

Appendix A

Technical Memorandum # 1 – Phase 1 Problem/Opportunity

Municipal Class Environmental Assessment and Conceptual Design

Technical Memorandum #1 - Phase 1 Problem or Opportunity

Main & Whitney (HD17A) Water Pumping Station City of Hamilton, ON



Prepared for the City of Hamilton
By Arcadis Professional Services (Canada) Inc.
300-2620 Bristol Circle, Oakville ON L6H 6Z7 Canada | www.arcadis.com

October 2023



Arcadis Professional Services (Canada) Inc.
300 - 2620 Bristol Circle
Oakville ON L6H 6Z7

October 31, 2023

Reference No. 136546

Udo Ehrenberg., P.Eng.
Senior Project Manager, Water Planning
Project Manager, Water & Wastewater Planning
Public Works Department Hamilton Water Division
City of Hamilton
100 King St W, 9th Floor
Hamilton, ON L8P 1A2

Dear Mr. Ehrenberg:

Re: Main & Whitney (HD17A) Water Pumping Station Municipal Class Environmental Assessment and Conceptual Design

Technical Memorandum #1 - Phase 1 Problem or Opportunity

Arcadis Professional Services (Canada) Inc. (Arcadis) was retained by the City of Hamilton to prepare Technical Memorandum #1 (TM #1) as part of the Main & Whitney (HD17A) Water Pumping Station Municipal Class Environmental Assessment and Conceptual Design study.

This project is classified as a Schedule B and is being undertaken in accordance with the planning process outlined in the Municipal Engineers Association Municipal Class Environmental Assessment document (March 2023).

Should you have any questions or require additional information, please feel free to contact us.

Yours truly,

Arcadis Professional Services (Canada) Inc.

Shelley Kuan, P.Eng.
Project Manager

For

Margaret Parkhill, P.Eng.
Public Facilitator and Class EA Planner

c.: Philip Gray and Shveta Shukla - Arcadis

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ORIGINATOR:	Shelley Kuan, P.Eng., Associate – Practice Lead, Hydraulic & Modelling, Project Manager Shveta Shukla, B.E.S., Environmental Planner	
REVIEWER:	Margaret Parkhill, P.Eng., Director – Sr. Practice Lead, Transportation Engineering Public Facilitator and Class EA Planner	
AUTHORIZATION:	Philip Gray, PE, P.Eng., Associate Director Practice Lead, Infrastructure Planning	
CIRCULATION LIST:	Udo Ehrenberg, P.Eng., Senior Project Manager, City of Hamilton, Public Works Department, Hamilton Water	
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1 Introduction

The City of Hamilton is planning to construct a new Water Pumping Station (WPS) to replace the existing Main Street West and Whitney Avenue Water Pumping Station (HD17A WPS) which is located in the west end of Hamilton. HD17A WPS was originally built in 1968 and draws water from the PD2 and provides booster capability to maintain water pressure in Pressure District 17 (PD17).

The need for a new WPS was documented in the facility Condition Assessment (CA) Report (WSP, October 2012), which indicated the existing HD17A WPS to be in a fair to poor state of repair and is beyond its recommended useful life and requires substantial rehabilitation. Based on the age, level of deterioration and deficiencies and confined space nature of a below grade water pumping station, construction of a new above ground pumping station was recommended to replace the existing HD17A WPS.

To support the project goal of a new WPS, the following project objectives have been defined:

- Complete a Municipal Class Environmental Assessment (Class EA) to determine a preferred location and alternative for the new WPS to replace the existing HD17A WPS to allow the City to proceed with acquiring the needed land and/or easements.
- Prepare a conceptual design for the new WPS.
- Prepare a retirement/decommissioning plan for the existing station (HD17A WPS).
- Assist the City in responding to any Section 16 Order requests (previously known as a Part II Order).

This Technical Memorandum #1 (TM #1) explains the Class EA approach to be followed for this project, identifies the project Class EA Study Area, defines the problem/opportunity statement, and examines the existing conditions that may affect the selection of the preferred site for the new WPS. The information presented in this document corresponds to Phase 1 of the Class EA process.

2 Municipal Class Environmental Assessment Process

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

The Municipal Class Environmental Assessment (MCEA) process was developed by the Municipal Engineers Association (MEA) as an alternative to individual Environmental Assessments for recurring municipal projects that were similar in nature, usually limited in scale, and with a predictable range of environmental effects which were responsive to mitigating measures.

The MCEA process applies to municipal infrastructure projects including roads, water and wastewater projects, etc. This study is to address Phase 1 and Phase 2 of the Municipal Class EA process and include a stakeholder consultation plan. **Figure 2-1** illustrates the Class EA planning flowchart.

The Municipal Class EA Study, through identification and evaluation of alternative solutions and consultation with the affected property owners, public and applicable regulatory review agencies, will determine the most cost effective and best overall solution.

The study is proceeding in accordance with the Municipal Class EA process as set out by the Municipal Engineers Association (March 2023).

This project began in late 2021 and initially followed the Municipal Class EA process in accordance with Environmental Assessment Act as per the MCEA documents, October 2000, as amended in 2007, 2011 and 2015. Projects subject to the Municipal Class EA process are classified into one of four types or “schedules” depending on the anticipated level of environmental impact and for some projects, the anticipated construction costs.

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 MCEA

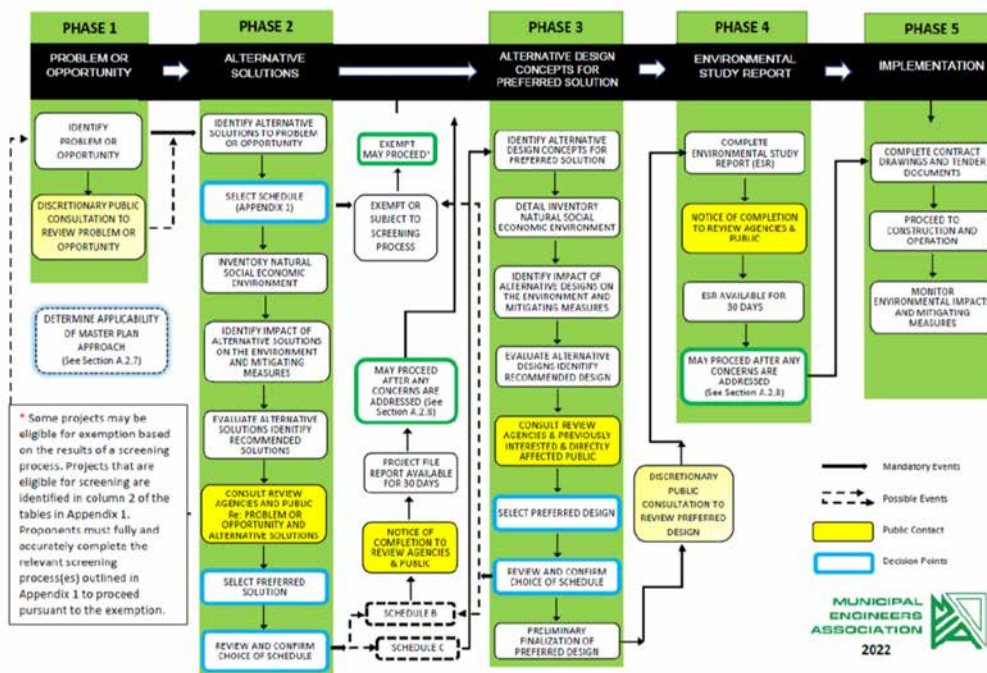


Figure 2-1 Municipal Class EA Process

The project activities/schedules for the subject Study were re-visited with the release of new guidance in March 2023. The MCEA Companion Guide (October 2000, as amended in 2007, 2011 & 2015) and MECA Amendment 2023 documents are listed below:

MECA DOCUMENTS	ACTIVITIES/SCHEDULES	
A) Retirement/decommissioning of Existing HD17A WPS		
Amended in 2015	<i>"Retire a water facility which would have been planned under Schedule A or Schedule A+ of the Municipal Class EA for its establishment"</i> (Project list for Municipal Water and Wastewater Projects included in Appendix 1 of the MCEA document, Project 2 on page 1-13).	The retirement/ decommissioning of the existing station WPS PD17A, which is therefore considered Schedule A+ (pre-approved). The public will be advised prior to the implementation (Phase 5) for the existing HD17A WPS.
Amended in 2023	<i>"Retire any water infrastructure facility (see Glossary for definition of Retirement)"</i> is categorized as exempt project. (Project list for Municipal Water and Wastewater Projects included in Appendix 1 of the MCEA document, Project 7 on Page 177) <i>"Retirement means the taking out of operation, abandonment, removal, demolition or disposal of a road, bridge, sewage, stormwater management or water facility for which approval under the EAA would have been necessary for its establishment and includes sale, lease, or other transfer of the facility for</i>	The retirement/ decommissioning of the existing station WPS PD17A is categorized as exempt project from EAA and will proceed directly without further study, as described in the MCEA 2023 Amendment.

MECA DOCUMENTS	ACTIVITIES/SCHEDULES
	<i>purposes of taking out of operation, abandonment, removal, demolition or disposal</i>" (Glossary on Page 18) <i>"Except Project means an undertaking which is exempt from the EAA</i> (Glossary on Page 14)
B) Construction of a new water pumping station for PD17A	
Amended in 2015	<i>"Establish, extend or enlarge a water distribution system and all works necessary to connect the system to an existing system or water source, where such facilities are not in either an existing road allowance or an existing utility corridor"</i> (Project list for Municipal Water and Wastewater Projects included in Appendix 1 of the MCEA document, Project 1 on page 1-16); or, <i>"Increase pumping station capacity by adding or replacing equipment and appurtenances where new equipment is located in a new building or structure"</i> (Project list for Municipal Water and Wastewater Projects included in Appendix 1 of the MCEA document, Project 4 on page 1-16).
Amended in 2023	<i>"Establish, extend or enlarge a water distribution system and all works necessary to connect the system to an existing system or water source, where such facilities are not in either an existing road allowance or an existing utility corridor"</i> (Project list for Municipal Water and Wastewater Projects included in Appendix 1 of the MCEA document Project 4c on Page 176); or, <i>"Increase pumping station capacity where new equipment is located in a new building or structure and the new building or structure would be located outside the existing pumping station site"</i> (Project list for Municipal Water and Wastewater Projects included Appendix 1: Project 23c on Page 180).

In addition, according to Table of Contents (Page 6) of MECA 2023 Amendment: *"These projects, most of which were formerly classified as Schedule A and A+ projects, include various municipal maintenance, operational activities, rehabilitation works, minor reconstruction or replacement of existing facilities, and new facilities that are limited in scale and have minimal adverse effects on the environment. These projects are exempt from the requirements of the Environmental Assessment Act"*.

The retirement/ decommissioning of the existing station WPS PD17A will proceed directly without further study is categorized as exempt from *Environmental Assessment Act* requirements, as described in the MCEA 2023 Amendment.

According to the MCEA 2023, the new WPS is identified the same as in MECA 2015 Amendment as a Schedule 'B' project. This Class EA will include an evaluation of environmental, social and cultural conditions as well as a technical assessment of the feasibility of alternative new pumping station solutions. To meet the requirements of a Schedule B Class EA, this study will complete Phases 1 and 2 of the Municipal Class EA Process (**Figure 2-1**):

Phase 1: **Problem or Opportunity:** Identify the problems (deficiencies) or opportunities to be addressed and the needs for justification.

Phase 2: **Alternative Solutions:** Identify alternative solutions to address the problems or opportunities by taking into consideration the existing environment and establish the preferred solution taking into considering review agencies, public, stakeholder and Indigenous Communities review and input.

The specific mandatory public and agency consultation contact points and methods for Schedule B undertakings as outlines in the MCEA process is to be completed.

At the end of the Class EA process, a Project File Report must be prepared to document the planning process and made available for review by any interested person or party. To complete the Schedule B process, a Notice of Completion will be issued to Indigenous Communities, review agencies and the public and a period of at least 30 calendar days will be allowed for comment and input. The Notice will include information on requesting the Section 16 Order. If there are no concerns raised and/or no Section 16 Order requested, Phase 5 (Implementation) can be proceeded, based on the preferred solution.

3 Description of Study Area

The Study Area is initially defined for the Municipal Class EA will be used for consultation purposes and will be subject to revision. The initial Study Area is defined by the existing PD17 service area boundary plus potential alternative site locations and approximately 500-metre radius area around a potential site. At this stage, one alternative site location is HD011 WPS (Osler) and other potential sites may be identified along Main Street West. **Figure 3-1** shows the initial Study Area.

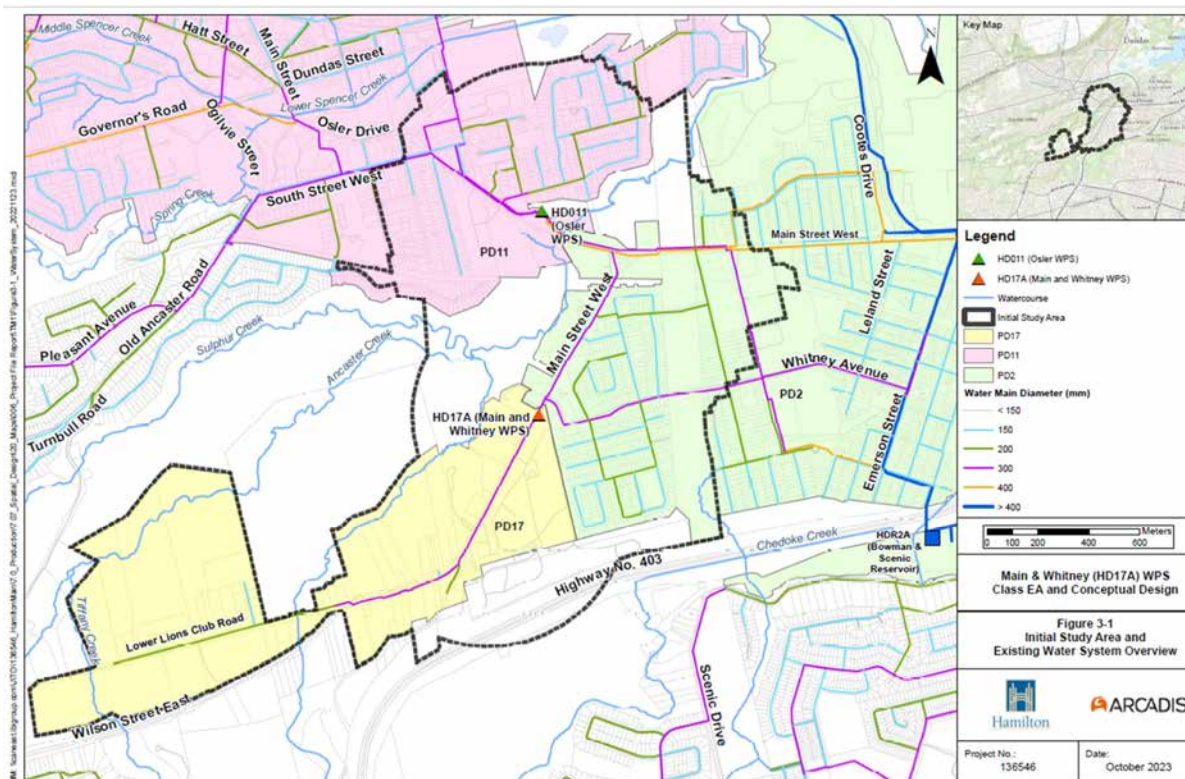


Figure 3-1 Initial Study Area and Existing Water System Overview

The initial Study Area includes the following:

- Existing Pressure District 17 (PD17) service area boundary
- Existing HD17A WPS (Main and Whitney WPS)
- Existing HD011 WPS (Osler WPS)
- Along Main Street West between Hamilton-Brantford Rail Trail and Ainslie Wood West

Together, the initial Study Area is approximately bound by Lower Spencer Creek to the north, Rifle Range Road to the east, Highway 403 to the south, and Ancaster Creek to the west.

Alternative site locations will be clearly identified in Technical Memorandum #2.

The City has been advancing a thorough, systematic approach to evaluate the water servicing option to PD17 through a facility condition assessment of the existing HD17A WPS (WSP, October 2012) and a feasibility study for a new WPS (WSP, May 2015). Three alternatives (1 to 3) including four scenarios (3A to 3D) were evaluated in this feasibility study. These are:

- Alternative 1: Status Quo: Similar to the 'do nothing' scenario which considers replacing HD17A WPS 'like-for-like'.
 - Alternative 1 was screened out as it did not meet current design standards and eliminate existing health and safety risks.
- Alternative 2: Separate Pumping Station Upgrades - upgrade HD011 WPS within the existing building at the Osler WPS site and replace the existing HD17A WPS with a new WPS at a new site near its current location.
 - Alternative 2 (separate WPS upgrades) was short-listed for further evaluation.
- Alternative 3: Combine HD011 & HD17A Pumping Stations - move HD17A WPS to the Osler site (HD011) within a new combined building to service both pressure districts. Four options (3A to 3D) for the watermain connections along Main Street West were evaluated.
 - Alternatives 3A and 3B (repurposing of existing 300 mm for water transmission to PD17) were screened out due to operation and maintenance concerns associated with Pressure Reducing Valves (PRV).
 - Alternatives 3C & 3D (combined WPS upgrades) were short-listed for further evaluation.

The previous feasibility study concluded that Alternative 2 (separate WPS upgrades) was the preferred solution, on the economic and hydraulic basis. However, the risks associated with land acquisition for Alternative 2 required further information beyond the scope of that study. The previous study recommended an investigation into the availability of suitable sites along Main Street West for the construction of a new WPS to replace the existing HD17A WPS. If a suitable site is not available, the City may choose to proceed with the design and construction of Alternative 3D (combined pumping station at the Osler HD011 WPS site).

The City indicated the recommendations of Alternative 2 (separate WPS upgrades) were partly implemented, i.e., pumping station upgrades (including pipes, pumps and electrical works) at Osler HD011 WPS were recently completed and no additional works are expected, at least in the near term, at Osler HD011 WPS.

As recommended in Alternative 2 (separate pumping station upgrades) from the previous feasibility study, the new site for HD17A WPS should be hydraulically close to the existing pumping station in order to provide for similar hydraulic conditions and minimal linear infrastructure works. Thus, the locations of the alternative sites are assumed along Main Street West between Ainslie Wood Road and south of Rail Trail for this EA study.

Through discussion, the City suggested to revisit the feasibility report's findings, including the pipeline options along Main Street West. Further, the location of the existing Osler HD011 WPS is suggested to be considered as an alternative site for the new WPS to replace HD17A WPS.

4 Pumping Capacity Design Criteria

PD17 is hydraulically a closed pressure zone and does not have floating storage. HD17A WPS draws water from PD2 and discharges to the distribution system of PD17.

The following subsections provide the level of service requirements for a pumping station and/or system performance measures based on the Ministry of the Environment, Conservation and Parks (MECP, formerly MOE) Design Guidelines for Drinking-Water Systems (2008) and the design criteria defined in the City's Water and Wastewater Master Plan (KMK, November 2006) and City's Water Outstations Design Manual (October 2020).

4.1 Water Demand

The design criteria requires that the distribution system is sized to convey the greater of peak hour demand flows or maximum day demand plus fire flows. See **Table 4.1** for the Estimated Water Demand.

Table 4.1 Estimated Water Demand for PD17

DESIGN CONDITIONS	POPULATION	EMPLOYMENT	WATER DEMAND (L/S)		
			ADD	MDD	PHD
2011	2,319	507	10	19	29
2021	2,568	574	11	21	32
2031	2,472	646	11	21	32

As per the City's Water and Wastewater Master Plan (KMK, November 2006):

- Average daily demand (Residential): 300 and 360L/capita/day
- Average daily demand (Employment): 260L/employee/day
- Maximum day peaking factor: 1.9
- Peak hour peaking factor: 3.0

4.2 Fire Flows

As per the City's fire flow requirement design guidelines policy (Staff Report PW19096), adopted by Council on November 27, 2019, the Required Fire Flow (RFF) is determined using the Ontario Building Code (OBC) Water Supply Flow Rate Calculation Method as outlined in OBC Section A-3.2.5.7 and OFM-TG-03-1999 Fire Protection Water Supply Guideline for Part 3 in the Ontario Building Code – 6.3 Building Requiring On-Site Fire Protection Water Supply and/or the City's suggested target Available Fire Flow (AFF) guidelines for the land use.

The largest fire flow is 150L/s from both guidelines (RFF from OBC method or AFF as suggested in the City guidelines), except for the industrial development, which may require a larger flow rate (e.g., 250L/s). Currently, there is no industrial development within PD17. The recent decision from the council meetings indicates there is no boundary expansion for PD17 in 2041 (or 2051) horizon. Thus, the required fire flow 150L/s is used for pumping/firm capacity design.

4.3 System Pressures

As per the City's Water and Wastewater Master Plan (KMK, November 2006):

- Minimum pressure (under peak hour demand): 275kPa (40psi)
- Minimum pressure (Maximum day demand plus fire flow): 140kPa (20psi)
- Maximum pressure: 690kPa (100psi)

4.4 Pumping Station Capacity

As per the City of Hamilton Water Outstations Design Manual (October 2020):

- Firm Capacity defined for closed distribution system: two largest pumps out of service, where there is one WPS.

The following criteria are indicated in the Design Guidelines for Drinking-Water Systems (MECP 2008):

- The firm capacity of the pumping station should be provided with the two largest units out of service if the pumping station serves a pressure zone that does not have adequate floating storage available and is the sole source of supply in the area, as per Section 7.3.1 of MECP, 2008.
- If no or inadequate storage is available, the proposed booster pumping station should be designed in a manner that will allow it to supply all of the extreme flow conditions (e.g., peak hour demand, low flow demand (during night time) and/or maximum day demand plus fire flows), as per Section 7.4.3 of MECP, 2008.

4.5 Problem or Opportunity Statement

The existing HD17A WPS is equipped with two pumps: each with a capacity of 91L/s. The City noted two pumps were recently (in Mid-2021) replaced with two slightly smaller pumps.

The MECP guidelines recommend that booster pumping stations servicing areas with inadequate storage be sized for a firm capacity able to handle peak hour demand or maximum day demand plus fire flows (whichever are higher). The firm capacity of the existing HD17A WPS is insufficient to meet current maximum day plus fire flow requirements.

The recommended firm pumping capacity for PD17 is 171L/s under maximum day demand (21L/s) plus fire flow conditions (150L/s). The design firm capacity for the new WPS of PD17 will be subject to confirmation/revision and the required capacity will be confirmed as part of the current City's Water Master Planning Study and/or detailed design.

Furthermore, the existing HD17A WPS is beyond its recommended useful life and requires substantial rehabilitation. Based on the age, level of deterioration and deficiencies and confined space nature of a below grade pumping station, construction of a new above ground pumping station is recommended to replace the existing HD17A WPS.

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

A solution is required for a new water pumping station to replace the existing HD17A WPS at a new site near its current location to service customers within PD17, to enhance water system security and reliability, and to meet the MECP guidelines and City design standards, while improving system operating efficiencies.

5 Existing Conditions

5.1 Existing Infrastructure

As discussed above, PD17 is supplied from PD2/HDR02 via the existing HD17A WPS. This facility provides booster capability for downstream domestic use in PD17 and maintains water pressure within PD17. PD2 system could provide a limited security of supply to PD17 via the check valve on Main Street West if the PD17 pressure downstream of the check valve/existing HD17A is lower than the PD2 pressure upstream of the check valve/existing HD17A WPS (e.g., both pumps offline). The apartment buildings in PD17 that have booster pumps, can run off PD2 pressure if the existing HD17A WPS is out of service. PD17 is the single branch water distribution network (i.e., limited looping) and the watermain sizes within PD17 range from 150mm to 300mm.

5.2 Natural Heritage Features

LGL Ltd. (LGL) was retained by the City and has completed a review of the preliminary natural heritage features in the initial Study Area. LGL indicated that multiple natural heritage features are known to occur and their functions are relatively well documented. Osler Road between Main Street and Grant Boulevard presents the largest natural heritage constraints in the initial Study Area. These constraints include watercourses, wetlands, significant wooded area, environmentally sensitive area and Niagara Escarpment designated area. The natural heritage constraints are illustrated in **Figure 5-1**. These constraints will be considered as alternative locations and identified for the proposed new WPS.

The Niagara Escarpment Plan (NEP, 2017) designates the Escarpment Protection Area within PD17 and along Main Street West and/or Lower Lion Club Road (west of Filman Road) were identified as Significant Woodlands and/or Escarpment Protection Area (Natural Heritage system (NHS) Area) - See Appendix C of Project Report File (PFR) for details. Thus, alternative locations within PD17 and west of Filman Road would not be considered for the new WPS of PD17. As recommended in the NEP (2017), new or expanding infrastructure should avoid key natural heritage features.

The potential for Species at Risk (SAR) and SAR habitat to date has been based on a variety of background data sources and will be refined following field studies. Field studies for vegetation communities and wildlife would be conducted in spring/summer/fall of 2022.

5.3 Archaeological Heritage Features

ASI Inc. was retained by the City and has begun the Stage 1 Archaeological Assessment and Cultural Heritage Assessment for the initial Study Area.

Preliminary review indicates that the Class EA initial Study Area meets the following criteria indicative of archaeological potential, as per the MHSTCI Standards and Guidelines Section 1.3.1. The initial Study Area consists of previously identified archaeological sites and Cultural Heritage Value or Interest (CHVI) sites. These constraints will be considered as alternative locations and identified for the proposed new WPS.

Figure 5-2 identifies the potential heritage features including Cultural Heritage Landscape (CHL), historic neighbourhood inventories, inventoried properties, registered (non-designated) properties and other archaeological/heritage potential for the initial Study Area may include:

- Early historic transportation routes (Hamilton-Brantford Rail Trail, near Main Street West and Osler Drive)
- Proximity to early settlements (Dundas and Ancaster)

Four cemeteries are located within the initial study area:

- Old Union (Dundas Old Union) Cemetery (19th century), at 60 Osler Drive
- White Chapel Memorial Gardens/Cemetery (early 20th century), at 1895 Main Street, Hamilton
- Binkley Hollow (Henry Binkley) Cemetery (19th century), located at the end of Desjardins Avenue, Dundas
- St. Augustine Catholic Cemetery (19th century), at 54 East Street South, Dundas

Natural wetlands and extreme slope are considered to have low archaeological potential. Undeveloped areas which have not been previously assessed will exhibit high archaeological potential.

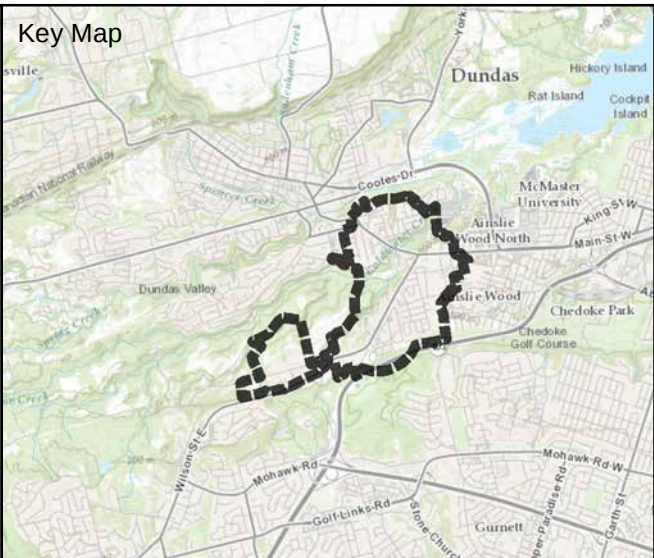
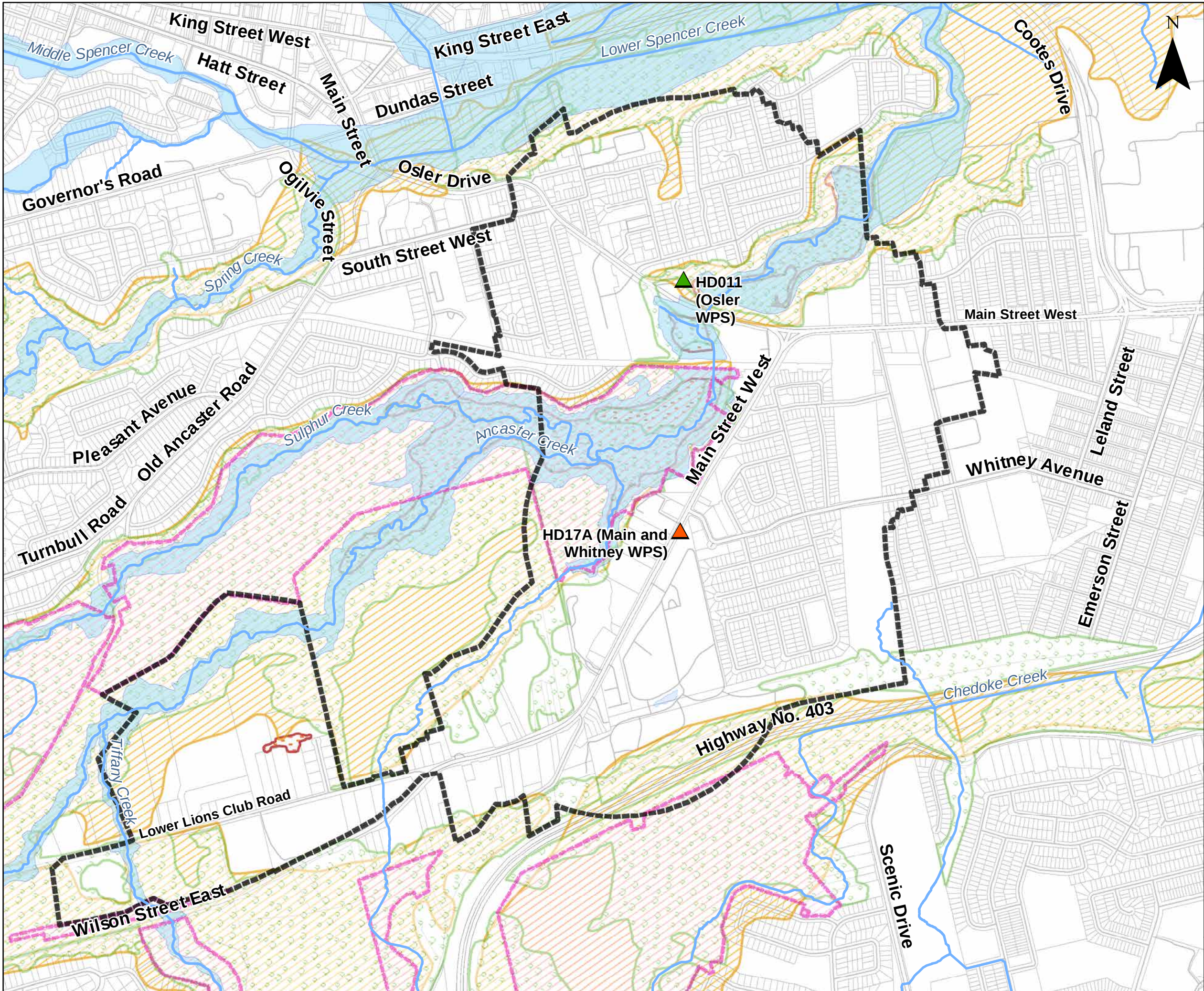
5.4 Geotechnical Site Conditions

Over 30 documents were provided to IBI Group on the geotechnical conditions in the vicinity of the initial Study Area. A Geotechnical-Environmental Investigation (Report No. GTR_1281) was conducted for a proposed upgrade of municipal services as well as road re-construction along a portion of Main Street West (AMEC, December 2007).

The section of Main Street West under investigation was between Osler Drive to Lower Lions Clubs Road, where nine (9) boreholes were placed for the depths between 1.8m and 2.7m. The findings on the groundwater from the studies are summarised as follows:

- Most of the boreholes remained dry and open upon completion of drilling.
- Free groundwater was observed in the vicinity of two boreholes. The water levels at the depths of 2.6m (near Ofield Road) and 1.8m (at a short distance south of Osler Drive) were observed.
- No major groundwater problems are anticipated for the excavation depths at these borehole locations. Excavation deeper than those levels in these areas could result in significant groundwater problems that may need to be addressed by a dewatering specialist.

MM: \\caneast.ibigroup.com\JTO136546_HamiltonMain\7.0_Production\7.07_Spatial_Design\20_Maps\006_Project File Report\TM1\Figure5-1_NaturalHeritageFeatures_20221121.mxd



Legend

HD011 (Osler WPS)

HD17A (Main and Whitney WPS)

Watercourse

Waterbodies

Initial Study Area

Niagara Escarpment Parks and Open Spaces

Regional Event Floodplain

Significant Wooded Area

Environmentally Sensitive Area

Unevaluated Wetland

Meters

0

100

200

400

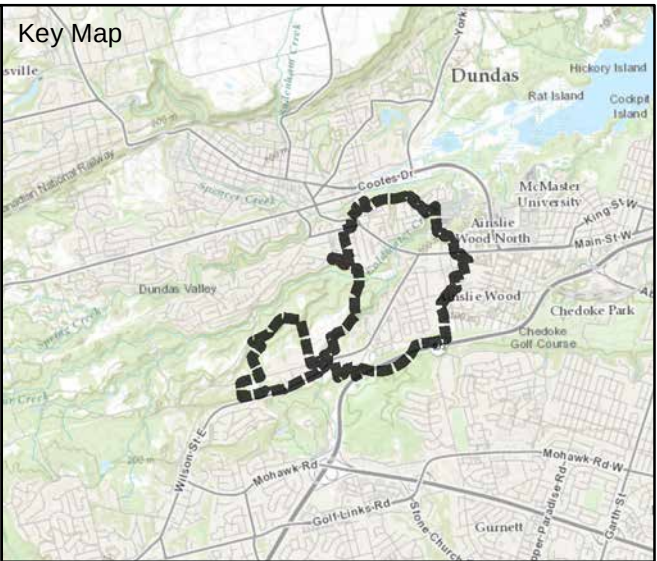
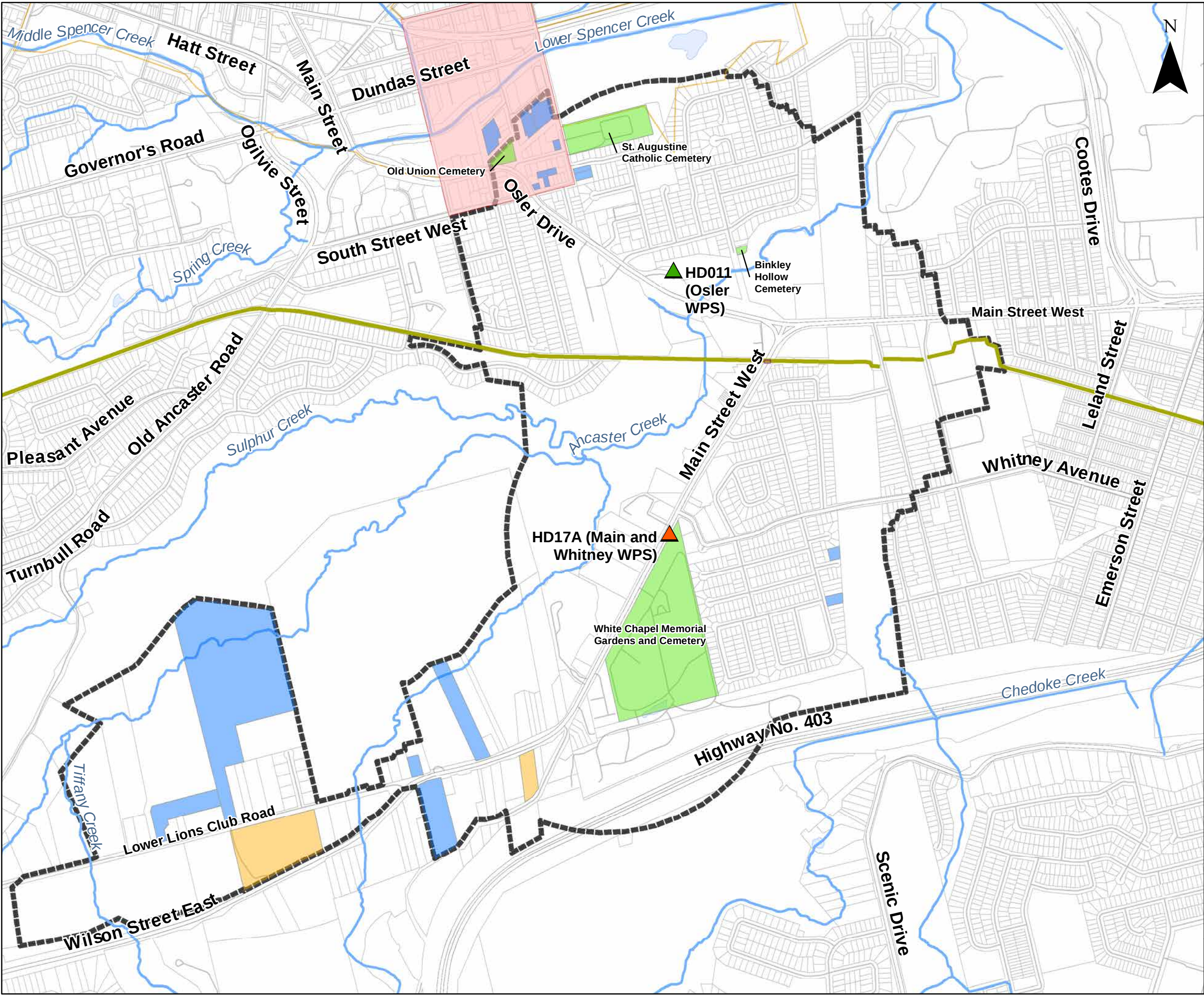
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Main & Whitney (HD17A) WPS

Class EA and Conceptual Design

Project No.: 136546	Date: October 2023
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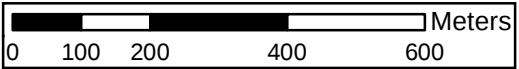
MM: \\caneast.ibigroup.com\J\TO1136546_HamiltonMain\7.0_Production\7.07_Spatial_Design\20_Maps\006_Project File Report\TM1\Figure5-2_ArchaeologicalHeritageFeatures_20221121.mxd



Legend

- HD011 (Osler WPS)
- HD17A (Main and Whitney WPS)
- Watercourse
- Hamilton - Brantford Rail Trail
- Waterbodies
- Initial Study Area
- Inventoried Property
- Inventory of Cemeteries and Burial Grounds
- Registered (Non-designated) Property
- Historic Neighbourhood Inventory
- Cultural Heritage Landscape (CHL) Inventory
- Heritage Bridge Inventory

Note: Study Area consists of previously identified archaeological sites, and Cultural Heritage Value or Interest (CHVI) Site



**Main & Whitney (HD17A) WPS
Class EA and Conceptual Design**

**Figure 5-2
Archaeological Heritage Features**



Project No.:
136546

Date:
October 2023

6 References

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- WSP [formerly GENIVAR]. (2012, October 26). Facility Condition Assessment for HD17A Main Street West/Whitney Ave Water Pumping Station.
- WSP (May 2015). Osler & Main/Whitney Pump Station Feasibility Study: Feasibility of Combining HD17A (Main/Whitney PS) and HD011 Osler PS (Report No. 141-25216-00).
- WSP (January 2016) New Highland Gardens Park Water Booster Pumping Station, As-Built Drawings.