York & Valley Road (HD016) Booster Water Pumping Station – Municipal Class Environmental Assessment Addendum

Appendices

City of Hamilton

60656498

September 2022

Delivering a better world

Statement of Qualifications and Limitations

The attached Report (the “Report”) has been prepared by AECOM Canada Ltd. (“AECOM”) for the benefit of the Client (“Client”) in accordance with the agreement between AECOM and Client, including the scope of work detailed therein (the “Agreement”).

The information, data, recommendations and conclusions contained in the Report (collectively, the “Information”):

- is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the “Limitations”);
- represents AECOM’s professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to AECOM which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context;
- was prepared for the specific purposes described in the Report and the Agreement; and
- in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time.

AECOM shall be entitled to rely upon the accuracy and completeness of information that was provided to it and has no obligation to update such information. AECOM accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared and, in the case of subsurface, environmental or geotechnical conditions, is not responsible for any variability in such conditions, geographically or over time.

AECOM agrees that the Report represents its professional judgement as described above and that the Information has been prepared for the specific purpose and use described in the Report and the Agreement, but AECOM makes no other representations, or any guarantees or warranties whatsoever, whether express or implied, with respect to the Report, the Information or any part thereof.

Without in any way limiting the generality of the foregoing, any estimates or opinions regarding probable construction costs or construction schedule provided by AECOM represent AECOM’s professional judgement in light of its experience and the knowledge and information available to it at the time of preparation. Since AECOM has no control over market or economic conditions, prices for construction labour, equipment or materials or bidding procedures, AECOM, its directors, officers and employees are not able to, nor do they, make any representations, warranties or guarantees whatsoever, whether express or implied, with respect to such estimates or opinions, or their variance from actual construction costs or schedules, and accept no responsibility for any loss or damage arising therefrom or in any way related thereto. Persons relying on such estimates or opinions do so at their own risk.

Except (1) as agreed to in writing by AECOM and Client; (2) as required by-law; or (3) to the extent used by governmental reviewing agencies for the purpose of obtaining permits or approvals, the Report and the Information may be used and relied upon only by Client.

AECOM accepts no responsibility, and denies any liability whatsoever, to parties other than Client who may obtain access to the Report or the Information for any injury, loss or damage suffered by such parties arising from their use of, reliance upon, or decisions or actions based on the Report or any of the Information (“improper use of the Report”), except to the extent those parties have obtained the prior written consent of AECOM to use and rely upon the Report and the Information. Any injury, loss or damages arising from improper use of the Report shall be borne by the party making such use.

This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

City of Hamilton

Prepared by:

KMK Consultants Limited
220 Advance Blvd.
Brampton, ON, L6T 4J5

Telephone: 905-459-4780
Fax: 905-459-7869

November 22, 2006

KMK Project No. 2590.01

1. INTRODUCTION

This Water and Wastewater Master Plan for the lake-based systems is a critical component in the integrated GRIDS process and provides the framework and vision for the water and wastewater servicing needs for the City into the future.

The purpose of the Integrated Water and Wastewater Master Plan for the Lake Based Systems is to provide the City with a water and wastewater servicing strategy in support of the preferred growth option identified by GRIDS Growth Related Integrated Development Strategy) and adopted by Council on May 24, 2006.

The Water and Wastewater Master Plan for the Lake Based System is comprised of three documents, namely:

- **Baseline and Optimization Report**: completed a review of the existing infrastructure and identified opportunities and constraints with respect to optimizing and servicing of future growth. This was a technical study that was used as one of the key inputs into the Integrated Water and Wastewater Master Plan for the Lake Based Systems.
- **Water and Waster Master Plan Policy Paper**: completed and endorsed by Council on May 11, 2005, provided a framework for planning water and wastewater infrastructure.
- **Integrated Water and Wastewater Master Plan for the Lake Based Systems**: followed the Municipal Class Environmental Assessment process which was integrated with the Transportation and Stormwater Master Plans through GRIDS.

This Master Plan Report, including all Appendices, is the documentation placed on public record for the Class EA review period.

1.1 STUDY AREA

The Study Area for this Master Plan consists of the existing lake-based water and wastewater servicing area, which extends to the Urban Boundary, plus any urban boundary expansion areas that are required to service the anticipated growth between the present date and 2031.

1.2 PROBLEM/OPPORTUNITY STATEMENT

The Problem/Opportunity Statement has been defined as:

- The Province, through its Place to Grow document, has identified the need to accommodate growth within the City of Hamilton.
- Water and wastewater infrastructure upgrades will be required to service areas already approved for development as well as future residential and non residential lands.
- Wastewater infrastructure upgrades will be required to address water quality concerns in Hamilton Harbour.

- Integration of planning, water/wastewater, transportation and stormwater processes will ensure implementation of a sustainable growth strategy and fulfill the City's goals identified in Vision 2020.

2. MASTER PLAN METHODOLOGIES

A number of tasks and evaluation requirements were undertaken as part of the Master Plan process unique to the City of Hamilton.

Under any Master Plan, the methodology for analyzing planning information, developing water demands and wastewater flows and modeling the systems needs to be developed to best serve the proponent.

These activities included:

- Development of a data management strategy for population projections
- Updating the City's existing water and wastewater system models for the evaluation of alternative strategies, and for on-going use by the City in the future
- Development of infrastructure unit costs to enable comparative evaluation of alternatives, and
- Evaluation of the servicing alternatives.

2.1 EVALUATION CRITERIA

Information on each of the servicing alternatives was developed to enable a comparative evaluation of impacts, and selection of a preferred alternative. The factors considered generally matched the Triple Bottom Line (TBL) evaluation approach approved for GRIDS:

- Physical and Natural Environment:
- Social, Economic, and Cultural Environment:
- Financial Factors:
- Technical Factors:

2.2 TECHNICAL CRITERIA AND GUIDELINES

Due to the nature of the City of Hamilton's water and wastewater systems and the location of the system and facilities on Lake Ontario and specifically the Hamilton Harbour, there are provincial technical guidelines relevant to the evaluation of the servicing strategies. Principle guidelines for the design criteria and water quality objectives primarily related to the wastewater system are:

- Procedure F-5-5, a supporting document for the Provincial Guideline F-5 "Levels of Treatment for Municipal and Private Sewage Treatment Works Discharging to Surface Waters"
- The Remedial Action Plan for the Hamilton Harbour (HHRAP).

These principal guidelines have been incorporated into the overall servicing evaluation being undertaken as part of the City of Hamilton Water and Wastewater Master Plan. Under the Master Plan, the goals related to strategies for wastewater servicing, wet weather control and wastewater treatment include:

- Provide capacity to service projected growth
- Maximize volume to be treated through full secondary and tertiary treatment
- Reduce discharge of untreated combined sewer overflow
- Endeavour to meet and achieve HHRAP loading targets and MOE Procedure F-5-5.

3. PLANNING PROJECTIONS

3.1 EXISTING AND FUTURE PLANNING DISTRICTS

The provincial projections under Places to Grow for Hamilton in 2031are as follows:

- Hamilton's residential populations will reach 660,000
- There will be 80,000 more households, with 58,400 within the existing urban boundary
- Hamilton will employ 90,000 more people
- There will be an additional 1050 gross hectares of employment land.

The preferred growth option developed through the GRIDS process is generally based on the nodes and corridors concept. The primary growth areas include the Elfrida node located in the southwest mountain and the airport lands. This option also includes selected intensification located primarily along corridors in the central mountain and downtown core.

The projected population and employment statistics are presented in Table ES-1.

Table ES-1 Growth Projections

	Population Projections		Jobs Projections	
	2001	**2031**	**2001**	**2031**
Existing Urban Boundary	471,958	594,795	195,718	286,318
Urban Boundary Expansion Areas	0	41,558	0	16,085
Total Urban	471,958	636,353	195,718	302,403
Total Rural	33,844	32,064	9,194	6,502
GRAND TOTAL HAMILTON	505,802	668,417	204,912	308,905

4. WATER TREATMENT AND DISTRIBUTION

4.1 EXISTING SYSTEM

The existing water system for the study areas consists of the Woodward Ave. WTP, a series of water pumping stations, reservoirs, elevated storage tanks and the distribution system. Based on the change in topography (including the Niagara Escarpment) and the wide geographical service area, numerous Pressure Districts have been established to maintain adequate levels of service.

The water system is set up to pump water through the Pressure Districts to the limits of the system. The transmission of water to each pumping station and reservoir is not provided through dedicated transmission mains but is conveyed through larger diameter trunk watermains. In some Pressure Districts, multiple trunk watermains distribute flow through the system.

The existing water system has two primary feedermains up the escarpment to service the Mountain areas. There is also one feedermain up the escarpment to service Waterdown.

The City water system also takes advantage of the change in topography by providing in-ground and at-grade reservoir storage to service the Pressure Districts in the central and northern areas. Based on historical City standards, the City of Hamilton water system has a large amount of storage available for supply (both floating storage and suction-side storage for pumping), equalization of system flows and pressures, and emergency conditions.

5. DEVELOPMENT AND EVALUATION OF WATER SERVICING ALTERNATIVES

5.1 DEVELOPMENT OF ALTERNATIVES

In general, the overall objectives for the development of water servicing alternatives are:

- Provide high level of service to existing users and approved growth
- Provide security of supply
- Review and mitigate impacts to natural, social and economic environments
- Best meet policy statements
- Ensure servicing meets the technical criteria
- Endeavour to optimize existing infrastructure
- Ensure the strategies are cost-effective and evaluate the life-cycle costs of the infrastructure.

The preliminary evaluation of the long list of alternatives led to the development of several water servicing alternatives. Due to the independent servicing needs in different areas of the City of Hamilton water system, the study area was divided into multiple servicing areas to more clearly evaluate the alternatives. The evaluation within each servicing area was then integrated to ensure the comprehensive preferred solution met all objectives system wide.

Four primary water servicing alternatives were developed to address the water treatment and distribution requirements for the study area. These are outlined in Table ES-2.

Table ES-2 Water Servicing Alternatives

Servicing Area	Alternative ID	Description
Waterdown	W-WS-3	Upgrade pumping capacity at the existing HD016 pumping station, and construct elevated storage
	W-WS-4a	Upgrade pumping station capacity at the existing HD016 pumping station, and construct additional storage in the Kelly Street area
	W-WS-4b	Upgrade pumping capacity at the existing HD016 pumping station and construct new reservoir and pumping station in the Kelly Street area
	W-WS-5	Upgrade HD016 pumping station and construct new reservoir on-site
	W-WS-6	Expand HD016 pumping station and construct new pumping station and reservoir southwest of Waterdown
Southeast Mountain	SEM-WS-1	Service growth area entirely from HD007 New elevated tank for storage, security and operational flexibility
	SEM-WS-2	Service growth area from HD007 and HD006B with new Pressure District 7 pumps New elevated tank for storage, security and operational flexibility
	SEM-WS-3	Service growth area from HD007 and new PD7 pumping station Provide all storage as pumped storage from suction side reservoirs
Airport Lands	AL-WS-1	Service lands from Pressure Districts 6 and 18 Minimize Pressure District 18 service area New elevated tank for storage, security and operational flexibility
	AL-WS-2	Service lands from Pressure Districts 6 and 18 Increased Pressure District 18 service area New elevated tank for storage, security and operational flexibility
Escarpment Crossing	EC-WS-1	Centennial Parkway Feedermain to HD007
	EC-WS-2	Centennial Parkway Feedermain to HD06B
	EC-WS-3	Upper Wellington Feedermain
	EC-WS-4	Beckett Drive Feedermain
	EC-WS-5	Feedermain from HDR02 to Scenic Drive

5.2 SELECTION OF THE PREFERRED ALTERNATIVES

5.2.1 Waterdown Water Servicing

Alternative W-WS-3 is preliminarily selected as the preferred servicing alternative for the Airport Lands, with the following rationale:

- It carries the lowest environmental impact of the alternatives considered;
- It carries a smaller overall land requirement;
- It is the most economical of the options considered;
- The proposed elevated tanks provide increased security of supply, operation flexibility, and efficiency.

5.2.2 Southeast Mountain Water Servicing

Alternative SEM-WS-2 is preliminarily selected as the preferred servicing alternative for the Airport Lands, with the following rationale:

- It carries the lowest capital cost of the three Southeast Mountain alternatives;
- It makes use of the available site capacity that currently exists in station HD06B; and,
- It provides security of supply through construction of a new elevated tank, and the addition of a second supply point.

5.2.3 Airport Lands Water Servicing

Alternative AL-WS-1 is preliminarily selected as the preferred servicing alternative for the Airport Lands, with the following rationale:

- Servicing the Airport Lands through District 6 eliminates the need to upgrade pumping stations servicing District 18.
- This alternative carries the lower capital cost.

5.2.4 Escarpment Crossing Water Servicing

Alternative EC-WS-2 is preliminarily selected as the preferred servicing alternative for the escarpment crossing, with the following rationale:

- There will be a need to reconstruct Centennial Parkway following completion of the Red Hill Valley Expressway. This provides an opportunity to install new trunk water and wastewater servicing while minimizing the impacts to the natural and socio-cultural environments.

5.2.5 Schedule ‘B’ Projects Included in the Preferred Water Servicing Alternatives

Table ES-3 presents a list of the Schedule ‘B’ water servicing projects, identified through the master planning process.

Table ES-3 Schedule 'B' Water Servicing Projects

Schedule 'B' Project	Location
Waterdown North Elevated Tank	Waterdown
New HD16A Pumping Station	Waterdown
Parkside Drive Watermain	Waterdown
HD12A – Governor's Rd. Pumping Station Upgrades	Dundas
Waterdown South Elevated Tank	Waterdown
New HD03B – Highland Gardens Pumping Station	Hamilton
HD007 Highland Pumping Station Upgrades and Reservoir Expansion	Hamilton Mountain
Centennial Trunk Feedermain	Hamilton/Hamilton Mountain
Pressure District 18 Elevated Tank	Ancaster
HD002 Ferguson Pumping Station Upgrades (Standby Power)	Hamilton
HD012 Lynden Ave Pumping Station Upgrades	Dundas
HD019 Binbrook/Hwy 56 Pumping Station Upgrades	Binbrook
HD06B Tunbridge Pumping Station Upgrades (New Zone 7 pumps - HD07A)	Hamilton Mountain
Pressure District 7 Elevated Tank in growth node	Hamilton Mountain
Stone Church Trunk Feedermain	Hamilton Mountain
HD016 Trunk Feedermain	Dundas to Waterdown
HD016 York/Valley Rd Pumping Station Upgrades	Dundas
HD05A Greenhill Pumping Station Upgrades	Hamilton
Binbrook Trunk Feedermain	Hamilton Mountain/Binbrook

6. WASTEWATER COLLECTION AND TREATMENT

The City of Hamilton wastewater system consists of combined sanitary/stormwater service areas and separated sanitary service areas. The combined system is generally located in the downtown core and northern sections of the Hamilton Mountain while the separated systems lie at the outer limits of the network.

There are three wastewater treatment plants; Woodward Avenue Wastewater Treatment Plant; The King Street (Dundas) Wastewater Treatment Plant; and the Main Street (Waterdown) Wastewater Treatment Plant.

The Woodward Ave. WWTP catchment area consists generally of the downtown and mountain areas of Hamilton including Ancaster and Stoney Creek. The topography of this catchment area typically falls south to north with the Niagara Escarpment as a significant topographical feature dividing the area. However, at the southern and western limits of the catchment areas, the topography begins to fall southerly and as such, there are a number of sewage pumping stations which convey flows back to the gravity system.

Within the combined sewer system, there are also numerous wet weather control devices including weirs, gates and combined sewer overflows and tanks.

Since the late 1990's, the City has systematically constructed CSO storage tanks, that collect wastewater during wet weather periods, resulting in reduced flow into the system and fewer and smaller system bypasses. CSO storage facilities in the City's system are presented in Table ES-4.

Table ES-4 CSO Storage Facilities - Existing and Under Construction

Tank	Date	Volume (m3)	System
Greenhill #1	1988	83,500	Fennell/RHCSI
Bayfront Park	1993	21,000	Western Interceptor
James Street	1993	3,200	Western Interceptor
Main/King	1997	77,100	Western Interceptor
Eastwood Park	1997	27,350	Western Interceptor
Greenhill #2	2003	66,750	Fennell/RHCSI
Royal	under construction	15,000	Western Interceptor
Ewen	Pending	5,935	Western Interceptor
Red Hill Valley	under construction	14,200 (in-line)	Red Hill Creek Sanitary Interceptor

During periods of wet weather, excess flows will enter the CSO tanks and fill the tanks. Where there are no tanks, excess flow bypasses the treatment system at CSO structures.

The weirs and gates are designed to capture as much wet weather flow as possible within the system or divert to overflow to prevent system surcharging and basement flooding.

The Dundas wastewater system consists primarily of separated service areas. The system conveys flows by gravity from the west to east to the Dundas plant. There is also provision for any excess flows beyond the plant capacity to enter a diversion structure which can convey flows to the Woodward Ave. WWTP.

The Waterdown wastewater system consists of three primary service areas: the core area which drains by gravity to the Waterdown WWTP; the western service area which drains by gravity down the Borer's Creek trunk sewer to the Dundas diversion structure and ultimately to the Woodward Ave. WWTP; the eastern service area which is pumped across to the western service area and ultimately to Borer's Creek trunk sewer.

7. DEVELOPMENT AND EVALUATION OF WASTEWATER SERVICING ALTERNATIVES

7.1 DEVELOPMENT OF ALTERNATIVES

The preliminary evaluation of the long list of alternatives led to the development of several wastewater servicing alternatives. Due to the independent servicing needs in different areas of the City of Hamilton wastewater system, the study area was divided into multiple servicing areas to more clearly evaluate the alternatives. The evaluation within each servicing area was then integrated to ensure the comprehensive preferred solution met all objectives system wide.

A number of servicing options were developed for providing wastewater treatment capacity for the urban buildout scenario. Servicing alternatives were developed for the following key servicing issues:

- Wastewater servicing within the former Towns of Waterdown and Dundas
- Southeast Mountain urban boundary expansion area, which also includes lands already approved for development through ROPA 9
- Airport Lands urban boundary expansion area
- Combined Sewer Overflow (CSO) control.

The wastewater servicing alternatives are presented in Table ES-5.

Table ES-5 Wastewater Servicing Alternatives

Servicing Area	Alternative ID	Description
Waterdown-Dundas Servicing	WD-WWS-1	The existing servicing areas remain unchanged Central Waterdown serviced through an expanded Waterdown WWTP North and South Waterdown and all of Dundas serviced through an expanded Dundas WWTP
	WD-WWS-2	Decommission Waterdown WWTP, and send all Waterdown flows through the Dundas diversion structure to the Woodward Avenue WWTP. Do nothing at Dundas WWTP, and send excessive flows through the Dundas diversion structure to the Woodward Avenue WWTP.
	WD-WWS-3	Decommission Waterdown WWTP, and send all Waterdown flows to an expanded Dundas WWTP.
	WD-WWS-4	Decommission Waterdown and Dundas WWTPs, and send all Waterdown and Dundas flows through an expanded Dundas diversion structure to the Woodward Avenue WWTP.
Southeast Mountain	SEM-WWS-1	Pump the flows from the Southeast Mountain servicing area to the Red Hill Creek Interceptor System.
	SEM-WWS-2	Service the Southeast Mountain servicing area through a new Centennial Parkway trunk sewer to the Eastern Interceptor System.
Airport Lands	AL-WWS-1a	Collect flows at a single pumping station in the south of the Airport Lands; pump through Ancaster to the Western Interceptor System.
	AL-WWS-1b	Collect flows at a pumping station in the south of the Airport Lands and an intermediate station in the middle of the Airport Lands; pump through Ancaster to the Western Interceptor System.
	AL-WWS-2	Collect flows at a single pumping station in the south of the Airport Lands; pump along Highway 6 to the Red Hill Creek Interceptor system.
	AL-WWS-3	Collect flows at a single pumping station in the south of the Airport Lands; pump along Highway 6 to a new gravity trunk along Dickenson Road and Centennial Parkway to the Eastern Interceptor system.

Servicing Area	Alternative ID	Description
CSO Control	CSO-WWS-1	Construct additional CSO tanks at the remaining uncontrolled outfalls in order to meet Procedure F-5-5 system-wide.
	CSO-WWS-2	Construct additional conveyance capacity in order to reduce the number of CSO events, and instead treat those flows at the expanded Woodward Avenue WWTP.

7.2 SELECTION OF THE PREFERRED ALTERNATIVES

7.2.1 Waterdown/Dundas Wastewater Servicing

Alternative WD-WWS-2 is preliminarily selected as the preferred servicing alternative for Waterdown and Dundas, with the following rationale:

- This alternative addresses the existing capacity issues at the Waterdown WWTP, while minimizing the new infrastructure requirements
- This alternative makes the most effective use of existing treatment capacity, without triggering an expansion of an aging plant
- Because the peak flows to the Western Interceptor will not change, this alternative will have little downstream impacts
- Because there are no major infrastructure upgrades required, this alternative will allow for earlier development in Waterdown than the other alternatives considered
- This alternative carries the lowest capital cost of the alternatives considered.

7.2.2 Southeast Mountain Wastewater Servicing

Alternative SEM-WWS-2 is preliminarily selected as the preferred servicing alternative for the Southeast Mountain, with the following rationale:

- This alternative has the lowest potential environmental impacts.
- The need for a pumping station is eliminated.
- This alternative makes use of existing reserve capacity within the Eastern Sanitary Interceptor and the Battlefield Trunk Sewer.
- This other alternative would have added the wastewater flows from a separated system to existing combined systems (the Red Hill Creek Sanitary Interceptor).
- This alternative presents an opportunity to remove additional separated sewer flow from the Red Hill Creek Sanitary Interceptor, mitigating some of the existing capacity limitations. It would also be able to service future development of the South Mountain, such as the existing business park or a future expansion of the urban boundary outside of the current planning horizon.

- This alternative carries a 33 percent lower capital cost than Alternative SEM-WWS-1, and eliminates the annual operational costs associated with the sewage pumping station.

7.2.3 Airport Lands Wastewater Servicing

Alternative AL-WWS-3 is preliminarily selected as the preferred servicing alternative for the Airport Lands, with the following rationale:

- This alternative has the lowest potential environmental impacts.
- The total forcemain length is minimized
- This alternative makes use of existing reserve capacity within the Eastern Sanitary Interceptor.
- The other alternatives would have added the wastewater flows from a separated system to existing combined systems (either the Western Sanitary Interceptor or the Red Hill Creek Sanitary Interceptor), which the City wishes to avoid.
- This alternative presents an opportunity to remove additional separated sewer flow from the RHCSI, mitigating some of the existing capacity limitations. It would also be able to service future development of the South Mountain, such as the existing business park or a future expansion of the urban boundary outside of the current planning horizon.
- While the capital cost of Alternative AL-WWS-3 is approximately 20 percent higher than the Ancaster alternatives, this should be mitigated by the decreased annual pumping costs.

7.2.4 Combined Sewer Overflow Control

Based on the City's commitment to F-5-5, and the results of the modelling exercises to date, the preferred solution will incorporate the optimum balance of collection system and treatment plant upgrades.

The range of collection system upgrades should consider, but not be limited to, the following CSO control options:

- Local improvements to control structures
- Construction of additional CSO tanks
- Constructing additional conveyance capacity.

The analysis of the collection system upgrades is being coordinated with the analysis of upgrade requirements at the Woodward Ave. WWTP for capacity and level of treatment.

Given that the wastewater treatment plant upgrades and some of the potential collection system upgrades are subject to further requirements of the Class EA process, it is determined that the optimum balance of system upgrades be established through the follow on Phases 3 and 4.

7.2.5 Schedule 'B' Projects included in the Preferred Wastewater Servicing Alternatives

Table ES-6 presents a list of the Schedule 'B' wastewater servicing projects, identified through the master planning process.

Table ES-6 Schedule 'B' Wastewater Servicing Projects

Schedule 'B' Project	Location
HC018 - Twenty Road SPS Upgrade and Twin Forcemain	Hamilton Mountain
Mountain Brow Trunk Sewer	Waterdown
DC014 - First Street SPS	Waterdown
Hwy 403 Trunk Sewer Twinning - Royal to Main-King	Hamilton
Ancaster-to-Fennell Trunk Sewer Twinning	Hamilton Mountain
Centennial Trunk Sewer	Hamilton/Hamilton Mountain
HC058 - Binbrook SPS Upgrade	Binbrook
HC056 - Green Road SPS Upgrade and Twin Forcemain	Stoney Creek
Decommission Waterdown WWTP	Waterdown
New Waterdown SPS and Forcemain at WWTP	Waterdown
Airport Lands SPS and Hwy 6 Forcemain	Hamilton Mountain
Hwy 6 Trunk sewer	Hamilton Mountain
Decommission Harmony Hall SPS	Ancaster
Dickenson Road trunk sewer	Hamilton Mountain
Dickenson Road SPS and Forcemain	Hamilton Mountain
HC053 – New Shaver Road SPS	Ancaster
HC002 – Scenic SPS Upgrade	Hamilton Mountain
HC011 – Calvin Street SPS Upgrade	Ancaster

8. IMPLEMENTATION

The preferred servicing strategies will support the short and long term servicing needs of the approved growth areas as well as addressing Hamilton Harbour water quality and provide flexibility for servicing potential growth areas in the future.

Under the Municipal Class EA, the Schedule A projects are pre-approved and may proceed to implementation. Upon completion of the master plan or Phase 2 of the EA process, Schedule B may proceed to Phase 5, Implementation, subject to finalization of the 30 day review period and assuming no Part II Orders (bump ups) are received. Schedule C projects must complete Phases 3 & 4 of the EA process prior to proceeding to implementation.

City Staff have discussed the interdependencies of the work at the Woodward Avenue WWTP and the proposed CSO and conveyance upgrades with primary equivalency treatment at either the Woodward Avenue WWTP or at a remote location with Ministry of Environment (MOE) staff. There has been consensus reached with MOE during the Master Plan process to allow the City to proceed beyond Phase 1 and 2 based on the preferred servicing solution for the combined sewer overflow control. The preferred solution will be developed through fulfilling the Class EA Phase 3 and 4 requirements for both undertakings. This study process will include the review and selection of a preferred design alternative.

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

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1. INTRODUCTION

1.1 BACKGROUND

The City of Hamilton is one of a number of Municipalities in the Greater Golden Horseshoe Area situated around the south western end of Lake Ontario and one of the fastest growing regions in North America. By 2031, the population of this area is forecasted to grow by an additional 3.7 million (from 2001) to 11.5 million people, accounting for over 80 percent of Ontario s population growth. This new growth will require 1.75 million new homes and 1.7 million additional jobs.

Ready and accessible public infrastructure is essential to the viability of existing and growing communities. Infrastructure planning, land use planning and infrastructure investment require close integration to ensure efficient, safe and economically achievable solutions to providing the required water and wastewater infrastructure.

The City of Hamilton has developed goals to blend the economic and social activities of a growing City with the preservation and protection of natural areas and resources through a sustainable approach to land management. This approach was initiated by the former Regional Municipality of Hamilton-Wentworth, now the City of Hamilton through strategic policies generated through VISION 2020, Building A Strong Foundation (BASF) and its Growth Related Integrated Development Strategy (GRIDS).

GRIDS brings together into one process, all of the activities related to development. This enables a more coordinated, time efficient and cost efficient investment process for the public and private sectors.

This Water and Wastewater Master Plan for the lake-based systems is a critical component in the integrated GRIDS process and provides the framework and vision for the water and wastewater servicing needs for the City into the future.

1.2 GRIDS PROCESS

In 2003, the City of Hamilton initiated the Growth Related Integrated Development Strategy study, known as GRIDS.

The Growth Related Integrated Development Strategy, or GRIDS, is a made-in-Hamilton balanced growth strategy. The purpose of GRIDS is to identify the most ideal places for growth and the type of growth based on environmental priorities, social issues, economic opportunities and population studies as well as to identify strategies to fund the servicing of these areas.

The City of Hamilton has undertaken GRIDS to help determine where the future growth of the City will take place over the next thirty years. This unique approach integrates land use, transportation, water/wastewater and stormwater planning into one project. GRIDS is intended to reflect the principles of Smart Growth, creating compact, affordable and liveable communities. GRIDS was developed concurrently with the Province s Places to Grow initiative, and reflects the requirements contained in that document.

GRIDS is being co-ordinated under Building A Strong Foundation , to ensure that sustainable thinking prevails in decisions. Citizens of Hamilton helped to establish an interrelated set of directions for accommodating new people and jobs in a way that supports the City's Vision. These directions are the starting point for Hamilton's 30-year growth strategy, GRIDS.

GRIDS is focused on the urban areas of the City of Hamilton. A parallel process for the rural areas is also being undertaken as part of the development of a new Official Plan. These processes recognize that rural and urban land use planning are not mutually exclusive, but rather both are interrelated. Both urban and rural areas are part of this water and wastewater master plan study.

The GRIDS process involved three distinct steps:

- Development and evaluation of growth concepts
- Development and evaluation of growth options
- Refinement of the preferred growth option.

Three comprehensive infrastructure Master Plans including this Water and Wastewater Master Plan Study provided critical input to the identification and evaluation of growth options to enable the full understanding and consideration of infrastructure requirements, costs and impacts associated with growth.

1.3 MASTER PLAN GOALS AND OBJECTIVES

The approach and goals of the City of Hamilton s Master Planning process is summarized in the following steps:

1. Complete a baseline review of the existing water and wastewater systems

   Where Are We Now

2. Develop water and wastewater policies to provide guidelines to the process and to the development/evaluation of servicing strategies

   What We Should Plan For

3. Complete and document the study and selection of the preferred solutions within the Class Environmental Assessment process for Water and Wastewater Master Plans

   Presenting the Details of our Recommendations

4. Develop sound water and wastewater servicing strategies which are cost effective, optimize existing infrastructure, minimize impact to or enhance the natural, social and economic environments, and meet the technical service requirements

In completing this approach, key objectives to be satisfied include:

- Develop several alternatives for servicing
- Evaluate the servicing alternatives against environmental and technical criteria
- Establish preferred long-term servicing strategies to meet the servicing needs of the existing system and approved growth
- Complete the process with extensive public and agency participation
- Document the process and provide sufficient technical information for the City to move forward and implement the system improvements
- Clearly identify the needed water and wastewater infrastructure and detail the capital and implementation plan.

1.4 MASTER PLAN REPORT OUTLINE

This Master Plan Class EA Report documents the planning and design process followed and conclusions reached for the City of Hamilton Water and Wastewater Master Plan Class Environmental Assessment.

This Master Plan Class EA Report forms part of the overall deliverables for the Master Plan project. Based on the approach followed, the documentation has been prepared as described below:

Report 1 Baseline Conditions (under separate cover)

The Baseline Conditions Report summarizes the inventory and evaluation of the current water and wastewater systems. The Baseline Conditions tasks included:

- Defining design criteria for the water and wastewater systems
- Identification of opportunity and constraint areas in the systems such as facilities with available capacity or identification of service areas with lower levels of service
- Computer modelling of the systems

Report 2 Policy Paper (under separate cover)

The Policy Paper Report summarizes the process completed for developing and endorsing water and wastewater policies which provide direction and guidelines for development, evaluation and implementation of servicing strategies.

Report 3 Water and Wastewater Master Plan Class EA Report

The Water and Wastewater Master Plan Class EA Report, including all Appendices, forms part of the comprehensive Report 3. Report 3, including Appendices, is the documentation placed on public record for the Class EA review period.

This report contains and describes all required phases of the planning process and incorporates the procedure considered essential for compliance with the Environmental Act.

This Report contains the following sections:

1. Introduction and Background provision of relevant information leading to the initiation of this study
2. Master Planning Process description of the Class EA Master Planning process
3. Problem/Opportunity Statement definition of the problem/opportunity needing to be addressed under this study and presentation of baseline planning information
4. Master Plan Methodologies description of the approach, specific tasks and relevant background information unique to the completion of the City of Hamilton Master Plan
5. Existing Conditions description of the natural and social environments within the City of Hamilton
6. Planning Scenarios description of the preferred growth option and relation to existing service areas

Water

7. Existing Water System description of the existing water system operating philosophy and trunk infrastructure

8. Water Design Criteria definition of the design criteria used for the water system

9. Development of Water Servicing Alternatives description of the rationale and methodology for developing and evaluating water servicing alternatives

10. Evaluation of Water Servicing Alternatives presentation of the evaluation process for the short listed water servicing alternatives

Wastewater

11. Existing Wastewater System description of the existing wastewater system operating philosophy and trunk infrastructure

12. Wastewater Design Criteria definition of the design criteria used for the wastewater system including plants, conveyance and analysis approaches

13. Development of Wastewater Servicing Alternatives description of the rationale and methodology for developing and evaluating wastewater servicing alternatives

14. Evaluation of Wastewater Servicing Alternatives presentation of the evaluation process for the short listed wastewater servicing alternatives

15. Preferred Servicing Strategies description of the preferred water and wastewater servicing strategies

16. Implementation description of overall implementation considerations and closing

17. Implementation description of general implementation requirements

18. References

Appendix A Project and Implementation Data (attached to this report)

Contains relevant project , implementation and analysis information

Appendix B Public Consultation (under separate cover)

Contains all relevant documentation of the public consultation process including notices, comments and responses and distributed information

Appendix C PIC Documentation (under separate cover)

Contains all presentation material from all Public Information Centres (PICs) held during the process

Appendix D Agency Consultation (under separate cover)

Contains all presentation material and discussion information from topical workshops held with relevant agency and approval bodies

Report 4 Master Plan Implementation Report (under separate cover)

This report provides additional project information including project data sheets and schedules to support City staff in implementing the preferred servicing strategies.

2. MASTER PLANNING PROCESS

The Municipal Class Environmental Assessment process clearly defines approaches for completion of Master Plans within the Class Ea context. The City of Hamilton has prepared this Master Plan based on Approach 2 which involves preparing a Master Plan document at the conclusion of Phases 1 and 2 in order to fulfil the requirements for Schedule B projects. Any Schedule C projects identified would continue to fulfil Phases 3 and 4.

2.1 CLASS ENVIRONMENTAL ASSESSMENT PROCESS

This section describes the environmental assessment process and the specific requirements for the preparation of master plans.

2.1.1 Environmental Assessment Act

Ontario s Environmental Assessment Act (EA Act) was passed in 1975 and proclaimed in 1976. The EA Act requires proponents to examine and document the environmental effects which might result from major projects or activities and their alternatives. Municipal undertakings became subject to the Act in 1981.

The Act defines the environment broadly as:

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

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

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

a) a description of the purpose of the undertaking

- i The undertaking
- ii The alternative methods of carrying out the undertaking
- iii Alternatives to the undertaking.

b) a description of:

  i 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.

  ii 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.

  iii 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.

c) 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 (RSO 1990, c. 18, s.2).

2.1.2 Principles of Environmental Planning

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

1. 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.

2. Consideration of a reasonable range of alternatives. Alternatives include functionally different solutions, alternatives to the proposed undertaking and alternative methods of implementing the preferred solution. The do nothing alternative must also be considered.

3. 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.

4. 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 to the evaluation of alternative methods .

5. Provision of clean and complete documentation of the planning process followed, to allow traceability of decision-making with respect to the project. The planning process must be documented in such a way that is may be repeated with similar results.

2.1.3 Class Environmental Assessment

Class Environmental Assessments (Class EAs) were approved by the Minister of the Environment in 1987 for municipal projects having predictable and mitigatable impacts. The municipal Class EAs were revised and updated in 1993 and again in 2000. 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
- Responsive to mitigation.

The Municipal Class Environmental Assessment, prepared by the Municipal Engineers Association (June 2000), outlines the procedures to be followed to satisfy EA requirements for water, wastewater and road projects. 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.

Public and agency consultation are integral to the Class EA planning process.

Projects subject to the Class EA process are classified into three possible schedules, depending on the degree of expected impacts. Schedule A projects are minor, operational and maintenance activities and are approved without the need for further assessment. Schedule B projects require a screening of alternatives for their environmental impacts and Phases 1 and 2 of the planning process must be completed.

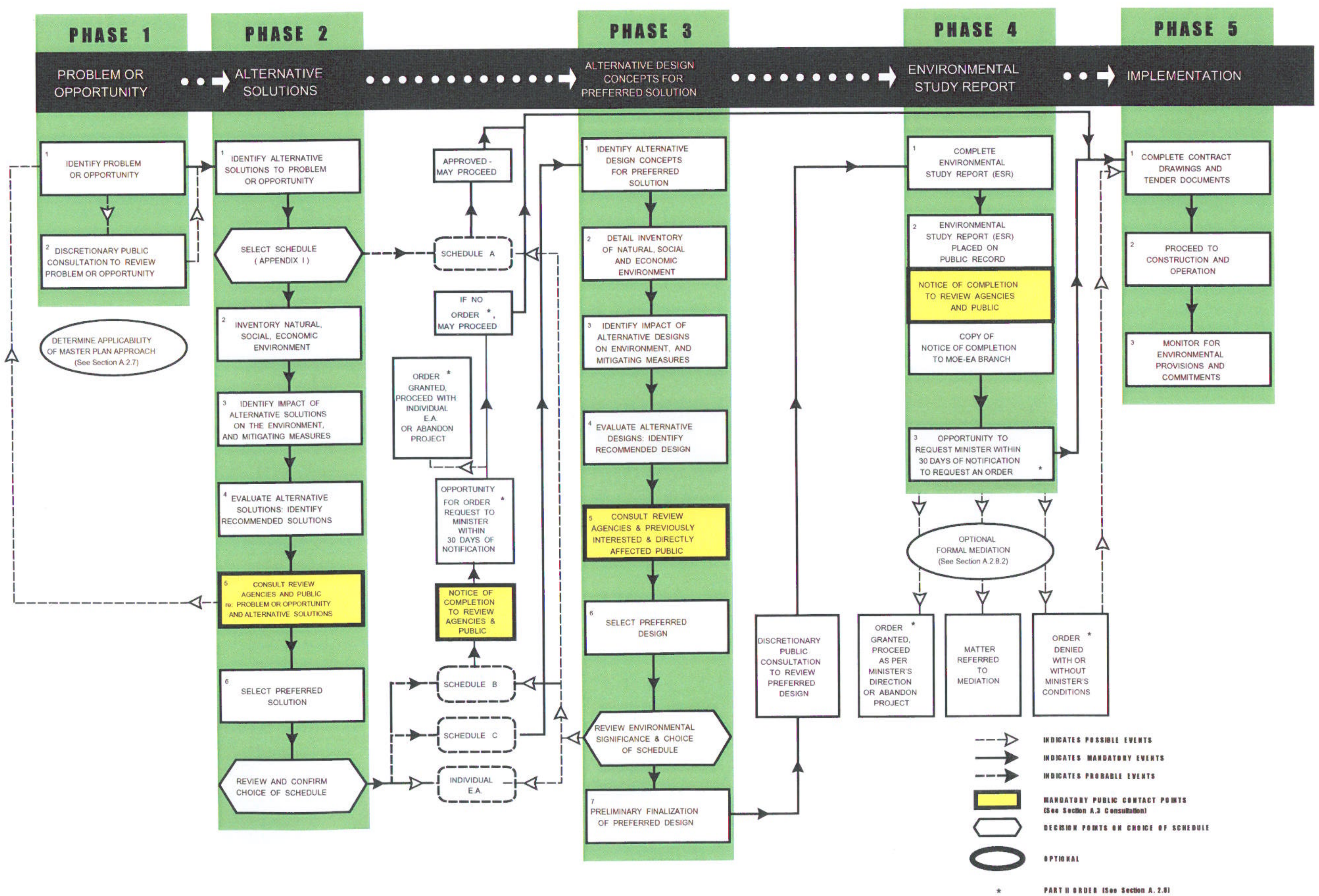
Provided no significant impacts are identified and no requests for a Part II order to a Schedule C or Individual Environmental Assessment are received, Schedule B projects are approved and may proceed directly to implementation. If outstanding issues remain after the public review period, any party may request that the Minister of the Environment consider bumping-up the project to an Individual EA.

Schedule C projects must satisfy all five phases of the Class EA planning process. These projects have the potential for greater environmental impacts. Phase 3 involves the assessment of alternative methods of carrying out the project, as well as public consultation on the preferred conceptual design. Phase 4 normally includes the preparation of an Environmental Study Report which is filed for public review. Provided no significant impacts are identified and no requests for bump-up to an Individual Environmental Assessment are received, Schedule C projects are then approved and may proceed directly to implementation.

The Class EA process flowchart is provided in Figure 1.

EXHIBIT A.2 MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS

NOTE: This flow chart is to be read in conjunction with Part A of the Municipal Class EA



Hamilton

BUILDING A STRONG FOUNDATION HAMILTON

Integrated Water & Wastewater Master Plan

Municipal Class EA Planning and Design Process

KMK Consultants Limited

Figure 1

Nov 10, 2006

N/A

2590-D-70

Master Planning Process

Municipalities recognize the benefits of comprehensive, long-range planning exercises that examine problems and solutions for an overall system of municipal services. The Municipal Class EA for Water and Wastewater Projects recognizes the importance of master plans as the basis for sound environmental planning. The Class EA defines master plans as:

> Long range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles. These plans examine an infrastructure system(s) or group of related projects in order to outline a framework for planning for subsequent projects and/or developments.

Master plans have distinguishing features that set them apart from project specific studies. These features include the following:

- Master plans are broad in scope and focus on the analysis of a system for the purpose of outlining a framework for the provision of future works and developments.
- Specific projects recommended in a master plan are part of a larger management system and are distributed geographically throughout the study area. The implementation of specific projects may occur over an extended time frame.

According to the Class EA document, a master plan must <u>at least</u> satisfy the requirements of Phases 1 and 2 of the Class EA process and incorporate the five key principles of environmental planning, as identified in Section 2.1. It is intended that the Hamilton Water/Wastewater Master Plan meet these requirements. The master plan must document public and agency consultation at each phase of the process and a reasonable range of alternative solutions must be identified and systematically evaluated.

2.2 CONSULTATION AND COMMUNICATION

At the outset of the Master Plan process, a Public Consultation Plan was developed. The activities that were undertaken as part of the process are described in the following sections and are considered critical and required under the Class EA Master Planning process.

Full documentation of the consultation and communication program is contained in the appendices to this report.

2.2.1 Public Access to Information

At the onset of the project, the City developed a website (www.gridsmasterplans.com), where all project publications, presentation materials and other documentation has been made available to the general public. Notices of upcoming Public Information Centres (PICs) and other project milestones were also posted on this website.

For those without Internet access, the City also maintained a Contact List, and sent relevant project materials to all who had expressed interest in the process.

2.2.2 Public Information Centres

Through Phases 1 and 2 of a Municipal Class EA, the study proponent (in this case, the City of Hamilton) is required to consult the public only once the alternative solutions to the problem being addressed have been evaluated, and a preferred option selected. The City of Hamilton, however, decided to consult the public more often than was required by the Class EA process, and instead consulted with the public on six (6) occasions:

- GRIDS PIC #1: May 30th 2005
- GRIDS PIC #2: May 16th, 17th, and 18th 2006
- Water/Wastewater PIC #1: June 20th, 21st, and 23rd 2005
- Water/Wastewater PIC #2: November 28th, 30th, and December 5th 2005
- Water/Wastewater PIC #3: July 6th and 10th 2006
- Stormwater/Transportation PIC #3: September 25th and 26th, 2006.

Each of these PICs was advertised in the local media and on the City s website such that any concerned parties would be aware of the opportunities to become involved in the Master Planning process.

All of the materials presented at these PICs are included in the PIC Documentation binder that is appended to this report.

2.2.3 Stakeholder Workshops

In addition to the project information disseminated through the mandatory contact distribution and public information centres, stakeholder workshops were held to provide opportunity for detailed discussion on the development and evaluation of the servicing strategies and for detailed discussion on specific technical topics related to Hamilton s systems.

The Stakeholder Workshops included:

- Wet Weather Workshop #1: May 2004
- Policy Workshop: November 2004
- Phase 1 Workshops: June 2005
- Wet Weather Workshop #2: May 2006
- Wet Weather Workshop #3: June 2006.

The stakeholders included representatives from various agencies including, but not limited to:

- City Departments (Planning and Economic Development, Public Health, Community Services, Public Works, City Manager s Office)
- Conservation Authorities

- Ministry of the Environment
- Environment Canada including the Hamilton Harbour Remedial Action Plan Office
- Bay Area Restoration Council.

2.3 ABORIGINAL DIALOGUE

The project communications approach also included specific dialogue with aboriginal agencies.

Three contacts including Hamilton Executive Directors Aboriginal Coalition (HEDAC), Six Nations and Ontario Secretariat for Aboriginal Affairs were part of the mandatory contact list and received all project notices and communications.

The City of Hamilton undertook additional communications with the aboriginal agencies during the project. These communications are appended in Appendix D.

3. PROBLEM/OPPORTUNITY STATEMENT

3.1 STUDY AREA

In 2001, the City of Hamilton was amalgamated with the former municipalities of Ancaster, Dundas, Flamborough, Glanbrook and Stoney Creek. Hamilton is now the 10th-largest municipality in Canada, and covers an area of over 112,000 ha. The City of Hamilton currently includes both urban and rural areas, and encompasses a number of hamlets.

The Study area is currently governed by the land use policies set forth in seven former Official Plans (the Region and the six former municipalities). A new Official Plan is being created which will update and consolidate the policies of the seven former Official Plans into one Plan to apply to the entire City. Several ongoing Corporate Projects are integrated with the development of the new Official Plan: Vision 2020, the GRIDS project, Social Development Strategy, Master Plans and Secondary Plans. All programs are linked through an initiative called Building a Strong Foundation , (BASF) is an initiative coordinated by the City that takes a cross-disciplinary, integrative and community-based approach to implementing Hamilton s Vision for a sustainable future. Hamilton has not yet adopted its new Official Plan. In accordance with the City of Hamilton Act, the by-laws of the 6 former municipalities remain in effect until new ones are established.

The Study Area for this Master Plan consists of the existing lake-based water and wastewater servicing area, which extends to the Urban Boundary, plus any urban boundary expansion areas that are required to service the anticipated growth between the present date and 2031. A map of the Study Area is included in Figure 2.

Initially, the community of Greensville, due to its close proximity to Dundas, was included in the Study Area. However, the City has initiated the Mid Spencer Creek/Greensville Rural Settlement Area Subwatershed study to determine the servicing needs and, as such, assessment of this area has been deferred.

Carlisle, due to the recommendations in a recent Class Environmental Assessment, was also included in the study area to assess long term water supply. Subsequently, an addendum to the Carlisle Water Supply Master Plan and Class Environmental Assessment was completed and identified an adequate water supply scheme which addresses the water demand projections included in the April 2004 project file report.

Hamilton

BUILDING A STRONG FOUNDATION HAMILTON

Integrated Water & Wastewater Master Plan

Preferred Growth Option

KMK Consultants Limited

Figure 3

Nov 22, 2006

N/A

2590-D-72

3.4 PLANNING PROJECTIONS

The growth options developed through the GRIDS process were developed concurrently with Places to Grow. As the growth options were being developed, the Provincial process was also being updated. As such, preliminary planning projections ranged from 660,000 persons to over 700,000 persons for population in 2031 and ranged from 290,000 employees to over 310,000 employees for employment in 2031.

Once the Places to Grow Growth Plan finalized and the GRIDS process finalized, the preferred growth option and the long term planning projections to year 2031 were established. The distribution of population and employment growth among the primary geographic regions of the City of Hamilton are presented in Tables 1 and 2.

Table 1 Projected Population Statistics 2001 through 2031

	Serviced Population			
	2001	**2011**	**2021**	**2031**
Lower Hamilton	191,499	202,588	207,843	217,419
Upper Hamilton	143,100	147,473	158,531	164,719
Stoney Creek	59,783	65,464	80,818	89,109
Glanbrook	8,132	10,119	18,938	26,794
Dundas	23,817	24,874	25,575	25,708
Ancaster	29,920	33,066	39,453	39,692
Flamborough	15,707	16,066	21,976	31,354
EXISTING URBAN BOUNDARY	**471,958**	**499,650**	**553,134**	**594,795**
Airport Lands UBE	0	0	0	0
Southeast Mountain UBE	0	946	4,559	41,558
URBAN BOUNDARY EXPANSION AREAS	**0**	**946**	**4,559**	**41,558**
TOTAL URBAN	**471,958**	**500,596**	**557,693**	**636,353**
TOTAL RURAL	33,844	33,893	32,669	32,064
GRAND TOTAL HAMILTON	**505,802**	**534,489**	**590,362**	**668,417**

Table 2 Projected Employment Statistics 2001 through 2031

	Number of Jobs			
	2001	2011	2021	2031
Lower Hamilton	115,497	126,302	139,100	154,931
Upper Hamilton	31,540	34,491	38,662	43,112
Stoney Creek	27,463	31,815	36,999	41,971
Glanbrook	4,022	5,404	8,477	15,374
Dundas	6,067	6,748	7,136	7,878
Ancaster	6,115	7,506	9,349	13,358
Flamborough	5,015	5,911	8,752	9,694
EXISTING URBAN BOUNDARY	**195,718**	**218,177**	**248,475**	**286,318**
Airport Lands UBE	0	0	4,482	12,560
Southeast Mountain UBE	0	0	3,140	3,525
URBAN BOUNDARY EXPANSION AREAS	**0**	**0**	**7,622**	**16,085**
TOTAL URBAN	**195,718**	**218,177**	**256,097**	**302,403**
TOTAL RURAL	**9,194**	**10,116**	**6,079**	**6,502**
GRAND TOTAL HAMILTON	**204,912**	**228,293**	**262,176**	**308,905**

3.5 PROBLEM/OPPORTUNITY STATEMENT

The purpose of the Problem/Opportunity Statement is to define the principal starting point in the undertaking of the Master Plan Class EA and assist in defining the scope of the project.

As such, the Problem/Opportunity Statement has been defined as:

- The Province, through its Place to Grow document, has identified the need to accommodate growth within the City of Hamilton.
- Water and wastewater infrastructure upgrades will be required to service areas already approved for development as well as future residential and non residential lands.
- Wastewater infrastructure upgrades will be required to address water quality concerns in Hamilton Harbour.
- Integration of planning, water/wastewater, transportation and stormwater processes will ensure implementation of a sustainable growth strategy and fulfill the City s goals identified in Vision 2020.

4. MASTER PLAN METHODOLOGIES

4.1 OVERVIEW

A number of tasks and evaluation requirements were undertaken as part of the Master Plan process unique to the City of Hamilton.

Under any Master Plan, the methodology for analyzing planning information, developing water demands and wastewater flows and modelling the systems needs to be developed to best serve the proponent.

In addition to analysis processes, the City of Hamilton is subject to unique provincial guidelines designed to ensure optimal water quality in Lake Ontario and the Hamilton Harbour. Plus, the City developed a policy process to augment the directives and guideline for the Master Plan study.

4.2 POPULATION AND EMPLOYMENT DATA

This Master Plan makes use of the planning information derived through the GRIDS process in order to assess growth areas and allocate future water demands and wastewater flows.

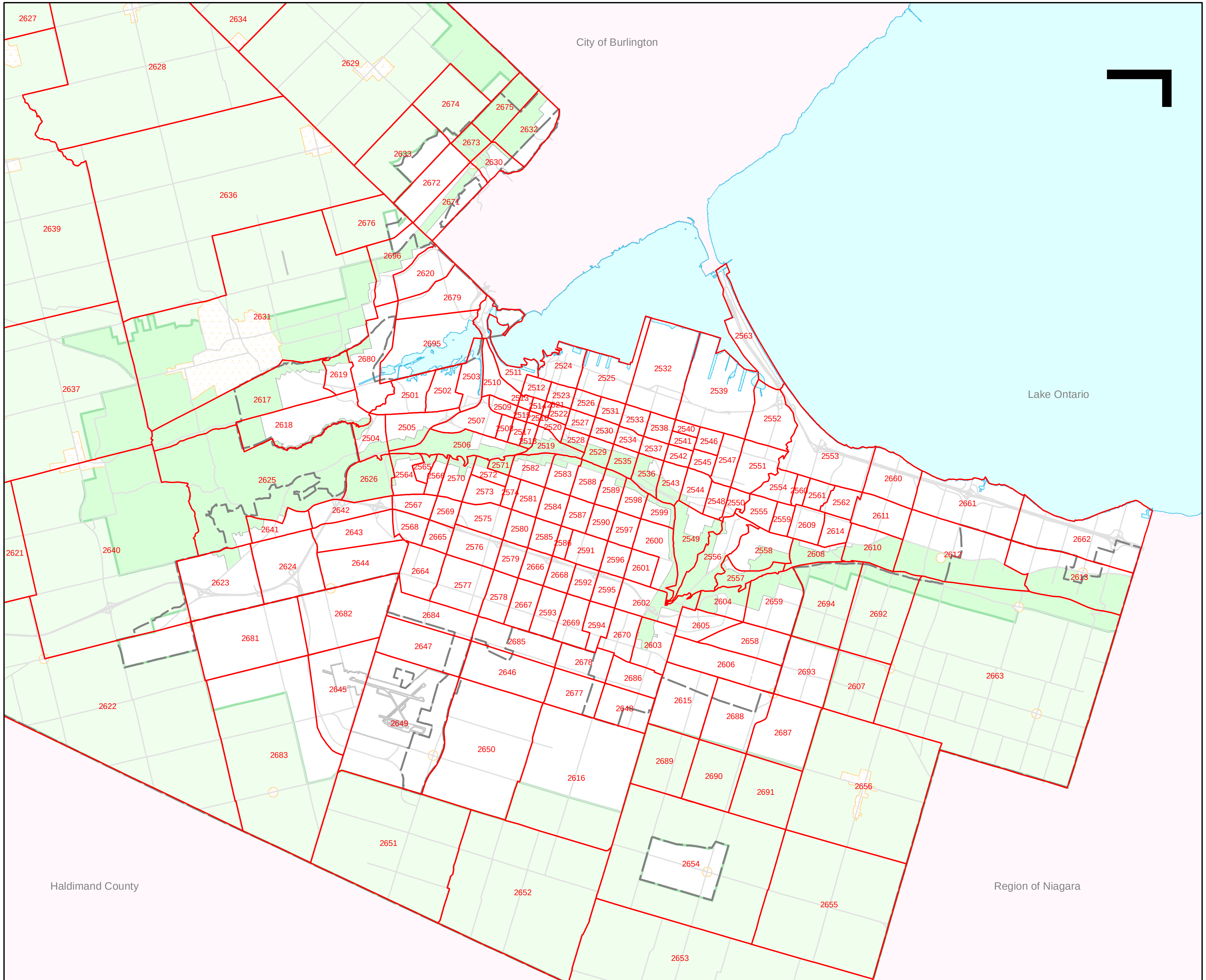
The planning data was developed by the City of Hamilton whereby City-wide projections were geographically allocated by traffic survey zone (TSZ). The planning projections including population and employment data, were developed through analysis of vacant lands, intensification opportunities and boundary expansion requirements. The data was provided to the Master Plan team in 10-year intervals for 195 separate traffic zones covering the entire City, as shown in Figure 4. Many of these traffic zones cover areas that lie outside of the study area (rural areas outside of the lake-based water and wastewater servicing area). Only the traffic zones that overlap the existing servicing area, the existing urban boundary, or identified urban boundary expansion areas were considered in this Master Plan.

In order to further allocate the planning data for modelling purposes, additional GIS processing was completed to allocate the TSZ data to model node polygons. This process used the GRIDS planning data in TSZ, the City s land use data, the wastewater model catchments (wastewater node polygons) and the water node polygons.

For areas within the existing urban boundary, the population and employment increases were distributed according to existing land uses. This assumes that existing residential areas will remain residential, with an increased population density. For urban boundary expansion areas, population and job growth was assumed to be evenly distributed across the traffic zones. A geographic overlay was used to transfer the population and job data to individual land parcels, and then to the wastewater catchments and water node polygons.

4.3 WATER AND WASTEWATER SYSTEM MODELS

Analysis of the infrastructure requirements for this Master Plan was undertaken utilizing the computerized water and wastewater models for the City systems.



Legend

- Traffic Zone Boundary
- Urban Boundary
- Rural Settlement Area
- Niagara Escarpment
- Greenbelt

Hamilton

Integrated Water & Wastewater Master Plan

Traffic Zone Map

Nov 22, 2006

1:125,000

2590-D-75

4.3.1 Water Model

WaterCAD, from Haestad Methods/Bentley was selected as the preferred water model software package. The water system model was developed in 2004 by the City of Hamilton and it includes all pumping stations, reservoirs, elevated tanks, valves and the existing watermains. The model is a skeletonized network consisting generally of watermains larger than 200 mm diameter with some smaller watermains included for connectivity.

The entire water system was divided into 3,076 individual geographic areas or water node polygons. These geographic areas covered the existing serviced areas of the City as well as areas that were under development or that could potentially be developed by the year 2031. The water demands were calculated for each water node polygon based on residential and employment projections.

4.3.2 Wastewater Model

MOUSE, from DHI Software, was selected as the preferred wastewater model software package. The wastewater system model was developed in 2004 by AWS Engineers & Planners Corp, and includes all of the sewage pumping stations and the main trunk infrastructure. Within the separated sewer system (SSS), the trunk sewers were generally defined as any pipe having a diameter of 300 mm and greater. Within the combined sewer system, the trunk sewers were generally defined as any pipe having a diameter of 600 mm and greater.

The entire drainage area for the three wastewater treatment plants (WWTPs): Woodward Avenue, Dundas and Waterdown; was divided into 610 individual sewer catchments (wastewater node polygons), each with an average area of approximately 155 ha. These catchments cover the existing serviced areas of the City as well as areas that are currently under development or that might potentially be developed by the year 2031.

The model was calibrated based on sewer flow data that was measured at 59 locations during the City s 2004 flow monitoring program. As well, ten temporary rain gauges were installed to augment the City s nine permanent rain gauges. In general, the calibrated model achieves a reasonably good match to the measured flows when using the 2004 rainfall data as the model input.

4.4 EVALUATION CRITERIA

Information on each of the servicing alternatives was developed to enable a comparative evaluation of impacts, and selection of a preferred alternative. The factors considered generally matched the Triple Bottom Line (TBL) evaluation approach approved for GRIDS:

- Physical and Natural Environment:
  - Impact on vegetation, fish and wildlife; surface drainage and groundwater; soil and geology
  - Impact on areas of natural and scientific interest, and environmentally-sensitive areas
  - Disruption of topographical features.

- Social, Economic, and Cultural Environment:
  - Impact on existing and proposed development
  - Impact on archaeological and historic sites
  - Impact on agricultural resources
  - Impact on recreational areas
  - Impact on other utilities
  - Coordination with proposed roadway development.
- Financial Factors:
  - Construction, operation and maintenance (life-cycle) costs
  - Best use of existing infrastructure
  - Flexibility for scheduling works.
- Technical Factors:
  - Level of service
  - Security and reliability
  - Impact on existing infrastructure
  - Constructability
  - Impact on operations and maintenance
  - Meeting legislated criteria and regulations.

4.5 RELEVANT TECHNICAL CRITERIA AND GUIDELINES

Due to the nature of the City of Hamilton s water and wastewater systems and the location of the system and facilities on Lake Ontario and specifically the Hamilton Harbour, there are provincial technical guidelines relevant to the evaluation of the servicing strategies. Principal guidelines for the design criteria and water quality objectives primarily related to the wastewater system are:

- Procedure F-5-5, a supporting document for the Provincial Guideline F-5 Levels of Treatment for Municipal and Private Sewage Treatment Works Discharging to Surface Waters
- The Remedial Action Plan for the Hamilton Harbour (HHRAP).

These principal guidelines have been incorporated into the overall servicing evaluation being undertaken as part of the City of Hamilton Water and Wastewater Master Plan. Under the Master Plan, the goals related to strategies for wastewater servicing, wet weather control and wastewater treatment include:

- Provide capacity to service projected growth
- Maximize volume to be treated through full secondary and tertiary treatment

- Reduce discharge of untreated combined sewer overflow
- Endeavour to meet and achieve HHRAP loading targets and MOE Procedure F-5-5.

In addition to the provincial policies and guidelines, the City undertook a Water and Wastewater Policy exercise to develop specific guidelines for the Master Plan process and for future use in implementing the strategies.

4.5.1 Procedure F-5-5

The key goals and objectives identified under Procedure F-5-5 and as interpreted for the Master Plan address:

- Generally:
  - Eliminate the occurrence of dry weather overflows
  - Minimize the potential for impacts on human health and aquatic life resulting from CSOs
  - Achieve as a minimum, compliance with body contact recreational water quality objectives.
- CSO events and discharges to the City s receiving waters
- Capture and Level of Treatment for wet weather flows across the City s wastewater system.

The F-5-5 goals and objectives as they relate to the Master Plan design criteria are further detailed in Section 12.

4.5.2 The Remedial Action Plan for the Hamilton Harbour (HHRAP)

The key goals and objectives identified under HHRAP for the City of Hamilton related to Woodward Ave. WWTP effluent loading targets to the Hamilton Harbour, Dundas WWTP effluent loading targets to the Cootes Paradise and system wide CSO effluent loading targets.

Further discussion and interpretation of these goals was refined as part of the wet weather workshops documented in the appendices.

The HHRAP goals and objectives as they relate to the Master Plan design criteria are further detailed in Section 12.

4.5.3 Water and Wastewater Servicing Policies

As part of the overall master planning process, the City of Hamilton has developed a series of water and wastewater servicing policies to provide guidelines and directions for developing and evaluating servicing alternatives cognizant of provincial legislation, regulations and Vision 2020. The Policies have been endorsed by City Council.

These policies are explained in detail in Report #2: City of Hamilton Water and Wastewater Policy Paper. The General, Water, and Wastewater Policy Statements are summarized in Tables 3, 4 and 5 respectively.

Table 3 General Servicing Policies

Policy	Policy Statement
G.01	The City of Hamilton shall harmonize planning and servicing policies and processes within the City of Hamilton Planning and Public Works Departments.
G.02	The City of Hamilton shall not permit partial servicing for new development.
G.03	Growth areas within the City of Hamilton shall be designated based on the provision of municipal water and wastewater.
G.04	The City of Hamilton shall ensure that the design of water and wastewater infrastructure recognizes the potential for growth beyond the time horizon of the Official Plan.
G.05	The City of Hamilton shall maximize the use of existing capacity, prior to the upgrading or expansion of infrastructure.
G.06	The City of Hamilton shall maintain sufficient reserve capacity in its water and wastewater infrastructure and facilities to provide operational flexibility and meet potential changes in servicing conditions.
G.07	The City of Hamilton shall adopt city-wide development standards, design standards, and by-laws.
G.08	The City of Hamilton shall implement best practices and standards to ensure system efficiency and optimization through infrastructure planning, design, operation, and maintenance.
G.09	The City of Hamilton shall maintain Operating procedures that support open communications between the public, review agencies, and City Departments.
G.10	The City of Hamilton shall locate all of its services and facilities on public property or on municipally-owned easements.
G.11	The City of Hamilton shall continue to monitor water and wastewater system conditions and water production/wastewater collection flow information.

Table 4 Water Servicing Policies

Policy	Policy Statement
W.01	The City of Hamilton shall endeavour to protect its raw water sources.
W.02	The City of Hamilton shall meet or exceed legislated water quality criteria.
W.03	The City of Hamilton shall provide potable water at adequate pressure and flow to its customers.
W.04	The City of Hamilton shall provide reliability and security throughout the water distribution system.
W.05	The City of Hamilton shall ensure that acceptable water quality is maintained throughout the distribution system.
W.06	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.
W.07	The City of Hamilton shall adopt the Ministry of the Environment Guidelines as the minimum acceptable level of water storage.
W.08	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.
W.09	The City of Hamilton shall encourage and promote water conservation.
W.10	The City of Hamilton shall utilize reasonable design and costing criteria for establishing and evaluating servicing scenarios.

Table 5 Wastewater Servicing Policies

Policy	Policy Statement
WW.01	Provision of separate sanitary and storm sewer systems shall be considered a priority for all new growth areas.
WW.02	The City of Hamilton shall implement a sewer use bylaw that will set the maximum permissible limits on the criteria for discharge into municipal sewers.
WW.03	The City of Hamilton shall provide adequate reliability and security in wastewater pumping systems.
WW.04	The City of Hamilton shall endeavour to meet or exceed the Ministry of Environment Procedure F-5-5 and HH-RAP for CSO control.
WW.05	The City of Hamilton shall meet the Hamilton Harbour Remedial Action Plan (RAP) initial loading objectives and work towards the refinement and achievement of the final stage loading objectives.
WW.06	The City of Hamilton shall meet or exceed the requirements of the C of A and the appropriate legislated treatment criteria.
WW.07	The City of Hamilton shall utilize reasonable design and costing criteria for establishing and evaluating servicing scenarios.
WW.08	The City of Hamilton shall ensure that there is a Biosolids Management Plan that addresses the needs of all residents within the City boundary.

5. EXISTING CONDITIONS

The City of Hamilton has many areas valued for their natural heritage and resource functions, as shown in Figure 5. These areas are not highly suitable for new growth and development. The Province provides guidance for the identification of areas to be protected from urban uses/growth through the Provincial Policy Statement (PPS 2005) as outlined in an earlier section. With the PPS guidelines in mind the following areas were identified as constraint areas for development.

Identification of Constraint Areas for Development:

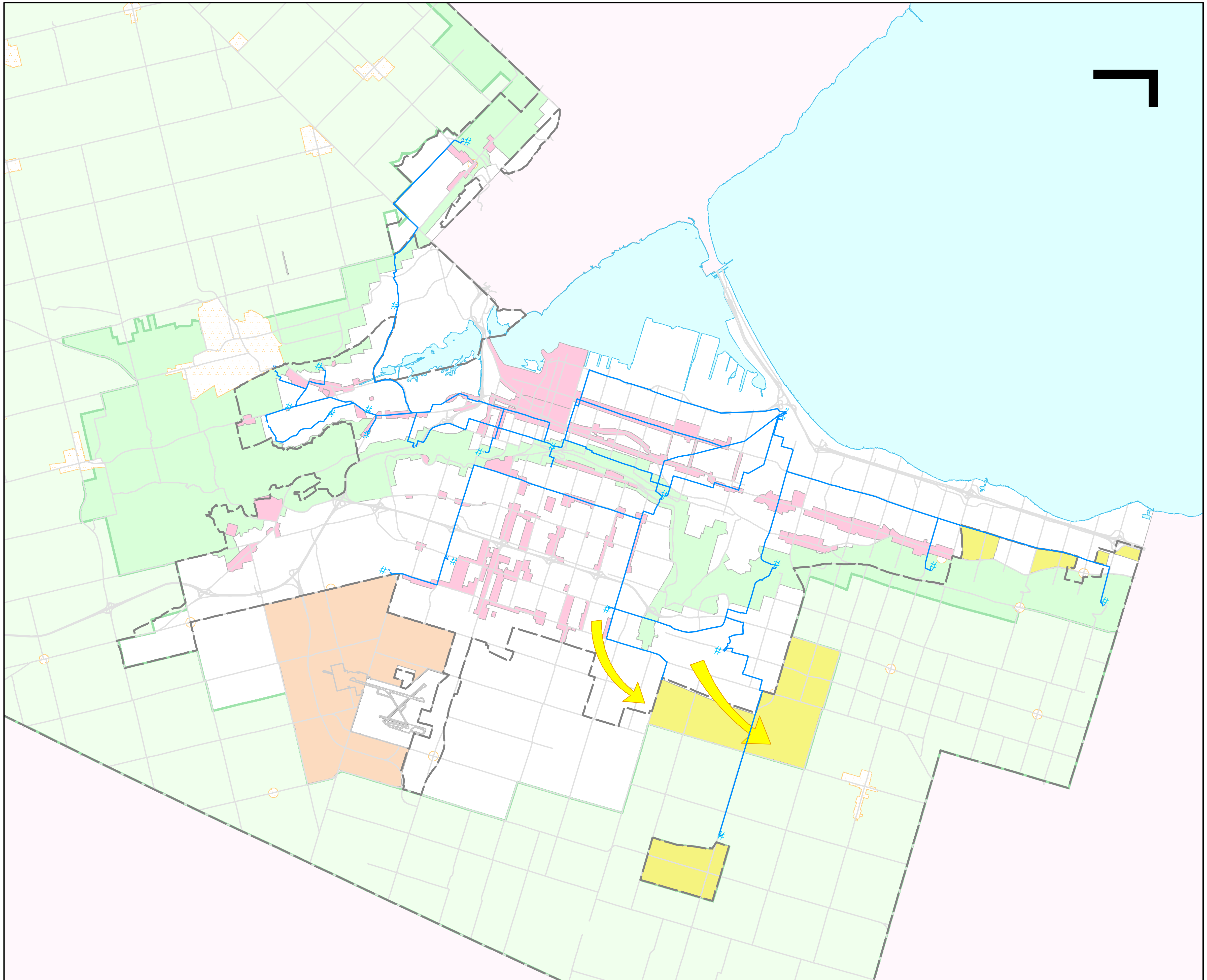
- The Greenbelt Plan (which incorporates The Niagara Escarpment Plan and The Parkway Belt West Plan)
- Aggregate Resource Areas
- Provincially Significant Wetlands
- Areas of Natural and Scientific Interest
- Prime Agricultural Lands, as defined by Hamilton s Land Evaluation and Area Review (LEAR) Study
- Significant Woodlands (significance defined by the City)
- Regionally and / or locally significant wetlands (defined by the City)
- Environmentally Significant Areas
- Land potentially impacted by aircraft noise as identified by Airport Noise Contours (25-28 NEF/NEP in Year 2011).

The depiction of these constraint areas and description below have been referenced from the GRIDS Final Report, May 2006 as prepared by Dillon Consulting.

5.1 NATURAL ENVIRONMENT

There exists a system of natural areas of varying significance. These interdependent areas are described as the Regional Natural Heritage System and are the focus of resource protection policies.

The City of Hamilton s diverse natural features perform numerous ecological functions, essential to life processes including the conservation of biological diversity. These functions include: maintaining and improving air and water quality; controlling and mitigating the effects of erosion, sedimentation and flooding; and, providing habitat for a wide variety of plant and animal species. Natural features also provide many recreational, aesthetic and economic benefits to our human communities.



Legend

Pump

Reservoir

Plant

Watermain

Rural Settlement Area

Potential Urban Boundary Expansion

Potential New Business Park

Intensification Area

Niagara Escarpment

Greenbeltu

Hamilton

Integrated Water & Wastewater Master Plan

South-East Mountain Water Servicing

Alternative 2

Nov 22, 2006

1:125,000

2590-D-65

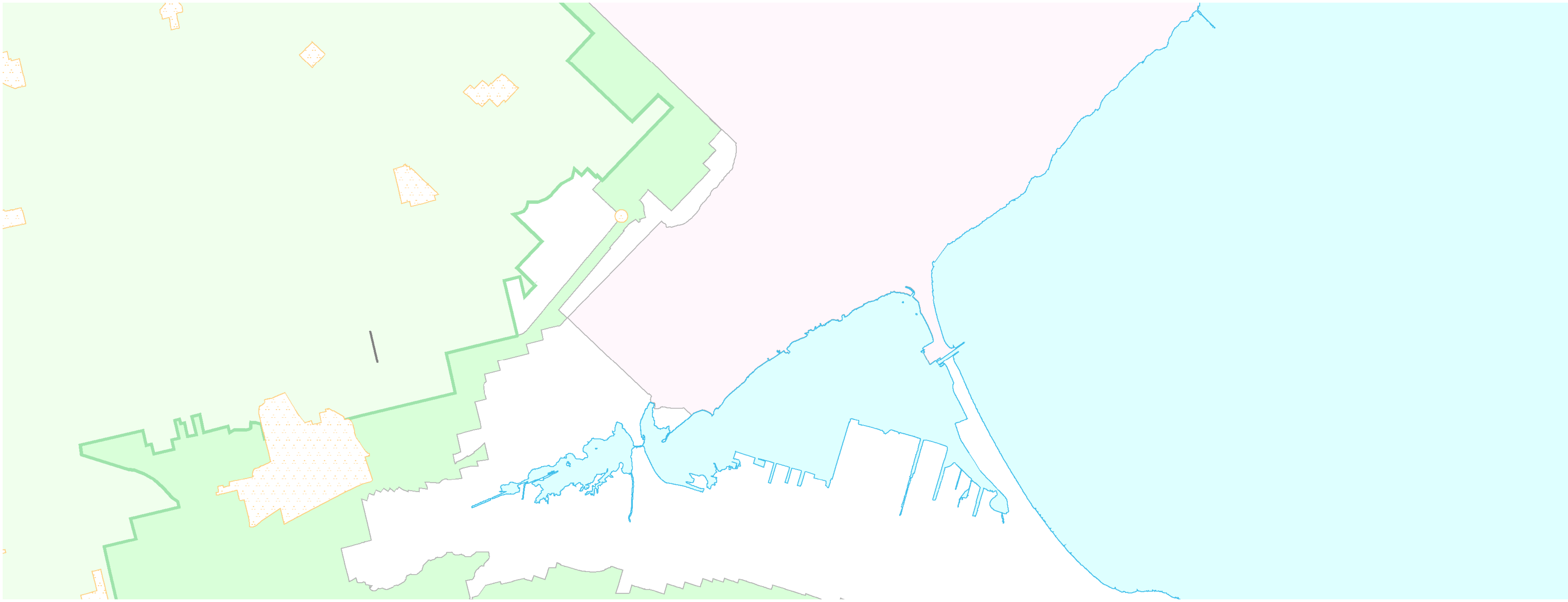


Table 17 Information Matrix of Southeast Mountain Water Servicing Alternatives

Evaluation Criteria	SOUTHEAST MOUNTAIN WATER SERVICING ALTERNATIVE 1	SOUTHEAST MOUNTAIN WATER SERVICING ALTERNATIVE 2	SOUTHEAST MOUNTAIN WATER SERVICING ALTERNATIVE 3
Description	i Service growth area entirely from HD007 i New elevated tank for storage, security and operational flexibility	i Service growth area from HD007 and HD006B with new Pressure District 7 pumps i New elevated tank for storage, security and operational flexibility	i Service growth area from HD007 and new PD7 pumping station i Provide all storage as pumped storage from suction side reservoirs
Natural Environment Factors	i Will require expansion at the HD007 site i There is significant property restrictions at the HD007 site to support the full reservoir capacity needed for this alternative. Additional property would be required. i Local watermains will be required which may require environmental feature crossings	i Will require expansion at the HD007 site i No site expansion required at HD06B i New feedermain alignment will need to mitigate any environmental feature crossings i Local watermains will be required which may require environmental feature crossings	i Will avoid expansion at the HD007 site i Will also require new pumping station and reservoir. However, this station will be located within growth area. i Local watermains will be required which may require environmental feature crossings
Socio-Cultural Factors	i Expansion at HD007 is within existing builtup area i Elevated tank will be located within suitable land uses	i Expansion at HD007 is within existing builtup area i Feedermain alignment will require construction through existing builtup area and will have temporary disruption i Elevated tank will be located within suitable land uses	i Expansion at HD007 is within existing builtup area i New pumping station and reservoir will be located within suitable land uses
Legal-Jurisdictional Factors	i There is no suitable additional property in the vicinity to support the reservoir capacity needed for this alternative i Property will need to be coordinated for the elevated tank	i There is sufficient property at HD007 to support this alternative i Property will need to be coordinated for the elevated tank	i There is sufficient property at HD007 to support this alternative i Property will need to be coordinated for the pumping station and reservoir
Technical Factors	i Only provides single supply feed to the area i Property restrictions impact the feasibility of this alternative	i Provides secure supply feed to the area from 2 sources i Utilizes available space and infrastructure in HD06B i Utilizes additional suction side storage for supply to the growth area i New elevated tank provides storage, security and operational flexibility	i Provides secure supply feed to the area from 2 sources i No elevated storage for security and operational flexibility i Adds a new station for maintenance
Economic Factors	i PS and Reservoir approximate costs : $20M i New elevated tank approximate cost: $4M	i PS and Reservoir approximate costs : $12M i New elevated tank approximate cost: $4M i Pumping station upgrades approximate costs: $3M i PD7 feedermain approximate cost: $4M	i PS upgrades approximate costs : $2M i New pumping station and reservoir approximate costs: $25M
Overall Alternative Rank	○	●	◑

Most Preferred ● ◕ ◑ ◔ ○ Least Preferred

10.3 AIRPORT LANDS WATER SERVICING ALTERNATIVES

The topography of the Airport Lands allows for potential servicing from either District 6 or District 18. As neither District 6 nor District 18 can supply the full water demands of the Airport Lands, the area will be serviced from both districts. Establishing the pressure district boundary within the Airport Lands is based on topography, and optimizing the expansion needs between the District 6 and 18 pumping stations and reservoirs.

Two wastewater servicing alternatives have been developed for the Airport Lands, and these are further described in the following sections. The following considerations are consistent for all servicing alternatives:

- Additional supply, pumping capacity, and storage capacity will be required
- Additional storage requirements for the southern Pressure Districts could be met through pumped reservoir storage or new elevated tanks
- Key supply stations should be provided with standby power, particularly for Pressure Districts without floating storage.
- There is an opportunity to include, as part of the alternatives, a new elevated tank in Pressure District 18 to provide system security.

The individual alternatives are described in the following sections.

10.3.1 Water Servicing Alternative AL-WS-1

Description and Infrastructure Requirements

Alternative AL-WS-1 is based on providing water servicing to the Airport Lands from Districts 6 and 18, with the supply from District 18 kept to a minimum. Doing so will eliminate the need for pumping station upgrades at either HD06A or HD018.

This alternative would include a new elevated storage tank, that would also provide system security and operational flexibility. The infrastructure requirements for this alternative are shown in Figure 11.

Capital Cost

Alternative AL-WS-1 would carry no additional capital costs at existing pumping stations. The main capital requirement would be the new elevated storage tank in District 18, which carries an approximate cost of $4M.

This alternative would result in increased operation and maintenance costs associated with the increased pumping requirements associated with servicing the Airport Lands.

Timing and Phasing Issues

The only major infrastructure requirement under this alternative is a new elevated tank, the construction of which will be triggered by growth within the Airport Lands.

While sufficient pumping capacity currently exists within Stations HD06A and HD018, full buildout of the Airport Lands will require additional supply to Districts 6 and 18 through an upgrade to pumping station HD05A.

Impact Assessment

The potential for impacts associated with Alternative AL-WS-1 was assessed, and options for mitigation of these impacts were reviewed. Details on the assessment are included in the following paragraphs.

Natural Environment Factors:

As there are no facility expansion projects associated with this project, major construction activities will be kept to a minimum. A new elevated storage tank will be constructed on a compatible site within an existing developed area, which will limit the potential environmental impact.

Construction of local watermains might require crossing environmental features, which would require mitigative construction practices.

Socio-Cultural Factors:

Most of the construction activities associated with this alternative will take place within currently-undeveloped areas, which will limit traffic-related impacts.

Locating the new elevated tank within an existing business park will minimize aesthetic concerns.

Legal-Jurisdictional Factors:

Under this alternative, the City would need to secure a property for the new elevated tank.

Technical Factors:

By minimizing the area of District 18, this alternative makes optimum use of the existing infrastructure.

The new elevated tank will provide additional storage, security and operational flexibility.

10.3.2 Water Servicing Alternative AL-WS-2

Description and Infrastructure Requirements

Alternative AL-WS-2 is also based on providing water servicing to the Airport Lands from Districts 6 and 18, only with an increased supply from District 18.

This alternative would include a new elevated storage tank, that would also provide system security and operational flexibility. This servicing alternative is presented in Figure 12.

Capital Cost

Alternative AL-WS-2 would carry an additional capital costs of $1M to upgrade existing pumping station HD018.

Like Alternative AL-WS-1, this alternative would also require a new storage tank, which carries an approximate cost of $4M.

This alternative would result in increased operation and maintenance costs associated with the increased pumping requirements associated with servicing the Airport Lands.

Timing and Phasing Issues

While additional pumping capacity will ultimately be required at Station HD018, development could proceed within the Airport lands based in the availability of supply through Pressure District 6 initially.

Full build-out of the Airport Lands will require the HD018 upgrade, and also an increased supply to Districts 6 and 18 through expansion of pumping station HD05A.

Impact Assessment

The potential for impacts associated with Alternative AL-WS-2 was assessed, and options for mitigation of these impacts were reviewed. Details on the assessment are included in the following paragraphs.

Natural Environment Factors:

As there are no facility expansion projects associated with this project, major construction activities will be kept to a minimum. A new elevated storage tank will be constructed on a compatible site within an existing developed area, which will limit the potential environmental impact.

Socio-Cultural Factors:

Most of the construction activities associated with this alternative will take place within currently-undeveloped areas, which will limit traffic-related impacts.

Locating the new elevated tank within an existing business park will minimize aesthetic concerns.

Legal-Jurisdictional Factors:

Under this alternative, the City would need to secure a property for the new elevated tank.

Technical Factors:

This alternative makes optimum use of the existing infrastructure.

The new elevated tank will provide additional storage, security and operational flexibility.

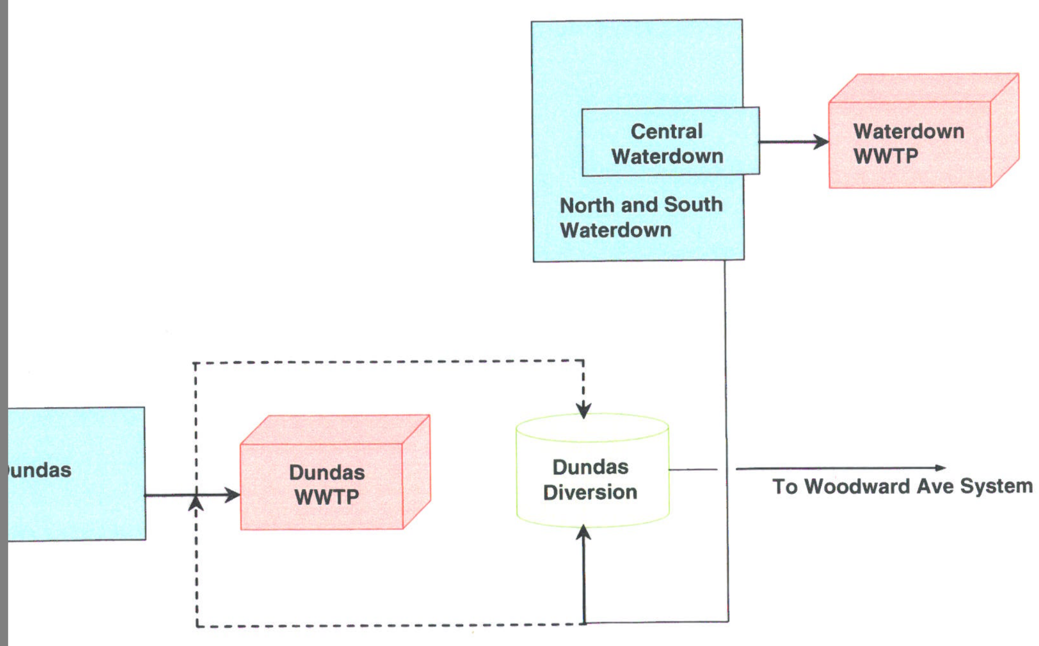
10.3.3 Information Matrix for Airport Lands Water Servicing Alternatives

Table 18 presents a comparison of the costs and impacts of the Airport Lands Water Servicing Alternatives.

10.3.4 Preliminary Selection of the Preferred Airport Lands Servicing Alternative

Alternative AL-WS-1 is preliminarily selected as the preferred servicing alternative for the Airport Lands, with the following rationale:

- Servicing the Airport Lands through District 6 eliminates the need to upgrade pumping stations servicing District 18.
- This alternative carries the lower capital cost.



ure 14a – Maintain existing service areas.
Waterdown WWTP expansion required.

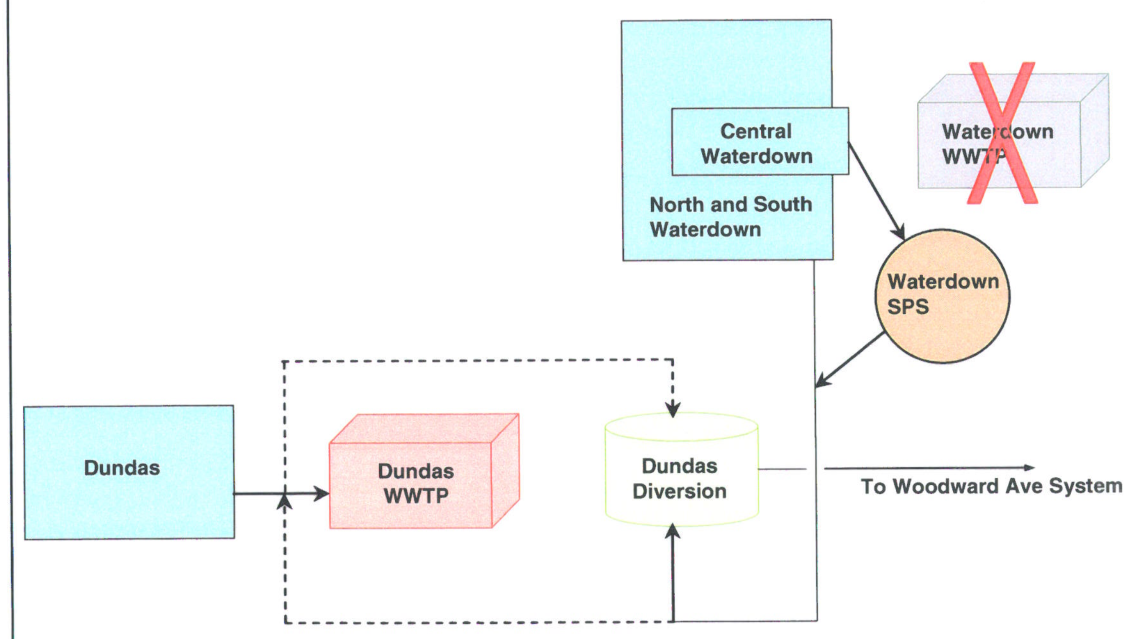
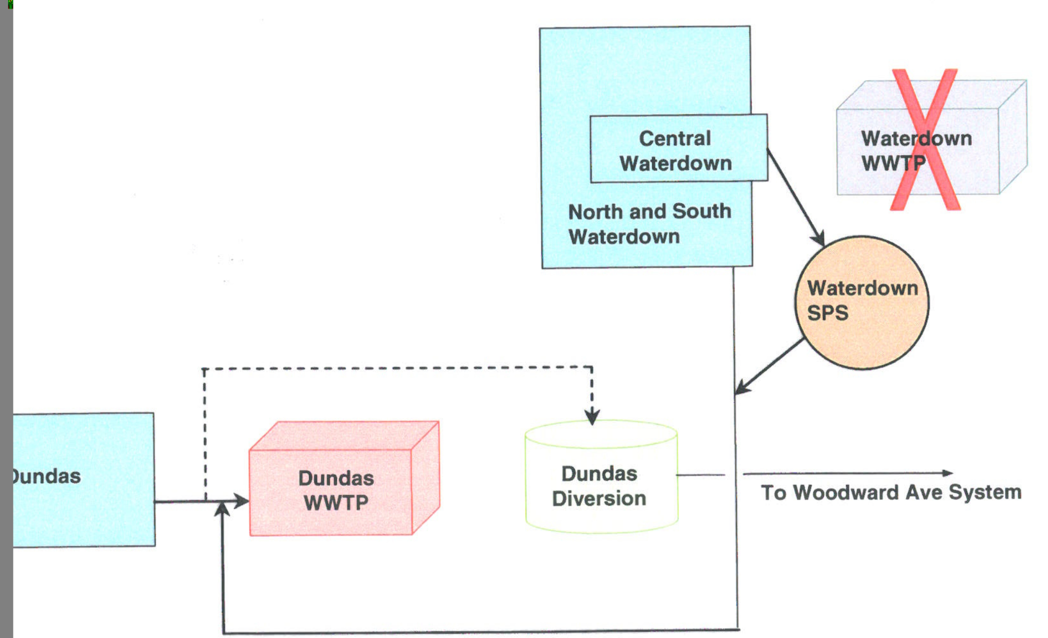


Figure 14b – Decommission Waterdown WWTP; pump flows to Borer's Creek Trunk Sewer.
Borer's Creek Trunk Sewer conveys flow to the Dundas diversion.
New Waterdown SPS required.



ure 14c – Decommission Waterdown WWTP; pump flows to Borer's Creek Trunk Sewer.
Borer's Creek Trunk Sewer conveys flow to the Dundas WWTP.
Dundas WWTP expansion required.

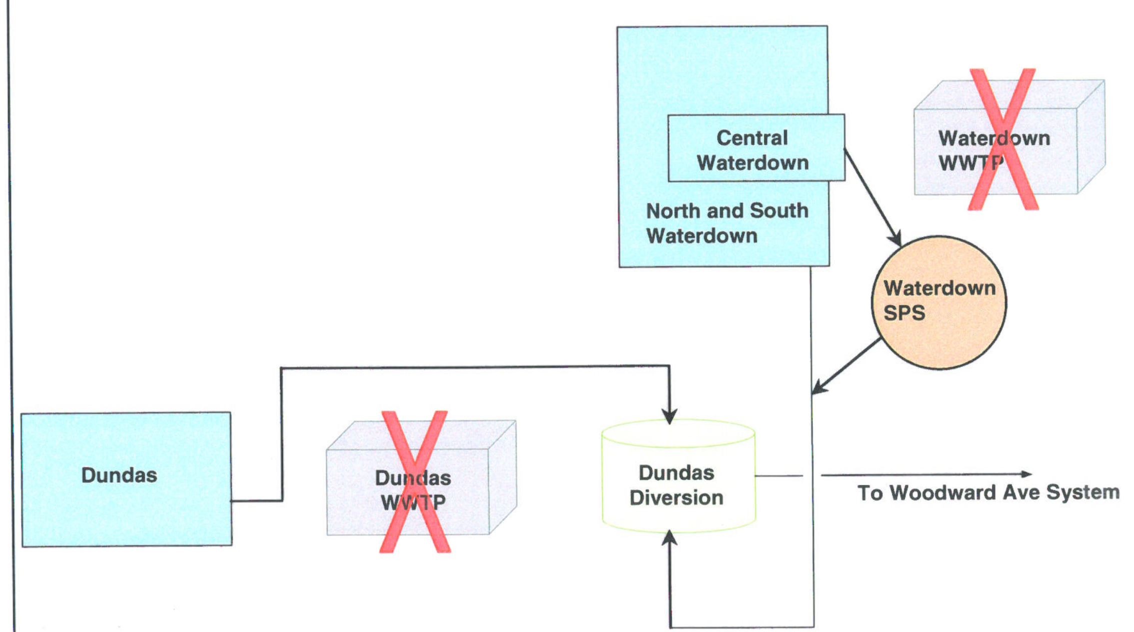


Figure 14d – Decommission Waterdown WWTP and Dundas WWTP.
Increase equalization tank volume and pumping capacity at the diversion.
Western Sanitary Interceptor upgrades required.

Hamilton

BUILDING A STRONG FOUNDATION HAMILTON

Integrated Water & Wastewater Master Plan

Waterdown / Dundas
Wastewater Servicing
Alternative Schematics

KMK Consultants Limited

Figure 15

22 NOV 06
N/A
2590-D-97

Table 32 Information Matrix of Waterdown/Dundas Wastewater Servicing Alternatives

Evaluation Criteria	WATERDOWN/DUNDAS WASTEWATER SERVICING ALTERNATIVE 1	WATERDOWN/DUNDAS WASTEWATER SERVICING ALTERNATIVE 2	WATERDOWN/DUNDAS WASTEWATER SERVICING ALTERNATIVE 3	WATERDOWN/DUNDAS WASTEWATER SERVICING ALTERNATIVE 4
Description	i The existing servicing areas remain unchanged i Central Waterdown serviced through an expanded Waterdown WWTP i North and South Waterdown and all of Dundas serviced through an expanded Dundas WWTP	i Decommission Waterdown WWTP, and send all Waterdown flows through the Dundas diversion structure to the Woodward Avenue WWTP. i Do nothing at Dundas WWTP, and send excessive flows through the Dundas diversion structure to the Woodward Avenue WWTP.	i Decommission Waterdown WWTP, and send all Waterdown flows to an expanded Dundas WWTP.	i Decommission Waterdown and Dundas WWTPs, and send all Waterdown and Dundas flows through an expanded Dundas diversion structure to the Woodward Avenue WWTP.
Natural Environment Factors	i Loadings to Cootes Paradise would increase i Increased plant effluent could have a significant impact on the Grindstone Creek (erosion, loss of vegetation, impact to aquatic species)	i Only positive. A significant source of pollutant loading would be removed from Cootes Paradise i Removing the plant effluent could result in very low baseflow in the Grindstone Creek during dry periods of the year.	i Overall loadings to Cootes Paradise would increase	i Only positive. A significant source of pollutant loading would be removed from Cootes Paradise i Removing the plant effluent could result in very low baseflow in the Grindstone Creek during dry periods of the year.
Socio-Cultural Factors	i Construction noise during the WWTP expansion i Potential for increased odours from the plant, which might affect nearby residents	i This alternative is likely to be well received by the community	i Construction noise during the WWTP expansion i Potential for increased odours from the plant, which might affect nearby residents	i This alternative is likely to be well received by the communities
Legal-Jurisdictional Factors	i None. No additional land would be required	i None. The new SPS could be built on the existing WWTP site	i This alternative might require additional land for expansion of the Dundas WWTP	i None. No additional land would be required
Technical Factors	i Limitations in expanding the Waterdown WWTP i It is an aging facility, so there is limited value in a significant upgrade	i Will require a new SPS i No impact is anticipated to the Woodward Avenue WWTP system	i Limitations in expanding the Dundas WWTP i It is an aging facility, so there is limited value in a significant upgrade	i This alternative would trigger significant upgrades to the Dundas diversion structure and pumping station, and also to the Western Interceptor. i This would require replacement of existing plant capital at the Woodward Ave WWTP
Economic Factors	i High cost with no tangible benefit	i Lowest capital cost of the alternatives considered	i High cost with no tangible benefit	i While there would be long-term operational savings, this alternative carries significant up-front costs.
Overall Alternative Rank	◔	●	○	◐

Most Preferred ● ◕ ◐ ◔ ○ **Least Preferred**

14.2 SOUTHEAST MOUNTAIN WASTEWATER SERVICING ALTERNATIVES

14.2.1 Servicing Area

The Southeast Mountain urban boundary expansion area will provide much of the residential land required under the 2031 development plan. The full extent of this urban boundary expansion is shown in Figure 2.

Upon full buildout of this area, which is anticipated by 2031, this area is expected to have a population of over 41,000 residents, and will provide 3,500 jobs. Development of this area is anticipated to begin in 2014, but 90 percent of the forecasted growth will occur between 2021 and 2031.

The Rymal Road Planning Area is included within this area. The servicing study for the Rymal Road Planning Area had previously identified the need for additional trunk sewer capacity for full buildout. It indicated that extensive upgrades to the Red Hill Creek Sanitary Interceptor would be required. This area is already approved for development through ROPA 9.

The topography of the Southeast Mountain area generally slopes to the south towards Binbrook. Only the northeast portion of the area bounded by Mud Road, Upper Centennial Parkway, Highland Road and Second Road has the opportunity of draining by gravity to a portion of the existing wastewater collection system.

Two wastewater servicing alternatives have been developed for the Southeast Mountain, and these are further described in the following sections.

14.2.2 Alternative SEM-WWS-1

Description and Infrastructure Requirements

Alternative SEM-WWS-1 is based on servicing the Southeast Mountain Area including ROPA 9 through existing infrastructure in the surrounding areas, where possible:

- i The northeast portion would be serviced by gravity through the Felker Trunk to the RHCSI
- i The balance of the area would be pumped from a pumping station located at the lowest point in the area (near the intersection of Golf Club Road and Highway 56) to the Davis Creek trunk sewer, and ultimately the Red Hill Creek Sanitary Interceptor.

The infrastructure requirements for this alternative are presented in Figure 16.

This alternative would require a 1,000 L/s sewage pumping station, which would be sized to service the Southeast Mountain area and the existing serviced areas in Binbrook. The combined Southeast Mountain and Binbrook flows would then be pumped into the Davis Creek Trunk via a twinned 600 mm forcemain.

Due to existing capacity limitations in the RHCSI, the Red Hill Valley CSO Tunnel (which is currently under construction) would have to be extended in both the upstream and downstream directions, such that it runs from the Greenhill CSO Tanks to the Woodward Avenue WWTP.

Capital Cost

The capital cost estimate for infrastructure required for the 2031 development scenario for Alternative SEM-WWS-1 is presented in Table 33.

Table 33 Capital Cost of Servicing Alternative SEM-WWS-1

Description	Cost (Millions)
Sewage Pumping Station (1,000 L/s)	$ 6.50
Twin Existing 600 mm Forcemain (2,000 m)	$ 4.50
RHCSI Upgrades (6,000 m)	$ 45.00
Total for Alternative SEM-WWS-1	**$ 56.00**

Timing and Phasing Issues

The east portion of ROPA 9 and the second phase of Binbrook development are pending construction of the additional trunk infrastructure.

Impact Assessment

The potential for impacts associated with Alternative SEM-WWS-1 was assessed, and options for mitigation of these impacts were reviewed. Details on the assessment are included in the following paragraphs.

<u>Natural Environment Factors:</u>

This alternative carries significant impacts to the natural environment due to the extensive construction activities that would be required within the Red Hill Creek Valley.

<u>Socio-Cultural Factors:</u>

Due to the predominant land use within the Southeast Mountain urban boundary expansion area being residential, there would be a high likelihood that the required sewage pumping station would be situate adjacent to residential land uses. Opportunities might arise that would mitigate the impact of the pumping station siting, but those cannot be anticipated at this time.

A more significant social impact would result from the construction activities required to expand the RHCSI. The Red Hill Valley Expressway will be in service by the time that these construction activities would need to be scheduled, resulting in significant delays to commuters soon after the Expressway is put into service.

<u>Legal-Jurisdictional Factors:</u>

The City would need to secure a site for the pumping station near the intersection of Golf Club Road and Highway 56.

Depending on the final alignment of the forcemains and gravity sewers, easements might also be required.

Technical Factors:

The main technical consideration under this alternative lies in the difficulties that would be encountered in increasing the capacity of the RHCSI, especially considering it s proximity to the Expressway. It would be impractical to begin significant new construction activities so soon after the completion of the highly controversial Red Hill Valley Expressway project.

Economic Factors:

Due to the expected difficulties associated with upgrading the RHCSI, this alternative carries an extremely high capital cost.

The annual operation costs associated with the new sewage pumping station are expected to be moderate.

14.2.3 Alternative SEM-WWS-2

Description and Infrastructure Requirements

Wastewater Servicing Alternative SEM-WWS-2 is based on the entire service area draining to a deep trunk sewer along Centennial Parkway. The depth of the sewer would eliminate the need for a sewage pumping station, and would also permit servicing of the Airport Lands through the Centennial Trunk.

Instead of directing the flows associated with ROPA 9, Binbrook and the Urban Boundary expansion areas to sewers or interceptors with existing capacity limitations, this alternative would make use of existing unused capacity in the Eastern Sanitary Interceptor. Since the Red Hill Creek Sanitary Interceptor carries combined sewage from the Fennell Trunk, servicing the Southeast Mountain lands through the fully-separated Eastern Interceptor system conforms with the City s policy of providing separated storm and sanitary sewers for new development.

This alternative would require construction of a 1,200 mm trunk sewer along Upper Centennial. Due to the required sewer depth required to facilitate gravity flow, some sections would need to be tunnelled. The total length of the new sewer would be approximately 8,000 m, with approximately 1,000 m of that length being more than 10 m below the existing grade.

The proposed Centennial Trunk Sewer could discharge into the existing Battlefield Trunk sewer following twinning of this trunk over a distance of approximately 2,000 m.

The infrastructure requirements for this alternative are presented in Figure 17.

Capital Cost

The capital cost estimate for infrastructure required for the 2031 development scenario for Alternative SEM-WWS-2 is presented in Table 34.

Table 34 Capital Cost of Servicing Alternative SEM-WWS-2

Description	Cost (Millions)
Centennial Trunk Sewer Including Tunnelling (1,200 mm)	$ 34.50
Battlefield Trunk Upgrades (2,000 m)	$ 4.00
Total for Alternative SEM-WWS-2	**$ 38.50**

Timing and Phasing Issues

There is currently a Class EA for servicing ROPA9 being completed. There is potential for development in the ROPA9 area to be accelerated before completion of the Centennial trunk sewer. The Class EA has made provision for a new sewage pumping station to pump flows from the eastern limit back to the Felker sub-trunk. While capacity analysis shows this interim servicing is acceptable, it is recommended that the long term solution for ROPA9 involve conveying flows to the new Centennial trunk sewer.

Also, a the subsequent sections will demonstrate, the Centennial trunk sewer will provide conveyance capacity to support growth in the Airport Lands and Binbrook. As such, the timing of this project is also related to the potential development rate in these areas.

Impact Assessment

The potential for impacts associated with Alternative SEM-WWS-2 were assessed, and options for mitigation of these impacts were reviewed. Details on the assessment are included in the following paragraphs.

<u>Natural Environment Factors:</u>

This alternative carries potential impacts to the natural environment associated with the required construction activities on the Battlefield Trunk sewer, which lies along Battlefield Creek. The total length of sewers along Battlefield Creek that would require twinning is approximately 2 km.

This alternative would also require six new creek crossings, and would require crossing the Niagara Escarpment. The Escarpment crossing would be within the existing road allowance, which would minimize the overall environmental impact.

<u>Socio-Cultural Factors:</u>

Once the Red Hill Valley Expressway is put into service, much of the existing traffic along Centennial Parkway can utilize the expressway as an alternate or primary transportation route. As such, there would be an opportunity for the City to upgrade the existing Centennial Parkway and install the required wastewater infrastructure. The impact of this alternative on existing traffic flow can be mitigated as a result of the Red Hill Valley Expressway.

<u>Legal-Jurisdictional Factors:</u>

While most of the sewer construction would occur in existing right-of-ways, an easement might be required between Centennial Parkway and the Battlefield Trunk sewer.

Technical Factors:

Aside from the tunnelling requirements associated with the deep sewer construction, no additional technical concerns are anticipated under this alternative.

Economic Factors:

While there would be high capital costs associated with the tunnelling of sections of the Centennial trunk sewer, these would be offset by the lack of annual pumping costs.

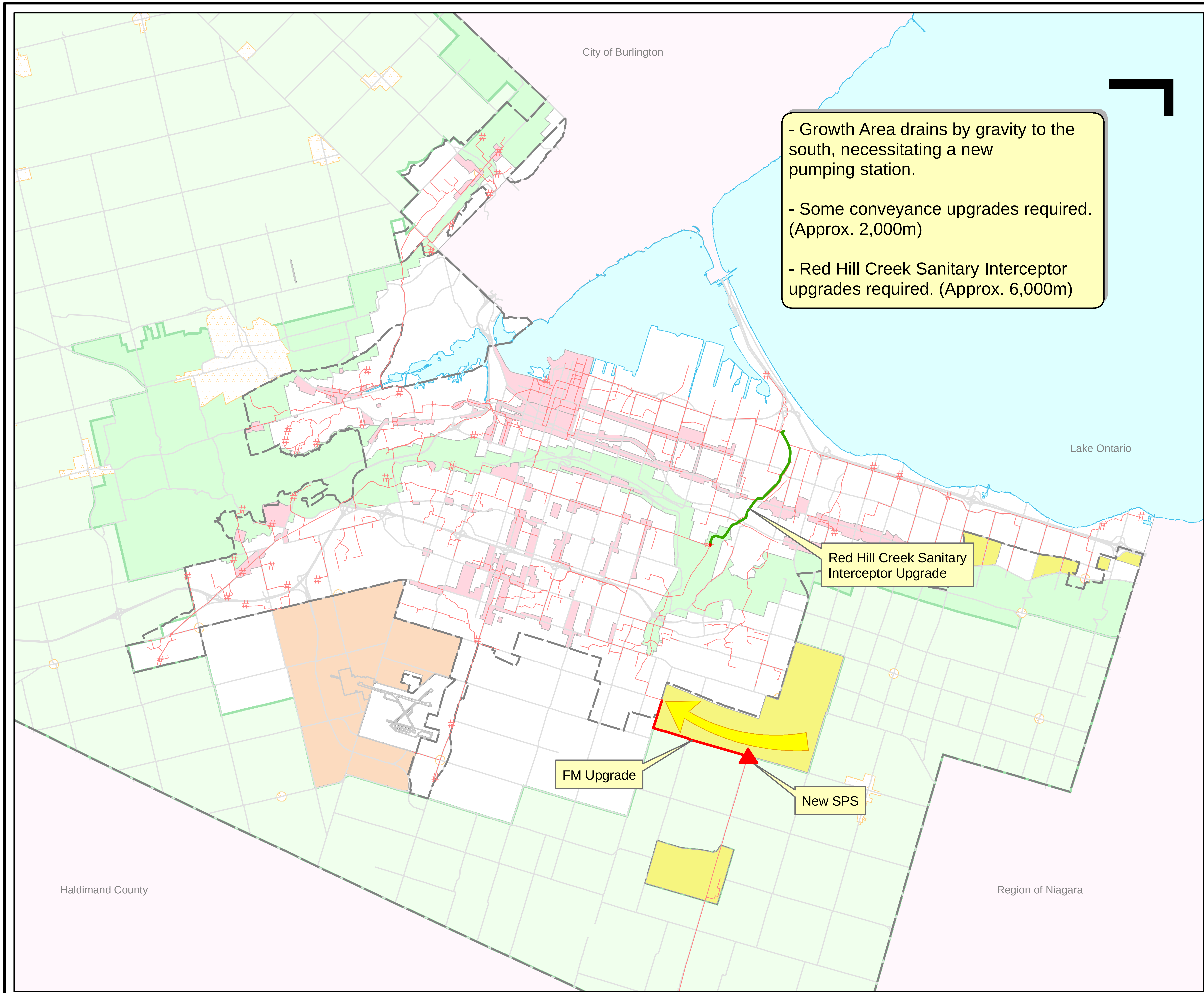
14.2.4 Information Matrix for Airport Lands Wastewater Servicing Alternatives

Table 35 presents a comparison of the costs and impacts of the Airport Lands Wastewater Servicing Alternatives.

14.2.5 Preliminary Selection of the Preferred Southeast Mountain Servicing Alternative

Alternative SEM-WWS-2 is preliminarily selected as the preferred servicing alternative for the Southeast Mountain, with the following rationale:

- This alternative has the lowest potential environmental impacts.
- The need for a pumping station is eliminated.
- This alternative makes use of existing reserve capacity within the Eastern Sanitary Interceptor and the Battlefield Trunk Sewer.
- This other alternative would have added the wastewater flows from a separated system to existing combined systems (the Red Hill Creek Sanitary Interceptor).
- This alternative presents an opportunity to remove additional separated sewer flow from the RHCSI, mitigating some of the existing capacity limitations. It would also be able to service future development of the South Mountain, such as the existing business park or a future expansion of the urban boundary outside of the current planning horizon.
- This alternative carries a 33 percent lower capital cost than Alternative SEM-WWS-1, and eliminates the annual operational costs associated with the sewage pumping station.



Legend

- Pumping Station
- Existing Sewer
- Upgrades Required
- Rural Settlement Area
- Expansion to Airport
- Potential Urban Boundary Expansion
- Potential New Business Park
- Intensification Area
- Niagara Escarpment
- Greenbelt
- Urban Boundary

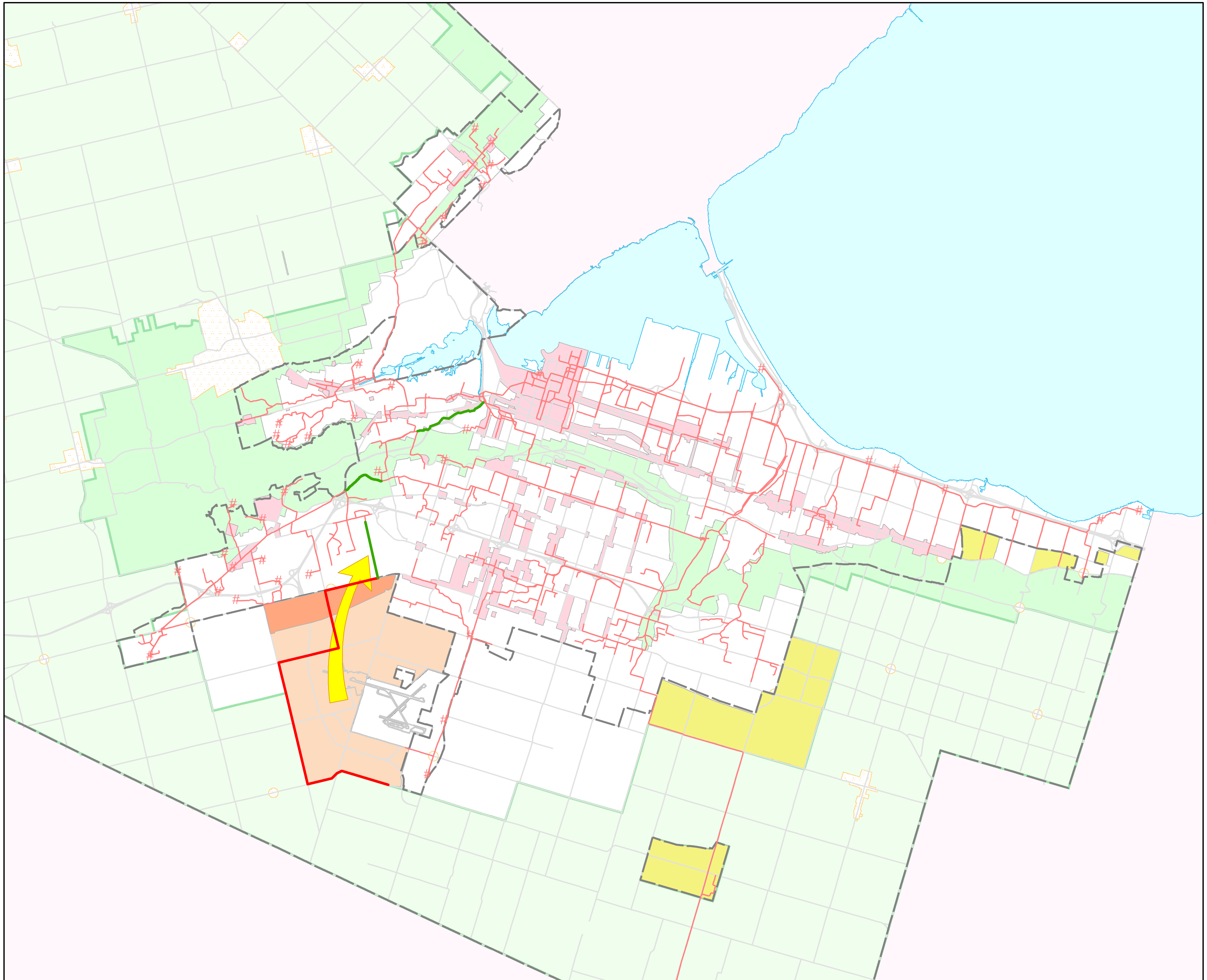
Hamilton

Integrated Water & Wastewater Master Plan

South-East Mountain Wastewater Servicing

Alternative 1

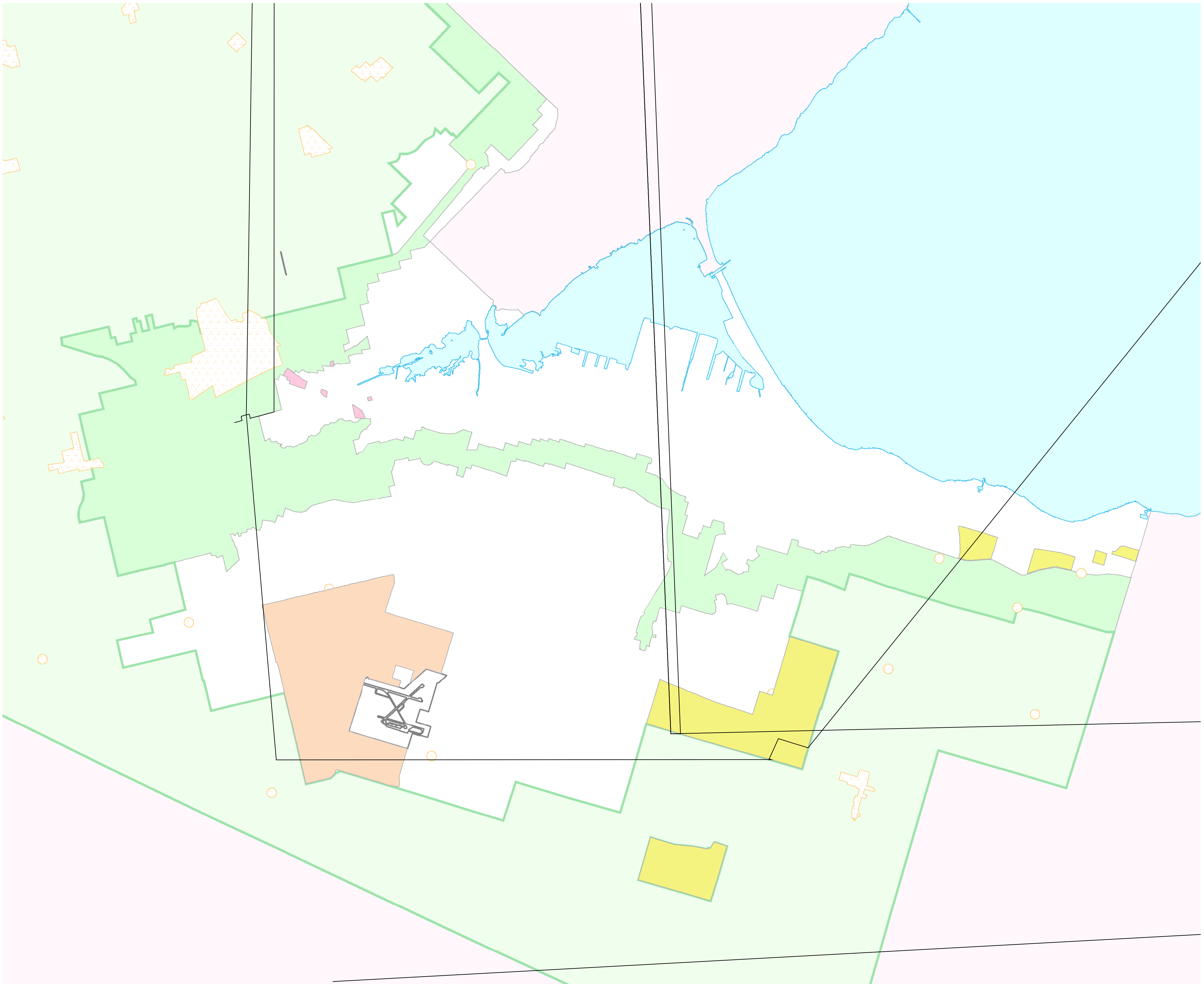
Nov 22, 2006
1:125,000
2590-D-61

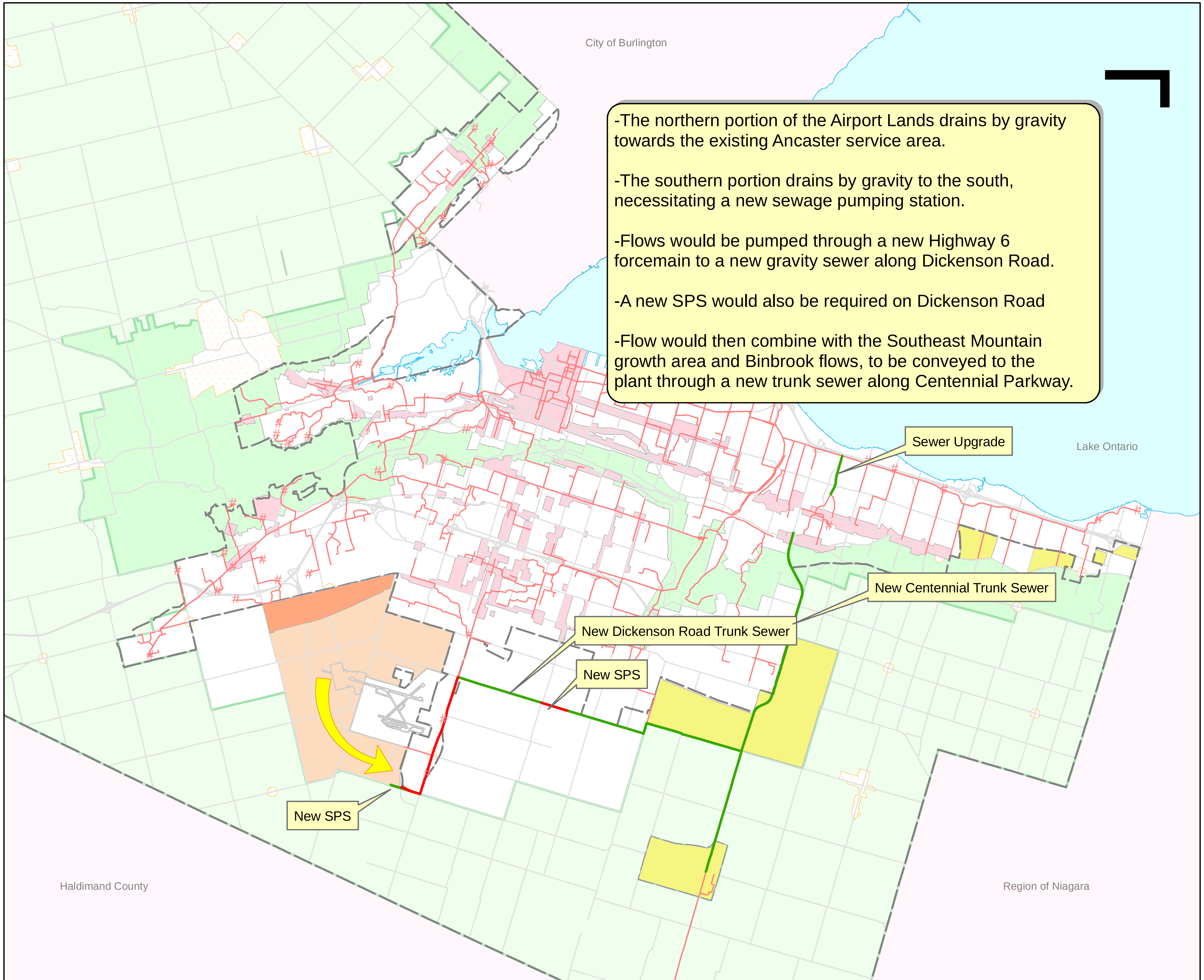


Airport Lands
Wastewater Servicing

Alternative 1a

Nov 22, 2006
1:125,000
2590-D-60





Legend

- Pumping Station
- Existing Sewer
- Upgrades Required
- Rural Settlement Area
- Potential Urban Boundary Expansion
- Gravity flow to new SPS
- Gravity flow to Ancaster
- Intensification Area
- Niagara Escarpment
- Greenbelt
- Urban Boundary

Integrated Water & Wastewater Master Plan

Airport Lands
Wastewater Servicing

Alternative 3

KMK Consultants Limited

Figure 21

Nov 22, 2006
1:125,000
2590-D-62

Table 40 Information Matrix of Airport Lands Wastewater Servicing Alternatives

Evaluation Criteria	AIRPORT LANDS WASTEWATER SERVICING ALTERNATIVE 1a	AIRPORT LANDS WASTEWATER SERVICING ALTERNATIVE 1b	AIRPORT LANDS WASTEWATER SERVICING ALTERNATIVE 2	AIRPORT LANDS WASTEWATER SERVICING ALTERNATIVE 3
Description	i Airport Lands drains by gravity to a new sewage pumping station in the southeast. i Flows are pumped through the Ancaster system to the Western Interceptor.	i Airport Lands drains by gravity to two new sewage pumping stations; one in the southeast corner, and the other in about the middle of the growth area. i Flows are pumped through the Ancaster system to the Western Interceptor.	i Airport Lands drains by gravity to a new sewage pumping station in the southeast. i Flows are pumped to the existing Highway 6 system, and eventually to the Red Hill Creek Sanitary Interceptor.	i Airport Lands drains by gravity to a new sewage pumping station in the southeast. i Flows are pumped to the existing Highway 6 system, and then along Dickenson Road to a new Centennial Parkway trunk sewer.
Natural Environment Factors	i Requires constructing a gravity sewer under the Welland River in the southeast of the Airport Lands. i 15 new creek crossings required along forcemain route. i Increased flows to the Western Interceptor could result in additional sanitary sewage overflow events to Hamilton Harbour.	i Requires constructing a gravity sewer under the Welland River in the southeast of the Airport Lands. i 15 new creek crossings required along forcemain route. i Increased flows to the Western Interceptor could result in additional sanitary sewage overflow events to Hamilton Harbour.	i Requires constructing a gravity sewer under the Welland River in the southeast of the Airport Lands i 11 creek crossings along Highway 6 would need to be upgraded. i 1 new creek crossing required along Highway 6.	i Requires constructing a gravity sewer under the Welland River in the southeast of the Airport Lands. i 11 new creek crossings required along Highway 6 and Dickenson Road.
Socio-Cultural Factors	i Upgrading the existing system will cause temporary disruptions in developed areas of Ancaster.	i Upgrading the existing system will cause temporary disruptions in developed areas of Ancaster.	i Upgrading the existing system will cause temporary disruptions along the busy Highway 6 corridor, from Chippewa Road to Twenty Road (7 km).	i Upgrading the existing system will cause temporary disruptions along the busy Highway 6 corridor, from Chippewa Road to Dickenson Road (5 km). i Building new systems will cause temporary disruptions along rural routes (Dickenson Road).
Legal-Jurisdictional Factors	i A property will be required for a pumping station in the southeast corner of the Airport Lands. i Easements might be required for forcemains and gravity sewers.	i A property will be required for a pumping station in the southeast corner of the Airport Lands. i A property will be required for a second pumping station near the intersection of Fiddler s Green Road and Book Road. i Easements might be required for forcemains and gravity sewers.	i A property will be required for a pumping station in the southeast corner of the Airport Lands.	i A property will be required for a pumping station in the southeast corner of the Airport Lands. i A property will be required for a second pumping station along Dickenson Road.
Technical Factors	i Airport Lands serviced through a single high-capacity sewage pumping station. i High-capacity forcemain will be extremely long (approximately 11 km).	i Constructing two pumping stations will facilitate the phasing of development i While the total forcemain length would remain approximately 11 km, having two pumping stations would shorten the length of the high-capacity forcemain (to approximately 6.5 km).	i Airport Lands serviced through a single high-capacity sewage pumping station. i The three existing pumping stations along Highway 6 will require substantial upgrades. i SITE CAPACITIES AT EXISTING SEWAGE PUMPING STATIONS ARE A SIGNIFICANT CONSTRAINT. THIS ALTERNATIVE IS NOT FEASIBLE.	i Airport Lands serviced through a single high-capacity sewage pumping station. i Moderate forcemain length of approximately 4 km. i This alternative can be combined with the South-East Mountain servicing. i Provides for future servicing of the South Mountain lands.
Economic Factors	i Approximate capital cost: $25.4M. i High annual operating costs.	i Approximate capital cost: $28.5M. i High annual operating costs.	i Approximate capital cost: $36.2M. i Moderate annual pumping costs as there is an opportunity to take advantage of gravity flow along some stretches of Highway 6.	i Approximate capital cost: $37.6M. i Moderate annual pumping costs due to the decreased length of forcemains.
Overall Alternative Rank	◑	◑	○	●

Most Preferred ● ◕ ◑ ◔ ○ **Least Preferred**

14.4 COMBINED SEWER OVERFLOW CONTROL

Much of the older areas of the City still utilize a single pipe for the collection of both sanitary wastewater emanating from homes and businesses, and storm water runoff. As discussed in earlier sections of the document, the true wastewater flow rate is readily predictable and consistent over time. The rate of wastewater flow varies throughout the day reflecting both the peak hourly domestic usage and recurring industrial-commercial patterns. In separated systems the conveyance capacity and downstream treatment would be based on all flows being contained within the system.

The rate of flow in a storm system, or combined system , is directly related to the rainfall intensity and duration. Storm events are characterized by return frequency or the probability of the same magnitude of the storm event recurring within a specified number of years, i.e. a 5 or 10 year storm is statistically likely to occur only once in 5 and 10 years respectively. Stormwater flows are usually much larger then sanitary wastewater flows generated in the same land area, and to achieve economically viability, the capacity allowed for storm flow has been set at a 5 year storm, with the knowledge and expectation that the system will overflow or surcharge during larger storms.

In Hamilton, the larger rainfall events result in greater dilution of the wastewater constituents, but also result in overflow. Over the past 10 years, the City has worked proactively to address this and has built six CSO tanks, with a seventh tank and in-line storage facility under construction to store this excess flow and re-pump it back to the trunk sewer once the storm has subsided. However, there are still a number of uncontrolled overflow locations. Following the completion of these two additional projects, 11 uncontrolled CSO outfalls will remain.

14.4.1 MOE Procedure F-5-5 and HHRAP

Going forward, the design criteria for the collection system previously detailed, adopts the requirements of MOE Policy F-5-5 and HHRAP targets.

Notwithstanding the requirements of the follow-on studies, the approach adopted for the collection system to ensure compliance with the City s policies, including meeting F-5-5 and HHRAP requirements will have a direct impact on the plant flows, loadings and operations.

14.4.2 2031 Modelling Results

Wastewater modelling results for the 2031 preferred growth alternative indicate that the City will not be in compliance with Procedure F-5-5, based on the current collection system attributes and rainfall patterns of 1988, which has been previously identified as an average rainfall year.

While the modelling results indicate that 90% control of wet-weather flows can be achieved with system upgrades, the following were reported, in contravention of the City s CSO policy:

- CSOs are reported by the model during dry-weather conditions
- 26 CSO events were reported at the Birch CSO

- 7 CSO events were reported at the Parkdale CSO
- 26 CSO events were reported at the Dunn CSO
- 8 CSO events were reported at the Sterling CSO.

The modelling results also indicate that dry weather flow may also be discharged before the full capabilities of the Woodward Ave. WWTP are exceeded.

While additional CSO tanks have been previously identified as viable options at these locations, there are additional options that should be considered.

14.4.3 Alternative Solutions

Based on the City s commitment to F-5-5, and the results of the modelling exercises to date, the preferred solution will incorporate the optimum balance of collection system and treatment plant upgrades.

The range of collection system upgrades should consider, but not be limited to, the following CSO control options:

- Local improvements to control structures
- Construction of additional CSO tanks
- Constructing additional conveyance capacity.

It is recommended that the assessment of CSO control options cover the entire study area provided in Figure 22.

Further details regarding the individual CSO control options are addressed in the following paragraphs.

Local Improvements to Control Structures

The combined system modelling results indicate that there are instances where flows in the combined sewer are bypassing the Western Sanitary Interceptor and discharging into Hamilton Harbour before the hydraulic capacity of the connections to the Interceptor are reached. This situation even occurs in situations when the Interceptor has not reached its peak conveyance capacity. This indicates that some CSO events appear to be triggered by hydraulic constraints within the flow regulator structures, and not necessarily by capacity limitations within the collection system.

A field program should be established in order to confirm the elevations of each of the CSO control weirs within the combined sewer system. These should then be compared with the elevations in the hydraulic model to establish whether the reported dry-weather CSO events are the result of inaccurate system information. Based on the results of the inspection program and future modelling scenarios, it might be possible to adjust the elevations of some of the weirs in order to assist in meeting F-5-5.

While it is not expected that local improvements to control structures will provide a complete solution, it may reduce the extent and cost of other required improvements.

Construction of Additional CSO Tanks

Modelling results have indicated that the existing CSO tanks are an effective means of controlling CSO discharges at the locations within the system where they have already been constructed. As such, it is anticipated that construction of additional CSO tanks would allow the City to meet F-5-5.

There are, however, operational concerns with installing CSO tanks. Wastewater system operators have indicated that it is sometimes difficult to empty the existing tanks within 48 hours due to prolonged periods of elevated flows through the WWTP. If the tanks aren t emptied before a second event occurs, the potential of a CSO bypass occurring increases. Also, when wastewater is stored for extended periods, the potential for growth of filamentous organisms exists. These can compromise treatment efficiency, and lead to elevated effluent loadings to the Harbour.

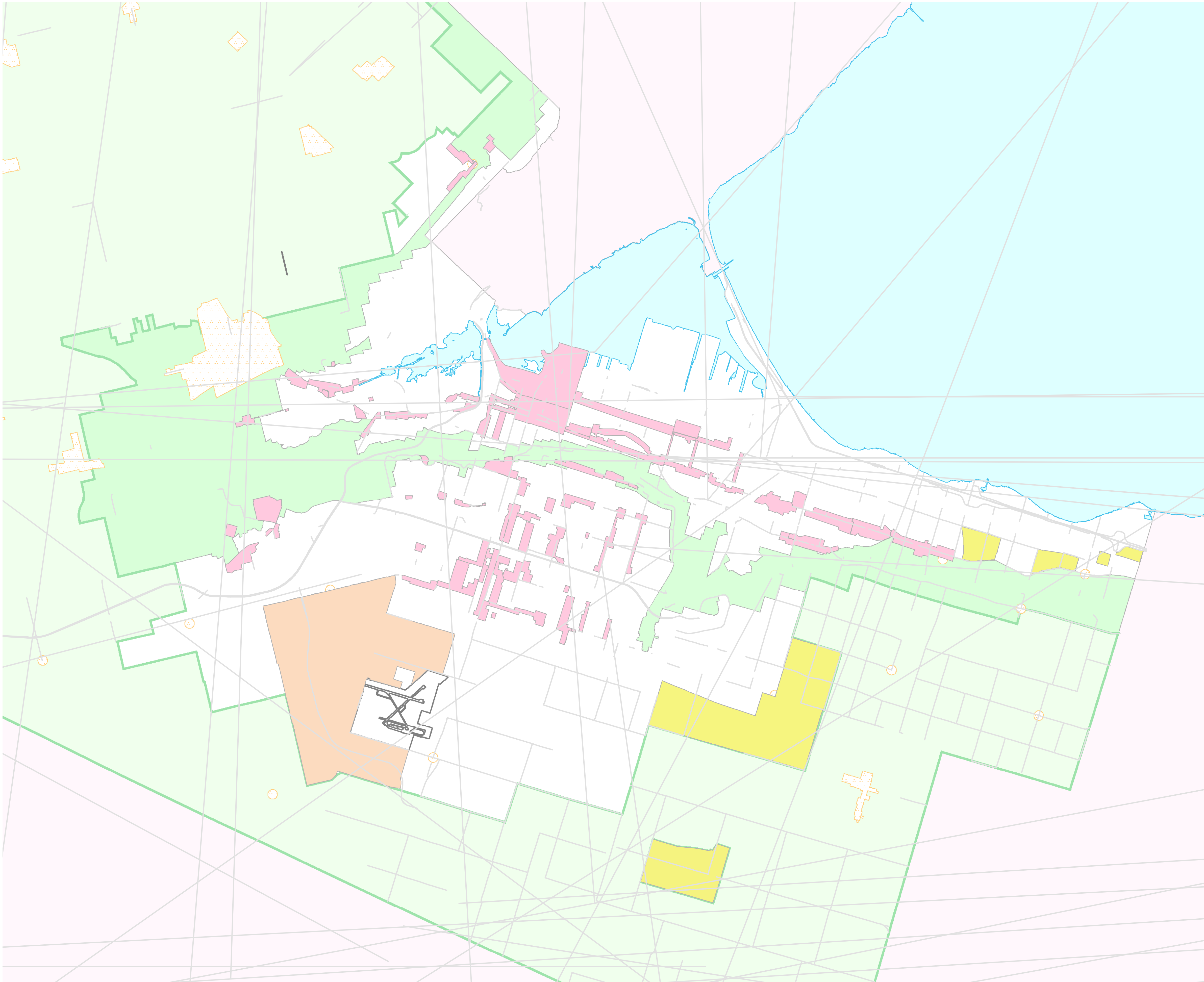
Adding additional tanks will make it more difficult to ensure that all of the tanks are drained in a timely matter, and this in turn will be made more challenging by the increase in dry-weather flows in the Interceptor associated with the population growth within the Western Interceptor service area.

Construction of Additional Conveyance Capacity

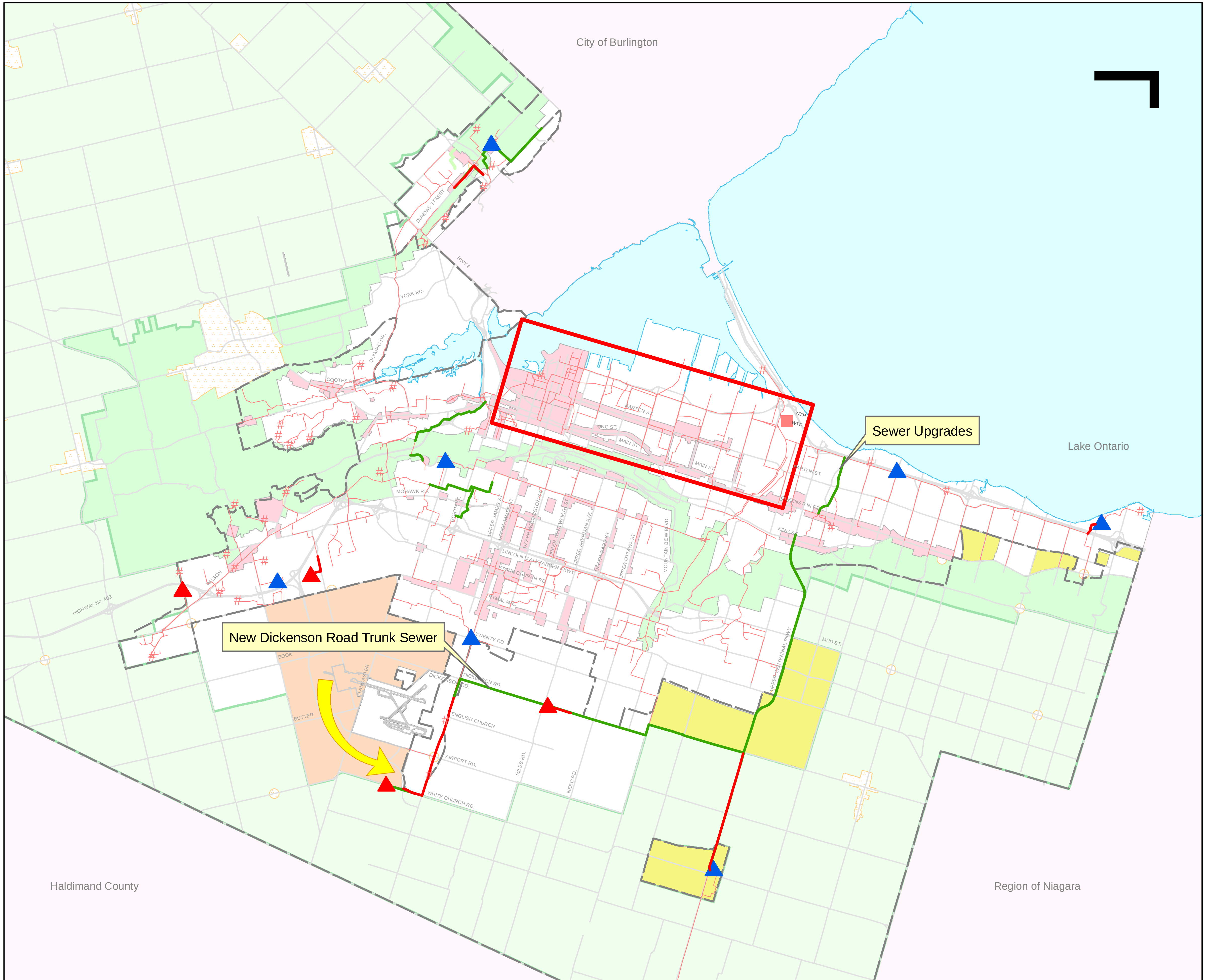
Construction of additional conveyance capacity paralleling the existing trunk sewer has also been shown through model simulations to be an effective solution to eliminating CSOs at specific outfall locations. While it avoids the potential operational issues related to storing wastewater in CSO tanks for an extended period, it might not result in an increased treatment volumes. While intercepting additional CSO flows and conveying them to the plant site provides an opportunity for the wastewater to be treated rather than stored, the additional flows will exceed the capacity of the plant and be bypassed at this location.

14.4.4 Preferred System Upgrades

Given that the wastewater treatment plant upgrades and some of the potential collection system upgrades are subject to further requirements of the Class EA process, it is determined that the optimum balance of system upgrades be established through the follow on Phases 3 and 4.



KMK Consultants Limited



Legend

- Pumping Station
- New SPS
- SPS Upgrades Required
- Existing Sewer
- New or Upgraded Gravity Sewer
- New or Upgraded Forcemain
- Rural Settlement Area
- Potential Urban Boundary Expansion
- Potential New Business Park
- Intensification Area
- Niagara Escarpment
- Greenbelt
- Urban Boundary

Hamilton

Integrated Water & Wastewater Master Plan

Wastewater Servicing

Recommended Preferred Solution

KMK Consultants Limited

Figure 24

Nov 22, 2006

1:125,000

2590-D-69

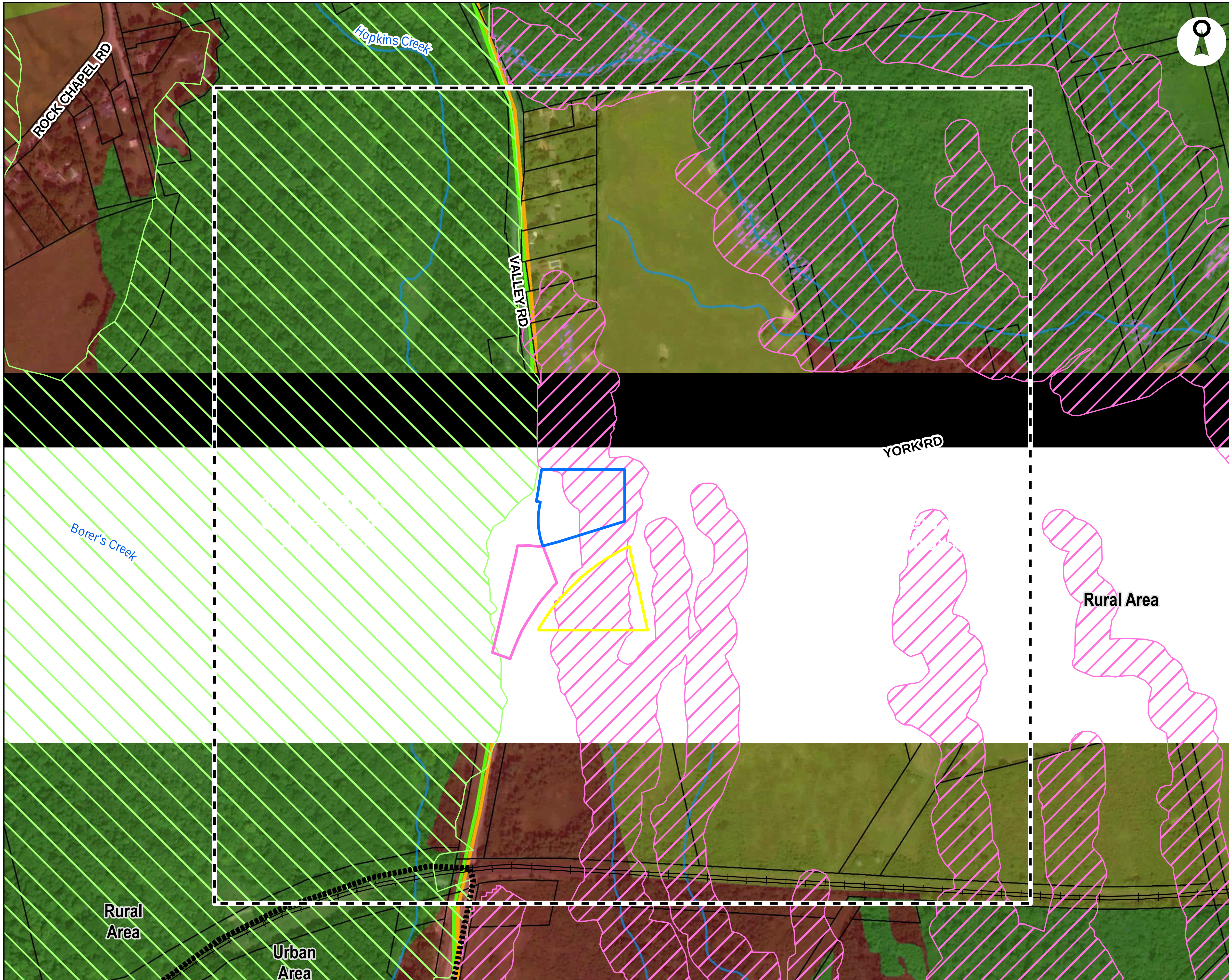
16. IMPLEMENTATION

The preferred servicing strategies will support the short and long term servicing needs of the approved growth areas as well as addressing Hamilton Harbour water quality and provide flexibility for servicing potential growth areas in the future.

Under the Municipal Class EA, the Schedule A projects are pre-approved and may proceed to implementation. Upon completion of the master plan or Phase 2 of the EA process, Schedule B may proceed to Phase 5, Implementation, subject to finalization of the 30 day review period and assuming no Part II Orders (bump ups) are received. Schedule C projects must complete Phases 3 & 4 of the EA process prior to proceeding to implementation.

This Notice of Completion for this Master Plan is issued with respect to Schedule B projects only which include the following:

Project	Location
Wastewater	
HC018 - Twenty Road SPS Upgrade and Twin Forcemain	Hamilton Mountain
Mountain Brow Trunk Sewer	Waterdown
DC014 - First Street SPS	Waterdown
Hwy 403 Trunk Sewer Twinning - Royal to Main-King	Hamilton
Ancaster-to-Fennell Trunk Sewer Twinning	Hamilton Mountain
Centennial Trunk Sewer	Hamilton/Hamilton Mountain
HC058 - Binbrook SPS Upgrade	Binbrook
HC056 - Green Road SPS Upgrade and Twin Forcemain	Stoney Creek
Decommission Waterdown WWTP	Waterdown
New Waterdown SPS and Forcemain at WWTP	Waterdown
Airport Lands SPS and Hwy 6 Forcemain	Hamilton Mountain
Hwy 6 Trunk sewer	Hamilton Mountain
Decommission Harmony Hall SPS	Ancaster
Dickenson Road trunk sewer	Hamilton Mountain
Dickenson Road SPS and Forcemain	Hamilton Mountain
HC053 New Shaver Road SPS	Ancaster
HC002 Scenic SPS Upgrade	Hamilton Mountain
HC011 Calvin Street SPS Upgrade	Ancaster



Legend

- Study Area
- Rail Track
- Watercourse
- Unevaluated Wetland
- Parcel
- Boundary between Rural and Urban Hamilton Official Plan Policy Areas
- Halton Region Conservation Authority Regulated Area
- Hamilton Conservation Authority Regulated Area
- Halton Region Conservation Authority Regulated Area
- Hamilton Region Conservation Authority Regulated Area

Niagara Escarpment Plan Designation

- Escarpment Natural Area
- Escarpment Protection Area
- Escarpment Rural Area

Alternative

- W-WS-3a
- W-WS-3b
- W-WS-3c

0 50 100 200 300
Metres

Hamilton HD016 EA

Policy Areas

May 16, 2022	1:5,000 * when printed 11"x17"	Datum: NAD 1983 UTM Zone 17N Source: MNRF, MECP, City of Hamilton, DFO Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c)
P#: 60656498	V: 00	**Figure 2**

ELC

Inclusion:		Code:	
Complex:		Code:	

Note: Depth to mottles and ley is measured from the top of the mineral soil only.

Roadside/edge survey only ☑

NOTE
- Candidate roosting habitat -> some trees with loose bark observed (dead ash snags). However, most trees within feature are between 10-24 cm dbh and did not posses suitable roosting features.

RACOON TRACKS

(elc community description/forms/1-gil-forms/042004)

Pg 5 of 5

ELC Community Description and Classification

Site: HD016	Map #:	Polygon: W-US-3C
Surveyor(s): AM / BM	Date: April 6, 2022	Time start: finish:
UTMZ:	UTEZ:	UTMN:

Polygon Description

System	Substrate	Topographic Feature	Plant Form	Community
☑ Terrestrial	☐ Organic	☐ Lacustrine	☐ Plankton	☐ Lake
☐ Wetland	☑ Mineral Soil	☐ Riverine	☐ Submerged	☐ Pond
☐ Aquatic	☐ Parent Min.	☐ Bottomland	☐ Floating-LVD.	☐ River
Site	☐ Acidic Bedrk	☐ Terrace	☑ Graminoid	☐ Stream
☐ Open Water	☐ Basic Bedrk	☐ Valley Slope	☑ Forb	☐ Marsh
☐ Shallow Water	☐ Carb. Bedrk	☐ Tableland	☐ Lichen	☐ Swamp
☑ Surficial Dep.		☑ Roll. Upland	☐ Bryophyte	☐ Fen
☐ Bedrock		☐ Cliff	☐ Deciduous	☐ Bog
History		☐ Talus	☐ Coniferous	☐ Barren
☐ Natural		☐ Crevice/Cave	☐ Mixed	☐ Meadow
☑ Cultural		☐ Alvar		☐ Prairie
Cover		☐ Rockland		☑ Thicket
☐ Open		☐ Beach / Bar		☐ Savannah
☑ Shrub		☐ Sand Dune		☐ Woodland
☐ Treed		☐ Bluff		☐ Forest
				☐ Plantation

Stand Description

Layer	HT	CVR	Species in Order of Decreasing Dominance (up to 4 sp) (>> Much Greater Than; > Greater Than; = About Equal To)
1 >10			
2 2-10 m			
0.5 - 2 m			
0 - 0.5 m	2	1	FRA AMER
0 (surface)	3	1	RHA CATH > FRA AMER
0 - 0.5 m deep	4	3	RHA CATH >> COR RACE >
> 0.5 m deep	6	4	BRO INER > POA SP. >> SYMPHYOTRICHUM sp > Solidago sp

HT Codes: 7 <0.2m 6 >0.2-0.5m 5 >0.5-1m 4 >1-2m 3 >2-6m 2 >6-25m 1 >25m
CVR Codes: 0 = none 1 0% - 10% 2 10 - 25% 3 25 - 60% 4 > 60%

Size Class Analysis		<10		10-24		25-50		>50
Standing Snags		<10		10-24		25-50		>50
Deadfall / Logs		<10		10-24		25-50		>50

Abundance Codes: N = None R = Rare O = Occasional A = Abundant

Com. Age: ☐ Pioneer ☑ Young ☐ Mid-Age ☐ Mature ☐ Old Growth

Ecosite:		Code:	
Vegetation Type:	Mineral cultural thicket	Code:	CUT1
Inclusion:		Code:	
Complex:		Code:	

Roadside/edge survey only ☑

Song sparrow

→ candidate loggerhead shrike habitat

Layers: 1 = Canopy 2 = Subcanopy 3 = Understory 4 = Ground Layer
Abundance Codes: D = Dominant A = Abundant O = Occasional R = Rare N = None

Species	Layer 1	Layer 2	Layer 3	Layer 4	C
FRA AMER		R			
RHA CATH			F		
COR RACE			O		
BRO INER				F	
POA SP				F	
Solidago sp				F	
SYMPHYOTRICHUM				F	
ACE PLAT		R			
DAU CARO				O	

Species	Layer	C

Soils

UTM:	
Depth to bedrock:	Depth of organics:
Depth to mottles:	Depth to gley:
Texture:	Moisture Regime:
UTM:	
Depth to bedrock:	Depth of organics:
Depth to mottles:	Depth to gley:
Texture:	Moisture Regime:

Note: Depth to mottles and ley is measured from the top of the mineral soil only.

Appendix B.2 Aquatic Habitat Assessment Field Notes

Field Investigations

AECOM

Watercourse Field Record Form

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60656498	Hamilton H0016 - EA Addendum	06	04	2022

Is STREAM REALIGNMENT required for this section: ☐ Yes ☐ No ☒ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
BM	Mix of Sun; Cloud/light wind	10:30	11:00

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
~ 8°C	—	—

PHOTO NUMBERS AND DESCRIPTIONS: See Photo Log on back.

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Unnamed Trib.	Borer's Ck Subwatershed - HCA North Cootes Paradise Watershed - CH	—	—

LOCATION OF CROSSING: York Rd e Valley Rd, Dundas, ON

GPS COORDINATES:	MTO CHAINAGE:
587198 E / 4793625 N	—
TOWNSHIP: Dundas	**MNR DISTRICT:** Guelph.

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Rd ROW / Municipal PS / Royal Botanical Land e/s / ~~co~~ public / residential	Runoff / Garbage

EXISTING STRUCTURE TYPE

Bridge ☐	Box Culvert ☐	Open Foot Culvert ☐	CSP ☒	N/A ☐

Other ☐ Describe: | Size (w x h) m² 600mm. - corroded.

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER: Option B/C | SECTION LOCATION: (include on habitat map) U/S

TYPE:	Stream/River	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	☐	☒	☐	☐	☐	Unknown u/s. (No PTE)

TOTAL SECTION LENGTH (m): 20m (No PTE) | CURRENT VELOCITY (m/s): —

SUB-SECTION(S)	Run ☒	Pool ☒	Riffle ☒	Flats ☐	Inside Culvert ☐	Other
Percentage of Area	70.	20	10			
Mean Depth Wetted (m)	0.02m	0.04m	0.01m			
Mean Width Wetted (m)	0.2m.	0.3.m	0.2.m.			
Mean Bankfull Width (m)	1.5-2.0m					
Mean Bankfull Depth(m)	0.6-0.7m					
Substrate	Sa/Mu/Co/Bo.					

Bedrock	Boulder	Cobble	Gravel	Sand	Silt	Clay	Muck	Detritus
Br	Bo	Co	Gr	Sa	Si	Cl	Mu	D

AECOM

Watercourse Field Record Form

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	☐	☒	☐	☐
Right Upstream Bank	☐	☒	☐	☐

HABITAT

IN-STREAM COVER (% surface area):	Undercut Banks	Boulders	Cobble	Woody Debris	Organic Debris	Vascular Macrophytes	None
	—	—	5	Instream 5 Overhanging 10	10	Instream — Overhanging 10	60.

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	☐	☐	☒	☐	☐

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
				0.
Predominant Species				

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Low flow / High flow	None.

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	None	None	None

POTENTIAL ENHANCEMENT OPPORTUNITIES:

stabilize eroding banks

COMMENTS:

Meander channel originating from CSP culvert draining upland area - cannot assess (No PTE) ~20m u/s of xing. Scour & bank erosion noted throughout - likely seasonal high flows. Predominately Sand/Muck substrate with some cobble. Some veg. (terr.) through channel with overhanging canopy for cover (substantial in summer). Low flow @ time of assessment. Steeply sloping banks - both sides. Side channel outlets @ culvert - conveys flow from along edge of ROW.

Additional Notes Appended? ☒ No ☐ Yes   Number of Pages 4

Aquatic Photographic Log

Client Name:	Report Name	Project No.
City of Hamilton	HD016 Pumping Station Municipal Class Environmental Assessment Addendum – Natural Environment Report	60656498

Photograph 1.
View looking south toward the existing HD016 pumping station (W-WS-3a) from the northwest corner of the property.

Photograph 2.
View looking northwest toward vegetated drainage swale along west side of Valley Road, immediately north of the existing HD016 pumping station (W-WS-3a).

Photograph 3.
View looking southeast toward vegetated drainage swale along west side of Valley Road, in front of the entrance to the existing HD016 pumping station (W-WS-3a).

Photograph 4.
View looking north toward outlet of corrugated steel culvert crossing Valley Road at the York Road intersection.

Photograph 5.
View looking south toward vegetated drainage swale along west side of York Road, immediately east of the existing HD016 pumping station (W-WS-3a).

Photograph 6.
View looking south toward inlet of corrugated steel pipe culvert crossing entrance to off-leash dog park, immediately south of the existing HD016 pumping station (W-WS-3a).

Photograph 7.
View looking northeast toward open field on north side of W-WS-3b, east of Valley Road.

Photograph 8.
View looking southeast toward open field on south side of W-WS-3b, east of Valley Road.

Photograph 9. ↑
View looking north toward vegetated drainage swale along east side of Valley Road, on the west side of W-WS-3b.

Photograph 10. ↑
View looking east toward vegetated drainage swale along the south boundary of W-WS-3b and the York Road Right-of-Way.

Photograph 11. ↑
Close-up of corrugated steel pipe culvert inlet and the unnamed watercourse on the north side of York Road, immediately downstream from W-WS-3b.

Photograph 12. ↑
View looking north toward unnamed watercourse on the north side of York Road, immediately downstream of W-WS-3b.

Photograph 13. ↑
View looking south through W-WS-3c and toward unnamed watercourse downstream of the York Road crossing.

Photograph 14. ↑
View looking east along south side of York Road and toward vegetated drainage swale which drains to the unnamed watercourse within W-WS-3c.

Photograph 15. ↑
View looking west toward sloped, vegetated land on the south side of the York Road crossing. The existing HD016 pumping station (W-WS-3a) is visible in the background.

Photograph 16. ↑
Close-up of bank failure above the corrugated steel pipe culvert on the downstream end of the York Road crossing.

Photograph 17.
View looking south through W-WS-3c and toward unnamed watercourse downstream of the York Road crossing.

Photograph 18.
Close-up of corrugated steel pipe culvert outlet, downstream of the York Road crossing within W-WS-3c.

Photograph 19.
View looking southeast toward right upstream bank of unnamed watercourse within W-WS-3c.

Photograph 20.
View looking southwest toward left upstream bank of unnamed watercourse within W-WS-3c.

Appendix D. Plant List

Appendix D: Vascular Plant List

Botanical Name		Plant Species Information													Alternative:	W-WS-3a	W-WS-3a	W-WS-3b	W-WS-3c	W-WS-3c
Common Name	Scientific Name	Family	CC	CW	Native Status	Invasive (Y/N)	Tall-grass Species (Y/N)	SRANK	NRANK	GRank	COSEWIC	SARO	HM	7E4	ELC Code:	Manicured Lawn	CUW1	CUM1-1	CUW1(2)	CUT1
Manitoba Maple	Acer negundo	Aceraceae	0	0	I	Y		S5	N5	G5			C	IC				X		
Norway Maple	Acer platanoides	Aceraceae	0	5	I	Y		SE5	NNA	GNR			IX	IC		X		X	X	X
Silver Maple	Acer saccharinum	Aceraceae	5	-3	N	N		S5	N5	G5			C	X		X				
Sugar Maple	Acer saccharum	Aceraceae	4	3	N	N		S5	N5	G5			C	C					X	
Staghorn Sumac	Rhus typhina	Anacardiaceae	1	3	N	N		S5	N5	G5			C	C			X			
European Swallowwort	Vincetoxicum rossicum	Apocynaceae	0	5	I	Y		SE5	NNA	GNR			IX	IC			X			
Aster species	Symphyotrichum sp	Asteraceae	0	0	0	0	0	0	0	0						X	X	X		X
Bull Thistle	Cirsium vulgare	Asteraceae	0	3	I	N		SE5	NNA	GNR			IX	IC				X		
Common Burdock	Arctium minus	Asteraceae	0	3	I	N		SE5	NNA	GNR			IC	IC				X		
Common Dandelion	Taraxacum officinale	Asteraceae	0	3	I	N		SE5	N5	G5			IC	IC		X	X			
Common Yarrow	Achillea millefolium	Asteraceae	0	3	I	N	Y	SE5?	NNR	G5			IX	IX					X	
Golden Tickseed	Coreopsis tinctoria	Asteraceae	0	3	I	N		SE1	N5	G5			0	0				X		
Goldenrod species	Solidago sp	Asteraceae	0	0	0	0	0	0	0	0						X	X	X	X	X
Great Burdock	Arctium lappa	Asteraceae	0	3	I	N		SE5	NNA	GNR			IX	IC		X				
Dame's Rocket	Hesperis matronalis	Brassicaceae	0	3	I	Y		SE5	NNA	G4G5			IC	IC		X				
Garlic Mustard	Alliaria petiolata	Brassicaceae	0	0	I	Y		SE5	NNA	GNR			IC	IC		X	X		X	
Tatarian Honeysuckle	Lonicera tatarica	Caprifoliaceae	0	3	I	Y		SE5	NNA	GNR			IX	IC			X		X	
Grey Dogwood	Cornus racemosa	Cornaceae	2	0	N	N		S5	N5	G5			C	C		X	X	X	X	X
Eastern Red Cedar	Juniperus virginiana	Cupressaceae	4	3	N	N		S5	N5	G5			C	U				X		
Common Teasel	Dipsacus fullonum	Dipsacaceae	0	3	I	Y		SE5	NNA	GNR			IX	IC		X		X	X	
Black Locust	Robinia pseudoacacia	Fabaceae	0	3	I	Y		SE5	NNA	G5			IC	IC		X	X		X	
Bitternut Hickory	Carya cordiformis	Juglandaceae	6	0	N	N		S5	N5	G5			C	C			X			
Black Walnut	Juglans nigra	Juglandaceae	5	3	N	N		S4?	N4?	G5			C	C			X	X	X	
Ash species	Fraxinus sp	Oleaceae	0	0	0	0		0	0	0							X			
White Ash	Fraxinus americana	Oleaceae	4	3	N	N		S4	N5	G5			C	C			X	X		X
Blue Spruce	Picea pungens	Pinaceae	0	3	I	N		SE1	NNA	G5			IR	0		X				
Eastern White Pine	Pinus strobus	Pinaceae	4	3	N	N		S5	N5	G5			C	C					X	
Red Pine	Pinus resinosa	Pinaceae	8	3	N	N		S5	N5	G5			R	R		X				
White Spruce	Picea glauca	Pinaceae	6	3	N	N		S5	N5	G5			C	U		X			X	
English Plantain	Plantago lanceolata	Plantaginaceae	0	3	I	N		SE5	NNA	G5			IC	IC		X				
Common Panicgrass	Panicum capillare	Poaceae	0	0	N	N		S5	N5	G5			C	U				X		
Kentucky Bluegrass	Poa pratensis	Poaceae	0	3	N	N		S5	N5	G5			0	0		X	X	X	X	X
Orchard Grass	Dactylis glomerata	Poaceae	0	3	I	N		SE5	NNA	GNR			IC	IC				X		
Smooth Brome	Bromus inermis	Poaceae	0	5	I	Y		SE5	NNA	G5			IC	IC		X		X	X	X
Yellow Indiangrass	Sorghastrum nutans	Poaceae	8	3	N	N	Y	S4	N4N5	G5			R	R				X		
European Buckthorn	Rhamnus cathartica	Rhamnaceae	0	0	I	Y		SE5	NNA	GNR			IC	IC		X	X	X	X	X
American Woodland Strawberry	Fragaria vesca ssp. americana	Rosaceae	4	3	N	N		S5	N5	G5T5			C	C		X		X		X
Black Raspberry	Rubus occidentalis	Rosaceae	2	5	N	N		S5	N5	G5			C	C		X	X			
Cherry species	Prunus sp	Rosaceae	0	0	0	0	0	0	0	0						X		X		
Red Raspberry	Rubus idaeus	Rosaceae	2	3	N	N		S5	N5	G5			0	0			X			
Wood Avens	Geum urbanum	Rosaceae	0	5	I	Y		SE3	NNA	G5			IX	IX				X		
Willow species	Salix sp	Salicaceae	0	0	0	0	0	0	0	0						X				
Narrow-leaved Cattail	Typha angustifolia	Typhaceae	0	-5	I	Y		SE5	N5	G5			IX	IC				X		
Elm species	Ulmus sp	Ulmaceae	0	0	0	0	0	0	0	0	0	0	0				X			
Riverbank Grape	Vitis riparia	Vitaceae	0	0	N	N		S5	N5	G5			C	C		X		X	X	

AECOM

Glossary

Rarity Ranks	
RANK	**DEFINITION**
EXP	**Extirpated -** A wildlife species that no longer exists in the wild in Canada, but exists elsewhere.
END	**Endangered -** A wildlife species facing imminent extirpation or extinction.
THR	**Threatened -** A wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.
SC	**Special Concern** - A wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats.

SARO Status	
RANK	**DEFINITION**
EXP	**Extirpated** -A species that no longer exists in the wild in Ontario but still occurs elsewhere.
END	**Endangered -** A species facing imminent extinction or extirpation in Ontario.
THR	**Threatened -** A species that is at risk of becoming endangered in Ontario if limiting factors are not reversed.
SC	**Special Concern** - A species with characteristics that make it sensitive to human activities or natural events.

Global (G) Conservation Status Ranks	
GLOBAL RANK	**DEFINITION**
GX	**Presumed Extinct** (species) - Not located despite intensive searches and virtually no likelihood of rediscovery **Presumed Eliminated** (ecosystems, i.e., ecological communities and systems) - Eliminated throughout its range, due to loss of key dominant and characteristic taxa and/or elimination of the sites and ecological processes on which the type depends
GH	**Possibly Extinct** (species) or **Possibly Eliminated** (ecosystems) - Known from only historical occurrences but still some hope of rediscovery. Examples of evidence include (1) that a species has not been documented in approximately 20-40 years despite some searching and/or some evidence of significant habitat loss or degradation; (2) that a species or ecosystem has been searched for unsuccessfully, but not thoroughly enough to presume
G1	**Critically Imperiled -** At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other
G2	**Imperiled -** At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
G3	**Vulnerable -** At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other
G4	**Apparently Secure -** At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a
G5	**Secure -** At very low risk or extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.

Variant Global Conservation Status Ranks	
RANK	**DEFINITION**
G#G#	**Range Rank -** A numeric range rank (e.g., G2G3, G1G3) is used to indicate uncertainty about the exact status of a taxon or ecosystem type. Ranges cannot skip more than two ranks (e.g.,
GU	**Unrankable -** Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. NOTE: Whenever possible (when the range of uncertainty is three consecutive ranks or less), a range rank (e.g., G2G3) should be used to

Plant Form or Type Codes		
CODE	**FORM**	**DESCRIPTION**
FE	Fern	non-flowering, vascular plant, reproducing by spores - Pteridophytes. Including the fern allies such as
FO	Forb	herbaceous broad-leaved plant
GR	Grass	graminoid plants in the Poaceae
RU	Rush	graminoid plants in the Juncaceae
SE	Sedge	graminoid plants in the Cyperaceae
SH	Shrub	plants with erect, reclining or prostrate woody stems (usually with more than one stem)
TR	Tree	woody perennial plant having a single (1-3) stem, usually with an elongate main stem (trunk)
VI	Vine	herbaceous plant that trail, cling, or twine, and requires support to grow vertically
VW	Woody Vine	a vine with a perennial woody stem

Coefficient of Wetness				
CW VALUE	**ABBRV.**	**INDICATOR STATUS**	**% OCCUR. IN**	**DEFINITION**
-5	**OBL**	Obligate Wetland	99	Almost always occur in wetlands. With few exceptions, these plants (herbaceous or woody are found in standing water or seasonally saturated soils (14 or more consecutive days) near the surface.
-4	**FACW+**			
-3	**FACW**	Facultative Wetland	67-99	Usually occur in wetlands, but may occur in non-wetlands. These plants predominately occur with hydric soils, often in geomorphic settings where water saturates the soils or floods the soil surface at lease seasonally.
-2	**FACW-**			
-1	**FAC+**			
0	**FAC**	Facultative	34-66	Occur in wetlands and nonwetlands. These plants can grow in hydric, mesic, or xeric habitats. The occurrence of these plants in differenct habitats represents responses to a variety of environmental variables other than just hydrology, such as shade tolerance, soil pH, and elevation, and they have a wide tolerance of soil moisture conditions.
1	**FAC-**			
2	**FACU+**			
3	**FACU**	Facultative Upland	1-33	Usually occur in non-wetlands, but may occur in wetlands. These plants predominately occur on drier or more mesic sites in geomorphic settings where water rarely saturates the soils or
4	**FACU-**			
5	**UPL**	Obligate Upland	1	Almost never occur in wetlands. These plants occupy mesic to xeric non-wetland habitats. They almost never occur in standing water or saturated soils. Typical growth forms include herbaceous,

"+" or "-" signs have been attached to the three Facultative categories to express exaggerated tendencies for those species. The "+" sign denotes that the species generally has a greater estimated probability of occurring in wetlands than species having the general indicator category, but a lesser estimated probability of occurring in wetlands than those having the next higher general indicator. The"-" sign denotes that the species generally has a lesser estimated probability of occurring in wetlands than those having the general indicator status, but a greater estimated probability of occurring in wetlands

Flowering Season		
CODE	**FORM**	**DESCRIPTION**
Win	Winter	Flowers from from December through March.

GNR	**Unranked -** Global rank not yet assessed.
GNA	**Not Applicable -** A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities. A global conservation status rank may be not applicable for several reasons, related to its relevance as a conservation target. For species, typically the species is a hybrid without conservation value, or of domestic origin. For ecosystems, the type is typically non-native (e.g, many ruderal

Rank Qualifiers	
RANK	**DEFINITION**
?	**Inexact Numeric Rank -** Denotes inexact numeric rank; this should not be used with any of the Variant Global Conservation Status Ranks or GX or GH.
Q	**Questionable taxonomy that may reduce conservation priority -** Distinctiveness of this entity as a taxon or ecosystem type at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or inclusion of this taxon or type in another taxon or type, with the resulting taxon having a lower-priority (numerically higher) conservation status rank. The "Q" modifier is only used at a global level
C	**Captive or Cultivated Only** - Taxon or ecosystem at present is presumed or possibly extinct or eliminated in the wild across their entire native range but is extant in cultivation, in captivity, as a naturalized population (or populations) outside their native range, or as a reintroduced population or ecosystem restoration, not yet established. The "C" modifier is only used at a global level and not at a national or subnational level. Possible ranks are GXC

Infraspecific Taxon Global Conservation Status Ranks	
RANK	**DEFINITION**
T#	**Infraspecific Taxon** (trinomial) - The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank. Rules for assigning T-ranks follow the same principles outlined above. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1. A T subrank cannot imply the subspecies or variety is more abundant than the species, for example, a G1T2 subrank should not occur. A vertebrate animal population (e.g., listed under the U.S. Endangered Species Act or assigned candidate status) may be tracked as an infraspecific

National (N) and Subnational (S) Conservation Status Ranks	
RANK	**DEFINITION**
NX **SX**	**Presumed Extirpated** - Species or ecosystem is believed to be extirpated from the jurisdiction (i.e., nation, or state/province). Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be
NH **SH**	**Possibly Extirpated** - Known from only historical records but still some hope of rediscovery. There is evidence that the species or ecosystem may no longer be present in the jurisdiction, but not enough to state this with certainty. Examples of such evidence include (1) that a species has not been documented in approximately 20-40 years despite some searching and/or some evidence of significant habitat loss or degradation; (2) that a species
N1 **S1**	**Critically Imperiled** - At very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.
N2 **S2**	**Imperiled** - At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
N3 **S3**	**Vulnerable**— At moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
N4 **S4**	**Apparently Secure** - At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
N5	**Secure -** At very low or no risk of extirpation in the jurisdiction due to a very extensive

Spr	Spring	Flowers from mid-March through to about mid-June.
Sum	Summer	Flowers from about early June through to the end of August.
Aut	Autumn	Flowers from late August through to the end of November.

The flowering seasons, as they are used within the 'Species List' worksheet, utilize the convention applied by the Ontario Wildflowers website. The seasons are not defined in the strict calendar sense (i.e., summer starting on June 21, etc). Rather, a looser definition is used in order to more accurately characterize a species flowering phenology for southern Ontario. Species with longer flowering periods are listed as flowering during multiple seasons (e.g., Spr-Sum - flowers in the Spring and Summer seasons if it typically blooms from late May through

Climate Change Vulnerability Index (CCVI)

CCVI Score Abbreviations	
CODE	**DEFINITION**
EV	**Extremely Vulnerable** - Abundance and/or range extent within geographical area assessed extremely likely to substantially decrease or disappear by 2050.
HV	**Highly Vulnerable** - Abundance and/or range extent within geographical area assessed likely to decrease significantly by
MV	**Moderately Vulnerable** - Abundance and/or range extent within geographical area assessed likely to decrease by 2050.
LV	**Less Vulnerable** - Available evidence does not suggest that abundance and/or range extent within the geographical area assessed will increase/decrease substantially by 2050. Actual range boundaries may change.

CCVI Confidence Levels	
LEVEL	**DEFINITION**
VH	**Very High** - >90% confidence.
High	**High** - 80–90% confidence.
Mod	**Moderate** - 60 - 80% confidence.
Low	**Low** - <60% confidence.

S5	range, abundant populations or occurrences, with little to no concern from declines or threats.

Variant National and Subnational Conservation Status Ranks	
RANK	**DEFINITION**
N# **S#**	**Range Rank** - A numeric range rank (e.g., S2S3 or S1S3) is used to indicate any range of uncertainty about the status of the species or ecosystem. Ranges cannot skip more than two ranks (e.g., SU is used rather than S1S4).
NU **SU**	**Unrankable** - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
NNR **SNR**	**Unranked** - National or subnational conservation status not yet assessed.
NNA **SNA**	**Not Applicable** - A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities (e.g., long distance aerial and aquatic migrants, hybrids without conservation value, and non-native species or ecosystems
Not Provided	Species or ecosystem is known to occur in this nation or state/province. Contact the appropriate NatureServe network program for assignment of conservation status.

Rank Qualifier	
RANK	**DEFINITION**
N#? **S#?**	**Inexact Numeric Rank** - Denotes inexact numeric rank; this should not be used with any of the Variant National or Subnational Conservation Status Ranks, or NX, SX, NH, or SH.

Carolinian Status	
REGION	**DEFINITION**
HM	City of Hamilton (formerly Hamilton-Wentworth County)
HA	Halton
Ham	Hamilton
RANK	**DEFINITION**
I	introduced; thought to have been present in the Carolinian Zone or individual CZ area prior to European settlement; believed to be deliberately or inadvertently introduced to the CZ by
C	common
U	uncommon
R	rare
H	historic records only (generally >30 years)
X	present; status unknown or not specified in source lists
?	unconfirmed report
hyb	hybrid

Appendix E. Species of Conservation Concern Screening

Appendix E. Species of Conservation Concern Habitat Screening

AECOM

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Associated ELC Communities	Known Species Range[1, 2]	W-WS-3a	W-WS-3b	W-WS-3b2
Amphibians	Western Chorus Frog (Great Lakes / St. Lawrence - Canadian Shield population) *Pseudacris triseriata*	No Status	THR Schedule 1	THR	The Western Chorus Frog is primarily a lowland terrestrial species. In marshes or wooded wetland areas, it is found on the ground or in low shrubs and grass. It is a poor climber. Like all other frogs, the Western Chorus Frog requires both terrestrial and aquatic habitats in close proximity. For breeding and tadpole development, it requires seasonally dry temporary ponds devoid of predators, particularly fish. The Western Chorus Frog is very rarely found in permanent ponds. Although it uses aquatic habitat during the breeding season, the Western Chorus Frog is a poor swimmer. The species hibernates in its terrestrial habitat, under rocks, dead trees, or leaves, or in loose soil or animal burrows, even though these sites are sometimes flooded.		In Canada, the Western Chorus Frog is found in southern Ontario and southwestern Quebec. In southern Ontario, its range is bounded by the United States border in the south, Georgian Bay in the northwest, and south of Algonquin Park and up the Ottawa River valley to the vicinity of Eganville in the east. There are approximately 100 locations, divided into two distinct populations: the Carolinian population (southwestern Ontario) and the Great Lakes/St. Lawrence–Canadian Shield population (other regions of Ontario and Quebec).	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Birds	Bald Eagle *Haliaeetus leucocephalus*	SC	No Status	Not at Risk	Bald Eagles nest in a variety of habitats and forest types, almost always near a major lake or river where they do most of their hunting. While fish are their main source of food, Bald Eagles can easily catch prey up to the size of ducks, and frequently feed on dead animals, including White-tailed Deer. They usually nest in large trees such as pine and poplar. During the winter, Bald Eagles sometimes congregate near open water such as the St. Lawrence River, or in places with a high deer population where carcasses might be found.	**FOC, FOM, FOD, SWC, SWM** and **SWD**. Nests typically located near major bodies of water.	In Ontario, they nest throughout the north, with the highest density in the northwest near Lake of the Woods. Historically they were also relatively common in southern Ontario, especially along the shore of Lake Erie, but this population was all but wiped out 50 years ago. After an intensive re-introduction program and environmental clean-up efforts, the species has rebounded and can once again be seen in much of its former southern Ontario range.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Birds	Black Tern *Chlidonias niger*	SC	No Status	Not at Risk	Black Terns build floating nests in loose colonies in shallow marshes, especially in cattails.	**MAS2-1** and **OAO**. These two communities must be present immediately adjacent each other and with sufficient water to provide suitable nesting habitat.	The Black Tern breeds in the temperate regions of Europe, and in North America where it ranges from northern British Columbia and Alberta south to Arizona and Kansas and east to New Brunswick. In Ontario, Black Terns are found scattered throughout the province, but breed mainly in the marshes along the edges of the Great Lakes.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Birds	Canada Warbler *Cardellina canadensis*	SC	THR Schedule 1	THR	The Canada Warbler breeds in a range of deciduous and coniferous, usually wet forest types, all with a well-developed, dense shrub layer. Dense shrub and understory vegetation help conceal Canada Warbler nests that are usually located on or near the ground on mossy logs or roots, along stream banks or on hummocks. It is also found in riparian shrub forests on slopes and in ravines and in old-growth forests with canopy openings and a high density of shrubs, as well as in stands regenerating after natural disturbances, such as forest fires, or anthropogenic disturbances, such as logging. Canada Warbler habitat is believed to be in decline, especially in South America, where the Canada Warbler overwinters. Habitat loss has also been observed in the eastern part of its breeding range, where wet forests have been drained for urban development or farming.	**FOC3, FOC4, FOM6, FOM7, FOM8, FOD6, FOD7, FOD8, FOD9, SWC, SWM** and **SWD** with a well-developed shrub layer.	The Canada Warbler only breeds in North America and 80% of its known breeding range is in Canada. Its primary breeding range is in the Boreal Shield, extending north into the Hudson Plains and south into the Mixedwood Plains. Although the Canada Warbler breeds at low densities across its range, in Ontario it is most abundant along the Southern Shield. The Canada Warbler breeds primarily across much of southeastern Canada, the northeastern United States, the Great Lakes region. In Canada, it breeds in all provinces and territories except Nunavut and Newfoundland and Labrador.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Birds	Common Nighthawk *Chordeiles minor*	SC	THR Schedule 1	SC	Traditional Common Nighthawk habitat consists of open areas with little to no ground vegetation, such as logged or burned-over areas, forest clearings, rock barrens, peat bogs, lakeshores, and mine tailings. Although the species also nests in cultivated fields, orchards, urban parks, mine tailings, and along gravel roads and railways, they tend to occupy natural sites. The Common Nighthawk nests in a wide range of open, vegetation-free habitats, including dunes, beaches, recently harvested forests, rocky outcrops, grasslands, pastures, marshes, and river banks. This species also inhabits mixed and coniferous forests. The Common Nighthawk probably benefited from the newly-opened habitats created by the massive deforestation associated with the arrival of European settlers in eastern Canada and United States. The appearance of gravel roofs contributed to the	**SD, BB, RB, CUM, BO, FOM, FOC** and **FOD** with openings with little vegetation.	The range of the Common Nighthawk spans most of North and Central America. In Canada, the species is found in all provinces and territories except Nunavut. In Ontario, the Common Nighthawk occurs throughout the province except for the coastal regions of James Bay and Hudson Bay.	**Low** No suitable habitat.	**Medium** Bare areas may be present within open meadow.	**Medium** Bare areas may be present within open meadow.
Birds	Eastern Wood-pewee *Contopus virens*	SC	SC Schedule 1	SC	The Eastern Wood-pewee lives in the mid-canopy layer of forest clearings and edges of deciduous and mixed forests. It is most abundant in intermediate-age mature forest stands with little understory vegetation. During migration, a variety of habitats are used, including forest edges and early successional clearings.	**FOC, FOM, FOD, SWD, SWM** and **CUW**.	The Eastern Wood-pewee is found across most of southern and central Ontario, and in northern Ontario as far north as Red Lake, Lake Nipigon, and Timmins. The breeding range of the Eastern Wood-pewee covers much of south-central and eastern North America.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Birds	Evening Grosbeak *Coccothraustes vespertinus*	SC	SC Schedule 1	SC	During the breeding season, the Evening Grosbeak is generally found in open, mature mixed-wood forests dominated by fir species, White Spruce, and/or Trembling Aspen. Its abundance is strongly linked to the cycle of its primary prey, the Spruce Budworm. Outside the breeding season, the species depends mostly on seed crops from tree species in the boreal forest, such as firs and spruces. It is also attracted to ornamental trees that have seeds or fruit, and may visit bird feeders.	**FOC** and **FOM**	The Evening Grosbeak is found in all Canadian provinces and territories except Nunavut. In Ontario, it breeds in coniferous forests across northern Ontario, as far south as southern Georgian Bay. Evening Grosbeak breeds in Canada, the United States, and Mexico. In winter, it is nomadic and can range widely, depending on the quantity of seeds produced in the boreal forest. Historically, this species was restricted to western North America, but expanded eastward in the late 19th and early	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Birds	Golden-winged Warbler *Vermivora chrysoptera*	SC	THR Schedule 1	THR	Golden-winged Warblers prefer to nest in areas with young shrubs surrounded by mature forest – locations that have recently been disturbed, such as field edges, hydro or utility right-of-ways, or logged areas. In their breeding areas, Golden-winged Warblers seem to be fond of regeneration zones where young shrubs grow, surrounded by mature forest, and characterized by plant succession of 10 to 30 years. The warblers frequent clusters of herbaceous plants and low bushes (where they place their nests, which are built on the ground). They favour environments where the trees are spread out, as well as the forest edge, and use this setting for perching, singing, and looking for food. Golden-winged Warblers are found in dry uplands, swamp forests, and marshes. This warbler shows a preference for beaver ponds and burned-out or intermittently cultivated areas.		The Golden-winged Warbler is found in southern Saskatchewan, Manitoba, Ontario, and Quebec, as well as the north-eastern United States. In Ontario, these birds breed in central-eastern Ontario, as far south as Lake Ontario and the St. Lawrence River, and as far north as the northern edge of Georgian Bay. Golden-winged Warblers have also been found in the Lake of the Woods area near the Manitoba border, and around Long Point on Lake Erie. Golden-winged Warblers nest primarily in the northeastern United States, southeastern Saskatchewan, southwestern Manitoba, southwestern Ontario and far southwestern Quebec. In Ontario, they breed from the far southwest of the province north as far as the centre of the Nipissing region, the southern part of the Sudbury and Algoma districts, and the southwest part of the Rainy River district, near Lake of the Woods.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Medium** Cultural thicket may provide suitable habitat.

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Associated ELC Communities	Known Species Range[1, 2]	W-WS-3a	W-WS-3b	W-WS-3b2
Birds	Grasshopper Sparrow *Ammodramus savannarum* Grasshopper Sparrow (pratensis subspecies; Eastern Grasshopper Sparrow) *Ammodramus savannarum pratensis*	SC	SC Schedule 1	SC	It lives in open grassland areas with well-drained, sandy soil. It will also nest in hayfields and pasture, as well as alvars, prairies, and occasionally grain crops such as barley. It prefers areas that are sparsely vegetated. Its nests are well-hidden in the field and woven from grasses in a small cup-like shape. The Grasshopper Sparrow is a short-distance migrant and leaves Ontario in the fall to migrate to the southeastern United States and Central America for the winter. In Canada, the Eastern Grasshopper Sparrow typically breeds in large human-created grasslands (5 ha or greater), such as pastures and hayfields, and natural prairies, such as alvars, characterized by well-drained, often poor soil dominated by relatively low, sparse perennial herbaceous vegetation.		The Grasshopper Sparrow can be found throughout southern Ontario, but only occasionally on the Canadian Shield. It is most common where grasslands, hay, or pasture dominate the landscape. In Canada, the breeding range of the Eastern Grasshopper Sparrow includes extreme southern Québec and southern Ontario, with the vast majority of birds occurring in Ontario.	**Low** No suitable habitat.	**Medium** Meadow may provide suitable habitat.	**Medium** Meadow may be present and provide suitable habitat.
Birds	Olive-sided Flycatcher *Contopus cooperi*	SC	THR Schedule 1	SC	The Olive-sided Flycatcher is most often found along natural forest edges and openings. It will use forests that have been logged or burned if there are ample tall snags and trees to use for foraging perches. Olive-sided Flycatchers' breeding habitat usually consists of coniferous or mixed forest adjacent to rivers or wetlands. In Ontario, Olive-sided Flycatchers commonly nest in conifers such as White and Black Spruce, Jack Pine, and Balsam Fir. The Olive-sided Flycatcher is most often associated with open areas containing tall live trees or snags for perching. These vantage points are required for foraging. This species generally forages from a high, prominent perch from which it sallies forth to intercept flying insects and then returns to the same perch. Open areas may be forest clearings, forest edges located near natural openings (such as rivers or swamps) or human-made openings (such as logged areas), burned forest, or openings within old-growth forest stands; these forests are characterized by mature trees and large numbers of dead trees. There is evidence that the breeding success of birds nesting in harvested habitats is lower than the breeding success of birds nesting in natural openings. In the boreal forest, suitable habitat is more likely to be in or near wetland areas. Although the amount of old-growth forest obviously decreased during the 20th century, the amount of habitat attractive to Olive-sided Flycatchers may have remained more or less constant, since logging operations continue to create openings favoured by these birds. However, recent	**CUW, FOC,** and **FOM** that contain White Spruce, Black Spruce, Jack Pine, or Balsam Fir and are adjacent open areas, rivers, or wetlands.	The Olive-sided Flycatcher has a broad breeding range across Canada and the western and northeastern United States. Just over half the range is found in Canada, where it breeds in every province and territory except Nunavut. In Ontario, it is widely distributed throughout the central and northern areas of the province.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Medium** Cultural woodland may provide suitable habitat.
Birds	Peregrine Falcon *Falco peregrinus* Peregrine Falcon (anatum/tundrius) *Falco peregrinus anatum/tundrius*	SC	SC Schedule 1	Not At Risk	Peregrine Falcons usually nest on tall, steep cliff ledges close to large bodies of water. Although most people associate Peregrine Falcons with rugged wilderness, some of these birds have adapted well to city life. Urban peregrines raise their young on ledges of tall buildings, even in busy downtown areas. Cities offer peregrines a good year-round supply of pigeons and starlings to feed on. The Peregrine Falcon is found in various types of habitats, from Arctic tundra to coastal areas and from prairies to urban centres. It usually nests alone on cliff ledges or crevices, preferably 50 to 200 m in height, but sometimes on the ledges of tall buildings or bridges, always near good foraging areas. Suitable nesting sites are usually dispersed, but can be common locally in some areas. The natural nesting habitat has not changed significantly since the population crash and is still largely available. In addition, structures built by humans in both rural and urban areas provide the Peregrine Falcon with other potential nesting sites. And though urbanization and other land uses have had a significant impact on some areas where they feed, Peregrine Falcons can usually modify their diet based on the prey species present in a given area.	**CLO**	The historic North American distribution of the eastern subspecies is east of the Rocky Mountains and south of the tree line. Although Peregrine Falcons now nest in and around Toronto and several other southern Ontario cities, the majority of Ontario's breeding population is found around Lake Superior in northwestern Ontario. The anatum Peregrine Falcon breeds in the interior of Alaska and throughout northern Canada up to southern Greenland, and across continental North America up to northern Mexico. In Canada it is found in all territories and provinces except Prince Edward Island, Nunavut, and the Island of Newfoundland. The tundrius Peregrine Falcon breeds in Alaska and throughout northern Canada up to Greenland. In Canada, it breeds from northern Yukon, the low Arctic islands, northern Northwest Territories, and northern Nunavut up to Baffin Island, Hudson Bay, Ungava, and northern Labrador.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Birds	Red-headed Woodpecker *Melanerpes erythrocephalus*	SC	THR Schedule 1	END	The Red-headed Woodpecker lives in open woodland and woodland edges, and is often found in parks, golf courses, and cemeteries. These areas typically have many dead trees, which the bird uses for nesting and perching. A few of these birds will stay the winter in woodlands in southern Ontario if there are adequate supplies of nuts. The Red-headed Woodpecker is found in a variety of habitats, including oak and beech forests, grasslands, forest edges, orchards, pastures, riparian forests, roadsides, beaver ponds, and burns.	**TPS, TPW, CUW, FOD1, FOD2, FOD4-1, FOD6, FOD7**, and **FOD9** that are open and have an abundance of dead trees.	The Red-headed Woodpecker is found across southern Ontario, where it is widespread but rare. In Canada, its range includes southern Saskatchewan, Manitoba, Ontario, and Quebec.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Medium** Cultural woodland may provide suitable habitat.
Birds	Rusty Blackbird *Euphagus carolinus*	SC	SC Schedule 1	SC	During the winter, it is found in wet woodlands, swamps, and pond edges and often forages in agricultural lands. The breeding range of the Rusty Blackbird in Canada is almost entirely within the boreal forest. Breeding habitat there is characterized by coniferous-dominated forests adjacent to wetlands, such as slow-moving streams, peat bogs, sedge meadows, marshes, swamps, and beaver ponds. On migration, the Rusty Blackbird is primarily associated with wooded wetlands. In winter, it occurs primarily in lowland forested wetlands, cultivated fields, and pecan groves. Suitable habitat for the species appears to be decreasing on its breeding range and wintering grounds, due mainly to the loss and degradation of wetlands by human activities.		The Rusty Blackbird is only found in North America. It breeds in every province and territory in Canada and migrates to most of the central and eastern United States for winter. In Ontario, the breeding range is found in the Hudson Bay Lowlands and northern Boreal Shield ecozones. The Rusty Blackbird has a wide distribution across boreal regions of Canada. The winter range includes most of the central and eastern United States, although it also winters irregularly in extreme southern Canada.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Associated ELC Communities	Known Species Range[1, 2]	W-WS-3a	W-WS-3b	W-WS-3b2
Birds	Short-eared Owl *Asio flammeus*	SC	SC Schedule 1	SC	The Short-eared Owl makes use of a wide variety of open habitats, including arctic tundra, grasslands, peat bogs, marshes, sand-sage concentrations, and old pastures. It also occasionally breeds in agricultural fields. Preferred nesting sites are dense grasslands, as well as tundra with areas of small willows. While the Short-eared Owl has a marked preference for open spaces, the main factor influencing the choice of its local habitat is believed to be the abundance of food, in both summer and winter. It nests on the ground and hunts for small mammals, especially voles. Suitable breeding, migration, and wintering habitat has declined significantly throughout the 20th century, resulting in a reduction in the number of owls. In North America, it breeds sporadically in arctic areas, coastal marshes, and interior grasslands, where voles and other small rodents proliferate.		The Short-eared Owl's North American range extends from the tundra south to the central United States. In Ontario, the species has a scattered distribution, found along the James Bay and Hudson Bay coastlines, along the Ottawa River in eastern Ontario, in the far west of the Rainy River District, and elsewhere in southern Ontario, at places such as Wolfe and Amherst Islands near Kingston. Most northern populations are migratory, moving southward in the winter. The Short-eared Owl breeds in all of Canada's provinces and territories. It generally heads southward in the winter and is found in open habitats along the extreme southern coast of British Columbia and in southern Ontario.	**Low** No suitable habitat.	**Medium** Meadow may provide suitable habitat.	**Medium** Meadow may provide suitable habitat.
Birds	Wood Thrush *Hylocichla mustelina*	SC	THR Schedule 1	THR	The Wood Thrush lives in mature deciduous and mixed (conifer-deciduous) forests. They seek moist stands of trees with well-developed undergrowth and tall trees for singing perches. These birds prefer large forests, but will also use smaller stands of trees. They build their nests in living saplings, trees, or shrubs, usually in Sugar Maple or American Beech. In Canada, the Wood Thrush nests mainly in second-growth and mature deciduous and mixed forests, with saplings and well-developed understory layers. This species prefers	**FOD** and **FOM** that are greater than 1 ha in size.	The Wood Thrush is found all across southern Ontario. It is also found, but less common, along the north shore of Lake Huron, as far west as the southeastern tip of Lake Superior. There is a very small population near Lake of the Woods in northwestern Ontario, and there have been scattered sightings in the mixed forest of northern Ontario. The Wood Thrush breeds in southeastern Canada from southern Ontario east to Nova Scotia.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
	Northern Brook Lamprey (Great Lakes - Upper St. Lawrence populations)	No Status	SC Schedule 1	SC	This lamprey is generally found in clear water streams of a wide range of sizes. Larval Northern Brook Lamprey reside in burrows in silt and sand substrate. After metamorphosing into juveniles, the larvae emerge from their burrows and attach themselves to the stream bottom. For spawning, they require a substrate composed of coarse gravel with a relatively swift, unidirectional current.		Adults have been found in streams throughout Ontario, southwestern Quebec, and southeastern Manitoba. Increased sampling efforts have revealed more locations over the past several years in Ontario. The widespread occurrence of *Icthyomyzon* larvae may indicate a much wider distribution, but collection of adults is required to confirm identification.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Fish	Northern Sunfish (Great Lakes - Upper St.Lawrence populations) *Lepomis peltastes*	SC	SC Schedule 1	SC	In Ontario, the Northern Sunfish lives in shallow vegetated areas of quiet, slow flowing rivers and streams, as well as warm lakes and ponds, with sandy banks or rocky bottoms. Northern Sunfish prefer to be near aquatic vegetation where they can avoid strong currents. During the breeding season, males guard their nests which are made by digging saucer like depressions in gravel or cobble substrates. It eats mostly aquatic insect larvae and algae, but is known for feeding at the water's surface more frequently than other sunfish. Northern Sunfish usually occurs in clear waters and is considered intolerant of siltation.		In Canada, the Northern Sunfish only lives in Ontario and Quebec. The Great Lakes - Upper St. Lawrence populations are found throughout southern Ontario including waters flowing into Lake Huron, Georgian Bay, Lake St. Clair, Lake Erie, and Lake Ontario, as well as rivers and small lakes in eastern Ontario. In Canada, Northern Sunfish range includes northwestern Ontario, south and central Ontario, and southern Québec. Because Northern Sunfish is found in Canada in two National Freshwater Biogeographic Zones it is assessed as	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Insects	Monarch *Danaus plexippus*	SC	SC Schedule 1	END	Throughout their life cycle, Monarchs use three different types of habitat. Only the caterpillars feed on milkweed plants and are confined to meadows and open areas where milkweed grows. Adult butterflies can be found in more diverse habitats where they feed on nectar from a variety of wildflowers. Milkweeds (numerous species) are the sole food plant for Monarch caterpillars. These plants grow predominantly in open and periodically disturbed habitats such as roadsides, fields, wetlands, prairies, and open forests. Milkweeds are often planted outside their native range, and sometimes wayward Monarchs are observed at these patches. Monarchs require staging areas which are used to rest, feed, and avoid inclement weather during migration. In Canada, they are found along the north shores of the Great Lakes where Monarchs roost in trees before crossing large areas of open water.	**AI, TP,** and **CUM** where milkweed plants are present.	The Monarch's range extends from Central America to southern Canada. In Canada, Monarchs are most abundant in southern Ontario and Quebec where milkweed plants and breeding habitat are widespread. During late summer and fall, Monarchs from Ontario migrate to central Mexico where they spend the winter months. During migration, groups of Monarchs numbering in the thousands can be seen along the north shores of Lake Ontario and Lake Erie. The overall native range of the Monarch occurs from Central America northward through the continental United States to southern Canada, and from the Atlantic Coast westward to the Pacific Coast. The Canadian range of occurrence includes portions of all ten provinces and the Northwest Territories. Monarchs are loosely divided into eastern and western subgroups based on their migratory routes and overwintering sites. Eastern Monarchs breed from Alberta east to Nova Scotia and migrate south to overwinter in the mountains of Central Mexico. The breeding range in Canada is south of the 50° latitude in Ontario, Quebec, and the Maritimes. Each fall hundreds of thousands of Monarchs migrate through Long Point in southern Ontario but it's unknown what proportion of the Canadian population these individuals represent.	**Low** No suitable habitat.	**Mdium** Cultural meadow may provide suitable habitat.	**Mdium** Cultural meadow may provide suitable habitat.
Molluscs	Eastern Pondmussel *Ligumia nasuta*	SC	SC Schedule 1	SC	The Eastern Pondmussel is typically found in sheltered areas of lakes and in slow-moving areas of rivers and canals with sand or mud bottoms. All mussels filter water to find food, such as bacteria and algae. Mussel larvae must attach to a fish (called a "host"), where they consume nutrients from the fish body until they transform into juvenile mussels and drop off the fish host. It is not known which species of fish act as hosts for the Eastern Pondmussel. Based on habitat data from collection sites, Eastern Pondmussel prefers sediment composed of clay, silt/organics, and/or sand/gravel where macrophytes are absent or at low densities. The species occurs in sheltered areas of lakes or in slack-water areas of rivers at depths ranging from 0.3 to 4.5 m.	**OAO**	In North America, the Eastern Pondmussel was once one of the most common mussels in the lower Great Lakes. In Canada, there are now only two known populations: one in the delta area of Lake St. Clair and the second in Lyn Creek, a small tributary of the upper St. Lawrence River. Eastern Pondmussel is restricted to eastern North America, from the lower Great Lakes east through New York to New Hampshire and south, in coastal rivers, to South Carolina. In Canada, the species is only known to be from the Great Lakes region of Ontario. Eastern Pondmussel is found in most waterbodies it occupied historically, including lakes St. Clair, Erie, and Ontario, their connecting channels, and Lyn Creek. Moreover, the species has been discovered in localities that were not surveyed (and not represented) in the last assessment period, particularly inland lakes in eastern Ontario. Comparing historical to current occurrences, an 18 - 87% loss in range is estimated. Eastern Pondmussel was one of the most common species of freshwater mussel in the lower Great Lakes, prior to the invasion of dreissenids in the late 1980s. It appears to have been eliminated from the offshore waters of Lake St. Clair and Lake Erie in Canada due to the impacts of dreissenids. A remnant subpopulation of Eastern Pondmussel currently occupies the nearshore areas of the St. Clair River delta. Extant subpopulations exist in the coastal wetlands of lakes Erie and Ontario, several eastern Ontario inland lakes, as well as Lyn Creek, a tributary of the upper St. Lawrence River.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.

AECOM

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Associated ELC Communities	Known Species Range[1, 2]	W-WS-3a	W-WS-3b	W-WS-3b2
Reptiles	Eastern Musk Turtle (Stinkpot) *Sternotherus odoratus*	SC	SC Schedule 1	SC	Eastern Musk Turtles are found in ponds, lakes, marshes, and rivers that are generally slow-moving and have abundant emergent vegetation and muddy bottoms that they burrow into for winter hibernation. Nesting habitat is variable, but it must be close to the water and exposed to direct sunlight. Nesting females dig shallow excavations in soil, decaying vegetation, and rotting wood or lay eggs in muskrat lodges, on the open ground, or in rock crevices. The Eastern Musk Turtle is a highly aquatic species inhabiting littoral zones of waterways such as bays, streams, canals, and swamps with slow to no current and soft bottoms. During their active season, Eastern Musk Turtles prefer shallow water.	**MAS, OAO, SAS, SAM,** and **SAF**. Nesting habitat can be any upland areas adjacent these areas that are exposed to direct sunlight.	In Canada, the Eastern Musk Turtle is found mostly along the southern edge of the Canadian Shield in Ontario and Quebec. In Ontario, it also occurs at various locations throughout southwestern and eastern Ontario. The limited data available indicate that the Stinkpot has disappeared from much of its original range in southwestern Ontario. The Eastern Musk Turtle is restricted to eastern North America. The species ranges from Florida, north to Ontario and Québec, and west to Wisconsin and central Texas. In Canada, the Eastern Musk Turtle is found in southern Ontario, the southeastern edge of northeastern Ontario, and the southwestern edge of Québec.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Reptiles	Eastern Ribbonsnake (Great Lakes population; Northern Ribbonsnake) *Thamnophis sauritus*	SC	SC Schedule 1	SC	The Eastern Ribbonsnake is usually found close to water, especially in marshes, where it hunts for frogs and small fish. A good swimmer, it will dive in shallow water, especially if it is fleeing from a potential predator. At the onset of cold weather, these snakes congregate in underground burrows or rock crevices to hibernate together. Eastern Ribbonsnakes are found in a variety of wetland habitats with both flowing and standing water such as marshes, bogs, fens, ponds, lake shorelines, and wet meadows. Most sightings of Eastern Ribbonsnakes outside of the overwintering period occur near the water's edge. Eastern Ribbonsnakes spend winter in underground hibernacula where they must avoid freezing and dessication. They may hibernate in well-drained sites or in areas close to water and may even be completely submerged inside their hibernacula. Some Eastern Ribbonsnakes may move considerable distances from water to overwinter in forested areas, but the extent of movements to their hibernation sites is not known.	**FOC, FOM, FOD, SWC, SWM, SWD, MAM, MAS, OAO, SAS, SAM,** and **SAF** containing or near year round standing or flowing water.	The Eastern Ribbonsnake is found from southern Ontario west to Michigan and Wisconsin (isolated pockets), south to Illinois and Ohio, and east to New York State and Nova Scotia, where there is an isolated population. In Ontario, this snake occurs throughout southern and eastern Ontario and is locally common in parts of the Bruce Peninsula, Georgian Bay, and eastern Ontario. There are four recognized sub-species of the Eastern Ribbonsnake; of these only the Northern Ribbonsnake (*T. s. septentrionalis*) occurs in Canada. Eastern Ribbonsnakes occur at the northern limit of their range in Canada, where there are two geographically distinct populations that are each considered a designatable unit. The Great Lakes population occurs in southern Ontario and extreme southern Quebec and is contiguous with the species' main USA range.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Reptiles	Northern Map Turtle *Graptemys geographica*	SC	SC Schedule 1	SC	The Northern Map Turtle inhabits rivers and lakeshores where it basks on emergent rocks and fallen trees throughout the spring and summer. In winter, the turtles hibernate on the bottom of deep, slow-moving sections of river. They require high-quality water that supports the female's mollusc prey. Their habitat must contain suitable basking sites, such as rocks and deadheads, with an unobstructed view from which a turtle can drop immediately into the water if startled. The Northern Map Turtle 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.	**OAO, SA** with emergent rocks and fallen trees suitable habitat for prey.	The Northern Map Turtle's range extends from the Great Lakes region west to Oklahoma and Kansas, south to Louisiana, and east to the Adirondack and Appalachian mountain barrier. In Canada, it is found in southwestern Quebec and southern Ontario. In southern Ontario, it lives primarily on the shores of Georgian Bay, Lake St. Clair, Lake Erie, and Lake Ontario, and along larger rivers including the Thames, Grand, and Ottawa. It reaches its northern limit in southern Ontario and southwestern Quebec, where it is associated with the Great Lakes Basin and the St. Lawrence River.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Reptiles	Snapping Turtle *Chelydra serpentina*	SC	SC Schedule 1	SC	Snapping Turtles spend most of their lives in water. They prefer shallow waters so they can hide under the soft mud and leaf litter, with only their noses exposed to the surface to breathe. During the nesting season, from early to mid summer, females travel overland in search of a suitable nesting site, usually gravelly 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. Although Snapping Turtles have been observed in shallow water in almost every kind of freshwater habitat, the preferred habitat of the species is characterized by slow-moving water with a soft mud bottom and dense aquatic vegetation. Established populations are most often located in ponds, sloughs, shallow bays or river edges, and slow streams, or areas combining several of these wetland habitats. Individual turtles will persist in urbanized water bodies, such as golf course ponds and irrigation canals, but it is unlikely that a population could become established in such habitats. The Snapping Turtle can occur in highly polluted waterways, but environmental contamination is known to reduce the already low reproductive output of this species. Basking on offshore logs and protruding rocks can be common in Snapping Turtles, depending on environmental temperature. Females generally nest on sand or gravel banks along waterways. Upon emergence from the nest in early fall, hatchling Snapping Turtles usually move to water, after which they bury themselves under leaf litter or debris. Snapping Turtles overwinter underwater, buried beneath logs, sticks or overhanging banks in small streams that flow continuously throughout the winter. They can also hibernate buried in deep mud in marshy areas or beneath floating mats of vegetation. Snapping Turtle habitat is diminishing in both quantity and quality in Canada, with losses primarily due to conversion of wetlands to agriculture and urban development.	**OAO, SA** near gravelly or sandy areas.	The Snapping Turtle's range extends from Ecuador to Canada. The Snapping Turtle's range is contracting. In Canada, the species is widespread from Nova Scotia to southeastern Saskatchewan, though it is absent from northwestern Ontario, where summers are likely too cool for Snapping Turtle embryos to complete development successfully. The Snapping Turtle is therefore present in mainland Nova Scotia, southern New Brunswick, southern and central Quebec, southern and central Ontario, southern Manitoba, and southeastern Saskatchewan, primarily in the Qu'Appelle watershed.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.

Glossary

EXP	ESA - Extripated - a species that no longer exists in the wild in Ontario but still occurs elsewhere. SARA - Extripated - a wildlife species that no longer exists in the wild in Canada, but exists elsewhere in the wild.
END	ESA - Endangered - a species facing imminent extinction or extirpation in Ontario which is a candidate for regulation under Ontario's Endangered Species Act. SARA - Endangered - a wildlife species that is facing imminent extirpation or extinction.
THR	ESA - Threatened - a species that is at risk of becoming endangered in Ontario if limiting factors are not reversed. SARA - Threatened - a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.
SC	ESA - Special Concern (formerly Vulnerable) - a species with characteristics that make it sensitive to human activities or natural events. endangered species because of a combination of biological characteristics and identified threats.
ESA	Endangered Species Act
SARA	Species at Risk Act (Federal)
Schedule 1	The official list of species that are classified as extirpated, endangered, threatened, and of special concern.
Schedule 2	Species listed in Schedule 2 are species that had been designated as endangered or threatened, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.
Schedule 3	Species listed in Schedule 3 are species that had been designated as special concern, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.
COSEWIC	Committee on the Stauts of Endangerd Wildlife in Canada - a committee of experts that assesses and designates which wild species are in some danger of disappearing from Canada.

Appendix F. Species at Risk Screening

Appendix F. Species at Risk Habitat Screening

AECOM

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Associated ELC Communities	Known Species Range[1, 2]	W-WS-3a	W-WS-3b	W-WS-3b2
Amphibians	Jefferson Salamander *Ambystoma jeffersonianum*	END	END Schedule 1	END	Adults live in moist, loose soil, under logs or in leaf litter. Your best chance of spotting a Jefferson Salamander is in early spring when they travel to woodland ponds to breed. They lay their eggs in clumps attached to underwater vegetation. By midsummer, the larvae lose their gills and leave the pond and head into the surrounding forest. Once in the forest, Jefferson Salamanders spend much of their time underground in rodent burrows, and under rocks and stumps. They feed primarily on insects and worms. Adult Jefferson Salamanders, throughout their range, are found within deciduous or mixed upland forests containing, or adjacent to, suitable breeding ponds. Breeding ponds are normally ephemeral, or vernal, woodland pools that dry in late summer. Terrestrial habitat is in mature woodlands that have small mammal burrows or rock fissures that enable adults to over-winter underground below the frost line.	**FOD** where permanent or temporary ponds or pools are present.	In Canada, the species is found only in isolated populations that are mostly associated with the Niagara Escarpment and Carolinian forest regions in Ontario.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Amphibians	Unisexual Ambystoma (Jefferson Salamander dependent population) *Ambystoma laterale-(2) jeffersonianum*	END	No Status	END	Unisexual Ambystoma salamanders live in leaf litter, under logs, and in underground cavities in deciduous and mixed forests, typically within close proximity to breeding habitats. Adults breed in vernal pools (temporary woodland ponds) or fish-free permanent wetlands. They lay their eggs in clumps attached to underwater vegetation in shallow water. The eggs hatch into aquatic larvae after about one month, and the larvae transform into juveniles by the end of summer. The juveniles leave the pond and head into the surrounding forest. Unisexual Ambystoma salamanders spend the winter underground where they can get below the frost line and avoid freezing temperatures, such as in mammal burrows, rock crevices, or other underground cavities. Although these salamanders spend much of the year underground or under cover, they can often be observed in early spring when they travel to breeding sites. Unisexual salamanders have the same habitat requirements as their respective sperm-donating species. They are normally found within deciduous or mixed forests containing, or adjacent to, suitable breeding ponds. Breeding ponds are normally ephemeral, or vernal, pools that dry in late summer. Terrestrial habitat is in moist woodlands, where the salamanders find shelter from predators and desiccation under fallen trees or rocks, as well as in mammal burrows. Adults forage during humid conditions at night on the forest		In Canada, the Unisexual Ambystoma (Jefferson Salamander dependent population) salamanders are restricted to southern Ontario, mainly along the Niagara Escarpment. Unisexual salamanders are found in association with appropriate bisexual species whose males serve as sperm donors. The geographic range of unisexual salamanders in the genus *Ambystoma* roughly coincides with deciduous and mixed-wood forests in northeastern North America from Nova Scotia and the New England States to Indiana. Their northern limits are in Minnesota, north-central Ontario, and southern Quebec, and they range south to Kentucky. In Canada, unisexual salamanders are found in association with the Jefferson Salamander in Ontario. In Canada, unisexual populations of salamanders occur in all known Jefferson Salamander populations.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Birds	Bank Swallow *Riparia riparia*	THR	THR Schedule 1	THR	Bank Swallows nest in burrows in natural and human-made settings where there are vertical faces in silt and sand deposits. Many nests are on banks of rivers and lakes, but they are also found in active sand and gravel pits or former ones where the banks remain suitable. The birds breed in colonies ranging from several to a few thousand pairs. The Bank Swallow breeds in a wide variety of natural and artificial sites with vertical banks, including riverbanks, lake and ocean bluffs, aggregate pits, road cuts, and stock piles of soil. Sand-silt substrates are preferred for excavating nest burrows. Breeding sites tend to be somewhat ephemeral due to the dynamic nature of bank erosion. Breeding sites are often situated near open terrestrial habitat used for aerial foraging (e.g., grasslands, meadows, pastures, and agricultural cropland). Large wetlands are used as communal nocturnal roost sites during post-breeding, migration, and wintering periods.		The Bank Swallow is found all across southern Ontario, with sparser populations scattered across northern Ontario. The largest populations are found along the Lake Erie and Lake Ontario shorelines, and the Saugeen River (which flows into Lake Huron). In North America, it breeds widely across the northern two-thirds of the U.S., north to the treeline. It breeds in all Canadian provinces and territories, except perhaps Nunavut.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Birds	Barn Swallow *Hirundo rustica*	THR	THR Schedule 1	THR	Barn Swallows often live in close association with humans, building their cup-shaped mud nests almost exclusively on human-made structures such as open barns, under bridges, and in culverts. The species is attracted to open structures that include ledges where they can build their nests, which are often re-used from year to year. They prefer unpainted, rough-cut wood, since the mud does not adhere as well to smooth surfaces. Before European colonization, Barn Swallows nested mostly in caves, holes, crevices, and ledges in cliff faces. Following European settlement, they shifted largely to nesting in and on artificial structures, including barns and other outbuildings, garages, houses, bridges, and road culverts. Barn Swallows prefer various types of open habitats for foraging, including grassy fields, pastures, various kinds of agricultural crops, lake and river shorelines, cleared rights-of-way, cottage areas and farmyards, islands, wetlands, and subarctic tundra.	**TPO, CUM1, MAM, MAS, OAO, SAS1, SAM1, SAF1**; containing or adjacent structures that are suitable for nesting.	The Barn Swallow may be found throughout southern Ontario and can range as far north as Hudson Bay, wherever suitable locations for nests exist. The Barn Swallow has become closely associated with human rural settlements. It breeds across much of North America south of the treeline, south to central Mexico. In Canada, it is known to breed in all provinces and territories.	**Low** None found during field investigations	**Low** No suitable habitat.	**Low** No suitable habitat.
Birds	Bobolink *Dolichonyx oryzivorus*	THR	THR Schedule 1	THR	Historically, Bobolinks lived in North American tallgrass prairie and other open meadows. With the clearing of native prairies, Bobolinks moved to living in hayfields. Bobolinks often build their small nests on the ground in dense grasses. Both parents usually tend to their young, sometimes with a third Bobolink helping. Most of this prairie was converted to agricultural land over a century ago, and at the same time the forests of eastern North America were cleared to hayfields and meadows that provided habitat for the birds. Since the conversion of the prairie to cropland and the clearing of the eastern forests, the Bobolink has nested in forage crops (e.g., hayfields and pastures dominated by a variety of species, such as clover, Timothy, Kentucky Bluegrass, and broadleaved plants). The Bobolink also occurs in various grassland habitats including wet prairie, graminoid peatlands, and abandoned fields dominated by tall grasses, remnants of uncultivated virgin prairie (tall-grass prairie), no-till cropland, small-grain fields, restored surface mining sites, and irrigated fields in arid regions. It is generally not abundant in short-grass prairie, Alfalfa fields, or in row crop monocultures (e.g., corn, soybean, wheat), although its use of Alfalfa may vary with region.	**TPO, TPS, CUM1** and **MAM2**.	The Bobolink breeds across North America. In Ontario, it is widely distributed throughout most of the province south of the boreal forest, although it may be found in the north where suitable habitat exists. The breeding range of the Bobolink in North America includes the southern part of all Canadian provinces from British Columbia to Newfoundland and Labrador and south to the northwestern, north-central and northeastern U.S.	**Low** No suitable habitat.	**Medium** Meadow may provide suitable habitat.	**Medium** Meadow may be present and provide suitable habitat.

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Associated ELC Communities	Known Species Range[1, 2]	W-WS-3a	W-WS-3b	W-WS-3b2
Birds	Cerulean Warbler *Setophaga cerulea*	THR	END Schedule 1	END	Cerulean Warblers spend their summers (breeding seasons) in mature, deciduous forests with large, tall trees and an open understorey. They are found in both wet bottomland forests and upland areas. At a finer spatial scale, canopy configuration (e.g., foliage stratification, gap distribution, tree species distribution) are predictors of habitat suitability.	**FOD** and **SWD** that are mature and contain an open understory.	The Cerulean Warbler's breeding range extends from extreme southwestern Quebec and southern Ontario west to Minnesota and Nebraska and south to Texas and other Gulf states across to North Carolina. In southern Ontario, populations appear to be separated into two distinct bands: one from southern Lake Huron to western Lake Ontario, and further north, the other from the Bruce Peninsula and Georgian Bay area to the Ottawa River. This species breeds in the deciduous forests of eastern North America but has a patchy distribution. The Canadian breeding range consists of two main geographic clusters in southwestern and southeastern Ontario, plus a small number of breeding individuals in southwestern Quebec.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Birds	Chimney Swift *Chaetura pelagica*	THR	THR Schedule 1	THR	Before European settlement, Chimney Swifts mainly nested on cave walls and in hollow trees or tree cavities in old growth forests. However, due to the land clearing associated with colonization, hollow trees became increasingly rare, which led Chimney Swifts to move into house chimneys. Today, they are more likely to be found in and around urban settlements where they nest and roost (rest or sleep) in chimneys and other manmade structures. It is likely that a small portion of the population continues to use hollow trees. They also tend to stay close to water as this is where the flying insects they eat congregate. The Chimney Swift spends the major part of the day in flight feeding on insects. In the northern part of the breeding range, the Chimney Swift favours sites where the ambient	**TPO, CUM1, MAM, MAS, OAO, SAS1, SAM1, SAF1** containing or adjacent structures with suitable nesting habitat (i.e. chimneys).	The Chimney Swift breeds in eastern North America, possibly as far north as southern Newfoundland. In Ontario, it is most widely distributed in the Carolinian zone in the south and southwest of the province, but has been detected throughout most of the province south of the 49th parallel. The Chimney Swift breeds mainly in eastern North America, from southern Canada down to Texas and Florida. The species breeds in east central Saskatchewan, southern Manitoba, southern Ontario, southern Quebec, New Brunswick, Nova Scotia, and possibly in Prince Edward Island and southwestern Newfoundland.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Birds	Eastern Meadowlark *Sturnella magna*	THR	THR Schedule 1	THR	Eastern Meadowlarks breed primarily in moderately tall grasslands, such as pastures and hayfields, but are also found in alfalfa fields, weedy borders of croplands, roadsides, orchards, airports, shrubby overgrown fields, or other open areas. Small trees, shrubs, or fence posts are used as elevated song perches. Eastern Meadowlarks prefer grassland habitats, including native prairies and savannahs, as well as non-native pastures, hayfields, weedy meadows, herbaceous fencerows, and airfields.	**TPO, TPS, CUM1, CUS**, and **MAM2** with elevated song perches.	In Ontario, the Eastern Meadowlark is primarily found south of the Canadian Shield but it also inhabits the Lake Nipissing, Timiskaming, and Lake of the Woods areas. Including all subspecies, the Eastern Meadowlark's global breeding range extends from central and eastern North America, south through parts of South America. However, there is only one subspecies in Canada and the neighbouring northeastern U.S. In Canada, the bulk of the population breeds	**Low** No suitable habitat.	**Medium** Meadow may provide suitable habitat.	**Medium** Meadow may be present and provide suitable habitat.
Birds	Golden Eagle *Aquila chrysaetos*	END	No Status	Not At Risk	Golden Eagles nest in remote, undisturbed areas, usually building their nests on ledges on a steep cliff or riverbank, but they will also use large trees if needed. Most hunting is done near open areas such as large bogs or tundra. During migration they could be encountered anywhere, but are most frequently seen migrating west along the shores of Lake Ontario and Erie in November. Small numbers also winter in the southern half of Ontario, most often near large deer wintering areas where carcasses might be found.		In Ontario, breeding Golden Eagles are presently known only from the Hudson Bay Lowland, although there is some evidence suggesting they once nested much further south.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Birds	Henslow's Sparrow *Centronyx henslowii*	END	END Schedule 1	END	In Ontario, the Henslow's Sparrow lives in open fields with tall grasses, flowering plants, and a few scattered shrubs. It has also been found in abandoned farm fields, pastures, and wet meadows. It tends to avoid fields that have been grazed, burned, or are crowded with trees and shrubs. It prefers extensive, dense, tall grasslands where it can more easily conceal its small ground nest. Henslow's Sparrows occupy open fields. The vegetation of these areas includes tall grasses that are interspersed with tall herbaceous plants, or shrubby species. It prefers undisturbed areas with dense living grasses and a dense thatch of dead grasses. The species may occupy hayfields, but if the hay is cut early, the nests are destroyed and the resulting losses are severe. Only areas that remain undisturbed for several years appear to be more successfully colonized. The precise amount of remaining suitable habitat in	**TPO, CUM**, and **MAM** that are a minimum of 30 ha in size with vegetation that is over 30cm in height with a thick thatch layer and a lack of emergent woody vegetation.	The Henslow's Sparrow breeds in the northeastern and east-central United States, and reaches its northeastern limit in Ontario. It was once fairly common in scattered areas of suitable habitat south of the Canadian Shield. However, steep declines since the 1960s have all but wiped this bird out as a breeding species in Ontario. A few are still seen each spring at migration hotspots such as Point Pelee National Park, and a few may breed at selected locations. In Canada, it now occurs in southern Ontario. Historical information indicates that the species probably occurred in natural prairie areas and that forest clearing in the 1800s probably lead to an expanded range for a time. In addition to southern Ontario, the Henslow's Sparrow used to occur in	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Birds	Least Bittern *Ixobrychus exilis*	THR	THR Schedule 1	THR	In Ontario, the Least Bittern is found in a variety of wetland habitats, but strongly prefers cattail marshes with a mix of open pools and channels. This bird builds its nest above the marsh water in stands of dense vegetation, hidden among the cattails. The nests are almost always built near open water, which is needed for foraging. This species eats mostly frogs, small fish, and aquatic insects. The Least Bittern breeds strictly in marshes dominated by emergent vegetation surrounded by areas of open water. Most breeding grounds in Canada are dominated by cattails, but breeding also occurs in areas with other robust emergent plants and in shrubby swamps. The presence of stands of dense vegetation is essential for nesting because the nests of Least Bittern sit on platforms of stiff stems. The nests are almost always within 10 m of open water. Open water is also needed for foraging, because Least Bitterns forage by ambushing their prey in shallow water near marsh edges, often from platforms that they construct out of bent vegetation. Access to clear water is essential for the birds to see their prey. This small heron prefers large marshes that have relatively stable water levels throughout the nesting period. Adults can raise nests somewhat to deal with rising waters, but persistent or sudden increases will flood nests. Conversely, drops in water level can reduce foraging opportunities and increase the species' exposure to predators. Needs for wintering habitat are less specific, and appear to be met by a wide variety of wetlands—not only emergent marshes like those used for breeding, but also brackish and saline swamps. Habitat use during migration is poorly	**MAS2-1, MAS3-1, SA** and **OAO**.	In Ontario, the Least Bittern is mostly found south of the Canadian Shield, especially in the central and eastern part of the province. Small numbers also breed occasionally in northwest Ontario. This species has disappeared from much of its former range, especially in southwestern Ontario, where wetland loss has been most severe. The Least Bittern breeds from southern Canada to South America. In Canada, the Least Bittern has been observed in every province, but most individuals occur in Ontario. The species breeds primarily in southern Ontario.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Associated ELC Communities	Known Species Range[1, 2]	W-WS-3a	W-WS-3b	W-WS-3b2
Birds	Loggerhead Shrike *Lanius ludovicianus* Loggerhead Shrike (migrans subspecies; Eastern Loggerhead Shrike) *Lanius ludovicianus migrans*	END	END Schedule 1	Non-active	In Ontario, the Loggerhead Shrike prefers pasture or other grasslands with scattered low trees and shrubs. It lives in fields or alvars (areas of exposed bedrock) with short grass, which makes it easier to spot prey. It builds its nest in small trees or shrubs and hunts by waiting patiently in tree branches until it swoops down and attacks its unsuspecting prey – usually large insects, such as grasshoppers. Loggerhead shrikes also require spiny, multi-branched shrubs where they can impale prey before eating it. Barbed wired fencing can also be used for this. The Loggerhead Shrike migrans subspecies inhabits open ranges with occasional trees and shrubs that provide nesting sites and perches from which to hunt. This species uses grazing areas where the grass is short. The fact that animals graze on the grass prevents the growth of too many trees and shrubs in these areas, which creates good feeding sites for the Loggerhead Shrike migrans subspecies. The presence of more grazing sites is typically associated with a greater abundance of Loggerhead Shrikes. The size of the habitat area is also important, because larger spaces allow the birds to avoid nesting too close to fences. This leads to greater breeding success, which may be due to the fact that predators use the fences.	**SWT, CUM, CUT, ALO** and **ALS**.	The Loggerhead Shrike currently breeds in central and western North America. Until the 1970s, the Loggerhead Shrike could be found at many locations throughout southern Ontario and other parts of northeastern North America, but it has declined dramatically. Although the occasional bird is still found within the broader former range, most remaining Loggerhead Shrikes are now found in two core grassland habitats - the Carden Plain north of Lindsay, and the Napanee Limestone Plain. The range of the migrans subspecies once extended from southeastern Manitoba and northwestern Ontario to New Brunswick, and southward to northeastern Texas, the western part of North Carolina and Maryland in the United States. In the 1990s, the shrike populations in northwestern United States and Canada underwent a continuing decline. This bird has virtually disappeared from most of the central and northern regions of its former range. The Canadian population is basically isolated from the larger populations found in the south-central United States. In Canada, the migrans subspecies is represented by only a few pairs in southeastern Manitoba and southern Ontario.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Medium** Cultural thicket and meadow may provide suitable habitat.
Birds	Louisiana Waterthrush *Parkesia motacilla*	THR	THR Schedule 1	THR	The Louisiana Waterthrush is usually found in steep, forested ravines with fast-flowing streams. The Louisiana Waterthrush occupies specialized habitat, showing a strong preference for nesting along relatively pristine headwater streams and wetlands situated in large tracts of mature forest. Although it prefers running water (especially clear, coldwater streams), it also inhabits heavily wooded swamps with vernal or semi-permanent pools, where its territories can overlap with its sister species the Northern Waterthrush. It is often classified as both an area-sensitive forest species, and a riparian-obligate species. Louisiana Waterthrush nests are constructed within niches in steep stream banks, in the roots of uprooted trees, or in mossy logs and stumps, usually within a few metres of water.	**FOD, FOM,** and **SWD** with fast flowing coldwater streams or large pools of open water.	The Louisiana Waterthrush summer range extends from the lower Great Lakes south to Georgia and west to Kansas. In Canada, the Louisiana Waterthrush breeds only in southern Ontario, along the Niagara Escarpment, in woodlands along Lake Erie, and scattered locations elsewhere. In Canada, the Louisiana Waterthrush breeds in southern Ontario, where it is considered a rare, but regular local summer resident. The bulk of the Canadian population is concentrated in two areas of Ontario: the Norfolk Sand Plain region bordering the north shore of Lake Erie, and the central	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Birds	Northern Bobwhite *Colinus virginianus*	END	END Schedule 1	END	Northern Bobwhites live in savannahs, grasslands, around abandoned farm fields, along brushy fencerows, and other similar sites. Grasslands that are occasionally burned are particularly important because the fires help keep the habitat from becoming too forested. In such places, bobwhites can find most of their needs such as food, nesting cover, and places to hide and rest throughout the year. In severe winter conditions bobwhites sometimes need to move into small forest areas to find snow-free areas for foraging. Bobwhites lay up to 16 eggs in a shallow natural depression that they line with plant material and conceal with grasses and vines. The Northern Bobwhite requires an early successional habitat that can be provided in a variety of vegetation types. Minimally it requires an interspersion of grassland, cropland, and brushy cover. In Ontario it is now usually associated with cultivated lands rather than native prairie fringes. In Ontario there were originally thousands of hectares of long-grass prairie in the extreme southwest. After settlement by Europeans, the creation of numerous small farms with diverse crops, inefficient harvest methods, and large weedy hedgerows greatly enhanced the potential for bobwhites, and resulted in the tremendous population increase. But, through the previous century, the trend has been away from pasture and summer fallow, and natural prairie has been all but eliminated. Habitat	**TPO, TPS, CUM, CUT, CUS,** and **CUW**.	The Northern Bobwhite is near its northern range limit in southern Ontario. This bird benefited greatly when the original forests were cleared and it expanded its range significantly in Ontario. At its peak over a century ago, its range in Ontario extended north to Georgian Bay and east to Kingston. This range has steadily retracted and now includes only the southwest corner of the province, mostly on Walpole Island, and possibly a few scattered locations nearby. Isolated sightings away from this area are usually a result of introductions or birds escaping from captivity. It has been introduced to many other areas with limited long-term success.	**Low** Outside of range.	**Low** Outside of range.	**Low** Outside of range.
Birds	Piping Plover *Charadrius melodus* Piping Plover (circumcinctus subspecies) *Charadrius melodus circumcinctus*	END	END Schedule 1	END	Piping Plovers nest exclusively on dry sandy or gravelly beaches just above the reach of high water and waves. When not migrating, this bird spends virtually all of its time between the water's edge and the back of the beach. It pecks the sand and searches small pools of water for food - mostly insects and small crustaceans.	**BBO**	In North America, the Piping Plover primarily breeds along the Atlantic coast, the western Great Lakes, and along wetlands, rivers, and lakes in the northern Great Plains. In Ontario, although never common, they breed along the shores of the Great Lakes, and at Lake of the Woods in northwestern Ontario. The circumcinctus subspecies of the Piping Plover is a North American bird that breeds on the American shores of the Great Lakes (Michigan) and throughout the Great Plains from the southern Canadian prairies to Nebraska. In Canada, the circumcinctus subspecies breeds in central Alberta, southern Saskatchewan, southern Manitoba, and used to breed in southern Ontario. The numbers of Piping Plovers have been decreasing everywhere. However, the most dramatic declines have occurred in the Great Lakes region. The last known nesting of Piping Plovers on the Canadian Great Lakes occurred at Long Point in 1977	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Birds	Prothonotary Warbler *Protonotaria citrea*	END	END Schedule 1	END	The Prothonotary is the only warbler in eastern North America that nests in tree cavities, where it typically lays four to six eggs on a cushion of moss, leaves, and plant fibres. In Canada, this species breeds only in deciduous swamp forests or riparian floodplain forests. The forests it occupies are typically dominated by Silver Maple, ash, and Yellow Birch. The species nests in naturally formed tree cavities or cavities excavated by other species, mainly Downy Woodpeckers and chickadees. It favours small, shallow holes situated at low heights in dead or dying trees, in which it builds a nest lined with moss. Nests are typically situated over standing or slow-moving water. Artificial nest boxes are also readily accepted and perhaps even preferred. Males often build one or more incomplete "dummy" nests. Females usually select one of these to complete, but they may also build an entirely new nest on their own. In any case, several suitable cavities appear to be required in each territory to accommodate all of these nests.	**FOD** and **SWD** with standing water.	In Canada, the Prothonotary Warbler is only known to nest in southwestern Ontario, primarily along the north shore of Lake Erie. Over half of the small and declining population is found in Rondeau Provincial Park. In Ontario, the Prothonotary Warbler is found in the warmer climate of the Carolinian deciduous forests. This species is very rare in Canada, but is actively monitored by a combination of amateurs and professionals. Many occupied sites are prone to blinking on and off. This level of annual fluctuation makes it difficult to ascertain whether there has been a true change in occupied range, but such a change seems unlikely. Fewer than 10 locations are occupied in Canada in any given year (e.g., no more than 8 in 2015).	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Associated ELC Communities	Known Species Range[1, 2]	W-WS-3a	W-WS-3b	W-WS-3b2
Birds	Yellow-breasted Chat *Icteria virens* Yellow-breasted Chat (virens subspecies) *Icteria virens virens*	END	END Schedule 1	END	The Yellow-breasted Chat lives in thickets and scrub, especially locations where clearings have become overgrown. This bird eats insects gathered from the foliage of low, dense shrubs, or from the ground. The Yellow-breasted Chat is a shrub specialist, occurring in early successional shrub habitats in eastern North America. In Ontario, habitat has declined since the early 1960s,	**CUT** and **SWT**	In Canada, it lives in southern British Columbia, the Prairies, and southwestern Ontario, where it is concentrated in Point Pelee National Park and Pelee Island in Lake Erie. Yellow-breasted Chats breed in North America, south of the boreal forest. The virens subspecies breeds from the east-central Great Plains and	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** Cultural thicket may provide suitable habitat.
Fish	American Eel *Anguilla rostrata*	END	No Status	THR	Over the course of its life, the American Eel can be found in both salt and fresh water. In fact, some scientists consider the American Eel to have the broadest diversity of habitats of any fish species in the world. In Canada, it is found in all fresh water, estuaries, and coastal marine waters that are accessible to the Atlantic Ocean, from Niagara Falls in the Great Lakes up to the mid-Labrador coast. American Eel can be declining in certain locations and be stable elsewhere.		In Canada, it is found in fresh water and salt water areas that are accessible from the Atlantic Ocean. This area extends from Niagara Falls in the Great Lakes up to the mid-Labrador coast. In Ontario, American Eels can be found as far inland as Algonquin Park. Once the eels mature (10-25 years) they return to the Sargasso Sea to spawn.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Insects	Mottled Duskywing (Great Lakes Plains population) *Erynnis martialis*	END	No Status	END	While many butterflies thrive in lush meadows, the Mottled Duskywing tends to live in dry habitats with sparse vegetation. These include open barrens, sandy patches among woodlands, and alvars. (Alvars are areas of limestone with shallow soil and sparse vegetation of grasses, shrubs, and wildflowers.) In Ontario, the Mottled Duskywing will only deposit their eggs on two closely-related plants: New Jersey Tea and Prairie Redroot. Larvae build silk leaf-nests and spend the winter as mature larvae, emerging as adults between mid-May and late June. In southwestern Ontario, a second brood matures in early July and takes flight between mid-July and late August. The Mottled Duskywing requires its host plants, New Jersey Tea (Great Lakes Plains DU) and Prairie Redroot (Boreal DU), during its life cycle. In Canada, these plants grow in dry, well-drained soils or alvar habitat within oak woodland, pine woodland, roadsides, riverbanks, shady hillsides, and tall grass prairies. The butterfly is frequently absent from apparently suitable host plant patches, suggesting additional limiting factors play a role in the species' site occupancy. The host plants also appear to be declining throughout most of the butterfly's range and the habitats may also be imperiled.		Scattered populations of this butterfly occur throughout southern Ontario. They have recently been documented in the Burlington and Oakville areas, and in Marmora (east of Peterborough). Some documented sites are within protected areas, including provincial parks and land set aside for conservation. The species extends into Canada in southeastern Manitoba and southern Ontario with populations in each region being separate designatable units (DU): the Boreal population (southern Manitoba) and Great Lakes Plains population (southern Ontario and historically Québec).	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Mammals	Eastern Small-footed Myotis (Eastern Small-footed Bat) *Myotis leibii*	END	N/A	N/A	In the spring and summer, Eastern Small-footed Bats will roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees. These bats often change their roosting locations every day. At night, they hunt for insects to eat, including beetles, mosquitos, moths, and flies. In the winter, these bats hibernate, most often in caves and abandoned mines. They seem to choose colder and drier sites than similar bats and will return to the same spot each		The Eastern Small-footed Bat has been found from south of Georgian Bay to Lake Erie and east to the Pembroke area. There are also records from the Bruce Peninsula, the Espanola area, and Lake Superior Provincial Park. Most documented sightings are of bats in their winter hibernation sites.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Medium** Cultural woodland may provide suitable habitat.
Mammals	Little Brown Myotis (Little Brown Bat) *Myotis lucifugus*	END	END Schedule 1	END	Bats are nocturnal. During the day they roost in trees and buildings. They often select attics, abandoned buildings, and barns for summer colonies where they can raise their young. Bats can squeeze through very tiny spaces (as small as six millimetres across) and this is how they access many roosting areas. Little Brown Bats hibernate from October or November to March or April, most often in caves or abandoned mines that are humid and remain above freezing. Their specific physiological requirements limit the number of suitable sites for overwintering. In the east, large numbers (i.e., >3000 bats) of several species typically overwinter in relatively few hibernacula. In the west, there are fewer known hibernacula, and numbers appear lower per site. Females establish summer maternity colonies, often in buildings or large-diameter trees. Foraging occurs over water, along waterways, and forest edges. Large open fields or clearcuts generally are avoided. In autumn, bats return to hibernacula, which may be hundreds of kilometres from their summering areas, swarm near the entrance, mate, and then enter that hibernaculum, or travel to different		The Little Brown Bat is widespread in southern Ontario and found as far north as Moose Factory and Favourable Lake. In Canada, *Myotis lucifugus* occurs from Newfoundland to British Columbia, and northward to near the treeline in Labrador, Northwest Territories and Yukon.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Medium** Cultural woodland may provide suitable habitat.
Mammals	Northern Myotis (Northern Long-eared Bat) *Myotis septentrionalis*	END	END Schedule 1	END	Northern Long-eared Bats are associated with boreal forests, choosing to roost under loose bark and in the cavities of trees. These bats hibernate from October or November to March or April. The Northern Long-eared Bat overwinters in cold and humid hibernacula (caves/mines). Their specific physiological requirements limit the number of suitable sites for overwintering. In the east, large numbers (i.e., >3000 bats) of several species typically overwinter in relatively few hibernacula. In the west, there are fewer known hibernacula, and numbers appear lower per site. Females establish summer maternity colonies in buildings or large-diameter trees. Foraging occurs along waterways, forest edges, and in gaps in the forest. Large open fields or clearcuts generally are avoided. In autumn, bats	**FOC, FOM, FOD, SWC, SWM,** and **SWD** where suitable roosting (i.e. cavity trees and trees with loose bark) habitat is available.	The Northern Long-eared Bat is found throughout forested areas in southern Ontario, to the north shore of Lake Superior and occasionally as far north as Moosonee, and west to Lake Nipigon. In Canada, *Myotis septentrionalis* occurs from Newfoundland to British Columbia, and northward to near the treeline in Labrador, Northwest Territories, and Yukon.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Medium** Cultural woodland may provide suitable habitat.

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Associated ELC Communities	Known Species Range[1, 2]	W-WS-3a	W-WS-3b	W-WS-3b2
Mammals	Tri-colored Bat *Perimyotis subflavus*	END	END Schedule 1	END	During the summer, the Tri-colored Bat is found in a variety of forested habitats. It forms day roosts and maternity colonies in older forest and occasionally in barns or other structures. They forage over water and along streams in the forest. Tri-colored Bats eat flying insects and spiders gleaned from webs. At the end of the summer they travel to a location where they swarm; it is generally near the cave or underground location where they will overwinter. They overwinter in caves where they typically roost by themselves rather than part of a group. The Tri-colored Bat overwinters in cold and humid hibernacula (caves/mines). Their specific physiological requirements limit the number of suitable sites for overwintering. In the east, large numbers (i.e., >3000 bats) of several species typically overwinter in relatively few hibernacula. In the west, there are fewer known hibernacula, and numbers appear lower per site. Females establish summer maternity colonies in buildings or large-diameter trees. Foraging occurs over water, along waterways, and forest edges. Large open fields or clearcuts generally are avoided. In autumn, bats return to hibernacula, which may be hundreds of kilometres from their summering areas, swarm near the		This bat is found in southern Ontario and as far north as Espanola near Sudbury. Because it is very rare, it has a scattered distribution. It is also found from eastern North America down to Central America. In Canada, *Perimyotis subflavus* occurs in Nova Scotia, New Brunswick, Quebec, and Ontario.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Medium** Cultural woodland may provide suitable habitat.
Molluscs	Lilliput *Toxolasma parvum*	THR	END Schedule 1	END	Unlike many at-risk mussels, Lilliput are found in a variety of soft river bottoms, such as mud, sand, and silt. Lilliputs burrow in these soft materials to filter-feed. This mussel is very sensitive to changes in water quality. Like most mussels, Lilliput females expel their larvae in the gills of host fish, where they live as parasites before forming into free-living mussels. Likely hosts are Johnny Darter, White Crappie, Bluegill, and Green Sunfish. Lilliput is found in a variety of habitats, from small to large rivers to wetlands and the shallows of lakes, ponds, and reservoirs. It prefers to burrow in soft substrates (river and lake bottoms) made of mud, sand, silt, or fine gravel.		This mussel is found in a small number of rivers flowing into Lake St. Clair, Lake Erie, and Lake Ontario, as well as two wetlands near the western end of Lake Ontario. Lilliput is only found in North America, where it is widely distributed from the Gulf of Mexico to the Great Lakes basin. In Canada, Lilliput was historically found in southern Ontario in the drainages of lakes St. Clair, Erie, and Ontario. No longer found in over 40 percent of its historical range, Lilliput is now restricted to the Sydenham River, lower Thames River (Baptiste Creek), Ruscom River, Belle River, Grand River, Welland River, 20 Mile Creek (Jordan Harbour), and Hamilton Harbour (Sunfish Pond, Cootes	**Low** No suitable habitat.	**Low** No suitable habitat.	**Medium** Watercourse may provide suitable habitat.
Plants	American Columbo *Frasera caroliniensis*	END	END Schedule 1	END	American Columbo grows primarily in open deciduous forests, and to a lesser extent along open forest edges and dense shrub thickets in Ontario. It is most commonly found in dry upland woods, but in parts of its range it has been found in grasslands, moist woods, and swampy habitats. American Columbo is most commonly associated with open deciduous forested slopes, but it can also be found in thickets and clearings. American Columbo grows in a variety of relatively stable habitats as well as on a wide variety of soils. In Ontario, American Columbo is frequently found growing with a rare plant, Perfoliate Bellwort, as well as with Woodland Sunflower, Pennsylvania Sedge, Poverty Oat-grass, and various asters	**FOD, CUM1,** and **SWD**.	American Columbo is widely distributed in eastern North America, ranging from southern Ontario west to Illinois and south to eastern Oklahoma, northern Mississippi, and western South Carolina. In Canada, American Columbo is only found in the Carolinian forest region of southern Ontario. There have been 22 populations recorded in Ontario. Based on field surveys in 2004 and 2005, 13 populations are currently believed to exist. Nine of these populations have not been seen since 1956. Of the 22 known populations in Canada, 12 are extant; the status of a 13th population is uncertain.	**Low** Not found during field investigations.	**Low** Not found during field investigations.	**Low** Not found during field investigations.
Plants	Butternut *Juglans cinerea*	END	END Schedule 1	END	In Ontario, Butternut usually grows alone or in small groups in deciduous forests. It prefers moist, well-drained soil and is often found along streams. It is also found on well-drained gravel sites and rarely on dry, rocky soil. This species does not do well in the shade, and often grows in sunny openings and near forest edges. Butternut occurs primarily in neutral to calcareous soils of pH 5.5 to 8, often in regions with underlying limestone, and is generally absent from acidic regions. It tends to reach greatest abundance in rich well-drained mesic loams in floodplains, streambanks, terraces, and ravine slopes, but can occur in a wide range of other situations. In closed-canopy stands, it must be in the overstory to thrive. Seedling establishment, growth, and survival to maturity are most frequent in stand openings, riparian zones, and forest	**FOD** and mature hedgerows; Soil: dry rocky or moist (4, 5, 6) to fresh (2, 3).	Butternut can be found throughout central and eastern North America. In Ontario, this species is found throughout the southwest, north to the Bruce Peninsula, and south of the Canadian Shield. Butternut's native Canadian range is restricted to southern Ontario and Quebec (primarily south of the area bounded by Georgian Bay, the Ottawa Valley, and the Quebec City region), and western and southern portions of New Brunswick.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** None found during field investigations.
Plants	Eastern Flowering Dogwood *Cornus florida*	END	END Schedule 1	END	Eastern Flowering Dogwood grows under taller trees in mid-age to mature deciduous or mixed forests. It most commonly grows on floodplains, slopes, bluffs, and in ravines, and is also sometimes found along roadsides and fencerows. This species is generally found in the drier areas of its habitat, although it is occasionally found in slightly moist environments. The Eastern Flowering Dogwood grows in sandy soil, more or less clayey. The species typically occurs in clusters within larger parcels of apparently suitable, though unoccupied, habitat. Historically, the Eastern Flowering Dogwood occupied a significant portion of the Carolinian forest in southern Ontario. However, large portions of the forest have been cleared to make way for agricultural activities, residential areas, and industrial facilities. This profound transformation resulted in a significant reduction and fragmentation of forest cover and suitable habitat.	**FOD** and **FOM**	In Canada, it can only be found in southern Ontario in the Carolinian Zone (the small area of Ontario southwest of Toronto to Sarnia down to the shores of Lake Erie). The Eastern Flowering Dogwood occurs in eastern North America from southern Michigan, Ontario, and Maine, to eastern Texas and northern Florida. In Canada, this species is only found in the deciduous forests of southern Ontario: in Oakville just west of Toronto, along the Niagara escarpment through Halton and Hamilton, and in several sites scattered throughout the Niagara region and towards the southwest. The Eastern Flowering Dogwood is particularly plentiful on the sand plain of Norfolk County.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Plants	Hoary Mountain-mint (Hoary Mountain Mint) *Pycnanthemum incanum*	END	END Schedule 1	END	In Ontario, Hoary Mountain-mint mostly occurs in dry, oak woodland habitat, on steep, warmer-than-normal slopes. The species does best in open areas with ample sunlight, in habitats that depend on disturbance such as fire to maintain these conditions. In Canada, the Hoary Mountain Mint is found on open, dry, sandy-clay habitats in open-canopied deciduous woods on relatively warm slopes. The prairie grasses Little Bluestem (*Schizachyrium scoparium*) and Big Bluestem (*Andropogon gerardii*) dominate one of the Hamilton sites.	**TPW** and **FOD1** with south facing slopes and ample sunlight.	In Canada, the species occurs only in southern Ontario. Initially there were two known extant locations, less than 2 km apart: Willow Point in Burlington, and Woodland Cemetery in Hamilton. A substantial new population was located in 2000, bringing the total of known extant locations to three, all found on the Burlington Bluffs in Hamilton and Burlington.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Plants	Red Mulberry *Morus rubra*	END	END Schedule 1	END	The Red Mulberry is an understory forest tree species found in moist forest habitats. In Ontario, these include slopes and ravines of the Niagara Escarpment, and sand spits and bottom lands near Lake Erie in the Kent and Essex counties region.	**FOD6, FOD7, FOD8,** and **FOD9**.	Red Mulberry is rare in Ontario, with very small populations scattered near the western edges of Lake Ontario and Lake Erie, and in the Niagara Region in forested valleys and floodplains. Within Canada, this eastern North American species is found only in southern Ontario. It has been confirmed in 18 locations in the province, but	**Low** No suitable habitat.	**Low** Not found during field investigations.	**Low** Not found during field investigations.

Taxonomy	Species	ESA Status	SARA Status	COSEWIC Status	Preferred Habitat[1, 2]	Associated ELC Communities	Known Species Range[1, 2]	W-WS-3a	W-WS-3b	W-WS-3b2
Plants	Spotted Wintergreen *Chimaphila maculata*	THR	END Schedule 1	THR	In Ontario, Spotted Wintergreen occurs in dry oak-pine woodland habitats with sandy soils Typically, dominant tree species include White Pine, Red Oak, Black Oak, and American Beech. The species does best in semi-open habitats. Spotted Wintergreen is a woodland understorey species typically associated with dry–fresh oak and oak–pine mixed forests and woodlands. The plant tends to occur on well-drained sandy soils free of coarse fragments, with low organic content and poor nutrient status.	**FOC1, FOM1, FOM2-1, FOD1,** and **FOD2** that are semi-open and have sandy soils.	In Canada, it is only found in a few locations in southern Ontario in Norfolk County and the Niagara Region. It is believed to have been been extirpated from Simcoe Kent, Middlesex, and York Counties, Hamilton-Wentworth Region, and the District of Muskoka. Spotted Wintergreen occurs in eastern North America, Mexico, and Central America. Its range in eastern North America extends from southern Michigan and Ontario, east to southern New Hampshire and Maine, and south to Mississippi and northern Florida. Historically, Spotted Wintergreen was more widely distributed in southern Ontario and into southwestern Quebec. It is now restricted to a few subpopulations in southern Ontario and is considered extirpated in Quebec. In Canada, there are currently five extant subpopulations.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.
Reptiles	Blanding's Turtle (Great Lakes / St. Lawrence population) *Emydoidea blandingii*	THR	THR Schedule 1	END	Blanding's Turtles live in shallow water, usually in large wetlands and shallow lakes with lots of water plants. It is not unusual, though, to find them hundreds of metres from the nearest water body, especially while they are searching for a mate or traveling to a nesting site. Blanding's Turtles hibernate in the mud at the bottom of permanent water bodies from late October until the end of April. In the Great Lakes/St. Lawrence population, Blanding's Turtles are often observed using clear water, eutrophic wetlands. Blanding's Turtles have strong site fidelity but may use several connected water bodies throughout the active season. Females nest in a variety of substrates including sand, organic soil, gravel, cobblestone, and soil-filled crevices of rock outcrops. Adults and juveniles overwinter in a variety of water bodies that maintain pools averaging about 1 m in depth; however, hatchling turtles have been observed hibernating terrestrially during their first winter. Reported mean home ranges generally fall between 10-60 ha (maximum 382 ha) or 1000-2500 m (maximum 7000 m); however, most studies likely underestimate Blanding's Turtle home range size because few have utilized GPS loggers to track daily movements throughout one or more entire active	**SWT2, SWT3, SWD, SWM, MAS2, SAS1, SAM1**, where open water is present.	The Blanding's Turtle is found in and around the Great Lakes Basin, with isolated populations elsewhere in the United States and Canada. In Canada, the Blanding's Turtle is separated into the Great Lakes-St. Lawrence population and the Nova Scotia population. Blanding's Turtles can be found throughout southern, central, and eastern Ontario. In its Canadian range, the Great Lakes/St. Lawrence population of the Blanding's Turtle occurs primarily in southern Ontario (with isolated reports as far north as Timmins) and southern Québec (with isolated reports occurring as far north as the Abitibi-Témiscamingue region and as far east as the Capitale-Nationale region in Québec). Across the North American range, Blanding's Turtles mainly occur in small, isolated subpopulations that maintain a few dozen to approximately 100 turtles.	**Low** No suitable habitat.	**Low** No suitable habitat.	**Low** No suitable habitat.

Glossary

EXP	ESA - Extripated - a species that no longer exists in the wild in Ontario but still occurs elsewhere. SARA - Extripated - a wildlife species that no longer exists in the wild in Canada, but exists elsewhere in the wild.
END	ESA - Endangered - a species facing imminent extinction or extirpation in Ontario which is a candidate for regulation under Ontario's Endangered Species Act. SARA - Endangered - a wildlife species that is facing imminent extirpation or extinction.
THR	ESA - Threatened - a species that is at risk of becoming endangered in Ontario if limiting factors are not reversed. SARA - Threatened - a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.
SC	ESA - Special Concern (formerly Vulnerable) - a species with characteristics that make it sensitive to human activities or natural events. endangered species because of a combination of biological characteristics and identified threats.
ESA	Endangered Species Act
SARA	Species at Risk Act (Federal)
Schedule 1	The official list of species that are classified as extirpated, endangered, threatened, and of special concern.
Schedule 2	Species listed in Schedule 2 are species that had been designated as endangered or threatened, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.
Schedule 3	Species listed in Schedule 3 are species that had been designated as special concern, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.
COSEWIC	Committee on the Stauts of Endangerd Wildlife in Canada - a committee of experts that assesses and designates which wild species are in some danger of disappearing from Canada.

AECOM Canada Ltd.
201 – 45 Goderich Road
Hamilton, ON   L8E 4W8 Canada

T: 905.578.3040
F: 905.578.4129
www.aecom.com

Appendix C

Stage 1 Archaeological Assessment Report (Watermain Twinning Trunk Municipal Class Environmental Assessment)

ARCHEOWORKS INC.

Stage 1 Archaeological Assessment for the Waterdown Watermain Trunk Twinning Schedule B Municipal Class Environmental Assessment and Conceptual Design Within Part of Lot 13, Concessions 2-3 In the Geographic Township of East Flamborough and Part of Lots 20-28, Concession 2, Part of Lots 20-25 and all of Lot 26, Concession 3 In the Geographic Township of West Flamborough Historic County of Wentworth Now in the City of Burlington, Regional Municipality of Halton And the City of Hamilton Ontario

Project #: 334-HA8355-21
Licensee (#): Kim Slocki (P029)
PIF #: P029-1033-2022

Original Report

July 7, 2022

<u>Presented to:</u>
GM BluePlan Engineering Limited
Royal Centre, 3300 Highway No. 7, Suite 402
Vaughan, Ontario
L4K 4M3
T: 416.703.0667

<u>Prepared by:</u>
Archeoworks Inc.
16715-12 Yonge Street, Suite 1029
Newmarket, Ontario
L3X 1X4
T: 416.676.5597
F: 647.436.1938

EXECUTIVE SUMMARY

Archeoworks Inc. was retained by *GM BluePlan Engineering Limited* to conduct a Stage 1 Archaeological Assessment (AA) in support of the Waterdown Watermain Trunk Twinning Schedule B Municipal Class Environmental Assessment (EA) and Conceptual Design. The project involves twinning the trunk watermain from Pumping Station HD016 at the intersection of York Road and Valley Road in Dundas to Highway 5 in Waterdown community. Water is currently pumped up the escarpment to Waterdown from Pumping Station HD016 through an existing 600 mm trunk watermain. A new watermain will provide additional security of supply and mitigate the elevated water storage needs in Waterdown.

The City of Hamilton previously initiated a Schedule B Municipal Class EA for the Waterdown Trunk Watermain Twinning which evaluated two main alignments and their sub-alternatives. The City of Hamilton has since expanded the scope of the project wherein additional alternatives have been added. The long-list of proposed trunk watermain alternative routes ("Route Alternatives") detailed below will be evaluated in Phases 1 and 2 of the revised Class EA project with the goal of selecting a preferred alignment:

- Route 1A, B, C, D, E: Valley Road/Rock Chapel Road/Highway 5
- Route 2: York Road/Royal Botanical Gardens lands/Patterson Road
- Route 3: York Road/Cartwright Nature Sanctuary/Patterson Road
- Route 4: York Road/Sovereign Avenue/South Drive
- Route 5: York Road/Old Guelph Road/South Drive
- Route 6: York Road/Highway 6

The Waterdown Watermain Trunk Twinning Schedule B Municipal Class EA and Conceptual Design project area ("study area") is located within: part of Lot 13, Concession 2, in the Geographic Township of East Flamborough, historic County of Wentworth, now in the City of Burlington, Regional Municipality of Halton; part of Lot 13, Concession 3, in the Geographic Township of East Flamborough, historic County of Wentworth, now in the City of Hamilton; and part of Lots 20-28, Concession 2, part of Lots 20-25 and all of Lot 26, Concession 3, in the Geographic Township of West Flamborough, historic County of Wentworth, now in the City of Hamilton, Ontario.

Background research identified elevated potential for the recovery of archaeologically significant materials within the Route Alternatives due to the proximity to documented pre-ca. 1900 Euro-Canadian settlements and historic settlement roads, proximity to cultural heritage resources and water courses. Additionally, the City of Hamilton's and Regional Municipality of Halton's archaeological management plans also identify the Route Alternatives as having archaeological potential. Two cemeteries are located within the study area of which one, the Rock Chapel Cemetery, is located immediately adjacent to the Route Alternatives. And finally, background research also identified several registered archaeological sites located in the study area and within 300 metres of the Route Alternatives and previous archaeological assessments that encompassed portions of the study area and Route Alternatives.

Combining the information from the background research and considering the findings detailed in the succeeding sections, the following recommendations are presented:

1. Lands within the Route Alternatives that were subjected to a previous AA and deemed free of further archaeological concern are recommended to be exempt from further assessment.
    a. The Trinity I (AhGx-501) archaeological site retains no further cultural heritage value or interest in relation to the Route Alternative located within a 50-metre radius.

2. Archaeological concerns remain for lands within the Route Alternatives that were previously subjected to an archaeological assessment that recommends further AA and/or the report is awaiting *MHSTCI* approval. A copy of the associated reports must be obtained to review the recommendations.

3. Parts of the Route Alternatives that were identified as having archaeological potential removed are exempt from requiring Stage 2 AA (extents of these areas to be confirmed through a detailed on-site property inspection during a Stage 2 AA).

4. Parts of the Route Alternatives that were identified as having no or low archaeological potential are exempt from requiring Stage 2 AA (extents of these areas to be confirmed through a detailed on-site property inspection during a Stage 2 AA).

5. Upon selection of the preferred alternative route, any construction activities which impact areas identified as having archaeological potential must be subjected to a Stage 2 AA. These areas must be subjected to pedestrian or test pit survey at five-metre intervals.

6. No intrusive activity may occur within the known limits of the Rock Chapel Cemetery without consent from the cemetery operator and the *Bereavement Authority of Ontario (BAO)*.
    a. Should the area within the current cemetery limits be impacted, additional Stage 2 and 3 archaeological investigations are required. A Cemetery Investigation Authorization (CIA) issued by the *BAO* is also required and needs to be obtained prior to conducting any soil-intrusive work.

7. Should proposed construction impacts occur within the swaths of land adjacent (i.e., within ten metres) to the Rock Chapel Cemetery identified as having potential for the recovery of unmarked burials, the following archaeological/cemetery investigations are required:

   a. A Cemetery Investigation Authorization (CIA) issued by the *BAO* is required and needs to be obtained prior to conducting any soil-intrusive work.
   b. As there is the potential to encounter both deeply buried archaeological resources and for archaeological resources to be present near the surface, surface survey methods (Stage 2 test pit survey) must occur within the grassed areas adjacent to the cemetery prior to mechanical excavation.
   c. Following the completion of the Stage 2 AA, regardless of the results, further cemetery investigations are required where the boundaries cannot be conclusively determined based on records, maps and plans of the cemetery. The recommendations for further cemetery investigations are as follows:
      i. A Stage 3 investigation consisting of mechanical topsoil removal must be undertaken following the lands immediately adjacent to the eastern limits of the Rock Chapel Cemetery (i.e., within ten metres) to confirm the presence or absence of deeply buried human remains.
      ii. Mechanical excavation is also recommended for the narrow strip of gravel and asphalt of Rock Chapel Road that falls within the ten-metre area of potential. However, should further discussion/research reveal buried utilities or pipelines with the roadway or time and circumstances do not permit mechanical removal within the roadway, construction monitoring by a licensed archaeologist will occur instead.

8. Should construction activities extend beyond the assessed limits of the Route Alternatives documented in this report, further archaeological investigation will be required to assess the archaeological potential of these lands.

No construction activities shall take place within the Route Alternatives prior to the *Ministry of Heritage, Sport, Tourism and Culture Industries* (Archaeology Programs Unit) confirming in writing that all archaeological licensing and technical review requirements have been satisfied.

TABLE OF CONTENTS

LIST OF TABLES

PROJECT PERSONNEL

Project Director.. Kim Slocki – MHSTCI licence P029

Historical Research.. Lee Templeton – MHSTCI licence R454

Graphics .... Cassandra Lamoureux
Lee Templeton

Report Preparation .... Cassandra Lamoureux
Lee Templeton

Report Review.. Kim Slocki

1.0 PROJECT CONTEXT

1.1 Objectives

The objectives of a Stage 1 Archaeological Assessment (AA), as outlined by the 2011 *Standards and Guidelines for Consultant Archaeologists* (‘*2011 S&G*’) published by the *Ministry of Heritage, Sport, Tourism and Culture Industries* (*MHSTCI*) (2011), are as follows:

- To provide information about the property’s geography, history, previous archaeological fieldwork and current land condition;
- To evaluate in detail the property’s archaeological potential, which will support recommendations for Stage 2 survey for all or parts of the property; and
- To recommend appropriate strategies for Stage 2 survey.

1.2 Development Context

Archeoworks Inc. was retained by *GM BluePlan Engineering Limited* to conduct a Stage 1 AA in support of the Waterdown Watermain Trunk Twinning Schedule B Municipal Class Environmental Assessment (EA) and Conceptual Design. The project involves twinning the trunk watermain from Pumping Station HD016 at the intersection of York Road and Valley Road in Dundas to Highway 5 in Waterdown community. Water is currently pumped up the escarpment to Waterdown from Pumping Station HD016 through an existing 600 mm trunk watermain. A new watermain will provide additional security of supply and mitigate the elevated water storage needs in Waterdown.

The City of Hamilton previously initiated a Schedule B Municipal Class EA for the Waterdown Trunk Watermain Twinning which evaluated two main alignments and their sub-alternatives. A previous Stage 1 AA was conducted for the Waterdown Trunk Watermain Twinning project area and specifically the alignment along Valley Road/Rock Chapel Road/Highway 5/Algonquin Avenue and its sub-alternative (Wood, 2019 – PIF# P354-0041-2020). However, because of enormous inputs and concerns from the public and other stakeholders regarding different trunk watermain alignments after the Class EA’s first Public Information Centre (PIC) on October 24, 2019, the City of Hamilton has since expanded the scope of the project wherein additional alternatives have been added. The long-list of proposed trunk watermain alternative routes detailed below (***see also Appendix A – Map 1***) will be evaluated in Phases 1 and 2 of the revised Class EA project with the goal of selecting a preferred alignment:

- Route 1A, B, C, D, E: Valley Road/Rock Chapel Road/Highway 5
- Route 2: York Road/Royal Botanical Gardens lands/Patterson Road
- Route 3: York Road/Cartwright Nature Sanctuary/Patterson Road
- Route 4: York Road/Sovereign Avenue/South Drive
- Route 5: York Road/Old Guelph Road/South Drive

- Route 6: York Road/Highway 6

The Waterdown Watermain Trunk Twinning Schedule B Municipal Class EA and Conceptual Design project area is located within: part of Lot 13, Concession 2, in the Geographic Township of East Flamborough, historic County of Wentworth, now in the City of Burlington, Regional Municipality of Halton; part of Lot 13, Concession 3, in the Geographic Township of East Flamborough, historic County of Wentworth, now in the City of Hamilton; and part of Lots 20-28, Concession 2, part of Lots 20-25 and all of Lot 26, Concession 3, in the Geographic Township of West Flamborough, historic County of Wentworth, now in the City of Hamilton, Ontario.

The Stage 1 AA documented herein will provide an overall review of archaeological potential for the Waterdown Watermain Trunk Twinning Schedule B Municipal Class EA and Conceptual Design project area (herein referred to as the "study area") (***see Map 2***). However, specific review, analysis and recommendations will only be provided for each of the alternative routes outlined above (i.e., Routes 1A-E, 2, 3, 4, 5 and 6) within the larger study area, herein referred to as the proposed "Route Alternatives" (***also see Map 2***). The existing road right-of-way (ROW) has been established as the limits of review for each of the alternative routes and where the route diverts beyond an open road allowance, a 20-metre-wide limit has been applied.

This study was triggered by the *Environmental Assessment Act* in support of a Schedule 'B' Class EA and Conceptual Design, satisfying Phases 1 and 2 of the Municipal Engineers Association (MEA) Municipal Class EA regulatory process. This Stage 1 AA was conducted under the project direction of Ms. Kim Slocki, under the archaeological consultant licence number P029, in accordance with the *Ontario Heritage Act* (1990; amended 2021) and *2011 S&G*. Permission to investigate the study area and Route Alternatives was granted by *GM BluePlan Engineering Limited* on December 14th, 2021.

1.3 Historical Context

To establish the historical context and archaeological potential of the study area, *Archeoworks Inc.* conducted a review of Indigenous and Euro-Canadian settlement history, and a review of historical mapping, topographic mapping and orthophotographs. The results of this background research are documented below and summarized in **Appendix B – Summary of Background Research**.

1.3.1 Pre-Contact Period

The pre-contact period of Southern Ontario includes numerous Indigenous groups that continually progressed and developed within the environment they inhabited (Ferris, 2013, p.13). **Table 1** includes a brief overview and summary of the pre-contact Indigenous history of Southern Ontario.

Table 1: Pre-Contact Period

<table>
<tr><th>Period</th><th>Date Range</th><th>Overview and Attributes</th></tr>
<tr><td colspan="3">PALEO-INDIAN (Early)</td></tr>
<tr><td>Early</td><td>ca. 11000 to 8500 BC</td><td rowspan="2">Small groups of nomadic hunter-gatherers who utilized seasonal and naturally available resources; sites are rare; hunted in small family groups who periodically gathered into larger groups/bands during favourable periods in the hunting cycle; campsites used during travel episodes and found in well-drained soils in elevated situations; sites also found along glacial features (e.g., glacial lake shorelines/strandlines) due to current understanding of regional geological history; artifacts include fluted and lanceolate stone points, scrapers and dart heads.
- Gainey, Barnes, Crowfield Fluted Points (Early Paleo-Indian)
- Holcombe, Hi-Lo, Lanceolates (Late Paleo-Indian)
(Ellis and Deller, 1990, pp.37-64; Ellis, 2013, p.37; Wright, 1994, p.25).</td></tr>
<tr><td>Late</td><td>ca. 8500 to 7500 BC</td></tr>
<tr><td colspan="3">ARCHAIC (Middle)</td></tr>
<tr><td>Early</td><td>ca. 7800 to 6000 BC</td><td rowspan="3">Descendants of Paleo-Indian ancestors; lithic scatters are the most commonly encountered site type; trade networks appear; artifacts include reformed fluted and lanceolate stone points with notched bases to attach to wooden shaft; ground-stone tools shaped by grinding and polishing; stone axes, adzes and bow and arrow; Shield Archaic in Northern Ontario introduced copper tools; oral traditions of the Algonquian-speaking Michi Saagiig (Mississauga Anishinaabeg) assert that they, “are the descendants of the ancient peoples who lived in Ontario during the Archaic and Paleo-Indian periods” (Gitiga Migizi and Kapyrka, 2015, p.1).
- Side-notched, corner-notched, bifurcate projectile points (Early Archaic)
- Stemmed, Otter Creek/Other Side-notched, Brewerton side and corner-notched projectile points (Middle Archaic)
- Narrow Point, Broad Point, Small Point projectile points (Late Archaic)
(Dawson, 1983, pp.8-14; Ellis et al., 1990, pp.65-124; Ellis, 2013, pp.41-46; Wright, 1994, pp.26-28).</td></tr>
<tr><td>Middle</td><td>ca. 6000 to 2000 BC</td></tr>
<tr><td>Late</td><td>ca. 2500 to 500 BC</td></tr>
<tr><td colspan="3">WOODLAND (Late)</td></tr>
<tr><td>Early</td><td>ca. 800 BC to AD 1</td><td>Evolved out of the Late Archaic Period; introduction of pottery (ceramic) where the earliest were coil-formed, under fired and likely utility usage; two primary cultural complexes: Meadowood (broad extent of occupation in Southern Ontario) and Middlesex (restricted to Eastern Ontario); poorly understood settlement-subsistence patterns; artifacts include cache blades, and side-notched points that were often recycled into other tool forms; primarily Onondaga chert; intensive exploitation of quarries in southeastern Ontario; commonly associated with Saugeen and Point Peninsula complexes.
- Meadowood side-notched projectile points
(Dawson, 1983, pp.15-19; Ferris and Spence, 1995, pp.89-97; Gagné, 2015; Spence et al., 1990, pp.125-142; Williamson, 2013, pp.48-61; Wright, 1994, pp.29-30).</td></tr>
<tr><td>Middle</td><td>ca. 200 BC to AD 700</td><td>Three primary cultural complexes in Southern Ontario: Point Peninsula (generally located throughout south-central and eastern Southern Ontario), Saugeen (generally located southwestern Southern Ontario), and Couture (generally located in southwestern-most part of Ontario); “given the dynamics of hunter-gatherer societies, with high levels of interaction and intermarriage among neighbouring groups, one would not expect the existence of discrete cultures” and the “homogeneity of these complexes have been challenged” (Ferris and Spence, 1995, p.98); introduction of large “house” structures and substantial middens; settlements have dense debris cover indicating increased degree of sedentism; incipient horticulture; burial mounds present; shared preference for stamped,</td></tr>
</table>

Period	Date Range	Overview and Attributes
		scallop-edged or tooth-like decoration, but each cultural complex had distinct pottery forms; Laurel Culture (ca. 500 BC to AD 1000) established in boreal forests of Northern Ontario. - Saugeen Point projectile points (Saugeen) - Vanport Point projectile points (Couture) - Snyder Point projectile points - Laurel stemmed and corner-notched projectile points (Dawson, 1983, pp.15-19; Ferris and Spence, 1995, pp.97-102; Gagné, 2015; Hessel, 1993, pp.8-9; Spence et al., 1990, pp.142-170; Williamson, 2013, pp.48-61; Wright, 1994, pp.28-33; Wright, 1999, pp.629-649).
Late Woodland		
Late (Transitional)	ca. AD 600 to 1000	According to their oral traditions, the north shore of Lake Ontario in Southern Ontario was occupied throughout the entire Late Woodland Period by the *Michi Saagiig* (Mississauga Anishinaabeg); their traditional territory extended north where they would hunt and trap during the winter months, followed by a return to Lake Ontario in the spring and summer; "the traditional territories of the Michi Saagiig span from Gananoque in the east, all along the north shore of Lake Ontario, west to the north shore of Lake Erie at Long Point. The territory spreads as far north as the tributaries that flow into these lakes, from Bancroft and north of the Haliburton highlands" (Gitiga Migizi and Kapyrka, 2015, p.1); oral traditions speak of people (the Iroquois) coming into their territory between AD 500-1000 who wished to establish villages and grow corn; treaties were made allowing the Iroquois to stay in their traditional territories; the Mississaugas of the Credit First Nation state they, "were the original owners of the territory embraced in the following description, namely commencing at Long Point on Lake Erie thence eastward along the shore of the Lake to the Niagara River. Then down the River to Lake Ontario, then northward along the shore of the Lake to the River Rouge east of Toronto then up that river to the dividing ridge to the head waters of the River Thames then southward to Long Point the place of the beginning" (MCFN, 2017a); the study area falls within land encompassed within the Mississauga of the Credit First Nation traditional territory (MCFN, 2017a). Earliest Iroquoian development in Southern Ontario is Princess Point which exhibits few continuities from earlier developments with no apparent predecessors; hypothesized to have migrated into Ontario; the settlement data is limited, but oval houses are present; introduction of maize/corn horticulture; artifacts include 'Princess Point Ware' vessels that are cord roughened, with horizontal lines and exterior punctation; smoking pipes and ground stone tools are rare; continuity of Princess Point and Late Woodland Iroquoian groups. - Triangular projectile points (Ferris and Spence, 1995, pp.102-106; Fox, 1990, pp.171-188; Gitiga Migizi and Kapyrka, 2015, pp.1-3; MCFN, 2017a).
Early	ca. AD 900 to 1300	Two Iroquoian cultures in Southern Ontario: Glen Meyer (located primarily in southwestern Ontario from Long Point on Lake Erie to southwestern shore of Lake Huron) and Pickering (encompassed north of Lake Ontario to Georgian Bay and Lake Nipissing); early houses were small and elliptical; developed into multi-family longhouses and some small, semi-permanent palisade villages; adoption of greater variety of harvest goods; increase in corn-yielding sites; well-made and thin-walled clay vessels with stamping, incising and punctation; crudely made smoking pipes, and worked bone/antler present; evolution of ossuary burials; grave goods are rare and not usually associated with a specific individual.

Period	Date Range	Overview and Attributes
		- Triangular-shaped, basally concave projectile points with downward projecting corners or spurs (Ferris and Spence, 1995, pp.106-109; Williamson, 1990, pp.291-320).
Middle	ca. AD 1300 to 1400	Two Iroquoian cultures in Southern Ontario: Uren and Middleport; increase in village sizes (0.5 to 1.7 hectares) and campsites (0.1 to 0.6 hectares) appear; some with palisades; classic longhouse takes form; increasing reliance on maize and other cultigens such as beans and squash; intensive exploitation of locally available land and water resources; decorated clay vessels decrease; well-developed clay pipe complex that includes effigy pipes; from Middleport emerged the Huron-Wendat, Petun, Neutral Natives and the Erie. - Triangular and (side of corner or corner removed) notched projectile points - Middleport Triangular and Middleport Notched projectile points (Dodd et al., 1990, pp.321-360; Ferris and Spence, 1995, pp.109-115).
Late	ca. AD 1400 to 1600	Algonquian-speaking groups of the Anishinaabeg (e.g., Mississauga, Ojibway, Chippewa, Odawa, Algonquin, and others) maintained stable relations with Iroquoian-speaking groups (e.g., Huron-Wendat, Neutral, Petun) who continued to establish settlements in Southern Ontario, according to *Michi Saagiig* oral tradition (Gitiga Migizi and Kapyrka, 2015, p.1). Two major Iroquoian groups: the Neutral Natives to the west of the Niagara Escarpment and the Huron-Wendat to the east; traditionally, the Huron-Wendat territory stretched "from the Gaspé Peninsula in the Gulf of Saint Lawrence and up along the Saint Lawrence Valley on both sides of the Saint Lawrence River all the way up to the Great Lakes. Huronia, included in Wendake South, represents a part of the ancestral territory of the Huron-Wendat Nation in Ontario. It extends from Lake Nipissing in the North to Lake Ontario in the south and Île Perrot in the East and Owend [sic] Sound in the West" and they "formed alliances and traded goods with other First Nations among the networks that stretched across the continent" (per. comm. R.Gaudreau-Couture, 21 June 2022 – ***see Supplementary Document, Section 3.0)***; Neutral Natives (or Attiewandaron/Attiwandaron) distributed west of the Niagara Escarpment, around the western end of Lake Ontario and eastward across the Niagara Peninsula to Lake Erie; sites also found in the Grand River area and as far as Milton in the east; varying settlements include villages up to five acres in size to isolated fishing cabins; villages tend to be located along smaller creeks, headwaters and marshlands; longhouses present; diet dependent on hunting, gathering, fishing and farming; ossuaries; tribe/band formation. - Neutral points typically small but long and narrow, frequently side-notched. (Ferris and Spence, 1995, pp.115-122; Gitiga Migizi and Kapyrka, 2015, pp.1-3; Lennox and Fitzgerald, 1990, pp.405-456; Ramsden, 1990, pp.361-384; Trigger, 1994, pp.42-47; Warrick, 2000, p.446; Warrick, 2008, p.15).

1.3.2 Contact Period

The contact period of Southern Ontario is defined by European arrival, interaction and influence with the established Indigenous communities of Southern Ontario. **Table 2** includes an overview of some of the main developments that occurred during the contact period of Southern Ontario.

Table 2: Contact Period

Period	Date Range	Overview and Attributes
European Contact	ca. AD 1600s	The Anishinaabeg continued to inhabit Southern Ontario, alongside the Iroquois; inter-marriage between Anishinaabeg and the Iroquois; Mississauga Anishinaabeg oral traditions tell of groups wintering with Iroquoian neighbours, resulting in a complex archaeological record; oral traditions also speak of Anishinaabeg "paddling away" to their northern hunting territories to escape disease and warfare in Southern Ontario at this time; Neutral Native villages were clustered in the Niagara Peninsula, but their territorial hunting grounds stretched from the "Niagara River on the east, Lake Erie on the south, Lake St. Clair on the west, and a hazy Huron-Neutral frontier on the north" (Hunt, 1940, p.50); Neutral Natives referred to as *la Nation neutre* by Samuel de Champlain "because they remained neutral in the fierce and continuous warfare between the Six Nations, then residing in what is now New York State; and the Hurons, residing along the shores of Georgian Bay and about what is now Barrie" (Reville, 1920, p.15); limited European contact with Neutral Natives; French missionaries (Father La Roche Daillon in 1626; Father Jean de Brébouf and Father Pierre Joseph Marie Chaumonot in 1640) visited Neutral Native villages but no permanent missions were established; no direct commercial trade relationship was formed between the French and Neutral Natives; trade goods begin to replace traditional tools/items; Jesuit and Recolléts missionaries; epidemics (Fox and Garrad, 2004, p.124; Gitiga Migizi and Kapyrka, 2015, pp.1-3; Jury, 1974, pp.3-4; Lennox and Fitzgerald, 1990, pp.405-456; Reville, 1920, p.16; Trigger, 1994, pp.47-55; Warrick, 2008, pp.12, 15, 80, 245; White, 1978, pp.407-411; Wilkinson, 2003, p.1).
Five Nations of Iroquois (Haudenosaunee)	ca. AD 1650s	The Five (later Six) Nations (Mohawk, Seneca, Oneida, Onondaga and Cayuga; later included the Tuscarora) of Iroquois (or Haudenosaunee), originally residing south of the Great Lakes, engaged in warfare with other Iroquois groups (Huron-Wendat, Petun and Neutral) as their territory no longer yielded enough furs; the Five Nations, armed with Dutch firearms, attacked and destroyed numerous Huron-Wendat villages in 1649-50; the groups that remained became widely dispersed throughout the Great Lakes region but remained an independent Nation; the Huron-Wendat ultimately resettled near Quebec City (forming the oldest First Nations community in Canada), in southwestern Ontario and in America; the Five Nations attacked the Neutrals ca. 1650s which appears to have caused their dispersal; Neutrals survivors were likely incorporated into the Five Nations or sought refuge with other groups; the Five Nations, particularly the Seneca, established settlements along the northern shoreline of Lake Ontario at strategic locations along canoe-and-portage routes and used territory for extensive fur trade; villages along the Niagara River; European fur trade and exploration continued (Abler and Tooker, 1978, p.506; Gitiga Migizi and Kapyrka, 2015, p.2; Robinson, 1965, pp.15-16; Schmalz, 1991, pp.12-34; Trigger, 1994, pp.53-59; Warrick, 2008, p.208; Williamson, 2013, p.60).
Anishinaabeg Return (and Arrival)	ca. AD 1650s to 1700	Some narratives tell of Anishinaabeg groups either returning (Gitiga Migizi and Kapyrka, 2015, p.2) or moving by military conquest (MCFN, 2017a) to Southern Ontario in the 1690s; battles fought throughout Southern Ontario, ultimately resulting in most of the Five Nations being driven out and returning to their lands south of the Great Lakes; some groups within the Five Nations remained in parts of Southern Ontario; '*Mississauga'* term applied to Anishinaabeg bands living on the north shore of Lake Ontario; they were focused on hunting/fishing/gathering with little emphasis on agriculture; temporary and moveable houses (wigwam) left little archaeological material behind; multiple settlements throughout Southern Ontario (Gibson, 2006, pp.35-41; Hathaway, 1930, p.433; Johnston, 2004, pp.9-10; McMillan

Period	Date Range	Overview and Attributes
		and Yellowhorn, 2004, pp.110-111; Smith, 2013, pp.16-20; Trigger, 1994, pp.57-59; Williamson, 2013, p.60).
Trade, Peace and Conflict	ca. AD 1700 to 1770s	Great Peace negotiations of 1701 in Montreal established peace around the Great Lakes; collectively referred to the Anishinaabeg and Five Nations of Iroquois as the 'First Nations'; European commerce and exploration resumed; beginnings of the Métis and their communities; skirmishes between France and Britain as well as their respective First Nations allies erupt in 1754 ("French and Indian Wars") and forms part of the larger Seven Years' War; French defeat transferred the territory of New France to British control; Treaty of Paris (1763); Royal Proclamation of 1763 "states explicitly that Indigenous people reserved all land not ceded by or purchased from them" (Hall, 2019a); the Proclamation established framework for how treaties were negotiated (by only the King or an assigned representative of the King, and only at a public meeting called for this specific purpose) and established the "constitutional basis for the future negotiations of Indigenous treaties in British North America" (Hall, 2019a); the Proclamation established the British administration of North American territories ceded by France to Britain; uprising by several First Nations groups against British ("Pontiac's War"); fur trade continued until Euro-Canadian settlement (Abler and Tooker, 1978, pp.505-517; Hall, 2019a; Jaenen, 2013; Johnston, 2004, pp.13-14; Schmalz, 1991, pp.35-62, 81; Surtees, 1994, pp.92-97; Tooker, 1978, pp.418-441).
Early British Administration and Early Euro-Canadian Settlement	ca. AD 1770s to 1800s	American Revolutionary War (1775-1783) drove large numbers of United Empire Loyalists (those who were loyal to the British Crown), military petitioners, and groups who faced persecution in the United States to re-settle in Upper Canada; Treaty of Paris (1783) formally recognized the independence of the United States; Province of Quebec divided in 1791 into sparsely populated Upper Canada (now southern Ontario) and culturally French Lower Canada (now southern Quebec); Jay's Treaty of 1795 establishes American/Canadian border along the Great Lakes; large parts of Upper Canada opened to settlement from the British Isles and continental Europe after land cession treaties were negotiated by the British Crown with various First Nations groups (Government of Ontario, 2021; Hall, 2019b; Jaenen, 2014; Surtees, 1994, p.110; Sutherland, 2014).
British Land Treaties	1781	In 1784, the Mississaugas at the western end of Lake Ontario ceded a large tract of land that "included the Niagara Peninsula, lands close to the head of Lake Ontario, and the north shore of Lake Erie as far west as Cat Fish Creek" (Surtees, 1994, p.103); this was later known as Treaty No. 3 or Between the Lakes Purchase; from this land, "the British carved out a tract to run nearly ten kilometres deep on each side of the Grand River from its mouth to its source, and awarded it to the Six Nations" (Surtees, 1994, pp.103-104) for their allegiance to the British during the American Revolutionary War; this tract along the Grand River was known as the Haldimand Proclamation, Haldimand Grant or Haldimand Tract of 1784 (Filice, 2016); due to uncertainties with the description of land in the original surrender, Treaty No. 3 was signed in 1792 and Treaty No. 4 was signed in 1793; the study area is located within Treaty No. 3 (Department of Indian Affairs, 1891, pp.xxiv-xxv; Government of Ontario, 2014; Government of Ontario, 2021; MCFN, 2017b; Surtees, 1994, p.103).

1.3.3 Euro-Canadian Settlement Period (AD 1800s to present)

1.3.3.1 East and West Flamborough Townships

Much of the early history of the County of Wentworth is tied to Gore District, a large administrative boundary that was broken up into individual counties in 1850. The Counties of Wentworth and Halton formed one municipality until 1854, at which time they separated. The County of Wentworth was named after Sir John Wentworth, Lieutenant-Governor of Nova Scotia from 1792 to 1808. Within the County of Wentworth was the Township of Flamborough; the township was divided into East and West parts sometime before 1816. The Township of Flamborough was named after a prominent geographic formation, the Flamborough Head, located in Yorkshire, England. The first surveyor to enter the Township of Flamborough was Augustus Jones in 1793 who surveyed Dundas Street from Morden's Wharf (now the community of Dundas) to York (now Toronto), by order of Lieutenant Governor John Graves Simcoe. Dundas Street was intended to be a military road situated inland from the lakeshore. By 1796-7, settlers had arrived in the township and initially settled along Dundas Street. However, it was not until 1797 that John Stegmann began the survey of the township. It was subsequently completed in 1798 (Hamilton Public Library, 2018; Martin, 1839, p.192; Mika and Mika, 1981, p.34; Mika and Mika, 1983, p.624; Page & Smith, 1875, p.xi; Welch and Payne, 2009; Woods, 1967, pp.11-12; Wray, 1994, p.3).

The topography of the Township of Flamborough varies containing both hills and valleys and the soil is primarily loam and is well watered by numerous small streams. Many waterfalls are found throughout the township. Settlement in the township was slow; by 1817, only 360 individuals resided in the area. By 1841, 1,341 individuals resided within the township, 25,537 acres were assigned to settlers, 8,750 acres were under cultivation, and two grist mills and nine saw mills were located in the township. Within nine years, the population increased to 2,428 individuals and a tannery, distillery, paper mill, woollen factory and the Great Western Railway were built (Mika and Mika, 1981, pp.34-35; Page & Smith, 1875, p.xii; Welch and Payne, 2009).

East Flamborough was described in Smith's 1846 *Canadian Gazetteer* as having 25,537 acres owned and 8,750 acres were under cultivation, with good farms, excellent land and having two grist and nine saw mills. The total population was noted to be 1,341 individuals in 1841 (Smith, 1846, p.59).

West Flamborough was described in Smith's 1846 *Canadian Gazetteer* as having 24,224 acres occupied, where 9,551 acres were under cultivation. It was noted to have some good farms, four grist mills, seven saw mills, a carding machine and fulling mill, an oil mill, cloth factory, a pump, a fanning mill and chair factory, a paper mill, two tanneries and two distilleries. In 1841, the total population was noted to include 2,428 individuals (Smith, 1846, pp.59-60).

1.3.3.2 The War of 1812

On June 18th, 1812, the United States declared war on Great Britain and planned to "invade Canada by way of Lake Champlain in the east, by the Niagara river in the centre and by the River Detroit in the west" (Smith, 1897, p.93). When the American army invaded and attacked the Town of York (now Toronto) and then proceeded to Fort George in Niagara-on-the-Lake, the British, who were outnumbered, retreated to Burlington Heights, south of the study area by

Cootes Paradise. In May 1813, an American fleet destroyed the 'Government House' or the King's Head Inn, on Burlington Beach. More familiarly known as the Government House, this building served as a way station, supply depot and also as a distributing centre for gifts to the First Nations people "who received gifts annually as compensation for land taken for settlement" (Smith, 1897, pp-94-95).

Despite defeat, the British soldiers continued and on June 6, 1813, defeated the Americans at the Battle of Stony Creek. After numerous additional battles throughout Upper Canada, on "the 14th of December, 1814, the Treaty of Ghent was concluded and peace restored" (Smith, 1897, p.99) in Upper Canada.

1.3.3.3 Town of Waterdown

Waterdown, located north of the study area, was built on land originally granted to Lt. Alexander McDonnell in 1796, but remained undeveloped until 1805. That year, Alexander Brown purchased the land and constructed a sawmill at the falls on Grindstone Creek. In 1831, Ebenezer Griffin prepared a village plan for Waterdown and throughout the decade sold several village lots, primarily the lots west of Mill Street and along Dundas Street. Ebenezer Griffin also constructed a sawmill, a flour mill and a woollen mill in Waterdown, and soon settlers arrived. The community was known as Smokey Hollow. By 1841, most of the village lots had been taken up, and 165 individuals resided in the community, many of which were employed by the local mills. A commercial area developed along Dundas Street and in 1878, Waterdown was incorporated as a village. Waterdown functioned as the centre of the Township of East Flamborough and a town hall was constructed in 1857. However, the remaining years of the nineteenth century saw decline to Waterdown after a series of fires, floods and declining water pressure resulted in the milling era of Waterdown coming to an end (Hamilton Public Library, 2018; Mika and Mika, 1983, p.600; Wray, 1994, p.5).

1.3.3.4 Town of Dundas

Dundas, located southwest of the study area, is situated between two faces of the Niagara Escarpment and was named after the military road built in 1794-95 at Cootes Paradise on Lake Ontario to the Thames River (Cruikshank, 2009). A small piece of land was set aside by John Graves Simcoe which became the Town of Dundas. Settlement began in 1787, and the town quickly became an important agricultural trading and milling centre. In 1832, the Desjardins Canal was opened, and by 1855, the Great Western Railway located its roundhouses, manufacturing and maintenance facilities in the community (Cruikshank, 2009).

In 1847, Dundas was incorporated as a town and six churches, a fire hall, several physicians and surgeons, lawyers, mills, stores, a bank, the Town Hall taverns, small industries, and multiple commercial and industrial businesses had established themselves in the town. However, the expanding port facilities along the Lake Ontario shoreline at Hamilton quickly displaced Dundas' importance as a commercial, industrial and urban centre in the region. By 2001, Dundas amalgamated with the City of Hamilton (Hamilton Public Library, 2022; Smith, 1846, p.49).

1.3.3.5 Rock Chapel Sanctuary/Royal Botanical Gardens (RBG) Berry Tract/Borer's Falls Conservation Area/Cartwright Nature Sanctuary/Nicholson Resource Management Area/Hopkins Tract

In the late 1910s, the City of Hamilton identified Burlington Heights as a grand entranceway to Hamilton. By the late 1920s, the City of Hamilton bought 377 acres for a botanical garden and to preserve Cootes Paradise at the western end of Lake Ontario. Over the remainder of the 20th century, the Royal Botanical Gardens accumulated 1,100 hectares of land "on several separate discrete parcels of land clustered around Burlington Bay at the western end of Lake Ontario" (Parks Canada, 1993). According to the Cultural Heritage Screening Report for the Waterdown Trunk Watermain Twinning Project (Golder Associates Ltd., 2019, p.8), the 1,100 hectares of land includes the Rock Chapel Sanctuary and Royal Botanical Gardens Berry Tract.

Borer's Falls Conservation Area, Cartwright Nature Sanctuary and the Nicholson Tract form part of the Borer's-Rock Chapel Heritage Lands which is a large "area of interior forest habitat with minimal disturbance" (Wong, 2009, p.31).

Hopkins Tract was established in 2015 and contains 24 hectares of land. It is located at the southeast corner of Old Guelph Road and York Road (Conservation Halton, 2022).

1.3.4 Past Land Use

1.3.4.1 Pre-1900 Land Use

To further assess the study area's potential for the recovery of Euro-Canadian remains, two pre-1900 maps – the 1859 *Map of the County of Wentworth* and the 1875 *Illustrated Historical Atlas of the County of Wentworth* (***see Maps 3-4***) – were reviewed. This revealed that a total of 34 historic structures and a cemetery are located in the study area and an additional 11 historical structures are depicted within a 300-metre radius of the study area limits, thereby elevating the potential to encounter archaeological resources.

A summary of depicted structures and named landowners in the historical maps is provided in **Table 3**. It must be noted that the dearth of structures illustrated in the 1859 map is not necessarily indicative of the lack of settlement in the area but is rather the result of a deliberate choice by the mapmakers to exclude this information. Additionally, due to the scale and depictions of the historic lots and roadways in these maps, the location of the study area in relation to the illustrated historic features (i.e., homesteads, church, school house, mills, blacksmith shops, etc., and roadways) is approximate.

Table 3: Summary of Structures in the Study Area in the Historical Maps of Wentworth County

Con.	Lot	Part	Owner/Occupant		Structure(s) in the Study Area	
			1859	1875	1859	1875
TOWNSHIP OF EAST FLAMBOROUGH						
2	13	N pt	Mrs. Biglow	J. Biglow	-	-
2	13	N pt		Mrs. Biglow		1 homestead
2	13	N pt		C. Biglow		-

Con.	Lot	Part	Owner/Occupant		Structure(s) in the Study Area	
			1859	1875	1859	1875
2	13	N pt		Wilson		-
2	13	N pt		Mrs. L.		-
2	13	N pt		Mrs. P.		-
2	13	N pt		Mrs. F.		-
2	13	N pt		Smith		1 homestead
3	13	S pt	John Long	John Long	-	-
3	13	S pt	John Long	Mrs. Foster	-	1 homestead
3	13	C pt	Thomas Foster	Mrs. Foster	-	1 homestead
3	13	N pt	A. Ryckman	Rickman	-	-
3	13	N pt	J. Curannie	George Hill	-	-
3	13	N pt	J. Curannie	J. Kaler	-	1 homestead
TOWNSHIP OF WEST FLAMBOROUGH						
2	19	N pt	Joseph Horning	-	-	-
2	20	N pt	T. Morden	James McKay	-	1 homestead
2	20	C pt	W. Rymal	James McKay	-	1 homestead
2	20	C pt	Unclear	James McKay	-	1 homestead
2	20	S pt	Thomas Bales	William Acland	-	-
2	21	N pt	P. Morden	Peter Morden	-	1 cemetery
2	21	C pt	Unlisted	W. K. Rymal	-	2 homesteads
2	21	S pt	Mrs. Erb	John Borer	Rock Chapel; S.W.M.	1 homestead; 1 saw mill
2	22	N pt	Unlisted	Peter Morden	-	-
2	22	C pt	P. Morden	J. Hatten	-	3 homesteads
2	22	S pt	Mrs. Erb	Wm. Simpson	-	1 homestead; 1 blacksmith; Rock Chapel
2	23	N pt	Harker Lyons	Henry McLaren	-	-
2	23	C pt	J. Cummings	Wm. Simpson	-	-
2	23	S pt	Mrs. Erb	Wm. Simpson	-	-
2	24	N pt	Harker Lyons	Henry McLaren	-	2 homesteads
2	24	S pt	Isaac Anderson	John Hayes	-	-
2	25	N pt	James Freeman	Thomas Curtis	-	-
2	25	N pt	James Freeman	James Freeman	-	-
2	25	S pt	John Smith	George Smith	-	1 homestead
2	26	N pt	James Lafferty	James Laffety	-	1 homestead; school house
2	27	Part	Toll Gate	James Hayes	Toll gate	1 homestead
2	27	Part	Thomas Samuels	James Hayes	-	1 homestead
2	28	All	Swezy	J. Hopkins	-	-
3	20	All	Mrs. Green	James Morden	-	-
3	21	S pt	David Rymal	John Chappel	-	1 homestead
3	22	All	Harker Lyons	Henry McLaren	-	2 homesteads
3	23	All	Abraham	Henry McLaren	-	2 homesteads
3	24	All	Rykeman	Abraham W. Rykeman	-	2 homesteads
3	25	All	A. Lebar	Abraham Baker	-	1 homestead
3	26	All	T.C.	Abraham Baker	-	1 homestead

Con.	Lot	Part	Owner/Occupant		Structure(s) in the Study Area	
			1859	1875	1859	1875
				TOTAL:	3 historic structures	26 homesteads; 1 cemetery; 1 blacksmith shop; 1 school; 1 chapel; 1 saw mill

Apart from the documented presence of historical settler farmsteads and other structures in close proximity, it must also be noted that the study area encompasses road allowances which were either constructed as given roads or originally laid out in the surveys of the townships they traverse, and thereafter facilitated transportation and settlement along their lengths. These include Highway 5, Highway 6, Patterson Road, Rock Chapel Road, Valley Road, Old Guelph Road and York Road.

In Ontario, the *2011 S&G* considers areas of early Euro-Canadian settlements (e.g., pioneer homesteads, isolated cabins, farmstead complexes, early wharf or dock complexes, pioneer churches, and early cemeteries), early historic transportation routes (e.g., trails, passes, roads, railways, portage routes), and properties that local histories or informants have identified with possible archaeological sites, historical events, activities, or occupations, as features or characteristics that indicate archaeological potential (per *Section 1.3.1*). Therefore, based on the proximity of early Euro-Canadian settlements and early historic transportation routes, these features contribute to establishing the archaeological potential of the study area.

1.3.4.2 Post-1900 Land Use

To facilitate further evaluation of the established archaeological potential within the study area, a detailed review of 1909, 1923, 1931 and 1938 topographic maps (***see Maps 5-6***), an aerial photograph from 1954 and orthophotographs from 2002, 2010 and 2019 (***see Maps 7-8***) was undertaken.

The 1909, 1923 and 1931 *Topographic Maps* revealed the study area primarily encompassed cleared agricultural fields and forested areas situated on either side of the Niagara Escarpment. Several streams traveled through the study area, and numerous houses were located within the study area. The Rock Chapel Church cemetery, a saw mill, two schools and several open road allowances were found in the study area. By 1923, a spur line from the Canadian National Railway to Waterdown was constructed through the northeast corner of the study area.

In 1935, the area was resurveyed and the results of that survey are depicted in the 1938 topographic map. Consequently, the distinguishable features more accurately matched their actual locations, such as the open road allowances of Highway 5, Highway 6, Patterson Road, Rock Chapel Road, Valley Road, Old Guelph Road and York Road. The remaining balance of the study area remained relatively unchanged.

By 1954, much of the study area encompassed agricultural fields, a large woodlot along the Niagara Escarpment, several structures, recreational and religious facilities, and the open road allowances of Highway 5, Highway 6, Patterson Road, Rock Chapel Road, Valley Road, Old Guelph Road and York Road. By 2002, land around the intersection of Highway 5 and Highway 6 consisted of several large industrial and commercial buildings and several small residential subdivisions were constructed within the study area. By 2010 an interchange was constructed along Highway 6 to provide access to and from York Road/Old York Road. After this time, the study area was relatively unchanged, primarily encompassing forest along the Niagara Escarpment and open farmland intersected with various roadways and blocks of residential communities. The only major land development that occurred within the study area was along Highway 6 and at the intersection with Highway 5.

1.3.5 Present Land Use

The present land use of the study area is categorized as Rural, Open Space, Escarpment Protection Area, North Aldershot Special Study Area, Parkway Belt West, Infill Residential, Greenlands (Escarpment Plan Area) and Environmental Protection Area (City of Hamilton, 2012; City of Burlington, 2011).

1.4 Archaeological Context

To establish the archaeological context and further establish the archaeological potential of the study area, *Archeoworks Inc*. conducted a comprehensive review of the local archaeological management plan, designated and listed cultural heritage resources, heritage conservation districts, commemorative markers and pioneer churches and early cemeteries in relation to the study area. Furthermore, an examination of registered archaeological sites and previous AAs within proximity to the study area limits, and a review of the physiography of the study area were performed. The results of this background research are documented below and summarized in **Appendix B – Summary of Background Research**.

1.4.1 Archaeological Management Plan

Per *Section 1.1, Standard 1* of the *2011 S&G*, when available, an archaeological management plan (AMP) or other archaeological potential mapping must be reviewed. Per the City of Hamilton's AMP and archaeological potential mapping, the majority of the study area has archaeological potential (City of Hamilton, 2016; City of Hamilton, 2019a-b).

According to the Regional Municipality of Halton AMP, the portion of the study area that is located within the City of Burlington is identified as having archaeological potential due to its proximity to historic structures and watercourses (ASI, 2009, p.11).

1.4.2 Designated and Listed Cultural Heritage Resources

Per *Section 1.3.1* of the *2011 S&G*, property listed on a municipal register or designated under the *Ontario Heritage Act*, or that is a federal, provincial, or municipal historic landmark or site, are considered features or characteristics that indicate archaeological potential.

According to the Cultural Heritage Screening Report for the Waterdown Trunk Watermain Twinning Project (Golder Associates Ltd., 2019), six protected heritage properties associated with the Royal Botanical Gardens National Historic Site of Canada (NHSC) are located within the study area (Golder Associates Ltd., 2019; ***see Table 4***). Per correspondence outlined in the Cultural Heritage Screening Report, the Royal Botanical Gardens NHSC designation includes 1,100 hectares of land and the designation makes references to natural areas and gardens, "which indicates the intent of the National Historic Sites and Monuments Board to include all properties" (Golder Associates Ltd., 2019, p.6).

Furthermore, the City of Hamilton and the City of Burlington maintain registers of properties with cultural heritage value or interest (CHVI). The City of Hamilton assigns three categories for heritage resources: Designated, Registered and Inventoried (City of Hamilton, 2021). Numerous Inventoried heritage properties are located within the study area (City of Hamilton, 2021; ***see Table 5***). Therefore, this feature contributes to establishing the archaeological potential of the study area.

No designated or non-designated cultural heritage resources are located in and within 300 metres of the portion of the study area that falls within the City of Burlington (City of Burlington, 2008).

Table 4: Royal Botanical Gardens NHSC within the Study Area

Address	Description
CITY OF HAMILTON	
40 Patterson Road	Protected Heritage Property
45 Patterson Road	Protected Heritage Property
318 Rock Chapel Road	Protected Heritage Property
360 Rock Chapel Road	Protected Heritage Property
Valley Road (no civic address; parcel No.174960001)	Protected Heritage Property
130 Valley Road	Protected Heritage Property

Table 5: Municipal Heritage Properties within the Study Area

Address	Description	Heritage Status
CITY OF HAMILTON		
43 Highway 5 W	-	Inventoried
88 Highway 5 W	-	Inventoried
95 Highway 5 W	-	Inventoried
167 Highway 5 W	Heritage Date: 1860	Inventoried
200 Old Guelph Road	Heritage Date: 1998	Inventoried
351 Rock Chapel Road	Heritage Date: 1870	Inventoried
355 Rock Chapel Road	Heritage Date: 1900	Inventoried
378 Rock Chapel Road	Borer House; Heritage Date: 1852	Inventoried
414 Rock Chapel Road	Heritage Date: 1830	Inventoried
451 Rock Chapel Road	Rock Chapel United Church; Heritage Date: 1876	Inventoried
446 Rock Chapel Road	-	Inventoried

"-" denotes no details provided in heritage inventory.

1.4.3 Heritage Conservation Districts

Per *Section 1.3.1* of the *2011 S&G*, heritage resources listed on a municipal register or designated under the *Ontario Heritage Act* are considered features or characteristics that indicate archaeological potential. The study area is not located in or within 300 metres of a Heritage Conservation District (City of Hamilton, 2021; City of Burlington, 2022). Therefore, this feature does not contribute to establishing the archaeological potential of the study area.

1.4.4 Commemorative Plaques or Monuments

Per *Section 1.3.1* of the *2011 S&G,* commemorative markers of Indigenous and Euro-Canadian settlements and history which may include local, provincial, or federal monuments, cairns or plaques, or heritage parks are considered features or characteristics that indicate archaeological potential. The study area is not located in or within 300 metres of a commemorative plaque and/or monument (OHT, 2021). Therefore, this feature does not contribute to establishing the archaeological potential of the study area.

1.4.5 Pioneer/Historic Cemeteries

Per *Section 1.3.1* of the *2011 S&G,* pioneer churches and early cemeteries are considered features or characteristics that indicate archaeological potential. Two early pioneer cemeteries are located within the study area: the Rock Chapel Cemetery and Hopkins Family Cemetery. The proximity of these cemeteries contributes to establishing archaeological potential of the study area (***see Sections 1.4.5.1 and 1.4.5.2 below for further details***).

Only the Rock Chapel Cemetery, however, is located immediately adjacent to the proposed construction impacts associated with the Watermain Route Alternatives (specifically routes 1A-D). Further discussion of Rock Chapel Cemetery and the requirements for archaeological and cemetery investigations within the scope of this project can be found in **Section 2.1.5**. The Hopkins Family Cemetery is located greater than 100 metres from any of the Route Alternatives and as such, no further archaeological or cemetery investigation recommendations are required for this cemetery within the scope of this project.

1.4.5.1 The Rock Chapel Cemetery

The Rock Chapel Cemetery is located at 451 Rock Chapel Road. In 1822, the first frame chapel (known as Rock Chapel) was constructed beyond the current property limits. This first chapel was located approximately a quarter mile from the present Rock Chapel United Church and “was erected on a ledge of solid rock jutting out from the brow of the escarpment and overlooking the Dundas Valley hence its name Rock Chapel” (Rock Chapel United Church, 2014). This frame chapel quickly became a meeting place for different religious denominations residing in the area: Anglicans, Baptists, Presbyterian, Episcopal, Wesleyan Methodist, Methodist and United. The cemetery was opened in 1838 after the Wesleyans purchased land from Moses Morden away from the Escarpment edge and the first burial occurred that same year. By 1870, the frame chapel became out-dated and in need of repairs. Following the Methodist union in 1876, a new church building was constructed adjacent to the cemetery property; this land was donated by the Lyons family. This new chapel, constructed of red brick, retained the name ‘Rock Chapel.’ The cemetery property is fenced by a wire fence with an open section fronting along Rock Chapel Road (City of

Hamilton, 2005, p.130; Rock Chapel United Church, 2014). According to the *Bereavement Authority of Ontario Public Register*, the cemetery license status is listed as inactive.

1.4.5.2 Hopkins Family Cemetery

The Hopkins Family Cemetery is located on the south side of York Road between Old Guelph Road and Highway 6 North. This cemetery is located within 300 metres of Route Alternatives 5 and 6. The Hopkins Family Cemetery was opened in 1816, and the first burial was Patty Mariah Hopkins. The last burial occurred in 1905 and the cemetery has been closed for burials since. A total of 25 headstones are located within the cemetery yard where the majority have been set into a cement pad; only one marker is not included in the cemetery pad and is located at the base of a hill. The burial grounds measure approximately 300 yards (~374 metres) and are beside a growth of trees (City of Hamilton, 2005, p.71).

1.4.6 Registered Archaeological Sites

Per *Section 1.1, Standard 1* and *Section 7.5.8, Standard 1* of the *2011 S&G*, the *Ontario Archaeological Sites Database (OASD)* maintained by the *MHSTCI* was consulted in order to provide a summary of registered or known archaeological sites within a minimum one-kilometre distance of the study area limits. According to the *OASD*, fifty (50) archaeological sites have been registered within one kilometre of the study area (MHSTCI, 2022). Of these, seven are located within the study area, one is located within 50 metres of the study area, and four are located within 300 metres of the study area (***see Tables 6-7***; ***see also attached Supplementary Document – Map S1***). Furthermore, there are no known sites located within any of the Route Alternatives and only one known site is located within a 50-metre radius (Trinity I – AhGx-501).

Table 6: Registered Archaeological Sites In and Within 50 Metres of the Study Area

Borden #	Name	Cultural Affiliation	Type	Development Status
Registered archaeological sites within the study area				
AhGx-283	Pleasant View	Pre-Contact (Indigenous)	Findspot	-
AhGx-501	Trinity I	Late Woodland (Indigenous)	Other: campsite	No further CHVI
AhGx-502	Trinity II	Late Archaic (Indigenous)	Findspot	No further CHVI
AhGx-711	Ryckman site	Pre-Contact; Post-Contact (Indigenous; Euro-Canadian)	Homestead; scatter	No further CHVI
AhGx-777	-	Pre-Contact	Unknown	Further CHVI
AhGx-778	-	Post-Contact	Unknown	Further CHVI
AhGx-779	-	Late Archaic	Unknown	Further CHVI
Registered archaeological sites within a 50-metre radius of the study area				
AhGx-760	P7	Pre-Contact (Indigenous)	Scatter	No further CHVI

"-" denotes no details provided in OASD.

Table 7: Registered Archaeological Sites Within 300 Metres and One-Kilometre of the Study Area

Borden #	Name	Cultural Affiliation	Type
Registered archaeological sites within a 300-metre radius of the study area			
AhGx-422	-	Post-Contact (Euro-Canadian)	Homestead
AhGx-758	P3	Pre-Contact	Scatter
AhGx-759	P4	Pre-Contact (Indigenous)	Scatter

Borden #	Name	Cultural Affiliation	Type
AhGx-761	P9	Pre-Contact (Indigenous)	Scatter
Registered archaeological sites within a one-kilometre radius of the study area			
AhGx-273	Lyons-Hopkins	Post-Contact (Euro-Canadian)	Homestead
AhGx-282	Hopkins Court	Pre-Contact (Indigenous)	Findspot
AhGx-288	-	Late Archaic (Indigenous)	Other: camp/campsite
AhGx-289	-	Archaic (Indigenous)	Other: camp/campsite
AhGx-290	-	Pre-Contact (Other)	-
AhGx-296	-	Pre-Contact (Other)	-
AhGx-297	-	Pre-Contact (Indigenous)	-
AhGx-299	-	Pre-Contact (Other)	-
AhGx-421	Clappison's Corners	Pre-Contact (Indigenous)	Findspot
AhGx-505	-	-	-
AhGx-550	-	Pre-Contact (Indigenous)	Findspot
AhGx-551	-	Pre-Contact (Indigenous)	Findspot
AhGx-552	-	Pre-Contact (Indigenous)	Scatter
AhGx-553	-	Pre-Contact (Indigenous)	Findspot
AhGx-554	-	Pre-Contact (Indigenous)	Findspot
AhGx-725	Silver Coffin	Pre-Contact	Unknown
AhGx-731	Cicada	Pre-Contact	Unknown
AhGx-740	Rill	Early Archaic	Camp/campsite
AhGx-741	Sable	Pre-Contact	Scatter
AhGx-742	FA-4	Pre-Contact	Scatter
AhGx-743	Tarn	Middle Archaic	Scatter
AhGx-744	FA-6	Pre-Contact	Scatter
AhGx-745	FA-8	Pre-Contact	Unknown
AhGx-746	Lunar	Pre-Contact	Scatter
AhGx-747	Aurora	Pre-Contact	Scatter
AhGx-748	FB-11	Pre-Contact	Scatter
AhGx-749	FB-12	Pre-Contact	Scatter
AhGx-750	Hythe	Late Archaic; Post-Contact (Indigenous; Euro-Canadian)	Other: field refuse; unknown
AhGx-751	FB-15	Pre-Contact	Scatter
AhGx-752	WB-16	Pre-Contact	Findspot
AhGx-753	Long	Early Archaic; Middle Archaic; Late Archaic; Middle Woodland; Late Woodland; Post-Contact (Indigenous; Euro-Canadian)	Camp/campsite; homestead
AhGx-754	FC-20	Pre-Contact	Scatter
AhGx-755	FA-22	Pre-Contact	Findspot
AhGx-756	FC-19	Archaic	Findspot
AhGx-757	FA-21	Late Woodland	Other: isolated find
AhGx-790	-	Pre-Contact	Scatter
AhGx-791	-	Early Archaic; Pre-Contact	Scatter
AhGx-792	-	Pre-Contact	Scatter

"-" denotes no details provided in OASD.

Per *Section 1.3.1* of the *2011 S&G*, previously registered archaeological sites in close proximity to the study area are considered to be features or characteristics that indicate archaeological potential. Therefore, given that a total of 12 registered archaeological sites are located either in or within 300 metres of the study area, this feature contributes to establishing the archaeological potential of the study area.

1.4.7 Previous Archaeological Assessments

Per *Section 1.1, Standard 1* and *Section 7.5.8, Standards 4-5* of the *2011 S&G*, to further establish the archaeological context of the study area, a review of previous AAs carried out within the limits of, or immediately adjacent (i.e., within 50 metres) to the study area (as documented by all available reports) was undertaken. Twenty-five (25) reports were located documenting previous archaeological work within the study area (***see Table 8; Map 9***) and an additional three reports were located documenting previous archaeological work within 50 metres of the study area (***see Table 9***).

The reports documenting the discovery of sites AhGx-777, AhGx-778 and AhGx-779 and subsequent stages of fieldwork conducted within the study area have not yet been entered into the *Ontario Public Register of Archaeological Reports* and therefore were not available to review (Templeton, 2022). According to their site forms available on the *OASD*, all three sites have further CHVI.

There is one additional report that documents the discovery of site AhGx-283 within the study area that was not available to review upon report completion (Mayer, Poulton & Associates Inc., 1991); a copy of this report has been requested from the *MHSTCI* (Lamoureux, 2022). According to the location information recorded on the site form available on the *OASD*, this site is located greater than 50 metres from any of the Route Alternatives. The CHVI of this site is unclear.

Table 8: Previous Archaeological Assessments in the Study Area

Location	Stage of Work	Details + Recommendations	Company, Report Date
Flamborough Power Centre, part of Lot 13, Concession 3, Township of East Flamborough (23 hectares)	1-2 AA	Consists of two separated areas of land, both located at the intersection of Dundas Street East (Hwy 5) and Highway 6. Parcels: 1) north of Dundas Street East and east of Highway 6; and 2) south of Dundas Street East and east of Highway 6. No archaeological resources were identified and as a result no further archaeological assessment is required.	AMICK Consultants Limited (2018a)
63 Highway 5 West, part of Lot 24, Concession 3, Township of West Flamborough (1 hectare)	1-2 AA	No archaeological resources were identified and as a result no further archaeological assessment is required.	AMICK Consultants Limited (2018b)
Mountain Brow Road, part of Lot 13, Concession 3, Township of East Flamborough (2.81 hectares)	1-2 AA	Physical evidence of human activity in the past was observed but it consisted mainly of 20th century refuse, including PVC pipe fragments. These finds are too recent to qualify as an archaeological resource and are of no CHVI. No archaeological resources of CHVI were identified and as a result no further archaeological assessment is required.	AMICK Consultants Limited (2019)

Location	Stage of Work	Details + Recommendations	Company, Report Date
Flamborough Lifestyle Centre Property, part of Lots 12 and 13, Concession 3, Township of East Flamborough (24.26 hectares)	1-2 AA	A total of five archaeological sites were identified during the Stage 2 AA: three indeterminate pre-contact findspots, one Late Archaic findspot (Trinity II site – AhGx-502) and one small Late Woodland pre-contact campsite (Trinity I site – AhGx-501). None of the five sites were determined to retain further CHVI and as a result no further archaeological assessment is required.	Archaeological Assessments Ltd. (2003)
Trinity I site (AhGx-501) – Flamborough Lifestyle Centre Property, part of Lot 13, Concession 3, Township of East Flamborough	3 AA	Although the Stage 1-2 report (Archaeological Assessments Ltd., 2003) determined none of the five sites found on the property to have CHVI, after reviewing the report, the *MHSTCI* indicated that a Stage 3 AA of the Trinity I site (AhGx-501) would be required before this section of the property could be cleared for development. The Trinity I site was determined to be the only potentially significant site on the property requiring further AA. Excavation of 12 one-metre-square test units in a 20-metre north-south by 15-metre east-west area; ten of the 12 test units were sterile and the two positive units only had 1-2 chipped lithics each. With a total of 7 artifacts recovered from the Stage 2-3 investigations, one of which is a diagnostic Late Woodland period projectile point, the site has been determined to represent a small activity area or temporary camp occupied by a single person or small group of people. The small number of artifacts recovered indicate this site does not have further CHVI. No further archaeological assessment is required.	Archaeological Assessments Ltd. (2007)
201 Old Guelph Road, Conservation Halton Hopkins Tract, part of Lot 27, Concession 2, Township of West Flamborough (16 hectares)	1-2 AA	The entire 16-hectare property was subjected to a Stage 1 AA. The Stage 2 assessment was limited to 11 specific areas on the property which will be impacted by the construction of a parking lot and 10 wetland features. The Stage 2 assessment area is two hectares in size. With the exception of the two-hectare area which was subjected to a Stage 2 assessment, the remaining 14 hectares of the subject property should be subjected to a Stage 2 archaeological assessment prior to any future development of this parcel of land. No archaeological resources were identified within the two-hectares and as a result no further archaeological assessment is required for these areas. The remaining 14-hectare area that requires a Stage 2 assessment will also require a Stage 3 assessment of the lands situated immediately adjacent to the Hopkins Family/Valley Cemetery. This is a closed 19th century pioneer cemetery which is surrounded on all four sides by the conservation	Archaeological Assessments Ltd. (2018)

Location	Stage of Work	Details + Recommendations	Company, Report Date
		lands. The Stage 3 assessment should consist of mechanical topsoil stripping a ten-metre wide corridor along all four sides of the cemetery in order to search for any unmarked graves.	
Preliminary Design and Class EA Study for Intersection Improvements at Various Locations: Location #3 - Highway 6 at York Road West Ramp Terminal (City of Hamilton)	1 AA	The majority of Location #3 (the only area located within 50 metres of the current study area) was determined to have been previously assessed (ASI, 1999; ASI, 2005; TMHC, 2010). Stage 2 AA in the form of test pit survey required for one small segment where archaeological potential remains.	Archeoworks Inc. (2019)
Highway 6 Improvements from Highway 403 to Highway 5 (also extension/ reconfiguration of Plains Road West, Old Plains Road, York Road, Old York Road, Maryvale Avenue and new ramps for Highway 6/York Road interchange)	1-2 AA (equivalent)	With the exception of the tablelands on either side of the existing cut of Highway 6 through the face of the Niagara Escarpment, all of the lands to be impacted by the improvements to Highway 6 proved to be extensively disturbed. Along the edge of the escarpment, 30 test pits were excavated on the west side of the highway and 15 test pits were excavated on the east side; no archaeological resources were identified. The majority of the areas of road extension/reconfiguration were also determined to be previously disturbed. Approximately 80 test pits were excavated in the Zellens Road and Maryvale Avenue sections of the project area; no archaeological resources were identified. An area of open pasture on the north side of Old York Road was subjected to test pit survey which proved disturbance. Two properties within the project area were not assessed due to lack of permission-to-enter (located at the northwest intersection of Highway 6 and York Road, and on the east side of Highway 6 to the north of Old York Road). Recommendations: 1) Those two portions of the project area that could not be examined due to lack of property access must be subject to assessment prior to the initiation of any ground-disturbing activities; and, 2) The balance of the project area may be considered free of any further archaeological concern. Note that the mapping provided within the report was not of a high enough quality to accurately map the limits of this previous assessment in relation to the current study area. The boundaries of this previous assessment as depicted in **Map 9** were determined based on mapping provided within the subsequent Stage 2 AA report (ASI, 2005).	ASI Archaeological and Cultural Heritage Services (1999)
Highway 6 from 500 m south of Highway 5,	1-2 AA	Although the project area extends to the 5th Concession East in the north, the Stage 2 assessment was focused on those lands south of Parkside Drive	ASI Archaeological and Cultural

Location	Stage of Work	Details + Recommendations	Company, Report Date
northerly to the 5th Concession East		where impacts are anticipated beyond the existing right-of-way. Approximately 50% of the project area south of Parkside Drive was determined to be either previously disturbed or low wet areas; these portions are of low archaeological potential. Approximately 15% was pedestrian surveyed and the remaining 35% was not surveyed because property access was not granted and/or the lands remained unploughed. Two archaeological sites (P2 or Clappison's Corners – AhGx-421 and H1 – AhGx-422) and an isolated find (P1) were encountered during pedestrian survey. Recommendations: 1) Pre-contact Clappison's Corners site (AhGx-421) and isolated chert flake P1 were determined to not have further CHVI and as a result no further archaeological assessment is required; 2) Historic site AhGx-422 is of no further CHVI and as a result no further archaeological assessment is required; and, 3) The remaining portions of the project area that are undisturbed (approximately 35% south of Parkside Drive) require Stage 2 pedestrian survey. Note that the mapping provided within the report was not of a high enough quality to accurately map the limits of this previous assessment in relation to the current study area. However, another archaeological assessment (Ministry of Transportation, 2010) provided a much clearer copy of ASI's 2002 Stage 1-2 AA result mapping within their report. Therefore, the boundaries of this previous assessment as illustrated within **Map 9** were determined based on the mapping included in the Ministry of Transportation's 2010 report.	Heritage Services (2002)
Highway 5 from 0.5 km west of Highway 6 to 1.0 km east of Highway 8 (length of 11.2 km)	1 AA	Project involved background research and property inspection. The project corridor was determined to encompass large areas exhibiting archaeological potential as well as areas of substantial disturbance along the Highway 5 right-of-way. Stage 2 AA recommended prior to any land-disturbing activities within the project corridor.	ASI Archaeological and Cultural Heritage Services (2004)
Detail Design Highway 6 improvements from Highway 403 to Highway 5	2 AA	Changes to the original detail design that necessitated additional AA include: the Zellens Road Extension grade separation (bridge crossing at the C.P. Rail Line), and a stormwater quantity treatment pond at the northeast quadrant of the York Road/Highway 6 interchange. Also examined two properties for which access permissions were not available for the previous Stage 2 assessment (ASI, 1999). No archaeological resources were identified and as a result no further archaeological assessment is required.	ASI Archaeological and Cultural Heritage Services (2005)

Location	Stage of Work	Details + Recommendations	Company, Report Date
Highway 5/Highway 6 Interchange Detail Design (190 hectares)	1 AA	Project involved background research and property inspection. Recommendations: 1) Sections of the project area that have been subject to extensive and deep land alterations that have severely damaged the integrity of any potential archaeological resources do not require additional archaeological assessment 2) Sections of the project area that have been previously assessed do not require additional archaeological assessment (ASI, 2002; MTO, 2010; New Directions Archaeology Ltd., 2011a); and 3) Should the proposed work impact areas identified as containing archaeological potential, then a Stage 2 AA must be conducted.	ASI Archaeological and Cultural Heritage Services (2012)
Highway 5/Highway 6 Interchange Detail Design (19.8 hectares revised to 13.3 hectares)	2 AA	The original project area consisted of 19.8 hectares which was later revised to 13.3 hectares. One Euro-Canadian homestead site of further CHVI was identified: Ryckman site (AhGx-711). Stage 3 AA required. Two additional isolated findspots (P1 & P2) were identified but they do not have further CHVI and as a result no further archaeological assessment is required. Sections of the Highway 5/6 project area were not assessed by this Stage 2 AA on account of lack of permission-to-enter; these areas will require Stage 2 AA once PTE is acquired.	ASI Archaeological and Cultural Heritage Services (2014)
43 Highway 5 West, part of Lot 24, Concession 3, Township of West Flamborough (9.3 hectares)	1-2 AA	A large portion of the subject property had been previously assessed as part of a Class EA project for the Highway 5 and Highway 6 Interchange detail design (ASI, 2014). During the course of this work, one historical site and one isolated pre-contact findspot were documented within the limits of the subject property. The historical site was registered as the Ryckman site (AhGx-711) and was recommended for a Stage 3 AA. The Stage 2 field assessment re-identified the Ryckman site (AhGx-711) as well as two additional pre-contact findspots (P5 and P8), and four pre-contact sites (AhGx-758, AhGx-759, AhGx-760 and AhGx-761). Recommendations: 1) Ryckman site (AhGx-711) requires a Stage 3 AA; 2) Pre-contact Indigenous findspots P5 and P8 are of no further CHVI; 3) Pre-contact Indigenous sites AhGx-759 and AhGx-761 are of no further CHVI; 4) Pre- contact Indigenous sites AhGx-758 and AhGx-760 require Stage 3 AAs.	ASI Archaeological and Cultural Heritage Services (2017)
Ryckman site (AhGx-711) – 43 Highway 5 West, part of Lot 24, Concession 3, Township of West Flamborough	3 AA	Excavation of 56 one-metre-square test units in a 70-metre north-south by 60-metre east-west area. The post-contact Euro-Canadian component of the site has further CHVI as does the pre-contact Indigenous component (Late Archaic). Stage 4 excavation recommended.	ASI Archaeological and Cultural Heritage Services (2019b)

Location	Stage of Work	Details + Recommendations	Company, Report Date
Ryckman site (AhGx-711) – 43 Highway 5 West, part of Lot 24, Concession 3, Township of West Flamborough	4 excavation	Excavation of 57 one-metre-square block units followed by mechanical topsoil removal and feature excavation. The Ryckman Site (AhGx-711) has been interpreted as a domestic assemblage that has been subject to a good degree of disturbance, with topsoil deposits dating from the mid-19th century through the mid-20th century. The site has been fully excavated and no further archaeological assessment is required.	Lincoln Environmental Consulting Corp. (2019a)
Rock Chapel United Church and Cemetery, 451 Rock Chapel Road, part of Lot 21, Concession 2, Township of West Flamborough	1 AA	The Stage 1 background research and property review resulted in the identification of approximately 94% of the subject property, consisting of the cemetery, the portions of the lawn and driveway outside of the cemetery limits, and the footprint of the original 1876 church building, as exhibiting archaeological potential. These portions of the property require further Stage 2 AA by means of test pit survey. Furthermore, it is recommended that no development or land alteration activity may take place within 4.57 metres or 15 feet of the identified burials within the cemetery, as per Section 154 of the *Funeral, Burial and Cremations Services Act* (R.S.O. 2002, S.O. 2002). The cemetery, as currently defined, comprises approximately 40% of the subject property. Should any building addition be proposed for the existing church, topsoil stripping of all areas to be impacted by the proposed construction activities, as well as an additional buffer of 4.57 metres (15 feet) beyond the limits of the proposed areas of development must be conducted. Should any future development plans involve removal or substantial alteration to the existing church, the footprint of the original 1876 church building, which lacks a basement, should be examined for the presence of burials. Due to the excavation of the subterranean basement beneath the two twentieth-century church additions, the footprints of these additions are determined to have no remaining archaeological potential and therefore do not require further assessment. Finally, it is the responsibility of the proponent to enter into discussions with the *BAO* regarding any future development plans proposed for the subject property.	ASI Archaeological and Cultural Heritage Services (2020)
Part of 556 York Road, part of Lot 25, Concession 2, Township of West Flamborough (2.3 hectares)	1 AA	Project involved background research and property inspection. Approximately 30% of the project area was identified as having no potential for the presence of archaeological resources (i.e., due to disturbances) and 70% exhibits archaeological potential (i.e., grassed and treed areas and arable	ASI Archaeological and Cultural Heritage Services (2021)

Location	Stage of Work	Details + Recommendations	Company, Report Date
		land) and requires Stage 2 AA. Should proposed impacts from any current or future developments on the 556 York Road property extend beyond the limits of the assessed project area, additional Stage 1 AA must be conducted.	
155 Coreslab Drive, part of Lot 23, Concession 3, Township of West Flamborough	1-2 AA	No archaeological resources were identified and as a result no further archaeological assessment is required.	CRM Lab Archaeological Services (2013)
Ontario Hydro transmission line right-of-way for proposed 115 kV refurbishment between Burlington TS and Horning Mountain Junction	1-2 AA	Sixteen tower areas, nine access roads and five puller tensioner (PT) sites were rated as having high potential for the discovery of archaeological resources and were surveyed. Two new locations with pre-contact lithic material were identified and one previously registered site (Coldwater Creek – AhGx-280) was confirmed to extend into a proposed tower access road. Location 1 was found adjacent to Tower 83 and consisted of two pieces of chipping detritus and one uniface; Location 2 was found adjacent to Tower 3 and consisted of one piece of chipping detritus (time constraints prevented a more intensified test pit survey); and, Location 3 (Coldwater Creek site – AhGx-280) was found adjacent to Towers 77 and 77A and consisted of 8 artifacts. While Location 1 is deemed to have little archaeological significance because of the paucity of cultural material observed on the surface, recommendations for follow-up assessment and mitigative measures are appropriate for Location 2 and AhGx-280; Location 2 requires a more intensive test pit survey and AhGx-280 requires Stage 3 AA. Note that although it was clear this project area overlapped with the current study area, it was not clear from the text or associated mapping in the report which areas had specifically been subjected to a Stage 2 AA. Therefore, the boundaries of this assessment in relation to the current study area are not included within **Map 9**. None of the sites documented in this report are located within one-kilometre of the current study area.	Mayer Heritage Consultants Inc. (1992)
Excess earth stockpiling area located on the northwest corner of the intersection of Highway 5 and Highway 6, City of Hamilton	1-2 AA	A large portion of the stockpiling area was assessed by a previous Stage 1-2 AA (ASI, 2002) to be disturbed and of low archaeological potential not requiring further AA. The portion of the stockpiling area not previously assessed contained additional disturbances and therefore further survey was not undertaken of these areas. The remainder of the stockpiling area was subjected to a Stage 2 AA. No archaeological resources were identified and as a	Ministry of Transportation (MTO) (2010)

Location	Stage of Work	Details + Recommendations	Company, Report Date
		result no further archaeological assessment is required of the stockpiling area.	
Part of 675 York Road, part of Lot 27, Concession 2, Township of West Flamborough	1-2 AA	Only part of the property where a proposed residence will be built was assessed (i.e., building footprint + area of impact). No archaeological resources were identified and as a result no further archaeological assessment is required. The remaining property will require assessment prior to it being impacted by construction	New Directions Archaeology Ltd. (2008)
21 Highway 5 West, part of Lots 24 and 25, Concession 3, Township of West Flamborough	1-2 AA	No archaeological resources were identified and as a result no further archaeological assessment is required.	New Directions Archaeology Ltd. (2011a)
724 Old York Road, part of Lot 28, Concession 2, Township of West Flamborough	1-2 AA	Stage 2 test pit survey determined that the entire property was disturbed and covered with a thick deposit of fill. Furthermore, no archaeological resources were identified and as a result no further archaeological assessment is required.	Timmins Martelle Heritage Consultants Inc. (TMHC) (2010)
Waterdown Trunk Watermain Twinning (same as current study area)	1 AA	Project involved background research and property inspection. The project area encompasses approximately 610.5 hectares, 8.7 hectares of which is comprised of the Valley Road Alignment. The Stage 1 property inspection included a walk-through of the right-of-way for Valley Road Alignment. The Valley Road Alignment begins approximately at the intersection of York Road and Valley Road, runs essentially northeast along Valley Road to Rock Chapel Road, then north along Rock Chapel Road to the intersection at Highway 5; from the intersection at Highway 5 it runs south to Algonquin Avenue and ends approximately 60 m west along Algonquin Avenue. Archaeological potential was established for the undisturbed, fairly level and well-drained portions of the project area. Recommendations: 1) Stage 2 AA required for areas of archaeological potential identified along the Valley Road Alignment; 2) Should ground disturbing activities occur within ten metres of the Rock Chapel Church and Cemetery, additional assessment will be required (contact the BAO, Stage 2 test pit survey followed by monitored mechanical removal of topsoil and inspection of subsoil surface for unmarked grave shafts outward to distance of ten metres from the cemetery); 3) The remainder of the project area along the Valley Road Alignment does not require further AA due to low archaeological potential (i.e., road side drainage ditches, excessive slope, roads, gravel shoulder, houses, driveways); and, 4) Prior to any disturbance beyond the project area for the Valley Road	Wood Environment & Infrastructure Solutions (Wood) (2019) *report not yet accepted into the *Ontario Public Register of Archaeological Reports* maintained by the *MHSTCI*

Location	Stage of Work	Details + Recommendations	Company, Report Date
		Alignment, these lands should be subjected to a combined Stage 1-2 AA at minimum.	

Table 9: Previous Archaeological Assessments within 50 Metres of the Study Area

Location	Stage of Work	Details + Recommendations	Company, Report Date
Part of Lot 20, Concession 2, Township of West Flamborough (only two parcels within the 34.80-hectare property were assessed)	1-2 AA	Consists of two parcels: 1) square shaped, 120 x 120 metres in size; and 2) rectangular in shape, 180 x 120 metres in size. One archaeological resource of First Nations origin was discovered in Parcel Two; it is of no further CHVI and was not registered with a Borden number. No further AA required within Parcels One or Two.	AMICK Consultants Limited (2008)
AhGx-758 & AhGx-760 – 43 Highway 5 West, part of Lot 24, Concession 3, Township of West Flamborough	3 AA	Report details the Stage 3 AA of both AhGx-758 & AhGx-760, however, only AhGx-760 is located within 50 metres of the current study area boundary. Stage 3 AA of AhGx-760 consisted of a controlled surface pick-up (CSP) followed by excavation of 48 one-metre-square test units in a 52-metre north-south by 33-metre east-west area. A diagnostic Genesee projectile point (3,500-2,800 BP) was recovered. Site AhGx-760 has further CHVI and Stage 4 excavation is recommended. Of note is that the results of the Stage 3 AA at AhGx-758 determined the site to have no further CHVI; no further archaeological assessment is required for this site.	ASI Archaeological and Cultural Heritage Services (2019a)
AhGx-760 – 43 Highway 5 West, part of Lot 24, Concession 3, Township of West Flamborough	4 excavation	Excavation of 83 one-metre-square block units. AhGx-760 has been interpreted as a short-term chipping station used for tool maintenance in the Late Archaic period. The site has been fully excavated and no further archaeological assessment is required.	Lincoln Environmental Consulting Corp. (2019b)

Note that there is a previous assessment report prepared by New Directions Archaeology Ltd. (2011b – P018-361-2011) for 231 York Road in the Town of Dundas. This report provides mapping and lot/concession information that incorrectly places the property within the boundaries of the current study area. However, a review of the report determined the property to not even be located within 50 metres of the current study area.

1.4.8 Physical Features

An investigation of the study area's physical features was conducted to aid in the development of an argument for archaeological potential. Environmental factors such as close proximity to water, soil type, and nature of the terrain, for example, can be used as predictors to determine where human occupation may have occurred in the past.

1.4.8.1 Physiographic Region

The study area is located within the Niagara Escarpment and Norfolk Sand Plains physiographic regions of Southern Ontario.

The Niagara Escarpment physiographic region extends from the Niagara River to the northern tip of the Bruce Peninsula, continuing through the Manitoulin Islands. Vertical cliffs along the brow mostly outline the edge of the dolostone of the Lockport and Amabel Formations, wherein the slopes below are carved in red shale. Flanked by landscapes of glacial origins, the rock-hewn topography stands in striking contrast, and its steep-sided valleys are strongly suggestive of non-glaciated regions. While the escarpment stands out boldly in the Niagara Peninsula and along the shore of Georgian Bay, the steep slopes of the Niagara Escarpment and shallow, rocky soils inhibited agricultural use and tended to preserve the forest. Water falling over the escarpment is a source of power; the smaller streams, amendable to the manipulations of a pioneer technology, became the foci of early industry and settlement. The development of Niagara power by Ontario Hydro furnishes energy to a large part of Southern Ontario (Chapman & Putnam, 1984, pp. 114-122).

The Norfolk Sand Plains is a wedge-shaped physiographic region shaped with a broad, curved base along the shore of Lake Erie and tapers northward to a point at Brantford on the Grand River. It also encompasses the western half of the Regional Municipality of Haldimand-Norfolk, and a portion of Elgin County, Brant County and Oxford County. The sand and silts of this region were deposited as a delta of the Grand River during the glacial Lake Whittlesey and Warren glacial lake phases. The Norfolk Sand Plain is noted to be well-watered and has an abundance of well water due to the sandy soils allowing for rapid infiltration of water to the water table. Settlement began early, and land was rapidly taken up after townships in the region were opened. However, the light-textured soils could not stand up to regular cropping and became exhausted, resulting in lowered productivity and wind erosion; abandoned farms became common. By the 1890s, tobacco growing started and quickly occupied the leading role in crop growth in the region. After the First World War, it was discovered the soils support flu-cured tobacco, which changed the pattern of land use rapidly. Urban centres started as small ports and fishing villages that are not connected by railway or provincial highway. Major centres of population are found at points where major traffic arteries cross larger streams (Chapman & Putnam, 1984, pp.155-156).

1.4.8.2 Soil Type and Topography

A few native soil types are found within the study area; a description of their characteristics may be found in **Table 10** and are also depicted in **Map 10** (Ontario Agricultural College, 1967; Ontario Agricultural College, 1971).

Table 10: Study Area Soil Types

Soil Series and Type	Great Group	Parent Materials	Drainage	Topography and Surface Stoniness
Ravine	-	-	-	-
Escarpment	-	-	-	-
Stream courses	-	-	-	-

Soil Series and Type	Great Group	Parent Materials	Drainage	Topography and Surface Stoniness
Chinguacousy loam	Gray Brown Podzolic	Clay loam till	Imperfect	0.5-2% complex topography; slightly stony
Farmington loam	Brown Forest	Less than 12” loam till over bedrock	Well drained	2-5% single topography; moderately stony
Oneida loam	Gray Brown Podzolic	Clay loam till	Well drained	6-9% complex topography; stone-free
Oneida loam	Gray Brown Podzolic	Clay loam till	Well drained	10-15% complex topography; slightly stony

The topography within the study area increases significantly, due to the Niagara Escarpment, from north to south, with the elevation measuring between approximately 120 to 229 metres above sea level.

1.4.8.3 Hydrological Features

Hydrological features such as primary water sources (e.g., lakes, rivers, creeks, streams) and secondary water sources (e.g., intermittent streams and creeks, springs, marshes, swamps) would have helped supply plant and food resources to the surrounding area and are indicators of archaeological potential (per *Section 1.3.1* of the *2011 S&G*). Borer’s Creek, Borer’s Falls, Hickory Brook, Hopkins Creek, Pleasant View tributary, and several other unnamed watercourses leading from the Niagara Escarpment to Cootes Paradise Marsh and to Grindstone Creek are located within the study area. Therefore, this feature contributes to establishing the archaeological potential of the study area.

1.4.9 Current Land Conditions

The study area is situated primarily within a rural area of the City of Hamilton and also borders a rural area of the City of Burlington. The study area encompasses asphalt roads, gravel shoulders and roadside ditching, concrete sidewalks, asphalt and gravel driveways and parking lots, residential/industrial/commercial structures, woodlots, active agricultural fields, the Rock Chapel Sanctuary, Royal Botanical Gardens Berry Tract, Borer’s Falls Conservation Area, Cartwright Nature Sanctuary, Nicholson Resource Management Area and Hopkins Tract, Valley Community Centre Park, the Rock Chapel United Church and Cemetery, Hopkins Family Cemetery, the Wedgewood Golf Centre and the Rock Chapel Golf Centre.

1.4.10 Date of Review and Fieldwork

A desktop review of field conditions using historic air photographs, and past and current orthophotographs was undertaken on January 28th, 2022.

1.5 Confirmation of Archaeological Potential

Based on the information gathered from the background research documented in the preceding sections, elevated archaeological potential has been established within the study area limits. Features contributing to archaeological potential are summarized in **Appendix B** and presented in **Map 11**. Specific review and assessment of conditions within the Route Alternatives encompassed within the study area will be addressed in **Section 2.0**.

2.0 ANALYSIS AND CONCLUSIONS

In combination with data gathered from the background research (***see Sections 1.3 and 1.4***), a review of an air photograph (courtesy of the University of Toronto Map and Data Library) and orthophotographs (courtesy of VuMAP © First Base Solutions) (***see Section 1.3.4.2***), an evaluation of the established archaeological potential of the Route Alternatives was performed. The results of this evaluation are presented in **Maps 12-22**.

2.1 Route Alternatives Analysis

Within the study area, the proposed trunk watermain alternative routes (or "Route Alternatives"), were evaluated together and include:

- Route 1A, B, C, D, E: Valley Road/Rock Chapel Road/Highway 5
- Route 2: York Road/Royal Botanical Gardens lands/Patterson Road
- Route 3: York Road/Cartwright Nature Sanctuary/Patterson Road
- Route 4: York Road/Sovereign Avenue/South Drive
- Route 5: York Road/Old Guelph Road/South Drive
- Route 6: York Road/Highway 6

2.1.1 Previous Archaeological Assessments and Previously Registered Archaeological Sites

Background research revealed that a number of parcels of land within the Route Alternatives have been subjected to a previous archaeological assessment (***see Section 1.4.7, Table 8***). Properties for which a Stage 1 background study, Stage 2 property assessment, Stage 3 site-specific assessment, and/or Stage 4 mitigation of development impacts were carried out within the Route Alternatives that could definitively eliminate areas of further archaeological assessment are detailed in **Section 1.4.7** and outlined in **Section 2.1.1.1** below. This section also details properties for which an archaeological site was discovered that does not retain further CHVI and does not require further archaeological assessment. Although there are several previously registered archaeological sites located within the overall study area, there are no known sites located within the Route Alternatives and only one site – Trinity I (AhGx-501) is located immediately adjacent to a Route Alternative. Given its close proximity to a Route Alternative, it has relevance to the current project and will be further discussed in **Section 2.1.1.1** below.

Some of these previous assessments within the Route Alternatives, however, have only been limited to a Stage 1 background study (and optional property inspection), have outstanding archaeological concerns, or are pending *MHSTCI* approval. Although these previous assessments recommend further stages of archaeological fieldwork without definitively eliminating any areas within the Route Alternatives of requiring further archaeological assessment, or have not been approved yet, the details of these assessments still have relevance to the current project and are introduced in **Section 1.4.7** and outlined in **Section 2.1.1.2**.

There is only one previous archaeological assessment report that has not yet been received from the *MHSTCI* that may document fieldwork within the Route Alternatives (Mayer, Poulton & Associates Inc., 1991). The assessment registered site AhGx-283 (Pleasant View) which is recorded to be located within the overall study area but greater than 50 metres from any of the Route Alternatives. However, given that the report was not available to review, the exact location of the project area and its relation to the current study area and Route Alternatives is unknown at this time. A copy of this report has been requested from the *MHSTCI* (Lamoureux, 2022).

2.1.1.1 No Further Archaeological Assessment Required

Lands encompassed within the Route Alternatives which have already been subjected to an archaeological assessment (Stage 1, Stage 2, Stage 3 and/or Stage 4) and cleared of further archaeological concerns (***see Section 1.4.7, Table 8***), are recommended to be exempt from further assessment (***see Maps 13-17, 19-21***). No additional archaeological assessment is required.

Further to this, there is only one known previously registered archaeological site (Trinity I – AhGx-501) located immediately adjacent (i.e., within 50 metres) to Route Alternative 6 north of Highway 6. The Trinity I site (AhGx-501) was first discovered during a Stage 1-2 AA (Archaeological Assessments Ltd., 2003) and subsequently subjected to a Stage 3 AA (Archaeological Assessments Ltd., 2007). The site was determined to have no further CHVI and as such does not require any additional AA. There are no known archaeological sites located within any of the Route Alternatives.

2.1.1.2 Further Archaeological Assessment Required and/or Pending MHSTCI Approval

As mentioned above, there are several previous archaeological assessments conducted by various consultant companies that recommend further archaeological assessment within all or parts of their project boundaries, or for which the report is still pending approval by the *MHSTCI*.

There is only one known report for which *MHSTCI* approval has not yet been received: a Stage 1 AA conducted by Wood Environment & Infrastructure Solutions (Wood, 2019). Their project area overlaps with the Route Alternatives along Valley Road, Rock Chapel Road, Highway 5 and Algonquin Avenue. The majority of their project area was recommended to be exempt from requiring further archaeological assessment (i.e., areas of low archaeological potential due to roadway disturbances, houses and driveways), however Stage 2 AA was recommended in several areas determined to retain archaeological potential. Furthermore, additional cemetery investigation within ten metres of Rock Chapel Cemetery along Rock Chapel Road was recommended to search for unmarked grave shafts.

Another previous archaeological assessment was very preliminary in nature (i.e., Stage 1 background research with no property inspection) and generally recommended Stage 2 AA be conducted along the length of Highway 5 between Highway 6 and Highway 8 (ASI Archaeological and Cultural Heritage Services, 2004).

The final two previous assessment reports that recommend further archaeological fieldwork within the Route Alternatives include a Stage 1 AA (ASI Archaeological and Cultural Heritage Services, 2012) and Stage 2 AA (ASI Archaeological and Cultural Heritage Services, 2014) for the Highway 5/Highway 6 Interchange Detail Design. The Stage 1 AA evaluated several areas within the project area as having archaeological potential but during the Stage 2 AA several of these sections could not be assessed due to a lack of permission-to-enter. As a result, Stage 2 AA remains outstanding for a small area of the Route Alternatives along South Drive (i.e., Routes 2-5).

Prior to any intrusive activities within the above lands, copies of the associated reports must be obtained to review the recommendations for further archaeological assessment associated with lands within the Route Alternatives.

2.1.2 Identified Deep and Extensive Disturbances

The Route Alternatives were then evaluated for deep and extensive land alterations – commonly referred to as disturbances – that have severely impacted the integrity of any archaeological resources. Per *Section 1.3.2* of the *2011 S&G*, these include, but are not limited to: quarrying, major landscaping involving grading below topsoil, building footprints, or sewage and infrastructure development.

Disturbances noted within the Route Alternatives during the background research include but are not limited to: the various asphalt roadways and associated features within the road right-of-way (e.g., gravel shoulders, concrete curbs and barriers, cut slopes and embankments, shallow and deep drainage ditching, utilities, etc.), several building footprints, (e.g., residences and outbuildings), asphalt and gravel driveways and parking areas (***see Maps 13-21***).

The construction of these features would likely have resulted in severe damage to the integrity of any archaeological resources which may have been present within their footprints and, as such, are exempt from requiring a systematic Stage 2 property survey. However, on-site confirmation and documentation of the actual condition and exact extent of the disturbances will be required during a detailed property inspection during a Stage 2 AA, in accordance with *Section 2.1.8* of the *2011 S&G*.

2.1.3 Identified Physical Features of No or Low Archaeological Potential

The Route Alternatives were also evaluated for physical features of no or low archaeological potential. These usually include but are not limited to: permanently wet areas, exposed bedrock, and steep slopes (greater than 20^{o}) except in locations likely to contain pictographs or petroglyphs, as per *Section 2.1, Standard 2.a* of the *2011 S&G.*

Physical features of low or no archaeological potential noted within the Route Alternatives during the background research include but are not limited to: permanently wet terrain associated with Hickory Brook and several other unnamed watercourses in the North Cootes Paradise watershed and Grindstone Creek watershed, and the steeply sloping terrain of the creek valleys and the Niagara Escarpment (***see Maps 14-20***).

Due to their low to no archaeological potential classification, these areas within the Route Alternatives are exempt from requiring a systematic Stage 2 property survey. However, on-site confirmation and documentation of the actual condition and exact extent of these features will be required during a detailed property inspection during a Stage 2 AA.

2.1.4 Identified Areas of Elevated Archaeological Potential

Portions of the Route Alternatives that were not previously assessed and not cleared of further archaeological concern and do not exhibit extensively disturbed conditions nor contain physical features of low to no archaeological potential, are therefore considered to retain the established archaeological potential. These areas include but are not limited to: manicured lawn and gardens, overgrown vegetation and forested areas (***see Maps 13-21***).

Upon selection of the preferred alternative route, any construction activities which impact areas identified as having archeological potential must be subjected to a Stage 2 AA. In areas where ploughing is not possible or viable due to the presence of wooded areas, overgrown vegetation, existing infrastructure and landscaping, or narrow (ten metres wide or less) linear survey corridors, a Stage 2 test pit survey at five metre intervals must be performed, in accordance with the standards outlined in *Section 2.1.2* of the *2011 S&G*. Per *Section 2.1.2, Standard 1.f* of the *2011 S&G*, where at the time of fieldwork the lands within a narrow (ten metres wide or less) linear survey corridor meet the standards as laid out within *Section 2.1.1* for pedestrian survey land preparation, pedestrian survey must be carried out.

2.1.5 Pioneer Cemeteries

As per the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 no intrusive activity may occur within the limits of a cemetery without consent from the *Bereavement Authority of Ontario (BAO)*. The *Registrar's Directive: Authorization for Stage 2-4 Archaeological Fieldwork (Assessments and Investigations) on Cemetery Lands (updated as of February 12, 2021)* also requires that a Cemetery Investigation Authorization (CIA) be obtained whenever invasive archaeological investigations are required within lands adjacent to a cemetery where its boundaries cannot be conclusively determined. The CIA will relieve the archaeologist of the prohibition and liability related to the intentional disturbance of a human burial within a cemetery should such an incident occur.

Two cemeteries are located within the study area: Rock Chapel Cemetery (located at 451 Rock Chapel Road) and Hopkins Family Cemetery (located at 686 York Rd – south side of York Road, between Old Guelph Road and Highway 6 North). However, only Rock Chapel Cemetery is located within 20 metres of a Route Alterative and will be further discussed below.

The Hopkins Family Cemetery is located greater than 20 metres from a proposed Route Alternative and will not be impacted by the proposed development of the Waterdown Watermain Trunk Twinning project. However, should construction activities extend beyond the proposed Route Alternatives and to within 20 metres of the current cemetery property limits, further background research will be required to assess the archaeological potential of Hopkins Family Cemetery.

2.1.5.1 Rock Chapel Cemetery

Rock Chapel Cemetery (opened in 1838) is located at 451 Rock Chapel Road. The cemetery is an active cemetery and is located adjacent to the Route Alternatives (specifically Routes 1A, 1B, 1C and 1D) (***see Map 22***). This pioneer cemetery is considered a sensitive cultural resource of high archaeological potential. Nineteenth century historic cemeteries were not highly regulated, and often employed markers of little substance that have since disappeared. The possible absence of grave markers can result in inaccurate depictions of the recognized cemetery property limits. Furthermore, the 'sneaking' of burials near the property limits of cemeteries is a phenomenon associated with early 19th century church burial grounds where the congregation influenced who was buried within the cemetery.

To gain a better understanding of the land use history within and immediately adjacent to Rock Chapel Cemetery, multiple resources (e.g., previous archaeological assessment reports) and contacts (including the *BAO*) were consulted to gather as much information as possible.

The licenced operator of the cemetery is listed as Rock Chapel United Church according to the *Bereavement Authority of Ontario Public Register*. The church was contacted, however, given its recent closure in 2017 (Christie, 2017), no response from the cemetery operator (Rock Chapel United Church) was received. The *BAO* was subsequently contacted to obtain any available maps, surveys or plans of the Rock Chapel Cemetery. The *BAO* confirmed they do not have any filed maps or surveys for the cemetery. There are, however, two previous archaeological assessments that have been conducted within and immediately adjacent to the Rock Chapel Cemetery (ASI Archaeological and Cultural Heritage Services, 2020; Wood Environment & Infrastructure Solutions, 2019) which provide additional insight into the history of the cemetery and current land conditions (***see Section 1.4.7, Table 8***). Taking into consideration all identified factors (i.e., lack of available correspondence with the cemetery operator, no credible mapping outlining the historic cemetery property limits and no official surveys that outline the current cemetery property limits, and a previous AA recommending further cemetery investigations within the Rock Chapel Road right-of-way) an assessment of the potential for unmarked burials within the swaths of lands within the current Route Alternatives adjacent to the eastern boundaries of the current Rock Chapel Cemetery property limits has been determined.

Given that cemetery requirements are ongoing and ever changing at the *MHSTCI*, *Archeoworks Inc*. presented the collected data and sought guidance from the *MHSTCI* (***see Supplementary Documentation – Section 2.1***). This was done to ensure recommendations regarding cemetery investigations are in line with the most up-to-date advice to guarantee that additional requirements and all possible options are provided. Upon provision of the gathered information, the *MHSTCI* offered cemetery investigation recommendations for those swaths of lands adjacent to Rock Chapel Cemetery that fall within the Route Alternatives along Rock Chapel Road (***see Supplementary Documentation – Section 2.2***). Guidance provided by the *MHSTCI* is presented below.

2.1.5.2 MHSTCI Guidance for Rock Chapel Cemetery

The *MHSTCI* agreed with the recommendation that further archaeological assessment to confirm the presence or absence of burials (Stage 2 AA followed by Stage 3 mechanical topsoil/asphalt/gravel removal) is required within ten metres of the current cemetery property limits along Rock Chapel Road and that a Cemetery Investigation Authorization (CIA) must be obtained prior to any invasive archaeological fieldwork (Stage 2 AA and Stage 3 mechanical topsoil/asphalt/gravel removal) within the Route Alternatives (***see Map 22***). Pending what is uncovered, additional cemetery investigations may be required.

2.2 Conclusions

Archeoworks Inc. was retained to conduct a Stage 1 AA for the Waterdown Trunk Watermain Twinning Class EA project area ("study area"). The study area is located within part of Lot 13, Concession 2, in the Geographic Township of East Flamborough, historic County of Wentworth, now in the City of Burlington, Regional Municipality of Halton; part of Lot 13, Concession 3, in the Geographic Township of East Flamborough, historic County of Wentworth, now in the City of Hamilton; and part of Lots 20-28, Concession 2, part of Lots 20-25 and all of Lot 26, Concession 3, in the Geographic Township of West Flamborough, historic County of Wentworth, now in the City of Hamilton, Ontario.

The study area encompasses several proposed trunk watermain alternative routes ("Route Alternatives") that were evaluated together with the goal of selecting a preferred alignment. These include:

- Route 1A, B, C, D, E: Valley Road/Rock Chapel Road/Highway 5
- Route 2: York Road/Royal Botanical Gardens lands/Patterson Road
- Route 3: York Road/Cartwright Nature Sanctuary/Patterson Road
- Route 4: York Road/Sovereign Avenue/South Drive
- Route 5: York Road/Old Guelph Road/South Drive
- Route 6: York Road/Highway 6

Based on the background research, elevated archaeological potential for the recovery of archaeologically significant materials has been established within the Route Alternatives. Where archaeological potential has been identified, a desktop review of ground conditions was undertaken using past and current air photographs and orthophotographs to determine if recent disturbance has removed this potential classification. The desktop review identified disturbed locations, permanently wet areas and steeply sloping terrain; these locations are considered to have no and low archaeological potential within the Route Alternatives. Furthermore, one previously registered archaeological site (Trinity I – AhGx-501) with no further cultural heritage value or interest and a cemetery (Rock Chapel Cemetery) requiring special consideration are located immediately adjacent to the Route Alternatives.

The only areas that can definitively be eliminated from requiring further AA within the Route Alternatives are those properties for which a Stage 1 background study, Stage 2 property assessment, Stage 3 site-specific assessment, and/or Stage 4 mitigation of development impacts has previously been carried out wherein the report recommended the property being cleared of requiring further archaeological assessment or for which an archaeological site was discovered and determined to be of no further cultural heritage value or interest. These previous assessment reports must have been submitted and accepted into the *MHSTCI* Ontario Public Register of Archaeological Reports.

Upon selection of the preferred Route Alternative within the Waterdown Trunk Watermain Twinning Class EA project area, any construction activities which impact any of the areas identified above as having no, low or archaeological potential will require Stage 2 AA and potentially a Stage 3 cemetery investigation. Detailed recommendations for further archaeological assessment required within the Route Alternatives are provided in **Section 3.0 – Recommendations**. A summary of the Stage 1 AA results for each of the Route Alternatives is provided within **Appendix D**.

3.0 RECOMMENDATIONS

Considering the findings outlined within this report, the following recommendations are presented:

1. Lands within the Route Alternatives that were subjected to a previous archaeological assessment (Stage 1 AA, Stage 2 AA, Stage 3 AA and/or Stage 4 Mitigation) and deemed free of further archaeological concern, with the report accepted into the *MHSTCI* Ontario Public Register of Archaeological Reports, are recommended to be exempt from further assessment. No further work is required within the scope of this project.
    a. The Trinity I (AhGx-501) archaeological site retains no further cultural heritage value or interest in relation to the Route Alternative located within a 50-metre radius. No further work is recommended for this site within the scope of this project.

2. Archaeological concerns remain for lands within the Route Alternatives that were previously subjected to an archaeological assessment that recommends further AA (Stage 2 AA or Stage 3 cemetery investigation) and/or the report is awaiting *MHSTCI* approval. A copy of the associated reports must be obtained to review the recommendations for further archaeological assessment associated with lands within the Route Alternatives.

3. Parts of the Route Alternatives that were identified as having archaeological potential removed (i.e., areas of deep and extensive disturbances) are exempt from requiring Stage 2 AA (extents of these areas to be confirmed through a detailed on-site property inspection during a Stage 2 AA as per *Section 2.1.8* of the *2011 S&G*).

4. Parts of the Route Alternatives that were identified as having no or low archaeological potential (i.e., watercourses and steeply sloping terrain) are exempt from requiring Stage 2 AA (extents of these areas to be confirmed through a detailed on-site property inspection during a Stage 2 AA).

5. Upon selection of the preferred alternative route, any construction activities which impact areas identified as having archaeological potential must be subjected to a Stage 2 AA. These areas must be subjected to pedestrian or test pit survey at five-metre intervals in accordance with the standards set within *Sections 2.1.1* and *2.1.2* of the *2011 S&G*.

6. As per the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 no intrusive activity may occur within the known limits of the Rock Chapel Cemetery without consent from the cemetery operator and the *Bereavement Authority of Ontario*.

   a. Should the area within the current cemetery limits be impacted, additional archaeological investigation consisting of Stage 2 test pit survey followed by Stage 3 mechanical topsoil/asphalt/gravel removal is required. A Cemetery Investigation Authorization (CIA) issued by the *Bereavement Authority of Ontario* is also required and needs to be obtained prior to conducting any soil-intrusive work (e.g., Stage 2/3/4 investigations; construction monitoring).

7. Should proposed construction impacts occur within the swaths of land adjacent (i.e., within ten metres) to the Rock Chapel Cemetery identified as having potential for the recovery of unmarked burials, the following archaeological/cemetery investigations are required:
   a. As there is the potential for the Rock Chapel Cemetery to extend into the Route Alternatives along Rock Chapel Road, a Cemetery Investigation Authorization (CIA) issued by the *Bereavement Authority of Ontario* is required and needs to be obtained prior to conducting any soil-intrusive work (e.g., Stage 2/3/4 investigations; construction monitoring).
   b. As there is the potential to encounter both deeply buried archaeological resources and for archaeological resources to be present near the surface, per *Section 2.1.7*, *Standard 2* of the *2011 S&G*, surface survey methods (Stage 2 test pit survey) must occur within the grassed areas adjacent to the cemetery prior to mechanical excavation.
   c. Following the completion of the Stage 2 AA, regardless of the results, per *Section 2.2*, *Guideline 4* of the *2011 S&G*, and in accordance with the *Registrar's Directive: Authorization for Stage 2-4 Archaeological Fieldwork (Assessments and Investigations) on Cemetery Lands (updated as of February 12, 2021)*, further cemetery investigations are required where the boundaries cannot be conclusively determined based on records, maps and plans of the cemetery. The recommendations for further cemetery investigations are as follows:
      i. In accordance with *Section 2.1.7, Standard 3, Section 3.3.3, Standard 2*, and *Section 4.2.3* of the *2011 S&G*, a Stage 3 investigation consisting of mechanical topsoil removal must be undertaken following the lands immediately adjacent to the eastern limits of the Rock Chapel Cemetery (i.e., within ten metres) to confirm the presence or absence of deeply buried human remains. Mechanical excavation must employ a flat-edged bucket and should begin at the furthest extent from the cemetery that will be investigated and move inward towards the known cemetery limits. Unless human remains are encountered, mechanical stripping of topsoil is to reach sterile subsoil depths.
      ii. Mechanical excavation is also recommended for the narrow strip of gravel and asphalt of Rock Chapel Road that falls within the ten-metre area of potential. However, should further discussion/research reveal buried utilities or pipelines with the roadway or time and circumstances do not permit mechanical removal within the roadway, construction monitoring by a licensed archaeologist will occur instead.

8. Should construction activities (e.g., staging areas, laydown areas, etc.) extend beyond the assessed limits of the Route Alternatives documented in this report, further archaeological investigation will be required to assess the archaeological potential of these lands.

No construction activities shall take place within the Route Alternatives prior to the *MHSTCI* (Archaeology Programs Unit) confirming in writing that all archaeological licensing and technical review requirements have been satisfied.

4.0 ADVICE ON COMPLIANCE WITH LEGISLATION

1. This report is submitted to the *MHSTCI* 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 *MHSTCI*, 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.

2. 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*.

3. 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*.

4. 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 at the *Ministry of Government and Consumer Services*.

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

5.0 BIBLIOGRAPHY AND SOURCES

5.1 Background Research

Abler, T. S. and Tooker, E. (1978). The Seneca. In B.G. Trigger, (Ed.), *Volume 15: Northeast*. Washington: Smithsonian Institution, pp. 505-517.

AMICK Consultants Limited (2008). Report on the 2007 Stage 1-2 Archaeological Assessment of the Proposed Development within Part of Lot 20, Concession 2 (Formerly the Township of West Flamborough), Now in the Town of Flamborough, Regional Municipality of Hamilton-Wentworth (P058-274-2007).

AMICK Consultants Limited (2018a). Flamborough Power Centre - Stage 1-2 Archaeological Property Assessment of Part of Lot 13, Concession 3 (Geographic Township of East Flamborough, County of Wentworth) City of Hamilton (P038-0910-2017).

AMICK Consultants Limited (2018b). *63 Highway 5 West - Stage 1-2 Archaeological Property Assessment of Part of Lot 24, Concession 3 (Geographic Township of West Flamborough, County of Wentworth) City of Hamilton* (P058-1663-2018).

AMICK Consultants Limited (2019). *Mountain Brow Road - 2018 Stage 1-2 Archaeological Assessment of Part of Lot 13, Concession 3 (Geographic Township of East Flamborough, County of Wentworth), City of Hamilton* (P058-1744-2018).

Archaeological Assessments Ltd. (2003). *The Stage 1-2 Archaeological Assessment of the Flamborough Lifestyle Centre Property, Part of Lots 12 and 13, Conc. 3, Geographic Township of East Flamborough, City of Hamilton* (P013-013).

Archaeological Assessments Ltd. (2007). *The Stage 3 Archaeological Assessment of the Trinity I Site (AhGx-501), Flamborough Power Centre Inc. Property, Part of Lot 13, Concession 3, Geographic Township of East Flamborough, City of Hamilton* (P013-300-2007).

Archaeological Assessments Ltd. (2018). *The Stage 1-2 Archaeological Assessment of 201 Old Guelph Road, Conservation Halton Hopkins Tract, Part of Lot 27, Concession 2, Geographic Township of West Flamborough, City of Hamilton* (P013-1190-2017).

Archeoworks Inc. (2019). *Stage 1 Archaeological Assessment for the Preliminary Design & Class EA Study for Intersection Improvements at Various Locations, in the City of Hamilton and Halton Region MTO Group Work Project No. 2190-16-00, Within Multiple Lots and Concessions, Geographic Townships of Ancaster, Beverly, East Flamborough & West Flamborough, Historic Wentworth County and Geographic Township Trafalgar, Historic Halton County (Now Part of the City of Hamilton and Town of Oakville & City of Burlington in Halton Region) Ontario* (P1059-0014-2019).

ASI Archaeological and Cultural Heritage Services (1999). *An Archaeological Assessment of Highway 6 Improvements from Highway 403 to Highway 5, (W.P. 19-95-00) Regional Municipalities of Halton and Hamilton-Wentworth, Ontario* (98-014).

ASI Archaeological and Cultural Heritage Services (2002). *Stages 1 and 2 Archaeological Assessments and Built Heritage Assessment of Highway 6 from 500 m South of Highway 5, Northerly to the 5th Concession East, New City of Hamilton, formerly the Township of Flamborough Regional Municipality of Hamilton- Wentworth, Ontario (W.O. 00-23011)* (2000-116-042).

ASI Archaeological and Cultural Heritage Services (2004). *Stage 1 Archaeological Assessment Highway 5 Between Highway 6 and Highway 8, Preliminary Design, Township of Flamborough, Regional Municipality of Hamilton-Wentworth, Ontario G.W.P. 03-23004* (P057-032).

ASI Archaeological and Cultural Heritage Services (2005). *Stage 2 Archaeological Assessment Detail Design Changes Highway 6 Improvements From Highway 403 to Highway 5, City of Burlington, Region of Halton and City of Hamilton, Ontario (W. P. 19-95-00)* (P057-216).

ASI Archaeological and Cultural Heritage Services (ASI) (2009). *Master Plan of Archaeological Resources of the Regional Municipality of Halton – 2008 Update*. [Online]. Available at: https://www.halton.ca/getmedia/6214fced-3e79-44a0-b78e-8939952025b5/LPS-sustainable-halton-master-plan-of-archaeological-resources.aspx [Accessed 28 January 2022].

ASI Archaeological and Cultural Heritage Services (2012). *Stage 1 Background Study and Property Inspection, Highway 5/Highway 6 Interchange Detail Design, City of Hamilton, Ontario, MTO GWP 2112-05-00* (P094-060-2011).

ASI Archaeological and Cultural Heritage Services (2014). *Stage 2 Archaeological Assessment Property Assessment Highway 5 / Highway 6 Interchange Detail Design City of Hamilton, Ontario MTO GWP 2112-05-00 Concession 3, Lot 13 and Concession 3, Lot 24 Historic Townships of Flamborough East and Flamborough West County of Wentworth* (P383-003-2012).

ASI Archaeological and Cultural Heritage Services (2017). *Stage 1 and 2 Archaeological Assessment of 43 Highway 5 West Part of Lot 24, Concession 3 Geographic Township of West Flamborough, County of Wentworth City of Hamilton* (P046-0259-2016, P046-0277-2017).

ASI Archaeological and Cultural Heritage Services (2019a). *Stage 3 Archaeological Assessment AhGx-758 & AhGx-760 43 Highway 5 West Lot 24, Concession 3, Geographic Township Of West Flamborough, Wentworth County, City Of Hamilton, Ontario* (P223-0223-2018, P223-0224-2018).

ASI Archaeological and Cultural Heritage Services (2019b). *Stage 3 Site-Specific Assessment of the Ryckman Site (AhGx-711), 43 Highway 5 West, Part of Lot 24, Concession 3, Geographic*

Township of West Flamborough, Wentworth County, City of Hamilton, Ontario (P223-0222-2018).

ASI Archaeological and Cultural Heritage Services (2020). *Stage 1 Archaeological Assessment of 451 Rock Chapel Road, Part of Lot 21, Concession 2, Geographic Township of West Flamborough, Wentworth County, City of Hamilton, Ontario* (P449-0175-2018).

ASI Archaeological and Cultural Heritage Services (2021). *Stage 1 Archaeological Assessment of part of 556 York Road, Part of Lot 25, Concession 2, Geographic Township of West Flamborough, Wentworth County, City of Hamilton* (P449-0581-2021).

Bereavement Authority of Ontario (BAO) (2021). REGISTRAR'S DIRECTIVE *Authorization for Stages 2-4 Archaeological Fieldwork (Assessments and Investigations) on Cemetery Lands (updated as of February 12, 2021)*. Toronto: Bereavement Authority of Ontario.

Chapman, L. J. and Putnam, D. F. (1984). *Physiography of Southern Ontario. 3rd ed*. *Ontario Geological Survey, Special Volume 2.* Toronto: Ministry of Natural Resources.

Christie, M. (2017). "Flamborough's Rock Chapel United Church closing its doors after 141 years." *Flamborough Review*. [Online]. Available at: https://www.flamboroughreview.com/news-story/7658680-flamborough-s-rock-chapel-united-church-closing-its-doors-after-141-years/ [Accessed 31 January 2022].

City of Burlington (2008). *Heritage Properties Directory*. [Online]. Available at: https://burlington.maps.arcgis.com/apps/webappviewer/index.html?appid=1cdd92b87995443bac7e83ad0ff2132f [Accessed 28 January 2022].

City of Burlington (2011). *Official Plan: Schedule D – Comprehensive Land Use Plan – North Aldershot Planning Area*. [Online]. Available at: https://www.burlington.ca/en/services-for-you/resources/Planning_and_Development/Official_Plan_Review_/Map-Schedules/COB_Official-Plan_Schedule-D.pdf [Accessed 28 January 2022].

City of Burlington (2022). *About Heritage Conservation Districts Tab*. [Online]. Available at: https://www.burlington.ca/en/services-for-you/Heritage-Property-Information.asp#:~:text=There%20are%20currently%20no%20heritage,neighbourhood%20or%20a%20main%20street [Accessed 28 January 2022].

City of Hamilton (2005). *Hamilton's Heritage Volume 6: Inventory of Cemeteries and Burial Grounds*. [Online]. Available at: https://www.hamilton.ca/sites/default/files/media/browser/2014-12-16/hamiltons-heritage-volume-6.pdf [Accessed 28 January 2022].

City of Hamilton (2012). *Rural Hamilton Official Plan: Schedule D – Rural Plan Use Designations*. [Online]. Available at: https://www.hamilton.ca/sites/default/files/media/browser/2017-03-

21/ruralhamiltonofficialplan-volume1-scheduled-rurallandusedesignations-sep2021.pdf [Accessed 28 January 2022].

City of Hamilton (2016). *Rural Hamilton Official Plan Appendix F-2- Rural Archaeological Potential*. [Online]. Available at: https://www.hamilton.ca/sites/default/files/media/browser/2015-01-19/ruralhamiltonofficialplan-volume1-appendixf2-ruralarchaeologicalpotential-sep2019.pdf [Accessed 31 January 2022].

City of Hamilton (2019a). *Rural Hamilton Official Plan, Volume 1, Appendix F-2: Rural Archaeological Potential*. [Online]. Available at: https://www.hamilton.ca/sites/default/files/media/browser/2015-01-19/ruralhamiltonofficialplan-volume1-appendixf2-ruralarchaeologicalpotential-sep2019.pdf [Accessed 25 May 2022].

City of Hamilton (2019b). *Urban Hamilton Official Plan, Volume 1, Appendix F-4: Archaeological Potential*. [Online]. Available at: https://www.hamilton.ca/sites/default/files/media/browser/2015-01-15/urbanhamiltonofficialplan-volume1-appendix-f4-archaeologicalpotential-dec2019.pdf [Accessed 25 May 2022].

City of Hamilton (2021). *Heritage Property Mapping*. [Online]. Available at: https://www.hamilton.ca/city-planning/heritage-properties/heritage-resources [Accessed 28 January 2022].

CRM Lab Archaeological Services (2013). *Stage 1 - 2 Archaeological Property Assessment Metrolinx Hamilton Bus Servicing & Storage Facility Part of Lot 23, Concession 3 Township of West Flamborough, Wentworth County 155 Coreslab Drive, Hamilton, Ontario Block 5, Plan 62M-1011* (P244-040-2013).

Conservation Halton (2022). *Hopkins Tract Restoration*. [Online]. Available at: https://conservationhalton.ca/hopkins-tract-restoration [Accessed 28 January 2022].

Cruikshank, K. (2009). *Dundas*. [Online]. Available at: https://www.thecanadianencyclopedia.ca/en/article/dundas#:~:text=Dundas%20was%20named%20after%20the,became%20the%20town%20of%20Dundas [Accessed 28 January 2022].

Dawson, K. C. A. (1983). *Prehistory of Northern Ontario*. Thunder Bay, Ontario: Thunder Bay Historical Museum Society.

Department of Indian Affairs (1891). *Indian Treaties and Surrenders from 1680 to 1890*. Ottawa: Browns Chamberlin Printers.

Dodd, C. F., Poulton, D. R., Lennox, P. A., Smith, D. G. and Warrick, G. A. (1990). The Middle Ontario Iroquoian Stage. In C.J. Ellis and N. Ferris, (Eds.), *The Archaeology of Southern Ontario to A.D. 1650*. London, Ontario: Occasional Publication of the London Chapter, OAS, pp. 321-359.

Ellis, C. J. and Deller, D. B. (1990). Paleo-Indians. In C.J. Ellis and N. Ferris, (Eds.), *The Archaeology of Southern Ontario to A.D. 1650*. London, Ontario: Occasional Publication of the London Chapter, OAS, pp. 37-64.

Ellis, C. J., Kenyon, I. T. and Spence, M. W. (1990). The Archaic. In C.J. Ellis and N. Ferris, (Eds.), *The Archaeology of Southern Ontario to A.D. 1650*. London, Ontario: Occasional Publication of the London Chapter, OAS, pp. 65-124.

Ellis, C. J. (2013). Before Pottery: Paleoindian and Archaic Hunter-Gathers. In M.K. Munson and S.M. Jamieson, (Eds.), *Before Ontario: The Archaeology of a Province*. Montreal & Kingston, Ontario: McGill Queen's University Press.

Ferris, N. (2013). Seeing Ontario's Past Archaeologically. In M.K. Munson and S.M. Jamieson, (Eds.), *Before Ontario: The Archaeology of a Province*. Montreal & Kingston, Ontario: McGill Queen's University Press, pp. 3-20.

Ferris, N. and Spence, M. W. (1995). The Woodland Traditions in Southern Ontario. *Revista de Arqueologia Americana*, (9), pp. 83-138.

Filice, M. (2016). *Haldimand Proclamation*. [Online]. Available at: https://www.thecanadianencyclopedia.ca/en/article/haldimand-proclamation [Accessed 28 January 2022].

Fox, W. A. (1990). The Middle Woodland to Late Woodland Transition. In C.J. Ellis and N. Ferris, (Eds.), *The Archaeology of Southern Ontario to A.D. 1650*. London, Ontario: Occasional Publication of the London Chapter, OAS, pp. 171-188.

Fox, W. A. and Garrad, C. (2004). Hurons in an Algonquian land. *Ontario Archaeology*, 77(78), pp. 121-134.

Gagné, M. (2015). *Woodland Culture*. [Online]. Available at: https://thecanadianencyclopedia.ca/article/woodland-culture [Accessed 28 January 2022].

Gibson, M. M. (2006). *In the Footsteps of the Mississaugas*. Mississauga, Ontario: Mississauga Heritage Foundation.

Gitiga Migizi and Kapyrka, J. (2015). *Michi Saagiig Historical/Background Context*. Unpublished manuscript courtesy of Gitiga Migizi and Dr. Julie Kapyrka of Curve Lake First Nation.

Golder Associates Ltd. (2019). *Cultural Heritage Screening Report – Waterdown Trunk Watermain Twinning Project, City of Hamilton, Ontario*. Technical Memorandum provided by Proponent.

Government of Ontario (1990). *Ontario Heritage Act, R.S.O. 1990, c. O.18, amended 2021*. [Online]. Available at: https://www.ontario.ca/laws/statute/90o18 [Accessed 28 January 2022].

Government of Ontario (2014). *First Nations and Treaties Map*. [Online]. Available at: https://files.ontario.ca/firstnationsandtreaties.pdf [Accessed 28 January 2022].

Government of Ontario (2020). *Provincial Policy Statement, 2020*. [Online]. Available at: https://files.ontario.ca/mmah-provincial-policy-statement-2020-accessible-final-en-2020-02-14.pdf [Accessed 28 January 2022].

Government of Ontario (2021). *Map of Ontario Treaties and Reserves*. [Online]. Available at: https://www.ontario.ca/page/map-ontario-treaties-and-reserves [Accessed 28 January 2022].

Hall, A. J. (2019a). *Royal Proclamation of 1763*. [Online]. Available at: https://www.thecanadianencyclopedia.ca/article/royal-proclamation-of-1763 [Accessed 28 January 2022].

Hall, R. (2019b). *Upper Canada*. [Online]. Available at: https://www.thecanadianencyclopedia.ca/en/article/upper-canada [Accessed 28 January 2022].

Hamilton Public Library (2018). *Historical Flamborough*. [Online] Available at: https://www.hpl.ca/articles/historical-flamborough [Accessed 28 January 2022].

Hamilton Public Library (2022). *Historical Dundas*. [Online]. Available at: https://www.hpl.ca/articles/historical-dundas [Accessed 28 January 2022].

Hathaway, E. the Late (1930). The River Credit and the Mississaugas*. Ontario Historical Society Papers and Records Vol. xxvi*. Toronto: Ontario Historical Society.

Hessel, P. (1993) *The Algonkin Nation – The Algonkins of the Ottawa Valley: An Historical Outline*. Arnprior, Ontario: Kichesippi Books.

Hunt, G. T. (1940). *The Wars of the Iroquois: A Study of Intertribal Trade Relations*. Madison, Wisconsin: The University of Wisconsin Press.

Jaenen, C. J. (2013). *Treaty of Paris 1763*. [Online]. Available at: https://www.thecanadianencyclopedia.ca/en/article/treaty-of-paris-1763 [Accessed 28 January 2022].

Jaenen, C. J. (2014). *Treaty of Paris 1783*. [Online]. Available at: https://www.thecanadianencyclopedia.ca/en/article/treaty-of-paris-1783 [Accessed 28 January 2022].

Johnston, D. (2004). *Connecting People to Place: Great Lakes Aboriginal History in Cultural Context*. [Online]. Available at: http://www.attorneygeneral.jus.gov.on.ca/inquiries/ipper wash/transcripts/pdf/P1_Tab_1.pdf [Accessed 28 January 2022].

Jury, E. M. (1974). The Neutral Indians of South-Western Ontario. London: Bulletin of the Museums no.13, *The Museum of Indian Archaeology*, The University of Western Ontario, London.

Lamoureux, C. (2022). Email to robert.vonbitter@ontario.ca, re. Report Request: P029-1033-2022, 09 February 2022 and 06 May 2022.

Lennox, P. A. and Fitzgerald, W. R. (1990). The Culture History and Archaeology of the Neutral Iroquoians. In C.J. Ellis and N. Ferris, (Eds.), *The Archaeology of Southern Ontario to A.D. 1650*. London, Ontario: Occasional Publication of the London Chapter, OAS, pp. 405-456.

Lincoln Environmental Consulting Corp. (2019a). *Preliminary Report: Stage 4 Archaeological Mitigation of the Ryckman Site (AhGx-711) at 43 Highway 5 West, in Part of Lot 24, Concession 3, Geographic Township of West Flamborough, Wentworth County, City of Hamilton, Ontario* (P344-0296-2019).

Lincoln Environmental Consulting Corp. (2019b). *Stage 4 Archaeological Mitigation of (AhGx-760) at 43 Highway 5 West, in Part of Lot 24, Concession 3, Geographic Township of West Flamborough, City of Hamilton, Wentworth County, Ontario* (P344-0288-2019).

Martin, R. M. (1839). *Statistics of the Colonies of the British Empire*. London: Wm. H. Allen & Co. [Online]. Available at: https://books.google.ca/books?id=PvtqMe2cxhoC [Accessed 28 January 2022].

Mayer Heritage Consultants Inc. (1992). *Archaeological Resource Assessment Survey Burlington TS x Horning Mountain Junction 115 kV South Transmission Line Refurbishment* (PIF-92-032-LIC-1992-013).

Mayer, Poulton & Associates Inc. (1991). *A.R.A. of Ont. Hydro Properties Burlington TSX Horning Mountain Junction 115 Kv Refurbishing*.

McMillan, A. D. and Yellowhorn, E. (2004). *First People in Canada*. Vancouver, B.C.: Douglas & McIntyre.

Mika, N. and Mika, H. (1981). *Places in Ontario – Their Name Origins and History: Part II F-M*. Belleville, Ontario: Mika Publishing Company.

Mika, N. and Mika, H. (1983). *Places in Ontario – Their Name Origins and History: Part III N-Z*. Belleville, Ontario: Mika Publishing Company.

Ministry of Transportation (MTO) (2010). *Stage 1-2 Archaeological Assessment (AA) of: Proposed Stockpiling Study Area Northwest Corner of the Intersection of Highway 5 and Highway 6, City of Hamilton, Regional Municipality of Hamilton-Wentworth, Ontario* (P305-011-2010).

Mississaugas of the Credit First Nation (MCFN) (2017a). *Treaty Lands & Territory*. [Online]. Available at: http://mncfn.ca/about-mncfn/treaty-lands-and-territory/ [Accessed 28 January 2022].

Mississaugas of the Credit First Nation (MCFN) (2017b). *Between the Lakes Treaty No. 3 (1792)*. [Online]. Available at: http://mncfn.ca/treaty3/ [Accessed 28 January 2022].

New Directions Archaeology Ltd. (2008). *Stage 1-2 Archaeological Assessment for Building Footprint at 675 York Road, Town of Dundas, City of Hamilton* (P018-268-2008).

New Directions Archaeology Ltd. (2011a). *Stage 1-2 Archaeological Assessment of 21 Highway 5 West, Part Lot 24 and 25, Concession 3, Clappison's Corner, Township of West Flamborough, City of Hamilton* (P018-363-2011).

New Directions Archaeology Ltd. (2011b). *Stage 1 and 2 Archaeological Assessment of Part of 231 York Road, Part of Lot 23, Concession 2, Town of Dundas, Geographic Township of Flamboro West, In the City of Hamilton* (P018-361-2011).

Ontario Agricultural College (1967). *Soil Map of Wentworth County, Ontario: Soil Survey Report No. 32.* Guelph, Ontario: Soil Research Institute.

Ontario Agricultural College (1971). *Soil Map Halton County, Ontario: Soil Survey Report No. 43.* Guelph, Ontario: Soil Research Institute.

Ontario Heritage Trust (OHT) (2021). *An Inventory of Provincial Plaques Across Ontario*. [Online]. Available at: https://www.heritagetrust.on.ca/user_assets/documents/2021-Provincial-plaques-Open-data-v02-FINAL-ENG.pdf [Accessed 28 January 2022].

Ontario Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) (2011). *Standards and Guidelines for Consultant Archaeologists*. Toronto: Ministry of Heritage, Sport, Tourism and Culture Industries.

Ontario Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) (2022). *Sites within a One Kilometre Radius of the Study Area* provided from the Ontario Archaeological Sites Database (OASD) by the Archaeological Data Coordinator, 01 February 2022.

Page & Smith (1875). *Illustrated Historical Atlas of the County of Wentworth*. [Online] Available at: http://digital.library.mcgill.ca/countyatlas/default.htm [Accessed 28 January 2022].

Parks Canada (1993). *Royal Botanical Gardens National Historic Site of Canada*. [Online]. Available at: https://www.pc.gc.ca/apps/dfhd/page_nhs_eng.aspx?id=792 [Accessed 28 January 2022].

Ramsden, P. G. (1990). The Hurons: Archaeology and Culture History. In C.J. Ellis and N. Ferris, (Eds.), *The Archaeology of Southern Ontario to A.D. 1650*. London, Ontario: Occasional Publication of the London Chapter, OAS, pp. 361-384.

Reville, F. D. (1920). *History of the County of Brant*. Brantford, Ontario: The Hurley Printing Company Ltd.

Robinson, P. J. (1965). *Toronto during the French Regime: 1615-1793.* Toronto: University of Toronto Press.

Rock Chapel United Church (2014). *Our Story – The Early Years*. [Online]. Available at: https://rockchapel.webs.com/ourhistory.htm [Accessed 02 February 2022].

Schmalz, P. S. (1991). *The Ojibwa of Southern Ontario*. Toronto, Canada: University of Toronto Press.

Smith, D. B. (2013). *Sacred Feathers: The Reverend Peter Jones (Kahkewaquonaby) and the Mississauga Indians*. Toronto: University of Toronto Press.

Smith, J. H. (1897). *Historical Sketch of the County of Wentworth and the Head of the Lake*. [Online]. Available at: https://archive.org/details/historicalsketch00smit_2 [Accessed 28 January 2022].

Smith, W. H. (1846). *Canadian Gazetteer; Comprising Statistical and General Information Respecting All Parts of the Upper Province, or Canada West*. [Online]. Available at: https://archive.org/stream/smithscanadianga00smit#page/n8/mode/1up [Accessed 28 January 2022].

Spence, M. W., Pihl, R. H. and Murphy, C. R. (1990). Cultural Complexes of the Early and Middle Woodland Periods. In C.J. Ellis and N. Ferris, (Eds.). *The Archaeology of Southern Ontario to A.D. 1650*. London, Ontario: Occasional Publication of the London Chapter, OAS, pp. 125-169.

Surtees, R. J. (1994). Land Cessions, 1763-1830. In E.S. Rogers and D.B. Smith, (Eds.), *Aboriginal Ontario: Historical Perspectives on the First Nations*. Toronto, Ontario: Dundurn Press Limited, pp. 92-121.

Sutherland, S. R. J. (2014). *Jay's Treaty*. [Online]. Available at: https://www.thecanadianencyclopedia.ca/en/article/jays-treaty [Accessed 28 January 2022].

Templeton, L. (2022). Email to archaeology@ontario.ca, re. Report Request: P029-1033-2022, 28 January 2022.

Timmins Martelle Heritage Consultants Inc. (TMHC) (2010). *Stage 1 and 2 Archaeological Assessment 724 Old York Road, Old York Road and Highway 6, Part of Lot 28, Concession 2, Geographic Township of West Flamborough, City of Hamilton Ministry of Transportation - Central Region Agreement 2008-E-0030 Assignment No.14* (P083-081-2010).

Tooker, E. (1978). The League of the Iroquois: Its History, Politics, and Ritual. In B.G. Trigger, (Ed.), *Volume 15: Northeast*. Washington: Smithsonian Institution, pp. 418-441.

Trigger, B. G. (1994). The Original Iroquoians: Huron, Petun and Neutral. In E.S. Rogers and D.B. Smith, (Eds.), *Aboriginal Ontario: Historical Perspectives on the First Nations*. Toronto, Ontario: Dundurn Press Limited, pp. 41-63.

Warrick, G. A. (2000). The Precontact Iroquoian Occupation of Southern Ontario. *Journal of World Prehistory*, 14(4), pp. 415-466.

Warrick, G. (2008). *A Population History of the Huron-Petun, A.D. 500-1650*. New York: Cambridge University Press.

Waterdown East Flamborough Centennial Committee (1967). *Waterdown and East Flamborough 1867-1967*. Hamilton: W.L. Griffith. [Online]. Available at: https://archive.org/details/waterdowneastfla0000unse [Accessed 28 January 2022].

Welch, D. and Payne, M. (2009). *Flamborough*. [Online] Available at: https://www.thecanadianencyclopedia.ca/en/article/flamborough [Accessed 28 January 2022].

White, M. E. (1978). Neutral and Wenro. In W.C. Sturtevant, (Ed.), *Handbook of North American Indians -Volume 15: Northeast*. Washington: Smithsonian Institution, pp. 407-411.

Williamson, R. F. (1990). The Early Iroquoian Period of Southern Ontario. In C.J. Ellis and N. Ferris, (Eds.), *The Archaeology of Southern Ontario to A.D. 1650*. London, Ontario: Occasional Publication of the London Chapter, OAS, pp. 291-320.

Williamson, R. F. (2013). The Woodland Period, 900 BCE to 1700 CE. In M.K. Munson and S.M. Jamieson, (Eds.), *Before Ontario: The Archaeology of a Province*. Montreal & Kingston, Ontario: McGill Queen's University Press.

Wood Environment & Infrastructure Solutions (Wood) (2019). DRAFT - *Original Report: Stage 1 Archaeological Assessment Waterdown Trunk Twinning in support of a Schedule "B" Class*

Environmental Assessment and Conceptual Design, historically located on part of Lot 13, Concession 2 and 3 East Flamborough, and part of Lots 20 to 28, Concession 2 and part of Lots 20 to 25, Concession 3 West Flamborough, County of Wentworth, now in the City of Hamilton, Ontario (P354-0041-2020).

Woods, D. R. (1967). *Waterdown and East Flamborough, 1867-1967*. [Online]. Available at: https://cdm22007.contentdm.oclc.org/digital/collection/p22007coll8/id/166728/rec/5 [Accessed 28 January 2022].

Wong, J. (2009). *Phase II Report: October 2009 – Cootes to Escarpment Park System Conservation and Land Management Strategy*. [Online]. Available at: https://www.cootestoescarpmentpark.ca/file/download/52ncRT4E0H6zYBKt4MmgTw [Accessed 28 January 2022].

Wray, S. (1994). *Dundas Street, Waterdown, 1793-1993*. [Online]. Available at: https://archive.org/details/localhistory_2mz [Accessed 28 January 2022].

Wright, J. V. (1994). Before European Contact. In E.S. Rogers and D.B. Smith, (Eds.), *Aboriginal Ontario: Historical Perspectives on the First Nations*. Toronto, Ontario: Dundurn Press Limited, pp. 21-40.

Wright, J. V. (1999). *A History of the Native People of Canada: Volume II (1,000B.C. – A.D. 500)*. Hull, Quebec: Museum of Civilization.

5.2 Map Sources

Canadian County Atlas Digital Project, Rare Books and Special Collections, McGill University Library, Montreal (McGill University Library, 2001)

- Page & Smith (1875). *Illustrated Historical Atlas of the County of Wentworth*, *Ont*. [Online]. Available at: https://digital.library.mcgill.ca/countyatlas/searchmapframes.php [Accessed 28 January 2022].

Natural Resources Canada - Toporama

- Natural Resources Canada (2013). *Atlas of Canada – Toporama: Topographic Map 1:30, 000, Hamilton-Burlington 030M05*. [Online]. Available at: http://atlas.gc.ca/toporama/en/index.html [Accessed 20 January 2022].

Ontario Council of University Libraries (OCUL), Historical Topographic Map Digitization Project (2022)

- Department of Militia and Defence (1909). *Topographic Map, 1:63,360, Ontario, Hamilton Sheet No.33*. [Online]. Available at: https://ocul.on.ca/topomaps/map-images/HTDP63360K030M05_1909TIFF.jpg [Accessed 28 January 2022].

- Department of National Defence (1923). *Topographic Map, 1:63,360, Ontario, Hamilton Sheet No.33; surveyed 1909, reprinted with corrections 1923*. [Online]. Available at: https://ocul.on.ca/topomaps/map-images/HTDP63360K030M05_1923TIFF.jpg [Accessed 28 January 2022].
- Department of National Defence (1931). *Topographic Map, 1:63,360, Ontario, Hamilton Sheet No.33; surveyed 1909; reprinted 1931*. [Online]. Available at: https://ocul.on.ca/topomaps/map-images/HTDP63360K030M05_1931TIFF.jpg [Accessed 28 January 2022].
- Department of National Defence (1938). *Topographic Map, 1:63,360, Ontario, Sheet No.30M/5; original survey 1909; resurveyed 1935; published 1938*. [Online]. Available at: https://ocul.on.ca/topomaps/map-images/HTDP63360K030M05_1938TIFF.jpg [Accessed 28 January 2022].

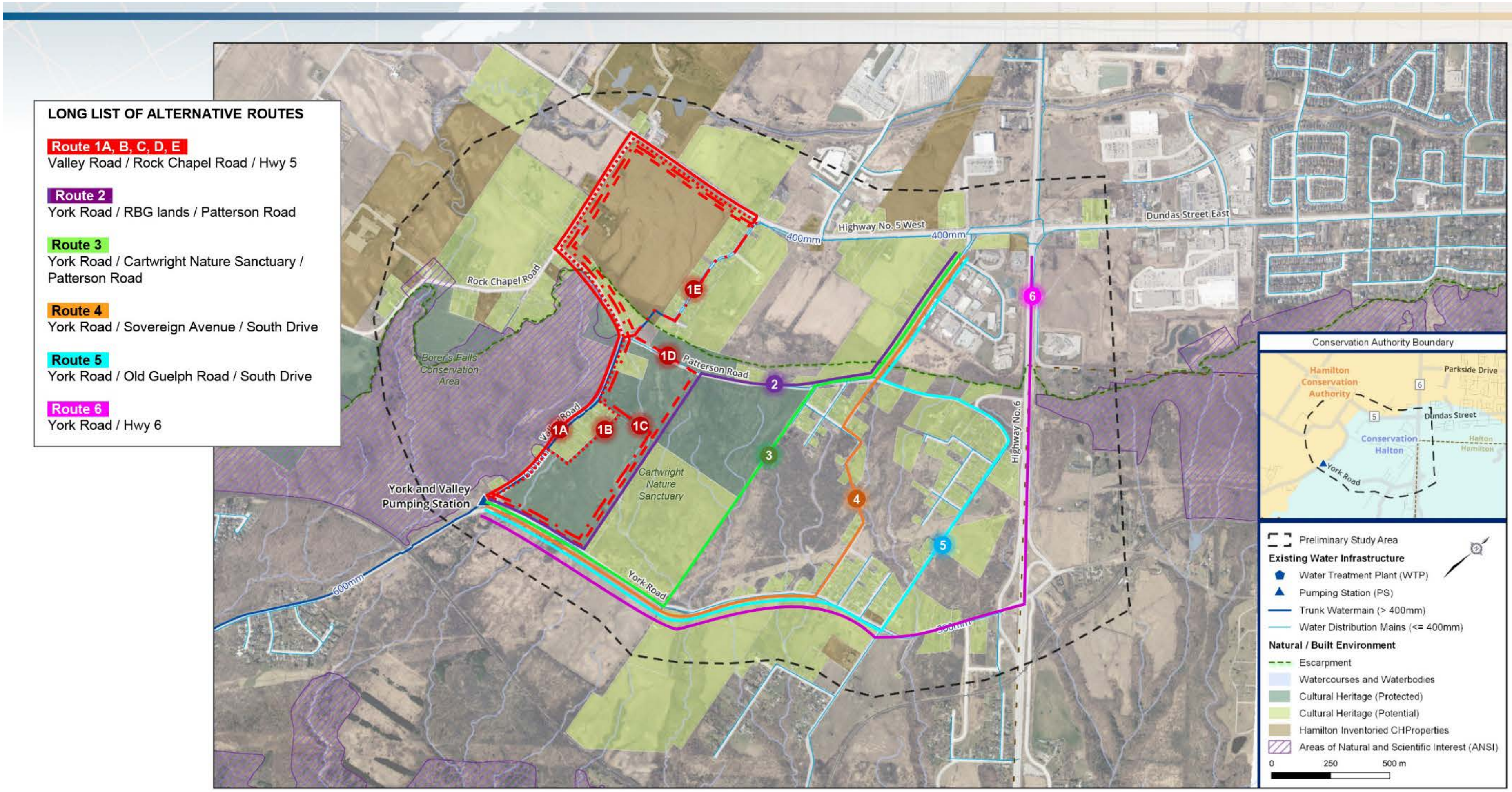
University of Toronto Libraries, Ontario Historical County Maps Project (OHCMP) (2019)
- Gregory, H. (1859). *Map of the County of Wentworth, Upper Canada*. Toronto. [Online]. Available at: http://maps.library.utoronto.ca/hgis/countymaps/york/index.html [Accessed 28 January 2022].

University of Toronto Map and Data Library (2022)
- 1954 Air Photo of Southern Ontario. [Online]. Available at: https://mdl.library.utoronto.ca/collections/air-photos/1954-air-photos-southern-ontario/index [Accessed 28 January 2022].

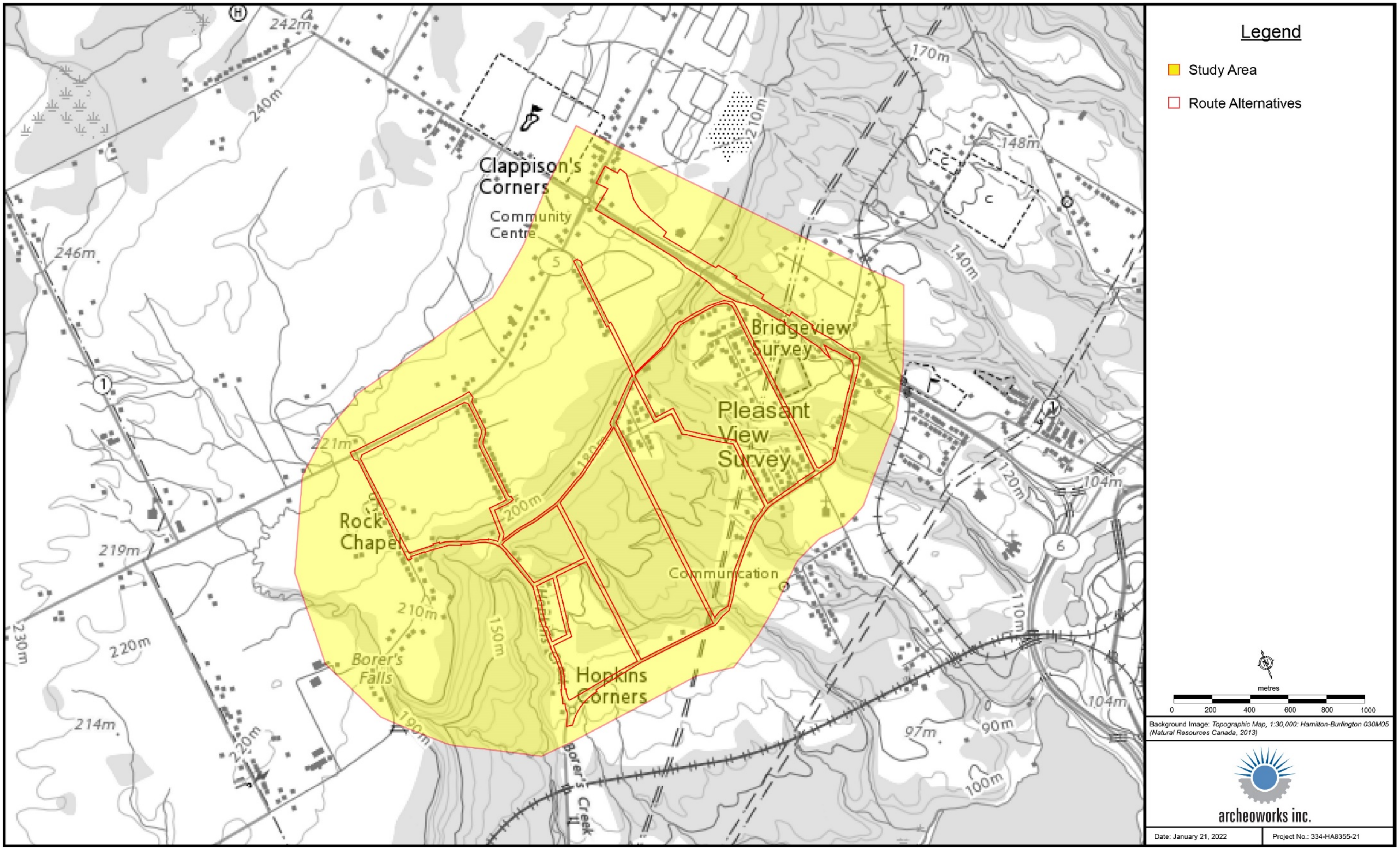
VuMAP ©First Base Solutions (2022)
- *2002, 2010 and 2019 Orthophotographs*. [Online]. Available at: http://vumap.firstbasesolutions.com/ [Accessed 28 January 2022].

APPENDICES

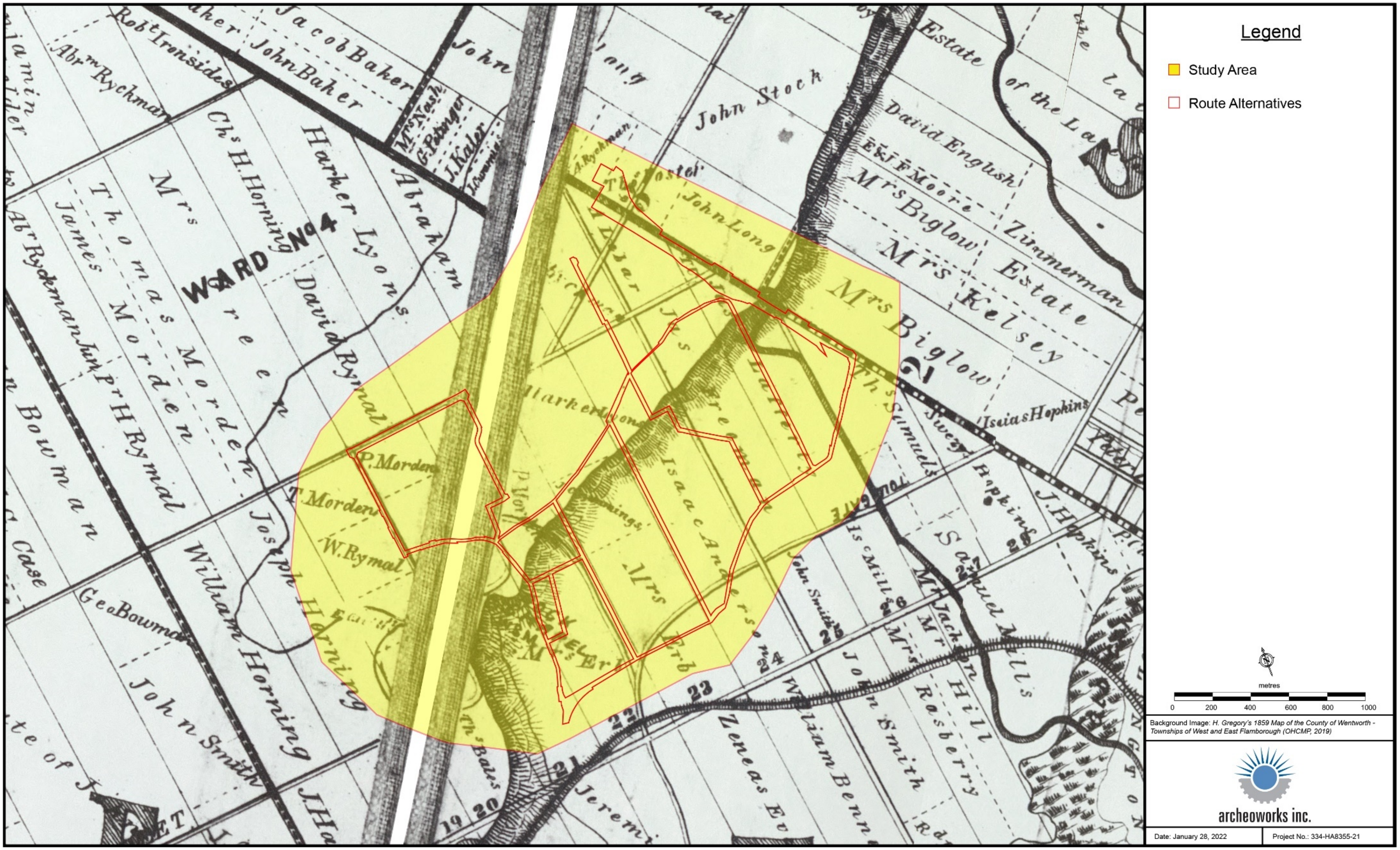
APPENDIX A: MAPS



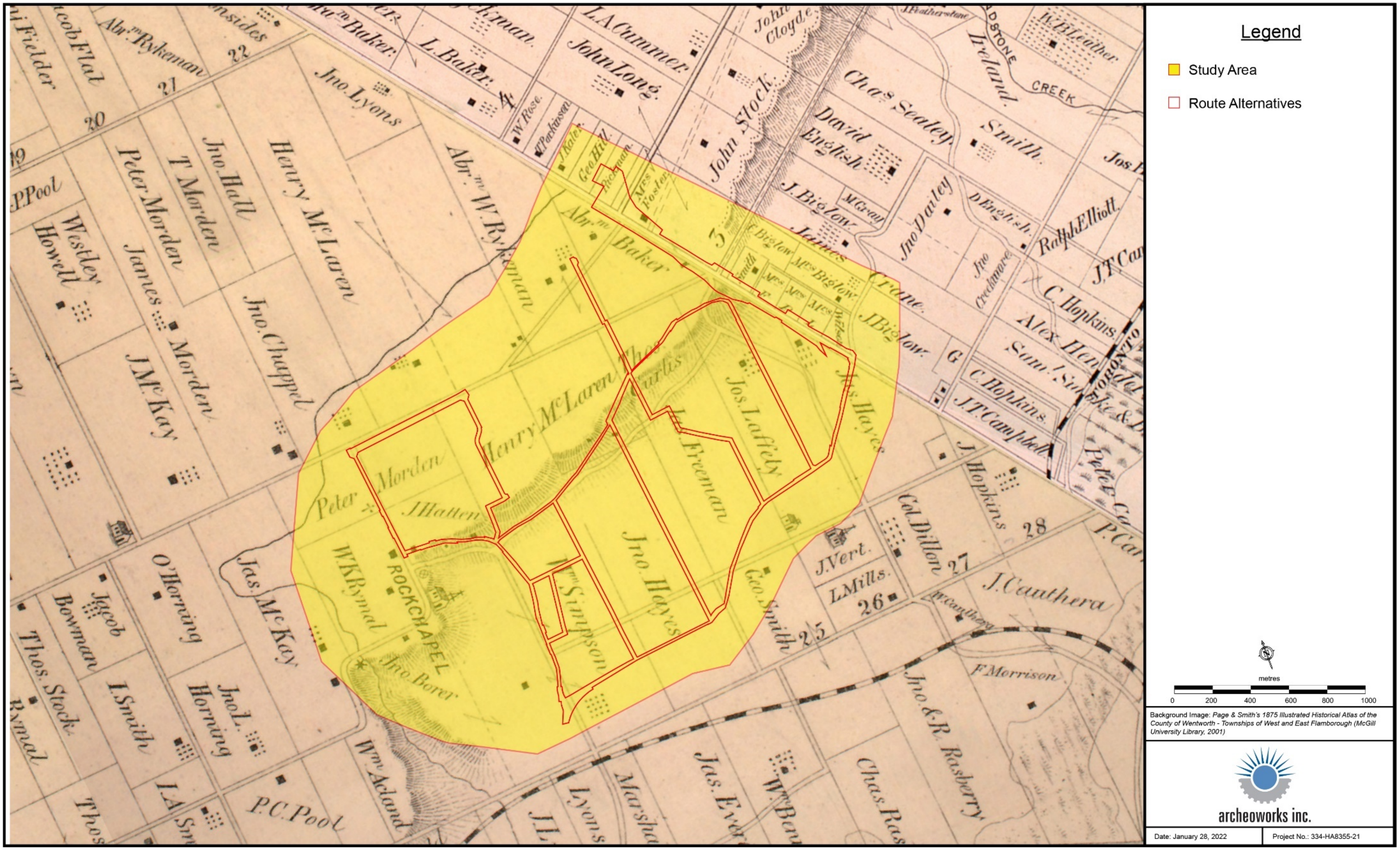
Map 1: Route Alternatives Map.



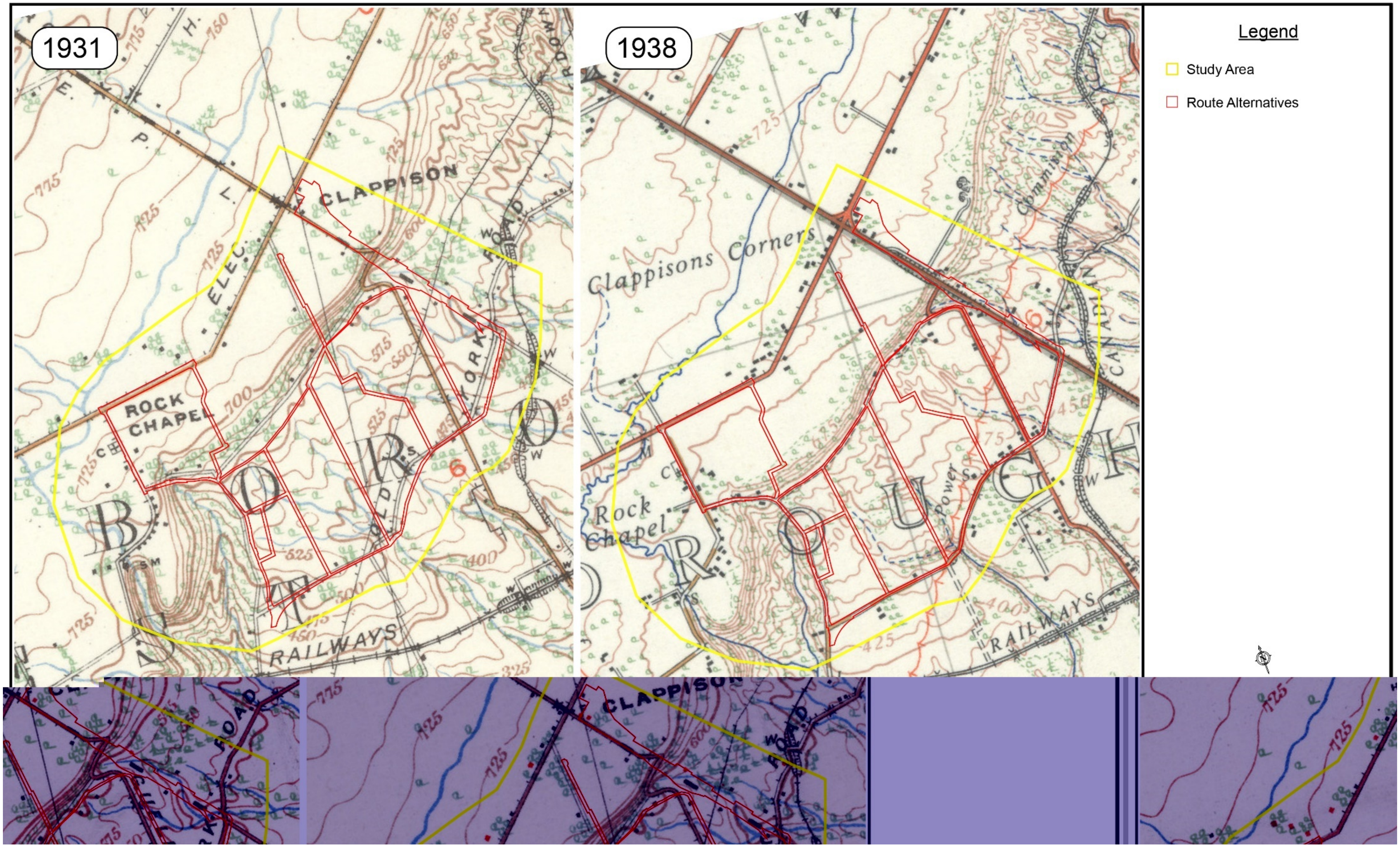
Map 2: National Topographic Map, 1:30,000, Hamilton-Burlington 030M05 identifying the Stage 1 AA study area and Route Alternatives.



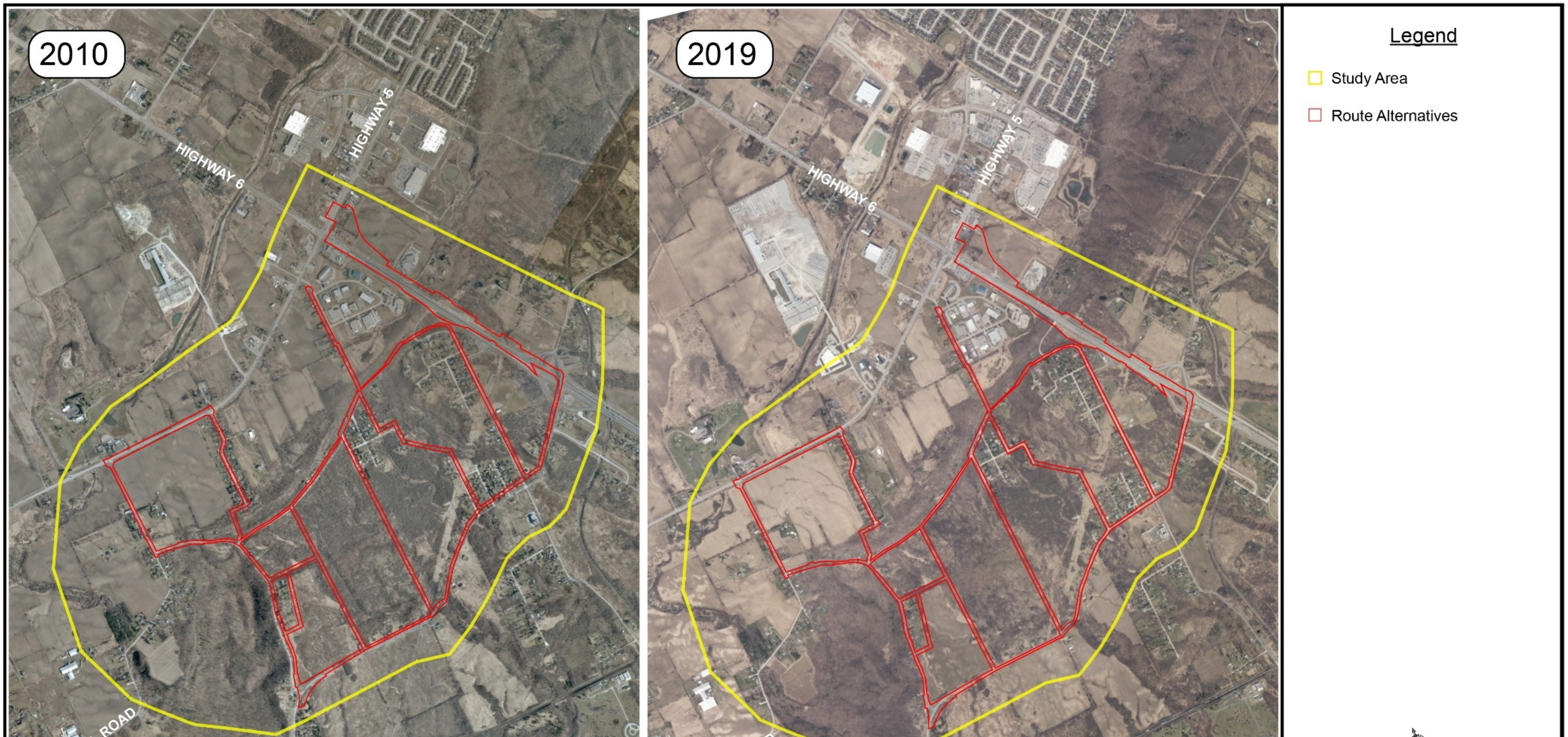
Map 3: Stage 1 AA study area and Route Alternatives within the 1859 *Map of the County of Wentworth*.



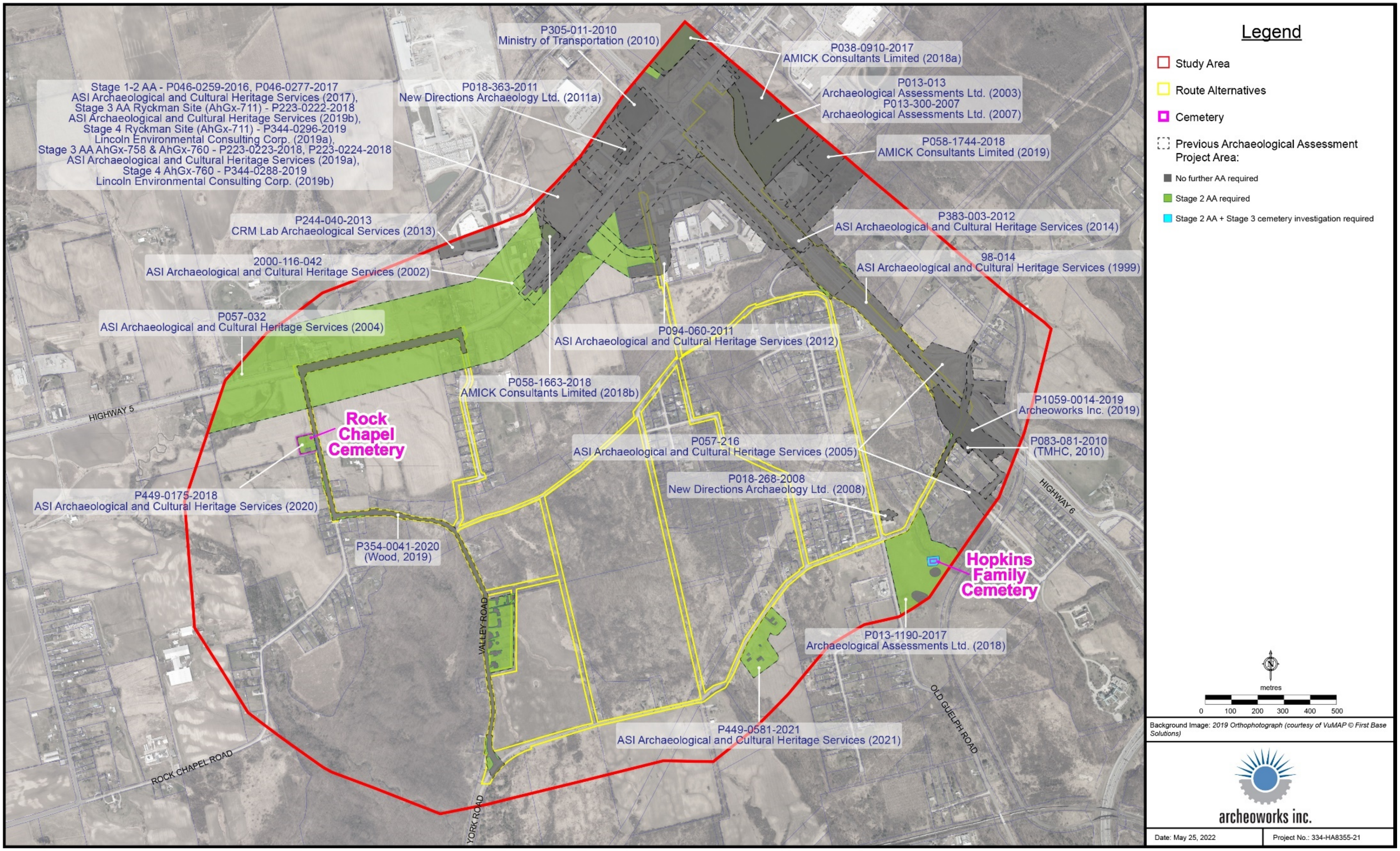
Map 4: Stage 1 AA study area and Route Alternatives within the 1875 *Illustrated Historical Atlas of the County of Wentworth*.



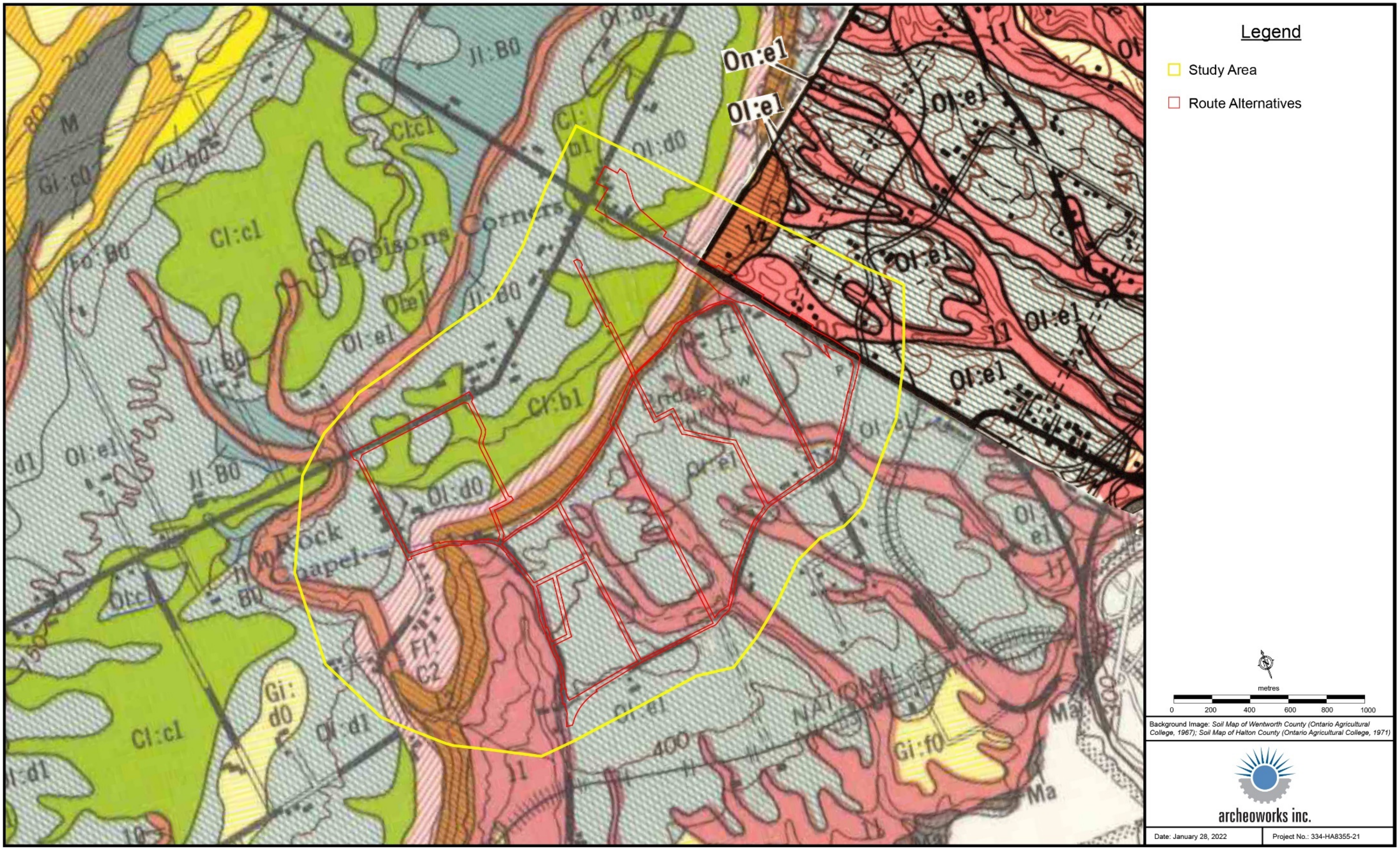
Map 6: Stage 1 AA study area and Route Alternatives within 1931 and 1938 topographic maps.



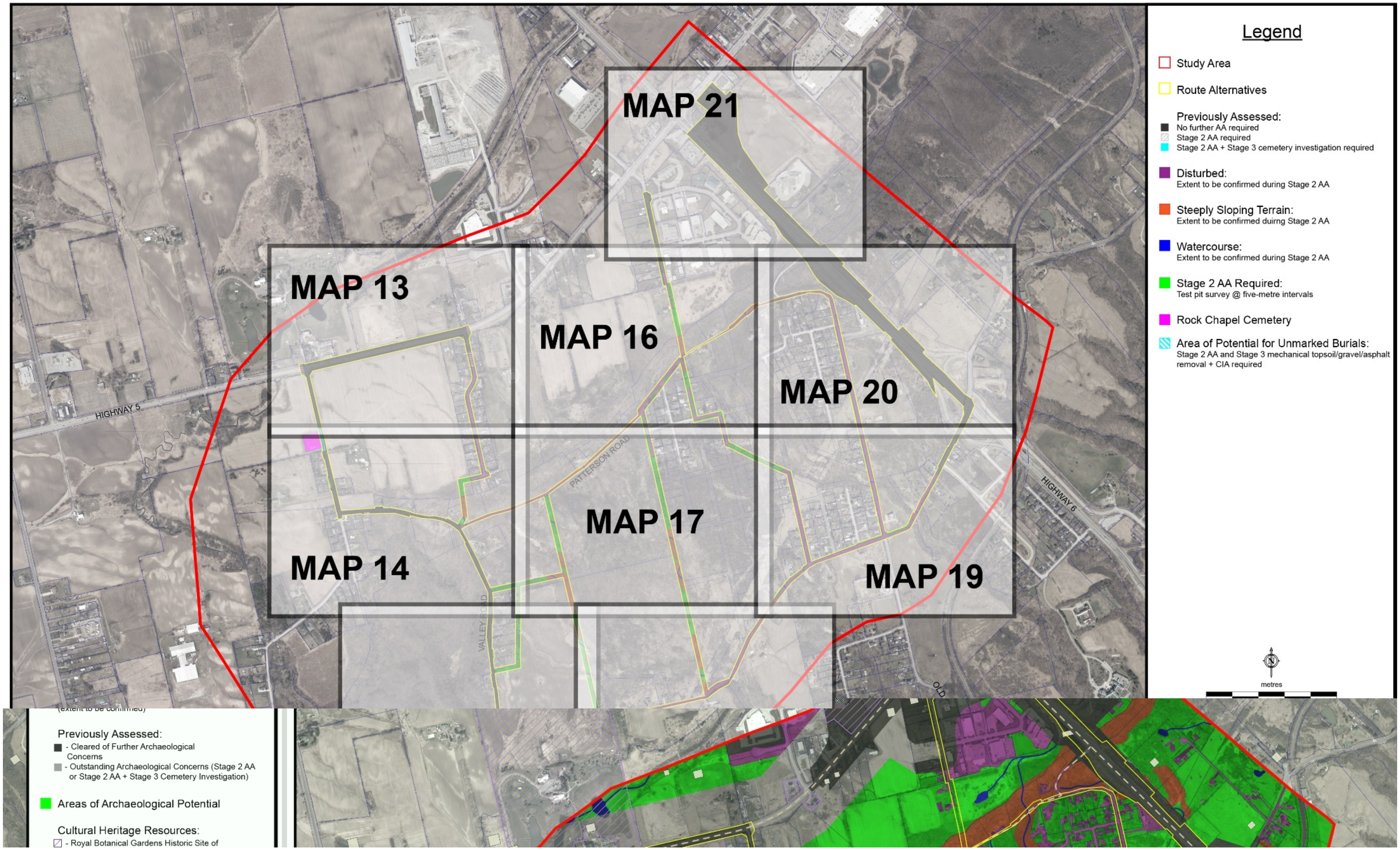
Map 8: Stage 1 AA study area and Route Alternatives within 2010 and 2019 orthophotographs.



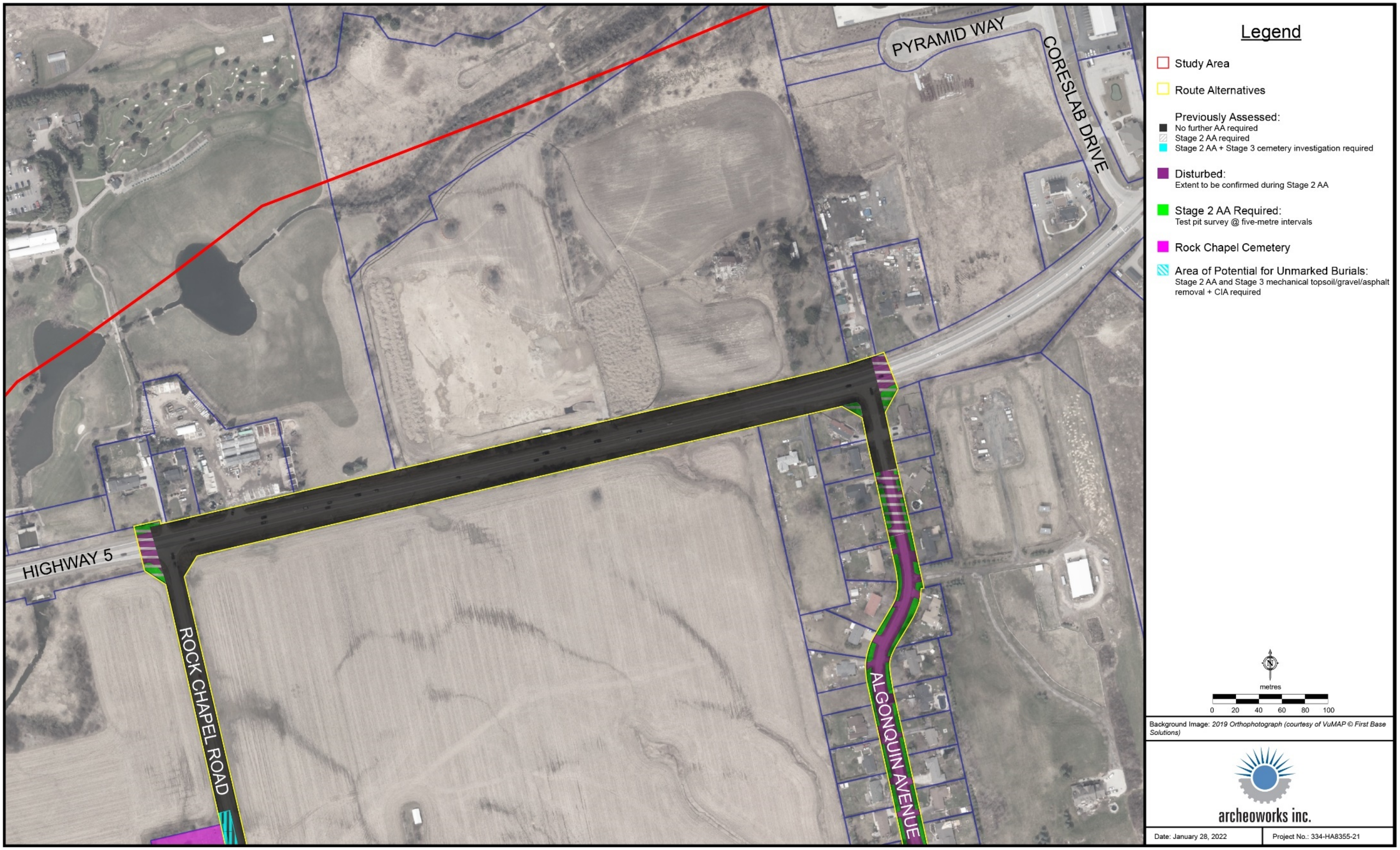
Map 9: Locations of previous archaeological assessments within the study area.



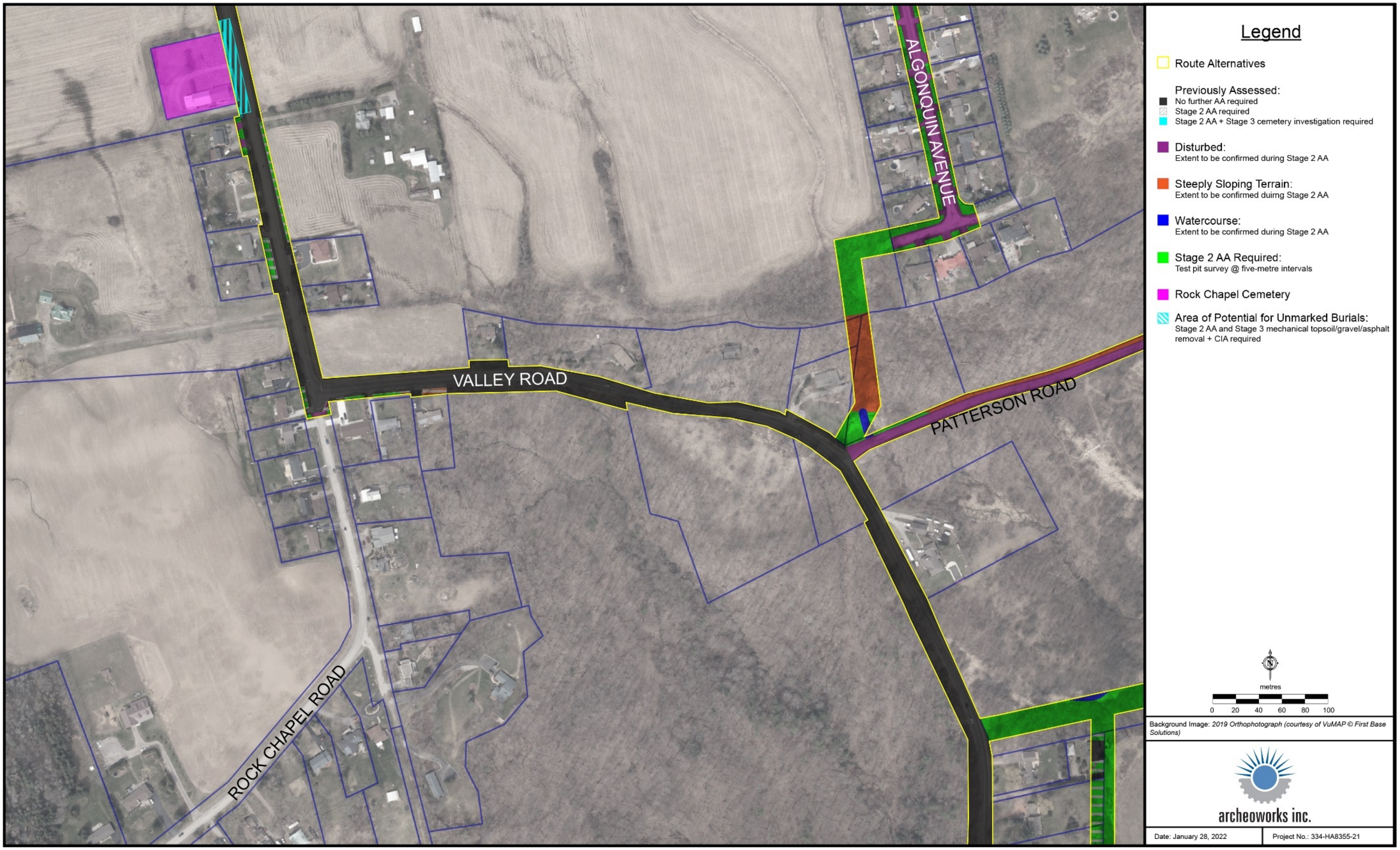
Map 10: Stage 1 AA study area and Route Alternatives within the soil map of Wentworth and Halton Counties.



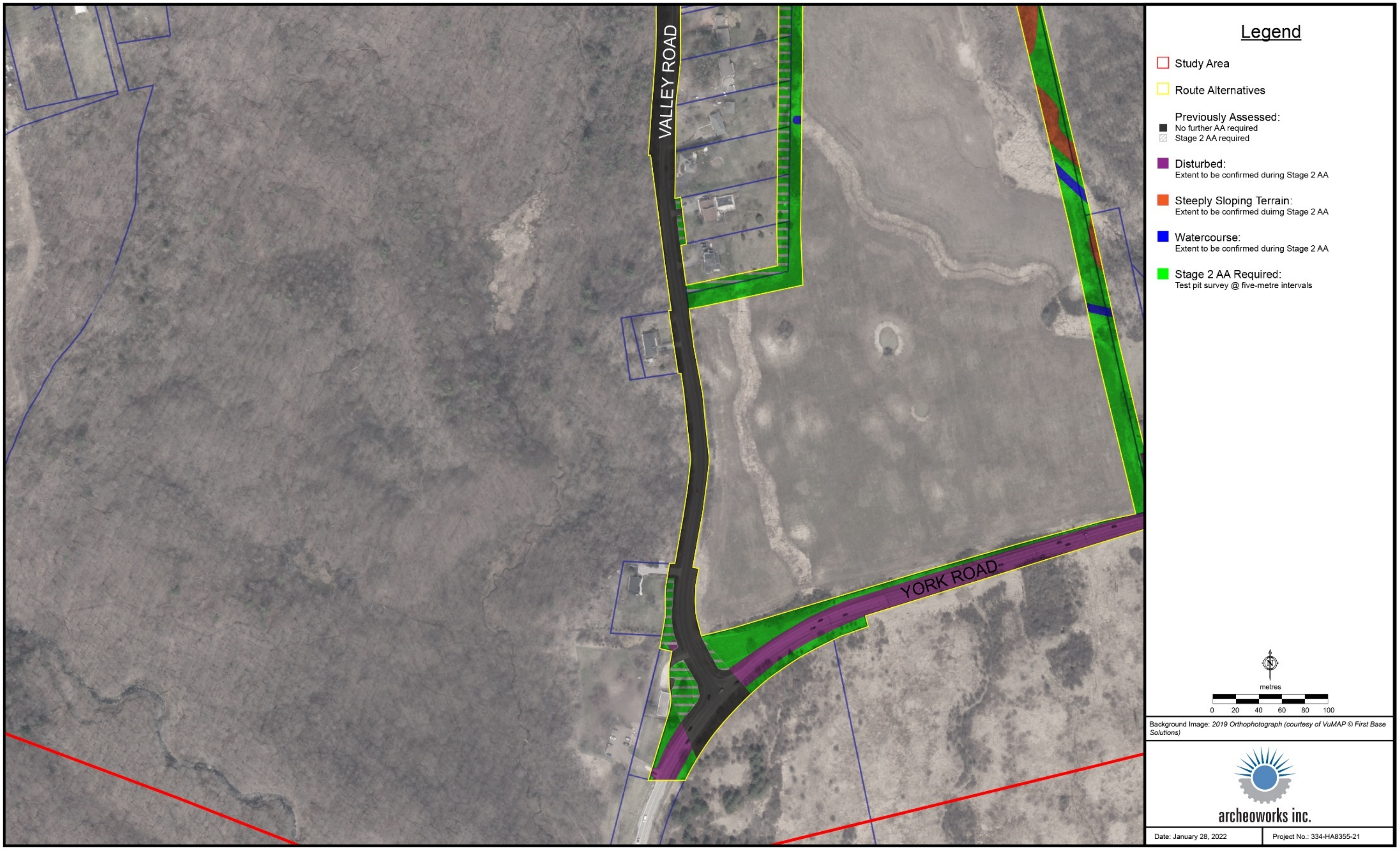
Map 12: Stage 1 AA Route Alternative results key plan.



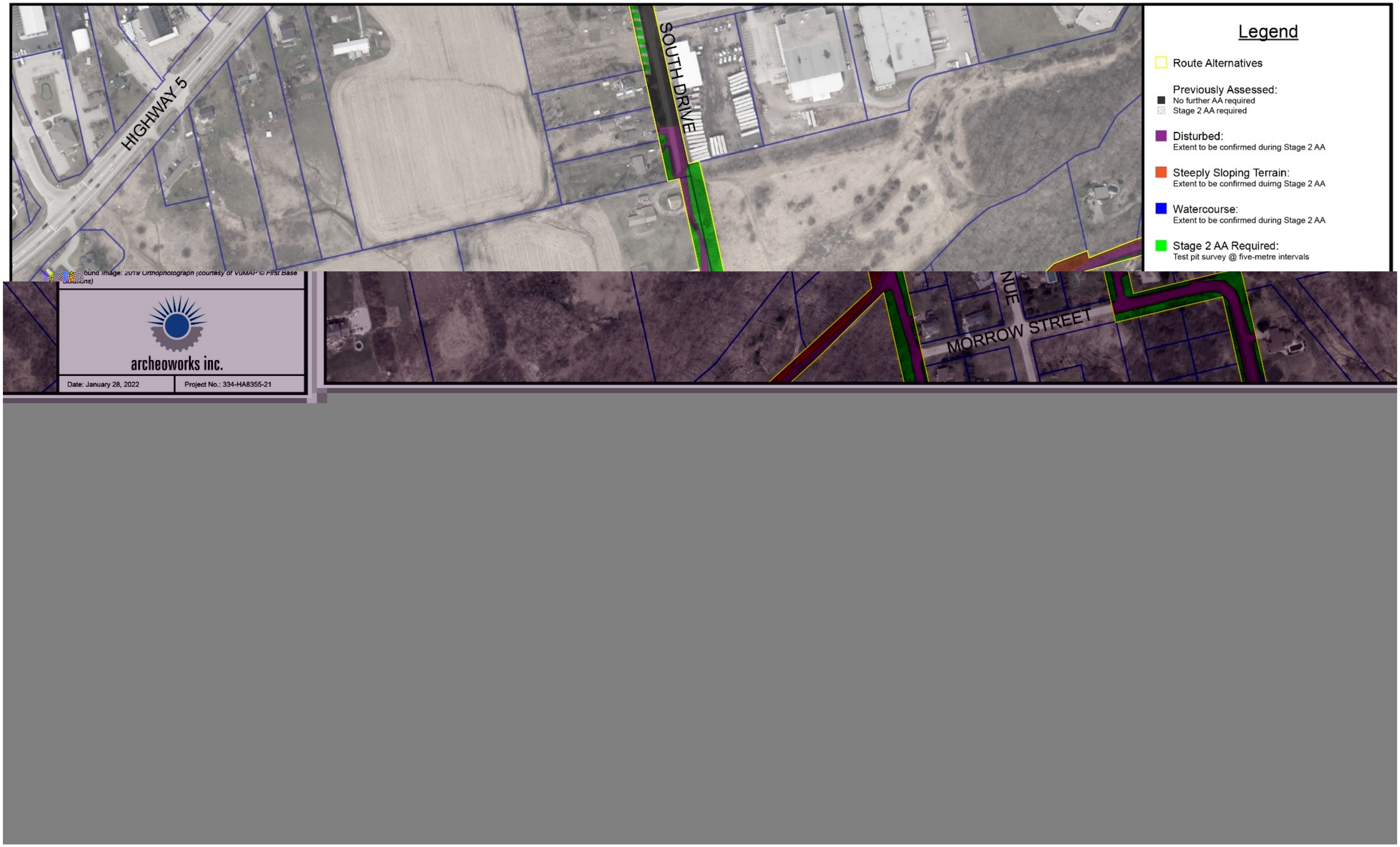
Map 13: Stage 1 AA Route Alternative results – along Algonquin Avenue, Highway 5 and Rock Chapel Road (associated with Routes 1A, 1B, 1C, 1D and 1E).



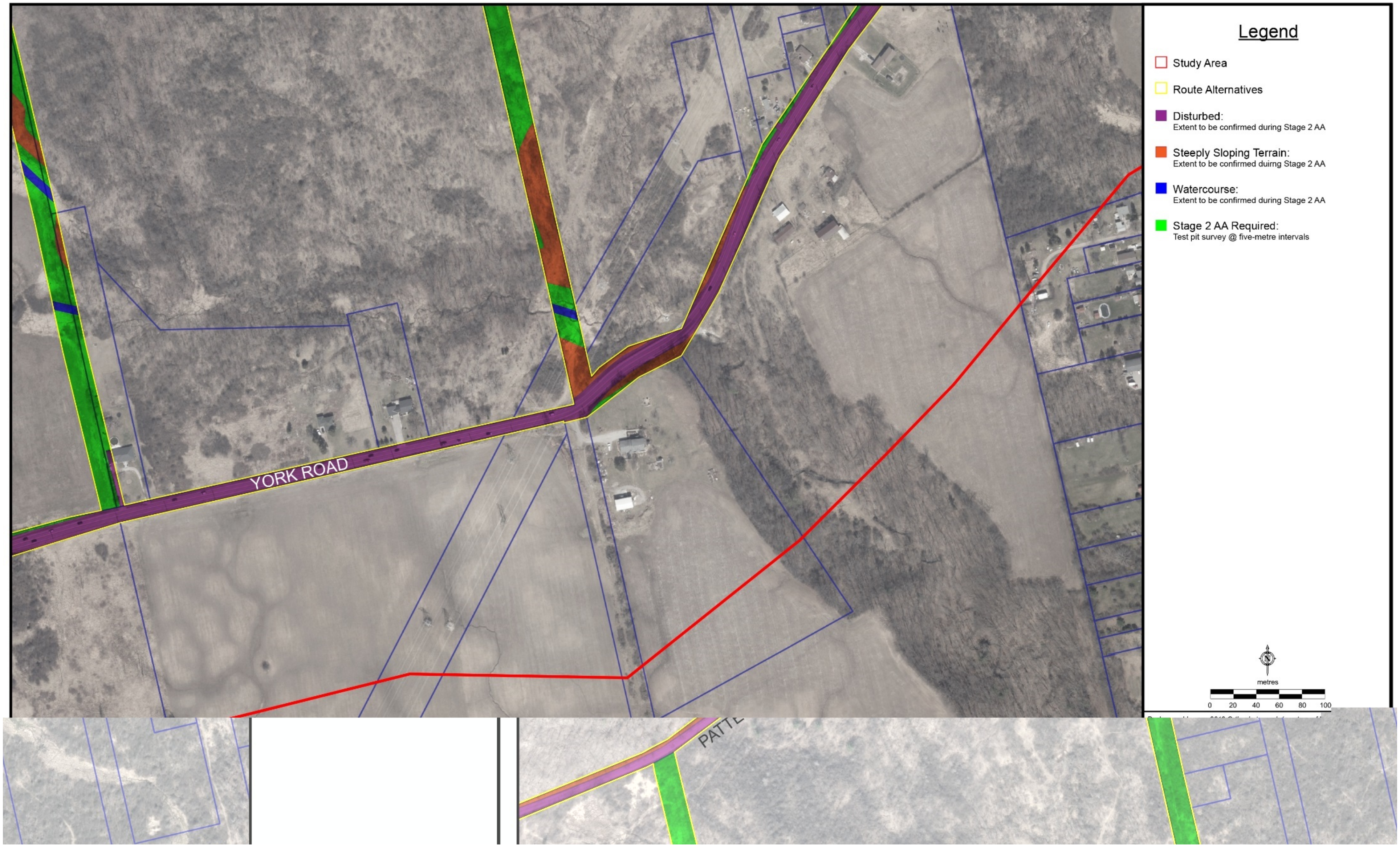
Map 14: Stage 1 AA Route Alternative results – along Rock Chapel Road, Valley Road and Patterson Road (associated with Routes 1A, 1B, 1C, 1D and 1E).



Map 15: Stage 1 AA Route Alternative results – along Valley Road and York Road and extending through RBG Berry Tract (associated with Routes 1A, 1B, 1C, 2, 3, 4, 5 and 6).

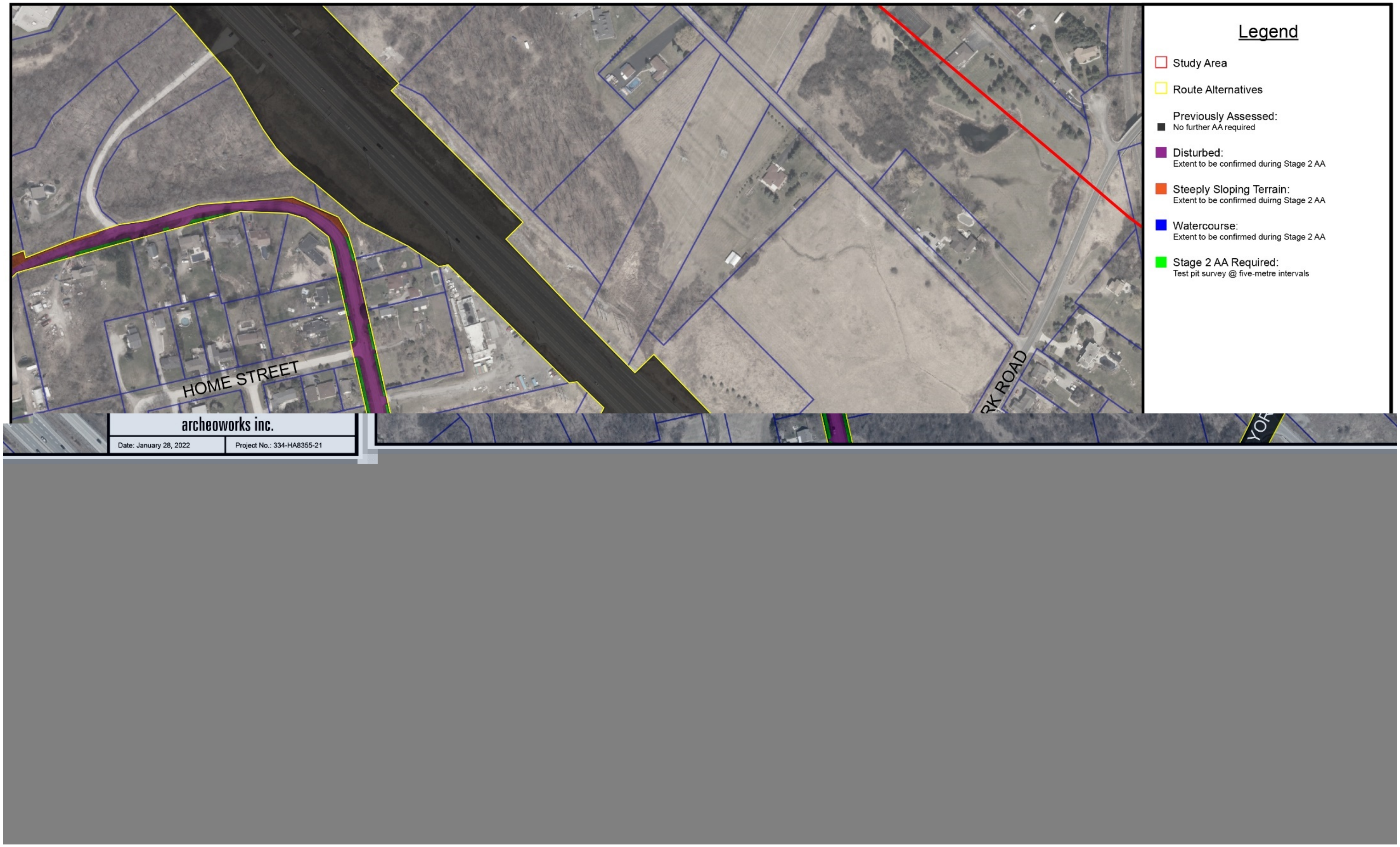


Map 16: Stage 1 AA Route Alternative results – along Rosina Avenue, Mina Avenue, Morrow Street, Wesley Avenue, Patterson Road and extending between Mina Avenue and South Drive (associated with Routes 2, 3, 4 and 5).



Map 18: Stage 1 AA Route Alternative results – along York Road and extending through Nicholson Resource Management Area, Cartwright Nature Sanctuary and the RBG Berry Tract (associated with Routes 1C, 1D, 2, 3, 4, 5 and 6).

Map 19: Stage 1 AA Route Alternative results – along York Road, Sovereign Avenue and Old Guelph Road and extending through Nicholson Resource Management Area (associated with Routes 4, 5 and 6).



Map 20: Stage 1 AA Route Alternative results – along Old Guelph Road and Highway 6 (associated with Routes 5 and 6).

Map 21: Stage 1 AA Route Alternative results – along South Drive and Highway 6 (associated with Routes 2, 3, 4, 5 and 6).

Map 22: Stage 1 AA recommendations for the Rock Chapel Cemetery.

APPENDIX B: STUDY AREA – SUMMARY OF BACKGROUND RESEARCH

Feature of Archaeological Potential		Results			
Physical Features		**Yes**	**No**	**Unknown**	**Comment**
1	Water on or adjacent to the study area	X			If Yes, potential confirmed
1a	Presence of primary water source within 300 metres of the study area (lakes, rivers, streams, creeks)	X			If Yes, potential confirmed
1b	Presence of secondary water source within 300 metres (intermittent creeks and streams, springs, marshes, swamps)	X			If Yes, potential confirmed
1c	Features indicating past presence of water source within 300 metres (former shorelines, relic water channels, beach ridges, etc.)		X		If Yes, potential confirmed
1d	Accessible or inaccessible shoreline within 300 metres (high bluffs, swamp or marsh fields by the edge of a lake, sandbars stretching into marsh, etc.)		X		If Yes, potential confirmed
2	Elevated topography (eskers, drumlins, knolls, plateaus, etc.)	X			If Yes to two or more of 2-4 or 7-10, potential confirmed
3	Pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground		X		If Yes to two or more of 2-4 or 7-10, potential confirmed
4	Distinctive land formations (mounds, caverns, waterfalls, peninsulas, etc.)	X			If Yes to two or more of 2-4 or 7-10, potential confirmed
Cultural Features		**Yes**	**No**	**Unknown**	**Comment**
5	Previously identified archaeological site(s) within 300 metres	X			If Yes, potential confirmed
6	Known burial site or cemetery on or directly adjacent to the property	X			If Yes, potential confirmed
7	Associated with resource areas related to food or medicinal plants, scarce raw materials, early Euro-Canadian industry		X		If Yes to two or more of 2-4 or 7-10, potential confirmed
8	Indications of early Euro-Canadian settlement (monuments, cemeteries, structures, etc.) within 300 metres	X			If Yes to two or more of 2-4 or 7-10, potential confirmed
9	Historic transportation route (historic road, trail, portage, rail area, etc.) within 100 metres	X			If Yes to two or more of 2-4 or 7-10, potential confirmed
10	Property listed on a municipal register or designated under the *Ontario Heritage Act* or that is a federal, provincial or municipal historic landmark or site within 300 metres	X			If Yes to two or more of 2-4 or 7-10, potential confirmed
Property-specific Information		**Yes**	**No**	**Unknown**	**Comment**
11	Contains property listed or designated (under the *Ontario Heritage Act*) by the municipality	X			If Yes, potential confirmed
12	Local knowledge (Indigenous communities, heritage organizations, municipal heritage committees, etc.)	X			If Yes, potential confirmed
13	Archaeological Management Plan (AMP) illustrating archaeological potential for all or parts of the study area	X - parts			If Yes, potential confirmed
14	Recent ground disturbance, not including agricultural cultivation (post-1960, extensive and deep land alterations)	X - parts			If Yes, low archaeological potential is determined

APPENDIX C: INVENTORY OF DOCUMENTARY AND MATERIAL RECORD

Project Information:				
Project Number:		334-HA8355-21		
Licensee:		Kim Slocki (P029)		
MHSTCI PIF:		P029-1033-2022		
Document/ Material		**Details**	**Location**	
1.	Research/ Analysis/ Reporting Material	Digital files stored in: /2021/334-HA8355-21 - Waterdown WM Trunk Twinning /Stage 1	Archeoworks Inc., 16715-12 Yonge Street, Suite 1029, Newmarket, ON, Canada, L3X 1X4	Stored on Archeoworks network servers

Under Section 14 of the Terms and Conditions for Archaeological Licences issued under the Ontario Heritage Act, “the licensee shall hold in safekeeping all artifacts and records of archaeological fieldwork carried out under this licence, except where those artifacts and records are transferred by the licensee to Her Majesty the Queen in right of Ontario or the licensee is directed to deposit them in a public institution in accordance with subsection 66(1) of the Act." The collections are being stored at *Archeoworks Inc.* on the licensee's behalf.

APPENDIX D: ROUTE ALTERNATIVES – SUMMARY OF STAGE 1 AA RESULTS

Route		Archaeological Potential	Required Next Steps	Reasoning
1	A	Yes	Stage 2 AA + Stage 3 Cemetery Investigations (requires Cemetery Investigation Authorization issued by BAO)	Confirm location and extent of previous disturbance and steep slope. Remaining lands retain archaeological potential and require test pit survey. Lands in ROW adjacent to Rock Chapel Cemetery have potential for uncovering unmarked burials. No further AA required for previously assessed lands where the report has been accepted into the *MHSTCI* Ontario Public Register of Archaeological Reports; Wood's Stage 1 AA report (2019, P354-0041-2020) must be reviewed once accepted by the *MHSTCI*.
	B	Yes	Stage 2 AA + Stage 3 Cemetery Investigations (requires Cemetery Investigation Authorization issued by BAO)	Confirm location and extent of previous disturbance, low-lying and wet terrain and steep slope. Remaining lands retain archaeological potential and require test pit survey. Lands in ROW adjacent to Rock Chapel Cemetery have potential for uncovering unmarked burials. No further AA required for previously assessed lands where the report has been accepted into the *MHSTCI* Ontario Public Register of Archaeological Reports; Wood's Stage 1 AA report (2019, P354-0041-2020) must be reviewed once accepted by the *MHSTCI*.
	C	Yes	Stage 2 AA + Stage 3 Cemetery Investigations (requires Cemetery Investigation Authorization issued by BAO)	Confirm location and extent of previous disturbance, low-lying and wet terrain and steep slope. Remaining lands retain archaeological potential and require test pit survey. Lands in ROW adjacent to Rock Chapel Cemetery have potential for uncovering unmarked burials. No further AA required for previously assessed lands where the report has been accepted into the *MHSTCI* Ontario Public Register of Archaeological Reports; Wood's Stage 1 AA report (2019, P354-0041-2020) must be reviewed once accepted by the *MHSTCI*.
	D	Yes	Stage 2 AA + Stage 3 Cemetery Investigations (requires Cemetery Investigation Authorization issued by BAO)	Confirm location and extent of previous disturbance, low-lying and wet terrain and steep slope. Remaining lands retain archaeological potential and require test pit survey. Lands in ROW adjacent to Rock Chapel Cemetery have potential for uncovering unmarked burials. No further AA required for previously assessed lands where the report has been accepted into the *MHSTCI* Ontario Public Register of Archaeological Reports; Wood's Stage 1 AA report (2019, P354-0041-2020) must be reviewed once accepted by the *MHSTCI*.
	E	Yes	Stage 2 AA	Confirm location and extent of previous disturbance, low-lying and wet terrain and steep slope. Remaining lands retain archaeological potential and require test pit survey. No further AA required for previously assessed lands where the report has been accepted into the *MHSTCI* Ontario Public Register of Archaeological Reports; Wood's Stage 1 AA report (2019, P354-0041-2020) must be reviewed once accepted by the *MHSTCI*.
2		Yes	Stage 2 AA	Confirm location and extent of previous disturbance, low-lying and wet terrain and steep slope. Remaining lands retain archaeological potential and require test pit survey. No further AA required for previously assessed lands where the report has been accepted into the *MHSTCI* Ontario Public Register of Archaeological Reports; Wood's Stage 1 AA report (2019, P354-0041-2020) must be reviewed once accepted by the *MHSTCI*.
3		Yes	Stage 2 AA	Confirm location and extent of previous disturbance, low-lying and wet terrain and steep slope. Remaining lands retain archaeological potential and require test pit survey. No further AA required for previously assessed lands where the report has been accepted into the *MHSTCI* Ontario Public Register of Archaeological Reports; Wood's Stage 1 AA report (2019, P354-0041-2020) must be reviewed once accepted by the *MHSTCI*.
4		Yes	Stage 2 AA	Confirm location and extent of previous disturbance, low-lying and wet terrain and steep slope. Remaining lands retain archaeological potential and require test pit survey. No further AA required for previously assessed lands

Route	Archaeological Potential	Required Next Steps	Reasoning
			where the report has been accepted into the *MHSTCI* Ontario Public Register of Archaeological Reports; Wood's Stage 1 AA report (2019, P354-0041-2020) must be reviewed once accepted by the *MHSTCI*.
5	Yes	Stage 2 AA	Confirm location and extent of previous disturbance, low-lying and wet terrain and steep slope. Remaining lands retain archaeological potential and require test pit survey. No further AA required for previously assessed lands where the report has been accepted into the *MHSTCI* Ontario Public Register of Archaeological Reports; Wood's Stage 1 AA report (2019, P354-0041-2020) must be reviewed once accepted by the *MHSTCI*.
6	Yes	Stage 2 AA	Confirm location and extent of previous disturbance, low-lying and wet terrain and steep slope. Remaining lands retain archaeological potential and require test pit survey. No further AA required for previously assessed lands where the report has been accepted into the *MHSTCI* Ontario Public Register of Archaeological Reports; Wood's Stage 1 AA report (2019, P354-0041-2020) must be reviewed once accepted by the *MHSTCI*.

ARCHEOWORKS INC.

Stage 1 Archaeological Assessment for the
Waterdown Watermain Trunk Twinning Schedule B
Municipal Class Environmental Assessment and Conceptual Design
Within Part of Lot 13, Concessions 2-3
In the Geographic Township of East Flamborough and
Part of Lots 20-28, Concession 2,
Part of Lots 20-25 and all of Lot 26, Concession 3
In the Geographic Township of West Flamborough
Historic County of Wentworth
Now in the City of Burlington, Regional Municipality of Halton
And the City of Hamilton
Ontario

Project #: 334-HA8355-21
Licensee (#): Kim Slocki (P029)
PIF #: P029-1033-2022

Supplementary Document

July 07, 2022

Presented to:
GM BluePlan Engineering Limited
Royal Centre, 3300 Highway No. 7, Suite 402
Vaughan, Ontario
L4K 4M3
T: 416.703.0667

Prepared by:
Archeoworks Inc.
16715-12 Yonge Street, Suite 1029
Newmarket, Ontario
L3X 1X4
T: 416.676.5597
F: 647.436.1938

TABLE OF CONTENTS

1.0 MAP

Map S1: Locations of previously registered archaeological sites located in and within 300 metres of the study area.

2.0 ROCK CHAPEL CEMETERY

2.1 Request for Technical Advice

2.2 MHSTCI Correspondence

Appendix D

Desktop Cultural Heritage Screening Report

Cultural Heritage Screening Report

York and Valley Roads Booster Pump Station (HD016) MCEA Addendum

The City of Hamilton

60656498

May 2022

Delivering a better world

Statement of Qualifications and Limitations

The attached

The information, data

is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications

represents AECOM s professional judgement in light of the Limitations and industry standards for the preparation of similar reports;

may be based on information provided to AECOM which has not been independently verified;

has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;

must be read as a whole and sections thereof should not be read out of such context;

was prepared for the specific purposes described in the Report and the Agreement; and

in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time.

AECOM shall be entitled to rely upon the accuracy and completeness of information that was provided to it and has no obligation to update such information. AECOM accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared and, in the case of subsurface, environmental or geotechnical conditions, is not responsible for any variability in such conditions, geographically or over time.

AECOM agrees that the Report represents its professional judgement as described above and that the Information has been prepared for the specific purpose and use described in the Report and the Agreement, but AECOM makes no other representations, or any guarantees or warranties whatsoever, whether express or implied, with respect to the Report, the Information or any part thereof.

Without in any way limiting the generality of the foregoing, any estimates or opinions regarding probable construction costs or construction schedule provided by AECOM represent AECOM s professional judgement in light of its experience and the knowledge and information available to it at the time of preparation. Since AECOM has no control over market or economic conditions, prices for construction labour, equipment or materials or bidding procedures, AECOM, its directors, officers and employees are not able to, nor do they, make any representations, warranties or guarantees whatsoever, whether express or implied, with respect to such estimates or opinions, or their variance from actual construction costs or schedules, and accept no responsibility for any loss or damage arising therefrom or in any way related thereto. Persons relying on such estimates or opinions do so at their own risk.

Except (1) as agreed to in writing by AECOM and Client; (2) as required by-law; or (3) to the extent used by governmental reviewing agencies for the purpose of obtaining permits or approvals, the Report and the Information may be used and relied upon only by Client.

AECOM accepts no responsibility, and denies any liability whatsoever, to parties other than Client who may obtain access to the Report or the Information for any injury, loss or damage suffered by such parties arising from their use of, reliance upon, or decisions or actions based on the
parties have obtained the prior written consent of AECOM to use and rely upon the Report and the Information. Any injury, loss or damages arising from improper use of the Report shall be borne by the party making such use.

This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

AECOM: 2015-04-13

Revision History

Rev #	Revision Date	Revised By:	Revision Description
0	March 16, 2022	Liam Ryan	Draft Report
1	May 06, 2022	Liam Ryan	Revised based on City Heritage Planner comments

Distribution List

# Hard Copies	PDF Required	Association / Company Name
		The City of Hamilton
		AECOM Canada Ltd.

Cultural Heritage Landscape (CHL) means 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 Indigenous community. The area may include features such as buildings, structures, spaces, views, archaeological sites or natural elements that are valued together for their interrelationship, meaning or association. Cultural heritage landscapes may be properties that have been determined to have cultural heritage value or interest under the *Ontario Heritage Act*, or have been included on federal and/or international registers, and/or protected through official plan, zoning by-law, or other land use planning mechanisms.

For the purpose of this study, the BHRs and CHLs are categorized as either:

Known BHR or CHL consisting of municipally, provincially, or federally designated or listed properties that have an existing level of heritage protection, designation, or recognition; or

Potential BHR or CHL

3. Stakeholder Consultation

The following stakeholders were contacted to gather information on known or potential BHRs and CHLs within the Study Area.

Table 1: Stakeholder Consultation

Contact	Contact Information	Date	Comments
Krystal Power, Ontario Heritage Trust, Natural Heritage Coordinator/Planner	Krystal.Power@heritagetrust.on.ca	February 18, 2022.	Krystal Power was contacted to confirm that there are no properties of interest to the OHT within or adjacent to the Study Area. At the time this report was submitted, no response was received.
Karla Barboza, MHSTCI, Team Lead, Heritage	Karla.Barboza@ontario.ca	February 18, 2022.	Karla Barboza was contacted to review and confirm if there are any known Provincial Heritage Properties, and/or Heritage Properties of Provincial Significance with or adjacent to the Study Area.
		February 22, 2022.	Karla Barboza confirmed that no properties have been designated by the Minister and MHSTCI is not aware of any provincial heritage properties within or adjacent to the Study Area.

Contact	Contact Information	Date	Comments
Chloe Richer, City of Hamilton, Cultural Heritage Planner	Chloe.Richer@hamilton.ca	March 04, 2022.	Chloe Richer was contacted by AECOM to boundary of the National Historic Site.[1] Chloe Richer responded and forward the question to RBG.
		March 17, 2022.	Chloe Richer, heard back from RBG and confirmed that that the Berry Tract property is not within the NHSC because it was purchased after the NHSC was designated in 1994, and that the NHSC includes the RBG lands as they were in 1993
Mark Mitchell, City of Hamilton GIS Technologist	Mark.mitchell@hamilton.ca	March 15, 2022.	Mark provided AECOM the Heritage Register data for the Study Area. Mark indicated there is only one (1) Inventoried property (the former Great Western Railway Line) and no other buildings, bridges, landscapes, places of worship, or cemeteries of heritage interest within the Study Area. Mark pointed out that York Road may be an Indigenous Trail, however research is underway, and it is not yet on the Inventory of Cultural Heritage Landscapes. In addition, the Study Area is near the historical settlement area of Rock Chapel.
Alissa Golden, City of Hamilton, Heritage Project Specialist	Allissa.Golden@hamilton.ca	March 16, 2022.	On March 16, the City of Hamilton Heritage Register map was updated to include four potential cultural heritage resources and added to the Inventory as part of the draft Cultural Heritage Assessment (CHA) for the EA of the Waterdown Twinning EA. Although added to the Inventory, Alissa told AECOM that the heritage interests of the properties have not yet been confirmed. At the moment, staff do not consider these four properties to be of sufficient heritage interest to warrant any recognition or protection under the Ontario Heritage Act. Note, AECOM has not been circulated the draft CHA since it under City review. This CHSR is based on the screening reports completed for the Waterdown Twinning EA.

[1] *Previous heritage studies for the Project had indicated that the RBG Berry Tract South was within the NHS boundary.*

4. Brief Historic Overview

Historically, the Study Area is located with a portion of Lot 22 and 23, Concession II, within the Township of West Flamborough, Wentworth County.

4.1 Pre and Post European Contact Era/ Indigenous Communities

The following excerpt from the *Cultural Heritage Screening Report Review & Assessment Waterdown Trunk Watermain Twinning Project, City of Hamilton, ON* (MHBC, 2022) summarizes the history of the pre and post European Contact Era/ Indigenous Communities appliable to this Study Area.

> The first inhabitants of Southern Ontario arrived approximately 11,000 years before present after the retreat of the glaciers which shaped the landscape and created large glacial lakes. Inhabitants were small groups of nomadic hunter-gatherers which seasonally resided in Southern Ontario during the Paleo-Indian, Archaic and Woodland periods (TRCA, 27).
>
> The Beaver Wars emerged in the 17th century and conflicts ensued between First Nations exacerbated by the greed by French and English for beaver pelts. As a result of the conflicts, the Neutral Nation collapsed in 1650 and the Wendat were forced off their lands by the Haudenosaunee Confederacy. The Mississaugas, an Anishinaabe nation, established a settlement in the area and established a peace agreement with the
>
> Historic Context Statement.). On December 7, 1792, the Between the Lakes Purchase (Treaty 3) was signed by the Crown and Mississauga peoples which included approximately 3 million acres of land and included all
> inistry of Indigenous Affairs).

4.2 Township Survey and Settlement

4.2.1 Township of West Flamborough

The T

Named after the Town of Flamborough in East Yorkshire, England, Flamborough Township became part of Halton County in 1816 and was divided into two separate townships, East and West Flamborough, in 1854.

One of the main features of West Flamborough Township was the waterway now known as Spencer Creek, which

and scenic waterfalls. When the Regional Municipality was created, the Townships of West Flamborough, East Flamborough, and Beverly were combined to create the Town of Flamborough. In 2001, the Town of Flamborough was amalgamated with five other municipalities to create the City of Hamilton.

4.2.2 City of Hamilton

In 1820, Hamilton was surveyed and established primarily because of the efforts of George Hamilton, James Durand and Nathaniel Hughson. George Hamilton purchased farm holdings from Durand after the War of 1812 (Weaver 1985). Hamilton, Durand and Hughson had all offered land to the Crown for the future town site. In 1832, a canal was cut through the outer sand bar connecting Burlington Bay to Lake Ontario that enabled Hamilton to become a major port city. By 1845, the population was 6,475 and included present day concession roads, with stagecoaches and steamboats in operation between Toronto, Queenston, and Niagara. A large number of churches, store fronts, and industry ventures were operational throughout the community. It was incorporated as a City in 1846. In the early

annexed. Settlement and City expansion moved easterly because of the geographic boundaries of the Niagara Escarpment to the south, Burlington Bay to the north, and a wide ravine to the west (Weaver 1978). After 1911, private expansion westward continued with considerable financial support from the City. The construction of McMaster University in the west end increased city expansion in that direction (Weaver 1978). On January 1, 2001, the new City of Hamilton was formed from the amalgamation of Hamilton and its five-neighbouring townships: Ancaster, Dundas, Flamborough, Glanbrook and Stoney Creek.

The Great W
centre portion of railway connected Niagara Falls and Windsor in the colony of Canada West (Ontario), which became a significant thoroughfare servicing the American immigration route, from New York City and Boston to Chicago and Milwaukee. The line was absorbed by the Grand Trunk Railway in 1882, and ultimately became a major part of the

4.2.3 Rock Chapel

The first Euro-Canadian settlers in West Flamborough Township arrived between 1796 and 1798. Many of the early pioneers were members of the Methodist Episcopal Church, who held their first meeting in the area in May of 1802. By 1808, the fledgling settlement o
Methodist Episcopal Church visited on a regular basis (Rock Chapel United Church, 2014). On June 24, 1822, an acre of land was purchased to serve as the location for a formal
since it was erected on a rock ledge on the Niagara Escarpment that overlooked the Dundas Valley (Rock Chapel United Church, 2014). At first, the structure was known as Cummins Chapel after its builder Daniel Cummins, though its name was later officially changed to Rock Chapel (Cummins, 2020). John Cummins, eldest son of Daniel Cummins, operated a mill in the community and overall, the family helped spur development in the community (Cummins, 2020).
Initially, Rock Chapel was used as a place of worship by adherents to the Anglican, Baptist, and Presbyterian denominations, but later became exclusive used by the Methodist Episcopal Church after a heated conflict occurred in the 1830s between Wesleyan and Episcopalian Methodists for control of the chapel (Rock Chapel United Church, 2014). By the latter half of the 19th century, the settlement of Rock Chapel contained a post office, two general stores,
ll (Flamborough Archives & Heritage Society, 2006).
Ultimately, by 1876 the wooden chapel had fallen into disrepair, so a new red brick church was constructed adjacent to the cemetery (that was established in 1830) on Rock Chapel Road near Highway #5. The original wooden Rock Chapel was demolished in 1948, though the site is commemorated with a historical plaque. Ultimately, the new Rock Chapel United Church closed at the end of October 2017 (Rock Chapel United Church, 2014). At present, Rock Chapel is a community in the City of Hamilton and remains in a predominantly rural, agrarian context.

4.3 Historic Mapping Review

The 1875 *Illustrated Historical Atlas of the County of Wentworth* was examined for the presence of 19th century structures or features within the Study Area (**Figure 2**). There is a farmhouse within a property owned by William Simpson in the Study Area within Lot 22, Concession II, on the west side of Valley Road. In addition, there is an orchard in Lot 23 on the east side of Valley Road. There are no structures illustrated within the three alternative solutions land. Based on the review of the current aerial photograph (**Figure 1**), the farmhouse and orchard are no longer extant. In 1875, the surrounding area was dominated by agricultural lands and the Niagara Escarpment. At the top of the Niagara Escarpment is the 19th century community of Rock Chapel. The 1875 Atlas also shows the Great Western Railway running in an east-west direction through the southern end of the Study Area.

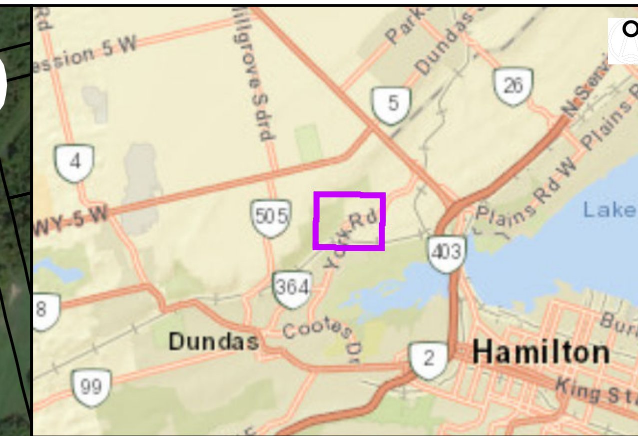
When examining the 1952 National Topographic Series (NTS) map of Hamilton (**Figure 3**), there are at least three houses and associated barns of unknown material located along York and Valley Roads within the Study Area. No structures are located within the three alternative solutions. The 1952 NTS map shows that the west side of Valley Road is forested, and the east side is cleared with some forest stands.

Based on a review of the current aerial photograph (**Figure 1**), it is determined that the structures illustrated on the 1952 NTS map are no longer extant[2]. As of 2022, the surrounding area is dominated by conservation areas and the Niagara Escarpment (Bor . It appears the former agricultural fields have become scrubland and reforested.

[2] *It is important to note that the current alignment of Valley Road and York Road have changed since the 1952 NTS map.*

Royal Botanical Garden (RBG) Berry Tract South

The two (2) additional properties are not identified as potential BHRs or CHLs in this CHSR as they are not included in the Municipal Heritage Register. In addition, while the RBG Berry Tract is owned and maintained by the RBG, it does not fall within the National Historic Site of Canada boundary. The municipal address associated with the Royal Botanical Gardens National Historic Site of Canada (NHSC) because the property was purchased after the NHSC was designated in 1994. The NHSC includes the RBG lands as they were in 1993, which include:
Centre, Rock Chapel, the North and South sides of Cootes Paradise
Heights. For consistency with the Golder (2019) report, these two (2) additional properties have been included in **Figure 4** which is simply shown to highlight the natural heritage importance of the land but is not considered a CHL.



Legend

- Rail Track
- Parcel
- Study Area

Alternative

- W-WS-3a
- W-WS-3b
- W-WS-3c

Heritage Potential

- Inventoried: Potential Built Heritage Resources & Cultural Heritage Landscapes (CHA-EA)
- Potential Cultural Heritage Landscape identified by MHBC (2022)
- Former Potential Cultural Property Identified by Golder (2019)
- Royal Botanical Gardens Berry Tract

0 50 100 200 300 400
Metres

Hamilton HD016 – EA Addendum

Aerial Photography overlaid with the Potential Heritage Properties and Study Area

Mar 16, 2022	1:5,000 *when printed 11"x17"	Datum: NAD 1983 UTM Zone 17N Source: MNRF, MECP, City of Hamilton Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS
P#: 60656498	V: 01	

AECOM

Figure 4

6. Key Findings and Recommendations

6.1 Key Findings

This CHSR was completed as part of the MCEA Addendum to identify

There are four (4) potential BHRs and two (2) potential CHLs within the Study Area. The construction work is not anticipated to directly impact CHL 1, CHL 2, BHR 1, BHR 2, BHR 3 or BHR 4 as they are not located within the three alternative solutions (W-WS-3a, W-WS-3B and W-WS-3c).

W-WS-3a This alternative solution is adjacent to CHL 1 however this solution results in upgrades to the existing PS. Therefore, no adverse impacts are anticipated.

W-WS-3c This alternative solution is not directly adjacent to any of the BHRs or CHLs. Therefore, no impacts are anticipated.

6.2 Recommendations

Based on the results of the CHSR, the following recommendations have been developed:

1.

2. Should the Study Area expand, or the footprints of the proposed alternative solution change, then a qualified heritage consultant should be retained to confirm impacts of the proposed work on known and potential BHRs resources and CHLs.

7. Sources

Primary and Secondary Sources:

City of Hamilton.

August 2020 Waterdown Village Historic Context Statement. historic_context_statement_2020-08-24_draft.pdf (hamilton.ca)

City of Hamilton

2021 Municipal Heritage Register. Accessed Online: historic_context_statement_2020-08-24_draft.pdf (hamilton.ca)

N.d. *Kilbride History Group*. Accessed Online: https://kilbridehistory.com/history/cumminsville/people-of-cumminsville/john-angle-cummins/

Department of Militia and Defence.

1952 National Topographic Series. Hamilton Sheet. 30 M/5 West Half.

Flamborough Archives & Heritage Society

(2006)
https://flamboroughhistory.com/chapel-on-the-rock-part-3/

Golder Associates Inc.

2019 *Cultural Heritage Screening Report Waterdown Trunk Watermain Twinning Project, City of Hamilton, ON*

MHBC

2022 *Cultural Heritage Screening Report Review & Assessment Waterdown Trunk Watermain Twinning Project, City of Hamilton, ON*

Ministry of Indigenous Affairs.

N.d. Map of Ontario Treaties and Reserves. Map of Ontario treaties and reserves | Ontario.ca

Page & Smith

1875 *Illustrated Historical Atlas of the county of Wentworth, Ont.* Toronto.

Rock Chapel United Church

2014 https://rockchapel.webs.com/ourhistory.htm

Provincial Standards and Resources:

Ministry of Heritage, Sport, Tourism and Culture Industries (M.H.S.T.C.I.)

2016 *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes, A Checklist for the Non-Specialist*. http://www.mtc.gov.on.ca/en/heritage/tools.shtml.

Ontario, Government of

2021 *Ontario Heritage Act, R.S.O. 1990, c.0.18.* Available online at https://www.ontario.ca/laws/statute/90o18

Ontario Heritage Trust
n.d. Easement Properties. Ontario Heritage Trust. https://www.heritagetrust.on.ca/en/property-types/easement-properties.

Ontario Heritage Trust
n.d. Ontario Heritage Act Register. Ontario Heritage Trust. https://www.heritagetrust.on.ca/en/index.php/pages/tools/ontario-heritage-act-register

Ontario Heritage Trust
n.d. Places of Worship Inventory. Ontario Heritage Trust. https://www.heritagetrust.on.ca/en/index.php/places-of-worship/places-of-worship-database

Ontario Heritage Trust
n.d. Provincial Plaque Program. Ontario Heritage Trust. https://www.heritagetrust.on.ca/en/pages/programs/provincial-plaque-program.

Ontario Historical Plaques
n.d. The Founding of Bothwell, 1855. Accessed online at http://www.ontarioplaques.com/Plaques/Plaque_ChathamKent01.html

Parks Canada
n.d.

Parks Canada
n.d. Canadian Register of Historic Places. https://www.historicplaces.ca/en/home-accueil.aspx.

Parks Canada
n.d. Directory of Federal Heritage Designations. https://www.pc.gc.ca/apps/dfhd/search-recherche_eng.aspx.

Appendix A: Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes

Clear Form   Print Form

Ministry of Tourism,
Culture and Sport

Programs & Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes

A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area:
  - is a recognized heritage property
  - may be of cultural heritage value
- it includes all areas that may be impacted by project activities, including – but not limited to:
  - the main project area
  - temporary storage
  - staging and working areas
  - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Cultural Heritage Evaluation Report (CHER)

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a qualified person(s) (see page 5 for definitions) to undertake a cultural heritage evaluation report (CHER).

The CHER will help you:

- identify, evaluate and protect cultural heritage resources on your property or project area
- reduce potential delays and risks to a project

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages for more detailed information and when completing this form.

Project or Property Name
York and Valley Roads Booster Pump Station (HD016) MCEA Addendum

Project or Property Location (upper and lower or single tier municipality)
The City of Hamilton

Proponent Name
The City of Hamilton

Proponent Contact Information

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	☐	☑

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

Part A: Screening for known (or recognized) Cultural Heritage Value

	Yes	No
2. Has the property (or project area) been evaluated before and found **not** to be of cultural heritage value?	☐	☑

If Yes, do **not** complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Is the property (or project area):		
a. identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value?	☐	☑
b. a National Historic Site (or part of)?	☐	☑
c. designated under the *Heritage Railway Stations Protection Act*?	☐	☑
d. designated under the *Heritage Lighthouse Protection Act*?	☐	☑
e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)?	☐	☑
f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?	☐	☑

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.

Part B: Screening for Potential Cultural Heritage Value

	Yes	No
4. Does the property (or project area) contain a parcel of land that:		
a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?	☐	☑
b. has or is adjacent to a known burial site and/or cemetery?	☐	☑
c. is in a Canadian Heritage River watershed?	☐	☑
d. contains buildings or structures that are 40 or more years old?	☑	☐

Part C: Other Considerations

	Yes	No
5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):		
a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?	☐	☑
b. has a special association with a community, person or historical event?	☐	☑
c. contains or is part of a cultural heritage landscape?	☐	☑

If Yes to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
  - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

For more information, see the Ministry of Tourism, Culture and Sport's Ontario Heritage Toolkit or Standards and Guidelines for Conservation of Provincial Heritage Properties.

In this context, the following definitions apply:

- **qualified person(s)** means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may already be in place for identifying potential cultural heritage resources, including:

- one endorsed by a municipality
- an environmental assessment process e.g. screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport (MTCS) under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s.B.2.]

Part A: Screening for known (or recognized) Cultural Heritage Value

2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

Respond 'yes' to this question, if all of the following are true:

A property can be considered not to be of cultural heritage value if:

- a Cultural Heritage Evaluation Report (CHER) - or equivalent - has been prepared for the property with the advice of a qualified person and it has been determined not to be of cultural heritage value and/or
- the municipal heritage committee has evaluated the property for its cultural heritage value or interest and determined that the property is not of cultural heritage value or interest

A property may need to be re-evaluated, if:

- there is evidence that its heritage attributes may have changed
- new information is available
- the existing Statement of Cultural Heritage Value does not provide the information necessary to manage the property
- the evaluation took place after 2005 and did not use the criteria in Regulations 9/06 and 10/06

Note: Ontario government ministries and public bodies [prescribed under Regulation 157/10] may continue to use their existing evaluation processes, until the evaluation process required under section B.2 of the Standards & Guidelines for Conservation of Provincial Heritage Properties has been developed and approved by MTCS.

To determine if your property or project area has been evaluated, contact:

- the approval authority
- the proponent
- the Ministry of Tourism, Culture and Sport

3a. Is the property (or project area) identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value e.g.:

i. designated under the *Ontario Heritage Act*

- individual designation (Part IV)
- part of a heritage conservation district (Part V)

Individual Designation – Part IV

A property that is designated:

- by a municipal by-law as being of cultural heritage value or interest [s.29 of the *Ontario Heritage Act*]
- by order of the Minister of Tourism, Culture and Sport as being of cultural heritage value or interest of provincial significance [s.34.5]. **Note**: To date, no properties have been designated by the Minister.

Heritage Conservation District – Part V

A property or project area that is located within an area designated by a municipal by-law as a heritage conservation district [s. 41 of the *Ontario Heritage Act*].

For more information on Parts IV and V, contact:

- municipal clerk
- Ontario Heritage Trust
- local land registry office (for a title search)

---

ii. subject of an agreement, covenant or easement entered into under Parts II or IV of the *Ontario Heritage Act*

An agreement, covenant or easement is usually between the owner of a property and a conservation body or level of government. It is usually registered on title.

The primary purpose of the agreement is to:

- preserve, conserve, and maintain a cultural heritage resource
- prevent its destruction, demolition or loss

For more information, contact:

- Ontario Heritage Trust - for an agreement, covenant or easement [clause 10 (1) (c) of the *Ontario Heritage Act*]
- municipal clerk – for a property that is the subject of an easement or a covenant [s.37 of the *Ontario Heritage Act*]
- local land registry office (for a title search)

---

iii. listed on a register of heritage properties maintained by the municipality

Municipal registers are the official lists - or record - of cultural heritage properties identified as being important to the community.

Registers include:

- all properties that are designated under the *Ontario Heritage Act* (Part IV or V)
- properties that have not been formally designated, but have been identified as having cultural heritage value or interest to the community

For more information, contact:

- municipal clerk
- municipal heritage planning staff
- municipal heritage committee

---

iv. subject to a notice of:

- intention to designate (under Part IV of the *Ontario Heritage Act*)
- a Heritage Conservation District study area bylaw (under Part V of the *Ontario Heritage Act*)

A property that is subject to a **notice of intention to designate** as a property of cultural heritage value or interest and the notice is in accordance with:

- section 29 of the *Ontario Heritage Act*
- section 34.6 of the *Ontario Heritage Act.* **Note**: To date, the only applicable property is Meldrum Bay Inn, Manitoulin Island. [s.34.6]

An area designated by a municipal by-law made under section 40.1 of the *Ontario Heritage Act* as a **heritage conservation district study area**.

For more information, contact:

- municipal clerk – for a property that is the subject of notice of intention [s. 29 and s. 40.1]
- Ontario Heritage Trust

v. included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties

Provincial heritage properties are properties the Government of Ontario owns or controls that have cultural heritage value or interest.

The Ministry of Tourism, Culture and Sport (MTCS) maintains a list of all provincial heritage properties based on information provided by ministries and prescribed public bodies. As they are identified, MTCS adds properties to the list of provincial heritage properties.

For more information, contact the MTCS Registrar at registrar@ontario.ca.

3b. Is the property (or project area) a National Historic Site (or part of)?

National Historic Sites are properties or districts of national historic significance that are designated by the Federal Minister of the Environment, under the *Canada National Parks Act*, based on the advice of the Historic Sites and Monuments Board of Canada.

For more information, see the National Historic Sites website.

3c. Is the property (or project area) designated under the *Heritage Railway Stations Protection Act*?

The *Heritage Railway Stations Protection Act* protects heritage railway stations that are owned by a railway company under federal jurisdiction. Designated railway stations that pass from federal ownership may continue to have cultural heritage value.

For more information, see the Directory of Designated Heritage Railway Stations.

3d. Is the property (or project area) designated under the *Heritage Lighthouse Protection Act*?

The *Heritage Lighthouse Protection Act* helps preserve historically significant Canadian lighthouses. The Act sets up a public nomination process and includes heritage building conservation standards for lighthouses which are officially designated.

For more information, see the Heritage Lighthouses of Canada website.

3e. Is the property (or project area) identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office?

The role of the Federal Heritage Buildings Review Office (FHBRO) is to help the federal government protect the heritage buildings it owns. The policy applies to all federal government departments that administer real property, but not to federal Crown Corporations.

For more information, contact the Federal Heritage Buildings Review Office.

See a directory of all federal heritage designations.

3f. Is the property (or project area) located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?

A UNESCO World Heritage Site is a place listed by UNESCO as having outstanding universal value to humanity under the Convention Concerning the Protection of the World Cultural and Natural Heritage. In order to retain the status of a World Heritage Site, each site must maintain its character defining features.

Currently, the Rideau Canal is the only World Heritage Site in Ontario.

For more information, see Parks Canada – World Heritage Site website.

Part B: Screening for potential Cultural Heritage Value

4a. Does the property (or project area) contain a parcel of land that has a municipal, provincial or federal commemorative or interpretive plaque?

Heritage resources are often recognized with formal plaques or markers.

Plaques are prepared by:

- municipalities
- provincial ministries or agencies
- federal ministries or agencies
- local non-government or non-profit organizations

For more information, contact:

- municipal heritage committees or local heritage organizations – for information on the location of plaques in their community
- Ontario Historical Society's Heritage directory – for a list of historical societies and heritage organizations
- Ontario Heritage Trust – for a list of plaques commemorating Ontario's history
- Historic Sites and Monuments Board of Canada – for a list of plaques commemorating Canada's history

4b. Does the property (or project area) contain a parcel of land that has or is adjacent to a known burial site and/or cemetery?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulations, Ontario Ministry of Consumer Services – for a database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, adjacent means contiguous or as otherwise defined in a municipal official plan.

4c. Does the property (or project area) contain a parcel of land that is in a Canadian Heritage River watershed?

The Canadian Heritage River System is a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage.

Canadian Heritage Rivers must have, and maintain, outstanding natural, cultural and/or recreational values, and a high level of public support.

For more information, contact the Canadian Heritage River System.

If you have questions regarding the boundaries of a watershed, please contact:

- your conservation authority
- municipal staff

4d. Does the property (or project area) contain a parcel of land that contains buildings or structures that are 40 or more years old?

A 40 year 'rule of thumb' is typically used to indicate the potential of a site to be of cultural heritage value. The approximate age of buildings and/or structures may be estimated based on:

- history of the development of the area
- fire insurance maps
- architectural style
- building methods

Property owners may have information on the age of any buildings or structures on their property. The municipality, local land registry office or library may also have background information on the property.

Note: 40+ year old buildings or structure do not necessarily hold cultural heritage value or interest; their age simply indicates a higher potential.

A building or structure can include:

- residential structure
- farm building or outbuilding
- industrial, commercial, or institutional building
- remnant or ruin
- engineering work such as a bridge, canal, dams, etc.

For more information on researching the age of buildings or properties, see the Ontario Heritage Tool Kit Guide Heritage Property Evaluation.

Part C: Other Considerations

5a. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has potential landmarks or defining structures and sites, for instance:

- buildings or landscape features accessible to the public or readily noticeable and widely known
- complexes of buildings
- monuments
- ruins

5b. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) has a special association with a community, person or historical event?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has a special association with a community, person or event of historic interest, for instance:

- Aboriginal sacred site
- traditional-use area
- battlefield
- birthplace of an individual of importance to the community

5c. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) contains or is part of a cultural heritage landscape?

Landscapes (which may include a combination of archaeological resources, built heritage resources and landscape elements) may be of cultural heritage value or interest to a community.

For example, an Aboriginal trail, historic road or rail corridor may have been established as a key transportation or trade route and may have been important to the early settlement of an area. Parks, designed gardens or unique landforms such as waterfalls, rock faces, caverns, or mounds are areas that may have connections to a particular event, group or belief.

For more information on Questions 5.a., 5.b. and 5.c., contact:

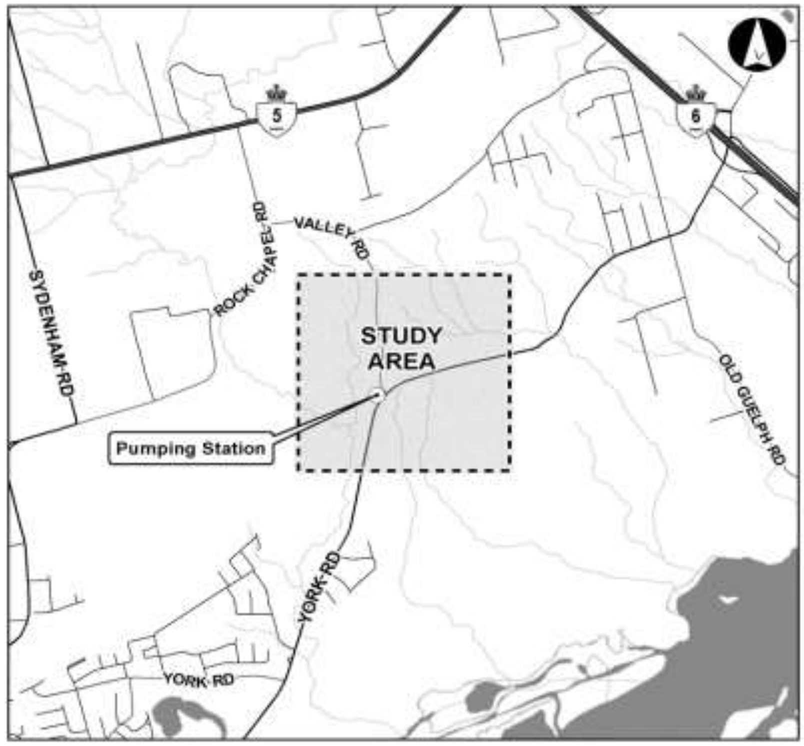
- Elders in Aboriginal Communities or community researchers who may have information on potential cultural heritage resources. Please note that Aboriginal traditional knowledge may be considered sensitive.
- municipal heritage committees or local heritage organizations
- Ontario Historical Society's "Heritage Directory" - for a list of historical societies and heritage organizations in the province

An internet search may find helpful resources, including:

- historical maps
- historical walking tours
- municipal heritage management plans
- cultural heritage landscape studies
- municipal cultural plans

Information specific to trails may be obtained through Ontario Trails.

Notice of Addendum Completion
York & Valley Road (HD016) Booster Water Pumping Station
Municipal Class Environmental Assessment Addendum



In 2006, the City of Hamilton completed the Water and Wastewater Master Plan Class Environmental Assessment (EA) for the lake-based systems. This study recommended a Schedule 'B' project be implemented for the York & Valley Road (HD016) Booster Water Pumping Station which included station upgrades to increase the pumping capacity to meet growth demands. This Booster Water Pumping Station is located adjacent to the Borer's Falls "Off Leash" Park in Ward 13 and it services the community of Waterdown in Ward 15.

Due to a lapse of time since filling the 2006 Water and Wastewater Master Plan Project File Report for public review, a Class EA Addendum has been completed to review the planning process to ensure that the project and mitigating measures are still valid given the current planning context. The preferred solution is to upgrade pumping capacity by expanding the HD016 pumping station within City property.

The Addendum Process

The Addendum study follows the planning and design process as defined in the Municipal Engineers Association Municipal Class Environmental Assessment document (October 2000, as amended in 2007, 2011 & 2015).

Public Review Period

An EA Addendum report will be filed for public review where those who are interested in the proposed changes are welcome to comment on the planning and decision-making process since the filing of the 2006 EA. The Addendum report is available for public comment for a period of 30 calendar days starting on September 22, 2022 and ending on October 21, 2022.

To facilitate review of the Addendum, the report will be available on the City's website: www.hamilton.ca/yorkvalleystationEA and at the following locations during regular business hours:

- **Location #1**
  Office of the City Clerk
  71 Main Street West
  City Hall, 1st Floor
  Hamilton, ON L8R 4Y5
  (905) 546-CITY
- **Location #2**
  Public Works Department
  100 King Street West, 2nd Floor
  Hamilton, ON L8P 1A2
  (905) 546-CITY
- **Location #3**
  Dundas Library
  18 Ogilvie Street
  Dundas, ON L9H 2S2
  (905) 546-3200

Notice of Addendum Completion
York & Valley Road (HD016) Booster Water Pumping Station
Municipal Class Environmental Assessment Addendum

Public Comment Process

After reviewing the EA Addendum report, if you have questions or concerns regarding this project, please contact the following staff:

- Trevor Marks
  Senior Project Manager, City of Hamilton
  100 King Street West
  Hamilton, ON L8P 1A2
  Phone: 905-546-2424 ext. 6025
  Email: Trevor.Marks@hamilton.ca

If concerns regarding this project cannot be resolved in discussion with the City of Hamilton, a request may be made to the Ministry of the Environment, Conservation and Parks for an order requiring a higher level of study (i.e., requiring an individual/ comprehensive Environmental Assessment approval before being able to proceed), or that conditions be imposed (e.g., require further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered. Requests should include the requester contact information and full name. Please visit the ministry's website for more information on requests for orders under Section 16 of the Environmental Assessment Act at: www.ontario.ca/page/class-environmental-assessments-section-16-order.

The request should be sent in writing or by email by October 21, 2022 to both ministry contacts below and a copy must also be sent to the City of Hamilton Clerk as well as the Project Manager listed above.

- **Minister of the Environment, Conservation and Parks**
  Ministry of Environment,
  Conservation and Parks
  777 Bay Street, 5th Floor
  Toronto ON M7A 2J3
  minister.mecp@ontario.ca

- **Director, Environmental Assessment Branch**
  Ministry of Environment,
  Conservation and Parks
  135 St. Clair Avenue West, 1st Floor
  Toronto, Ontario M4V 1P5
  EABDirector@ontario.ca

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 be become part of the public record.

If you have any accessibility requirements to participate, please call 905-546-2424 Ext. 6025. Advance requests are encouraged to enable us to meet your needs adequately.

This Notice issued September 15, 2022 and September 22, 2022.

RESPONSE FORM
City of Hamilton
York & Valley Road (HD016) Booster Pumping Station
Municipal Class Environmental Assessment Addendum

Contact Name: ____

Ministry/Agency/Office: ______________________________________

Address: ____

Postal Code: ________________________

Phone No.: __________________________

Email: ______________________________

Please note specific comments and/or concerns (please attach additional sheets ifnecessary):

____

____

____

____

____

5. Do you wish to be notified for continued involvement in the project process, up to and including project implementation? Yes __________ No _________

Signature ___________________________ Date ________________

Please return this form to:

Trevor Marks
Project Manager
City of Hamilton
100 King Street West, 9th Floor
Hamilton, ON L8P 1A2
Phone: 905-546-2424 ext. 6025
Email: Trevor.Marks@hamilton.ca

Samantha Zandvliet
Environmental Planner
AECOM
201 – 45 Goderich Road
Hamilton, ON L8E 4W8
Phone: 905-578-3040
Email: Samantha.Zandvliet@aecom.com

Thank you for your participation in this study.

York & Valley Road (HD016) Booster Water Pumping Station

Municipal Class Environmental Assessment Addendum

Online Public Information Centre

April 28, 2022

York & Valley Road (HD016) Booster Water Pumping Station Needs

- Upgrade to 28 ML/d Firm Capacity to support Pressure Districts 16 and 24 (Waterdown Community)
- Add redundant systems for improved maintenance and reliability
- Replace aging equipment assets
- New permanent standby generator
- Update station design for improved health and safety
- New roof
- Improve driveway access for large vehicles, winter maintenance.

Why this Study?

- A Municipal Class Environmental Assessment (MCEA) Addendum for the York & Valley Road (HD016) Booster Water Pumping Station is being completed to update the previously obtained Schedule B EA that was completed via the City's 2006 Water and Wastewater Master Plan MCEA study
- Due to a lapse of time since the initial EA, an Addendum has been initiated to review the planning process for expansion of the station to meet the current demand projections.

Municipal Class Environmental Assessment Planning Process

- This addendum involves reviewing the Schedule B planning process (Phases 1, 2 and 5 apply) followed from the 2006 Master Plan to ensure that the project and the mitigating measures are still valid

WE ARE HERE!

Phase 1: Problem Or Opportunity Statement

Problem:

- Significant near and long-term growth is expected within the Waterdown settlement area. The City's 2006 Water and Wastewater Master Plan ("the Master Plan") followed the MCEA Master Plan Approach # 2 planning process and confirmed the need to increase the pumping capacity of the "York and Valley Road" Pumping Station (HD016) along with upgraded standby power to meet planned growth to 2031 and address security of supply
- The proposed pumping station capacity increase was confirmed as a Schedule B MCEA project and was approved through the 2006 Water Master Plan. The 2006 Municipal Class Environmental Assessment recommended a firm capacity of 20.4 ML/d in 2031, however updated planning values estimate a required 28 ML/d firm capacity
- The York and Valley Roads (HD016) Pumping Station is located adjacent to the Borer's Falls Off Leash Dog Park and requires careful consideration on how the proposed upgrades are designed and constructed. This considers that the "small dog" leash free area is part of the pumping station property, which is required to construct the proposed upgrades
- Recognizing the MCEA manual 10 Year Lapse of Time and that construction has not started within 10 years of the Master Plan filing in 2006 the City is required to complete a MCEA Addendum that will include a review of the planning and design process of the pumping station upgrade project as presented in the 2006 Master Plan in light of what has changed since 2006

Problem (Continued)

- There are also operational concerns as the York and Valley Roads (HD016) Pumping Station is a critical to the Waterdown community and various pressure zones in the area. The City has also carried out condition assessments that have identified the need to update equipment assets within the existing facility.
- Proposed design approach will maintain operation through construction and will allow immediate upgrade of the system to maintain reliability of service and improve future accommodation of maintenance activities

Opportunity:

- Complete the MCEA Addendum planning process in consultation with key stakeholders, review agencies, Indigenous Communities and the public that will confirm the preferred solution and design concept for the proposed pumping station upgrades to meet the anticipated 2027 in-service date
- Coordinate the HD016 Pumping Station planning and design process with the current City of Hamilton Waterdown Feedermain Twinning Municipal Class Environmental Assessment study (upgraded HD016 Pumping Station will include a chamber for new feedermain)
- Confirm preferred design approach that will maintain operation through construction and will allow immediate upgrade of the system to maintain reliability of service and improve future accommodation of maintenance

Existing Conditions – Technical Environment

- Small pumping station property with existing constraints, including being located within a utility corridor
- Unique pumping requirements
  - ÅStation lifts water up to the Escarpment where Waterdown is located
  - ÅSupplies pressure district (PD) 016 in the community of Waterdown and adjacent PD019, PD020, and PD024
- The existing pumping station must continue to run during construction
- The station will include a connection to the future Waterdown Trunk Watermain Twinning. A separate Municipal Class Environment Assessment process is underway for the watermain component as noted on a previous slide.

Large Dog Park

Small Dog Park

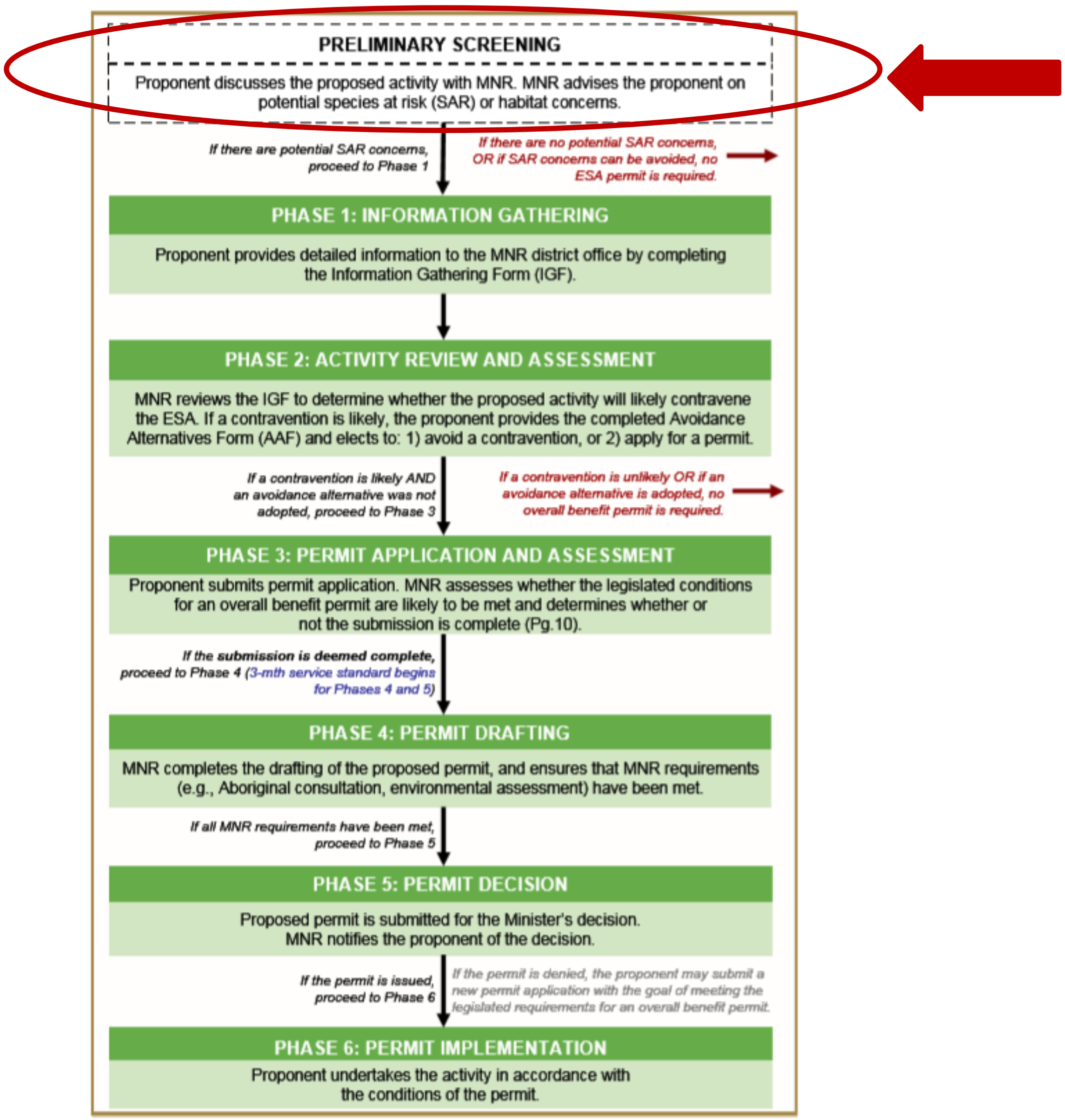
Existing Conditions – Land Use

- The Study Area is located within the City of Hamilton Rural Official Plan area
- Adjacent land uses around the station include:
  - Single family residential to the north
  - Royal Botanical Gardens lands – Barry Tract South / York Road Acreage Conservation Area to the northeast and southeast
  - Borer’s Falls “Off Leash” Park and Niagara Escarpment Development Control Area immediately to the west of the pumping station. The dog park includes a fenced area for both large dogs and smaller dogs
- Ray Lowes side trail extends southerly from the current parking lot at Borer’s Falls Dog Park where it provides access to the Borer’s Falls Conservation Area

1.0

1.3 Background and Context

To receive advice on their proposed activity, clients must first determine whether any species at risk or their habitat exist or are likely to exist at or near their proposed activity, and whether their proposed activity is likely to contravene the ESA. Once this step is complete, clients may contact the ministry at SAROntario@ontario.ca to discuss the main purpose, general methods, timing and location of their proposed activity as well as information obtained about species at risk and their habitat at, or near, the site. At this stage, the ministry can provide advice and guidance to the client about potential species at risk or habitat concerns, measures that the client is considering to avoid adverse effects on species at risk or their habitat and whether additional field surveys are advisable. This is referred to as the "Preliminary Screening" stage. For more information on additional phases in the diagram below, please refer to the *Endangered Species Act Submission Standards for Activity Review and 17(2)(c) Overall Benefit Permits* policy available online at https://www.ontario.ca/page/species-risk-overall-benefit-permits. Please note: any reference to MNR in the diagram is replaced by MECP.



2.0 Roles and Responsibilities

To provide the most efficient service, clients should initiate species at risk screenings and seek information from all applicable information sources identified in this guide prior to contacting Government of Ontario ministry offices for further information or advice.

Step 1: Client seeks information regarding species at risk or their habitat that exist, or are likely to exist, at or near their proposed activity by referring to all applicable information sources identified in this guide.

Step 2: Client reviews and consider guidance on whether their proposed activity is likely to contravene the ESA (see section 3.4 of this guide for guidance on what to consider).

Step 3: Client gathers information identified in the checklist in section 4 of this guide.

Step 4: Client contacts the ministry at SAROntario@ontario.ca to discuss their preliminary screening. Ministry staff will ask the client questions about the main purpose, general methods, timing and location of their proposed activity as well as information obtained about species at risk and their habitat at, or near, the site. Ministry staff will also ask the client for their interpretation of the impacts of their activity on species at risk or their habitat as well as measures the client has considered to avoid any adverse impacts.

Step 5: Ministry staff will provide advice on next steps.

Option A: Ministry staff may advise the client they can proceed with their activity without an authorization under the ESA where the ministry is confident that:

- no protected species at risk or habitats are likely to be present at or near the proposed location of the activity; or
- protected species at risk or habitats are known to be present but the activity is not likely to contravene the ESA; or
- through the adoption of avoidance measures, the modified activity is not likely to contravene the ESA.

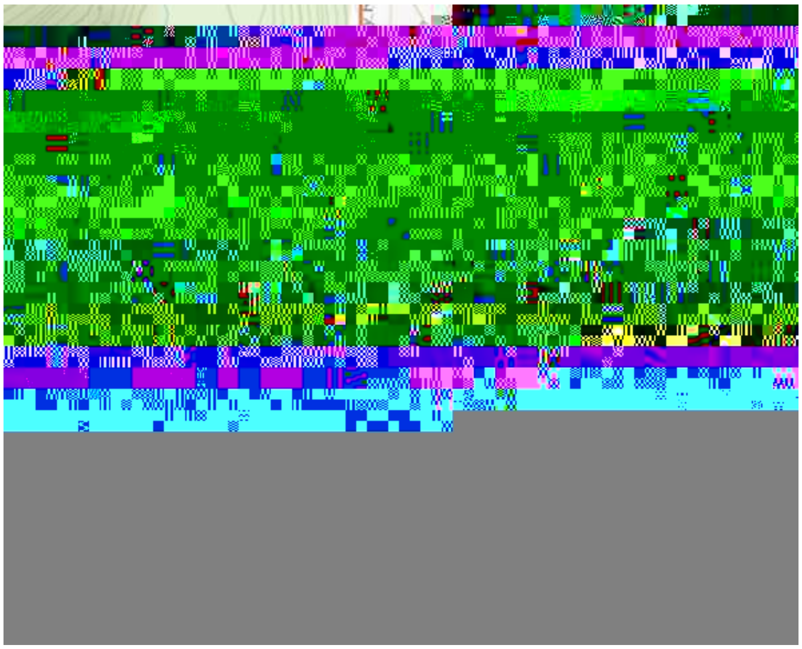
Option B: Ministry staff may advise the client to proceed to Phase 1 of the overall benefit permitting process (i.e. Information Gathering in the previous diagram), where:

- there is uncertainty as to whether any protected species at risk or habitats are present at or near the proposed location of the activity; or
- the potential impacts of the proposed activity are uncertain; or
- ministry staff anticipate the proposed activity is likely to contravene the ESA.

From: Marks, Trevor <Trevor.Marks@hamilton.ca>
Sent: May 25, 2022 2:25 PM
To: Leah Smith <leahsmith@hrca.on.ca>; Kellie McCormack <kmccormack@hrca.on.ca>
Cc: Zandvliet, Samantha <Samantha.Zandvliet@aecom.com>
Subject: Notice of an EA Addendum and PICr York & Valley Road Booster Pumping Station Upgrades MCEAr HCRA

Good Afternoon Leah, and Kellie,

Last month I sent a notice of EA Addendum and PIC for a pumping station project at 501 York Road, in Dundas which is adjacent to land identified in the HCRA basemap (owned by the RBG) at the intersection with Valley Road:



I realized afterward you were not on the distribution list so I have attached the notification email for your reference. Please accept my apologies for missing you in this correspondence. The addendum PIC material is posted on the City's website at the following link: York & Valley Road (HD016) Booster Pumping Station Capacity Upgrades EA | City of Hamilton, Ontario, Canada.

In summary, the station is need of upsizing and updating. The preferred solution is simply to expand the existing station within City property. This represents the lowest impact to the environment, and lowest cost as we would not have to purchase land or rerroute large water mains. In following the MEA guidelines for new structures we are completing an addendum to a Schedule B EA (due to a lapse in time). This requires an assessment of alternatives and as such our consultant, AECOM, has selected two nearby plots of land in which a new pumping station could feasibly be built from a technical perspective – please see attached pdf "MAPr20220215rAlternativesr60656498" for reference. Of note we contacted representatives at the Royal Botanical Gardens, Hamilton Conservation Authority, and the Niagara Escarpment Commission among many other provincial, and utility councils. We have received an acknowledgment from the Royal Botanical Gardens but have not received any other comments from the various groups or members of the public regarding the EA addendum. In short, due to the lack of opposition to the preferred solution we plan to move forward with plans to expand the station within City property. This will require approval from Hamilton City Council to commence with the 30rday review period to finalize the study. If granted this will take place through July and August with EA completion following shortly thereafter.

With that said, I am more than happy to discuss any questions or concerns you may have. Please reach out to me via email and we can set up a call with our consultant (AECOM Ltd.) to provide you with an overview with Q&A if desired. We have added you to the correspondence list so you will receive notifications moving forward.

Regards,

Trevor Marks
Senior Project Manager
Public Works
Hamilton Water, City of Hamilton
(905) 546-2424 Ext.6025

The City of Hamilton encourages physical distancing, wearing a mask in an enclosed public space, and increased handwashing. Learn more about the City's response to COVID-19 www.hamilton.ca/coronavirus

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Indigenous Community/ Organization	Date	Consultation Activity	Method	Action Items
Haudenosaunee Development Institute (HDI) for the Haudenosaunee Confederacy of Chiefs Council (HCCC)	April 1, 2022	Outgoing – Notice of Addendum Commencement and Public Information Centre	Email	• No action items
	April 11, 2022	Outgoing – Follow up on receipt of Notice of Addendum Commencement and Public Information Centre	Phone	• Confirmed receipt of notice • City to follow up prior to undertaking of the Stage 2 archaeological assessment
	September 2022	Outgoing – Notice of Addendum Completion	Email	
Métis Nation of Ontario	April 1, 2022	Outgoing – Notice of Addendum Commencement and Public Information Centre	Email	• No action items
	May 9, 2022	Outgoing – Follow up on receipt of Notice of Addendum Commencement and Public Information Centre	Phone	• Left voice mail message
	September 2022	Outgoing – Notice of Addendum Completion	Email	
Six Nations Land and Resources Department, Land Use Unit for the Six Nations of the Grand River Elected Council (SNEC)	April 1, 2022	Outgoing – Notice of Addendum Commencement and Public Information Centre	Email	• No action items
	April 1, 2022	Incoming – Confirmed receipt of Notice of Addendum Commencement and Public Information Centre	Email	• No action items
	September 2022	Outgoing – Notice of Addendum Completion	Email	• No action items

Indigenous Community/ Organization	Date	Consultation Activity	Method	Action Items
Huron Wendat First Nation at Wendake	April 1, 2022	Outgoing – Notice of Addendum Commencement and Public Information Centre	Email	• No action items
	April 1, 2022	Incoming – Requested participation in the Stage 2 archaeological assessment	Email	• City to follow up prior to undertaking of the Stage 2 archaeological assessment
	September 2022	Outgoing – Notice of Addendum Completion	Email	
Mississaugas of the Credit First Nation (MCFN)	April 11, 2022	Outgoing – Notice of Addendum Commencement and Public Information Centre	Email	• No action items
	May 9, 2022	Outgoing – Follow up on receipt of Notice of Addendum Commencement and Public Information Centre	Phone	• Left voice mail message
	September 2022	Outgoing – Notice of Addendum Completion	Email	