of Ancaster

"Woodend", known municipally as 838 Mineral Springs Road, in the Town of Ancaster, being of historic and architectural value and interest, is the finest rural-gothic stone building in the Dundas Valley. Built circa 1862, it is sited along Mineral Springs Road in keeping with the picturesque lanscape-architecture principles of the day, and possesses much of the original Laing garden layout. The house was the residence of Ancaster's first Reeve and Warden of the County, John Heslop. In 1958 the property and house was bought by Mr. George Donald, who restored the house and donated "Woodend" to the Hamilton Region Conservation Authority in 1971. Without restricting the generality of the foregoing the reasons for this Council designating the described premises include the intention that the following features of the described premises should be preserved, that is,

(a) the facades of the existing stone building with the exclusion of the garage and windows on the west facade which will provide access to the new addition and garage, and

(b) the roof gables, chimneys and bargeboards, and

(c) the fenestration, shutters and doors, and

(d) all original wooden architectural elements of the exterior, and

(e) all architectural features of the main hall and stairway and the drawing room to the east of the hall, and

(f) the open space area surrounded by Mineral Springs Road and the semi-circular driveway,

but

this Council has no intention that any alteration, maintenance, repair, replacement or improvement of elements of the premises requires the prior written consent of this Council unless such affect the reasons for the designation of the premises as described in paragraphs (a) to (f) herein. Further, this Council has no intention to require prior written consent for the construction and maintenance of other buildings upon the lands described in Schedule "A" and/or any landscape adjustments in respect of such lands.

It is clearly understood that Schedule "A" covers a more extensive area than is intended to be protected for historical purposes by this By-law. The description in Schedule "A" was used only as it represents an existing legal survey. The purpose of this By-law is to only protect those portions of "Woodend" as outlined in paragraphs (a) to/and including (f).

It is also clearly understood that this By-law only relates to the existing building known as "Woodend" and not to the addition which is proposed to be built in 1978 and 1979.

Authority: Item **15,** Planning and Economic Development Committee Report-04-001 (PD04013) CM: January 14,2004

Bill No. 065

City of Hamilton

BY-LAW NO. 04-065

To Designate:

LAND LOCATED AT MUNICIPAL NO. 245 GARNER ROAD WEST, FORMER TOWN OF ANCASTER, CITY OF HAMILTON

As Property of:

CULTURAL HERITAGE VALUE

WHEREAS the Council of the City of Hamilton did give notice of its intention to designate the property mentioned in section 1 of this by-law in accordance with subsection 29(3) of the Ontario Heritage Act, R.S.O. 1990, Chapter 0.18;

AND WHEREAS no notice of objection was served on the City Clerk as required by subsection 29(5) of the said Act;

AND WHEREAS it is desired to designate the property mentioned in section 1 of this by-law in accordance with clause 29(6)(a) of the said Act.

NOW THEREFORE the Council of the City of Hamilton enacts as follows:

1. The property located at Municipal No. 245 Garner Road West, Hamilton, Ontario and more particularly described in Schedule "A' hereto annexed and forming part of this by-law, is hereby designated as property of cultural heritage value.

2. The Corporate Counsel is hereby authorized and directed to cause a copy of this by-law, together with reasons for the designation set out in Schedule "B" hereto annexed and forming part of this by-law, to be registered against the property affected in the proper registry office.

3. The City Clerk is hereby authorized and directed,

(i) to cause a copy of this by-law, together with reasons for the designation, to be served on The Ontario Heritage Foundation by personal service or by registered mail;

(ii) to publish a notice of this by-law once in a newspaper having general circulation in the City of Hamilton.

PASSED and enacted this 24th day of March, 2004.

Mayor

City Clerk

Schedule "A"
To
By-Law No. 04-065

245 Garner Road West
Former Town of Ancaster
Hamilton, Ontario

PT LT 40 CON 3 Ancaster, Parts 1 – 14 ON 62R16585; Ancaster City of Hamilton, S/T Easement over PTS 6 & 12 ON 62R16585 as in LT502974, S/T Easement over PTS 7, 8, & 10 ON 62R16585 as in LT502975, S/T Easement over PTS 2, 3, 5, 6, 8, 9 & 13 ON 62R16585 as in WE115540

PIN (Property Identification Number) – 17415-0828 (LT)

Schedule "B"
To By-law No. 04-065

245 Garner Road West
Former Town of Ancaster

REASONS FOR DESIGNATION

Cultural Heritage Value

245 Garner Road West possesses cultural heritage value, expressed in historical associations with the Rymal and Marshall families and is associated with the early agricultural development of Ancaster. The former farmhouse located on this property is of architectural value as an example of a two-storey, vernacular interpretation of the Italianate architectural style. The former farmhouse is also a rare surviving example of Pre-Confederation stone construction.

The Reasons for Designation apply to all elevations and the roof of the former farmhouse including all façades, entranceways, windows and chimneys, together with construction materials of stone, wood and glazing, building techniques, specific interior features and landscape features as follows:

Front (North) Façade:

- Symmetrical arrangement of three bays with central projecting bay;
- roof and roofline together with wood fascia and eaves with wood brackets;
- frontispiece together with moderately pitched gable roof with return eaves, wood panelled door with hardware, six-light transom and tri-pane sidelights;
- all six-over-six windows together with the openings, wood frames, lintels, sills, muntins and glazing;
- arched window on the second floor together with the opening, wood frame, voussoirs, sill, muntins and glazing; and,
- dressed stone walls with raised mortar joints.

Side (West) Elevation:

- Roof and roofline together with wood fascia and eaves with wood brackets;
- all six-over-six windows on the second floor together and one-over-one sash windows on the first floor with the openings, wood frames, lintels, sills, muntins and glazing;
- window openings on the first floor together with lintels and sills; and,
- two-storey rear addition together with roof, all windows and stucco exterior.

Rear (South) Elevation:

- Roof and roofline together with wood fascia and eaves with wood brackets;
- two-storey enclosed verandah together with roof, all windows and stucco exterior;
- second storey window opening together with lintel and sill; and,
- randomly coursed stone wall with raised mortar joints.

Side (East) Elevation:

- Roof and roofline together with wood fascia and eaves with wood brackets;
- six-over-six window on the second floor together with the opening, wood frame, lintel, sill, muntins and glazing;
- window openings on the first and second floors together with lintels and sills; and,
- randomly coursed stone wall with raised mortar joints.

Interior:

- Front foyer together with door surrounds and wood doors with hardware;
- main staircase together with handrail and balustrade; and,
- wood doors on the first and second floor together with surrounds and hardware.

Landscape Features:

- Front and side yards with grassy open space;
- existing grades and topography;
- driveway leading to west side of the house; and,
- coniferous tree in the front yard.

The attached garage **is not to be included** in the Reasons for Designation.

Appendix E

PUBLIC CONSULTATION PLAN, NOTICE OF STUDY COMMENCEMENT, NOTICE OF PIC 1, NOTICE OF PIC 2 AND RESPONSE FORMS

GENIVAR

111-25440-00

January 10, 2012

Mr. Winston Wang, P. Eng
Project Manager, Water & Wastewater Planning
Infrastructure & Source Water Planning Section
Environment & Sustainable Infrastructure Division, Public Works Department
City of Hamilton
77 James Street North, Suite 400,
Hamilton, ON, L8R 3K3

Re: Ancaster Water Tower Class Environmental Assessment and Conceptual Design Public Consultation Plan

Dear Winston:

We are pleased to submit our final draft of the Public Consultation Plan for the Ancaster Water Tower Class Environmental Assessment and Conceptual Design Study. The purpose of this plan is to outline the public consultation activities that will take place over the course of the study in order to fulfill all of the City's requirements and the requirements of a Schedule 'B' Municipal Class Environmental Assessment.

Please do not hesitate to contact us if you have any questions or comments.

Yours truly,

GENIVAR Inc.

Christopher Mills, P. Eng.
Project Manager

600 Cochrane Drive, 5th Floor, Markham, Ontario L3R 5K3
Telephone: 905.475.7270 • Fax: 905.475.5994 • www.genivar.com

Table of Contents

1. Introduction

The City of Hamilton is undertaking a Schedule 'B' Municipal Class Environmental Assessment (Class EA) for a new water storage facility to service Pressure District 18 in the Ancaster area.

Consultation with the public, stakeholders, interested parties and government review agencies is a necessary and important component of the Class EA process. This Public Consultation Plan outlines the approach that will be taken to fulfill the consultation requirements of the Class EA process and ensure that stakeholders input is properly captured and considered as part of the study.

This Plan identifies key stakeholders, potential issues, and how stakeholder groups will be provided the opportunity to provide input and feedback into the evaluation of alternatives conducted as part of this study.

2. Stakeholder Sensitivity Analysis

A Stakeholder Sensitivity Analysis was conducted based on input from the City and GENIVAR's understanding of the study area. The results of this analysis are included in Table 2-1 below.

Table 2-1 Stakeholder Sensitivity Analysis

Agency/Stakeholder	Description	Potential Issues	Sensitivity
Local Residents	Local Residents in area (area TBD)	It is expected that local residents will have a high sensitivity to this project. Residents are generally most concerned with construction impacts in their area (traffic, noise, dust) and visual impact of the water storage facility. Notices will be mailed/hand delivered to local residents during the Study.	High* *Sensitivity may change depending on ET location
Commercial and Industrial Properties	Ancaster Industrial Park	The Ancaster Industrial Park is within the Study Area and the Pressure District 18. Therefore, the tenants of the Park will be a key stakeholder in the Study. Local businesses and developers within this area will be included on the project contact list. Expected concerns include construction and visual impact.	High
Proposed Developments	Land Owners Development Companies	Local land developers will have a high sensitivity to projects on or near to their development area. Land owners of alternative site locations will be contacted directly early on in the Study.	High
Local Interest Groups	TBD	It is expected that local interest groups will have an interest in this Study, however no specific concerns are expected.	Moderate

Agency/Stakeholder	Description	Potential Issues	Sensitivity
Local Agencies	Grand River Conservation Authority (GRCA) Niagara Escarpment Commission	The GRCA will have a high sensitivity to the Study, specifically during the evaluation of alternative sites and watermains with regards to environmental features. The Study Area is located outside of the Escarpment Plan but within the Grand River Conservation Area. However, the sites being considered are within areas that have been disturbed and therefore, the incremental impact from an natural heritage perspective is not considered to be significant.	High Low
First Nations Agencies and Aboriginal Communities	Six Nations/First Nations Indian and Northern Affairs Canada Ministry of Aboriginal Affairs	All public notifications for this project will be sent to First Nations and Aboriginal Communities and Agencies. Letters specific to First Nations will be sent and agencies will be requested to return a response form in the early stages of the project.	Moderate
Federal Agencies	Canadian Environmental Assessment Agency Department of Fisheries and Oceans Environment Canada Transport Canada NAV Canada Parks Canada	Federal agencies will be notified during the project as part of the Class EA process. No specific issues are expected.	Low
Provincial Agencies	Ministry of the Environment Ministry of Culture Ministry of Natural Resources Ministry of Transportation Ministry of Attorney General Ministry of Tourism & Culture Ministry of Municipal Affairs and Housing Ministry of Public Infrastructure Renewal Ontario Provincial Police	Provincial agencies will be notified of the Study as part of the Class EA process. Agencies will be mailed the project notices and will be requested to complete a response form in the early stages of the project. No specific issues are expected.	Moderate
Utilities	Bell Canada Rogers Cable Enbridge Atria	Local utilities required to service the facility will have an interest in the Study and Preliminary Design.	Moderate

3. Proposed Consultation Approach

3.1.1 Public and Review Agencies Contact

The Ancaster Water Tower Class EA study will fulfill Phases 1 and 2 of the Municipal Class EA process as required for a Schedule 'B' Class EA study. There are two (2) mandatory points of public contact (i.e. notification of the project, invitations to stakeholders to provide input). However, the City's requires that the minimum requirements of the Class EA process be exceeded. Therefore, five (5) key points of contact will occur throughout the Study; namely:

- Notice of Study Commencement and PIC 1 (anticipated in January 2012)
- Public Information Centre (PIC) 1 to introduce the background and objectives of the study, identify the communicate the approach to the evaluation of alternatives, present the alternative sites, and to request public input (anticipated in March 2012)
- Notice of PIC 2 (anticipated in May 2012)
- Public Information Centre (PIC) 2 to discuss the evaluation of alternatives, and to request public input (**mandatory consultation point** - anticipated in August 2012)
- Publication of Project File and Notice of Study Completion (**mandatory consultation point** - anticipated in September 2012).

Consultation activities for each point of contact are described in more detail in Table 3-1 below.

A third PIC may be held (if required) to obtain additional feedback from stakeholders/public after the publication of the Project File and issuance of the Notice of Study Completion. This would be considered if comments received lead to significant changes to the evaluation of alternatives.

Table 3-1 Public Consultation Activities

Activity	Public Consultation Activities
Notice of Commencement	Notice published in local newspapers Notice posted on City of Hamilton website Letter sent to Agencies and key public/stakeholders on the Stakeholder List and/or listed as 'High Sensitivity' in Stakeholder Sensitivity Analysis Letter sent to First Nations and Aboriginal Groups
Public Information Centres	Notice published in local newspapers Notice posted on City of Hamilton website Notice distributed to key stakeholders, local residents and businesses within 500 m of the preferred site Notice sent to Agencies and key public/stakeholders on the Stakeholder List and/or listed as 'High Sensitivity' in Stakeholder Sensitivity Analysis Notice sent to First Nations and Aboriginal Groups Hold Public Consultation Centre 1 (March 2012) and 2 (August 2012)
Notice of Completion	Notice published in local newspapers Notice posted on City of Hamilton website Notice sent to Agencies and key public/stakeholders on the Stakeholder List and/or listed as 'High Sensitivity' in Stakeholder Sensitivity Analysis Notice sent to First Nations and Aboriginal Groups Place Final Phase 1 and 2 Class EA Report on Public Record for a minimum 30-day review period

The City has retained Azimuth Consultants to conduct an assessment of the natural heritage impacts of the various alternatives, and to ensure the requirements of the GRCA are met. Azimuth and the City will lead the consultation activities with the GRCA and provide input to GENIVAR in the documentation of these consultation activities.

3.1.2 Public Information Centres

The purpose of the PIC's is to present the alternative sites, storage facility configuration, the evaluation process and the recommended site as well as to solicit input on the site selection process followed.

Information will be presented on display boards and staff from both the City and GENIVAR will be in attendance to discuss the information and respond to questions from participants. A comment sheet/questionnaire will be available for attendees to provide written feedback. The City will review all PIC materials in advance of the presentation to the public.

All local residents and businesses within 500 m of the preferred site will be informed of the PIC's through either a local mailing or hand delivered notices.

Questionnaires/comment sheets received at PIC's as well as verbal comments received will be summarized and incorporated into the final Phase 1 and 2 EA Report.

An effort will be made to ensure that the venue selected for the PICs is accessible. The notices of PIC will include invitations for members of the public to contact the project team to communicate accessibility requirements.

3.1.3 First Nations Program

An inclusive list of First Nations groups and appropriate agencies has been included in the Stakeholder Contact List. The communication approach may consist of mail-outs, meetings and follow up phone calls or emails or a combination of these (as required). When sending out project notices and updates, First Nations groups and agencies will receive a customized letter in addition to the project notice.

4. Communications Management

4.1.1 Stakeholder Contact List

A preliminary Stakeholder Contact List has been developed. This list will be reviewed and updated over the course of the project.

Public and Agencies are encouraged to add their name to the Stakeholder Contact List through any of the project notices or at the PICs. Any new interest groups and/or interested members of the public identified during the progress of the Study will be added to the Stakeholder List.

4.1.2 Agency Communications

All communications with the public and the various agencies and interest groups will be included as an appendix to the Phase 1 and 2 EA Report, and will be part of the final public document.

4.1.3 Master List of Concerns

In order to effectively document and address all stakeholder concerns, a Master List of Concerns will be compiled and regularly updated. The list will include all issues that arise during communications with any stakeholders and will also include a documented methodology to deal with the issues. The City's Project Manager will be provided with the updated Master List of Concerns. Any issues requiring immediate

attention will be raised with the City's Project Manager at the earliest possible opportunity for discussion and to determine the required actions to be taken.

Table 4-1 Example List of Public and Agency Comments

Agency/Stakeholder	Date	Source	Comment Received	Response
Utility ABC	Oct 15, 2010	Email	No conflicts in Study Area	Comment acknowledged
Local Resident	Jan 15, 2011	Letter	Evaluation method is acceptable	Comment acknowledged

All communications (written and oral) received during the course of the project will be documented and included in the final Phase 1 and 2 EA Report. The names of local residents will be excluded from public record to protect their privacy.

City of Hamilton

NOTICE OF STUDY COMMENCEMENT AND PUBLIC INFORMATION CENTER NO 1

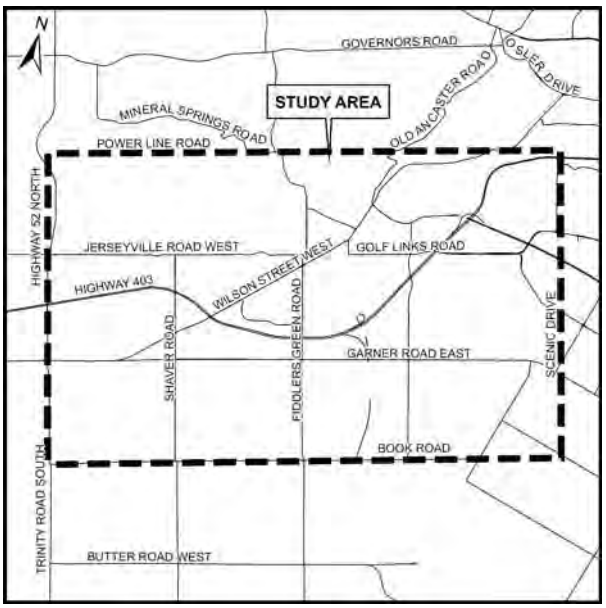
CLASS ENVIRONMENTAL ASSESSMENT STUDY
ANCASTER ELEVATED WATER RESERVOIR

Project Background

The City of Hamilton is planning to construct an elevated water reservoir to provide floating storage for the Pressure District 18 in Ancaster. The City has initiated a Schedule B Class Environmental Assessment (Class EA) study for this project in accordance to the *Municipal Class Environmental Assessment* document (October 2000, as amended in October 2007). The need for an elevated water reservoir was documented in the City of Hamilton's Water and Wastewater Master Plan Class Environmental Assessment Report (November 2006).

The Study Process

The purpose of this Class EA study is to determine the preferred location to construct an elevated water reservoir within the study area (see Figure).



Consultation with, and input from the public and government review agencies will be a vital component of the Class EA study. Members of the public and review agencies are invited to provide comment for incorporation into the overall planning and design of the Ancaster Elevated Water Reservoir. Additional notices will be advertised to inform, and to solicit further input from the public as the study progresses.

Public Information Centre (PIC) No. 1

As part of this study, two (2) Public Information Centres (PICs) will be held to present the findings of the study to the public and other stakeholders, and to provide an opportunity for interested parties to provide comments and feedback to the project team.

PIC 1 will be scheduled as following:

Date: September 25, 2012

Time: 5:00 PM to 8:30 PM (Presentation at 6:00 PM)

Location: Ancaster Municipal Building & Library, 300 Wilson Street East, Ancaster, ON L9G 2B9

The purpose of PIC 1 will be to introduce the background and objectives of the study, to communicate the approach to the evaluation of alternatives, to present the alternative sites, and to request public input. Information will be presented on display boards and staff from both the City and GENIVAR will present the information and respond to questions from participants. A comment sheet/questionnaire will be available for attendees to provide written feedback. If you have any accessibility requirements in order to participate in this event, please contact any of the individuals listed below by August 26, 2012. Advance requests are highly encouraged to enable us to meet your needs adequately.

Comments

We are interested in hearing any comments or concerns you may have with respect to this study. Comments received through the course of the study will be considered in selecting the preferred solution. Information will be collected in accordance with the *Freedom of the Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record.

As part of the consultation process, a mailing list for notification purposes is now being compiled. If you wish to receive further information about this project, to submit a comment, or to be added to the mailing list, please contact:

Winston Wang, P. Eng., Project Manager
City of Hamilton
77 James Street North, Suite 400
Hamilton, Ontario L8R 2K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Christopher Mills, P. Eng., Project Manager
GENIVAR Inc.
1425 Cormorant Road, Suite 300
Ancaster, Ontario, L9G 4V5
Phone: 289 239-0100
Fax: 289 239-0109
Email: christopher.mills@genivar.com

This Notice published on September 14th and September 21st. Thank you for your participation in this study!

City of Hamilton
City Hall, 71 Main Street West
Hamilton, Ontario,
Canada L8P 4Y5
www.hamilton.ca

Environment & Sustainable Infrastructure Division, Public Works Department
Physical Address: 77 James Street North, Suite 400, Hamilton, Ontario, L8R 2K3
Phone: 905-546-2424 ext. 4092 Fax: 905-546-4491
Email: Winston.wang@hamilton.ca

August 1, 2012

Dear Sir/Madam:

Re: Ancaster Water Tower Class Environmental Assessment and Conceptual Design
Notice of Study Commencement and PIC 1
City of Hamilton
Our File No: 11-61850

The City of Hamilton is undertaking a Class Environmental Assessment (Class EA) study for a new water storage facility to service Pressure District 18 in Ancaster area. This storage is required to meet the water supply needs of residents and businesses and to accommodate projected growth in this area. This project is being undertaken in accordance with the procedure outlined in the Municipal Engineers Association Municipal Class Environmental Assessment (October 2000, as amended in October 2007) as a Schedule B project.

Please refer to the attached notice, which will appear in both The Hamilton Spectator and Ancaster News on September 14, 2012 and September 21, 2012, for further details.

If your agency/office has any comments or input regarding this project, we invite you to complete and return the attached Response Form by August 31, 2012. If your agency/office has no comments or interest in this project, we would appreciate you advising us either by letter or by endorsing the space provided at the end of this letter, by August 31, 2012. If you have any questions, or would like additional information on the project, please contact:

Winston Wang, P. Eng., Project Manager
City of Hamilton
77 James Street North, Suite 400
Hamilton, Ontario L8R 2K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Christopher Mills, P. Eng., Project Manager
GENIVAR Inc.
1425 Cormorant Road, Suite 300
Ancaster, Ontario, L9G 4V5
Phone: 289 239-0100
Fax: 289 239-0109
Email: christopher.mills@genivar.com

Comments and information regarding this project are being collected to assist the City of Hamilton in arriving at the preferred solution and in meeting the requirements of the *Environmental Assessment Act*. Comments input and information received will be used in accordance with the *Municipal Freedom of Information and Protection of Privacy Act.*

We thank you for your co-operation.

Sincerely,

Winston Wang, P. Eng.
Project Manager

Attachments enclosed.

Name:

Agency/Office:

Address:

This Agency/Office will not be providing input to or participating in the Ancaster Water Tower Class EA study.

_____ _____

Date Per

City of Hamilton
City Hall, 71 Main Street West
Hamilton, Ontario,
Canada L8P 4Y5
www.hamilton.ca

Environment & Sustainable Infrastructure Division, Public Works Department
Physical Address: 77 James Street North, Suite 400, Hamilton, Ontario, L8R 2K3
Phone: 905-546-2424 ext. 4092 Fax: 905-546-4491
Email: Winston.wang@hamilton.ca

August 1, 2012

Dear Sir/Madam:

Re: Ancaster Water Tower Class Environmental Assessment and Conceptual Design
Notice of Study Commencement and PIC 1
City of Hamilton
Our File No: 11-61850

The City of Hamilton is undertaking a Class Environmental Assessment (Class EA) study for a new water storage facility to service Pressure District 18 in Ancaster area. This storage is required to meet the water supply needs of residents and businesses and to accommodate projected growth in this area. This project is being undertaken in accordance with the procedure outlined in the Municipal Engineers Association Municipal Class Environmental Assessment guidance document (October 2000, as amended in October 2007) for a Schedule B project.

The study area included is bounded by Book Road to the north, Highway 52 to the east, Power Line Road to the south and Scenic Drive to the west. Several potential sites are being evaluated. The attached notice, which will appear in The Hamilton Spectator and Ancaster News on September 14, 2012 and September 21, 2012, illustrates the location of the study area, provides additional background information, and includes details on the upcoming Public Information Centre 1 (PIC 1).

Comments and information regarding this project are being collected to assist the City in arriving at the preferred solution and in meeting the requirements of the *Environmental Assessment Act.* The City of Hamilton values the participation of all stakeholders and wishes to ensure that all First Nations' interests and concerns are taken into consideration and addressed in a timely manner. We would appreciate receiving any comments or concerns that your First Nation may have with the project by August 31, 2012.

Should you have any questions or if I can be of further assistance, please do not hesitate to contact me by telephone at 905-546-2424 ext. 4092, by mail at the address above, or by e-mail at winston.wang@hamilton.ca.

We thank you for your co-operation.

Sincerely,

Winston Wang, P. Eng.
Project Manager

Attachment enclosed.

City of Hamilton
City Hall, 71 Main Street West
Hamilton, Ontario,
Canada L8P 4Y5
www.hamilton.ca

Environment & Sustainable Infrastructure Division, Public Works Department
Physical Address: 77 James Street North, Suite 400, Hamilton, Ontario, L8R 2K3
Phone: 905-546-2424 ext. 4092 Fax: 905-546-4491
Email: Winston.wang@hamilton.ca

August 1, 2012

Dear Sir/Madam,

Subject: **Ancaster Water Tower – Municipal Class Environmental Assessment – Notice of Public Information Centre 1**

The City of Hamilton has initiated a Municipal Class Environmental Assessment (EA) project to address current unbalanced water supply and distribution security in Ancaster area through the proposed construction of an elevated water tower.

Through this Class EA study, all the potential locations for constructing an elevated water tower will be examined and respective potential impacts on the natural, social, technical, economic, and cultural environments will be assessed. The preferred location will then be chosen to build the water tower to ensure that adequate water supply and distribution pressures are provided to residents and businesses in Ancaster area.

The first Public Information Centre (PIC) will be held on September 25, 2012 from 5:00 PM to 8:30 PM at *Ancaster Municipal Building & Library, 300 Wilson Street East, Ancaster, ON L9G 2B9* to discuss the nature of the problem and the problem statement with the public, and to discuss alternative solutions to the problem and receive the public's input.

Our purpose in contacting you or your agency is two fold. Firstly, we wish to advise you of the Public Information Centre and secondly, to ask your co-operation in providing any input you feel is relevant to this project. To that end, we request you update us with any information and/or identify any issues you or your organization has relating to this study. Please send your comments directly to the undersigned. These issues will be considered as part of the Municipal Class EA study process to fulfil the requirements under the Ontario Environmental Assessment Act, 1990.

A copy of the first Notice of Public Information Centre (PIC) is enclosed for your reference and we take this opportunity to invite you to attend. At any time during the Class EA process, interested persons or review agencies may identify outstanding issues and bring concerns to the attention of the Project Manager or the Consultant. We would appreciate any comments or input you may have concerning this Class EA. Please direct any comments or enquiries to the undersigned.

Sincerely,

Winston Wang, M. A. Sc., P. Eng.
Project Manager, Water & Wastewater Planning
Infrastructure & Source Water Planning Section
Public Works Department, City of Hamilton
77 James Street North, Suite 400
Hamilton, ON L8R 2K3
(905) 546-2424 ext. 4092
Email: winston.wang@hamilton.ca

Encl.

cc. Project File 11-61850

RESPONSE FORM
City of Hamilton
Class Environmental Assessment Study
Ancaster Water Tower Class Environmental Assessment and Conceptual Design

1. Contact Name: _____

2. Ministry/Agency/Office: _____

3. Address: _____

   Postal Code: _____

   Phone No.: _____

   Email: _____

4. Please note specific comments and/or concerns (please attach additional sheets if necessary):

   _____

   _____

   _____

   _____

   _____

5. Do you wish to be notified for continued involvement in the project process, including to project implementation? Yes _____ No _____

Signature _____ Date _____

Please return this form to:

Winston Wang, P. Eng.
City Project Manager
City of Hamilton
Water & Wastewater Planning
Infrastructure & Source Water
Planning Section
77 James Street North, Suite 400
Hamilton, Ontario L8R 2K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Christopher Mills, P. Eng.
Consultant Project Manager
GENIVAR Inc.
1425 Cormorant Road, Suite 300
Ancaster, Ontario, L9G 4V5
Phone: 289 239-0100
Fax: 289 239-0109
Email: christopher.mills@genivar.com

Hamilton at your service

905-546-CITY (2489)
519 AREA RESIDENTS CALL 519-647-2577
CAMPBELLVILLE RESIDENTS CALL 905-634-2971

需要中文咨询，请打如下电话 • Pour des informations en français, s'il vous plaît composez le 905.546.2489 • Per informazioni in Italiano per favore chiama 905.546.2489 • Para Informações em português, por favor ligue 905.546.2489 • Po Informacje z jezyku polskim, prosze dzwonic 905.546.2489

NOTICES

Do you know where your garbage goes?

Free tour of the Glanbrook Landfill

Saturday September 29, 2012
10am - 2pm
Rain or shine

Scan QR code for a map to free shuttle from St Mark Catholic Elementary School
43 Whitedeer Road, L8J 3T1
Access to tour by shuttle only

Please wear flat, closed-toe shoes
hamilton.ca/waste - (905) 546-CITY (2489)

Hamilton

NOTICE OF PUBLIC INFORMATION CENTRE
IMPROVEMENTS TO PARKSIDE DRIVE FROM HIGHWAY 6 TO 500m EAST OF CHURCHILL AVENUE

Hamilton

THE STUDY
The City of Hamilton has initiated a Schedule C (Phase 3 and 4) Municipal Class Environmental Assessment (EA) for Parkside Drive to examine road improvements to Parkside Drive, from Highway 6 to 500m east of Churchill Ave (see map below). This study is building on the recommendations of the Hamilton Transportation Master Plan (May 2007). The required improvements may include road widening to accommodate a continuous two-way left turn lane as well as a bicycle lane and pedestrian sidewalk.

The purpose of this study is to develop reasonable alternative design concepts; evaluate alternatives based on natural, social, economic, and technical criteria; select a preferred alternative for Parkside Drive and complete an Environmental Study Report (ESR) to document all activities undertaken.

THE PROCESS
This study is being planned as a Schedule C project under the Municipal Class EA (*Municipal Engineers Association, October 2000 as amended in 2007,2011*). As Phases 1 and 2 of the EA process have already been completed through the City's Transportation Master Plan (2007), this study will fulfill requirements of Phases 3 and 4 of the Municipal Class EA process. A Public Information Centre (PIC) has been scheduled to present the existing conditions and constraints, infrastructure alternatives, evaluation criteria and next steps. At the completion of this study, an Environmental Study Report will be prepared and made available for public review.

PUBLIC INFORMATION CENTRE
The following PIC will be held to provide further information and to receive public input:

DATE: Wednesday September 19th, 2012
TIME: 6:00 p.m. to 8:00 p.m.
LOCATION: St. Thomas the Apostle Parish, 715 Centre Road, Waterdown ON

PUBLIC COMMENTS INVITED
There is an opportunity at any time during this process for interested persons to review outstanding issues and bring concerns to the attention of the Project Managers. If you have any questions or comments or wish to be added to the study mailing list, please contact:

Diana Morreale, MCIP, RPP
Senior Project Manager
City of Hamilton
Planning and Economic Development Dept.
Phone: 905.546.2424 Ext. 4101
Fax: 905.540.5611
Email: Diana.Morreale@hamilton.ca

Bob Bower, P.Eng.
Vice President
Transportation Division
Delcan Corporation
Phone: 905.631.0500 Ext. 6601
Fax: 905.631.0570
Email: b.bower@delcan.com

Information will be collected in accordance with the *Freedom of Information and Protection of Privacy Act.* With the exception of personal information, all comments will become part of the public record.

This Notice issued September 7th, 2012 and September 14th, 2012

NOTICES

Hamilton

NOTICE OF STUDY COMMENCEMENT AND PUBLIC INFORMATION CENTER NO 1
CLASS ENVIRONMENTAL ASSESSMENT STUDY ANCASTER WATER TOWER

Project Background
The City of Hamilton is planning to construct a water tower to provide flooating storage for the Pressure District 18 in Ancaster. The City has initiated a Schedule B Class Environmental Assessment (Class EA) study for this project in accordance to the *Municipal Class Environmental Assessment* document (October 2000, as amended in October 2007). The need for a water tower was documented in the City of Hamilton's Water and Wastewater Master Plan Class Environmental Assessment Report (November 2006), which indicated an unbalanced water supply and limited ability to adequately service future system demands in the area.

The Study Process
The purpose of this Class EA study is to determine the preferred location to construct a water tower within the study area (see Figure).

Consultation with, and input from the public and government review agencies will be a vital component of the Class EA study. Members of the public and review agencies are invited to provide comment for incorporation into the overall planning and design of the Ancaster Water Tower. Additional notices will be advertised to inform, and to solicit further input from the public as the study progresses.

Public Information Centre (PIC) No. 1
As part of this study, two (2) Public Information Centres (PICs) will be held to present the findings of the study to the public and other stakeholders, and to provide an opportunity for interested parties to provide comments and feedback to the project team.

PIC 1 will be scheduled as following:

Date: September 25, 2012
Time: 5:00 PM to 8:30 PM (Presentation at 6:00 PM)
Location: Ancaster Municipal Building & Library,
300 Wilson Street East, Ancaster, ON L9G 2B9

The purpose of PIC 1 will be to introduce the background and objectives of the study, to communicate the approach to the evaluation of alternatives, to present the alternative sites, and to request public input. Information will be presented on display boards and staff from both the City and GENIVAR will present the information and respond to questions from participants. A comment sheet/questionnaire will be available for attendees to provide written feedback. If you have any accessibility requirements in order to participate in this event, please contact any of the individuals listed below by August 26, 2012. Advance requests are highly encouraged to enable us to meet your needs adequately.

Comments
We are interested in hearing any comments or concerns you may have with respect to this study. Comments received through the course of the study will be considered in selecting the preferred solution. Information will be collected in accordance with the *Freedom of the Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record.

As part of the consultation process, a mailing list for notification purposes is now being compiled. If you wish to receive further information about this project, to submit a comment, or to be added to the mailing list, please contact:

Winston Wang, P. Eng.,
Project Manager
City of Hamilton
77 James Street North, Suite 400
Hamilton, Ontario L8R 2K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Christopher Mills, P. Eng.,
Project Manager
GENIVAR Inc.
1425 Cormorant Road, Suite 300
Ancaster, Ontario, L9G 4V5
Phone: 289 239-0100
Fax: 289 239-0109
Email: christopher.mills@genivar.com

This Notice published on September 14th and September 21st. Thank you for your participation in this study!

Hamilton

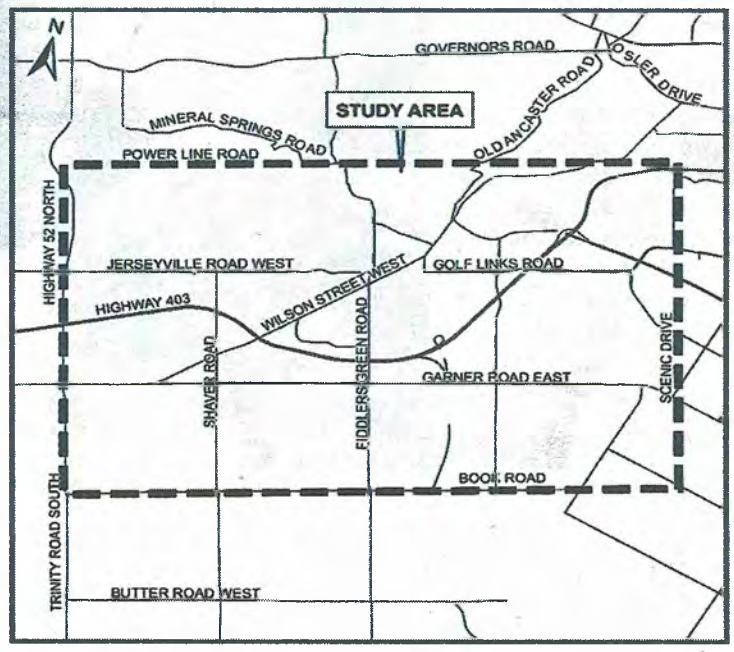
City of Hamilton

NOTICE OF PUBLIC INFORMATION CENTER NO 2

CLASS ENVIRONMENTAL ASSESSMENT STUDY
ANCASTER ELEVATED WATER RESERVOIR

Project Background

The City of Hamilton is planning to construct an elevated water reservoir to provide floating storage for the Pressure District 18 in Ancaster. The City has initiated a Schedule B Class Environmental Assessment (Class EA) study for this project in accordance to the *Municipal Class Environmental Assessment* document (October 2000, as amended in October 2007, 2011 and 2015). The need for the elevated water reservoir was documented in the City of Hamilton's Water and Wastewater Master Plan Class Environmental Assessment Report (November 2006), which indicated an unbalanced water supply and limited ability to adequately service system demands in the area.



The Study Process

The purpose of this Class EA study is to determine the preferred location to construct an elevated water reservoir within the study area (see Figure).

Consultation with, and input from the public and government review agencies will be a vital component of the Class EA study. Members of the public and review agencies are invited to provide comment for incorporation into the overall planning and design of the Ancaster Elevated Water Reservoir. Additional notices will be advertised to inform, and to solicit further input from the public as the study progresses.

Public Information Centre (PIC) No. 2

As part of this study, two (2) Public Information Centres (PICs) will be held to present the findings of the study to the public and other stakeholders, and to provide an opportunity for interested parties to provide comments and feedback to the project team.

PIC No. 2 will be scheduled as following:

Date: October 5, 2016

Time: 6:00 PM to 8:00 PM

Location: Old Town Hall, 310 Wilson St E, Ancaster, ON L9G 2B9

The purpose of PIC 2 will be to introduce the background and objectives of the study, to communicate the approach to the evaluation of alternatives, present alternative sites and the preferred site, and to request public input. Information will be presented on display boards and staff from both the City and WSP will present the information and respond to questions from participants. A comment sheet/questionnaire will be available for attendees to provide written feedback. If you have any accessibility requirements in order to participate in this event, please contact any of the individuals listed below by September 30, 2016. Advance requests are highly encouraged to enable us to meet your needs adequately.

Comments

We are interested in hearing any comments or concerns you may have with respect to this study. Comments received through the course of the study will be considered in selecting the preferred solution. Information will be collected in accordance with the *Freedom of the Information and Protection of Privacy Act*. With the exception of personal information, all comments will become part of the public record.

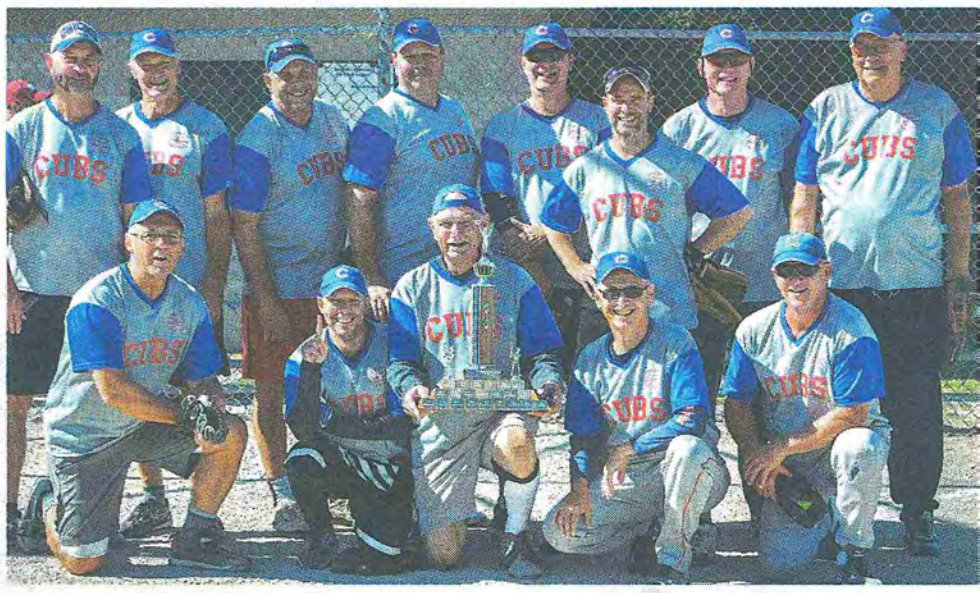
As part of the consultation process, a mailing list for notification purposes is now being compiled. If you wish to receive further information about this project, to submit a comment, or to be added to the mailing list, please contact:

Winston Wang, P. Eng., Project Manager
City of Hamilton
77 James Street North, Suite 400
Hamilton, Ontario L8R 3K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Gustavo Arvizu, P. Eng., Project Manager
WSP Canada Inc.
600 Cochrane Drive, Suite 500
Markham, Ontario L3R 5K3
Phone: 905 475-7270
Fax: 905 475-5994
Email: Gustavo.arvizu@wspgroup.com

This Notice published on September 22th, and 29th, 2016.
Thank you for your participation in this study!

Hamilton



Back row, from left, Greg Davis, Bob McDermott, Steve Henderson,Rich Higgins, Scott Ashworth, Rob McKenzie, David Sawatzky and Frank Hruska. Front row: Claudio Sartori, Joey Sweeney, Bob Harris, Rick McKenzie and manager Steve Davis. Photo by Rick McKenzie

Cubs nab slo-pitch crown

Harris wraps up a stellar vet slo-pitch career

It took two games, but in the end, the Cubs managed to take the 2016 Ancaster Vet baseball trophy.

In the elimination round, the Blue Jays bounced the Royals 9-5. Rob Watts led the hit parade with a platter perfect four for four and three RBIs. Dennis Gowan and Pat Wiltsie manned an airtight infield, shutting out Royal batters in four of the seven innings. For the Royals, Des Dufresne, Mike Harris and Andy Price tripled but generally Royal bats were quiet. Andy Price made several circus catches in the outfield and the Mike Harris-Geoff Burmann pitching duo deserved a better fate.

In the championship round, the Jays jumped on the Cubs 9-7 in their first match. Jays' Brian Hitzroth was three for four with three RBIs. Infielders Scott Hannah and Steve Warrick, along with pitcher Ron Lacroix, shut down the heavy-hitting Cub squad. Cubbies Rich Higgins, Rick McKenzie, Bob McDermott and Scott Ashworth managed three hits apiece, but this did not generate enough offence to get past a dogged Blue Bird defence.

Finally in their third game of the day, the Blue Jays were simply unable to keep Cub batters at bay. The Cubs claimed the championship with a 16-9 victory. Jays' Rob Watts and Bruce Lawson tracked long fly balls. Pitcher Ron Lacroix and catcher Ken Lucas played error-free ball. Cubs' leadoff Rob McKenzie was four for five with a dinger over left center. Rich Higgins was four for four. Claudio Sartori and Greg Davis had three hits each. Steve Henderson continued to show determined defence in left field and Joey Sweeney snagged a liner at second and threw to first for the double play.

Bob Harris wrapped up a stellar vet slo-pitch career with a key single at the plate and a final championship to ponder in retirement.

Appendix F

PIC BOARDS, SIGN-IN SHEET AND QUESTIONNAIRE

WELCOME TO THE

PUBLIC CONSULTATION CENTRE FOR THE ANCASTER ELEVATED WATER STORAGE FACILITY MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

Please complete the sign-in sheet and review the display materials.
Our representatives will be pleased to answer your questions and discuss any concerns.

Your input is much appreciated!

Ancaster Water Storage Facility

Schedule 'B' Municipal Class EA

Panel No. 1

Hamilton

Introduction

The purpose of this Study is to identify the preferred location for an elevated water reservoir to address the long-term water storage needs in Pressure District (PD) 18 in Ancaster and PD-13, PD-14 and PD-15, and to mitigate pressure and operational issues in the system.

The proposed storage facility will improve system security and reliability, provide operations and maintenance savings, alleviate pressure issues and provide system equalization.

Purpose of this Public Information Centre

This evening's Public Information Centre (PIC) is an opportunity for local residents, landowners, and other stakeholders to:

- Review and discuss the project with City staff and its Consultant
- Provide input for the City to consider during the planning of this project
- Voice concerns regarding the water storage project
- Discuss potential construction impacts to local residents, businesses and other stakeholders

The water storage facility project is classified as a **Schedule "B"** project and is being undertaken in accordance with Phases 1 and 2 of the Municipal Class Environmental Assessment (Class EA) process.

As part of the Class EA process, the public is invited to provide comment for consideration in the planning and design of this project. The Class EA process ensures that the opportunity is given to Agencies and the public to provide comments and voice concerns regarding environmental, social, cultural, economic and other issues for consideration in the planning and design of the project.

The Study Area

The Study Area boundary shown below has been identified as the most suitable area to locate a water storage facility for the Ancaster PD 18 and PD-13, PD-14 and PD-15, based on ground elevations and proximity to existing infrastructure and the serviced population.

Welcome to the Public Consultation Centre

GENIVAR

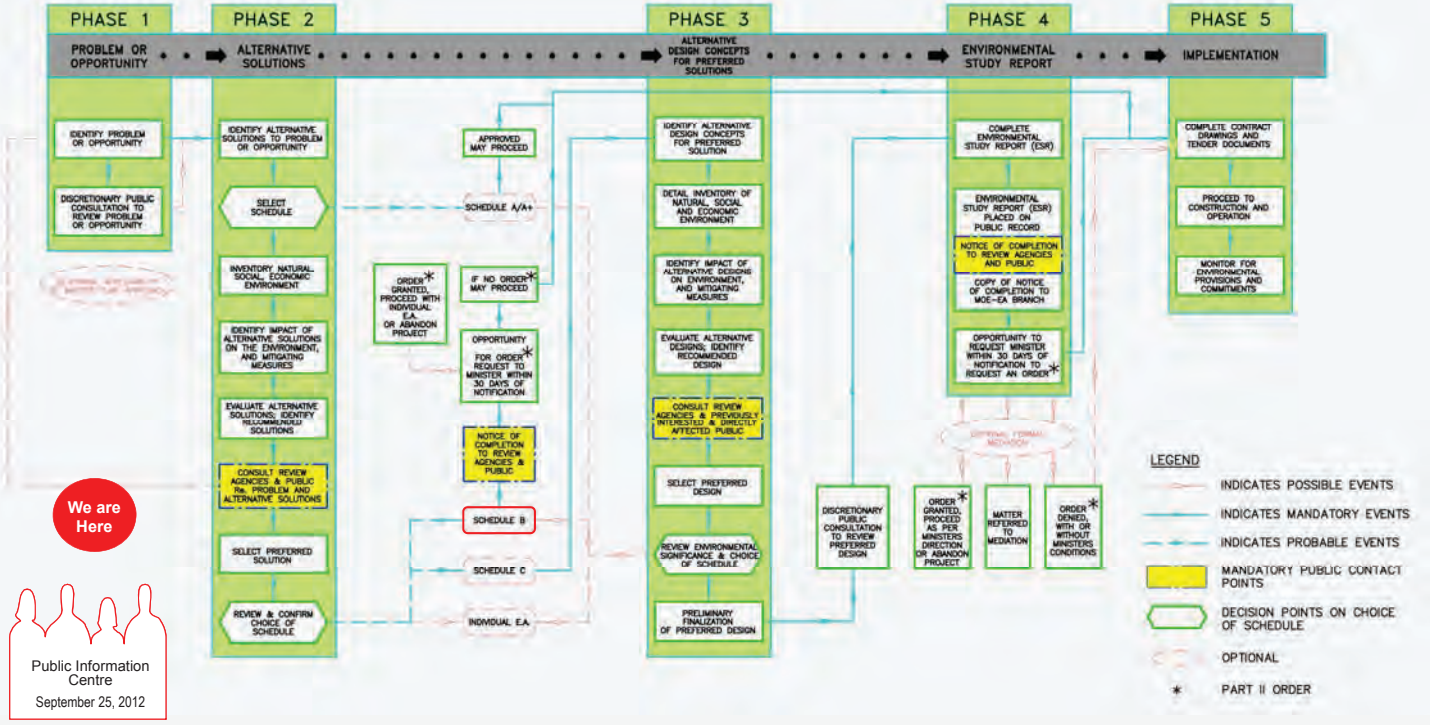
Ancaster Water Storage Facility

Schedule 'B' Municipal Class EA

Panel No. 2

Municipal Class Environmental Assessment (EA) Process

The Ancaster Water Storage Facility project corresponds to a **Schedule 'B'** undertaking, in accordance with the planning process outlined in the *Municipal Engineers Association (MEA) Municipal Class Environmental Assessment document (October 2000, amended in 2007).* As such, the Study requires the completion of Phases 1 and 2 of the MEA Class EA. Upon completion of the Study, a Phase 1 and 2 Class Environmental Assessment Report will be prepared and filed for comment.



Municipal Class Environmental Assessment Planning and Design Process

Ancaster Water Storage Facility

Schedule 'B' Municipal Class EA

Panel No. 3

Problem Statement

It is the City's objective to provide adequate water services to its residents, businesses and industries to meet existing community needs in an efficient and cost-effective manner.

The City is aiming to implement the Council-approved Water and Wastewater Master Plan (2006), which details infrastructure requirements to improve the water system.

Elevated storage is required in Ancaster to improve system security & reliability, provide operations and maintenance savings, and alleviate system pressure issues and provide equalization.

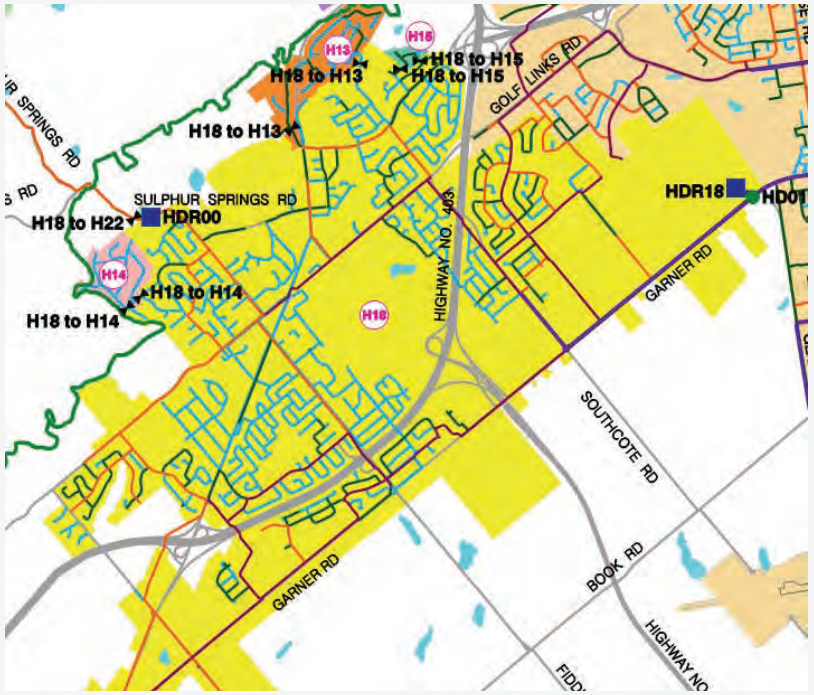
Due to the lack of elevated storage, the system requires continuous pumping to meet water demand variations, which increases the electricity and maintenance costs. Furthermore, without elevated storage, the system is vulnerable to emergency situations such as watermain breaks, and fire fighting.

An elevated reservoir would provide constant water pressure and supply, reducing water pressure fluctuations, reducing operating costs, and improving water quality.

As a customer, you will receive improved water supply, increased security and reliability, and overall operation and maintenance savings.

Ancaster Water System

Currently all of the water for the Ancaster PD-18 is supplied by the HD018 Pumping Station and HDR18 Reservoir, located on Garner Road, and the local water distribution network. This pressure district also feeds sub-zones PD-13, PD-14 and PD-15 through pressure reducing valves, and provides a secondary feed into PD-22 through a watermain along Sulphur Springs Road.



Needs Assessment and Justification

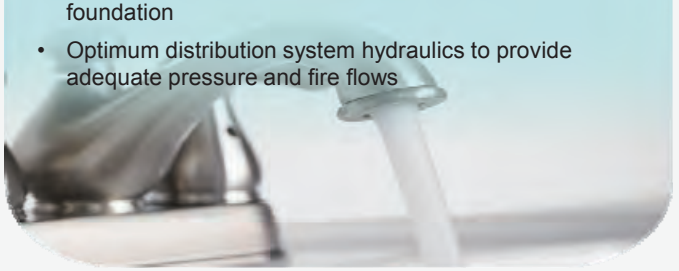
Ancaster Water Storage Facility

Schedule 'B' Municipal Class EA

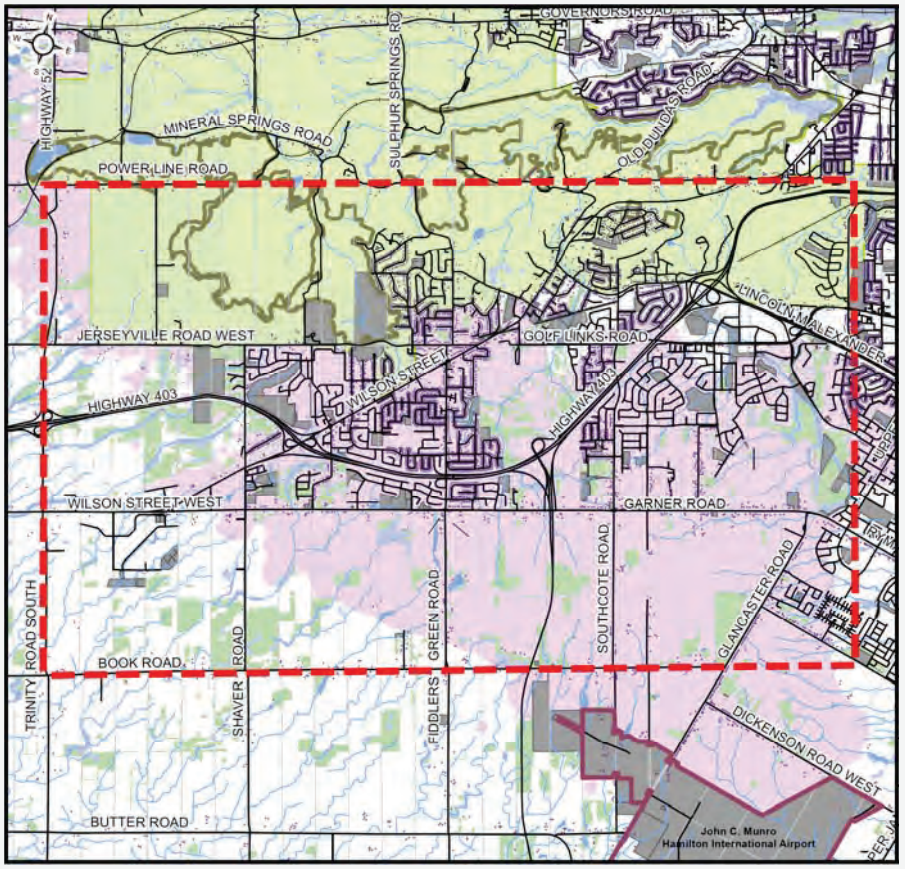
Panel No. 4

Elevated Tank Site Selection Criteria

- The top water level of the elevated tank must be 294 m.
- The overall height of the elevated tank pedestal should be minimized to reduce visual impact and construction costs.
- Land Use Designation (Within Urban Area and outside Greenbelt Area and Niagara Escarpment boundary)
- Proximity to John C. Munro Hamilton International Airport
- Property acquisition requirements
- Ground elevations > 233 m to minimize pedestal height
- Approx. 60 m x 100 m site area with good access
- Proximity to existing infrastructure
- Lowest aesthetic impact on existing residents and customers (Commercial or Industrial area is preferred)
- Minimum natural/heritage/environmental impacts
- Suitable geotechnical conditions for reservoir foundation
- Optimum distribution system hydraulics to provide adequate pressure and fire flows



Constraints Map



Site Selection Criteria

Ancaster Water Storage Facility

Schedule 'B' Municipal Class EA

Panel No. 5

Hamilton

SOCIAL & CULTURAL ENVIRONMENT CONSIDERATIONS

- Proximity to heritage and areas of archaeological importance
- Aesthetic impact on existing and proposed development (Viewshed Analysis)
- Availability of Land
- Traffic impacts during construction
- Air and noise considerations

NATURAL ENVIRONMENT CONSIDERATIONS

- Impacts on flora and fauna
- Proximity to Environmentally Sensitive Areas (e.g. Greenbelt, Niagara Escarpment and Conservation Authority Regulated Areas)
- Groundwater/subsurface conditions

TECHNICAL CONSIDERATIONS

- Ground elevation
- Proximity to existing infrastructure
- Constructability and site access
- Soil / ground conditions
- System reliability and hydraulic performance
- Site size and compatibility
- Ability to provide fire protection

ECONOMIC CONSIDERATIONS

- Capital cost of elevated tank and watermains
- Operation and maintenance costs
- Land acquisition costs
- Proximity to service area

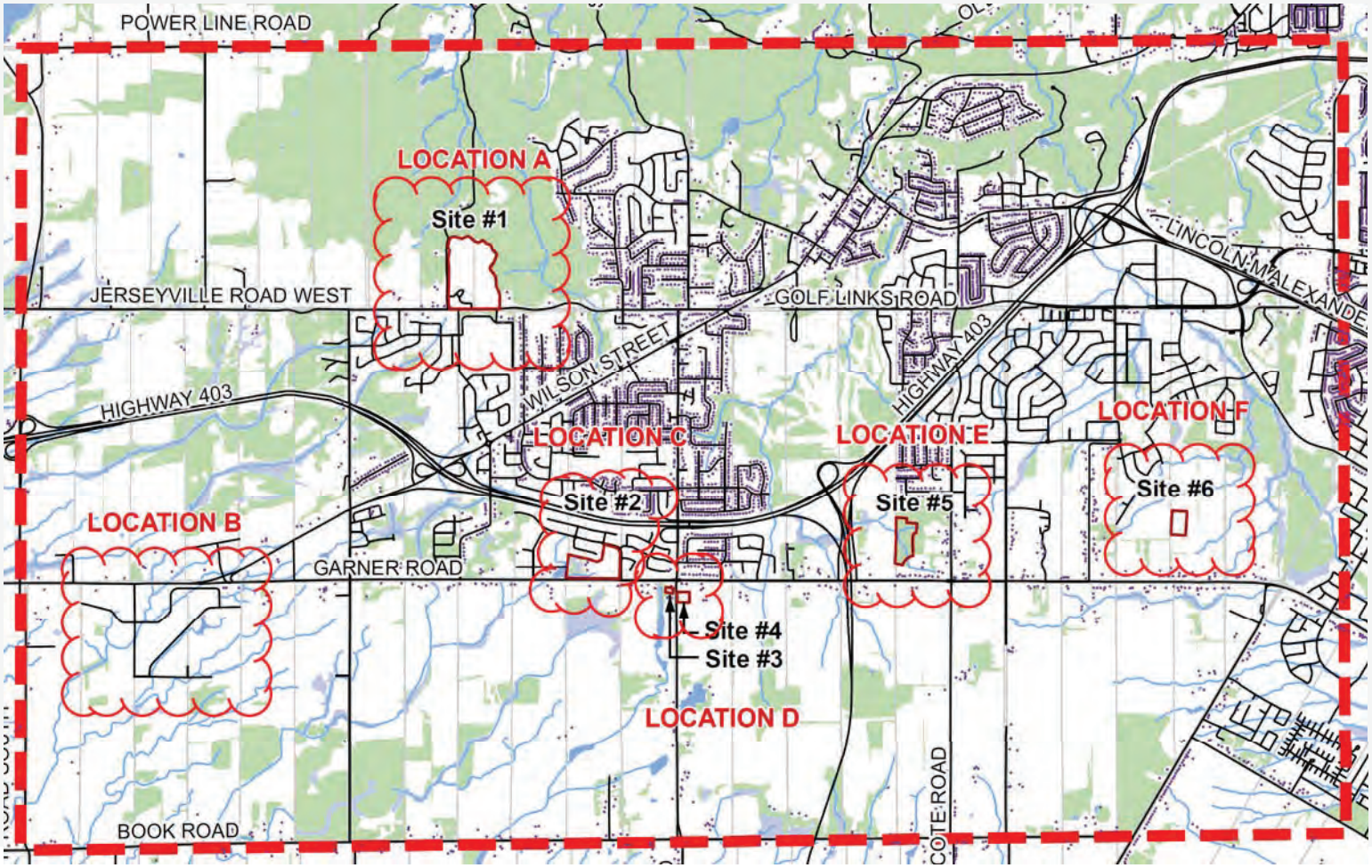
Site Evaluation Criteria

GENIVAR

Ancaster Water Storage Facility

Schedule 'B' Municipal Class EA

Panel No. 6



Alternative Elevated Water Reservoir Locations

Ancaster Water Storage Facility

Schedule 'B' Municipal Class EA

Panel No. 7

LOCATION A

LOCATION C

LOCATION E

LOCATION B

LOCATION D

LOCATION F

Alternative Elevated Storage Locations with Representative Sites

Ancaster Water Storage Facility

Schedule 'B' Municipal Class EA

Panel No. 8

Hamilton

Natural Heritage Assessment

Azimuth Environmental Consulting Inc. completed a preliminary Natural Heritage Assessment of the alternative sites identified within the Study Area. The objective of the assessment was to identify potential environmental constraints and opportunities that may assist in the evaluation of alternatives from an environmental perspective.

The assessment involved a review of data from City of Hamilton, Ministry of Natural Resources, Hamilton Conservation Authority and Grand River Conservation Authority to identify Areas of Natural and Scientific Interest (ANSI), Environmentally Sensitive Areas, Wetlands (Locally and Provincially Significant), Woodlands, drainage courses, and occurrences of Species at Risk.

Also as part of the assessment, conducted field surveys to determine the presence of vegetation, birds, amphibians, and Species at Risk.

Natural Heritage Assessment Findings

SITE	NATURAL FEATURES ASSOCIATED WITH PROPERTY	SUITABILITY FOR DEVELOPMENT
1	• Dundas Valley Forests Life Science ANSI on adjacent lands • Within the Plan area of the Niagara Escarpment Commission • No significant natural features were identified within the manicured areas	**There IS potential for development within the disturbed areas**, outside of mandated vegetated buffers for natural features on adjacent lands.
2	• Areas of ground water seepage were observed in a remnant woodlot – this area is identified as a PSW by the City of Hamilton • Manicured areas offer no natural features of note.	**There IS potential for development** within the disturbed areas.
3	• No significant natural features were identified	**There IS potential for development** as no significant natural features were identified .
4	• Potential habitat for Barn Swallow (Threatened) on adjacent lands. No habitat for Barn Swallow was observed within the property limits	**There IS potential for development** as no significant natural features were identified .
5	• City of Hamilton identified SAR (American Chestnut) and Significant Woodlands within the property limits	**There IS NO potential for development** within the property limits.
6	• Potential habitat for Barn Swallow (Threatened) on adjacent lands. No habitat for Barn Swallow was observed within the property limits • Intermittent drainage features have been identified	**There IS potential for development** within the property limits outside of mandated vegetated buffers for natural features

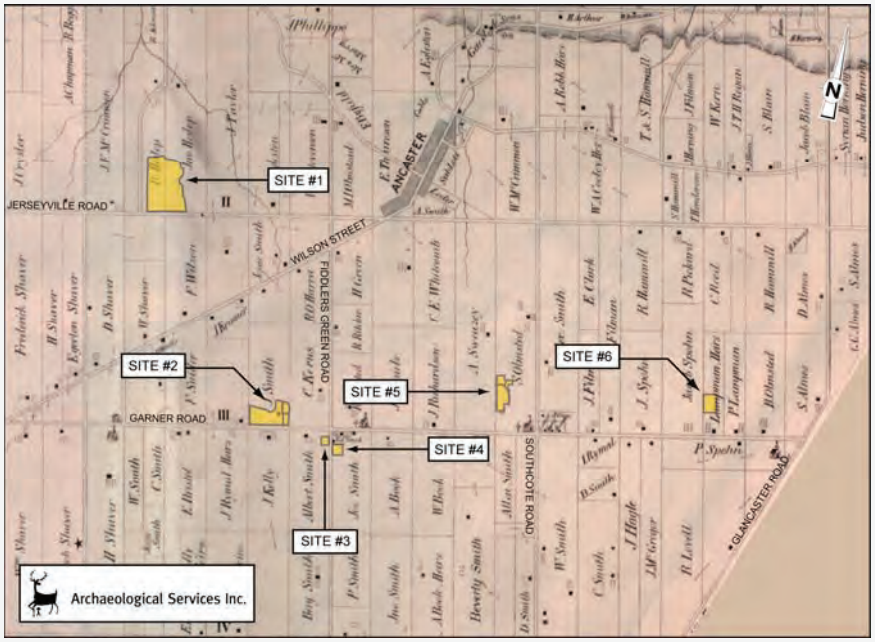
Ancaster Water Storage Facility

Schedule 'B' Municipal Class EA

Panel No. 9

Archaeological Assessments

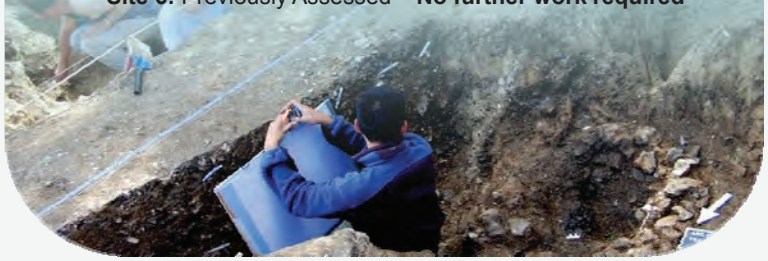
Archaeological Services Inc. completed Stage 1 archaeological assessments as part of this Class EA study. The objective of the Stage 1 assessment was to determine the presence or absence of known archaeological sites in the Study Area and in proximity to the Alternative Sites for the proposed Ancaster Elevated Water Storage Facility, and to identify the need for Stage 2 archaeological assessments for areas identified during the Stage 1 assessment as having potential archaeological planning concerns.



Stage 1 Archaeological Assessment Findings

The Stage 1 archaeological assessment involved background research concerning the known and potential archaeological resources in the Study Area. The conclusions of the assessment are summarized below:

- 204 archaeological sites registered within 1 km of the alternative sites
- Geography and history of area suggest that there is potential for the recovery of Aboriginal and Euro-Canadian archaeological resources
- **Site 1:** Mainly disturbed with some areas of potential **– Stage 2 Archaeological Assessment required**
- **Site 2:** Previously Assessed **– No further work required**
- **Site 3:** All potential **– Stage 2 Archaeological Assessment required**
- **Site 4:** All potential **– Stage 2 Archaeological Assessment Required**
- **Site 5:** Mix of low/wet conditions and areas with potential **– Stage 2 Archaeological assessment required**
- **Site 6:** Previously Assessed **– No further work required**



Archaeological Environment

Ancaster Water Storage Facility

Schedule 'B' Municipal Class EA

Panel No. 10

Public Consultation Centre # 1
Tuesday September 25th, 2012

We are Here

Comment Sheets from Public Information Centre (due to Project Team by October 25th)
Incorporation of comments received from Public and Review Agencies

Evaluation of Alternative Solutions
Identification of Recommended Solution (Siting of Elevated Tank)

Public Consultation Centre # 2
Spring of 2013

Incorporation of Comments received from Public and Review Agencies

Selection of Preferred Site Location

Prepare Project File Report
Distribute for Agency Review

Issue Notice of Study Completion
File Class EA Report followed by a mandatory 30-day Public Review Period
(Anticipated Spring 2013)

Commence Detailed Design and Construction of Preferred Solution

Next Steps

Ancaster Water Storage Facility

Schedule 'B' Municipal Class EA

Panel No. 11

- Please sign-in on the sheet provided.
- The Study Team is interested in receiving any comments that you may have about the Study.
- Comment Sheets are available for your input on the project.
- Should you have any questions, concerns or wish to obtain additional information, please contact one of the Study Team members.
- Additional information on the project can be found on the project website.

Winston Wang, P. Eng.
Project Manager
City of Hamilton
77 James Street North, Suite 400
Hamilton, Ontario L8R 2K3
Phone: 905-546-2424 ext. 4092
Fax: 905-546-4491
Email: winston.wang@hamilton.ca

Christopher Mills, P. Eng.
Project Manager
GENIVAR Inc.
1425 Cormorant Road, Suite 300
Ancaster, Ontario L9G 4V5
Phone: 289-239-0100
Fax: 289-239-0109
Email: christopher.mills@genivar.com

Project Team Contacts

City of Hamilton
City Hall, 71 Main Street West,
Hamilton, Ontario,
Canada L8P 4Y5
www.hamilton.ca

Environment & Sustainable Infrastructure Division, Public Works Department
Physical Address: 77James Street North, Suite 400, Hamilton ON L8R 2K3
Phone: 905.546.2424 ext. 4092 Fax: 905.546.4491
Email: winston.wang@hamilton.ca

Municipal Class Environmental Assessment for Ancaster Elevated Water Reservoir

Public Information Centre No 1

(5:00 PM ~ 8:30 PM; September 25, 2012)

SIGN IN SHEET

Thank you for attending the Public Information Centre. Please print legibly.

Name	Address	Phone	E-mail
[redacted]			

Personal information on this form is collected in accordance with the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record. Questions regarding the collection of this information may be forwarded to Co-ordinator, Elections and Freedom of Information, City Clerk's Division, 2nd Floor, Hamilton City Hall, 71 Main Street West, Hamilton, ON L8P 4Y5. Phone (905) 546-2424 x 7966 Fax: (905) 546-2095 E-mail: clerk@hamilton.ca

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City of Hamilton
City Hall, 71 Main Street West,
Hamilton, Ontario,
Canada L8P 4Y5
www.hamilton.ca

Environment & Sustainable Infrastructure Division, Public Works Department
Physical Address: 77James Street North, Suite 400, Hamilton ON L8R 2K3
Phone: 905.546.2424 ext. 4092 Fax: 905.546.4491
Email: winston.wang@hamilton.ca

Municipal Class EA for Ancaster Water Tower
Public Information Centre Questionnaire, September 25, 2012

After reading the newsletter and display panels at the Public Information Centre, please take a few minutes to complete this comment sheet. The City of Hamilton is interested in hearing from your comments or questions regarding the proposed elevated water tank. Your input is important and will be considered in the assessment of the preferred site.

1. Do you have any comments or concerns regarding the proposed elevated water tower in the Ancaster Industrial Park? ☐ Yes ☐ No If yes, please specify

_____

_____

_____

2. Do you have any comments or concerns with the preferred site for the new elevated tank, and/or with the location of the new connecting watermains? ☐ Yes ☐ No If yes, please specify

_____

_____

_____

3. Do you have any other issues or additional information that you feel the City should be made aware of regarding this project? ☐ Yes ☐ No If yes, please specify

_____

_____

_____

4. What is the nature of your interest in this project? ☐ Yes ☐ No If yes, please specify

_____

_____

_____

5. Please comment on the usefulness of this Information Centre. ☐ Yes ☐ No If yes, please specify

_____

_____

_____

6. Other comments:

_____

_____

_____

7. If any changes are made to this preferred site, do you wish to be informed?

☐ Yes ☐ No

Name: _____

Address: _____

Telephone: _____

Note: The information on this form is collected under the authority of the Environmental Assessment Act and will become the public information. All comments will be included in the final report. If you do not wish to have personal information (name, address, telephone) released, please make a check (√) in the box below.

☐ Please withhold personal information.

Thank you for your completing this comment sheet. Please leave it in the box provided at the registration table at the Public Information Centre, or mail or fax it by October 25, 2012 to:

Winston Wang
Project Manager, Water/Wastewater Planning
Infrastructure & Source Water Planning
Public Works Department
City of Hamilton
77 James Street North, Suite 400
Hamilton, ON L8R 2K3

T: (905) 546-2424 ext. 4092
F: (905) 546-4491

or

Christopher A. Mills
Project Manager
GENIVAR
425 Cormorant Road, Suite 300
Ancaster, Ontario
L9G 4V5

T: (289) 239-0100 x 16218
F: (289) 239-0109

GENIVAR

PIC # 1 SUMMARY

Ancaster Elevated Water Reservoir Class Environmental Assessment

Date:	September 25, 2012	**Project:**	111-25440-00
Time:	5:00-8:30 PM	**Location:**	Ancaster Municipal Building and Library, Murray Ferguson Room
Purpose:	Summary of Public Information Centre # 1		
Prepared By:	Gustavo Arvizu		

1. Overview

The City of Hamilton is planning to construct a new elevated water storage facility to provide storage for the Pressure District 18 (PD-18) in Ancaster. The need for the elevated water reservoir was documented in the City of Hamilton's Water and Wastewater Master Plan Class Environmental Assessment Report (November 2006), which indicated an unbalanced water supply and limited ability to adequately service future system demands in the area. The project is identified as a Schedule 'B' project under the Municipal Class Environmental Assessment (Class EA) Process. This Class EA involves an evaluation of environmental, social and cultural conditions as well as an assessment of the technical feasibility of the alternative water storage solutions. As part of the requirements of the Class EA process for a Schedule 'B' project, the first of two Public Information Centres (PIC) was held on September 25, 2012 at the Ancaster Municipal Building and Library. The PIC was published on the local newspaper on September 13 and September 20.

The objective of the PIC was to the background and objectives of the study, to communicate the approach to the evaluation of alternatives, to present the alternative sites, and to request public input. Information will be presented on display boards and staff from both the City and GENIVAR was present to provide additional information and respond to questions from the attendees.

A presentation was given during which the main aspects of the project were explained, and the material covered in the display boards was summarized.

Attendees were asked to provide their names and contact information on a sign-in sheet, and some of them filled out a questionnaire with their comments.

2. Summary of Comments

A total of 10 people signed in their name and information during the PIC. However, only three (3) people provided comments by completing a questionnaire. The completed sign-in sheet and questionnaires are included as attachments to this document. The questionnaire includes questions on the attendees' opinion on the accessibility of the PIC venue, the quality and clarity of the information presented, whether the staff in attendance explained the information adequately, and whether any questions were responded satisfactorily.

The three questionnaires received indicated that neither of the participants had any concerns with the construction of the elevated water reservoir. However, one of the respondents questioned the rationale for the definition of the Study Area, arguing that the residents south of Garner Road are not connected to the water system and thus the reservoir should not be located on their lands. One of the participants noted that there had been water towers in the Ancaster area, and requested that examples of what the elevated reservoir would look like.

Councillor Lloyd Ferguson from Ancaster was also in attendance. After all the remaining attendees had left, he expressed his concerns regarding the construction of an elevated tank and requested that additional information be provided on the various alternatives, including the option of installing VFDs at the Garner Road pumping station, and potential building a new booster pumping station to alleviate pressure issues within the Study Area. He requested that a comparison of the lifecycle costs of the various alternatives be completed to demonstrate that the elevated tank would result in the most beneficial use of the taxpayers money.

End of PIC Summary

WELCOME TO THE

PUBLIC INFORMATION CENTRE 2 FOR THE ANCASTER ELEVATED WATER RESERVOIR MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

Please complete the sign-in sheet and review the display materials.
Our representatives will be pleased to answer your questions and discuss any concerns.

Your input is much appreciated!

Ancaster Elevated Water Reservoir

Schedule 'B' Municipal Class EA

Panel No. 1

Introduction

The purpose of this Class EA study is to identify the preferred solution to address the long-term water storage needs in Pressure District (PD) 18 in Ancaster and PD-13, PD-14 and PD-15, and to mitigate pressure and operational issues in the system.

The preferred solution would improve system security and reliability, provide operations and maintenance savings, and alleviate pressure issues.

This project is classified as a Schedule 'B' Class EA and is being undertaken in accordance with Phases 1 and 2 of the Municipal Class Environmental Assessment process.

Purpose of this Public Information Centre

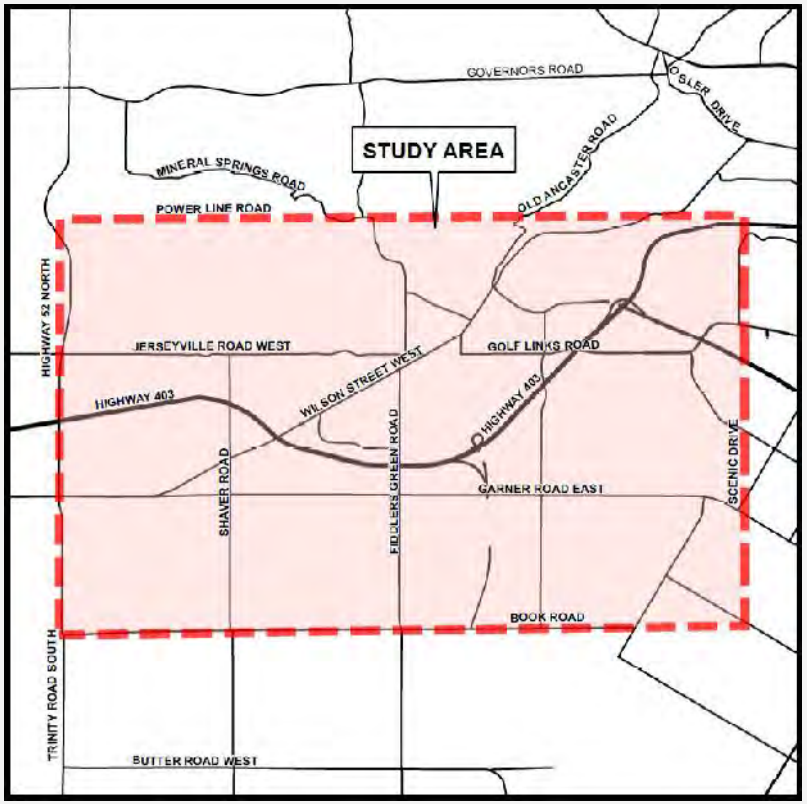
As part of the Class EA process, the public is invited to provide feedback for consideration in the planning and design of this project. The Class EA process ensures that the opportunity is given to Agencies and the public to provide comments and voice concerns regarding environmental, social, cultural, economic and other potential issues related to the project.

This evening's Public Information Centre (PIC) is being held to allow local residents, landowners, and other stakeholders to:

- Review and discuss the information being presented with City staff and its Consultant
- Voice concerns regarding the project
- Provide input for the City to consider during this Class EA
- Discuss potential construction impacts to local residents, businesses and other stakeholders

The Study Area

The Study Area boundary shown below has been identified.



Welcome to the Public Information Centre 2

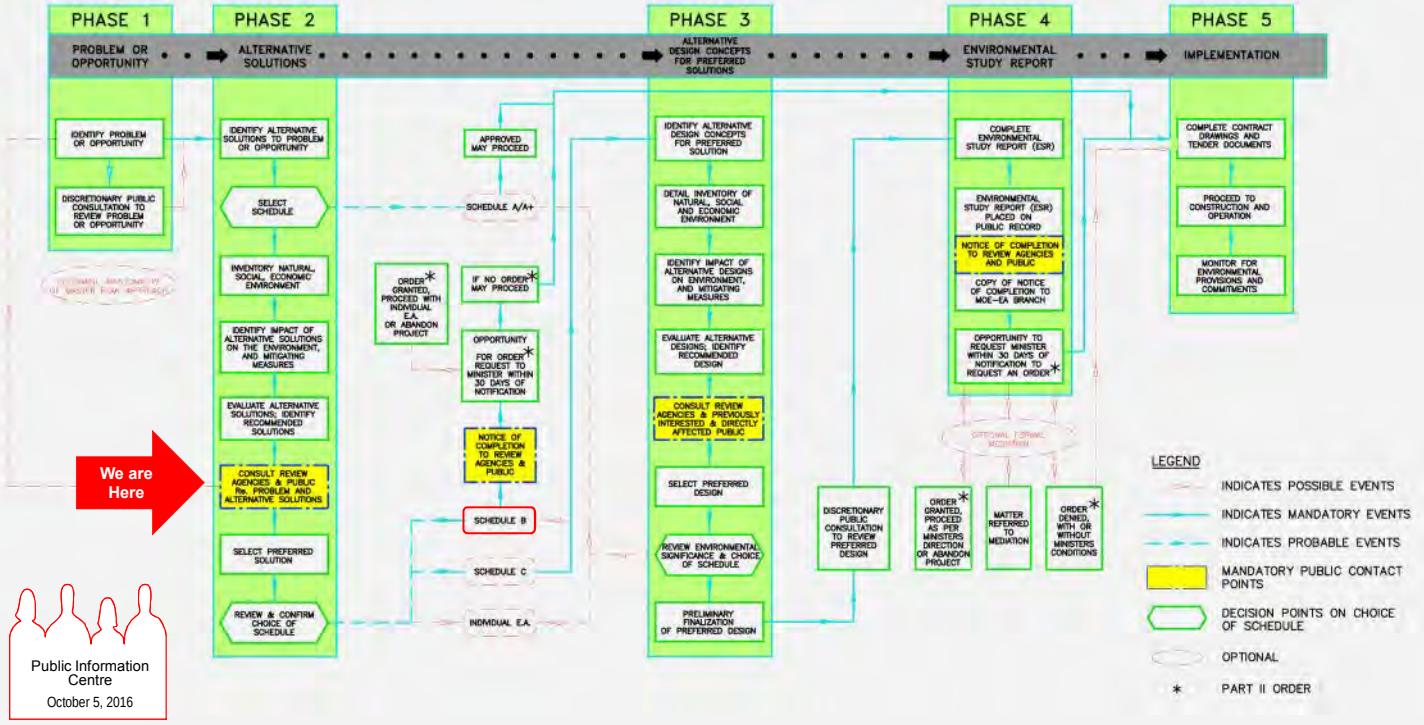
Ancaster Elevated Water Reservoir

Schedule 'B' Municipal Class EA

Panel No. 2

Municipal Class Environmental Assessment (EA) Process

The Ancaster Elevated Water Reservoir project corresponds to a **Schedule 'B'** undertaking, in accordance with the planning process outlined in the *Municipal Engineers Association (MEA) Municipal Class Environmental Assessment document (October 2000, amended in 2007, 2015).* As such, the Study requires the completion of Phases 1 and 2 of the MEA Class EA process. Upon completion of the Study, a Phase 1 and 2 Class Environmental Assessment Project File Report will be prepared and filed for comment.



Municipal Class Environmental Assessment Planning and Design Process

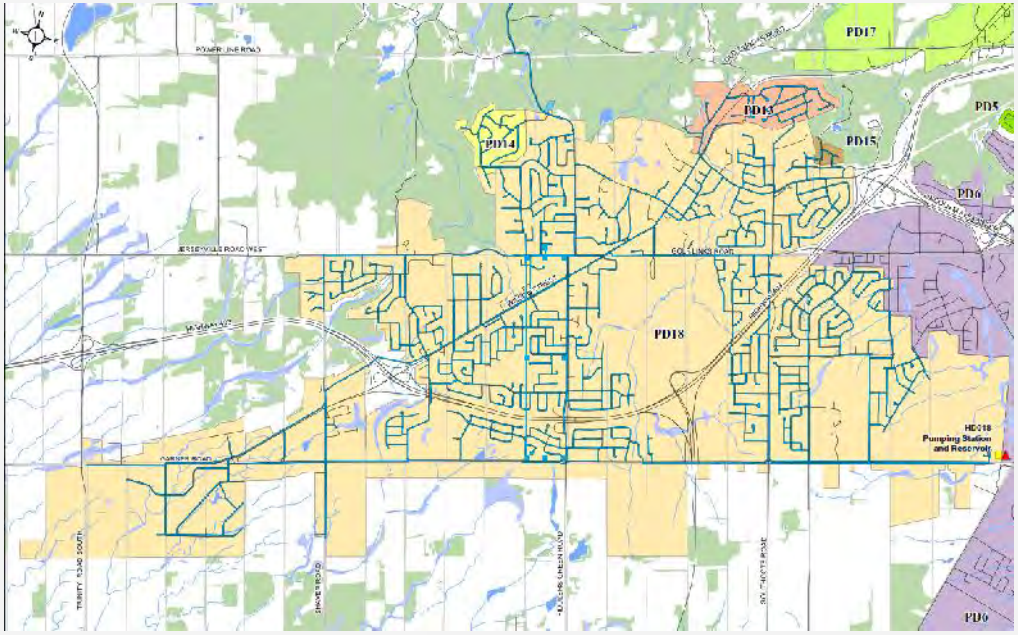
Ancaster Elevated Water Reservoir

Schedule 'B' Municipal Class EA

Panel No. 3

Ancaster Water System

Ancaster is divided into Pressure Districts 13, 14, and 18. Currently all of the water for Ancaster is supplied by the HD018 Pumping Station and HDR18 Reservoir, located on Garner Road. The Ancaster distribution system also feeds sub-zone PD-15 through a pressure reducing valve, and provides a secondary feed into PD-22 in northwest Dundas through a watermain along Sulphur Springs Road.



Problem Statement

The existing water system requires continuous pumping to meet the varying water demands, which results in high electricity and maintenance costs. Furthermore, the system is vulnerable to emergency situations such as watermain breaks and loss of power.

Historically, low water pressure issues have been reported in the high elevation areas of Ancaster (corresponding roughly to areas northwest of Wilson Street). To address these issues the City has modified the operation of the HD018 Pumping Station to run at a higher pressure. This change in operation philosophy has resulted in increased water recirculation within the station, lower pump efficiency, increased equipment wear and tear, and increased maintenance and energy costs.

It is the City's objective to provide adequate water services to its residents, businesses and industries to meet existing community needs in an efficient and cost-effective manner.

Therefore, a solution is required in Ancaster to improve water system security and reliability, to alleviate system pressure issues, and to improve the efficiency and reduce operation and maintenance costs.

Ancaster Elevated Water Reservoir

Schedule 'B' Municipal Class EA

Panel No. 4

Hamilton

Alternative Servicing Strategies

Several alternative servicing strategies were considered. These included:

- Do Nothing - Retrofit of the Pumps at HD018 Pumping Station
- Alternative 1 - Upgrade HD018 Pumping Station (*)
- Alternative 2 - Upgrade HD018 Pumping Station and Construction of a New Elevated Water Reservoir
- Alternative 3 - Upgrade HD018 Pumping Station and Construction of a New Booster Station
- Alternative 4 - Upgrade HD018 Pumping Station and Construction of a New Booster Station and In-Ground Reservoir

Preferred Servicing Strategy

The preferred servicing strategy is to upgrade HD018 pumping station and to construct a new elevated water reservoir in Ancaster. This alternative was preferred because it provides more reliability, results in more efficient operation, reduced energy costs and greenhouse gas emissions and results in the lowest overall lifecycle cost.

Do Nothing Retrofit of Existing Pumps at HD018 PS	Alternative 1 Upgrade HD018 PS (*)	Alternative 2 Upgrade HD018 and Construct a New Elevated Water Reservoir	Alternative 3 Upgrade HD018 PS and Construct a New Booster Station	Alternative 4 Upgrade HD018 PS and Construct a New Booster Station and In-Ground Reservoir
Description				
Current mode of operation at the Garner Road HD018 pumping station will be maintained. The existing pumps will be replaced with similar capacity pumps.	The pumps at the HD018 pumping station will be replaced with larger capacity pumps.	An elevated water reservoir will be constructed. Various pieces of equipment including the pumps at the HD018 pumping station will be replaced.	Construction of a new booster station to service high elevation areas in Ancaster.	Construction of a new booster station and in-ground reservoir to service high elevation areas in Ancaster.
Overall				
Unsustainable operation. Does not meet MOE requirements for firm capacity and does not provide adequate fire protection. Current mode of operation results in extremely high operations and energy costs.	Can satisfy technical requirements. However, results in high operations and energy costs.	Water supply is uninterrupted by power outages and other emergencies within the pressure district. Provides superior equalization of daily flow cycles and system pressures. Permits power-saving time-of-day filling approaches. Lowest lifecycle cost.	Dependent on HD018 PS to maintain supply. Increased energy costs. Requires standby power to maintain supply during power outages. High lifecycle costs.	Dependent on Garner Road HD018 PS to maintain supply. Increased energy costs. Requires standby power to maintain supply during power outages. Highest lifecycle costs.
Risk Ranking				
5 Unsustainable. Station failure is imminent due to poor condition. Major rehabilitation would be required in addition to replacement of the pumps	4 Increase operating efficiency. However, HD018 would remain the sole source of supply to the pressure district. Any failures in the station would result in complete loss of supply.	1 Minimizes risk. Most robust operation. Not as vulnerable to failures in HD018. Most efficient operation. Reduced energy costs and greenhouse gas emissions.	3 Increase operating efficiency. However, HD018 would remain the sole source of supply to the pressure district. Any failures in the station would result in complete loss of supply.	2 Increase operating efficiency. However, HD018 would remain the sole source of supply to the pressure district. Any failures in the station would result in complete loss of supply. Reservoir would amount to some protection in the new pressure district.

(*) – Pumping Station will be on the same site as existing

Evaluation of Alternative Servicing Strategies

WSP

Ancaster Elevated Water Reservoir

Schedule 'B' Municipal Class EA

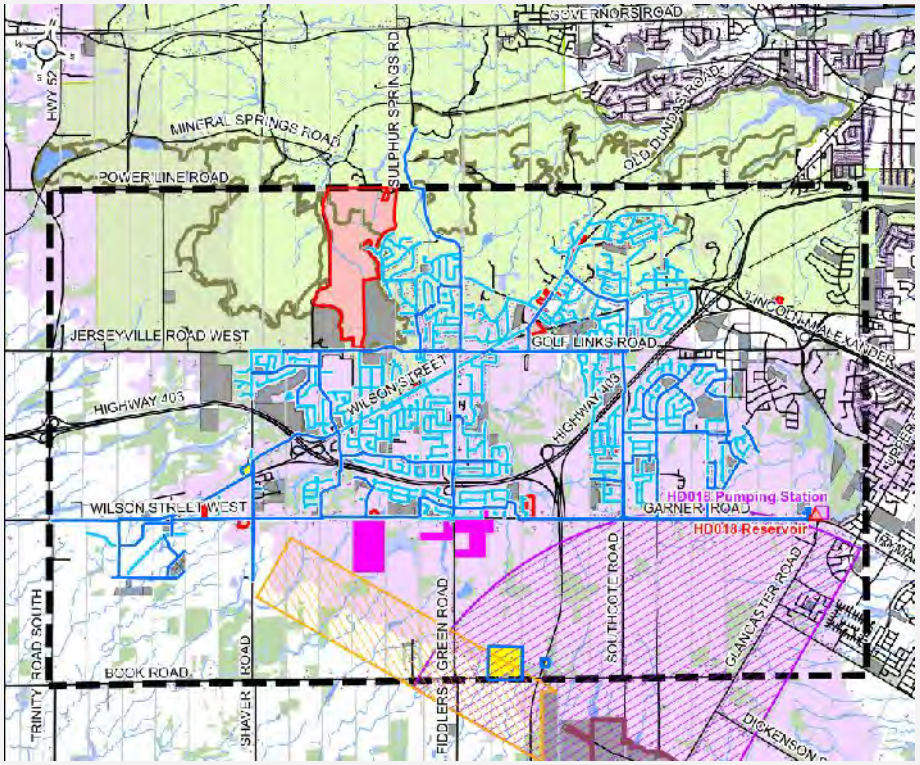
Panel No. 5

Hamilton

Elevated Reservoir Site Selection Criteria & Constraints

- Top water level of the elevated reservoir > 294 m
- Seek to minimize overall height of the elevated reservoir
- Ground elevations > 233 m to minimize pedestal height
- Compatible Land Use Designation (Outside Greenbelt Area and Niagara Escarpment boundary)
- Away from John C. Munro Hamilton International Airport Zoning Regulation areas
- Consider property acquisition requirements
- Preferred 60 m x 100 m site area with good road access. 60 m x 60 m minimum site area.
- Proximity to existing watermain infrastructure
- Lowest aesthetic impact on existing residents and customers
- Minimum natural/heritage/environmental impacts
- Optimum distribution system hydraulics to provide adequate pressure and fire flows

Constraints Map



Elevated Water Reservoir Site Selection – Key Considerations

WSP

Ancaster Elevated Water Reservoir

Schedule 'B' Municipal Class EA

Panel No. 6

Hamilton

SOCIAL & CULTURAL ENVIRONMENT CONSIDERATIONS

- Proximity to built heritage areas and areas of archaeological importance
- Aesthetic impact on existing and proposed development
- Availability of Suitable Sites/Property Ownership
- Traffic impacts during construction
- Air and noise impact during construction

NATURAL ENVIRONMENT CONSIDERATIONS

- Proximity to Environmentally Sensitive Areas (e.g. Greenbelt, Niagara Escarpment and Conservation Authority Regulated Areas)

TECHNICAL CONSIDERATIONS

- Ground elevation
- Constructability and site access
- System reliability and hydraulic performance

ECONOMIC CONSIDERATIONS

- Capital cost
- Land acquisition costs
- Distance of new watermain connection to existing system

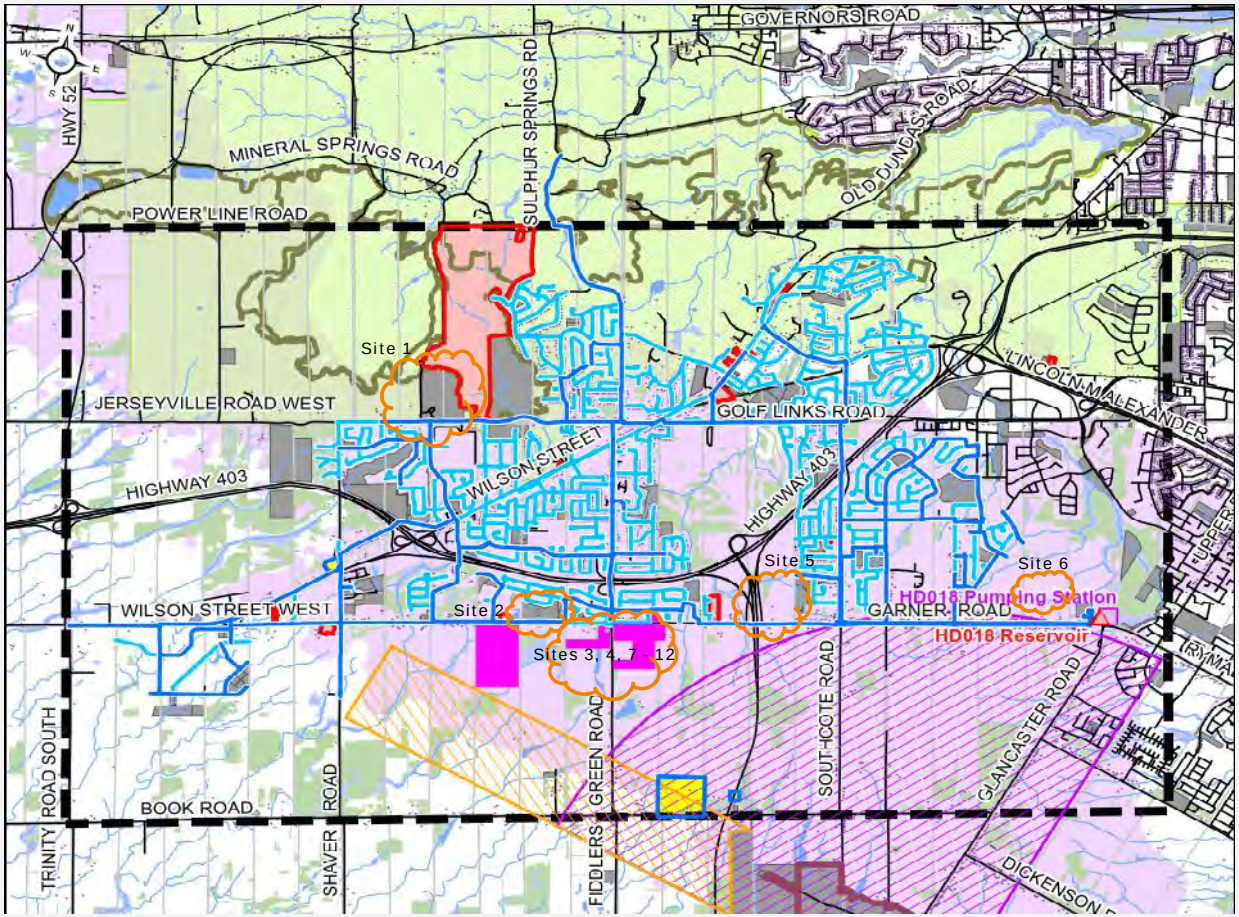
Elevated Water Reservoir Site Evaluation Criteria

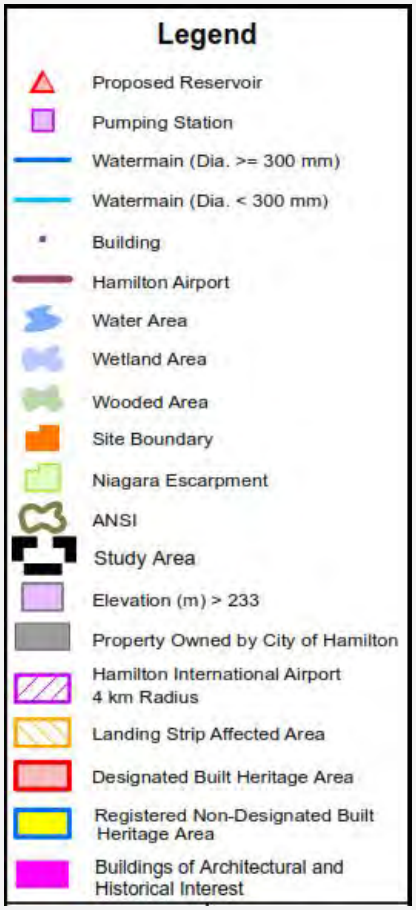
WSP

Ancaster Elevated Water Reservoir

Schedule 'B' Municipal Class EA

Panel No. 7





Elevated Water Reservoir Alternative Sites

Ancaster Elevated Water Reservoir

Schedule 'B' Municipal Class EA

Panel No. 8

Natural Heritage Assessment

Azimuth Environmental Consulting Inc. completed a preliminary Natural Heritage Assessment of the alternative sites identified within the Study Area. The objective of the assessment was to identify potential environmental constraints and opportunities that may assist in the evaluation of alternatives from an environmental perspective.

The assessment involved a review of data from City of Hamilton, Ministry of Natural Resources, Hamilton Conservation Authority and Grand River Conservation Authority to identify Areas of Natural and Scientific Interest (ANSI), Environmentally Sensitive Areas, Wetlands (Locally and Provincially Significant), Woodlands, drainage courses, and occurrences of Species at Risk.

Also as part of the assessment, conducted field surveys to determine the presence of vegetation, birds, amphibians, and Species at Risk.

Natural Heritage Assessment Findings

SITE	NATURAL FEATURES ASSOCIATED WITH PROPERTY	SUITABILITY FOR ELEVATED WATER RESERVOIR
1	• Dundas Valley Forests Life Science ANSI on adjacent lands. • Within the Plan area of the Niagara Escarpment Commission. • No significant natural features were identified within the manicured areas.	The site includes areas of previously disturbed land. An elevated water reservoir can be constructed in these areas.
2	• Areas of ground water seepage were observed in a remnant woodlot – this area is identified as a PSW by the City of Hamilton. • Manicured areas offer no natural features of note.	The site includes areas of previously disturbed land. An elevated water reservoir can be constructed in these areas.
3, 4, 7 - 12	• No significant natural features were identified, although there is the City's Natural Heritage System and unevaluated wetlands within close proximity. Further investigation is required.	No significant natural features were identified. However, there is the City's Natural Heritage System and unevaluated wetlands within close proximity. An elevated water reservoir can be constructed in this area provided it does not affect the Natural Heritage System and wetlands.
5	• City of Hamilton identified SAR (American Chestnut) and Significant Woodlands within the property limits.	The area is within Significant Woodlands and habits American Chestnuts. An elevated water reservoir cannot be constructed in this area.
6	• Potential habitat for Barn Swallow (Threatened) on adjacent lands. No habitat for Barn Swallow was observed within the property limits. • Intermittent drainage features have been identified.	An elevated water reservoir can be constructed outside of the mandated vegetated buffers for natural features.

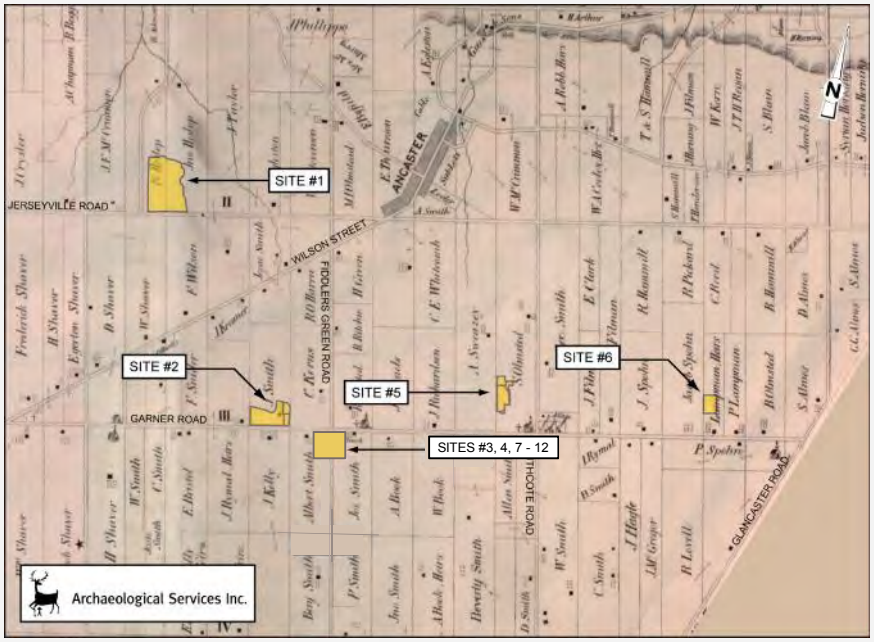
Ancaster Elevated Water Reservoir

Schedule 'B' Municipal Class EA

Panel No. 9

Archaeological, Built, and Cultural Heritage Assessments

Archaeological Services Inc. and ARA Ltd. completed Stage 1 archaeological assessments as part of this Class EA study. The objective of the Stage 1 assessment was to determine the presence or absence of known archaeological sites in the Study Area and in proximity to the Alternative Sites for the proposed Ancaster Elevated Water Storage Facility, and to identify the need for Stage 2 archaeological assessments for areas identified during the Stage 1 assessment as having potential archaeological planning concerns.



Stage 1 Assessment Findings

The Stage 1 assessment involved background research concerning the known and potential archaeological resources in the Study Area. The conclusions of the assessment are summarized below:

- 204 archaeological sites registered within 1 km of the alternative sites
- Geography and history of area suggest that there is potential for the recovery of Aboriginal and Euro-Canadian archaeological resources
- **Site 1:** Mainly disturbed with some areas of potential. Near Designated Built Heritage Area. **Stage 2 Archaeological Assessment required.**
- **Site 2:** Area disturbed by grading and heavy landscaping. Previously assessed in 1995 and 1997. No archaeological potential found. Near Designated Built Heritage Area.
- **Sites 3, 4, 7-12:** Archaeological and built heritage potential **– Stage 2 Archaeological Assessment required**
- **Site 5:** Mix of low/wet conditions and areas with potential. **Stage 2 Archaeological assessment required**
- **Site 6:** Area disturbed by grading and heavy landscaping. Previously assessed in 2004. No archaeological potential found.

Ancaster Elevated Water Reservoir

Schedule ‘B’ Municipal Class EA

Panel No. 10

Alternative Elevated Storage Locations with Representative Sites

Ancaster Elevated Water Reservoir

Schedule 'B' Municipal Class EA

Panel No. 11

Evaluation Criteria	Site #1 North-East corner of Martin Rd. and Jerseyville Rd. W. In the Robert E Wade Ancaster Community Park	Site #2 West of Fiddler's Green Rd. and Garner Rd. W In James Smith Park	Site #3, #4, #7 to #12 South-West corner of Fiddler's Green Rd. and Garner Rd. W.	Site #5 North-West of Southcote Rd. and Garner Rd. E.	Site #6 North-East of Raymond Rd. and Rymal Rd. W.
	Natural Environment Considerations				
Proximity to Environmentally Sensitive Areas	In Niagara Escarpment	Identified as Provincially Significant Wetland by City. Sections of previously disturbed areas. No natural features of note.	No significant natural features were identified, although there is the City's Natural Heritage System and unevaluated wetlands within close proximity. Further investigation is required.	American Chestnut and Significant Woodlands located within the site.	No environmentally sensitive areas within the site.
	Social & Cultural Environment Considerations				
Proximity to Built Heritage Areas	Near Designated Built Heritage Area	Near Designated Built Heritage Area	Areas listed in the City's inventory of Buildings of Architectural and/or Historical Interest.	Not in the proximity of any Built Heritage Areas	Not in the proximity of any Built Heritage Areas
Proximity to Archaeological and Cultural Heritage Areas	Several sections appear undisturbed and retain archaeological potential. A Stage 2 Archaeological Assessment is required.	Area disturbed by grading and heavy landscaping. Previously assessed in 1995 and 1997. No archaeological potential found.	Several sections appear undisturbed and retain archaeological potential. A Stage 2 Archaeological Assessment is required. A portion of the area within the sites has been identified as Cultural Heritage Resources.	Several sections appear undisturbed and retain archaeological potential. A Stage 2 Archaeological Assessment is required.	Area disturbed by grading and heavy landscaping. Previously assessed in 2004. No archaeological potential found.
Aesthetic Impact	High, in the Niagara Escarpment	High, within residential areas	Low, south of Garner Rd.	High, within residential areas	High, within residential areas
Land Ownership	Owned by the City	Owned by the City	Privately Owned	Owned by the City	Owned by the City
Noise, Traffic, and Dust Impacts Disrupting Surrounding Area During Construction	High, near residential areas. High traffic impact on Jerseyville Rd. W.	High, within residential areas. High traffic impact on Garner Rd.	Low, south of residential areas. High traffic impact on Fiddler's Green Rd.	High, within residential areas. Low traffic impact on local roads	High, within residential areas. Low traffic impact on local roads
	Economic Considerations				
Capital Cost including Land Acquisition ($M)	$6.8	$6.9	$8.3	$6.9	$7.3
	Technical Considerations				
Tower Height	38 m	46 m	47 m	49 m	54 m
Constructability and Site Access	Accessible by urban local road Jerseyville Rd. W.	Accessible by minor arterial road Garner Rd.	Accessible by minor arterial road Fiddler's Green Rd.	Accessible by urban local road Bookjans Dr.	Accessible by urban local road Vinton Rd.
System Reliability and Hydraulic Performance	Located within the highest elevation area of the pressure district, near the areas more likely to experience low pressures. The distance from the pumping station and the size of the pipe feeding the site results in greater pressure losses.	Most preferred hydraulically. Highest pressures in the district when operated under gravity. In close proximity to the existing 400mm diameter trunk main along Garner Rd.	Most preferred hydraulically. Highest pressures in the district when operated under gravity. In close proximity to the existing 400mm diameter trunk main along Garner Rd.	Most preferred hydraulically. Highest pressures in the district when operated under gravity. In close proximity to the existing 400mm diameter trunk main along Garner Rd.	This Site is the least preferred hydraulically due to the distance to the west side of the pressure district, which is more likely to experience low pressures. Low pressure during maximum day condition. In addition, the tank location is serviced by 300mm diameter pipes.
Summary	Located within the Niagara Escarpment and near a built heritage area. Contains archaeological potential. Owned by the City. High aesthetic impact on the Escarpment and high impact during construction. Reduced tank height. Accessible by urban local roads. Less preferred hydraulically.	Located beside a designated built heritage area and in a Provincially Significant Wetland. No archaeological potential. High impact during construction due to being within a major residential area. Owned by the City. Reduced tank height. Accessible by minor arterial road. Most preferred hydraulically.	Not near any environmentally sensitive areas or built heritage areas. Contains archaeological potential. Privately owned. Is not near major residential areas and will have low construction impact. Reduced tank height. Accessible by minor arterial road. Most preferred hydraulically.	Located within the American Chestnut and Woodlands area. Not near any built heritage areas. Owned by the City. High impact during construction due to being within a major residential area. Tank is required to be taller due to lower ground height. Accessible only by urban local roads. Most preferred hydraulically.	Not located near any environmentally sensitive areas or built heritage areas. No archaeological potential. Large aesthetic and construction noise impact on the residential area. Owned by the City. Tank is required to be taller due to lower ground height. Accessible only by urban local roads. Least preferred hydraulically.
Rank	Least preferred	Less preferred	Most preferred	Less preferred	Less preferred

Ancaster Elevated Water Reservoir

Schedule ‘B’ Municipal Class EA

Panel No. 12

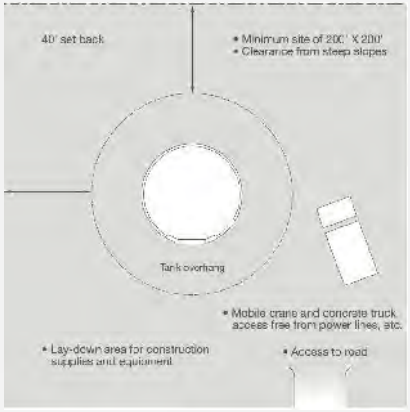
Preferred Solution

Sites 3, 4 and 7 through 12 are the preferred sites of the elevated water reservoir. The specific location will depend on property acquisition negotiations. Initial consultation with the John C. Munro Airport has concluded that all sites being evaluated would have no impact on the airport, although further investigation and consultation is required.

These sites will have minimal impact on environmentally sensitive areas and built heritage areas. There will also be minimal noise and dust impacts during construction as the sites are south of the major residential areas.

These sites are preferred because they are south of Garner Rd. and not near major residential areas.

These sites result in superior hydraulic performance due to their proximity to the trunk watermain on Gardner Road and their central location in the water supply network.



(*) Typical Elevated Water Reservoir Site Layout

(**) Sample of an elevated water reservoir

Preferred Alternative

Ancaster Elevated Water Reservoir

Schedule 'B' Municipal Class EA

Panel No. 13

Public Consultation Centre # 1
Tuesday September 25th, 2012

Comment Sheets from Public Information Centre
Incorporation of comments received from Public and Review Agencies

Evaluation of Alternative Solutions
Identification of Recommended Solution (Siting of Elevated Tank)

We are Here

Public Consultation Centre # 2
Wednesday October 5th, 2016

Comment Sheets from Public Information Centre (due to Project Team by October 5th, 2016)
Incorporation of comments received from Public and Review Agencies

Incorporation of Comments received from Public and Review Agencies

Selection of Preferred Site Location

Prepare Project File Report
Distribute for Agency Review

Issue Notice of Study Completion
File Class EA Report followed by a mandatory 30-day Public Review Period
(Anticipated Winter 2017)

Commence Detailed Design and Construction of Preferred Solution

Next Steps

Ancaster Elevated Water Reservoir

Schedule 'B' Municipal Class EA

Panel No. 14

- Please sign-in on the sheet provided.
- The Study Team is interested in receiving any comments that you may have about the Study.
- Comment Sheets are available for your input on the project.
- Should you have any questions, concerns or wish to obtain additional information, please contact one of the Study Team members.
- Additional information on the project can be found on the project website.

Winston Wang, P. Eng.
Project Manager
City of Hamilton
77 James Street North, Suite 400
Hamilton, Ontario L8R 2K3
Phone: 905-546-2424 ext. 4092
Fax: 905-546-4491
Email: winston.wang@hamilton.ca

Gustavo Arvizu, P. Eng.
Project Manager
WSP Canada Inc.
600 Cochrane Dr., Suite 500
Markham, Ontario L3R 5K3
Phone: 905-475-7270 x18346
Fax: 905-475-5994
Email: gustavo.arvizu@wspgroup.com

Project Team Contacts

Public Works Department
Hamilton Water Division
Infrastructure Planning & Systems Design
77 James St N, Suite 400, Hamilton, ON L8R 2K3
Phone: 905.546.2424, ext. 4092 Fax: 905.546.4491
Email: Winston.wang@hamilton.ca

Municipal Class Environmental Assessment for Ancaster Elevated Water Reservoir

Public Information Centre No 2

(6:00 PM ~ 8:00 PM; October 5th, 2016)

SIGN IN SHEET

Thank you for attending the Public Information Centre. Please print legibly.

Name	Address	Phone	E-mail
[redacted]			

Personal information on this form is collected in accordance with the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record. Questions regarding the collection of this information may be forwarded to Co-ordinator, Elections and Freedom of Information, City Clerk's Division, 2nd Floor, Hamilton City Hall, 71 Main Street West, Hamilton, ON L8P 4Y5. Phone (905) 546-2424 x 7966 Fax: (905) 546-2095 E-mail: clerk@hamilton.ca

Public Works Department
Hamilton Water Division
Infrastructure Planning & Systems Design
77 James St N, Suite 400, Hamilton, ON L8R 2K3
Phone: 905.546.2424, ext. 4092 Fax: 905.546.4491
Email: Winston.wang@hamilton.ca

Municipal Class Environmental Assessment for Ancaster Elevated Water Reservoir

Public Information Centre No 2

(6:00 PM ~ 8:00 PM; October 5th, 2016)

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City of Hamilton
City Hall, 71 Main Street West,
Hamilton, Ontario,
Canada L8P 4Y5
www.hamilton.ca

Environment & Sustainable Infrastructure Division, Public Works Department
Physical Address: 77James Street North, Suite 400, Hamilton ON L8R 2K3
Phone: 905.546.2424 ext. 4092 Fax: 905.546.4491
Email: winston.wang@hamilton.ca

Municipal Class EA for Ancaster Elevated Water Reservoir
Public Information Centre No 2 Questionnaire October 5th, 2016

After reading the newsletter and display panels at the Public Information Centre, please take a few minutes to complete this comment sheet. The City of Hamilton is interested in hearing from your comments or questions regarding the proposed elevated water tank. Your input is important and will be considered in the assessment of the preferred site.

1. **How did you hear about this public meeting?**

   [ ] Newspaper ad [ ] Notice in mail [ ] Other

2. **Please indicate your satisfaction with the following:**

	Satisfied (Y/N)	**If not Satisfied, please specify your preference here**
Location of Meeting		
Time of Meeting		
Day of the Week		

On a scale of 1 to 5, where "1" is "very" and "5" is "not at all", please rate the following by circling the appropriate number:

3. **How informative were the display materials?**
   1 (very) 2 3 (somewhat) 4 5 (not at all)

4. **How helpful were the staff and consultants in attendance?**
   1 (very) 2 3 (somewhat) 4 5 (not at all)

5. **Were all your questions answered satisfactorily?**
   [ ] Yes [ ] No

6. **Do you have any comments or concerns regarding the proposed elevated water reservoir in the Ancaster area? [ ] Yes [ ] No If yes, please specify**

_____

_____

_____

_____

7. **Do you have any other issues or additional information that you feel the City should be made aware of regarding this project? [ ] Yes [ ] No If yes, please specify**

_____

_____

_____

8. **What is the nature of your interest in this project?**

_____

_____

9. **Other comments:** _____

_____

_____

_____

Thank you for participating in this study.

Comments and information regarding this study are being collected to assist the City of Hamilton in meeting the requirements of the Environmental Assessment Act. This material will be maintained on file for use during the study and may be included in project documentation. *Information will be collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act. With the exception of personal information all comments will become part of the public record.*

Please provide your contact information below should you wish to be added to our Project Mailing List.

Name: _____
(please print)
Address:_____

Telephone:_____

Please return this completed **Comment Sheet** to our staff at the Registration Table or place in the *'Comment Box'.* You can also mail/fax/email your comments to the Project Manager by **October 25th, 2016**:

Winston Wang, P. Eng., Project Manager
City of Hamilton
77 James Street North, Suite 400
Hamilton, Ontario L8R 2K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Gustavo Arvizu, P. Eng., Project Manager
WSP Canada Inc.
600 Cochrane Drive, Suite 500
Markham, Ontario, L3R 5K3
Phone: 905 475-7270
Fax: 905 475-5994
Email: gustavo.arvizu@wspgroup.com

SUMMARY OF PIC 2

TO: City of Hamilton Technical Committee

FROM: WSP

SUBJECT: **PIC 2 Summary – Ancaster Elevated Water Reservoir Class EA**

DATE: **October 18, 2016 (revised November 7, 2016)**

1 OVERVIEW

The purpose of this Class EA study is to identify the preferred solution to address the long-term water storage needs in Pressure District (PD) 13, 14, 15 and 18 in the Ancaster area, and to mitigate pressure and operational issues in the system.

The preferred solution would improve system security and reliability, provide operations and maintenance savings, and alleviate pressure issues.

This project is classified as a Schedule 'B' Class EA and is being undertaken in accordance with Phases 1 and 2 of the Municipal Class Environmental Assessment process.

The second of two Public Information Centres (PIC) was held on October 5, 2016 at the Old Town Hall in Ancaster. The Notice of PIC was published on the local Ancaster newspaper on September 22 and September 29, 2016.

The objectives of the PIC were to present the background and objectives of the study, to communicate the approach to the evaluation process, to present the alternative solutions, to present the preferred solution, and to request public input. Information was presented on display boards and staff from both the City and WSP was present to provide additional information and respond to questions from the attendees.

The PIC was done in an open-house setup where attendees were free to review the boards on their own, or with a member of the project team.

Attendees were asked to provide their names and contact information on a sign-in sheet, and some of them filled out a questionnaire with their comments.

2 ATTENDEES

There were a total of four City staff and two WSP staff in attendance for the duration of the PIC. Councillor Lloyd Ferguson from Ancaster was also in attendance.

10 members of the public attended the PIC and signed in. Copies of the sign in sheets are attached.

3 SUMMARY OF COMMENTS

All attendees were requested to complete a questionnaire at the PIC or to submit it by email following the PIC. The questionnaire included questions on the attendees' opinions on the accessibility of the PIC venue, the quality and clarity of the information presented, whether the staff in attendance explained the information adequately, and whether any questions were responded satisfactorily. The questionnaire also

requested comments from attendees, including the attendees' interest in the project. The completed PIC questionnaires are included as attachments to this document.

One of the attendees brought with him a comment sheet. This comment sheet was mailed to local area residents and property-owners in the study area prior to the PIC. The same individual completed a PIC questionnaire as well. No additional questionnaires or comment sheets were submitted during the PIC. One additional PIC questionnaire was received by email on October 14, 2016. In this questionnaire, the respondent noted that his questions were not answered satisfactorily and was interested in the reasoning for the need of an elevated water reservoir and the location selected. Project staff will follow up with this individual to address his concerns and the correspondence will be documented in the Project File.

No other issues or concerns were noted in the feedback received at the PIC.

During the PIC one of the members of the public inquired whether the City would consider extending the 30 day review period given to the public to provide comments as part of the Class EA. He was instructed to submit his request in writing.

Councillor Lloyd Ferguson, in discussion with City staff, asked that the need for a zoning variance for the preferred site of the elevated water reservoir be addressed and documented in the Project File.

Following the PIC, a question was received by email from a member of the public who had reviewed the presentation material posted on the City's website. She lives near the preferred sites and noted her support for the project. She also asked where exactly the preferred site was located (behind Avondale's or further down Fiddler's Green) and about the timeline of the project. The project team explained that the location would be south of Avondale's, pending property acquisition, and that construction timing is not yet clear but could be in 2020 or later.

A PIC questionnaire was received by mail following the PIC. The member of the public inquired about the reasoning for the need of an elevated reservoir. The member was contacted by phone and was explained the reasons for the elevated water reservoir is to meet the water servicing issues, such as water supply reliability, sustainability, energy saving, greenhouse gas reduction, and low water pressure at a higher elevation within the community. The member asked if there are any complaints and if someone is protesting. The member was informed that there have been no complaints from the residents so far and there are no protests.

End of PIC Summary

Appendix G

PUBLIC COMMENTS

City of Hamilton
City Hall, 71 Main Street West,
Hamilton, Ontario,
Canada L8P 4Y5
www.hamilton.ca

Environment & Sustainable Infrastructure Division, Public Works Department
Physical Address: 77James Street North, Suite 400, Hamilton ON L8R 2K3
Phone: 905.546.2424 ext. 4092 Fax: 905.546.4491
Email: winston.wang@hamilton.ca

Municipal Class EA for Ancaster Elevated Water Reservoir
Public Information Centre No 1 Questionnaire, September 25, 2012

After reading the newsletter and display panels at the Public Information Centre, please take a few minutes to complete this comment sheet. The City of Hamilton is interested in hearing from your comments or questions regarding the proposed elevated water tank. Your input is important and will be considered in the assessment of the preferred site.

1. **How did you hear about this public meeting?**

[X] Newspaper ad [ ] Notice in mail [ ] Other

2. **Please indicate your satisfaction with the following:**

	Satisfied (Y/N)	If not Satisfied, please specify your preference here
Location of Meeting	Y	
Time of Meeting	Y	
Day of the Week	Y	

On a scale of 1 to 5, where "1" is "very" and "5" is "not at all", please rate the following by circling the appropriate number:

3. **How informative were the display materials?**
   (1) (very) 2 3 (somewhat) 4 5 (not at all)

4. **How helpful were the staff and consultants in attendance?**
   1 (very) (2) 3 (somewhat) 4 5 (not at all)

5. **Were all your questions answered satisfactorily?**
   [X] Yes [ ] No

6. **Do you have any comments or concerns regarding the proposed elevated water reservoir in the Ancaster area? [X] Yes [ ] No If yes, please specify**

SITE 6 IS PREFERRED

7. **Do you have any other issues or additional information that you feel the City should be made aware of regarding this project? [ ] Yes [X] No If yes, please specify**

8. **What is the nature of your interest in this project?**

RESIDENT IN THE AREA.

9. **Other comments:** WOULD LIKE TO SEE EXAMPLES OF WHAT THIS TOWER LOOKS LIKE.

REMIND PPL THAT ANCASTER USED TO HAVE H_2O TOWERS.

Thank you for participating in this study.

Comments and information regarding this study are being collected to assist the City of Hamilton in meeting the requirements of the Environmental Assessment Act. This material will be maintained on file for use during the study and may be included in project documentation. *Information will be collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act. With the exception of personal information all comments will become part of the public record.*

Please provide your contact information below should you wish to be added to our Project Mailing List.

Name: [redacted]
(please pri
Address: [redacted]

Telephone: [redacted]

For more information about this project, please visit our website at:

Please return this completed **Comment Sheet** to our staff at the Registration Table or place in the *'Comment Box'*. You can also mail/fax/email your comments to the Project Manager by **October 25, 2012**:

Winston Wang, P. Eng., Project Manager
City of Hamilton
77 James Street North, Suite 400
Hamilton, Ontario L8R 2K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Christopher Mills, P. Eng., Project Manager
GENIVAR Inc.
1425 Cormorant Road, Suite 300
Ancaster, Ontario, L9G 4V5
Phone: 289 239-0100
Fax: 289 239-0109
Email: christopher.mills@genivar.com

City of Hamilton
City Hall, 71 Main Street West,
Hamilton, Ontario,
Canada L8P 4Y5
www.hamilton.ca

Environment & Sustainable Infrastructure Division, Public Works Department
Physical Address: 77James Street North, Suite 400, Hamilton ON L8R 2K3
Phone: 905.546.2424 ext. 4092 Fax: 905.546.4491
Email: winston.wang@hamilton.ca

Municipal Class EA for Ancaster Elevated Water Reservoir
Public Information Centre No 1 Questionnaire, September 25, 2012

After reading the newsletter and display panels at the Public Information Centre, please take a few minutes to complete this comment sheet. The City of Hamilton is interested in hearing from your comments or questions regarding the proposed elevated water tank. Your input is important and will be considered in the assessment of the preferred site.

1. **How did you hear about this public meeting?**

[ ] Newspaper ad [ ] Notice in mail [ ] Other

2. **Please indicate your satisfaction with the following:**

	Satisfied (Y/N)	If not Satisfied, please specify your preference here
Location of Meeting	Y	
Time of Meeting	Y	
Day of the Week	Y	

On a scale of 1 to 5, where "1" is "very" and "5" is "not at all", please rate the following by circling the appropriate number:

3. **How informative were the display materials?**
   1 (very) 2 3 (somewhat) 4 5 (not at all)

4. **How helpful were the staff and consultants in attendance?**
   1 (very) 2 3 (somewhat) 4 5 (not at all)

5. **Were all your questions answered satisfactorily?**
   [ ] Yes [ ] No

6. **Do you have any comments or concerns regarding the proposed elevated water reservoir in the Ancaster area? [ ] Yes [ ] No If yes, please specify**

_____

_____

_____

_____

7. **Do you have any other issues or additional information that you feel the City should be made aware of regarding this project? [ ] Yes [ ] No If yes, please specify**

N/A

8. **What is the nature of your interest in this project?**

PUBLIC INFORMATION

9. **Other comments:** NONE

Thank you for participating in this study.

Comments and information regarding this study are being collected to assist the City of Hamilton in meeting the requirements of the Environmental Assessment Act. This material will be maintained on file for use during the study and may be included in project documentation. *Information will be collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act. With the exception of personal information all comments will become part of the public record.*

Please provide your contact information below should you wish to be added to our Project Mailing List.

Name: [redacted]

(ple

Address: [redacted]

Telephone: [redacted]

For more information about this project, please visit our website at:

Please return this completed **Comment Sheet** to our staff at the Registration Table or place in the *'Comment Box'*. You can also mail/fax/email your comments to the Project Manager by **October 25, 2012**:

Winston Wang, P. Eng., Project Manager
City of Hamilton
77 James Street North, Suite 400
Hamilton, Ontario L8R 2K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
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Christopher Mills, P. Eng., Project Manager
GENIVAR Inc.
1425 Cormorant Road, Suite 300
Ancaster, Ontario, L9G 4V5
Phone: 289 239-0100
Fax: 289 239-0109
Email: christopher.mills@genivar.com

City of Hamilton
City Hall, 71 Main Street West,
Hamilton, Ontario,
Canada L8P 4Y5
www.hamilton.ca

Environment & Sustainable Infrastructure Division, Public Works Department
Physical Address: 77James Street North, Suite 400, Hamilton ON L8R 2K3
Phone: 905.546.2424 ext. 4092 Fax: 905.546.4491
Email: winston.wang@hamilton.ca

Municipal Class EA for Ancaster Elevated Water Reservoir
Public Information Centre No 1 Questionnaire, September 25, 2012

After reading the newsletter and display panels at the Public Information Centre, please take a few minutes to complete this comment sheet. The City of Hamilton is interested in hearing from your comments or questions regarding the proposed elevated water tank. Your input is important and will be considered in the assessment of the preferred site.

1. **How did you hear about this public meeting?**

[X] Newspaper ad [ ] Notice in mail [ ] Other

2. **Please indicate your satisfaction with the following:**

	Satisfied (Y/N)	If not Satisfied, please specify your preference here
Location of Meeting	Y	
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On a scale of 1 to 5, where "1" is "very" and "5" is "not at all", please rate the following by circling the appropriate number:

3. **How informative were the display materials?**
1 (very) 2 (3) (somewhat) 4 5 (not at all)

4. **How helpful were the staff and consultants in attendance?**
(1) (very) 2 3 (somewhat) 4 5 (not at all)

5. **Were all your questions answered satisfactorily?**
[X] Yes [ ] No

6. **Do you have any comments or concerns regarding the proposed elevated water reservoir in the Ancaster area?** [X] **Yes** [ ] **No** **If yes, please specify**

Including a study area outside of current urban boundary is confusing. Residents living S of Garner do not get water service so why should reservoir be located on their lands.

7. **Do you have any other issues or additional information that you feel the City should be made aware of regarding this project? [ ] Yes [X] No If yes, please specify**

8. **What is the nature of your interest in this project?**

Want to ensure need is ~~for~~ now and not connected to future plans for AEGD

9. **Other comments:**

Thank you for participating in this study.

Comments and information regarding this study are being collected to assist the City of Hamilton in meeting the requirements of the Environmental Assessment Act. This material will be maintained on file for use during the study and may be included in project documentation. *Information will be collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act. With the exception of personal information all comments will become part of the public record.*

Please provide your contact information below should you wish to be added to our Project Mailing List.

Name: _____
(please print)
Address: _____

Telephone: _____

For more information about this project, please visit our website at:

Please return this completed **Comment Sheet** to our staff at the Registration Table or place in the *'Comment Box'*. You can also mail/fax/email your comments to the Project Manager by **October 25, 2012**:

Winston Wang, P. Eng., Project Manager
City of Hamilton
77 James Street North, Suite 400
Hamilton, Ontario L8R 2K3
Phone: 905 546-2424 ext. 4092
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Email: winston.wang@hamilton.ca

Christopher Mills, P. Eng., Project Manager
GENIVAR Inc.
1425 Cormorant Road, Suite 300
Ancaster, Ontario, L9G 4V5
Phone: 289 239-0100
Fax: 289 239-0109
Email: christopher.mills@genivar.com

Canadian Environmental Assessment Agency
Agence canadienne d'évaluation environnementale

55 St. Clair Avenue East
Suite 907
Toronto, Ontario
M4T 1M2

55, avenue St-Clair Est
Bureau 907
Toronto (Ontario)
M4T 1M2

August 21, 2012

Winston Wang
City of Hamilton
City Hall, 71 Main Street West
Hamilton, Ontario L8P 4Y5

Dear Mr.Wang:

RE: Ancaster Water Tower Class Environmental Assessment and Conceptual Design - Notice of Study Commencement and PIC 1

Thank you for your letter of August 1, 2012, related to the above-noted project.

As part of the Government's plan for Responsible Resource Development which seeks to modernize the regulatory system for project reviews, the former *Canadian Environmental Assessment Act* was repealed when the new *Canadian Environmental Assessment Act, 2012* (CEAA 2012) came into force on July 6, 2012.

The CEAA 2012 applies to projects listed in the *Regulations Designating Physical Activities*. Under CEAA 2012, the proponent must provide the Canadian Environmental Assessment Agency (the Agency) with a description of their proposed project if it is captured under the above-noted regulations.

For more information about CEAA 2012, please access the following links http://www.ceaa.gc.ca/default.asp?lang=En&n=16254939-1 and http://www.ceaa.gc.ca/default.asp?lang=En&n=9EC7CAD2-1. You may also find the Guide to Preparing a Description of a Designated Project and the *Prescribed Information for a Description of a Designated Project Regulations* on the Agency website.

If it appears that CEAA 2012 applies to your proposed project or if you have questions, please contact the undersigned at 416-952-5016.

Sincerely,

Amiel Blajchman, Project Manager
Canadian Environmental Assessment Agency, Ontario Region

Indian and Northern Affairs Canada / Affaires indiennes et du Nord Canada

FACSIMILE TRANSMITTAL
TRANSMISSION PAR TÉLÉCOPIEUR

Number of pages including this page / Nombre de pages incluant cette page	2

Date: 2012-08-20

From - De

Name - Nom	Position Title - Titre du poste	Room - Pièce
Don Boswell	Senior Claims Analyst	

Directorate - Direction	Branch - Direction générale	Facsimile No. - N° de télécopieur	Telephone. No. - N° de téléphone
TAG	Specific Claims	819 997-9873	

To - À

Name - Nom	Facsimile No. - N° de télécopieur	Telephone. No. - N° de téléphone
Christopher Mills	289 239-0109	289 239-0100

Ancaster Water Tower Class Environmental Assessment and Conceptual Design

Notice of Study Commencement and PIC 1

City of Hamilton - File No. 11-61850

Hamilton

RESPONSE FORM
City of Hamilton
Class Environmental Assessment Study
Ancaster Water Tower Class Environmental Assessment and Conceptual Design

1. Contact Name: Don Boswell
2. Ministry/Agency/Office: Aboriginal Affairs & Nor. Dev.
3. Address: 10 Wellington, Rm 1310 Gatineau PQ

   Postal Code: K1A 0H4

   Phone No.: 819-953-1940

   Email: boswelld@inac.gc.ca

4. Please note specific comments and/or concerns (please attach additional sheets if necessary):

5. Do you wish to be notified for continued involvement in the project process, including to project implementation? Yes ____ No ✓

Signature D M Boswell Date Aug. 9, 2012

Please return this form to:

Winston Wang, P. Eng.
City Project Manager
City of Hamilton
Water & Wastewater Planning
Infrastructure & Source Water
Planning Section
77 James Street North, Suite 400
Hamilton, Ontario L8R 2K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Christopher Mills, P. Eng.
Consultant Project Manager
GENIVAR Inc.
1425 Cormorant Road, Suite 300
Ancaster, Ontario, L9G 4V5
Phone: 289 239-0100
Fax: 289 239-0109
Email: christopher.mills@genivar.com

Osaka, Erin

From: Wang, Winston <Winston.Wang@hamilton.ca>
Sent: Thursday, August 23, 2012 3:56 PM
To: 'Melanie Arthur'
Cc: 'Christopher Mills'
Subject: RE: City of Hamilton-Ancaster Water Tower-EA

Thank you Melanie for your response regarding Ancaster water storage project and we will keep your people posted on any findings of archaeological or environmental impact matters.

Warmest regards,

Winston Wang, M.A.Sc., P. Eng., CRSP
Project Manager, Water & Wastewater Planning
Infrastructure & Source Water Planning Section
Environment & Sustainable Infrastructure Division
Public Works Department, City of Hamilton
77 James Street North, Suite 400, Hamilton, ON L8R 2K3
Tel: 905-546-2424 Ext. 4092; **Fax**: 905-546-4491
Email: winston.wang@hamilton.ca

From: Melanie Arthur [mailto:marthur@alderville.ca]
Sent: August 23, 2012 3:35 PM
To: Wang, Winston
Subject: City of Hamilton-Ancaster Water Tower-EA

Good afternoon Winston,

Please view the attatched consultation response in regards to your project.
Thank you and have a great day!

Melanie Arthur
Lands and Resources Communications Clerk
Alderville First Nation

ALDERVILLE FIRST NATION
P.O. Box 46
11696 Second Line
Roseneath, Ontario K0K 2X0

August 14th, 2012

Att: Winston Wang, P.Eng.

Re: Ancaster Water Tower Class Environmental Assessment and Conceptual Design
Notice of Study Commencement and PIC 1
City of Hamilton
File No: 11-61850

Dear Winston,

Thank you for your consultation request to Alderville First Nation regarding the **Class Environmental Assessment study for the new water storage facility in the Ancaster area,** which is being proposed within our Traditional and Treaty Territory. We appreciate the fact that the **City of Hamilton,** recognizes the importance of First Nations Consultation and that your office is conforming to the requirements within the Duty to Consult Process.

As per the Alderville First Nation Consultation Protocol, your proposed project is deemed a level 3, having minimal potential to impact our First Nations' rights, therefore, please keep Alderville apprised of any archaeological findings, burial sites or any environmental impacts, should any occur, during this study.

Although we may not always have representation at all stakeholders meetings, it is our wish to be kept apprised throughout all phases of this project. I can be contacted at the mailing address above or electronically via email, at the email address below.

In good faith and respect,

Dave Simpson
Lands and Resources
Communications Officer
Alderville First Nation

dsimpson@aldervillefirstnation.ca

Tele: (905) 352-2662
Fax: (905) 352-3242

Hamilton

RESPONSE FORM
City of Hamilton
Class Environmental Assessment Study
Ancaster Water Tower Class Environmental Assessment and Conceptual Design

1. Contact Name: KEN WHITBREAD

2. Ministry/Agency/Office: NIAGARA ESCARPMENT COMMISSION

3. Address: 232 GUELPH ST. GEORGETOWN ON L7G 4B1

Postal Code: L7G 4B1

Phone No.: 905-877-4026

Email: Ken.whitbread@ontario.ca

4. Please note specific comments and/or concerns (please attach additional sheets if necessary):

1) Parts of the Study Area are in the Niagara Escarpment Plan and Development Control.
2) NEP limits the location of public utilities within the area of the Plan. Escarpment Natural Areas are to be avoided.
3) Urban uses* ~~are urban uses~~ are confined to the Urban Area designation of the NEP. New urban uses confined to Urban Areas until the 2015 Greenbelt Review.

5. Do you wish to be notified for continued involvement in the project process, including to project implementation? Yes ✓ No _____

Signature _____ Date AUG/7/12

* water storage facilities are defined as urban uses.

Please return this form to:

Winston Wang, P. Eng.
City Project Manager
City of Hamilton
Water & Wastewater Planning
Infrastructure & Source Water
Planning Section
77 James Street North, Suite 400
Hamilton, Ontario L8R 2K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Christopher Mills, P. Eng.
Consultant Project Manager
GENIVAR Inc.
1425 Cormorant Road, Suite 300
Ancaster, Ontario, L9G 4V5
Phone: 289 239-0100
Fax: 289 239-0109
Email: christopher.mills@genivar.com

Osaka, Erin

From: CAU-UCA <CAU-UCA@aadnc-aandc.gc.ca>
Sent: Thursday, August 16, 2012 9:15 AM
To: christopher.mills@genivar.com; Wang, Winston
Subject: Aboriginal consultation information - Ancaster Water Tower project (11-61850)

Hello Project Leadership,

I am writing on behalf of the Consultation and Accommodation Unit (CAU) of Aboriginal Affairs and Northern Development Canada (AANDC). The CAU's Consultation Information Service (CIS) has been established to help co-ordinate departmental responses to consultation-related queries coming from federal departments and third parties. We provide information (generally within a 100 km radius of a project) related to Aboriginal groups and their asserted or established Aboriginal and/or treaty rights, to the extent that these are known by AANDC.

I was forwarded the Notice of Study Commencement and PIC 1 dated August 1, 2012. Please note that future requests for Aboriginal consultation information from AANDC, can be submitted directly to the following mailbox: UCA-CAU@aadnc-aandc.gc.ca. As the Regional Subject Expert for Ontario, I provide information on behalf of AANDC through a 'single window approach' via the Consultation and Accommodation Unit.

If you are contacting Aboriginal Affairs and Northern Development (AANDC) as a request for Aboriginal consultation information, please reply, and I will be happy to provide it.To facilitate a more timely response, specify in your communication that you would like an '**Aboriginal consultation information response**' from the CIS.

Regards,

Allison Berman
Regional Subject Expert for Ontario
Consultation and Accommodation Unit
Aboriginal Affairs and Northern Development Canada
300 Sparks Street, Room 205,
Ottawa, ON K1A 0H4
Tel: 613-943-5488

September 5 , 2012

Winston Wang
Project Manager
City of Hamilton
77 James Street North, Suite 400
Hamilton, Ontario L8R 2K3
Winston.wang@hamilton.ca

Dear Mr. Wang,

Thank you for your letter of August 1, 2012 regarding your request for information held by Aboriginal Affairs and Northern Development Canada (AANDC) on established or potential Aboriginal and treaty rights in the vicinity of the Ancaster Water Tower project for Hamilton, Ontario.

Consulting with Canadians on matters of interest or concern to them is an important part of good governance, sound policy development and decision-making. In addition to good governance objectives, there may be statutory or contractual reasons for consulting, as well as the common law duty to consult with First Nations, Métis and Inuit when conduct that might adversely impact Aboriginal or treaty rights (established or potential) is contemplated.

It is important to note that the information held by AANDC is provided as contextual information and may or may not pertain directly to Aboriginal or treaty rights. In most cases, the Aboriginal community remains best positioned to explain their traditional use of land, their practices or claims that may fall under section 35, including claims they may have put before the courts.

The Department has recently developed a new information system, the Aboriginal and Treaty Rights Information System (ATRIS), which brings together information regarding Aboriginal groups such as their location, related treaty information, claims (specific, comprehensive and special) and litigation. Using ATRIS and a 100 km radius surrounding the project location, information regarding potentially affected Aboriginal communities is presented in the attached report in the following sections for each community:

Aboriginal Community Information includes key contact information and any other information such as Tribal Council affiliation.

Treaties, Claims and Negotiations includes Historic Treaties, Specific, Comprehensive and Special Claims. Self-Government may be part of Comprehensive claims or stand-alone negotiations.

Litigation usually refers to litigation between the Aboriginal Group and the Crown, often pertaining to section 35 rights assertions or consultation matters.

Also included, where available, is a section entitled **Other Considerations**. This may include information on Métis rights, consultation-related protocols or agreements and other relevant information.

Should you require further assistance regarding the information provided, or if you would prefer that a smaller or greater buffer be used to gather information, please do not hesitate to contact me.

Regards,

Allison Berman
Regional Subject Expert for Ontario
Consultation and Accommodation Unit
Aboriginal Affairs and Northern Development Canada
300 Sparks Street, Ottawa
Tel: 613-943-5488

First Nation/Aboriginal Community Information

Within a 100 km radius of your project there are 15 First Nation communities. The following information should assist you in planning any consultation that may be required.

In general, where historic treaties have been signed, the rights of signatory First Nation's are defined by the terms of the Treaty. In many cases, however, there are divergent views between First Nations and the Crown as to what the treaty provisions imply or signify. For each First Nation below, the relevant treaty area is provided.

In areas where no historic treaty exists or where such treaties were limited in scope (i.e. where only certain rights were addressed by the treaty, such as the Peace and Friendship Treaties), there may be comprehensive claims that are asserted or being negotiated. Comprehensive claim negotiations are the means by which modern treaties are achieved.

Specific claims refer to claims made by a First Nation against the federal government related to outstanding lawful obligations, such as the administration of land and other First Nation assets, and to the fulfillment of Indian treaties, although the treaties themselves are not open to re-negotiation. The below response provides summaries of relevant claims that are current to the date of the response. As the claims progress regularly, it is recommended that the status of each claim be reviewed through the Reporting Centre on Specific Claims at:
http://pse4-esd4.ainc-inac.gc.ca/SCBRI/Main/ReportingCentre/IndexExternal.aspx?lang=eng

Caldwell First Nation
Chief Louise Hillier
P.O. Box 388
Leamington, Ontario, N8H 3W3
Phone: 519-322-1766 Fax: 519-322-1533
www.sfns.on.ca/pages/Caldwell

Treaty area – Southern Ontario Treaties for Settlement: 1783 to 1815
In the early part of the 20th century, the Department of Indian Affairs took some preliminary steps to provide a reserve for this First Nation. None of these attempts were completed, and the First Nation remained without a land base and other benefits under Treaty 2 of 1790. The Caldwell land claim is being settled through the Specific Claims process. For more information on the treaties, see "Other Considerations" below.

Membership
Association of Iroquois and Allied Indians
London District Chiefs Council
Southern First Nations Secretariat
Chiefs of Ontario
For more information, see "Other Considerations" below.

Specific Claims
Name: Land Entitlement
Status: settling through negotiations as of 2011
Description: The First Nation alleged that their members are the original inhabitants, occupants and owners of Point Pelee & Pelee Island. They contended that they never surrendered Point Pelee in 1790, and that the 999 year lease to Pelee Island was invalid.

Name: Pelee Island
Status: concluded – no lawful obligation found
Description: The First Nation alleged that they did not surrender Pelee Island and that the 999 year lease is invalid since the Crown's patent is void.

Litigation
Name: Peter Welch v. HMTQ in Right of Ontario
Status: active
Court No.: not yet available
Description: This is a Fish and Wildlife Conservation Act prosecution involving a member of the Caldwell First Nation. The case involves an investigation regarding the shooting of a deer in 2011. The applicant is claiming Aboriginal and treaty rights to hunt, and will argue that his Charter rights were breached in the investigation.

Mississaugas of the Credit
Chief M. Bryan Laforme (tenure expires December 15, 2013)
2789 Mississauga Road
RR 6
Hagersville, Ontario, N0A 1H0
Phone: (905) 768-1133 Fax: (905) 768-1225
www.newcreditfirstnation.com

Treaty Area – Southern Ontario treaties for Settlement: 1783 -1815
For more information on the treaties, see "Other Considerations" below.

Membership
Association of Iroquois and Allied Indians
Chiefs of Ontario
See "Other Considerations" below for more information.

Specific Claims
Name: Brant Tract Purchase
Status: settled through negotiations
Description: The First Nation alleged that the 1797 treaty for cession of lands at Burlington Bay was illegal, and that the Mississauga Nation retained rights and title to lakeshore at Burlington Bay and 200 acres at Burlington Heights. The other First Nations involved in this claim are: Curve Lake, New Credit, Alderville, Scugog and Hiawatha. Note: this claim was settled on October 29, 2010.

Name: Crawford Purchase
Status: concluded- no lawful obligation found
Description: The First Nation alleged that the purchase of 1783-1784 covering lands in Frontenac, Prince Edward, Hastings counties and United county of Lennox Addington was illegal.

Name: Damages to Wild Rice
Status: concluded- no lawful obligation found
Description: The First Nation alleged that Mississauga title to wild rice, traditional economy, waters and lands beneath the waters. They claim that flooding by the Trent canal has destroyed the wild rice and hence their traditional economy.

Name: Gunshot Treaty
Status: concluded- no lawful obligation found
Description: The First Nation alleged that the Gunshot Treaty of 1788 covering lands in Prince Edward and Northumberland counties and regional municipality of Durham was illegal. The First Nations involved are: Curve Lake, New Credit, Alderville, Scugog and Hiawatha.

Name: Lake Ontario Lakeshore
Status: concluded- no lawful obligation found
Description: The Mississauga Tribal Claims Council alleged that part of the lakeshore in the townships of Oakville Burlington, Mississauga and Etobicoke were never ceded by treaty or

otherwise. The First Nations involved are: Curve Lake, New Credit, Alderville, Scugog and Hiawatha.

Name: Navy Island
Status: concluded- no lawful obligation found
Description: The Mississauga Tribal Claims Council alleged that islands were never ceded in the Niagara treaty of 1781.

Name: Niagara Treaty Lands
Status: concluded- no lawful obligation found
Description: The Mississauga Tribal Claims Council (MTCC) alleged that lands covered by the Niagara treaty of 1781 in the Regional Municipality of Niagara were never properly ceded & that the Mississauga were not compensated for them. This claim was originally submitted in 1986 by the MTCC as a component of the Williams Treaty claim & was subsequently hived off as a separate claim in 1990.

Name: 200 Acre
Status: settled through negotiations
Description: The First Nation alleged that there was an invalid surrender in 1820, of 200 acres of land on the north shore of the Credit River.

Name: Railway Claim – Loss of Use
Status: settled through negotiation
Description: The First Nation alleged that there was an invalid expropriation of land for railway purposes in 1876, and failure to compensate for interest in lands taken.

Name: Toronto Purchase
Status: settled through negotiation in 2010
Description: Non-fulfillment of the terms of the 1805 Surrender.

Litigation
No relevant litigation to report.

Six Nations of the Grand River
Chief William (Bill) Kenneth Montour
1695 Chiefswood Road
PO Box 5000
Ohsweken, Ontario, N0A 1M0
Phone: (519) 445-2201 Fax: (519) 445-4208
www.sixnations.ca

The main reserve is the Six Nations of the Grand River, and is an 18,000 hectare land base located 25 km southwest of the city of Hamilton, between the cities of Brantford, Caledonia and Hagersville, Ontario. Their ancestral homeland is located in the Mohawk River Valley (Ontario and Quebec) and present day states of New York and Vermont.

The Six Nations of the Grand River is the contact point for the following local individual First Nation communities which fall under the Six Nations and/or Haudenosaunee leadership.

Bearfoot Onondago	Mohawks of the Bay of Quinte	Tuscarora
Delaware	Niharondasa Seneca	Upper Cayuga
Konadaha Seneca	Oneida	Upper Mohawk
Lower Cayuga	Onondaga Clear Sky	Walker Mohawk
Lower Mohawk		

The Haudenosaunee Grand Council of Chiefs, also known as the Six Nations Confederacy Council, considers itself to be the central government of the Iroquois Confederacy. They contend that they represent the fifty Chiefs of the Six Nations Confederacy, and assert traditional rights in the southern Ontario region based on the text of the Nanfan treaty. In the past, federal officials have included them in their notification and consultation, however, they are not legally recognized as the official Canadian leadership of the Iroquois.

There is also an American component of the Haudenosaunee Grand Council. It exercises its sovereignty by issuing passports to its citizens travelling abroad. As the territory crosses the Canada/ USA border, many Haudenosaunee citizens work and live on opposite sides and may not recognize either a Canadian or American identity. They also may not view the international border in their territory in the same way that the federal governments of either country do.

Treaty Areas
Southern Ontario pre-Confederation treaties to open the interior: 1815 to 1862 and other pre-Confederation treaties. Haudenosaunee Six Nation rights are premised under these pre-Confederation treaties.

Between the Lakes Treaty of 1784 and 1792
This treaty was a land purchase signed by the Mississauga for a tract of land on either side of the Grand River. Governor Haldimand purchased this land for the Six Nations to enhance the original purchase made for them. This treaty is one of over 30 land purchases and treaties known as the Upper Canada Treaties.

Haldimand Proclamation of 1784
The Six Nations and their descendants were granted by decree, lands six miles deep from each side of the Grand River as compensation for their loss of territory as a result of their alliance with the British during the American War of Independence.

Simcoe Patent of 1793
This patent confirms the lands granted to the Six Nations by the Haldimand Proclamation. It specifies that the Six Nations can surrender and dispose of their land only to the Crown. Any other leases, sales or grants to people other than Six Nations shall be unlawful and such intruders evicted.

Nanfan Treaty of 1701
This Treaty, also known as the Treaty of Albany, covers a land base of 800 by 400 miles around the Lake Erie, Huron and Ontario area, as well as a portion of the United States and includes the five nations of the Mohawks, the Onondagas, the Oneida, the Seneca and Cayuga. The Treaty states:

> "We (the five nations are to have free hunting for us and their heirs and

descendants from the Five Nations forever and that free of all disturbances expecting to be protected therein by the Crown of England."

The Province of Ontario (*R. v. Ireland (1990)* decision) recognizes the hunting rights under the Nanfan Treaty. To date, Canada does not have a position concerning the standing of this Treaty.

The Haudenosaunee Council and the elected Chief of the Six Nations submitted a claim to the Minister of AANDC regarding their "right to hunt and fish" which was premised in part on the Nanfan Treaty. The Haudenosaunee Six Nations was referred to the Ontario Government for remedy, as hunting and fishing issues are the responsibility of the province.

<u>The Jay Treaty 1794 – Treaty of Amity, Commerce and Navigation</u>
The Jay Treaty is a Treaty between the United States and Great Britain. While it is not a Treaty made with Aboriginal peoples, it does demonstrate the importance of First Nations to diplomatic relations at the time, and recognized the need for the protection of the Aboriginal reality which included trade and travel.

Since its conclusion in 1794, Aboriginal Peoples have been guaranteed the right to trade and travel between the United States and Canada. This right is recognized in Article III of the Treaty, and subsequent laws of the United States that stem from this Treaty. Canadian-born people with at least 50% Aboriginal blood can enter, live in, and work in the United States without immigration restrictions. In addition, they cannot be deported for any reason. Canada has not passed legislation to implement Article III of the Jay Treaty.

*Atlas of Canada

History of Claims and Negotiations with the Six Nations
Prior to 2006, the Government of Canada and the Province of Ontario held discussions with the Elected Chief and Council of the Six Nations in an attempt to achieve out-of-court resolution on various claims. However, this process was interrupted in February of 2006 when a group of Six Nations protesters took occupation in a residential building site in Caledonia known as the Douglas Creed Estates. When the situation escalated, the discussion table was extended to

include the Haudenosaunee Confederacy Council (HCC). At this time, a Special Federal Representative and Senior Federal Negotiator were appointed.

The Elected Chief and Council (who are elected under the Indian Act) delegated the lead on resolving matters tied to the Douglas Creek Estates to the Haudenosaunee Confederacy Council. Negotiations on other claims continued to include the HCC, who has retained the lead at the negotiating table. The Elected Chief and Council are also represented at the negotiations by a member or members of the Council.

With regard to the litigation process, the elected Chief and Council of the Six Nations and the Haudenosaunee Grand Council are well informed and have an established capacity. It is recommended that any consultation proceed with respect for their negotiating experience, as well as their consultation knowledge and capacity. When planning consultation, federal officials should be approaching both the elected Chief and Council and the Haudenosaunee Council regarding any federal engagement. While the Haudenosaunee Development Insitute (HDI) maintains that the Haudenosaunee Confederacy Chiefs have legislated them to represent their interests on development issues, the federal government is not aware of any legal authority in place for HDI to do so.

Specific Claims and Negotiations

Six Nations of the Grand River have many specific claims filed with Canada, not all of which are currently active. From the 1980s to the mid-1990s, Six Nations submitted 29 specific claims to Canada. In 2007 Canada made an offer to Haudenosaunee Six Nations for settlement of 4 claims: Grand River Navigation Company Investment; Block 5 (Moulton Township); Welland Canada Flooding and the Burtch Tracts. The offer was not accepted and negotiations have not continued since 2008. The specific claims are grouped according to areas below:

The Haldimand Tract

In general, Six Nations' claims deal with past grievances that relate to lands known as the Haldimand Tract. These lands were set aside for Six Nations when they came from New York to Canada in 1784 as allies of the Crown after the American Revolution. A link to a map and information is: http://www.sixnations.ca/LandsResources/HaldProc.htm

Today, the Six Nations reserve covers approximately 50,000 acres of the original million acre tract. The Haudenosaunee/Six Nations claims that over the past two centuries, thousands of acres were stolen, improperly transferred to non-Aboriginals, or sold without proper compensation. Canada's negotiation of Six Nations' claims is an out-of-court process. In 1999, 2000 and 2001, all three parties-Six Nations, the Province of Ontario and the Government of Canada-turned from active litigation to talks to find common ground upon which to proceed with some form of out-of-court resolution.

While these efforts did not produce results, other efforts have been made since 2004. The Government of Canada began exploratory discussions with the Six Nations' Elected Chief and Council and the Province of Ontario to address the claims. These discussions were interrupted when a group of Six Nations protesters occupied the then privately owned Douglas Creek Estates site in Caledonia.

There have been no formal negotiation sessions since October 8, 2009. Canada continues to engage in bilateral and trilateral exploratory discussions with representatives from Ontario and Six Nations (both the elected Chief and Council and the Haudenosaunee Council). The purpose of these discussions has been to explore means to redefine the negotiation process.

The Culbertson Tract Claim

This claim concerns the easterly most First Nation, the Mohawk of the Bay of Quinte. The Culbertson Tract claim relates to a land transaction that took place in 1793. In recognition of military alliance of the Mohawk people during the American Revolution, a tract of land the size of a township was set aside for the Six Nations under a formal treaty issued by Lt.-Gov. John Graves Simcoe.

Under the terms of the treaty, if the lands were to fall into the hands of non-Six Nations interests, the Crown promised to "dispossess and evict" the trespassers from the lands and restore the occupied lands to Six Nations possession.

The Mohawk of the Bay of Quinte's claim alleges that approximately 827 acres, now located in the townships of Desoronto and Tyendinaga, was improperly taken from the First Nation in 1837. Specific claim negotiations with Canada closed in 2008, and the issue is now in litigation with the Ontario Federal Court since 2010. However, the Mohawk are not asking the court to determine the validity of their claim to the Tract, but rather they are seeking an order that Canada is in breach of fiduciary duty and other legal duties to negotiate in good faith under the Specific Claims Branch Policy. If the Mohawk choose to claim title to the land, they can do so through AANDC's Special Claims process.

Litigation

Name: Thahoketoteh of Kanekota v. HMTQ
Status: active
Court No: T-1396-12
Description: In this claim, the Plaintiff seeks, among other things, the removal of alleged non-native squatters from Lot 1 Concession 11, Clearview Township, Simcoe County. He alleges that the Crown has not respected the Royal Proclamation of 1784 and he also seeks compensation from other parties, such as the Canadian Hydro Developers, Inc. and Enbridge Gas, for their alleged illegal involvement in the area.

Name: Six Nations Elected Council on its own behalf and on behalf of the Six Nations of the Grand River v. The Corporation of the City of Brantford
Status: active
Court No: CV-08-361454
Description: The Plaintiffs seek various declarations pertaining to Ontario and/or the City of Brantford's constitutional duty to consult with and accommodate the Six Nations of the Grand River before considering or undertaking any planning activities and disposition of lands which could potentially affect the interests of the Six Nations of the Grand River.

Name: Six Nations of the Grand River Band of Indians et al. – Superior Court of Justice
Status: active
Court No.: 406/95
Description: The Plaintiffs claims that an accounting of all Six Nations' assets including money and real property that was to be held in trust by the Crown for the benefit of the Six Nations since 1784. The Plaintiff seeks a declaration by the Court that the Defendants are in breached of their fiduciary duties towards the Plaintiff, and are liable for replacing all assets or the value of all assets found to be missing, with compound interest.

Name: Aaron Detlor; the Haudenosaunee Development Institute v. the Corporation of the City of Brantford – Superior Court of Justice
Status: active
Court No.: CV-08-356782

Description: The Applicants Aaron Detlor and the Haudenosaunee Development Institute intend to question the constitutional validity and applicability of By-laws 63-2008 and 64-2008 of the City of Brantford Municipal Code, made under the Municipal Act, 2001, S.O. 2001, c. 25. The hearing is scheduled for November 2012.

Name: King Chief ah'she hodeeheehonto v. HMTQ in Right of Canada
Status: active
Court No.: 10-20244 JR
Description: This is a Notice of Constitutional Question which seems to involve an argument involving Six Nations that among other things relies on the Two Row Wampum Treaty and other Aboriginal and treaty rights, as protection from the jurisdictional obligation to follow Canada's laws and other obligatory requirements.

Unitlateral Protocols

Six Nations of the Grand River Land Use Consultation and Accommodation Policy
The Six Nations of the Grand River published a consultation and accommodation policy in 2009. The Six Nations request that the Crown, developers and municipalities consult in good faith to obtain free and informed consent prior to approval of any projects affecting their interests. It is recommended that this protocol be reviewed in advance of consultation to better understand First Nation expectations. However, the federal government does not endorse its content. The link to the protocol is: http://www.sixnations.ca/admConsultationAccomodationPolicy.pdf

The Development Protocol of the Haudenosaunee Development Institute
The Haudendosaunee Development Institute is an unicorporated office for the Confederacy Council of the Six Nations. The Institute states that the Haudenosaunee Confederacy Chiefs have legislated the Institute to represent their interests in the development of lands within areas of Haudenosaunee jurisdiction. They maintain that this includes, but is not limited to, the land prescribed by the Haldimand Proclamation and the 1701 Treaty area. It is recommended that this protocol be reviewed in advance of consultation to better understand First Nation expectations. However, the federal government does not endorse its content. The link to the protocol and further information is: www.haudenosauneeconfederacy.ca/HDI/aboutus.html

Other Considerations

Aboriginal Rights Assertions: the Métis

The inclusion of the Métis in s.35 represents Canada's commitment to recognize and value their distinctive cultures, which can only survive if they are protected along with other Aboriginal communities. In 2003, the Supreme Court of Canada affirmed Métis rights under s.35 of the Constitution Act, 1982, in the Sault St. Marie area, in the *Powley* decision. For more information on the *Powley* decision visit the following link: www.aadnc-aandc.gc.ca/eng/1100100014419

The Office of the Federal Interlocutor for Métis and Non-Status Indians (OFI) is aware that the Métis Nation of Ontario (MNO), its regional and community councils, have asserted a Métis right to harvest in a large section of the province.

The provincial government has accommodated Métis rights on a regional basis within Métis harvesting territories identified by the MNO. These accommodations are based on credible Métis rights assertions. An interim agreement (2004) between the MNO and the Ministry of Natural Resources (MNR) recognizes the MNO's Harvest Card system. This means that

Harvester's Certificate holders engage in traditional Métis harvest activities within identified Métis traditional territories across the province. For a map of Métis traditional harvesting territories visit the MNO website at: http://www.metisnation.org/harvesting/harvesting-map.aspx

The MNO maintains that Aboriginal 'rights-holders' are Métis communities which are collectively represented through the MNO and its Community Councils. In partnership with community councils, MNO has established a consultation process. The MNO has published regional consultation protocols on their website which offer pre-consultation stage instructions on engaging the Métis through their community councils (via the consultation committee made up of an MNO regional councilor, a community councilor representative and a Captain of the Hunt). A list of the community councils is also available on their website. However, that this organization does not represent all Métis in Ontario.

Métis Nation of Ontario
Métis Consultation Unit is located within the MNO head office.
500 Old St. Patrick Street, Unit 3
Ottawa, Ontario, K1N 9G4
Phone: (613) 798-1488 Fax: (613) 725-4225
www.metisnation.org/home.aspx

Métis National Council
4-340 MacLaren Street,
Ottawa, Ontario, K2P 0M6
Phone: (613) 232-3216 Fax: (613) 232-4262
www.metisnation.ca

For an indication of the population in Ontario who self-identify as Métis, visit the Statistics Canada website. The Ontario map indicates populations as small as 250 up to over 2,000 within its borders.
http://geodepot.statcan.gc.ca/2006/13011619/20080513012009031301161 9/16181522091403090112_13011619/151401021518090709140112_20152001121305200919090416151 6_0503-eng.pdf

Métis Litigation in Ontario
Name: HMTQ in Right of Canada v. Denis Larabie
Status: active
Court No.: not available
Description: The defendant has been charged for unlawfully hunting moose without a license and possessing killed wildlife contrary to s.6 (1)(a) and s.12 of the Fish and Wildlife Conservation Act. The defendant identifies himself as Métis and claims that he was exercising his Aboriginal and/or treaty right by hunting within his traditional territory in Ontario.

Name: HMTQ in Right of Canada, Laurie Desautels v. Henry Wetelainen Jr.
Status: active
Court No.: CV-08-151
Description: The defendant, Henry Wetelainen Jr., intends to question the constitutional validity of sections 28, 31 and 40 of the Crown Forest Sustainability Act (1994), S.O. 1994, c. 25 and Ontario Regulation 167/95, as amended, in relation to an act or omission of the government of Ontario. The defendant claims that he was exercising Aboriginal and treaty rights afforded by the Adhesion to Treaty 3, by harvesting wood within his traditional territory. He claims that he is a Métis/Non-Status Indian and that the imposition of payment for harvesting or use of the forest resource is an infringement and violates is constitutional rights.

Name: Ministry of Natural Resources v. Kenneth Sr. Paquette
Status: active
Court No.: to be determined
Description: This Notice of Constitutional Question relates to a provincial prosecution involving a charge pertaining to hunting moose. The Defendant intends to assert his s. 35 right as a Métis person to hunt moose, and he also intends to seek a Charter remedy under s. 15 of the *Charter.*

Court Decisions concerning Métis in Ontario
R. v. Laurin, Lemieux, Lemieux - 2007
Court No.: ONCJ 265

Three Métis defendants were charged with fishing violations and claimed that the decision of the Ministry of Natural Resources (MNR) to prosecute them violated the terms of the Interim Agreement (2004) between the MNR and the Métis Nation of Ontario (MNO). As the defendants were indeed Harvester Card holders authorized to fish in the Mattawa/Nipissing territory, therefore, they were entitled to the exemption in the agreement.

The Court concluded that laying of charges against any valid Harvester Card holder who is harvesting in the territory designated on the card within 2 years of the 2004 agreement was a breach. The Interim Agreement itself was silent as to any geographic limitations. There was no mention of the Agreement only applying north and east of Sudbury. Further, the reliance on Harvester Cards, which explicitly contained the territorial designation of the cardholder, signified that the MNR accepted such designations for the purpose of the agreement. The Court was clear to note that this case did not make any ruling regarding the merits of any claim that the Mattawa/Nipissing area contains section 35 rights bearing Métis communities.

Membership
First Nations may or may not delegate certain authority and/or powers to tribal councils to administer programs, funding and/or services on their behalf. The best source of information with respect to consultation is though individual First Nations themselves.

Association of Iroquois and Allied Indians
This is a political organization which advocates the interests of its eight members. Using political lines the members form a collective to protect their Aboriginal and treaty rights.
387 Princess Avenue
London, Ontario, N6B 2A7
Phone: (519) 434-2761
www.aiai.on.ca

Chiefs of Ontario
The Chiefs of Ontario is a coordinating body for 133 First Nation communities in Ontario. The main objective of this body is to facilitate the discussion, planning, implementation and evaluation of all local, regional and national matters affecting its members.
www.chiefs-of-ontario.org

Administrative Office:
111 Peter Street, Suite 804
Toronto, Ontario, M5V 2H1
Phone: (416) 597-1266

Political Office:
Fort William First Nation
RR 4, Suite 101, 9- Anemki Drive
Thunder Bay, Ontario, P7J 1A5

Fax: (416) 597-8365

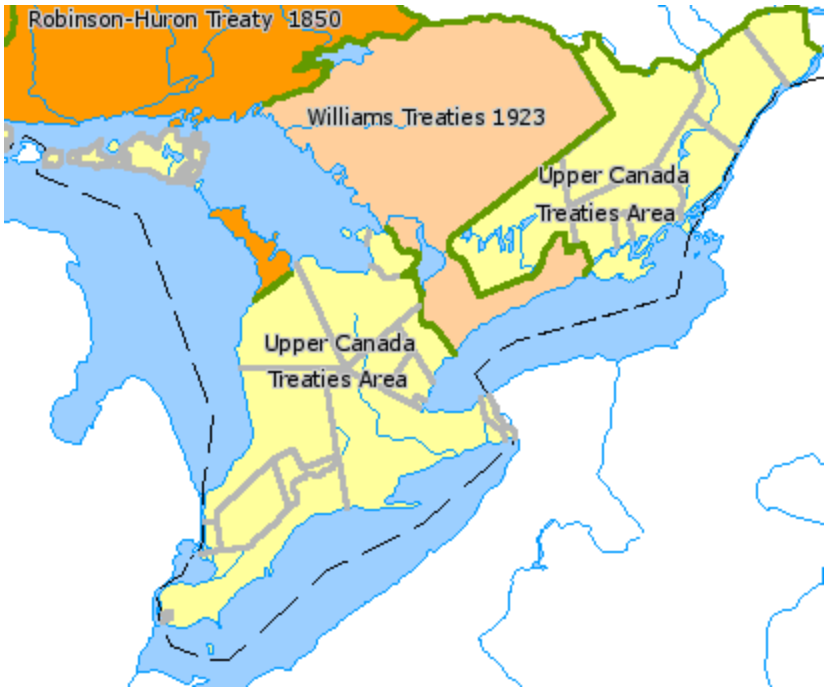
Phone: (807) 626-9339
Fax: (807) 626-9404

London District Chiefs Council (LDCC) and the Southern First Nations Secretariat (SFNS)
The Council is an association of Seven First Nation governments in southwestern Ontario.
22361 Austin Line
Bothwell, Ontario, N0P 1C0
Phone: 519-692-5868 Fax: 519-692-5972

The Secretariat is a non-profit, non-political corporate support body. It provides service delivery for the London District Chiefs Council (LDCC). The Secretariat facilitates communications amongst their member First Nations, their organizations and other similar service providers.
22361 Austin Line
Bothwell, Ontario
N0P 1C0
Tel: 519-692-5868
http://www.sfns.on.ca

Treaty Areas

Treaties of Southern Ontario- The Upper Canada Treaties
There are several treaty making eras which impact the province of Ontario. These eras are known as the Upper Canada Land Surrenders from 1764 to 1862. The Upper Canada Land Surrenders are seen as treaties which transfer all Aboriginal rights and title to the Crown in exchange for one-time payments. In light of the evolution of Aboriginal law over the past twenty years, this position may not be as clear as believed. There may be residual rights remaining especially relating to hunting and fishing.



*Atlas of Canada

1783-1815- Treaties for Settlement
As part of the plan to resettle some 30,000 United Empire Loyalists who refused to accept American rule, and fled to Montreal, the Indian Department undertook a series of land surrenders west of the Ottawa River with the Mississauga and the Chippewa of the southern Great Lakes. These tended to be uncomplicated arrangements whereby for a particular Aboriginal group was paid a specific sum paid in trade goods, to surrender a stated amount of land.

Provincial guidelines
Under its responsibility to promote stronger Aboriginal relationships, the Ontario Ministry of Aboriginal Affairs has produced *Draft Guidelines on Consultation with Aboriginal Peoples Related to Aboriginal Rights and Treaty Rights.* These guidelines are for use by ministries who seek input from key First Nations and Métis organizations, all Ontario First Nations and selected non-Aboriginal stakeholders. To review the guidelines, visit:
http://www.aboriginalaffairs.gov.on.ca/english/policy/draftconsultjune2006.pdf

GOVERNMENT SERVICES BUILDING
AND CULTURAL CENTRE

CURVE LAKE
FIRST NATION

CURVE LAKE, ONTARIO K0L 1R0

PHONE (705) 657-8045
FAX (705) 657-8708

October 2, 2012

Winston Wang
City Hall, 71 Main Street West
Hamilton, Ontario L8P 4Y5

Dear Winston Wang,

RE: Ancaster Water Tower Class EA and Conceptual Design, Notice of Study Commencement and PIC 1, File No: 11-61850

We would like to acknowledge receipt of your correspondence, which we received on 8/7/2012 regarding the above noted project.

As you may be aware, the area in which your project is proposed is situated within the Traditional Territory of Curve Lake First Nation. Our First Nation's Territory is incorporated within the Williams Treaty Territory and is the subject of a claim under Canada's Specific Claims Policy. We strongly suggest that you provide Karry Sandy-Mackenzie, Williams Treaty First Nation Claims Coordinator, 8 Creswick Court, Barrie, ON L4M 2S7, with a copy of your proposal as your obligation to consult to also extend to the other First Nations of the Williams Treaty.

Although we have not conducted exhaustive research nor have we the resources to do so, Curve Lake First Nation Council is not currently aware of any issues that would cause concern with respect to our Traditional, Aboriginal and Treaty rights.

Please note that we have particular concern for the remains of our ancestors. Should excavation unearth bones, remains or other such evidence of a native burial site or any Archaeological findings, we must be notified without delay. In the case of a burial site, Council reminds you of your obligations under the *Cemeteries Act* to notify the nearest First Nation Government or other community of Aboriginal people which is willing to act as a representative and whose members have a close cultural affinity to the interred person. As I am sure you are aware, the regulations further state that the representative is needed before the remains and associated artifacts can be removed. Should such a find occur, we request that you contact our First Nation immediately. Curve Lake First Nation also has available, trained Archaeological Liaisons who are able to actively participate in the archaeological assessment process as a member of a field crew, the cost of which will be borne by the proponent.

If any new, undisclosed or unforeseen issues should arise, that has potential for anticipated negative environmental impacts or anticipated impacts on our Treaty and Aboriginal rights we require that we be notified regarding these as well.

Thank you for recognizing the importance of consultation and respecting your duty to consult obligations as determined by the Supreme Court of Canada.

Should you have further questions or if you wish to hire a liaison for a project, please feel free to contact Melissa Dokis or Krista Coppaway at 705-657-8045x222 or dutytoconsult@curvelakefn.ca.

Yours sincerely,

Chief Phyllis Williams
Curve Lake First Nation

Hamilton

RESPONSE FORM
City of Hamilton
Class Environmental Assessment Study
Ancaster Water Tower Class Environmental Assessment and Conceptual Design

1. Contact Name: Scott Peck

2. Ministry/Agency/Office: Hamilton Conservation Authority

3. Address: P.O. Box 81067, 838 Mineral Springs Rd. Ancaster

   Postal Code: L9G 4X1

   Phone No.: (905) 525-2181 ext. 133

   Email: tspeck@hamiltonconservation.ca

4. Please note specific comments and/or concerns (please attach additional sheets if necessary):

   No specific site noted. Study area includes regulated areas, ESA's, PSW's. Specific comments can be provided through EA review

5. Do you wish to be notified for continued involvement in the project process, including to project implementation? Yes ✓ No _____

Signature _____ Date August 10/12

Please return this form to:

Winston Wang, P. Eng.
City Project Manager
City of Hamilton
Water & Wastewater Planning
Infrastructure & Source Water
Planning Section
77 James Street North, Suite 400
Hamilton, Ontario L8R 2K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Christopher Mills, P. Eng.
Consultant Project Manager
GENIVAR Inc.
1425 Cormorant Road, Suite 300
Ancaster, Ontario, L9G 4V5
Phone: 289 239-0100
Fax: 289 239-0109
Email: christopher.mills@genivar.com

Osaka, Erin

From: [redacted]
Sent: Tuesday, September 18, 2012 3:07 PM
To: Wang, Winston
Subject: Ancaster Elevated Water Reservoir

Good afternoon Mr. Wang

I am writing to you to request to be added to the mailing list (see address in signature below) regarding this Class EA Study. Our company owns lands and homes in the study area (140 Garner Road East, 720 Fiddlers Green Road and another parcel of 92 acres on Garner Road). We would like to be informed of the study as it progresses. Hopefully we can have someone attend the PIC 1 on Sept. 25, 2012. If we cannot attend will there be online access to the material at the PIC 1?

Thank you for your time.

Regards,

[redacted]

Osaka, Erin

From: Drew Cherry <dcherry@grandriver.ca>
Sent: Thursday, August 16, 2012 9:00 AM
To: Wang, Winston; christopher.mills@genivar.com
Subject: Ancaster Water Tower Class E.A. and Conceptual Design
Attachments: Ancaster Water Tower Class E.A..pdf

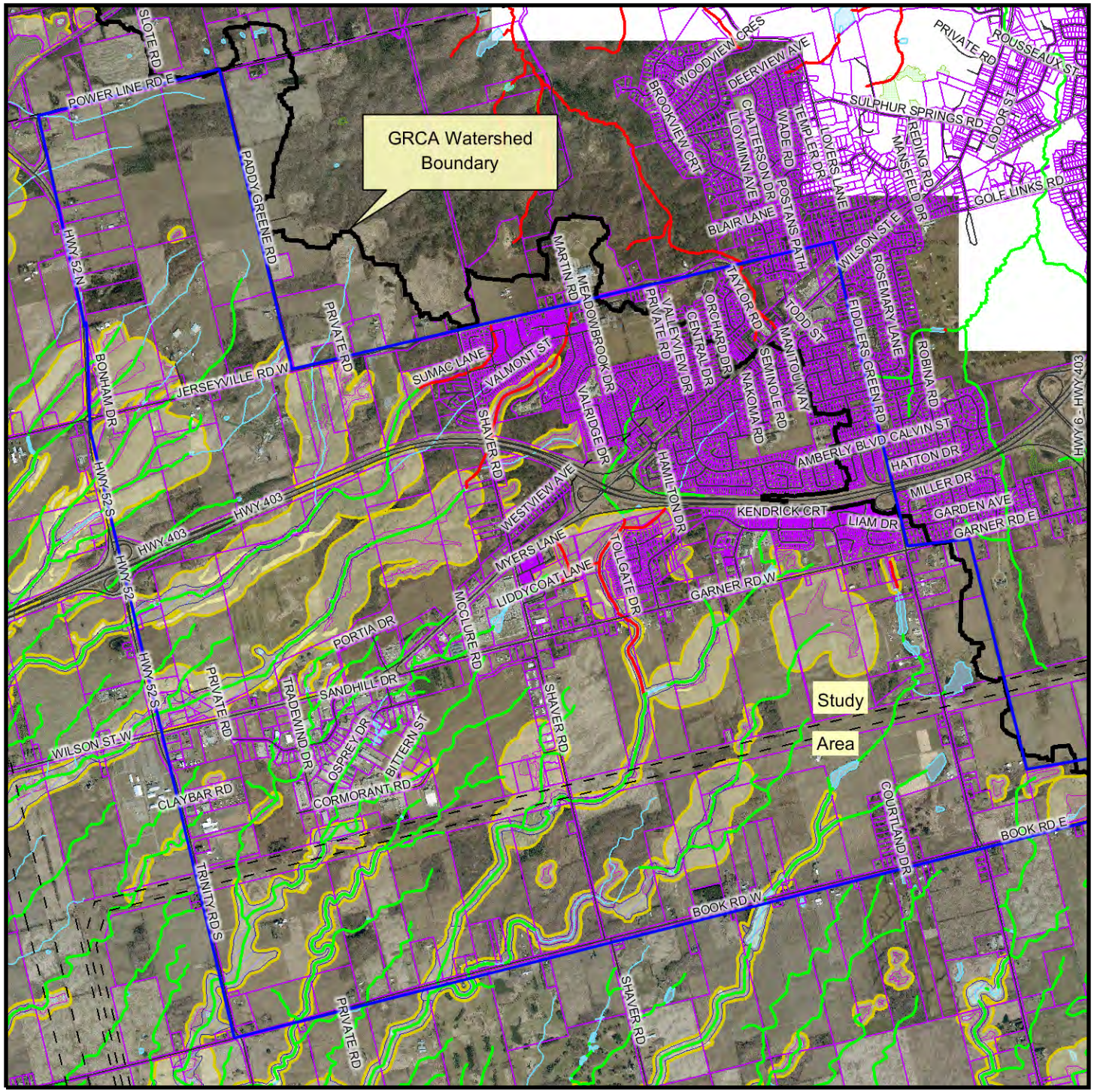
Gentlemen,
The Grand River Conservation Authority has recently received a copy of the Notice of Study Commencement for a new water storage facility to service Pressure District 18 in the Ancaster area. As this work will take place in the Grand River Watershed, the GRCA is interested in continuing to participate in the study design.

I have attached a copy of our GIS mapping showing our resource interests and the extent of the GRCA regulated areas within the study area. Regulated areas include surface watercourses, adjacent floodplains and floodplain allowances, wetlands and wetland allowances, erosion prone slopes and slope hazards as shown on the mapping. To date we have provided comments to Azimuth Environmental Consulting Inc. on the proposed Terms of Reference for the Natural Environment component of the Class E.A.

Based on our resource interests in the study area, we would appreciate the opportunity to continue to be involved in the study. If you would be so kind as to provide study design information and materials to me, I will be responsible for coordinating the GRCA's review and response.

I trust these comments are of assistance. Should you have any questions please contact me at your convenience.
Regards,

Drew Cherry
Resource Planner
Grand River Conservation Authority
400 Clyde Rd.
Cambridge, Ontario
N1R 5W6
(519) 621-2763 EXT. 2237



Grand River Conservation Authority
Map created: August 14, 2012

Ancaster Water Tower E.A.

LEGEND

- WATERSHED BOUNDARY (GRCA)
- UTILITY LINE (NRVIS)
- ROADS-ADDRESSED (MNR)
- RAILWAY (NRVIS)
- LAKE FLOOD (GRCA)
- CLASSIFIED STREAMS - NEW (NRVIS)
  - COLD WATER
  - COOL WATER
  - UNKNOWN
  - WARM WATER
- DRAINAGE-NETWORK (GRCA)
- PARCELS-ASSESSMENT (MPAC)
- FLOODPLAIN (GRCA)
  - ENGINEERED
  - APPROXIMATE
  - ESTIMATED
- LAKE EROSION (GRCA)
- WETLAND (GRCA)
- SLOPE VALLEY (GRCA)
  - STEEP
  - OVERSTEEP
- SLOPE EROSION (GRCA)
  - STEEP
  - OVERSTEEP
  - TOE
- WETLAND (NRVIS)
  - PROVINCIALLY SIGNIFICANT
  - OTHER
  - UNEVALUATED
- REGULATION LIMIT (GRCA)
- DRAINAGE-POLY (NRVIS)

GRCA Disclaimer

This map is for illustrative purposes only. Information contained hereon is not a substitute for professional review or a site survey and is subject to change without notice. The Grand River Conservation Authority takes no responsibility for, nor guarantees, the accuracy of the information contained on this map. Any interpretations or conclusions drawn from this map are the sole responsibility of the user.

The source for each data layer is shown in parentheses in the map legend. For a complete listing of sources and citations go to:

http://grims.grandriver.ca/docs/SourcesCitations1.htm

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NAD 1983, UTM Zone 17 Scale 1:36,556

N

THIS MAP IS NOT TO BE USED FOR NAVIGATION

horizon UTILITIES Looking beyond...

RECEIVED OCT 0 3 2012

September 28, 2012

City of Hamilton
Planning and Economic Development Department
71 Main St W
Hamilton, Ontario
L8P 4Y5

Attention: Winston Wang, City Project Manager

File# 11-61850

Re: Ancaster Water Tower, Ancaster

In response to your correspondence(s) dated August 1, 2012, please be advised that our Engineering Design Department have reviewed the information concerning the above noted Consent Application and our comments are as follows:

- The address is not within the Horizon Utilities service territory.

We trust that you will find this information satisfactory. Should you have any questions regarding this response, please contact Paul Wardell at 905-522-6611 ext 4724 in our Engineering Design Department.

Sincerely,

Mark Jakubowski
Supervisor, Engineering Design

Horizon Utilities Corporation
55 John Street North, Hamilton, ON – Tel: 1-866-458-1236
Mail to: PO Box 2249 STN LCD 1, Hamilton, ON L8N 3E4

Ministry of the Environment
West Central Region

119 King Street West
12th Floor
Hamilton, Ontario L8P 4Y7
Tel.: 905 521-7640
Fax: 905 521-7820

Ministère de l'Environnement

119 rue King ouest
12e étage
Hamilton (Ontario) L8P 4Y7
Tél. : 905 521-7640
Téléc. : 905 521-7820

Ontario

August 8, 2012

Mr. C. Mills
GENIVAR Inc.
1425 Cormorant Road, Suite 30
Ancaster, Ontario
L9G 4V5

Dear Mr. Mills:

Re: Ancaster Water Tower Class EA and Conceptual Design
Notice of Study Commencement and PIC #1
City of Hamilton
Your File 11-61850

Thank you for your letter of August 1, 2012 advising of the commencement of the above-noted EA Study and upcoming PIC. It is understood that this project is being undertaken in order to enable the City to determine optimal additional water storage for Pressure District #18 (Ancaster).

Please note that this project is subject to the *Safe Drinking Water Act, s. 31* (need for approval, permit and licence) and does form part of the definition of a *Drinking Water System* (again from *SDWA*) which includes *any thing used for the collection, production, treatment, storage, supply or distribution of water* (excluding plumbing). The project is also covered by the definition (again from *SDWA)* of a Municipal drinking-water system. At this point we have moved from the old CofA system to Municipal Licences and Drinking Water Works Permits, so once the EA process has been completed, a Schedule C application to the DWS' drinking water works permit will be required.

You have indicated that you will be undertaking this as a Schedule B project. Accordingly, Schedule "B" projects require that a Project File be prepared. The Project File shall be organized in such a way as to clearly demonstrate that the appropriate steps in Phases 1 and 2 have been followed and explain the following:

- background to the project and earlier studies;
- the nature and extent of the problem or opportunity, to explain the source of the concern or issue and the need for a solution;
- description/inventory of the environment;
- the alternative solutions considered and the evaluation process followed to select the preferred solution;
- follow-up commitments, including any monitoring necessary; and,
- public consultation program employed and how concerns raised have been addressed.

The Project File must contain a complete record of all activities associated with the planning of the Project and shall include:

- correspondence;
- copies of notices, letters, bulletins relating to public consultation;
- memoranda to file explaining the proponent's rationale in developing stages of the project; and,
- copies of reports prepared by consultants and others.

The project documentation must be maintained in such a way that it is suitable for easy review by the public at any time. Once the Project File is finalized a Notice of Completion is required to be issued, allowing the public at least a 30 calendar day period during which documentation may be reviewed and comment and input submitted to the municipality. We request that the proponent forward one copy of the Notice of Completion with the complete Project File to this Office for our review, filing and potential comments as well as any information that is available in the interim.

Please note that as part of the required stakeholder and agency consultation, proponents are advised to contact the following agencies to determine potentially affected Aboriginal communities in the project area. You are encouraged to visit the ministry's website at link http://www.ene.gov.on.ca/en/eaab/aboriginal-resources.php for the most up to date contact list in this regard. Once identified, you are advised to provide notification directly to the Aboriginal communities who may be affected by the project and provide them with an opportunity to participate in any planned public consultation sessions and comment on the project.

You are also reminded that when concerns are raised during the public comment period, the concerned party should be consulted in an attempt to resolve the concerns. Discussions to this end should proceed for an appropriate period of time, even if this means the 30-day review period is exceeded. The concerned party must be advised that if such discussions are unsuccessful at resolving the concerns, they can submit a Part II Order request if they have not already done so to the Minister within a further seven calendar days following the end of discussions.

Should you have any questions regarding the Class EA process, please feel free to contact me at (905) 521-7864 or at Barbara.slattery@ontario.ca.

Thank you,

Barbara Slattery
Environmental Assessment & Planning Coordinator
West Central Regional Office

cc. Winston Wang, City of Hamilton (via email only)
Blair Kidney, Inspector, Safe Drinking Water Branch, MOE-Hamilton (via email only)

Osaka, Erin

From: Wang, Winston <Winston.Wang@hamilton.ca>
Sent: Friday, August 10, 2012 2:07 PM
To: 'Jenny.Mui@HydroOne.com'
Cc: 'w.d.kloostra@HydroOne.com'; 'ierullo@HydroOne.com'; 'Lana.Kegel@HydroOne.com'; 'Christopher Mills'
Subject: RE: Ancaster Water Tower Class EA

Follow Up Flag: Follow up
Flag Status: Flagged

Thank you Jenny for your comments and we will take every comment into consideration!

Winston

Winston Wang, M.A.Sc., P. Eng., CRSP
Project Manager, Water & Wastewater Planning
Infrastructure & Source Water Planning Section
Environment & Sustainable Infrastructure Division
Public Works Department, City of Hamilton
77 James Street North, Suite 400, Hamilton, ON L8R 2K3
Tel: 905-546-2424 Ext. 4092; **Fax**: 905-546-4491
Email: winston.wang@hamilton.ca

From: Jenny.Mui@HydroOne.com [mailto:Jenny.Mui@HydroOne.com]
Sent: August 10, 2012 2:00 PM
To: Wang, Winston
Cc: w.d.kloostra@HydroOne.com; ierullo@HydroOne.com; Lana.Kegel@HydroOne.com
Subject: Ancaster Water Tower Class EA

Dear Mr. Wang,

In our initial review, we have confirmed that Hydro One Transmission facilities are located within immediate vicinity of the proposed site in your study area. Please allow appropriate lead-time in your project schedule in the event that proposed development impacts Hydro One infrastructure which requires relocation or modifications, or needs an outage, that may not be readily available.

In planning, please note that developments should not reduce line clearances and limit access to our facilities at any time in the study area of your Proposal. Any construction activities must maintain the electrical clearance from the transmission line conductors as specified in the Ontario Health and Safety Act for the respective line voltage.

The integrity of the structure foundations must be maintained at all times, with no disturbance of the earth around the poles, guy wires and tower footings. There must not be any grading, excavating, filling or other civil work close to the structures.

Note that existing rights of ways may have provisions for future lines or already contain secondary land uses (i.e. pipelines, water mains, parking, etc). Please take this into consideration in your planning.

Once details are known and it is established that your development will affect Hydro One facilities including the rights of way, please submit plans that detail your development and the affected Hydro One facilities to:

Lana Kegel, Hydro One Real Estate Management
185 Clegg Road, Markham L6G 1B7
Phone: (905) 946-6277, Fax: (905) 946-6242
Lana.Kegel@HydroOne.com

Please note that the proponent will be responsible for costs associated with modification or relocation of Hydro One facilities, as well as any added costs that may be incurred due to increase efforts to maintain our facilities.

Regards,

Lok Man (Jenny) Mui

Transmission Lines Sustainment, System Investment

Asset Management, Hydro One Networks Inc.

483 Bay Street, 15th floor

Toronto, Ontario

M5G 2P5

Phone: 416-345-5338

Jenny.Mui@HydroOne.com

Osaka, Erin

From: Leah Higens <leah.higens@ancasterbia.com>
Sent: Friday, August 31, 2012 11:43 AM
To: Wang, Winston
Cc: Robert J Wilkins; Geoff Walker; Ferguson, Lloyd; Bishop, Kathy; Maloney, Eileen
Subject: Response - Water Tower

Good Morning Winston,

I have not received many responses of comments or concerns regarding the Ancaster Water Tower. However, it was noted that;

1. Ancaster previously had water tower(s) that were removed.
2. Concern that the tower near the Ancaster Heritage Village (Dalley Drive to Montgomery Drive) deflects from the beauty and historic features of the BIA.

Should I hear any additional comments or concerns I will pass them along to you if that is acceptable after today.

I would like to be kept informed in the project so that I may update the Ancaster BIA Board.

Kind regards,

Leah

--
Leah Higens
Executive Director ~ Ancaster BIA
289 239-7828

www.ancasterheritagevillage.com

Osaka, Erin

From: Wang, Winston <Winston.Wang@hamilton.ca>
Sent: Monday, August 27, 2012 9:37 AM
To: 'Leah Higens'
Subject: RE: Ancaster Water Tower
Attachments: Notice of Study Commencement and PIC 1 Rev 2.pdf; Notice of PIC - External Agency.pdf; Notice of Commencement Response Form.pdf

Good Morning Leah,

Attached are the notices sent to external agencies on August 1, 2012.

Thank you for your interest on this project!

Regards,

Winston Wang, **M.A.Sc., P. Eng., CRSP**
Project Manager, Water & Wastewater Planning
Infrastructure & Source Water Planning Section
Environment & Sustainable Infrastructure Division
Public Works Department, City of Hamilton
77 James Street North, Suite 400, Hamilton, ON L8R 2K3
Tel: 905-546-2424 Ext. 4092; **Fax**: 905-546-4491
Email: winston.wang@hamilton.ca

From: Leah Higens [mailto:leah.higens@ancasterbia.com]
Sent: August 27, 2012 9:32 AM
To: Wang, Winston
Subject: Ancaster Water Tower

Good Morning Winston,

Would you have an electronic copy of letter you sent out Aug 01 2012 - Cover letter, Notice of Study & the Response form that I can send out to my board.

Kind regards,
Leah

--
Leah Higens
Executive Director ~ Ancaster BIA
289 239-7828

www.ancasterheritagevillage.com

Osaka, Erin

From: Wang, Winston <Winston.Wang@hamilton.ca>
Sent: Friday, September 21, 2012 9:25 AM
To: 'Ellen Boyce'; 'christopher.mills@genivar.com'
Cc: 'ellen boyce'; Shrive, Chris
Subject: RE: regarding Elevated Reservoir for Pressure District 18 Ancaster

Importance: High

Thank you Ellen for your interest in and suggestion to the project of Ancaster Elevated Water Reservoir and we will take all the public feedback into consideration during the whole consultation process. As per your request, we will add you to the mailing list for project updates as the project progresses. You are also encouraged to visit our project website for more details at

http://www.hamilton.ca/CityDepartments/PublicWorks/Environment_Sustainable_Infrastructure/StrategicPlanning/StrategicEnvironmentalPlanningProjects/Ancaster+Elevated+Water+Reservoir+Municipal+Class+Environmental+Assessment+%28EA%29.htm

or

Best regards,

Winston Wang, M.A.Sc., P. Eng., CRSP
Project Manager, Water & Wastewater Planning
Infrastructure & Source Water Planning Section
Environment & Sustainable Infrastructure Division
Public Works Department, City of Hamilton
77 James Street North, Suite 400, Hamilton, ON L8R 2K3
Tel: 905-546-2424 Ext. 4092; **Fax**: 905-546-4491
Email: winston.wang@hamilton.ca

From: [redacted]
Sent: September 21, 2012 9:07 AM
To: Wang, Winston; christopher.mills@genivar.com
Cc: [redacted]
Subject: regarding Elevated Reservoir for Pressure District 18 Ancaster

Dear Winston and Christopher;

I am a real estate agent and a citizen of Ancaster. I am sorry that I can not make the meeting on Sept 25th due to prior engagement.

I do have concerns about the height and the style of the water reservoir to be erected in the conservation area or on the Immaculate Lands. As the map is not exact in the newspaper, I would certainly like to have further information directed to me at either my mailing address or email. [redacted]
If it has to be a high tower maybe they would consider something more artistic than the big balls that we have dotting the landscape around Ontario now. Enclosed is a suggested style that would work within the concepts of Native, Conservation and with an artistic style.

Sincerely
[redacted]

An individual water tower, by a world-famous architect, you will find on the east coast of Bornholm. In the idyllic place Svaneke stand a water tower, that is called the navigation mark. The name-giving is easy to understand, but not the water technical form. The dram glass form had probably been better, even in Denmark. The pyramid form is perhaps the price you must pay, when the unconventional architect Jörn Utzon design water towers.

Some years later he created another individual building, the famous Sydney Opera in Australia. The Svaneke citizen is pride of the water tower they got 1952. With a reservoir volume of 110 m^3, it solved the support until 1988. Now is it out of operation and declared as a historic building.

Hamilton

HAMILTON WATER

Public Works Department
Hamilton Water Division
Infrastructure Planning & Systems Design
77 James St N, Suite 400, Hamilton, ON L8R 2K3
Phone: 905.546.2424, ext. 4092 Fax: 905.546.4491
Email: Winston.wang@hamilton.ca

Municipal Class EA for Ancaster Elevated Water Reservoir
Public Information Centre No 2 Questionnaire October 5th, 2016

After reading the newsletter and display panels at the Public Information Centre, please take a few minutes to complete this comment sheet. The City of Hamilton is interested in hearing from your comments or questions regarding the proposed elevated water tank. Your input is important and will be considered in the assessment of the preferred site.

1. **How did you hear about this public meeting?**

   [X] Newspaper ad [ ] Notice in mail [ ] Other

2. **Please indicate your satisfaction with the following:**

	Satisfied (Y/N)	If not Satisfied, please specify your preference here
Location of Meeting	Y	
Time of Meeting	Y	
Day of the Week	Y	

On a scale of 1 to 5, where "1" is "very" and "5" is "not at all", please rate the following by circling the appropriate number:

3. **How informative were the display materials?**
   1 (very) 2 3 (somewhat) 4 5 (not at all)

4. **How helpful were the staff and consultants in attendance?**
   1 (very) 2 3 (somewhat) 4 5 (not at all)

5. **Were all your questions answered satisfactorily?**
   [ ] Yes [ ] No

6. **Do you have any comments or concerns regarding the proposed elevated water reservoir in the Ancaster area? [ ] Yes [X] No If yes, please specify**

_____

_____

_____

_____

7. **Do you have any other issues or additional information that you feel the City should be made aware of regarding this project? [ ] Yes [X] No If yes, please specify**

8. **What is the nature of your interest in this project?**

Interest in reasoning for need of elevated reservoir
Interest in reasoning of groups which

9. **Other comments:** probably will oppose location favoured by study

Thank you for participating in this study.

Comments and information regarding this study are being collected to assist the City of Hamilton in meeting the requirements of the Environmental Assessment Act. This material will be maintained on file for use during the study and may be included in project documentation. *Information will be collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act. With the exception of personal information all comments will become part of the public record.*

Please provide your contact information below should you wish to be added to our Project Mailing List.

Name: [redacted]
(please
Address: [redacted]

Telephone: [redacted]

Please return this completed **Comment Sheet** to our staff at the Registration Table or place in the *'Comment Box'.* You can also mail/fax/email your comments to the Project Manager by **October 25th, 2016**:

Winston Wang, P. Eng., Project Manager
City of Hamilton
77 James Street North, Suite 400
Hamilton, Ontario L8R 2K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Gustavo Arvizu, P. Eng., Project Manager
WSP Canada Inc.
600 Cochrane Drive, Suite 500
Markham, Ontario, L3R 5K3
Phone: 905 475-7270
Fax: 905 475-5994
Email: gustavo.arvizu@wspgroup.com

Public Works Department
Hamilton Water Division
Infrastructure Planning & Systems Design
77 James St N, Suite 400, Hamilton, ON L8R 2K3
Phone: 905.546.2424, ext. 4092 Fax: 905.546.4491
Email: Winston.wang@hamilton.ca

RESPONSE FORM

City of Hamilton
Class Environmental Assessment (EA) Study
Ancaster Elevated Water Reservoir Class EA and Conceptual Design

1. Contact Name: [redacted]

2. Ministry/Agency/Office: _____

3. Address: [redacted]

   [redacted] Postal Code: [redacted]

   Phone No.: [redacted]

   Email: [redacted]

4. Please note specific comments and/or concerns (please attach additional sheets if necessary):

   We drink Hamilton tap water at present. Will there be any change to quality or taste?

5. Do you wish to be notified for continued involvement in the project process, including to project implementation? Yes ✓ No _____

Signature [redacted] Date OCT 01/2016

Please return this form to:

Winston Wang, P. Eng
City Project Manager
City of Hamilton
Infrastructure Planning & Systems Design Section,
Hamilton Water Division
77 James Street North, Suite 400
Hamilton, Ontario L8R 3K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Gustavo Arvizu, P. Eng, M. Eng
Consultant Project Manager
WSP Canada Inc.
600 Cochrane Drive, Suite 500
Markham, Ontario, L3R 5K3
Phone: 905 475-7270
Fax: 905 475-5994
Email: gustavo.arvizu@wspgroup.com

Public Works Department
Hamilton Water Division
Infrastructure Planning & Systems Design
77 James St N, Suite 400, Hamilton, ON L8R 2K3
Phone: 905.546.2424, ext. 4092 Fax: 905.546 4491
Email: Winston.wang@hamilton.ca

RESPONSE FORM

City of Hamilton
Class Environmental Assessment (EA) Study
Ancaster Elevated Water Reservoir Class EA and Conceptual Design

1. Contact Name: Drew Cherry

2. Ministry/Agency/Office: GRAND RIVER CONSERVATION AUTHORITY

3. Address: 400 Clyde Road Box 729 Cambridge Ontario Postal Code: N1R 5W6

   Phone No.:

   Email: dcherry@grandriver.ca

4. Please note specific comments and/or concerns (please attach additional sheets if necessary):

   Wetlands/floodplains/watercourses/valleylands within study area.

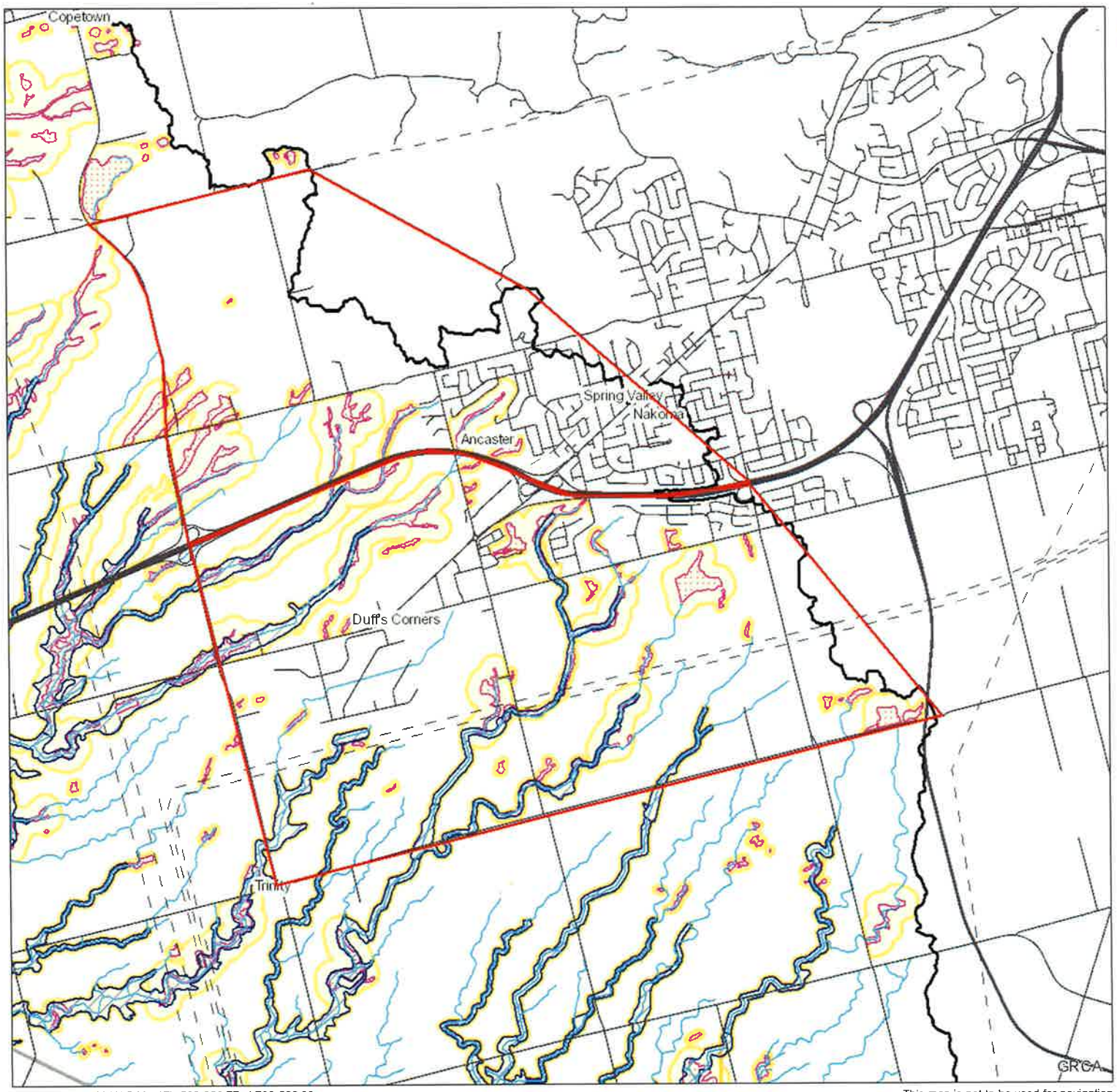
5. Do you wish to be notified for continued involvement in the project process, including to project implementation? Yes ✓ No

Signature [signature] Date August 18 2016

Please return this form to: for Drew Cherry

Winston Wang, P. Eng
City Project Manager
City of Hamilton
Infrastructure Planning & Systems Design Section,
Hamilton Water Division
77 James Street North, Suite 400
Hamilton, Ontario L8R 3K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Gustavo Arvizu, P. Eng, M. Eng.
Consultant Project Manager
WSP Canada Inc.
600 Cochrane Drive, Suite 500
Markham, Ontario, L3R 5K3
Phone: 905 475-7270
Fax: 905 475-5994
Email: gustavo.arvizu@wspgroup.com



Grand River Conservation Authority

Date: Aug 18, 2016

Notes

Legend

- Municipal Boundary (GRCA)
- Watercourse - Local (GRCA)

Floodplain (GRCA)

- Engineered
- Estimated
- Approximate
- Wetland (GRCA)
- Park - Local (GRCA)
- Regulation Limit (GRCA)
- Great Lakes - Local (GRCA)

0 300 600 1,200 1,800 Metres

N

Map Centre (UTM NAD83 z17): 580,889.77 4,783,568.33

This map is not to be used for navigation

NAD 1983 UTM Zone 17N

Scale: 49,039

RESPONSE FORM
City of Hamilton
Class Environmental Assessment (EA) Study
Ancaster Elevated Water Reservoir Class EA and Conceptual Design

1. Contact Name: Cathy Plosz

2. Ministry/Agency/Office: City of Hamilton, Planning and Economic Development, Development Planning, Heritage, and Design

3. Address: 71 Main Street West, Hamilton

Postal Code: L8P 4Y5

Phone No.: (905) 546-2424 Ext. 1231

Email: Catherine.Plosz@hamilton.ca

4. Please note specific comments and/or concerns (please attach additional sheets if necessary):

5. Do you wish to be notified for continued involvement in the project process, including to project implementation? Yes X No

Signature _____ Date August 30, 2016

Please return this form to:

Winston Wang, P. Eng
City Project Manager
City of Hamilton
Infrastructure Planning & Systems Design
Section, Hamilton Water Division
77 James Street North, Suite 400
Hamilton, Ontario L8R 3K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Gustavo Arvizu, P. Eng
Consultant Project Manager
WSP Canada Inc.
600 Cochrane Drive, Suite 500
Markham, Ontario, L3R 5K3
Phone: 905 475-7270
Fax: 905 475-5994
Email: Gustavo.arvizu@wspgroup.com

RESPONSE FORM
City of Hamilton
Class Environmental Assessment (EA) Study
Ancaster Elevated Water Reservoir Class EA and Conceptual Design

1. Contact Name: MELISSA KIDDIE

2. Ministry/Agency/Office: CITY OF HAMILTON, PLANNING AND ECONOMIC DEVELOPMENT DEVELOPMENT PLANNING, HERITAGE + DESIGN

3. Address: 71 MAIN STREET WEST, HAMILTON
Postal Code: L8P 4Y5

Phone No.: (905) 546-2424 ext. 1290

Email: Melissa.Kiddie@hamilton.ca

4. Please note specific comments and/or concerns (please attach additional sheets if necessary):

5. Do you wish to be notified for continued involvement in the project process, including to project implementation? Yes X No ____

Signature Melissa Kiddie Date August 19/16

Please return this form to:

Winston Wang, P. Eng
City Project Manager
City of Hamilton
Infrastructure Planning & Systems Design
Section, Hamilton Water Division
77 James Street North, Suite 400
Hamilton, Ontario L8R 3K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Gustavo Arvizu, P. Eng
Consultant Project Manager
WSP Canada Inc.
600 Cochrane Drive, Suite 500
Markham, Ontario, L3R 5K3
Phone: 905 475-7270
Fax: 905 475-5994
Email: Gustavo.arvizu@wspgroup.com

Public Works Department
Hamilton Water Division
Infrastructure Planning & Systems Design
77 James St N, Suite 400, Hamilton, ON L8R 2K3
Phone: 905.546.2424, ext. 4092 Fax: 905.546.4491
Email: Winston.wang@hamilton.ca

RESPONSE FORM
City of Hamilton
Class Environmental Assessment (EA) Study
Ancaster Elevated Water Reservoir Class EA and Conceptual Design

1. Contact Name: ABU SANNEH, COORINATOR, AIRPORT OPERATIONS
2. Ministry/Agency/Office: HAMILTON INTERNATIONAL AIRPORT LTD
3. Address: 9300 AIRPORT RD, SUITE 2206
   MOUNT HOPE, ON Postal Code: LOR 1W0
   Phone No.: 905-667-8786
   Email: ASANNEH@FLYHAMILTON.CA
4. Please note specific comments and/or concerns (please attach additional sheets if necessary):
   DUE TO THE PROXIMITY OF THE PROPOSED SITES TO THE HAMILTON INTERNATIONAL AIRPORT, A REVIEW OF THE SITES IS REQUIRED TO DETERMINE POTENTIAL EFFECT ON AIRPORT ZONING REGULATIONS. IT IS ALSO RECOMMENDED THAT THE PROPOSAL BE SUBMITTED TO TRANSPORT CANADA AND NAV CANADA FOR REVIEW TO ENSURE THE STRUCTURE(S) MEET LIGHTING REQUIREMENTS & FLIGHT PROCEDURES ARE NOT IMPACTED.
5. Do you wish to be notified for continued involvement in the project process, including to project implementation? (Yes) No ____

Signature _____ Date SEPTEMBER 27, 2016

Please return this form to:

Winston Wang, P. Eng
City Project Manager
City of Hamilton
Infrastructure Planning & Systems Design Section,
Hamilton Water Division
77 James Street North, Suite 400
Hamilton, Ontario L8R 3K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Gustavo Arvizu, P. Eng, M. Eng.
Consultant Project Manager
WSP Canada Inc.
600 Cochrane Drive, Suite 500
Markham, Ontario, L3R 5K3
Phone: 905 475-7270
Fax: 905 475-5994
Email: gustavo.arvizu@wspgroup.com

Osaka, Erin

From: Chehab, Dania
Sent: Thursday, October 20, 2016 2:18 PM
To: Osaka, Erin
Subject: FW: Ancaster Water Tower

Follow Up Flag: Follow up
Flag Status: Completed

FYI

Dania Chehab, P.Eng., M.Eng.
Project Engineer, WSP Canada Inc.
T 905-882-1100 ext. 6810 | www.wspgroup.com

From: Wang, Winston [mailto:Winston.Wang@hamilton.ca]
Sent: October-20-16 2:13 PM
To: Chehab, Dania <Dania.Chehab@wspgroup.com>; Arvizu, Gustavo <Gustavo.Arvizu@wspgroup.com>
Subject: FW: Ancaster Water Tower

FYI…….

Winston Wang, M. A. Sc., P. Eng.
Project Manager, Water & Wastewater Planning
Infrastructure Planning & Systems Design Section
Hamilton Water, Public Works Department, City of Hamilton
77 James Street North, Suite 400, Hamilton, ON L8R 2K3
Tel: 905-546-2424 Ext. 4092 Fax: 905-546-4491 Email: winston.wang@hamilton.ca

---

From: Wang, Winston
Sent: October-14-16 8:21 AM
To: [redacted]
Cc: 'Arvizu, Gustavo'; Chehab, Dania
Subject: RE: Ancaster Water Tower

Hi[redacted]

Thank you for your support!

The location is about slightly further south of Avondales where a private land will be purchased. It all depends on the availability of lands. In terms of the completion of the water tower, once the land is purchased, then design, bidding and construction, the project may be in 2020 or later and it is not clear yet at the moment.

Regards,

Winston Wang, M. A. Sc., P. Eng.
Project Manager, Water & Wastewater Planning
Infrastructure Planning & Systems Design Section
Hamilton Water, Public Works Department, City of Hamilton
77 James Street North, Suite 400, Hamilton, ON L8R 2K3
Tel: 905-546-2424 Ext. 4092 Fax: 905-546-4491 Email: winston.wang@hamilton.ca

From: [redacted]
Sent:
To: Wang, Winston
Subject: Ancaster Water Tower

Hi Winston,

I would first like to say that I fully support a water tower being built in Ancaster. I actually live on Garner Rd right near Fiddlers Green and was wondering exactly where it will be situated. Is it behind the Avondales or further down Fiddlers to the south? The maps in the PDF's were not clear on the location.

What is also the timeline for this project? 2019, 2020?

Regards,
[redacted]

Osaka, Erin

From: Arvizu, Gustavo
Sent: Friday, September 23, 2016 9:29 AM
To: Chehab, Dania; Osaka, Erin; Winston Wang
Subject: Fwd: Ancaster Elevated Water Reservoir

Gustavo Arvizu

Begin forwarded message:

[redacted]
Date: September 23, 2016 at 9:27:31 AM EDT
To: "'gustavo.arvizu@wspgroup.com'" <gustavo.arvizu@wspgroup.com>
Subject: Re: Ancaster Elevated Water Reservoir

Good morning Gustavo, with respect to the "**Ancaster Elevated Water Reservoir**".

How will that affect me? I live on [redacted] within the study area.

Will that mean I will get city water?

Thank you for your assistance in this matter.

[redacted]

[redacted]

Please consider the environment before printing this email

Osaka, Erin

From: [redacted]
Sent: Monday, October 03, 2016 4:10 PM
To: winston.wang@hamilton.ca; Arvizu, Gustavo
Subject: Ancaster Elevated Water Reservoir Class EA and Conceptual Design

Hi Winston and Gustavo,
I received a copy of the Notice of the Public Information Centre (PIC) 2 scheduled for Oct. 5 from a client. I am not able to attend the PIC but would like to be able to review the material presented at the PIC. Is it possible to get the information in advance or shortly thereafter?

Could you also add myself to the mailing list for information related to this project moving forward. Kindly confirm. My contact information is below.

With thanks,

[redacted]

Ministry of Tourism, Culture and Sport

Heritage Program Unit
Programs and Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7
Tel: 416 314-7159
Fax: 416 212 1802

Ministère du Tourisme, de la Culture et du Sport

Unité des programmes patrimoine
Direction des programmes et des services
401, rue Bay, Bureau 1700
Toronto ON M7A 0A7
Tél: 416 314-7159
Téléc: 416 212 1802

Ontario

September 12, 2016 (By email only)

Mr. Gustavo Arvizu, Consultant Project Manager
WSP Canada Inc.
600 Cochrane Drive, Suite 500
Markham, On L3R 5K3
E: gustavo.arvizu@wspgroup.com

RE: MTCS file #: 0005492
Proponent: City of Hamilton
Subject: Notice of PIC #2 - Ancaster Elevated Water Reservoir Class EA
Location: Hamilton (Ancaster)

Dear Mr. Arvizu

Thank you for providing the Ministry of Tourism, Culture and Sport (MTCS) with the Notice of the upcoming PIC for the above-noted project. MTCS's interest in this EA project relates to its mandate of conserving Ontario's cultural heritage, which includes:

- archaeological resources, including land-based and marine
- built heritage resources, including bridges and monuments and
- cultural heritage landscapes.

Under the EA process, the proponent is required to determine a project's potential impact on cultural heritage resources

Cultural Heritage Considerations

While some cultural heritage resources may have already been formally identified, others may be identified through screening and evaluation. Aboriginal communities may have knowledge that can contribute to the identification of cultural heritage resources, and we suggest that any engagement with Aboriginal communities includes a discussion about known or potential cultural heritage resources that are of value to these communities. Municipal Heritage Committees, historical societies and other local heritage organizations may also have knowledge that contributes to the identification of cultural heritage resources.

Archaeological Resources

MTCS records indicate that a Stage 1 archaeological assessment has been completed for this project. We note that some proposed sites will require additional archaeological assessment. Please ensure that the recommendations for further assessment are addressed in the final EA report

For your information, MTCS typically advises that EA projects be screened with the MTCS *Criteria for Evaluating Archaeological Potential* to determine if an archaeological assessment is needed. MTCS archaeological sites data are available at *archaeology@ontario.ca*. If the EA project area exhibits archaeological potential, then an archaeological assessment (AA) should be undertaken by an archaeologist licenced under the *OHA*, who is responsible for submitting the report directly to MTCS for review.

Built Heritage and Cultural Heritage Landscapes

If you have not already done so, we recommend that the MTCS *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* be completed to help determine whether this EA project may impact cultural heritage resources. The municipal Clerk or heritage planning staff can provide information on property registered or designated under the *Ontario Heritage Act*. Municipal Heritage Planners can also provide information that will assist you in completing the checklist.

If potential or known heritage resources exist, MTCS recommends that a Heritage Impact Assessment (HIA), prepared by a qualified consultant, should be completed to assess potential project impacts. Our Ministry's *Info Sheet #5: Heritage Impact Assessments and Conservation Plans* outlines the scope of HIAs. Please send the HIA to MTCS for review, and make it available to local organizations or individuals who have expressed interest in review.

Environmental Assessment Reporting

All technical heritage studies and their recommendations are to be addressed and incorporated into EA projects. If your screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists and supporting documentation in the EA report or file.

Thank you for consulting MTCS on this project. We would appreciate being informed as this project continues through the EA process. Please contact me for any questions or clarification.

Sincerely,

Rosi Zirger
Heritage Planner
rosi.zirger@ontario.ca

Copied to: Winston Wang, City Project Manager, City of Hamilton

Public Works Department
Hamilton Water Division
Infrastructure Planning & Systems Design
77 James St N, Suite 400, Hamilton, ON L8R 2K3
Phone: 905.546.2424, ext. 4092 Fax: 905.546.4491
Email: Winston.wang@hamilton.ca

RESPONSE FORM
City of Hamilton
Class Environmental Assessment (EA) Study
Ancaster Elevated Water Reservoir Class EA and Conceptual Design

1. Contact Name: Hossein Hosseini
2. Ministry/Agency/Office: Ministry of Transportation (MTO)
3. Address: 159 Sir. William Hearst Ave., Downsview, ON
   Bldg. D, 4th Floor Postal Code: M3M0B7
   Phone No.: 416-235-5513
   Email: hossein.hosseini@ontario.ca
4. Please note specific comments and/or concerns (please attach additional sheets if necessary):
   I'd like to be copied on all correspondences during the design phase as much as the MTO ROW is impacted. (Hwy 403 ROW)
5. Do you wish to be notified for continued involvement in the project process, including to project implementation? Yes X No _____

Signature _____ Date Sep. 22, 2016

Please return this form to:

Winston Wang, P. Eng
City Project Manager
City of Hamilton
Infrastructure Planning & Systems Design Section,
Hamilton Water Division
77 James Street North, Suite 400
Hamilton, Ontario L8R 3K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Gustavo Arvizu, P. Eng, M. Eng.
Consultant Project Manager
WSP Canada Inc.
600 Cochrane Drive, Suite 500
Markham, Ontario, L3R 5K3
Phone: 905 475-7270
Fax: 905 475-5994
Email: gustavo.arvizu@wspgroup.com

Osaka, Erin

From: [redacted]
Sent: Friday, September 30, 2016 2:59 PM
To: Wang, Winston
Cc: Arvizu, Gustavo
Subject: Re: Ancaster Elevated Water Reservoir EA and Conceptual Design

Much appreciated. I will arrange for someone to attend. Thank you.

[redacted]

[redacted]

On 2016-09-30, at 2:53 PM, Wang, Winston wrote:

> Hi [redacted]
>
> Yes, absolutely. We can put your company on the mailing list and if you could, you and/or your staff can come to the Public Information Centre 2 (PIC2) on **October 5, 2016** at Ancaster Old Town Hall from 6:00pm – 8:00pm to provide your input for this project.
>
> Regards,
>
> **Winston Wang, M. A. Sc., P. Eng.**
> Project Manager, Water & Wastewater Planning
> Infrastructure Planning & Systems Design Section
> Hamilton Water, Public Works Department, City of Hamilton
> 77 James Street North, Suite 400, Hamilton, ON L8R 2K3
> Tel: 905-546-2424 Ext. 4092 Fax: 905-546-4491 Email: winston.wang@hamilton.ca
>
>

[redacted]

To: Wang, Winston
Subject: Ancaster Elevated Water Reservoir EA and Conceptual Design

Good afternoon

[redacted] ived notice regarding the above noted EA Study. Our company, known as [redacted] our numbered companies are the registered owners) owns many acres in th area and wish to be kept informed. Would you kindly keep us on the mailing list.

Thank you and regards,

[redacted]

Chehab, Dania

From: Wang, Winston <Winston.Wang@hamilton.ca>
Sent: October-20-16 1:25 PM
To: Arvizu, Gustavo
Cc: Chehab, Dania
Subject: Ancaster Elevated Water Reservoir PIC 2 Follow Up

Hi Gustavo,

I have contacted the individual [redacted], (by phone [redacted]), who was concerned about the property to the north of Site #1, which is at Ancaster Rotary Center around the Niagara Escarpment. I explained the reasons for the elevated water reservoir to meet the water servicing issues, such as ***water supply reliability***, ***sustainability***, energy saving, and greenhouse gas reduction, some low water pressure at a higher elevation within the community, …, etc. Basically, he asked if there are any complaints and if someone is protesting. I said that no complaints from the residents have been received so far and there are no protests as well. He finally understood the purpose and the reasoning for constructing this elevated water reservoir in Ancaster community.

Please use this email as an written document of PIC 2 follow-up.

Regards,

HAMILTON WATER
WATER IS LIFE

Winston Wang, M.A.Sc., P. Eng.

Project Manager, Water & Wastewater Planning
Infrastructure Planning & Systems Design
City of Hamilton | Public Works Department
77 James Street North, Suite 400
Hamilton, ON L8R 2K3
T: 905.546.2424 ext. 4092
winston.wang@hamilton.ca

Public Works Department
Hamilton Water Division
Infrastructure Planning & Systems Design
77 James St N, Suite 400, Hamilton, ON L8R 2K3
Phone: 905 546 2424, ext. 4092 Fax: 905 546.4491
Email: Winston.wang@hamilton.ca

RESPONSE FORM

City of Hamilton
Class Environmental Assessment (EA) Study
Ancaster Elevated Water Reservoir Class EA and Conceptual Design

1. Contact Name: Darlene Presley
2. Ministry/Agency/Office: MHBC Planning on behalf of TRANSCANADA PIPELINES LIMITED
3. Address: 442 Brant St., Suite 204
   Burlington Postal Code: L7R 2G4
   Phone No.: 905-639-8686 xt 229
   Email: dpresley@mhbcplan.com
4. Please note specific comments and/or concerns (please attach additional sheets if necessary):

   _____

   _____

   _____

   _____

   _____

5. Do you wish to be notified for continued involvement in the project process, including to project implementation? Yes X No _____

Signature _____ Date Oct. 7/16

Please return this form to:

Winston Wang, P. Eng
City Project Manager
City of Hamilton
Infrastructure Planning & Systems Design Section,
Hamilton Water Division
77 James Street North, Suite 400
Hamilton, Ontario L8R 3K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Gustavo Arvizu, P. Eng, M. Eng
Consultant Project Manager
WSP Canada Inc.
600 Cochrane Drive, Suite 500
Markham, Ontario, L3R 5K3
Phone: 905 475-7270
Fax: 905 475-5994
Email: gustavo.arvizu@wspgroup.com

Public Works Department
Hamilton Water Division
Infrastructure Planning & Systems Design
77 James St N, Suite 400, Hamilton, ON L8R 2K3
Phone: 905.546.2424, ext. 4092 Fax: 905.546.4491
Email: Winston.wang@hamilton.ca

Municipal Class EA for Ancaster Elevated Water Reservoir
Public Information Centre No 2 Questionnaire October 5th, 2016

After reading the newsletter and display panels at the Public Information Centre, please take a few minutes to complete this comment sheet. The City of Hamilton is interested in hearing from your comments or questions regarding the proposed elevated water tank. Your input is important and will be considered in the assessment of the preferred site.

1. **How did you hear about this public meeting?**

   [ ] Newspaper ad [✓] Notice in mail [ ] Other

2. **Please indicate your satisfaction with the following:**

	Satisfied (Y/N)	If not Satisfied, please specify your preference here
Location of Meeting	Y	
Time of Meeting	Y	
Day of the Week	Y	

On a scale of 1 to 5, where "1" is "very" and "5" is "not at all", please rate the following by circling the appropriate number:

3. **How informative were the display materials?**
   1 (very) 2 3 (somewhat) 4 5 (not at all)

4. **How helpful were the staff and consultants in attendance?**
   1 (very) 2 3 (somewhat) 4 5 (not at all)

5. **Were all your questions answered satisfactorily?**
   [ ] Yes [ ] No

6. **Do you have any comments or concerns regarding the proposed elevated water reservoir in the Ancaster area? [ ] Yes [ ] No** **If yes, please specify**

_____

_____

_____

_____

7. **Do you have any other issues or additional information that you feel the City should be made aware of regarding this project? [ ] Yes [ ] No If yes, please specify**

8. **What is the nature of your interest in this project?**

LOCAL NEIGHBORHOOD INTEREST.

9. **Other comments:**

Thank you for participating in this study.

Comments and information regarding this study are being collected to assist the City of Hamilton in meeting the requirements of the Environmental Assessment Act. This material will be maintained on file for use during the study and may be included in project documentation. *Information will be collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act. With the exception of personal information all comments will become part of the public record.*

Please provide your contact information below should you wish to be added to our Project Mailing List.

Name: [redacted]

(please print)

Address: [redacted]

Telephone:

Please return this completed **Comment Sheet** to our staff at the Registration Table or place in the *'Comment Box'.* You can also mail/fax/email your comments to the Project Manager by **October 25th, 2016**:

Winston Wang, P. Eng., Project Manager
City of Hamilton
77 James Street North, Suite 400
Hamilton, Ontario L8R 2K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Gustavo Arvizu, P. Eng., Project Manager
WSP Canada Inc.
600 Cochrane Drive, Suite 500
Markham, Ontario, L3R 5K3
Phone: 905 475-7270
Fax: 905 475-5994
Email: gustavo.arvizu@wspgroup.com

Osaka, Erin

From: Wang, Winston <Winston.Wang@hamilton.ca>
Sent: Thursday, August 25, 2016 3:30 PM
To: Arvizu, Gustavo
Subject: FW: Ancaster Elevated Water Resevoir

FYI……..for EA Report.

Winston Wang, M. A. Sc., P. Eng.
Project Manager, Water & Wastewater Planning
Infrastructure Planning & Systems Design Section
Hamilton Water, Public Works Department, City of Hamilton
77 James Street North, Suite 400, Hamilton, ON L8R 2K3
Tel: 905-546-2424 Ext. 4092 Fax: 905-546-4491 Email: winston.wang@hamilton.ca

---

From: Wang, Winston
Sent: August-25-16 7:33 AM
To: [redacted]
Subject: RE: Ancaster Elevated Water Resevoir

Hi [redacted]

Generally PIC 1 is to present background information and current conditions while PIC 2 is to present proposed alternatives and the preferred alternative, this the “rule of thumb” as you may be aware. You are welcome to come to PIC 2 for discussion.

The road name abutting Site #1 on the west is called Martin Rd.

All the best,

Winston

From: [redacted]
Sent:
To: Wang, Winston
Subject: RE: Ancaster Elevated Water Resevoir

Hello, Mr. Wang.
You did not explain the relevance of PIC No 1 to PIC No 2. Specifically: will the 6 sites proposed in PIC No. 1 be presented at PIC No. 2 and the one or more preferred identified and justified?

My second question is: what are the names of the North - South roads that abut or are closest to Site #1?

I look forward to receiving your replies.

[redacted]

From: Wang, Winston [Winston.Wang@hamilton.ca]
Sent: August 23, 2016 9:04 AM
To [redacted]
Su Elevated Water Resevoir

Thanks [redacted] for pointing out the status of this project. It has already been changed to “Active”.

I will add your name to the mailing list for notifications. As for the PIC number, the coming PIC is No. 2 and there will not be a No. 3. Sorry for the confusion due to my poor grammar.

Winston

From: [redacted]
Sent: August-23-16 8:43 AM
To: Wang, Winston
Subject: Ancaster Elevated Water Resevoir

Hello, Mr. Wang.
Yesterday, I spoke on the telephone with you concerning the Ancaster Elevated Water Reservoir. Please add my name to your mailing list for notifications on this project.

I see the announcement I spoke with you about and is scheduled for October 5, 2016, is called PIC No. 2. When I put the name of the project in the Search box at the City's web site I found a few sentences that ended with "Study status: Active (on hold)..." Further exploration through Google indicates that there was PIC No. 1 in 2012. I find it odd that no reference to this is made in the notice of PIC No.2 and that in our conversation you did not mention the information distributed at that time including a map showing possible sites. In the notice I have for PIC No. 2, in the third section (Public Information Centre (PIC) No. 2, it says "As part of this study, two (2) Public Information Centres (PIC's) will be held to present the findings of the study to the public and other stakeholders, ..." The use of the future tense indicates that there will be a PIC No. 2 and a PIC No. 3. However apparently there has already been a PIC No.1, held some years ago. Since you call the October 5, 2016 session PIC No. 2, the total number of PICs in the end will be 3, will it not?

Please clarify for me the status of the project, the relevance of PIC No. 1 that has already been held to the PICs yet to be held, and the proper way of identifying the PICs to be held in future.

[redacted]

Hamilton

HAMILTON WATER

Public Works Department
Hamilton Water Division
Infrastructure Planning & Systems Design
77 James St N, Suite 400, Hamilton, ON L8R 2K3
Phone: 905.546.2424, ext. 4092 Fax: 905.546.4491
Email: Winston.wang@hamilton.ca

RESPONSE FORM

City of Hamilton
Class Environmental Assessment (EA) Study
Ancaster Elevated Water Reservoir Class EA and Conceptual Design

1. Contact Name: ANTHONY Cupido
2. Ministry/Agency/Office: MOHAWK COLLEGE
3. Address: 135 FENNELL AVENUE WEST, PO Box 2034
   HAMILTON ON Postal Code: L8N 3T2
   Phone No.: 905-575-2243
   Email: Tony.cupido@mohawkcollege.ca
4. Please note specific comments and/or concerns (please attach additional sheets if necessary):
   None
5. Do you wish to be notified for continued involvement in the project process, including to project implementation? Yes _____ No X

Signature Anthony Cupido Date Aug 23/16

Please return this form to:

Winston Wang, P. Eng
City Project Manager
City of Hamilton
Infrastructure Planning & Systems Design Section,
Hamilton Water Division
77 James Street North, Suite 400
Hamilton, Ontario L8R 3K3
Phone: 905 546-2424 ext. 4092
Fax: 905 546-4491
Email: winston.wang@hamilton.ca

Gustavo Arvizu, P. Eng, M. Eng.
Consultant Project Manager
WSP Canada Inc.
600 Cochrane Drive, Suite 500
Markham, Ontario, L3R 5K3
Phone: 905 475-7270
Fax: 905 475-5994
Email: gustavo.arvizu@wspgroup.com

Osaka, Erin

From: Arvizu, Gustavo
Sent: Thursday, August 18, 2016 7:54 AM
To: Osaka, Erin; Chehab, Dania
Subject: FW: Class EA Study - Ancaster Elevated Water Reservoir, City of Hamilton: NEATS 42715

Please save to the file. Do we have a consultation folder?

Gustavo Arvizu, P. Eng., M. Eng.
Project Manager
Water and Wastewater

WSP Canada Inc.
600 Cochrane Drive, Suite 500
Markham, Ontario L3R 5K3 Canada
T +1 905-475-7270 #18346
F +1 905-475-5994
C +1 416-272-1519

www.wspgroup.com

From: EnviroOnt [mailto:EnviroOnt@tc.gc.ca]
Sent: Thursday, August 18, 2016 7:52 AM
To: winston.wang@hamilton.ca; Arvizu, Gustavo
Subject: Class EA Study - Ancaster Elevated Water Reservoir, City of Hamilton: NEATS 42715

Greetings all,

Thank you for your correspondence.

Please note Transport Canada **does not** require receipt of all individual or Class EA related notifications. We are requesting project proponents to self-assess if their project will interact with a federal property **and** require approval and/or authorization under any Acts administered by Transport Canada*.

Under *the Canadian Environmental Assessment Act, 2012*, Transport Canada is required to determine the likelihood of significant adverse environmental effects of projects that will occur on federal property prior to exercising a power, performing a function or duty in relation to that project. The project proponent should review the Directory of Federal Real Property, available at http://www.tbs-sct.gc.ca/dfrp-rbif/, to verify if the project will potentially interact with any federal property and/or waterway. The project proponent should also review the list of Acts that Transport Canada administers and assists in administering that may apply to the project, available at: https://www.tc.gc.ca/eng/acts-regulations/acts.htm.

If the aforementioned does not apply, the Environmental Assessment program should not be included in any correspondence. If there is a role under the program, correspondence should be forwarded *electronically* to: EnviroOnt@tc.gc.ca.

*Below is a summary of the most common Acts that have applied to projects in an Environmental Assessment context:

- ***Navigation Protection Act (NPA)*** – the Act applies primarily to works constructed or placed in, on, over, under, through, or across scheduled navigable waters set out under the Act. The Navigation Protection Program administers the NPA through the review and authorization of works affecting scheduled navigable waters. Information about the Program, NPA and approval process is available at: http://www.tc.gc.ca/eng/programs-621.html. Enquiries can be directed to NPPONT-PPNONT@tc.gc.ca or by calling (519) 383-1863.

- ***Railway Safety Act (RSA)*** – the Act provides the regulatory framework for railway safety, security, and some of the environmental impacts of railway operations in Canada. The Rail Safety Program develops and enforces regulations, rules, standards and procedures governing safe railway operations. Additional information about the Program is available at: https://www.tc.gc.ca/eng/railsafety/menu.htm. Enquiries can be directed to RailSafety@tc.gc.ca or by calling (613) 998-2985.

- ***Transportation of Dangerous Goods Act (TDGA)*** – the transportation of dangerous goods by air, marine, rail and road is regulated under the TDGA. Transport Canada, based on risks, develops safety standards and regulations, provides oversight and gives expert advice on dangerous goods to promote public safety. Additional information about the transportation of dangerous goods is available at: https://www.tc.gc.ca/eng/tdg/safety-menu.htm. Enquiries can be directed to TDG-TMDOntario@tc.gc.ca or by calling (416) 973-1868.

- ***Aeronautics Act*** – Transport Canada has sole jurisdiction over aeronautics, which includes aerodromes and all related buildings or services used for aviation purposes. Aviation safety in Canada is regulated under this Act and the Canadian Aviation Regulations (CARs). Elevated Structures, such as wind turbines and communication towers, would be examples of projects that must be assessed for lighting and marking requirements in accordance with the CARs. Transport Canada also has an interest in projects that have the potential to cause interference between wildlife and aviation activities. One example would be waste facilities, which may attract birds into commercial and recreational flight paths. The *Land Use In The Vicinity of Aerodromes* publication recommends guidelines for and uses in the vicinity of aerodromes, available at: https://www.tc.gc.ca/eng/civilaviation/publications/tp1247-menu-1418.htm. Enquires can be directed to CASO-SACO@tc.gc.ca or by calling 1 (800) 305-2059 / (416) 952-0230.

Please advise if additional information is needed.

Thank you,

Environmental Assessment Program | Programme d'évaluation environnementale
Transport Canada, Ontario Region | Transports Canada, Région de l'Ontario
4900 Yonge St., Toronto, ON M2N 6A5 | 4900, rue Yonge, Toronto, ON, M2N 6A5
Email | Courriel: EnviroOnt@tc.gc.ca
Facsimile | télécopieur: (416) 952-0514
Government of Canada | Gouvernement du Canada

Osaka, Erin

From: [redacted]
Sent: Sunday, November 06, 2016 9:16 AM
To: Wang, Winston
Subject: Propsed water tower construction

My name is [redacted] and I live on [redacted]. I learned that a water tower might be constructed near my home. I also learned that a informational meeting took place in early October. I believe that it is usually customary for the city to inform residents of meetings concerning construction close to their homes. We have not received any notification by mail concerning the water tower construction. Can you please inform us of any developments in the future at:

[redacted]

[redacted]

Sent from Samsung tablet

Osaka, Erin

From: Chehab, Dania
Sent: Thursday, January 12, 2017 4:09 PM
To: Osaka, Erin
Subject: FW: Ancaster Elevated Water Reservoir - Class EA Information

Follow Up Flag: Follow up
Flag Status: Completed

Could you add this to the comment table and appendix please?

From: Wang, Winston [mailto:Winston.Wang@hamilton.ca]
Sent: January-12-17 2:32 PM
To: Arvizu, Gustavo <Gustavo.Arvizu@wspgroup.com>; Chehab, Dania <Dania.Chehab@wspgroup.com>
Subject: FW: Ancaster Elevated Water Reservoir - Class EA Information

FYI……for the Class EA Project File.

Winston Wang, M. A. Sc., P. Eng.
Project Manager, Water & Wastewater Planning
Infrastructure Planning & Systems Design Section
Hamilton Water, Public Works Department, City of Hamilton
77 James Street North, Suite 400, Hamilton, ON L8R 2K3
Tel: 905-546-2424 Ext. 4092 Fax: 905-546-4491 Email: winston.wang@hamilton.ca

---

From: Wang, Winston
Sent: January-12-17 2:31 PM
To: 'Mélanie Vincent'
Subject: RE: Ancaster Elevated Water Reservoir - Class EA Information

Thanks Melanie and you have a wonderful afternoon as well!

Winston Wang, M. A. Sc., P. Eng.
Project Manager, Water & Wastewater Planning
Infrastructure Planning & Systems Design Section
Hamilton Water, Public Works Department, City of Hamilton
77 James Street North, Suite 400, Hamilton, ON L8R 2K3
Tel: 905-546-2424 Ext. 4092 Fax: 905-546-4491 Email: winston.wang@hamilton.ca

From: Mélanie Vincent [mailto:melanievincent21@yahoo.ca]
Sent: January-12-17 2:28 PM
To: Wang, Winston
Cc: Maxime Picard
Subject: Re: Ancaster Elevated Water Reservoir - Class EA Information

Happy New Year Winston! The HWN has no further comments on this, have a good afternoon!

Cheers,

Mélanie Vincent, M.Sc.AJS
Cell / SMS: (418) 580-4442
melanievincent21@yahoo.ca
Gestion MV Management
Gestion de projets / Project Management

From: "Wang, Winston" <Winston.Wang@hamilton.ca>
To: 'Melanie Vincent' <melanievincent21@yahoo.ca>
Sent: Thursday, January 12, 2017 11:36 AM
Subject: FW: Ancaster Elevated Water Reservoir - Class EA Information

Hi Melanie,

Nice to communicate with you again!

After my conversation with Tina, I am sending you this email as a courtesy follow up for this Ancaster project, please find the potential locations of elevated water reservoir in Ancaster community (attached). We are looking for any concerns or comments regarding this project. Since we are in the process of the concluding this project, could you please let us know your concerns, if any, by early next week?

The following is the link to the whole project file and we are finalizing the process for now but the final report will come soon.

https://www.hamilton.ca/city-planning/master-plans-class-eas/ancaster-elevated-water-reservoir

Regards,

HAMILTON WATER
WATER IS LIFE

Winston Wang, M.A.Sc., P. Eng.

Project Manager, Water & Wastewater Planning
Infrastructure Planning & Systems Design
City of Hamilton | Public Works Department
77 James Street North, Suite 400
Hamilton, ON L8R 2K3
T: 905.546.2424 ext. 4092
winston.wang@hamilton.ca

Hamilton

HAMILTON WATER

Public Works Department
Hamilton Water Division
Infrastructure Planning & Systems Design
77 James St N, Suite 400, Hamilton, ON L8R 2K3
Phone: 905.546.2424, ext. 4092 Fax: 905.546.4491
Email: Winston.wang@hamilton.ca

EA Phone Tracking Log

1. Project Summary Script:

The Ancaster Elevated Water Reservoir Class EA and Conceptual Design project is to identify and evaluate the alternative locations to permit the construction of an elevated water reservoir in Ancaster community. The alternative locations include the following:

- Jerseyville Rd. W and Martin Rd, Ancaster
- Garner Rd. W & Braithwaite Ave, Ancaster
- Fiddler's Green Rd. & Garner Rd. E, Ancaster
- Garner Rd. E & Southcote Rd., Ancaster
- Garner Rd. E & Raymond Rd., Ancaster

2. Questionnaire:

a). Did you receive a letter from the **City of Hamilton** regarding this Class EA project consultation to you or your organization? **YES** **NO**

b). Are you interested in continued participation in the consultation in the future?
YES **NO**

c). What are the concerns or interest you may have regarding this project?

a). Called [redacted] about this Class EA comments and she refers [redacted] for further detailed information. [redacted] is away and will be back on Friday Jan. 13, 2017
b) Received response from [redacted] and they have no comments.

3. Contact Information (to be verified)

Individual/Organization	Huron-Wendat Nation Council
Address	[redacted]
Contact Name	[redacted]
Telephone Number	[redacted]
Email	
Date	Jan. 11, 2017
Contacted by (signature)	

Hamilton

HAMILTON WATER

Public Works Department
Hamilton Water Division
Infrastructure Planning & Systems Design
77 James St N, Suite 400, Hamilton, ON L8R 2K3
Phone: 905.546.2424, ext. 4092 Fax: 905.546.4491
Email: Winston.wang@hamilton.ca

EA Phone Tracking Log

1. Project Summary Script:

The Ancaster Elevated Water Reservoir Class EA and Conceptual Design project is to identify and evaluate the alternative locations to permit the construction of an elevated water reservoir in Ancaster community. The alternative locations include the following:

- Jerseyville Rd. W and Martin Rd, Ancaster
- Garner Rd. W & Braithwaite Ave, Ancaster
- Fiddler's Green Rd. & Garner Rd. E, Ancaster
- Garner Rd. E & Southcote Rd., Ancaster
- Garner Rd. E & Raymond Rd., Ancaster

2. Questionnaire:

a). Did you receive a letter from the **City of Hamilton** regarding this Class EA project consultation to you or your organization? (**YES**) **NO**

b). Are you interested in continued participation in the consultation in the future?
YES (**NO**) ?

c). What are the concerns or interest you may have regarding this project?

They received the notice for comments and he will send the notice to the their review team for their review again. If they are any concerns, they will get back to the City by Friday Jan. 13, 2017

3. Contact Information (to be verified)

Individual/Organization	Six Nation Eco-Centre
Address	[redacted]
Contact Name	[redacted]
Telephone Number	[redacted]
Email	[redacted]
Date	Jan. 11, 2017
Contacted by (signature)	

Hamilton

HAMILTON WATER

Public Works Department
Hamilton Water Division
Infrastructure Planning & Systems Design
77 James St N, Suite 400, Hamilton, ON L8R 2K3
Phone: 905.546.2424, ext. 4092 Fax: 905.546.4491
Email: Winston.wang@hamilton.ca

EA Phone Tracking Log

1. Project Summary Script:

The Ancaster Elevated Water Reservoir Class EA and Conceptual Design project is to identify and evaluate the alternative locations to permit the construction of an elevated water reservoir in Ancaster community. The alternative locations include the following:

- Jerseyville Rd. W and Martin Rd, Ancaster
- Garner Rd. W & Braithwaite Ave, Ancaster
- Fiddler's Green Rd. & Garner Rd. E, Ancaster
- Garner Rd. E & Southcote Rd., Ancaster
- Garner Rd. E & Raymond Rd., Ancaster

2. Questionnaire:

a). Did you receive a letter from the **City of Hamilton** regarding this Class EA project consultation to you or your organization? **YES** **NO**

b). Are you interested in continued participation in the consultation in the future?
YES **NO**

c). What are the concerns or interest you may have regarding this project?

Called the organization and left a voice message regarding the project notification and comment request and still waiting for the organization's response.

3. Contact Information (to be verified)

Individual/Organization	[redacted]
Address	[redacted]
Contact Name	
Telephone Number	[redacted]
Email	
Date	Jan. 11, 2017
Contacted by (signature)	

Hamilton

HAMILTON WATER

Public Works Department
Hamilton Water Division
Infrastructure Planning & Systems Design
77 James St N, Suite 400, Hamilton, ON L8R 2K3
Phone: 905.546.2424, ext. 4092 Fax: 905.546.4491
Email: Winston.wang@hamilton.ca

EA Phone Tracking Log

1. Project Summary Script:

The Ancaster Elevated Water Reservoir Class EA and Conceptual Design project is to identify and evaluate the alternative locations to permit the construction of an elevated water reservoir in Ancaster community. The alternative locations include the following:

- Jerseyville Rd. W and Martin Rd, Ancaster
- Garner Rd. W & Braithwaite Ave, Ancaster
- Fiddler's Green Rd. & Garner Rd. E, Ancaster
- Garner Rd. E & Southcote Rd., Ancaster
- Garner Rd. E & Raymond Rd., Ancaster

2. Questionnaire:

a). Did you receive a letter from the **City of Hamilton** regarding this Class EA project consultation to you or your organization? **YES** **NO**

b). Are you interested in continued participation in the consultation in the future?
YES **NO**

c). What are the concerns or interest you may have regarding this project?

→ Called the organization and was directed to contact Land & Resources Department to see if they received notifications. Then she will call back.

3. Contact Information (to be verified)

Individual/Organization	Six Nation of the Grand River Territory
Address	[redacted]
Contact Name	
Telephone Number	[redacted]
Email	
Date	Jan. 11, 2017
Contacted by (signature)	

Hamilton

HAMILTON WATER

Public Works Department
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2. Questionnaire:

a). Did you receive a letter from the **City of Hamilton** regarding this Class EA project consultation to you or your organization? (**YES**) **NO**

b). Are you interested in continued participation in the consultation in the future?
YES **NO**

c). What are the concerns or interest you may have regarding this project?

Called the Department of Consultation and Accomodation. She will provide comments this afternoon or tomorrow.

3. Contact Information (to be verified)

Individual/Organization	Mississaugas of New Credit First Nation
Address	[redacted]
Contact Name	
Telephone Number	[redacted]
Email	
Date	Jan. 11, 2017
Contacted by (signature)	

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b). Are you interested in continued participation in the consultation in the future?
YES **NO**

c). What are the concerns or interest you may have regarding this project?

I called [redacted] for asking if their organization received the notice of PIC 2 for comments. They did not receive the notice due to staff change.

I forwarded another copy of notice, along with the response form and City's website information and asked them to provide response within one week

3. Contact Information (to be verified)

Individual/Organization	Association of Iroquois and Allied Indians
Address	[redacted]
Contact Name	[redacted]
Telephone Number	[redacted]
Email	[redacted]
Date	Jan. 11, 2017
Contacted by (signature)	D Wang

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2. Questionnaire:

a). Did you receive a letter from the **City of Hamilton** regarding this Class EA project consultation to you or your organization? **YES** **NO**

b). Are you interested in continued participation in the consultation in the future?
YES **NO**

c). What are the concerns or interest you may have regarding this project?

They received the Notice of PIC 2 and Response Form but they have no comments.

3. Contact Information (to be verified)

Individual/Organization	Hamilton Regional Indian Centre
Address	[redacted]
Contact Name	[redacted]
Telephone Number	[redacted]
Email	[redacted]
Date	Jan. 11, 2017
Contacted by (signature)	

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2. Questionnaire:

a). Did you receive a letter from the **City of Hamilton** regarding this Class EA project consultation to you or your organization? **YES** **NO**

b). Are you interested in continued participation in the consultation in the future?
YES **NO**

c). What are the concerns or interest you may have regarding this project?

Called the Executive Director of this organization and he will have a look. If they have anything or concerns, they will let the City know

3. Contact Information (to be verified)

Individual/Organization	The Metis Nation of Ontario
Address	[redacted]
Contact Name	[redacted]
Telephone Number	[redacted]
Email	
Date	Jan. 11, 2017
Contacted by (signature)	[signature]

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2. Questionnaire:

a). Did you receive a letter from the **City of Hamilton** regarding this Class EA project consultation to you or your organization? **YES** (**NO**)

b). Are you interested in continued participation in the consultation in the future?
YES (**NO**)

c). What are the concerns or interest you may have regarding this project?

I contacted [redacted] about the EA notifications regarding this project and she did not know about it and everything they received, they passed to the Council.

3. Contact Information (to be verified)

Individual/Organization	Metis Nation of Ontario Training Initiatives
Address	[redacted]
Contact Name	[redacted]
Telephone Number	[redacted]
Email	
Date	Jan. 12, 2017
Contacted by (signature)	[signature]

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b). Are you interested in continued participation in the consultation in the future?
YES **NO**

c). What are the concerns or interest you may have regarding this project?

1) Left a message to the voicemail of the Executive Director and waiting for response.

3. Contact Information (to be verified)

Individual/Organization	Niwasa Aboriginal Early Learning Program
Address	[redacted]
Contact Name	[redacted]
Telephone Number	[redacted]
Email	
Date	Jan. 12, 2017
Contacted by (signature)	

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2. Questionnaire:

a). Did you receive a letter from the **City of Hamilton** regarding this Class EA project consultation to you or your organization? **YES** **NO**

b). Are you interested in continued participation in the consultation in the future?
YES **NO**

c). What are the concerns or interest you may have regarding this project?

1) Left a voice message to [redacted] and wait for response.

3. Contact Information (to be verified)

Individual/Organization	Native Women's Centre
Address	[redacted]
Contact Name	[redacted]
Telephone Number	[redacted]
Email	
Date	Jan. 12, 2017
Contacted by (signature)	

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b). Are you interested in continued participation in the consultation in the future?
YES **NO**

c). What are the concerns or interest you may have regarding this project?

Called this organization and [redacted]
said they did not receive the notice & response
form. Asked them to send their comments
by early next week, if any.

3. Contact Information (to be verified)

Individual/Organization	Ontario Federation of Indian Friendship Centres
Address	[redacted]
Contact Name	
Telephone Number	[redacted]
Email	[redacted]
Date	Jan. 12, 2017
Contacted by (signature)	

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b). Are you interested in continued participation in the consultation in the future?
YES **NO**

c). What are the concerns or interest you may have regarding this project?

Called the organization and left a message to [redacted] and wait for response regarding this project

3. Contact Information (to be verified)

Individual/Organization	Sacajawea Non-Profit Housing Inc.
Address	[redacted]
Contact Name	[redacted]
Telephone Number	[redacted]
Email	
Date	Jan. 12, 2017
Contacted by (signature)	

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b). Are you interested in continued participation in the consultation in the future?
YES **NO**

c). What are the concerns or interest you may have regarding this project?

Called the organization and left a message for them to call back

3. Contact Information (to be verified)

Individual/Organization	Council of Ontario Chiefs
Address	[redacted]
Contact Name	[redacted]
Telephone Number	[redacted]
Email	
Date	Jan. 12, 2017
Contacted by (signature)	