



ENVIRONMENTAL ASSESSMENT REPORT
MOHAWK LAKE AND MOHAWK CANAL CLEANUP
AND REHABILITATION PROJECT
DECEMBER 2019
UPDATED IN JUNE 2020
-FINAL-



wood.



Environmental Assessment Report

Mohawk Lake and Mohawk Canal Functional Master Drainage
and Restoration Study
Brantford, Ontario
Project # TPB188172

Prepared for:

City of Brantford

100 Wellington Square, Brantford, Ontario N3T 5R7

December 20, 2019
Updated in June 2020



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June 17, 2020

Mr. Nahed Ghbn, P.Eng.
Senior Project Manager
City of Brantford
100 Wellington Square
Brantford, ON N3T 5R7

Dear Sir,

**RE: Environmental Assessment Report - Mohawk Lake and Mohawk Canal
Functional Master Drainage and Restoration Study - City of Brantford**

Please accept this Environmental Assessment Report for the Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study.

This report provides an introduction to the project, summarizes the consultation process and existing conditions in the Project area, identifies alternative solutions, and recommends preferred remedial alternatives and the proposed implementation process.

Sincerely,

**Wood Environment & Infrastructure
Solutions
a Division of Wood Canada Limited**

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Executive Summary

The Mohawk Lake and Mohawk Canal and the surrounding parklands are located in the southeast sector of City of Brantford, proximate to the City's downtown; the subject lands drain to the Grand River (Figure 1). Mohawk Lake was constructed in the 1800s as part of the canal system to provide access for barges traveling through Brantford and to enable the barges to turn around. In the early 1900s, the lake and the surrounding parkland provided the community with recreational opportunities to residents city-wide and continues to offer valuable natural heritage for the City.

In the 1980s, the inflow from the Grand River, diverting flow to the canal, was disconnected with the removal of a dam. Years of municipal stormwater drainage and a legacy of industrial discharges have resulted in the deterioration of the lake. Industrial discharges have been largely discontinued for a number of years and recently upstream brownfield remediation has largely eliminated the potential for migration of contaminants from former industrial lands adjacent to the lake and canal.

The lake surface area is about 13 hectares; the water depths range from 1 to 3 meters. The Mohawk Lake subwatershed area (directly to Mohawk Lake and Canal; not including downstream areas) is approximately 873 hectares. The lake is primarily replenished by stormwater coming from municipal storm sewers that service the drainage of roadways, parking areas, and individual properties via catch basins, connected directly to the area's storm sewers. The lake water quality is largely determined by the quality of the incoming urban runoff. The land use within the subwatershed is primarily low to medium density residential, commercial and some industrial properties.

In 2017, the City, with financial support from the Federal Government, approved a plan to initiate the Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project (the Project) to improve the environmental quality of Mohawk Lake and Mohawk Canal and provide enhanced recreational, fish and wildlife conditions through improved water quality. This rehabilitation project consists of four (4) phases:

- Characterization Study (largely Completed Oct, 2019) – Phase 1;
- Subwatershed Stormwater Plan – Phase 2 (this project);
- Environmental Assessment and Master Plan - Phase 2 (this project); and
- Design & Construction of the Cleanup and Remedial Work (future phase).

The Characterization Study which began early 2018 and largely completed Oct 2019, has focused on determining the current environmental conditions of the lake and canal with the intent to define baseline conditions to support future rehabilitation measures. This study has been essential in supporting the future study phases, including developing subwatershed stormwater management guidelines, environmental assessment needs and ultimately the direction to facilitate the cleanup of the lake and canal.

Wood Environment & Infrastructure Solutions, a Division of Wood Canada Limited (Wood) was retained by City of Brantford to complete Subwatershed Stormwater Plan, Environmental Assessment and Master Plan components of the Project.

As part of the Municipal Class EA process for the Environmental Assessment and Master Plan Phase of the Project, a wide range, and types, of alternatives were developed and assessed. Alternative solutions for this Project were developed to consider all aspects of the environment (natural, cultural, social, and economic), and were reviewed through consultation with the public, Stakeholders, Indigenous communities, and regulatory agencies throughout the assessment process. Solutions include recommendations for structural and non-structural, short/long-term improvements within the Study Area including retrofits and restoration work.

The multi-pronged approach is comprised of three (3) components:

1. Restoration strategies for Mohawk Lake and Mohawk Canal consisting of Alternative Remedial Solutions.
2. Subwatershed runoff improvement strategies consisting of Stormwater Management Alternatives (Quality focus)
3. Existing and Future Land Use Plans and Policies

Components of each of these solutions have been considered as distinct scenarios to establish a comprehensive plan for short-term and long-term remediation of the Mohawk Lake and Mohawk Canal and the overall Subwatershed and related natural resources.

Based upon the evaluation and assessment completed as part of Phase 2 of the Municipal Class EA process, the following preferred alternatives have been advanced based upon those works envisioned in the short-term and those that would be expected to have a longer-term implementation timeframe, or those that would be contingent on additional study (field and/or analytical).

Short-Term (Approximately 2020/2021) Remedial Alternatives

1. Design & Construction of Oil and Grit Separators (OGS)

- Implement the list of preferred locations premised on water quality sampling results and areas discharging directly to Mohawk Lake and Canal, among other factors (refer to list of twelve (12) preferred locations in the Subwatershed Stormwater Plan report)
- To manage runoff from Small scale catchments (generally <10 ha)
- To be Constructed in Public ROWs
- Schedule A/A+ works
- First three (3) priority locations to be constructed in 2020, remaining to be constructed at a rate of about one (1) per year (+/-)

2. Incorporate Stormwater Management (Quality focus) into Roadway Reconstruction

- All roadway reconstruction in Mohawk Lake subwatershed to incorporate stormwater quality treatment going forward (source controls and/or end of pipe measures), targeting at least 50% average annual TSS removal

- Schedule A/A+ works

3. Design of Mohawk Canal Restoration and Sediment Removal

- Potential to consider in logical phases for West Canal (downstream & upstream) – focus on upstream portion of West Canal first (higher priority), and downstream portion thereafter (lower priority).
- The East Canal is less of a priority given the overall lower contaminant concentrations and location downstream of Mohawk Lake. It is recommended that any works in this area potentially be combined with works within Mohawk Lake itself.
- Adopt natural channel design principles
- Incorporate Riparian plantings
- Co-ordinate with any hydraulic structure crossing improvements (Eagle Avenue/Alfred Street as the highest priority)
- Consider scoped/targeted sediment removal
- Consider an online, linear stormwater management facility in upper West Canal. Any potential ecological impacts, including fisheries enhancement opportunities would need to be considered further.
- Schedule B works – requires public and agency consultation

4. Design and Construction of (Selected) Outfall Retrofits (SWM Facilities – Wet Ponds)

- Advance short-listed/preferred SWMF outfall retrofits
 - OF-444A and OF-444B: Shallow Creek Park at upstream limits
 - OF-194: Shallow Creek Trail - Rawdon Street storm sewer to public land between Murray Street and Drummond Street north of the trail
- Consider feasibility of other opportunities for outfall retrofits
 - OF-222: Six Nations Land (Glebe Farm property) – requires further discussions with landowner to determine potential feasibility
 - Arrowdale Public Golf Course – requires further review/discussion with City of Brantford (given planned sale and re-development of these lands)

5. Assessment/Preliminary Design of Mohawk Lake (and East Canal) Sediment Removal and Lake Bed Re-contouring

- Additional assessment required to determine ecological and limnological linkages to lake health. Information will provide direction to locations of strategic sediment removal and also configuration of lake bed recontouring (field/analytic) and lake levels to optimize function/health and improve sustainability

- The East Canal is less of a priority given the overall lower contaminant concentrations and location downstream of Mohawk Lake. It is recommended that any works in this area potentially be combined with works within Mohawk Lake itself.
- Develop preliminary detail on preferred management approach
- Schedule B works – requires public and agency consultation

6. Stormwater Management for Redeveloping Lands (Infill/Intensification – Privately-led)

- Create policy to establish stormwater management criteria for redevelopment lands in Mohawk Lake Subwatershed
- Proposed “Enhanced” (80% average annual TSS removal) water quality treatment
- Incorporate erosion control and quantity control
- Ensure treatment is for whole of property (not just area of change) to recover capacity in system

7. Public Education

- Prepare materials focused on Mohawk Lake area residents and businesses to encourage engagement on practices which the public can implement

8. Wildlife Management (Carp Exclusion)

- Conduct a field study into resident carp invasive species within Mohawk Lake
- Develop appropriate management opportunities including potential modification of Mohawk Lake outfall.

9. Study to Isolate Locations of Sanitary Cross-Connections

- Need to locate where connections are and the potential remediation opportunities
- Focus on identified location from Characterization Study (Aquafor Beech Limited, 2019) – Rawdon Street and Bruce Street area

Medium to Long-Term (Approximately 2022-2029) Remedial Alternatives

- 1. Construction of West Canal Restoration, Clean-Out and Retrofit (Upstream Section of West Canal)**
- 2. Design and Potential Construction of West Mohawk Canal Restoration and Clean-Out (Downstream Section of West Canal)**
- 3. Construction of Mohawk Lake (and East Mohawk Canal) Strategic Sediment Removal and Lake Bed Re-contouring**
- 4. Construction of Wildlife Management (Carp Exclusion)**
- 5. Construction of Balance Outfall Retrofits**

- 6. Incentive-based program for retrofitting existing properties with SWM practices**
- 7. Ongoing Stormwater Management for Redeveloping Lands (Infill/Intensification)**
- 8. Incorporate Stormwater Management, particularly stormwater quality (including Low Impact Development (LID) design elements and end of pipe measures) into Road Reconstruction (Ongoing)**
- 9. Ongoing Investigation and Disconnection of Cross-Connections (Storm and Sanitary sewers)**
- 10. Study and Construct Landfill Contamination Migration Potential to Mohawk Lake**
 - Install field instrumentation upstream and downstream of area landfills to isolate extent, magnitude and severity of potential lake contamination
 - Based on field work, establish preliminary management practices (leachate management)
- 11. Street Management**
 - Consider enhanced frequency of street sweeping in Mohawk Lake Subwatershed.
 - Develop and implement a Road Salt Management Plan for the subwatershed, or potentially City-Wide. Limit use of road salt to the extent possible; review potential alternative measures.

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1.0 Introduction

The Mohawk Lake and Mohawk Canal and the surrounding parklands are located in the southeast sector of City of Brantford (the City), proximate to the City's downtown; the subject lands drain to the Grand River (Figure 1). Mohawk Lake was constructed in the 1800s as part of the canal system to provide access for barges traveling through Brantford and to enable the barges to turn around. In the early 1900s, the lake and the surrounding parkland provided the community with recreational opportunities to residents city-wide and continues to offer valuable natural heritage for the City.

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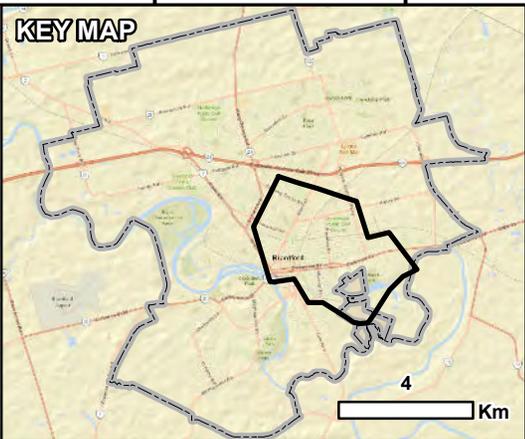
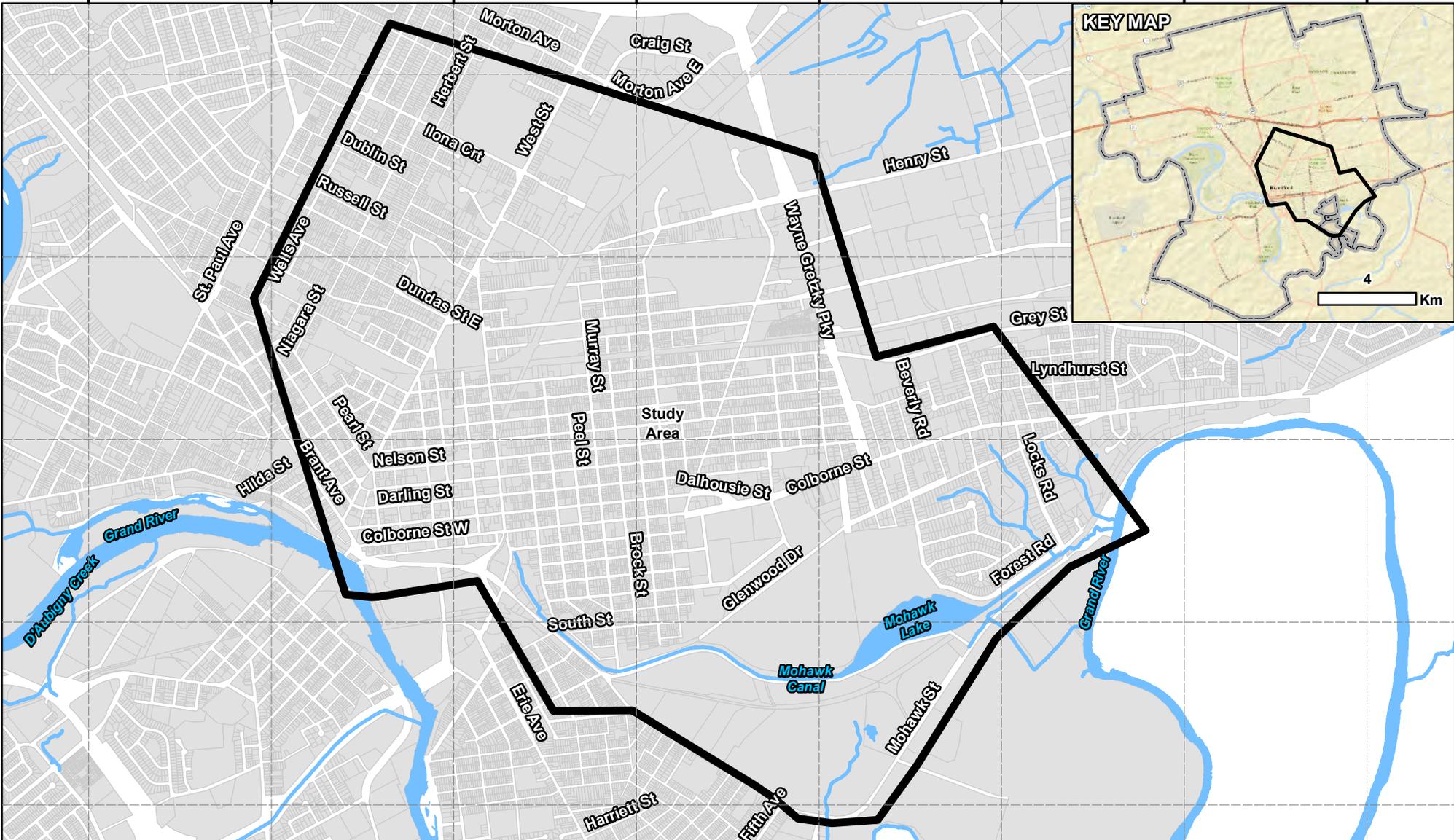
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- Characterization Study (largely Completed Oct, 2019) – Phase 1;
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Wood Environment & Infrastructure Solutions, a Division of Wood Canada Limited (Wood) was retained by the City to complete Subwatershed Stormwater Plan, Environmental Assessment and Master Plan components of the Project.

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P:\2018\Projects_Other\TPB188172_Mohawk lake & Canal11_GIS\MXD\Study_Area_Map_2.mxd

- LEGEND**
-  Study Area
 -  Watercourse
 -  Waterbody
 -  Property Parcel

NOTES:
 - Regulation Limit from GRCA Open Data, 2019
 - Key Map topography from ESRI



Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study

Study Area Map



Datum: NAD83
 Projection: UTM Zone 17N



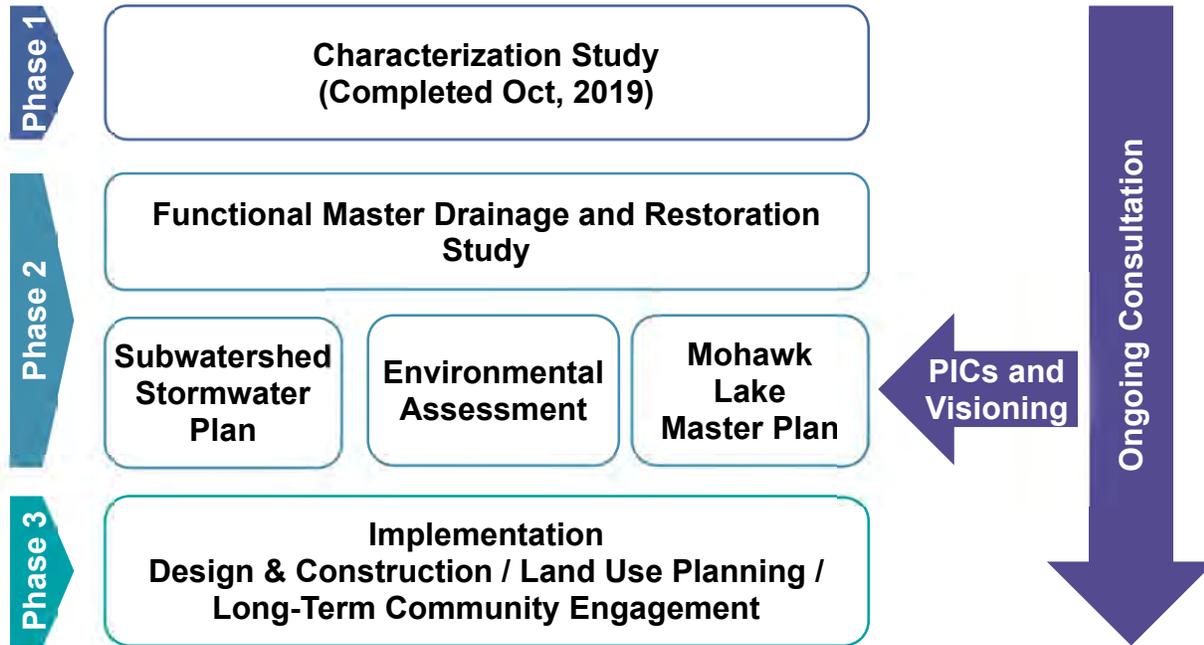
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Figure 2: Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project



2.0 Environmental Assessment Process

2.1 Federal Environmental Assessment Requirements

2.1.1 Federal Economic Development Agency

2.1.1.1 Historical Context

In May 2008, the Federal Economic Development Agency for Southern Ontario provided an agreement to the City to supply additional funds to support the clean-up and rehabilitation Mohawk Lake and Mohawk Canal (the Funding Agreement). At that time, any project receiving federal funding was “triggered” to automatically adhere to a federal level environmental assessment process, as stipulated under the *Canadian Environmental Assessment Act, 1992*.

2.1.1.2 Current Context

The Funding Agreement has been amended three times since 2012. These amendments were made in November 2012, March 2017 and May 2017. A stipulation of the amended Funding Agreement is for the City to demonstrate due diligence with respect to any requirements under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012).¹

2.1.2 Canadian Environmental Assessment Act, 2012

On February 22, 2019, the City and Wood provided a letter to the Canadian Environmental Assessment Agency (CEA Agency) (now Impact Assessment Agency of Canada) regional office containing the Municipal Class Environmental Assessment (Class EA) ‘Schedule ‘B process Notice of Commencement on Mohawk Lake and Mohawk Canal Clean Up and Rehabilitation Project - Functional Master Drainage and Restoration Study (Appendix A). To further support the CEA Agency in its determination, it was noted that federal funding was a part of the City’s endeavor and a map was included with the Notice to set out, generally, the geographic limits of the area under study.

On March 20, 2019 the CEA Agency regional office responded to the Notice of Commencement and provided further web-based guidance to review according to CEAA 2012, including (Appendix A):

- The prescribed Regulations (<https://www.canada.ca/en/environmental-assessment-agency/corporate/acts-regulations/legislation-regulations.html>); and
- To check section 1 of the Regulations which details federally designated migratory bird sanctuaries or wildlife areas.

¹ On August 28, 2019, the Federal *Impact Assessment Act* came into force. It repealed the Canadian Environmental Assessment Act, 2012 and created the new Impact Assessment Agency of Canada. This Study has proceeded under the terms of the Funding Agreement, which references CEAA 2012.

Furthermore, the CEA Agency indicated that based on the information provided to it, this project did not appear to be described in the Regulations. The CEA Agency indicated it wanted to be removed from the project’s distribution list if by a process of self-determination, the City does not consider the project to fall under the requirements of CEAA 2012 (Appendix A).

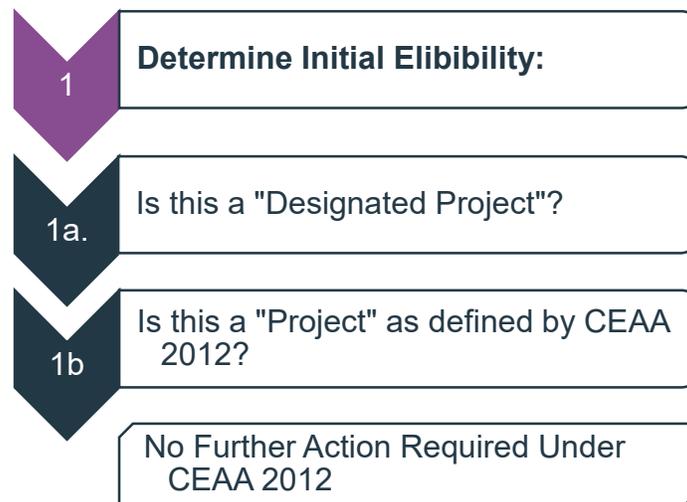
2.1.2.1 Determination of Requirements under Canadian Environmental Assessment Act, 2012

On behalf of the City, Wood has reviewed the anticipated scope of physical works and activities that may be prescribed to implement the Project to improve environmental conditions in the study area. It is also noted that the Phase 2 Study (ref. Figure 2) is applying the Municipal Class EA process, and as such, it is unlikely to have significant adverse environmental effects.

As shown on Figure 3, the Federal EA Determination Approach Flow Chart has been applied to the Project to determine initial eligibility under CEAA 2012 (Canadian Environmental Assessment Agency, 2016). In making a determination as to the applicability of CEAA 2012 to the Project, the Project Team gave due consideration to the following:

- Question 1a - Is the study likely to prescribe works or activities that are Designated Physical Activities listed in the CEAA 2012 Regulations list?
- Question 1b - Does the Study Area, likely to be affected directly or indirectly by prescribed works or activities, encompass federal lands, wildlife areas or migratory bird sanctuaries or as described in the section 1 of Regulations list?

Figure 3: Federal Environmental Assessment Determination Approach Flow Chart



It was concluded that with respect to *Question 1a.*, the Project is not comprised of physical works or activities covered under Regulations Designating Physical Activities (SOR/2012-147). Further that for *Question 1b*, it is not a “Project” as defined under CEAA 2012; that being a *physical activity* in relation to a *physical work* located on

federal lands. There are federal lands, as defined by the Act that lie within the broader study area. However, the determination by the City at this stage of the Project is that the preferred solution to be implemented, will not meet the definition of a Project as defined under CEAA 2012.

Given the foregoing findings based on due diligence considerations by the Project Team, it is self-determined that an EA is not required under the scope of CEAA 2012. This finding is also congruent with the response letter from the CEA Agency regional office (Appendix A).

2.2 Ontario Environmental Assessment Requirements

A variety of project activities carried out by the City are subject to the requirements of the Ontario *Environmental Assessment Act*. As summarized in the Municipal Class EA (ref. Municipal Engineers Association's Municipal Class Environmental Assessment October 2000, as amended in 2007, 2011 & 2015), the purpose of the Ontario *Environmental Assessment Act* is "the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management in Ontario of the environment". Environment is applied broadly and includes the natural, social, cultural, built and economic components. Environmental Assessment (EA) is a decision-making process to promote good environmental assessment planning.

The key features are:

- Early consultation;
- Consideration of a reasonable range of alternatives;
- Assessment of environmental effects;
- Systematic evaluation of alternatives; and
- Clear documentation and traceable decision making.

There are two basic types of EA processes:

Individual EA

- requires Terms of Reference approved by the Ministry of the Environment, Conservation and Parks (MECP)
- requires that EA report be submitted to MECP for review and approval by the province

Class EA

- project is approved subject to compliance with an approved Class EA process for a group or "class" of projects

The Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study is being carried out in accordance with the requirements of the Municipal Engineers Association's Class Environmental Assessment (October 2000, as amended in 2007, 2011 & 2015). This is an approved process under the Ontario *Environmental Assessment Act*.

2.2.1 Municipal Class Environmental Assessment

As described in Figure 4, the Municipal Class EA process consists of five phases that may be applied, depending on the scope of the physical works and activities being considered as a preferred solution to be implemented to address a problem or set of problems, or to respond to an opportunity or opportunities for community betterment. The Class EA process classifies projects according to their level of complexity and potential environmental impacts. These are termed “Schedules” and are summarized below (ref. Municipal Engineers Association’s Municipal Class Environmental Assessment October 2000, as amended in 2007, 2011 & 2015):

- Schedules A and A+ include projects that involve minor modifications to existing facilities. Environmental effects of these projects are generally small; therefore, the projects are considered pre-approved.
- Schedule B includes projects that involve improvements and minor expansion to existing facilities. There is a potential for some adverse environmental impacts and, therefore, the proponent is required to proceed through a screening process, including consultation with those affected. Schedule B projects are required to proceed through Phases 1, 2 and 5 of the Municipal Class EA process.
- Schedule C includes projects that involve construction of new facilities and major expansion of existing facilities. These projects proceed through the environmental assessment planning process outlined in the Municipal Class EA document. These projects are required to fulfill the requirements of all five phases of the Municipal Class EA process.

In addition, the Municipal Class EA document recognizes that, it is beneficial to undertake a master planning process for a group of related projects, or an overall system, e.g. water, wastewater and/or roads network. Through this process, the need and justification for individual projects and the associated broader context, are better defined.

Master Plans are defined 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 or a group of related projects in order to outline a framework for planning for subsequent projects. At a minimum, Master Plans address Phases 1 and 2 of the Municipal Class EA process.

There are four approaches that may be followed to complete a Master Plan process. This project followed Approach #2 of the master planning process. This approach involves the preparation of a Master Plan document at the conclusion of Phases 1 and 2 of the Municipal Class EA process where the level of investigation, consultation and documentation are sufficient to fulfil the requirements for Schedule B projects. Accordingly, the final public notice for the Master Plan could become the Notice of Completion for the Schedule B projects within it. Any Schedule C projects, however, would have to fulfil Phases 3 and 4 prior to filing an ESR(s) for public review. The Master Plan would provide the basis for future investigations for the specific Schedule C projects identified within it.

This study identified Schedule A/A+ and Schedule B projects. A list of those projects is provided in Section 9.3 of this report.

2.2.1.1 Master Planning Process

As a master planning study under the Class EA, this Study must fulfill Phases 1 and 2 of the planning and design process, including the mandatory points of public contact. The EA process requirements are illustrated in Figure 5 and described more fully in the sections below:

2.2.1.1.1 Phase 1 - Identify and Describe the Problem or Opportunity

Projects are initiated based on a Problem or Opportunity identified by the proponent. Factors leading to this initiation may have been identified or documented in previous studies. The problem/opportunity is refined into a clear problem and/or opportunity statement that becomes the basis of the project and defines its scope.

2.2.1.1.2 Phase 2 - Alternative Planning Solutions

Using the problem or opportunity statement identified in Phase 1, a long list of methods to address this statement is developed. These alternatives are then assessed based on their potential impact to the natural, social and economic environments and the degree of harm or benefit that could occur. Following this evaluation, and consultation with agencies, stakeholders, and the public, a preferred solution(s) is identified.

Phase 2 of the Class EA also requires preparation of a physical description of the area where the project is to occur, and a general inventory of the natural, social and economic environments, which are to be considered when reviewing the effects of a project in that area. In this instance, the Characterization Study (Aquafor Beech Limited, 2019), and the Subwatershed Stormwater Plan both contribute relevant data and information to:

- describe baseline environmental conditions;
- forecast future conditions through modelling; and
- identify constraints that may;
 - limit the range and form of remedial options to be evaluated;
 - require mitigation strategies to limit impacts; or
 - affect how and when elements of the preferred solution get implemented.

2.2.1.1.3 Mohawk Lake and Mohawk Canal Master Plan

As noted above, under the Municipal Class EA framework, Master Plans are long range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles. Approach #2 of the master planning process was followed for this study, which broadens the perspective for implementation of the preferred solution, by:

- looking beyond the infrastructure and remediation components that are the focus of the Class EA process;
- bringing in the land use and park use policy direction; and

- translating the Community Visioning exercise into current actions, and commitments for the future, including the long-term community engagement program.

2.2.1.1.4 Project Filing - Project File Report

The documentation of master planning process is provided in the Master Plan Project File Report. This is a chronological collection of the information (including background, environmental inventories, and alternative solutions) evaluated through the course of Phase 1 and 2 of the Class EA process. This Project File is made available to the public and review agencies for a minimum comment period of 30 days following the completion of Phase 2. The public also has the right to request a Part II Order from the Minister if they feel the identified Schedule B projects require further planning, design or documentation. Through the Part II Order process, the Minister has the ability to require a higher level of review take place, or to place conditions on project implementation.

2.2.1.1.5 Phase 5 - Implementation

Following the filing of the Project File Report for public review, if no Part II Order request is received or granted, then the project can proceed to Phase 5 of the Municipal Class EA process, which is the implementation stage.

Figure 4: Municipal Class Environmental Assessment Planning and Design Process

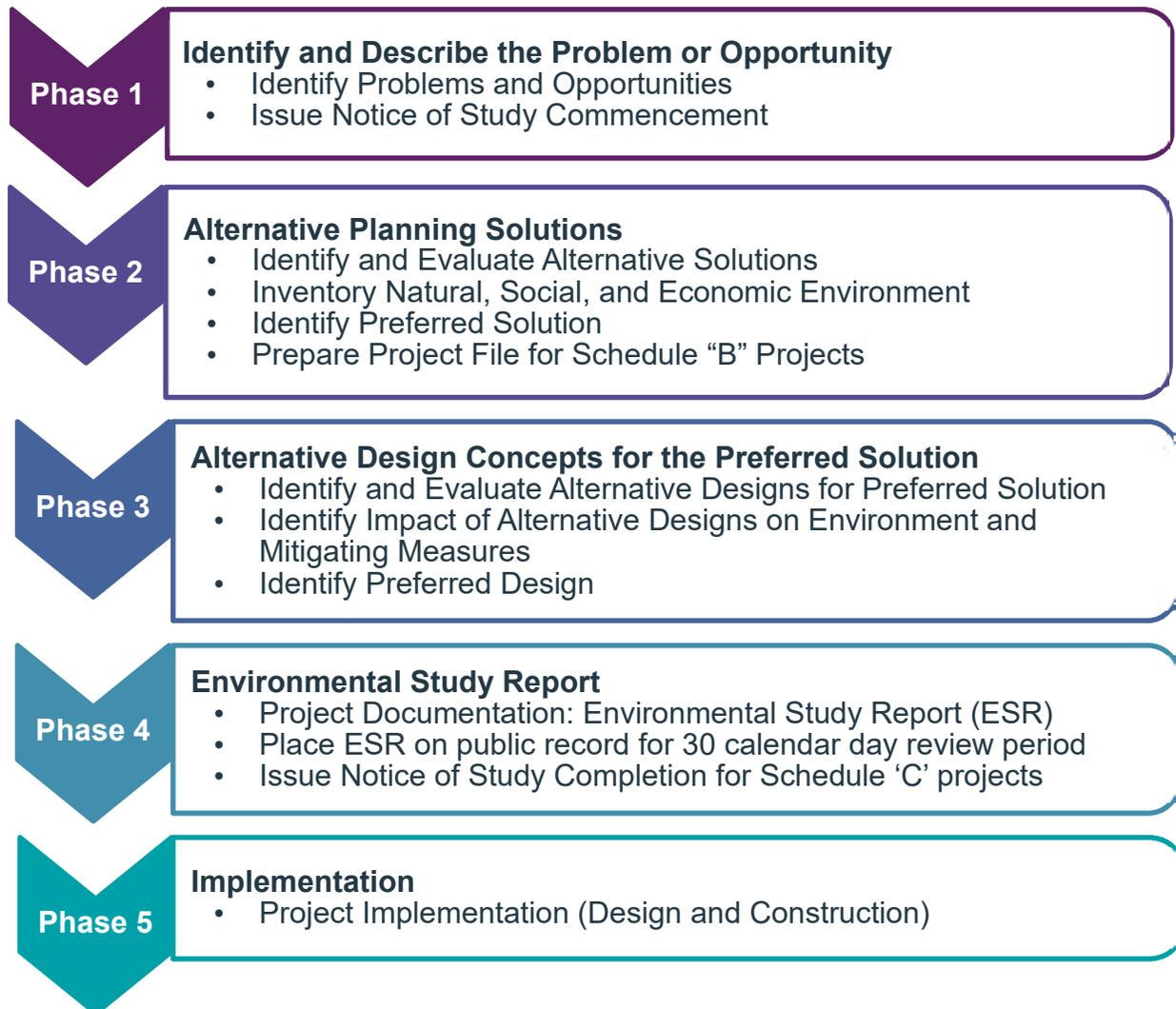


Figure 5: Environmental Assessment Process Requirements for Master Plans



3.0 Problem/Opportunity Statement

For decades concern has been expressed about the deteriorating environmental conditions in Mohawk Lake and Mohawk Canal (Gore & Storrie Ltd, 1995). As early as 1950, studies were conducted to improve the flow and to combat the silting problems in both the Mohawk Canal and Mohawk Lake (Source: GRCA, 1972). This Project was in part initiated in response to these concerns. As part of the Phase 1 component of the EA, need and justification to take action is established. For this there needs to be consideration of both the problem of environmental degradation and the associated adverse effects, and the opportunities presented through the clean-up and restoration of the lake and canal. The intent is to achieve the broader project objectives specifically to improve the environmental conditions and promote sustainable conditions for the Mohawk Lake and Mohawk Canal; this is to be achieved through:

- Protecting and enhancing the environment in a manner which is in harmony with the natural features of the Mohawk Lake subwatershed;
- Restoring and maintaining water quality to a level which maintains ecological integrity and permits desired uses including potential recreational activities;
- Protecting, maintaining and enhancing aquatic communities, with particular regard for fish and fish habitat;
- Protecting and maintaining self-sustaining natural ecosystems and significant natural features;
- Protecting and maintaining groundwater recharge/discharge areas and base flow to a level which ensures adequate supply for desired uses;
- Restoring the Mohawk Lake area through remedial works and land use controls; and
- Minimizing soil loss through land management practices and remedial control measures.

Further detail is provided in the following to describe the problem being addressed, and the opportunities to be realized through the EA process.

3.1 The Problem

As described in the *Mohawk Lake Revitalization Plan Report* by Weslake (1999), Mohawk Lake has the following characteristics:

- Short hydraulic removal time for sediment in the lake given its small size;
- Low transparency due to high turbidity resulting from algae and suspended sediments;
- Minimal thermal stratifications/layers;
- Chemical stratification (layers of different organic and inorganic material) is non-existent;
- Tolerant benthos (a community of organisms that live near the lake bed);
- A large urbanized subwatershed and airshed; and
- Negative thermal impacts during summer months.

The Problem under study and the subject to this Environmental Assessment is primarily two-fold. The first area of concern relates to the presence of large amounts of contaminated sediment that have accumulated over decades in Mohawk Canal and Mohawk Lake and their potential environmental effects. The second area of concern is the ongoing inflow of sediment and contaminants, as a function of stormwater runoff in the subwatershed that drains into the lake and canal, and ultimately into the Grand River.

Many years of industrial discharges and municipal stormwater drainage (drainage from roadways, parking areas, and individual properties) have resulted in the deterioration of Mohawk Lake and Mohawk Canal. The City has made significant efforts to improve the inflows to the lake including discontinuing industrial discharges. Recent efforts for upstream brownfield remediation have eliminated new potential occurrences of legacy contaminants to migrate from former industrial lands (ref. Pers. Comm. City staff). However, water quality in Mohawk Lake still remains affected by non-point contaminants from incoming stormwater runoff from the subwatershed.

3.1.1 Contaminated Sediments

As part of the Characterization Study (Aquafor Beech Limited, 2019), a background review was conducted of reports completed between 1972 and 1994 that documented and assessed sediment quantities and quality conditions in Mohawk Lake and Mohawk Canal. Surveys and sampling programs taken over the years, and most recently as part of the Characterization Study (Aquafor Beech Limited, 2019), have provided data on the volumes of contaminated sediments that have accumulated in the lake and canal, and the profile and concentrations of various contaminants found in the sediment deposits.

Sediment quality is most significantly impacted at the west end of Mohawk Lake and Mohawk Canal and improves towards the east end. Several sediment samples contained Copper and Lead concentrations that were identified to have “Severe Effects,” as per the Provincial Sediment Quality Guidelines (PSQG’s). Additionally, sediment samples at all sampling locations exceeded ‘Lowest Effect’ for PCB concentrations, all metals (with the exception of arsenic), and one (1) or more PAHs. The parameter exceedances of various Provincial Sediment Quality Guidelines (PSQGs), have been identified to negatively impact aquatic biota due to impacted water quality (Ecological Services for Planning, 1994).

3.1.2 Contaminated Stormwater Runoff

The Lake surface area is about 13 hectares; the depths range from 1 to 3 meters. The Mohawk Lake sub-drainage area is approximately 873 hectares. Figure 1 shows an approximated limit of the area that drains to Mohawk Lake. The lake is primarily replenished by stormwater coming from municipal storm sewers that provide drainage of roadways, parking areas, and individual properties, connected directly to the storm sewers. As such, the lake water quality is largely determined by the quality of the incoming flows and runoff. A summary of the upstream watershed drainage area based on the findings from monitoring of stormwater runoff from the surrounding urban area and adjacent outfalls has been compiled. “Hotspots” have been identified where

contaminants may be entering the system through local stormwater runoff from the industrial uses adjacent to the West Canal.

Identifying the contaminant sources and applying stormwater controls to treat and manage the runoff, prior to entering the system, may play a significant role in improving the water quality of the lake and canal over the long-term. The form of restoration measures will be dependent on contaminant source type and whether the activity is ongoing, or the likely source of contamination is an inactive legacy site.

3.1.3 Other Constraints

3.1.3.1 Flooding

Mohawk Lake and a portion of the Mohawk Canal are within the Regulatory floodplain for the Grand River. The Mohawk Lake area is designated as a Special Policy Area (SPA) by the Grand River Conservation Authority (GRCA). This designation permits development (with restrictions), despite the fact that the area is located within the Regulatory floodplain. There is also a dyke system in place to the south of Mohawk Lake, which connects to the south bank of the East Canal in proximity to the Grand River. The primary floodplain extends beyond Mohawk Lake to the south, towards Mohawk Street and the Water Pollution Control Plant (WPCP). The Regulatory floodplain and the dyke system are shown in Figure 6.

3.1.3.2 Cultural Heritage Landscape

The findings from the Cultural Heritage Landscape (CHL) Feasibility Study conducted for Mohawk Canal and Alfred Watts Hydro Generation Station Ruins by ASI in 2016 have been reviewed. The CHL identified numerous resources as having cultural heritage value warranting some level of protection. It is understood (Pers. Comm. City staff) that further study is refining and updating the findings from the ASI feasibility study. Based on resource protection requirements, constraints may be placed on the development and implementation of the preferred solution(s).

3.2 The Opportunities

Through the Environmental Assessment process, efforts to develop a preferred solution(s) to solve the identified problems afford an opportunity to enhance features and environmental conditions, and realize benefits in terms of resource protection, community use, and quality of life.

3.2.1 Remediation and Restoration

Strategic removal of Lake and Canal material to address sediment quantity and quality constraints related to contamination, provides an opportunity to reconfigure the channels and restore the canal-lake system to a more natural and sustainable state, however there are constraints in terms of preventing impacts to other features that need to be considered. A list of some of the potential benefits that may be realized through the remediation and restoration of Mohawk Lake and Mohawk Canal may include such outcomes as:

- Aquatic and Terrestrial Habitat enhancement
- Protection and interpretation of Cultural Heritage resources that comprise the Cultural Heritage Landscape
- Water contact recreation

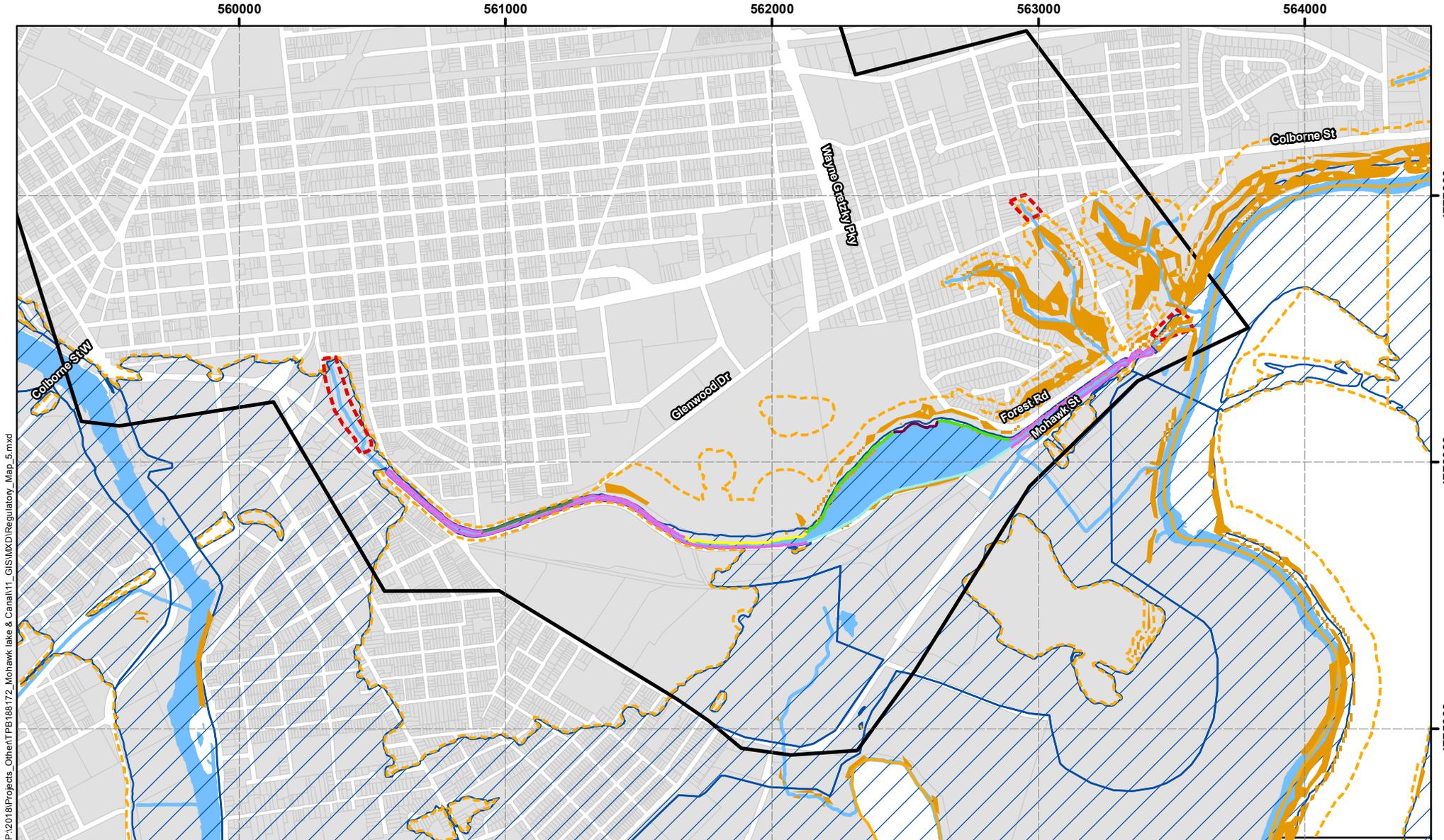
The intended objective in completing the three components of the Functional Master Drainage and Restoration Study (Figure 2) is the enhancement of environmental features, water features and ecological functions which are elements of the long-term sustainable ecological and hydrologic integrity of the Mohawk Lake subwatershed.

3.2.2 Future Development

The north shore of Mohawk Lake and Mohawk Canal is predominately natural and is designated as a Core Natural Area in the Draft Official Plan 2016, therefore is less likely to be impacted by future development which may offer opportunities for restoration options. The south shore of Mohawk Lake and Mohawk Canal conversely is predominately artificial and abuts areas identified for future development (Figure 7). Development and restoration alternatives in this area will need to consider stormwater management controls to mitigate potential impacts of development, such as increased sedimentation and reduction in natural bank characteristics. Restoration alternatives should consider locations where improvements to erosion hazards will also benefit other systems, such as aquatic habitat improvements and targeting areas of contaminated sediment.

The City is developing the Mohawk Lake District Plan for a study area located in the southeast part of Brantford, which includes Mohawk Lake, Mohawk Canal, and the 50-acre property that was home to the former Massey Ferguson and Cockshutt Plow farm equipment factories. The former industrial lands, referred to as a “Brownfield” (due to site contamination from past industrial use), have been remediated, and the Mohawk Lake District Plan is setting the stage for the future use and enjoyment of the District. Clean up of Mohawk Lake and Mohawk Canal, and prevention of further environmental degradation through management of stormwater inflow is considered key to realizing the full potential of the Mohawk Lake District Plan.

Several areas within the Mohawk Lake Subwatershed have been identified for redevelopment (infill/ intensification). These lands represent an excellent opportunity for application of new (contemporary) stormwater management for lands which currently have no treatment. The potential for benefits is significant and the costs to the public is negligible, as the works would be expected to be built and financed by new development.



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- LEGEND**
- Study Area
 - Watercourse
 - Waterbody
 - Property Parcel

- Bank Assessment**
- Natural Slope and Shoreline
 - Natural Riparian Bench Shoreline Marsh
 - Artificial Bench Shoreline Access
 - Artificial Slope with Locally Undercut Banks
 - Artificial Slope with Locally Eroded Banks
 - Artificial Banks

- Erosion Site
- Regulation Limit
- Slope Hazard
- Regulatory Floodplain

NOTES:
Regulation Limit from
GRCA Open Data, 2019



**Mohawk Lake and Mohawk Canal Functional
Master Drainage and Restoration Study**

Regulation Mapping

Datum: NAD83
Projection: UTM Zone 17N



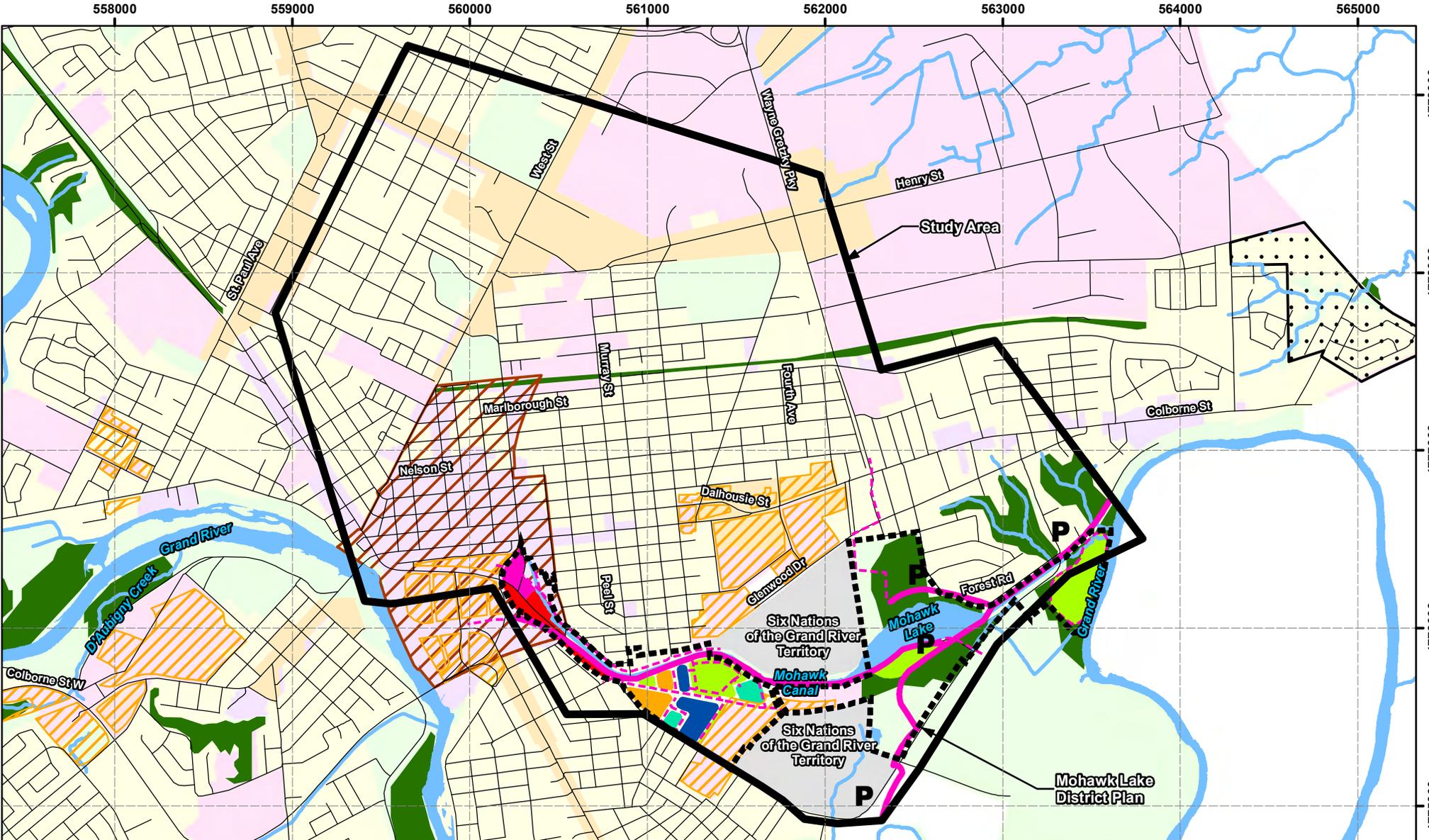
PROJECT N^o: TPB188172

DRAWING: 6

SCALE: 1:20,000

DATE: December 2019





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<p>LEGEND</p> <table style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> Study Area Mohawk Lake District Plan Watercourse Waterbody Primary Waterfront Trail (Existing) Proposed Trail P Parking (Proposed) </td> <td style="width: 50%; vertical-align: top;"> <p>Land Use Designation</p> <ul style="list-style-type: none"> Greenfield Area Intensification Corridor Urban Growth Centre Built-Up Area Community Commercial Centre Employment Land Employment Area Core Natural Area Existing Stable Neighbourhood </td> </tr> </table>		<ul style="list-style-type: none"> Study Area Mohawk Lake District Plan Watercourse Waterbody Primary Waterfront Trail (Existing) Proposed Trail P Parking (Proposed) 	<p>Land Use Designation</p> <ul style="list-style-type: none"> Greenfield Area Intensification Corridor Urban Growth Centre Built-Up Area Community Commercial Centre Employment Land Employment Area Core Natural Area Existing Stable Neighbourhood 	<p>Development</p> <p>Proposed Development</p> <ul style="list-style-type: none"> Enhanced Mixed Use Gateway Institutional Mixed Commercial Mixed Use Corridor Museum Potential New Park <p>Potential Development</p> <ul style="list-style-type: none"> Potential Development Area 		<p>NOTES:</p> <ul style="list-style-type: none"> - Regulation Limit from GRCA Open Data, 2019 - Proposed development from Mohawk Lake District Plan - Overall Draft Preferred Plan 	<p>Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study</p> <p>Future Growth Summary</p>
<ul style="list-style-type: none"> Study Area Mohawk Lake District Plan Watercourse Waterbody Primary Waterfront Trail (Existing) Proposed Trail P Parking (Proposed) 	<p>Land Use Designation</p> <ul style="list-style-type: none"> Greenfield Area Intensification Corridor Urban Growth Centre Built-Up Area Community Commercial Centre Employment Land Employment Area Core Natural Area Existing Stable Neighbourhood 						
<p>Datum: NAD83 Projection: UTM Zone 17N</p>			<p>PROJECT N^o: TPB188172</p> <p>SCALE: 1:30,000</p>	<p>DRAWING: 7</p> <p>DATE: December 2019</p>			

4.0 Consultation

As a part of this project, Wood prepared a Communication and Engagement Plan to engage with the public stakeholders and Indigenous communities. The key engagement activities included the preparation and distribution of Project Notices; Public Information Centres (PICs) to share Project background and plans and seek public input; engagement with Indigenous communities; and participating in meetings with the Mohawk Lake Working Group.

4.1 Notices

To inform the public and stakeholders about the Project, engagement opportunities and to gather input to inform Project planning, several notices were prepared and published in the local newspapers, posted on the City's website and mailed out directly to the key stakeholders and agencies (Refer to Appendix B for the mailing list).

The following formal public notices were prepared and published in the local newspapers:

- Notice of Study Commencement, published in *Turtle Island News* on May 8, 2019 and *Civic News* on May 30, 2019.
- PIC Notices
 - PIC No. 1, published in the *Turtle Island News* and *Civic News* on May 29 and 30, 2019 respectively.
 - PIC No. 2, published in the *Turtle Island News* and *Civic News* on October 16 and 17, 2019, respectively.

Copies of the published notices are provided in Appendix B.

Information regarding the PICs was also advertised on the City's website.

(<https://www.brantford.ca/en/your-government/mohawk-lake-and-mohawk-canal-cleanup-and-rehabilitation-project.aspx>).

4.2 Public Engagement

As part of the Project, the City held two (2) PICs to allow the public and interested stakeholders to learn more about the Project and provide input into the Project. Both PICs were held within the Mohawk Lake Study Area at the Mohawk Park Pavilion and were organized in an open house, drop-in format with information presented on the display boards and members of the Project Team on hand to respond to the questions and gather feedback. The attendees were encouraged to browse the display boards and discuss interests with the Project representatives. Copies of the materials from both PICs are presented in Appendix B.

4.2.1 Public Information Centre No. 1

The City hosted the first PIC on June 5, 2019 from 5:00 p.m. to 7:00 p.m. at the Mohawk Park Pavilion, 51 Lynnwood Drive, Brantford. The goal of this PIC was to share Project information with the interested community members, and to identify priorities and interests that should be considered in Project planning and execution. The key information exchanged during the PIC included background and status, summary of the Characterization Study, overview of existing land use of the Study Area and an outline

of the next steps. Copies of the PIC materials, including the redacted attendance record are presented in Appendix B.

Comments heard by City representatives and consultant during the PIC included:

- Interest in advancing the Project and concern with the time it has taken to reach this stage.
- Concerns relating to the Mohawk Lake District Plan (A City staff member was on hand to discuss these concerns)
- The history of Mohawk Lake and Mohawk Canal is very important and needs to be recognized in the study.

There were 22 attendees at the event who were encouraged to provide their comments on the problem and opportunity statement as well as their vision for the Mohawk Lake. A copy of the comments received on the problem and opportunity statement and visioning board is provided in Appendix B. The attendees were also provided with comment forms. The comment forms offered a method for participants to provide feedback on the Project by submitting their comments at the PIC or subsequently by mail, website or email. The deadline for comments was June 21, 2019. Six (6) comment sheets were received during the PIC and one (1) was received by email after the PIC. The comments received were reviewed by the Project team and were integrated into the next phases of Project planning. Refer to Section 4.2.3 for the summary of comments received during the PIC. All comments received are provided in Appendix B.

4.2.2 Public Information Centre No. 2

The City hosted a second PIC on October 23, 2019 between 5:00 pm and 7:00 pm at the Mohawk Park Pavilion, 51 Lynnwood Drive, Brantford. The purpose of this meeting was to provide an update on the Project and to share information on the evaluation criteria used to assess different management alternatives, evaluation results and identify preliminary preferred alternatives. Like the first PIC, there were a series of information display boards arranged around the room and the attendees were encouraged to provide their feedback. Copies of the PIC materials, including the redacted attendance record are presented in Appendix B.

Comments heard by City representatives and the consultant team during the PIC included:

- Supportive of public engagement and consultation throughout the process and hoping to be informed in the next phases as well.
- Unsupportive of preserving existing vegetation especially if vegetation is incompatible and does not fit with aesthetic.
- Mohawk Canal – trees were cut, and channels dredged in the 1980's. The plans were to dredge the lake, but it never happened.
- Some residents kayak every week and many people swim and fish (catch and release). Mostly carp found in the lake.
- Currently, there is little vegetation, lots of sediment and lots of garbage (including old cars at the bottom of the lake).
- There are five pipes that stick out from the bottom of the lake.

- Some attendees questioned the timeline and budget, stating that this can't be done. However, a more realistic plan can be doable.
- Some attendees expressed support and excitement for this plan and excitement that something may happen next year.
- Queen Elizabeth visited Brantford sometime between 1970's to 1980s, which was the last time the canal was dredged.

There were 18 attendees who signed the attendance record. Comment forms were provided to attendees. One (1) comment form was received by email on October 25, 2019. The comments received were reviewed by the Project team and were integrated into the next phases of project planning. Refer to Section 4.2.3 for the summary of comments received during the PIC.

4.2.3 Summary of Comments Received

Several opportunities, through the Public Information Centres (PICs) and the City's Project website, were provided to the public and other interested parties to provide their input into project planning. The comment forms received during the PICs and during the comment period are provided in Appendix B. Comments received, and the responses provided by the City and its consultant are summarized in the following table:

Date	Stakeholder	Comment	Response
June 5, 2019	Public Member	Information about the number and variety of bird and wildlife species that reside in the Study Area should be shared with the public.	Natural environment information, including birds and wildlife species can be found in the Characterization study.
June 5, 2019	Public Member	Concerns were raised to include the history of Mohawk Lake and Mohawk Canal into project planning	The EA and Master Plan considers the history of Mohawk Lake and Mohawk canal. Previous studies were considered throughout various stages of the project.
June 5, 2019	Public Member	Concerns were raised by numerous members of the public about the "over-development" of the Mohawk Lake. They prefer not to change too much.	The purpose of this project is to improve the water quality of Mohawk Lake and Mohawk Canal. The infrastructure improvements are considered part of the Master Plan and will aim to maintain the natural landscape as much as possible.
June 5, 2019	Public Member	The lake is wildlife habitat and refuge and it is what makes the park such a wild, special place. Make it	The purpose of this project is to improve the water quality, which will improve the aquatic habitat and refuge. The project

Table 4-1: Summary of Comments Received

Date	Stakeholder	Comment	Response
		a somewhat more accessible but do not change the positions, wildlife has adapted to this place as it is now.	will enhance the natural landscape of Mohawk Park, which will aim to protect the existing terrestrial wildlife habitat.
June 5, 2019	Public Member	Concerns were raised about the sustainability of fish, wildlife, birds, and vegetation in the area. The area is a wildlife habitat for dozens of species of amphibians, reptiles, birds and mammals.	The purpose of this project is to improve the water quality, which will improve the aquatic habitat and refuge. The project will enhance the natural landscape of Mohawk Park, which will aim to protect the existing terrestrial wildlife habitat.
October 23, 2019	Public Member	Suggestions were made to develop a hiking path around the Lake to increase its usage.	The Project Team will take into consideration the suggestion to develop hiking paths within Mohawk Park.
October 23, 2019	Public Member	It was recommended to use other communication methods other than Brantford Expositor.	During future phases, other communication methods will be considered.
October 23, 2019	Public Member	Emphasis should be placed on the clean-up of the lake i.e., removal of garbage from the lake.	The purpose of this project is to improve the water quality, which will involve the removal of any waste found in the lake.
October 23, 2019	Public Member	Portion of the lake is a landfill that must be avoided.	This comment will be taken into consideration during the design phase of this project.

4.3 Indigenous Engagement

Early engagement with the Indigenous communities is an important part of the planning process. Through engagement with the MECP, the following Indigenous communities were identified as being potentially affected and requiring consultation:

- Haudenosaunee Confederacy Chiefs Council
- Mississaugas of the Credit First Nation
- Six Nations of the Grand River

Introductory letters, including the Notice of Commencement, were issued to the Mississaugas of the Credit First Nation and Six Nations of the Grand River (with a copy to the Haudenosaunee Development Institute who represents the Haudenosaunee Confederacy Chiefs Council as part of the broader Six Nations community). See

Appendix B for the letters issued to the Indigenous communities and email correspondences.

The City and Wood made follow up phone calls and emails to each Indigenous community to discuss their potential interest in the Project and next steps.

The City met with the representatives of the Six Nations of the Grand River during meetings with the Mohawk Lake Working Group. The City also made efforts to meet with Mississaugas of the Credit First Nation to discuss the Project; however, due to extenuating circumstances, the meeting could not be held. The City welcomes the opportunity to engage with the involved Indigenous communities during future phases of the Project.

4.4 Mohawk Lake Working Group

The Mohawk Lake Working Group provides an effective avenue through which to share and valid information as well as gather feedback and insights. Participates include a wide variety of community members, including representatives from the Six Nations of the Grand River and representatives from public interest groups.

The City conducted working group meetings on:

- April 5, 2019
- November 20, 2019

Copies of meeting minutes are provided in Appendix B.

4.5 Agency Consultation

Agencies were consulted throughout the different phases of the project. The Notice of Commencement was distributed to various agencies. Responses were received from the following agencies:

- Ministry of Environment, Conservation and Parks (Official Response: February 15, 2019)
- Canadian Environmental Assessment Agency: (Official Response: March 20, 2019)
- Ministry of Tourism, Culture and Sport: (Official Response: June 6, 2019)
- Transport Canada: (Official Response: May 27, 2019)

On January 20, 2020, GRCA was provided draft versions of the Master Plan, Environmental Assessment and Subwatershed Stormwater Plan reports prepared as part of this study. On February 18, 2020, GRCA provided comments which were incorporated in this report. The following is the summary of GRCA's key comments:

- Work within regulated areas may trigger the need for a Scoped Environmental Impact Statement. Wetland boundaries will need to be delineated by a qualified consultant and subsequently verified by the GRCA.
- The use of naturally occurring wetlands for quality control would typically not be supported by GRCA's current policies.

- Additional project screening and a fisheries self-assessment are recommended to ensure compliance with *Fisheries Act* and the *Species at Risk Act*, as applicable.

In addition, at a meeting on February 19, 2020, GRCA commented that an online, linear stormwater management facility could be considered for the canal, noting that the canal basically functions as a pond currently given minimal gradient.

Copies of the correspondence are provided in Appendix B.

5.0 Study Area Characterization

5.1 Overview

The Characterization Study (Aquafor Beech Limited, 2019) was reviewed to identify the key findings. This information has been used to identify preliminary constraints in relation to each discipline and determine potential impacts to the Cleanup and Rehabilitation of Mohawk Lake and Mohawk Canal, taking into account future development and land use changes in the tributary catchment.

5.2 Land Use

The population of the City is projected to grow by an additional 48,000 residents by the year 2036, an increase from the current population of 104,000 residents (ref. Growth Plan 2017, Schedule 3). This is expected to be accompanied by an additional 20,410 new dwellings units, and employment growth is projected to include an additional 23,000 jobs by the year 2036, an increase from the current 49,000 jobs (ref. Greater Golden Horseshoe Forecast to 2041 - Appendix B: Detailed Forecast Results, prepared by Hemson Consulting for the Province of Ontario).

The Project, and the long-term management of the lake and canal, will need to account for this additional growth and the impacts associated with intensification and new development within the tributary watershed. In order to gain a better understanding of the future land use and growth impacts, the following documents have been reviewed:

- City of Brantford Official Plan - Draft, 2016;
- Brantford Waterfront Master Plan, 2010; and
- Mohawk Lake District Planning Study, 2017.

5.2.1 City of Brantford Official Plan, Draft 2016

The City of Brantford Official Plan provides a statement of goals, objectives and policies that guide the City's growth and change around physical development and future land use. The Official Plan is currently under review; it was originally developed in 1988 and last amended in 2018. An entirely new Official Plan, the Draft Official Plan Version 1, was released in July 2016, which is not yet in effect and remains under review. As such, the Official Plan developed in 1988 that has been continuously amended over the years remains the City's legal document. For the purposes of this study, the Draft Official Plan 2016 has been reviewed, as the intent for this study is to understand future growth patterns conformance with existing policies.

Schedule 1- Growth Management identifies growth and intensification areas within the City boundaries, which include the Built-Up Area, Greenfield Area, Future Urban Growth Area, and Core Natural Area. Within the Built-Up Area, the Downtown Urban Growth Centre and Intensification Corridor areas, as the primary designated growth areas. In relation to the Mohawk Lake and Mohawk Canal study area, these areas are located upstream to the north and northwest of the subject lands and are expected to impact surface water runoff. The lands directly adjacent to the study area are designated Existing Stable Neighbourhood, where development will be limited and consist primarily of the development of vacant lots and minor infill (Official Plan, Part 1, 3.4(i)). This form

of development is not anticipated to have significant effects on the surface water runoff or erosion hazards and is not considered a significant concern to this project.

Erosion Site #1, Shallow Creek, (ref. Characterization Study, 2019) is located within the Downtown Urban Growth Centre, where much of the surface water will be directed to Shallow Creek via surface water runoff and storm sewer outfalls. Additional development in this area may result in a higher quantity and poorer quality of stormwater runoff and may exacerbate the erosion conditions already occurring at this location. Mitigation measures should be considered in future scenarios.

Schedule 5-1- Floodplain identifies the banks of Mohawk Lake and Mohawk Canal and the lands to the south as Special Policy Area 1, and the lands to the southeast of the east canal as Floodway Policy Area. The Floodway Policy Area (Official Plan, Part 1, 7.2.1) states that development is to be limited to public infrastructure, flood control works, and structures associated with open space uses (Official Plan, Part 1, 7.2.1.b). Special Policy Area 1 contains restrictions on the form of development, generally prohibiting sensitive uses such as emergency services and structures with basements.

Schedule 5-3 Steep Slope and Erosion Hazard identifies the majority of the banks of Mohawk Lake and Mohawk Canal as Steep Slopes and Erosion Hazard, including parts of Mohawk Park, Glebe Farm Indian Reserve, and the areas surrounding Tributary 1. This designation requires the areas be generally maintained in their natural state, with the exception of some development subject to approval by the GRCA, geotechnical assessments and other appropriate studies, and appropriate erosion and siltation control measures during construction (Official Plan, Part 1, 7.3).

Schedule 6- Landfill Sites identifies the active and abandoned landfill sites in the City and classifies the abandoned sites into four (4) categories. These sites should be further investigated to determine their potential role in both current and previous sources of contamination to water and sediment quality.

Schedule 9- Bikeway and Trails Network Plan identifies the existing and proposed network of multi-use trails and on-street routes. The proposed routes should be taken into consideration when developing the Drainage Plan and Master Plan.

Schedule 11- Modified Policy Areas classifies the study area as Area 5- Mohawk Lake/ Greenwich Mohawk District Area, which encourages a mix of uses and further detailed planning studies to provide direction to the redevelopment of the area (Official Plan, Part 2, 1.5).

5.2.2 Brantford Waterfront Master Plan, 2010

The Brantford Waterfront Master Plan provides a framework to protect and enhance the Grand River and its tributaries by protecting the natural features, trails, and access to water, and allowing for appropriate development on adjacent land. The Master Plan includes a Waterfront vision statement, guiding principles, Waterfront Master Plan, and implementation strategy, which incorporate the Official Plan policies.

The Natural Heritage Framework identifies the study area as Core Environmental Features and Potential Restoration Area, Glebe Farm Indian Reserve as a Significant Vegetation Community, and other portions of the study area as Woodland.

The **Parks Framework** identifies Mohawk Park as a Destination Park (as does The Destination Framework) and identifies a Linear River Edge Open Space along the banks of Mohawk Lake and Mohawk Canal on both the north and south banks. The Waterfront Master Plan provides background on the important history of Mohawk Park, and its role as a major focus of the Waterfront Master Plan, as the continuous greenway has the potential to provide nodes of recreational activity and provides park vistas for nearby locations.

The **Access Framework** identifies a proposed and existing Primary Waterfront Trail, which has been assumed to be synonymous with the Linear River Edge Open Space. The existing trail currently runs along the north and south banks of the eastern portion of Mohawk Lake and the east canal. A new 3 km portion of the Primary Waterfront Trail is proposed on the north side of Mohawk Lake and Mohawk Canal from Mohawk Park to Clarence Street, as well as a green street connection along the south of the lake and canal along Greenwich Street. The development of these trails will require coordination and approval with the Six Nations of the Grand River. Waterfront trails and parks often attract large numbers of visitors and may also attract additional development. The creation of the Primary Waterfront Trail may initiate development, which should be considered in the Drainage Plan and Master Plan.

The **Heritage & Culture Framework** identifies areas of Archaeological Potential, as well as areas of Mohawk Park, Lake and Canal, and Hydro Generation Station Ruins as Cultural Heritage Resources; this is discussed in more detail in the Characterization Report and CHL Feasibility Study.

The **Cultural Corridor Framework** identifies much of the study area as a Major Natural Cultural Heritage Interpretation & Recreation Destination, and the east canal and south side of the west canal as a Focus of Cultural Heritage Interpretation.

The **Destination Framework** identifies Mohawk Park as a Sports Field destination. The Plan proposes the branding of the Waterfront Cultural Corridor for overall promotion of the area as a tourism destination and suggests marketing efforts could be undertaken in partnership with destination marketing activities in the region. The Plan discusses a variety of economic development opportunities, and coordination with the City's Economic Development Strategy, both of which could bring further growth and development to the area.

The **Neighbourhoods & Districts Framework** identifies several areas classified as Potential Development Areas within and surrounding the study area. The Plan identifies the lands north of Glebe Farm Indian Reserve and adjacent to the south bank of the West Canal as Potential Development Areas. These areas do not align with the areas identified for growth in the Growth Management Plan. The Waterfront Master Plan does not elaborate on how these areas were identified as Potential Development Areas.

The **Implementation Plan** recommends a range of projects and initiatives, including the following initiatives specific to Mohawk Park: the preparation of a forest management plan, removal of invasive plants from natural areas, implementation of wildlife crossings, upgrade of park facilities, and removal of the fence around the perimeter of the park.

5.2.3 Mohawk Lake District Planning Study, Ongoing

The Mohawk Lake District Planning Study was initiated as a result of the City of Brantford Strategic Plan in order to guide development and revitalization in the Mohawk Lake District. The ultimate goal for the area is to create a vibrant, mixed-use urban neighbourhood, focusing on economic development needs and growth. The Mohawk Lake District Plan will include a District Plan Report, a series of technical studies, and implementing planning documents (i.e. Design Guidelines, an Official Plan Amendment and Zoning By-law Amendment). The Mohawk Lake District Plan Background Study, 2018, has been developed, and three (3) preliminary concept plans were presented to the public, each with a different vision for the Greenwich Mohawk Site. All information regarding the Mohawk District Plan are available on the City's website at <https://www.brantford.ca/en/your-government/mohawk-lake-district-plan.aspx>.

The Greenwich Mohawk Site is a 20.59-hectare brownfield site located on the lands to the south of the West Canal. The site consists of three (3) properties all owned by the City, previously vacant industrial lands. The City decided to remediate the lands in order to initiate private sector interest and completed the remediation program in 2017. All buildings associated with the vacant industrial lands were demolished, with the exception of the Canadian Military Heritage Museum and the Timekeeper's Office Buildings, which is designated under the Ontario Heritage Act. The Spur Railway line also traverses the lot.

The Mohawk Lake District Draft Overall Preferred Plan has been developed. The Draft Overall Preferred Plan proposes development at the Greenwich Mohawk Site which includes mixed-use developments of low and mid-rise residential, institutional and cultural, and open spaces. New trails and parks have been identified, as well as focal points throughout the district. As part of the implementation of the plan, the site will undergo significant development in the future and the impacts of which should be accounted for in the creation of the Drainage Plan and Master Plan.

5.3 Natural Environment

The Characterization Study (Aquafor Beech Limited, 2019) included a review of natural heritage planning policies, including policies from the City of Brantford Official Plan and Grand River Conservation Authority. A background review was completed of previous aquatic ecosystem studies conducted within Mohawk Lake related to the fish community, benthic macroinvertebrate community, and aquatic habitat. The terrestrial ecosystem background review included studies related to flora, vegetation communities, species-at-risk (SAR) and other species of conservation concern, and significant wildlife habitat. Historical information related to the terrestrial ecosystem was noted to be insufficient, and the assessment of Natural Heritage System (NHS) features could not be determined solely through review of background information, resulting in a requirement for a significant field survey program. Figure 8 shows the natural heritage features within the Study Area.

5.3.1 Aquatic Ecosystem

Fish community, benthic macroinvertebrate, and aquatic surveys were completed as part of the Characterization Study (Aquafor Beech Limited, 2019). Fish surveys included four (4) minnow traps and a fyke net over a five (5) day period only targeting Mohawk Lake; electrofish and seine net surveys were not conducted due to local conditions. Benthic macroinvertebrate surveys were conducted following the travelling kick and sweep method with three replicates conducted. Aquatic habitat surveys were conducted using Section 4: Module 2 of *Ontario Stream Assessment Protocol (OSAP)* for Point-Transsect Sampling for Channel Structure, Substrate and Bank Conditions; dissolved oxygen and temperature were also measured within the lake.

5.3.1.1 Constraints

Historic fish community surveys (1972 and 1993) from Mohawk Lake identified cyprinid species, generally known to be tolerant of degraded conditions. Pumpkinseed (*Lepomis gibbosus*), a species somewhat resilient to impaired conditions, was also identified. No large predator or game fish were captured as part of these historical surveys. Fish community surveys completed in 1995 reported a diverse assemblage of top-level and mid-level predators and omnivorous and planktivorous species. These historic surveys also identified Common Carp (*Cyprinus carpio*), an invasive species generally known to thrive in lake/lotic systems with high turbidity. It was estimated that Common Carp comprised approximately 50% of the catch. As noted in the Characterization Report, the MNRF confirmed the presence of many the species reported in 1995 (ref. MNRF response in April 2018 to Aquafor Beech Ltd.'s Information Request). Results from the fish community surveys completed as part of the Characterization Study (Aquafor Beech Limited, 2019) confirmed previously identified species with the addition of Creek Chub (*Semotilus atromaculatus*) and Bluegill (*Lepomis macrochirus*). No sensitive species or SAR were captured.

Previous studies noted that the existing silt substrate limited the potential for fish spawning, as silt can smother eggs. It was also noted that the lack of emergent vegetation nearshore limited the potential for nursery habitat for juvenile fish. Current Fisheries and Oceans Canada (DFO) SAR mapping indicate critical habitat for Eastern Sand Darter (*Ammocrypta pellucida*) and Round Pigtoe (*Pleurobema sintoxia*) in the Grand River downstream of the outflow channel. DFO SAR mapping identified additional SAR fish and mussel species potentially occurring in the reaches immediately downstream of the outflow channel, including Black Redhorse (*Moxostoma duaesnei*), Silver Shiner (*Notropis photogenis*) and Wavy-rayed Lampmussel (*Lampsilis fasciola*). The Characterization Study (Aquafor Beech Limited, 2019) identified the potential for three (3) aquatic SAR within the study area; Rainbow Mussel (*Villosa iris*), Round Pigtoe and Wavy-rayed Lampmussel. However, given the current observed habitat conditions, it was determined that these species do not likely inhabit the Mohawk Lake system.

Benthic macroinvertebrate sampling in 1972 only identified species within the outflow channel. The identified species were all considered to be pollution tolerant. Benthic macroinvertebrate sampling in 1995 noted a higher diversity of species along the littoral zone compared to the profundal zone. With the exception of a few species, all were

considered to be tolerant to pollution. Benthic macroinvertebrate surveys undertaken as part of the Characterization Study (Aquafor Beech Limited, 2019) focused on around the edges of the lake and within the canals. The results indicate that conditions are considered not to be impaired; however, conditions within the canal and outflow channel were noted to be poorer compared to the lake.

The results of the Characterization Study identified the Mohawk Lake system to have a cool-warm water thermal regime with an assemblage of species that are intermediately tolerant to adverse and impaired conditions. The highest quality of habitat identified included the littoral nearshore areas of Mohawk Lake. Habitat within the profundal zone was considered to be impaired and highly influenced by deep sediment accumulations, which has impacted the benthic macroinvertebrate community and reduced dissolved oxygen concentrations.

Recommended Habitat Enhancements

To improve aquatic habitat conditions, the Characterization Study included the following recommendations:

- Create a varied bathymetric profile of the lake to provide a diversity of water depth and thus habitat for fish;
- Introduce coarse substrate material into the Mohawk Canal and to an extent within the lake to increase substrate diversity and promote a variety of habitat for aquatic vegetation, invertebrates and fish;
- Introduce coarse substrate material into the Mohawk Canal to improve hydraulic conditions, expand capacity and utilization for a variety of lentic and lotic fish species. These changes could also improve sediment transport, under the assumption that incoming bedload is controlled and not substantially impactful to the hydraulic regime provided by the additional coarse substrate; and
- Address identified erosion areas (GRCA – Riverine Erosion Hazard Lands) within the lake, canal, and tributaries where over-steepened banks are present.

Constraints related to the implementation of aquatic habitat improvements included:

- The effectiveness of introducing coarse substrate material will be dependent on the identification and mitigation of the primary sediment sources. Coarse substrate materials will become buried in sediment and yield limited benefit unless the quantity of sediment entering the system is reduced.
- The ability to vary the bathymetric profile of the lake will be dependent on the assessment of sediment contamination and whether transporting the sediment will result in the mobilization of contaminants.
- Mohawk Lake and Mohawk Canal are part of a larger natural heritage system, which is urbanized upstream and naturalized downstream. Improvements to aquatic habitat will be constrained by the context of the site, as the water quality flowing from the urbanized watershed is degraded.

Data Constraints

Recommendations for Additional Studies:

The Characterization Study provided a focus on conditions within Mohawk Lake and in the immediate areas of the canal and outflow channel. The Characterization Study does not cover areas relative to the Shallow Creek pond or Rawdon Street pond (ID#1 and ID#2, respectively). However, the Rawdon Street pond is proposed outside of the existing aquatic environment, and therefore no further aquatic investigations are recommended at this time. It is recommended that the field survey program be extended to further characterize conditions within the Shallow Creek pond area, the identified tributary, the east and west canal, and within the Grand River proper. A fish community survey program to collect information is recommended. Aquatic habitat characterization will be carried out by following the Ministry of Transportation/Fisheries and Oceans Canada/MNRF fisheries protocol. Aquatic habitat characterization will include the collection of data pertaining to the general morphology of the reach (bankfull depth, channel width, and stream gradient), instream and riparian vegetation, occurrences of seeps or springs, general description of substrates as they relate to potential fish habitat, and flow. Information collected will be used to identify fisheries' constraints and evaluate impacts on existing fisheries resources (as needed).

A complete understanding of the system will enable a broader understanding and identification of all constraints and sensitivities to focus remediation efforts.. In general, surveys within the Grand River should also focus on evaluating habitat potential for the identified SAR, to confirm future permitting and approval requirements under applicable provincial and federal legislation.

Overall, an Environmental Impact Study (EIS) will need to be prepared through coordination with the GRCA through an approved terms of reference (TOR) to facilitate the project moving forward.

5.3.2 Terrestrial Ecosystem

Biophysical studies completed as part of the Characterization Study (2019) (Aquafor Beech Limited, 2019) included breeding bird surveys, amphibian calling surveys, incidental observations of wildlife surveys (e.g. reptiles, lepidopterans, odonates, mammals) and botanical and vegetation community surveys. Vegetation communities were assessed in accordance with the *Ecological Land Classification Protocol for Southern Ontario* (Lee et al., 1998) and complemented by aerial imagery interpretation and roadside assessments. Wetlands were assessed according to the *Ontario Wetland Evaluation System (OWES), Southern Manual* (MNRF, 2014). Botanical inventory and vegetation community surveys were completed in the summer/early fall to identify vascular plants in the study area. Breeding bird surveys were conducted in accordance with the *Ontario Breeding Bird Atlas (OBBA)* (Bird Studies Canada et al., 2001) protocol in June 2018 over the course of five (5) dates; a total of 28-point count surveys were established within the study area, reflective of areas where significant species and/or habitat were considered to be present and included a review of eBird (an online database of public observations). Targeted mammal surveys were not undertaken for the Characterization Study; field surveys conducted in 2018 resulted in incidental mammal observations. Amphibian call surveys were conducted in accordance with the

Marsh Monitoring Program (Bird Studies Canada, 2009) standard protocol, on calm nights, typically immediately after rain. SAR and other species of conservation concern were identified through several primary and secondary information sources, including correspondence with the Ontario Ministry of Natural Resources and Forestry (MNR) and other background information sources. Significant Wildlife Habitat (SWH) was identified in accordance with the *Significant Wildlife Habitat Criteria Schedules For Ecoregion 7E* (MNR, 2015).

5.3.2.1 Constraints

The results of the program undertaken as part of the Characterization Study identified 26 (twenty-six) Ecological Land Classification (ELC) polygons comprised of 23 (twenty-three) vegetation community types. The identified communities were varied and ranged from highly disturbed areas to natural forests and wetlands. One (1) of the communities (provincially ranked Imperiled to Vulnerable, S2S3) is considered to be a rare vegetation community: Fresh-Moist Lowland Black Walnut Deciduous Forest (FOD4-7), according to the *Significant Wildlife Habitat Technical Guide* (2000). This community was found in three (3) locations: a steep slope on the north shore of Mohawk Lake, in between Mohawk Road and the existing hydro corridor, and around Beach Road adjacent to the Grand River.

The Mohawk Lake and Oxbow Wetland Complex were evaluated in 2000, and was not considered to be significant. Some species documented in the original 2000 evaluation have since been up-listed, for example Eastern Wood-Pewee (*Contopus virens*), and new documentation of SAR, Snapping Turtle (*Chelydra serpentina*) and Blanding's Turtle (*Emydoidea blandingii*), result in the classification of Provincially Significant Wetland (PSW). The reclassification of the wetland as a PSW will have policy implications. As such, the extent of the wetland would also require further evaluation to determine if smaller wetland features that would be complexed together. The Characterization Study, recommended that the existing wetland evaluation be updated according to OWES.

The results of the botanical survey undertaken during the Characterization Study identified a total of 260 species, with 179 native species and 81 introduced species and no SAR were identified. However, four (4) species of provincial significance were recorded: Ohio Buckeye (*Aesculus glabra*), Tall Boneset (*Eupatorium altissimum*), Pignut Hickory (*Carya glabra*) and Sharp-leaved Goldenrod (*Solidago arguta* var. *arguta*). Locally rare species that were identified included: Carpenter's Square (*Scrophularia marilandica*), Columbia Watermeal (*Wolffia columbiana*) and Pale-leaved Wood Sunflower (*Helianthus strumosus*). Common Buckthorn, an aggressive non-native invasive species, was present in the understory in many communities throughout the study area. Other invasive species observed include Garlic Mustard (*Alliaria petiolate*), Common Reed (*Phragmites australis*) and Periwinkle (*Vinca minor*). The Characterization Study noted that previous studies recommended the implementation of an Invasive Species Management Plan.

Breeding bird surveys undertaken during the Characterization Study identified a total of 62 species, which included four (4) SAR: Chimney Swift (*Chaetura pelagica*), Barn Swallow (*Hirundo rustica*), Wood Thrush (*Hylocichla mustelina*) and Eastern Wood-

pewee. Additionally, the Caspian Tern (*Hydroprogne caspia*), which is provincially rare, was identified during surveys. Caspian Tern is included in the Characterization Study Breeding Bird Table (Table 5.3.1), however this species is not included in the Appendix E-7, Species-at-Risk and Species of Conservation Concern Screening Table. However, Caspian Tern is included in Appendix E-8 – Significant Wildlife Habitat Screening Table, the Tern is identified as a potential species within Colonially – Nesting Bird Breeding Habitat (Ground). The assessment determined that the required habitat for this significant wildlife habitat category is not present within the study area. Background records (eBird) identified the potential for three (3) additional species of special concern: Bald Eagle (*Haliaeetus leucocephalus*), Red-headed Woodpecker (*Melanerpes erythrocephalus*) and Horned Grebe (*Podiceps auritus*) and one (1) provincially rare species, Great Black-backed Gull (*Larus marinus*). The eBird observations are year-round, and any particular record could include migrant individuals or winter residents and does not explicitly confirm the species is breeding.

Incidental mammal observations included: Eastern Grey Squirrel (*Sciurus carolinensis*), Eastern Chipmunk (*Tamias striatus*) and White-tailed Deer (*Odocoileus virginianus*). Of note, there is potential for bats species to be present in the study area; however, such investigations were not undertaken as part of the Characterization Study. A local resident conducted surveys throughout the study area and reported the following additional species: Beaver (*Castor Canadensis*), Eastern Cottontail (*Sylvilagus floridanus*), feral and domestic cats (*Felis catus*), Red Fox (*Vulpes vulpes*), Muskrats (*Ondatra zibethicus*), Virginia Opossum (*Didelphis virginiana*) and Raccoons (*Procyon lator*).

Herpetofauna surveys were undertaken as part of the Characterization Study. A total of six (6) survey stations identified five (5) frog species over three (3) monitoring events. No full chorus calls were recorded, with many stations having no calls (11 of 18 station events). Identified species were all considered to be secure.

Extirpated, Endangered and Threatened species and their habitat are protected under the provincial *Endangered Species Act (ESA, 2007)*. Special Concern species are listed under the *ESA, 2007*. However, they are not allotted habitat or species protection under the *ESA, 2007*. The result of the SAR screening, as presented in the Characterization Study, confirmed the presence of 11 terrestrial SAR and species of conservation concern within the study area: Barn Swallow, (Threatened) Chimney Swift (Threatened), Eastern Wood-pewee (Special Concern), Wood Thrush (Special Concern), Monarch (*Danaus plexippus*) (Special Concern), Pignut Hickory (S3), Ohio Buckeye (S1), Sharp-leaved Goldenrod (S3), Tall Boneset (S1), Blanding's Turtle (Threatened) and Snapping Turtle (Special Concern). Potential habitat for other terrestrial SAR was also identified, including Bald Eagle, Golden-winged Warbler (*Vermivora chrysoptera*) (Special Concern), Northern Bobwhite (*Colinus virginianus*) (Endangered), Red-headed Woodpecker, Yellow-breasted Chat (*Icteria virens*) (Endangered), Rapids Clubtail (*Gomphus quadricolor*) (Endangered), American Badger (*Taxidea taxus*) (Endangered), bats species (Endangered), Eastern Ribbonsnake (*Thamnophis sauritus*) (Special Concern) and Butternut (*Juglans cinerea*) (Endangered).

Confirmed Significant Wildlife Habitat (SWH), as reported in the Characterization Study, included Rare Vegetation Communities (Fresh-Moist Lowland Black Walnut Deciduous

Forest), Bald Eagle and Osprey Nesting, Foraging and Perching Habitat, Amphibian Breeding Habitat (Wetlands), and Specialized Habitat for Wildlife: Special Concern and Rare Wildlife Species. Potential SWH within the study area included: Raptor Wintering Area, Bat Maternity Colonies, Turtle Wintering Areas and Turtle Nesting Areas, Reptile Hibernaculum, and Shrub/Early Successional Bird Breeding Habitat.

Recommended Habitat Enhancements

- Develop and implement an Invasive Species Management Plan;
- Develop and implement an Edge Management Plan for associated woodlands, particularly the Black Walnut Lowland Deciduous Forest (FOD7-4) which is considered a rare vegetation community according to the *Significant Wildlife Habitat Technical Guide* (2000);
- Develop and create butterfly habitat by enhancing existing meadow habitat with the removal of invasive species and new plantings of suitable native species (e.g. Common Milkweed);
- Create new turtle nesting areas and basking opportunities through the placement of sand and gravel beds, as well as logs;
- Enhance existing vegetation communities with a native species planting program combined with the Invasive Species Management Plan through the creation of a Landscape Restoration Plan; and
- Depending on the level of habitat present, the potential creation of raptor habitat or perching structures.

Constraints related to terrestrial natural heritage recommendations:

- Should the Mohawk Lake and Oxbow Wetland Complex be designated a PSW, this will represent a significant constraint to the site, as a 120m PSW adjacent lands setback would restrict development and adjacent land use opportunities.
- Construction activities and site disturbance may result in delays for habitat creation, as a native species planting program may be destroyed in the process of remediation works. Similar effects should be considered if a maintenance program or regular dredging is proposed.
- Mohawk Lake and Mohawk Canal are located in an increasingly urbanizing environment. Terrestrial habitat should consider wildlife fencing and site design that redirects wildlife away from vehicular traffic and urbanized areas.

Data Constraints

The Characterization Study provided a focus on conditions within Mohawk Lake and in the immediate areas of the canal and outflow channel. The characterization study does not cover areas relative to the Shallow Creek pond or Rawdon Street pond (ID#1 and ID#2, respectively). It is recommended that the field survey program be extended to further characterize conditions within the future Shallow Creek and Rawdon Street pond area.

Recommendations for Additional Studies:

- Should the works proposed near or within the Mohawk Lake and Oxbow Wetlands, evaluation of these wetlands should be updated to include recent SAR records; the results of this evaluation would be expected to change the status of the wetland complex, making it a PSW. Consultation should occur with the MNRF to confirm the PSW designation. It is important to note these features are not adjacent or within 120 m of the proposed Shallow Creek and Rawdon pond areas;
- Completion of a two (2) season (spring and summer) botanical inventory and evaluation and mapping of the existing vegetation communities using the Ecological Land Classification (ELC) system for southern Ontario (Lee 1998);
- Completion of breeding bird surveys consistent the Ontario Breeding Bird Atlas (two surveys timed 15 days apart between late May and 10 July);
- Search for Reptile hibernaculum to document burrows, rock piles, old stone fences, abandoned crumbling foundations, and wetlands to confirm absence and presence;
- Potential maternity roost habitat has been documented in the Characterization Study. It is recommended that MECP be consulted regarding information required to determine mitigation for tree removal, should tree removals be proposed. ;
- Evaluation of wildlife habitat features, potentially significant wildlife habitat, general extent of habitat use and potential linkage functions between the natural areas, particularly for SAR, to the extent feasible;
- Butternut field survey to confirm the presence or absence of species. No parent Butternut were observed during the field investigations in the Characterization Report. However, several young walnut species were noted in communities 10 and 11 that exhibited signs of a Butternut Hybridity. Confirmation should be made through another field survey with the potential submission of DNA samples to MNRF. It is important to note these features are not adjacent or within 120 m of the proposed Shallow Creek and Rawdon pond areas, however, given their proximity a search for Butternut is recommended which would occur in tandem with the recommended three (3) season botanical inventory; and
- A tree inventory to document the trees that may be impacted by future construction activities shall also be completed.

Overall, an Environmental Impact Study (EIS) will need to be prepared through coordination with the GRCA through an approved TOR to facilitate the project moving forward. The above noted recommended studies will serve as part of the EIS or completed separately and included within the EIS. As noted in Section 4.5, in response to the review of draft project documentation, GRCA indicated that Wetland boundaries will need to be delineated by a qualified consultant and subsequently verified by the GRCA.

5.3.3 Linkages (Features and Function)

Based on the information provided, it is evident that the adjacent land uses have contributed to increased sedimentation in Mohawk Lake along with potential contaminants from the multiple outfalls along the banks. Each of these adjacent land uses contributed to the alteration of the water quality of Mohawk Lake and, subsequently, the fish and benthic population. Improvements to better manage land use influences on Mohawk Lake will help improve the aquatic habitat and overall function .

As it pertains to the terrestrial ecosystem, the east and west canal, are more than 20 m wide in most instances in the Study Area. a 20 m break between two features is considered large enough to separate the features, per the Natural Heritage Reference Manual (2010). For example, a break in a woodland canopy that is 20 m or greater, results in the delineation of two separate woodlands. Therefore, based on the existing Study Area, those features on the north shoreline are separated from those along the south shoreline. A better understanding of the linkages between groundwater and hydrologic functions and their role and influence in adjacent wetland function is needed. Furthermore, the role of groundwater in the interaction with legacy landfills is also important and in need of further study.

It is expected that through environmental rehabilitation, the linkages between water resources, existing natural heritage features, and surface water features may be improved to be more functional and sustainable. Rehabilitation will allow for improvements to the riparian habitat along the banks and help link those communities between the shorelines.

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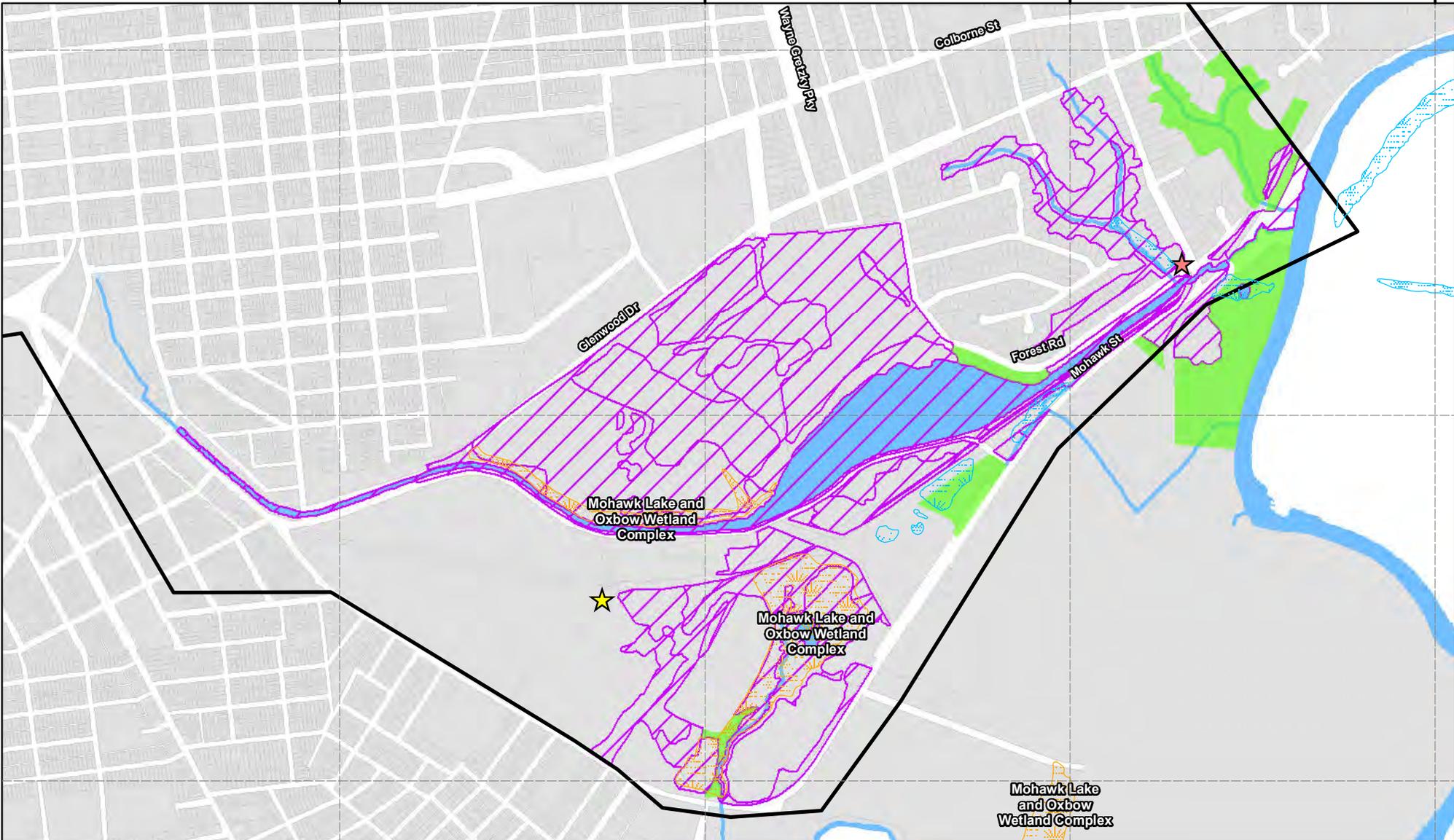
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LEGEND		NOTES: Regulation Limit from GRCA Open Data, 2019		
<ul style="list-style-type: none"> Study Area Watercourse Waterbody Property Parcel 	<ul style="list-style-type: none"> Rare Vegetation Community (Provincially Significant) Confirmed Significant Wildland Habitat Wetland (Non - PSW) Provincially Significant Wetland (Recommended) 		<ul style="list-style-type: none"> Osprey Nest Barn Swallow Nest 	Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study
			Natural Heritage Map	
			Datum: NAD83 Projection: UTM Zone 17N	

5.4 Physical Environment

5.4.1 Geology, Hydrogeology and Groundwater

The Characterization Study (Aquafor Beech Limited, 2019) provides a general description and characterization of the soils, overburden, hydrogeology and groundwater for the Project.

The Characterization Study has documented the geology of the study area based on previous investigations and ten (10) boreholes advanced at Mohawk Lake, including wells (seven (7) sites; three (3) nested).

Single well response tests were conducted on six (6) of the wells, with the resulting estimates ranging from 4.4×10^{-8} m/s to 4.1×10^{-5} m/s. The tests were all falling head tests with pre-test water levels below the top of well screen and analysis based mainly on early time response data. Consequently, the results could be affected by infiltration of water to the well annulus sand filter pack. Based on the data and information provided in Appendix A-1 of the Characterization Study, comments are provided below for each test:

- MW#1D – The pre-test water level is only ~0.5 m below the top of well screen. There appears to be no notable early time effects; 4.4×10^{-8} m/s is considered reliable for the screened silt, silty sand/silty clay;
- MW#2 – The pre-test water level is within silty clay below the base of the sand. Almost complete head loss ($H/H_0 = 0.1$) occurs within 50 s; 1.5×10^{-5} m/s is likely to represent infiltration to the sand filter pack and upper sand;
- MW#4D - The pre-test water level is within silty clay at the top of the well screen just below the base of the fill. All head loss ($H/H_0 = 0.45$) occurs within 50 s after which the water level does not decline; 5.4×10^{-6} m/s is likely to represent infiltration to the sand filter pack and potentially Fill (silty sand) just above the top of the well screen;
- MW#5/5R - The pre-test water level is within silty clay above the sandy gravel at the base of the well. Head loss is uniform and gradual ($H/H_0 = 0.65$ after 550 s); 2.5×10^{-7} m/s is too low for gravel, which would be expected to dominate the hydraulic conductivity of this well;
- MW#6 - The pre-test water level is within silty clay above silty sand. Most head loss ($H/H_0 = 0.3$) occurs within 60 s after which the water level does not decline much; 4.1×10^{-5} m/s is likely too high for silty clay and silty sand. It is more likely to represent flow through the sand filter pack to the Fill (sand) immediately above the well screen;
- MW#7D - The pre-test water level is within fill (sand). Head loss occurs within 20 s and is very limited ($H/H_0 = 0.8$) after which the water level does not decline; this type of response suggests there is potentially a well construction issue and 1.4×10^{-6} m/s should not be considered representative of the soils indicated in the well log.

The Hazen method was used to estimate hydraulic conductivity from the soils sampled from MW#5/5R (sandy gravel) and MW#6 (silty sand), which gave results of 1.6×10^{-5} m/s and 1.0×10^{-5} m/s respectively.

Overall, the well logs and hydraulic data indicate the following hydrostratigraphy:

- a shallow aquifer usually within 2 – 5 mbgs comprising fill (mainly sand or silty sand, with some silty clay, gravel and organics) and sand with a hydraulic conductivity of around 1×10^{-5} m/s +/- half an order of magnitude. Cross-sections on drawings 7-2A and 7-2B of Appendix-A1 of the Characterization Study show this unit to be largely unsaturated;
- a deeper aquitard comprising mainly silt and silty clay, with subsidiary silty sand with a hydraulic conductivity lower than 1×10^{-7} m/s. Cross-sections on drawings of 7-2A and 7-2B of Appendix-A1 of the Characterization Study show the water table just above or within this unit.

The groundwater levels and flow directions were characterized based on twelve (12) months of groundwater level data collection, beginning in September 2018, comprising a total of ten (ten) records collected at the seven (7) new well sites. The record of MW#5 starts in February 2019 as the headworks of this well was destroyed during a vehicular incident and re-established in February 2019.

One (1) sampling round has been completed with analyses reported for conductivity, pH, turbidity, chloride, cyanide, dissolved metals, hexavalent chromium, volatile organic compounds (VOCs), hydrocarbons and polycyclic aromatic hydrocarbons (PAHs).

The results of the groundwater level monitoring program are presented in a series of hydrographs in the Characterization Study together with temperature plots. It should be noted that the format of the groundwater hydrographs is not conducive to thorough review as:

- Changes in the groundwater level are not clear as the vertical scale of the hydrographs (25 m) is far greater than the seasonal variation (mostly less than 2 m); and
- In MW3 the groundwater level is below the bottom of the well for most of the record; and

Overall the data indicate that groundwater levels have stayed relatively consistent across the year with peak groundwater levels coinciding with the freshette.

The Characterization Study has one (1) groundwater level contour map interpreted from the measured groundwater levels in the ten monitoring wells. It does not include data from other sources, so the interpretations regarding groundwater flow directions are restricted to the immediate vicinity of Mohawk Lake. This contour map indicates southwards groundwater flow from the high-ground in the north towards the Grand River.

The Characterization Study indicates that the area north of Mohawk Lake is a recharge area and south is a discharge area based on the vertical gradients and groundwater temperatures. Wood considers that the Characterization Study data are more consistent

with Mohawk Lake acting as groundwater flow through feature associated with predominantly horizontal groundwater flow draining along the base of the shallow aquifer (sandy fill and sand) above the aquitard (mainly silts and silty clays). In addition to the hydrostratigraphy described above, this is supported by the following information:

- The elevation of the Mohawk Lake outlet control structure is 198.1 masl, which controls the water level of Mohawk Lake. To the north of Mohawk Lake the groundwater levels are above 207 masl, with exception of MW4S and 4D, which are 198.5 at masl. To the south of Mohawk Lake the groundwater levels are around 195 to 196 masl. In combination, these data indicate groundwater discharge to Mohawk Lake along the north bank and surface water exfiltration from Mohawk Lake to groundwater along the south bank.
- Based on the manual groundwater level data (Appendix-A1 of the Characterization Study), the vertical hydraulic gradients appear to be relatively subdued. On the north bank, the shallow groundwater levels at MW#1S are on average approximately 0.2 m higher than the deeper groundwater levels at MW#1D, indicating a downward vertical hydraulic gradient. The groundwater level difference at the other two nested sites are very limited; measured differences are on average approximately 0.02 m at MW#7S/MW#7D (south bank) and 0.03 m at MW#4S/MW#4D (north bank), in both cases indicating upward vertical gradients. The magnitude of these groundwater level differences is not sufficient to indicate a discharge area to the south of Mohawk Lake. They are more consistent with predominantly horizontal flow.
- The temperature data are variable. Lower temperatures tend to occur north of Mohawk Lake with warmer temperatures south of the lake as indicated in the Characterization Report. All the monitoring wells are shallow, which may cause a relatively large seasonal variation in groundwater temperatures; depth to water table could also influence this variation. The more variable temperatures along the south bank of Mohawk Lake may also be due to surface water exfiltration to groundwater.

It is uncertain if groundwater discharge to Mohawk Lake on the north bank exceeds surface water exfiltration to groundwater on the south bank. However, it would appear that horizontal hydraulic gradients are greater on the northern side of the lake, potentially indicating higher groundwater discharges.

5.4.1.1 Constraints

Generally, the soils from the ten (10) boreholes comprise a predominantly sandy fill overlying silty clay. The fill is generally 2 – 3 m thick, but at one (1) location exceeded 6.5 m thick. These boreholes are mapped by the Ontario Geological Survey (OGS) in alluvium (south of Mohawk Lake) or laminated glaciolacustrine deposits (north of Mohawk Lake). Except for two (2) boreholes (MW#7 nested well site), none of the new boreholes are located within the potential development areas of the study area.

The potential development areas are mapped by the OGS to lie in the following overburden units:

- Modern alluvial deposits of the Grand River comprising unsubdivided muck, clay, silt, sand and gravel;
- Older alluvial deposits comprising sand and gravel; and
- Coarse-textured glaciolacustrine deposits.

Based on previous reports, Aquafor Beech (2019) estimated the overburden to be about 20 m thick resting on the Silurian bedrock of the Salina Formation.

Exceedances of the O.Reg. 153/04 Table 1 groundwater standards have been recorded for some of the following parameters: pH, chloride, cyanide, dissolved metals, hexavalent chromium, VOCs, hydrocarbons and PAHs. The interim Characterization Study reviewed previous studies on groundwater contamination in the study area and mapped the potential sources for groundwater contamination based on existing information.

The following constraints have been identified associated with the geology and groundwater for the potential development lands within the study area:

- There is historical groundwater contamination around Mohawk Lake. Specifically, the area of Shallow Creek Park to the west of Mohawk Lake was investigated in 1995 by Gore and Storrie and found the area to be affected by coal tar wastes with associated PAH contamination of groundwater. For this area Gore and Storrie (1995) interpreted the contaminants to be relatively immobile. Although mostly outside the potential development lands (ref. Drawing 7), the groundwater quality samples from the Aquafor Beech wells showed elevated PAH, hydrocarbon (F2 and F3), barium, zinc and chloride concentrations exceeding O.Reg. 153/04 Table 1 groundwater standards.
- Any redevelopment is therefore likely to require a site condition assessment for soil and groundwater contamination, to determine the risk of contaminant mobilization in groundwater.
- Information provided by Aquafor Beech (2018) indicates that Mohawk Lake is a groundwater discharge feature. Mohawk Lake and Mohawk Canal lie mostly within an Intake Protection Zone (IPZ 3), with the downstream end within an IPZ 2. An expected constraint of any new development will be that the groundwater discharge to Mohawk Lake and associated surface water features, would not be reduced either in quality or quantity.
- The elevation of the outlet control structure of Mohawk Lake may influence groundwater-surface water interaction at the lake.
- Development infiltration may not be less than pre-development infiltration.
- Soil erosion would have to be controlled to prevent discharge of water with excessive suspended and/ or contaminated sediment load to Mohawk Lake and Canal.

Data Constraints

The following data and information constraints have been identified:

1. Data on surficial geology (borehole data collected from previous studies, MECP well records and published OGS geological map) in the project area have not been compiled into a single map showing required detail of the surface geology of the potential development lands and Mohawk Lake and Mohawk Canal. Such a map will be required to provide a qualitative or semi-quantitative assessment of potential impacts on infiltration that any development may have.
2. Information available on groundwater levels (understanding from previous reports, groundwater levels in the investigation report, MECP water well records etc.) have not yet been processed into a groundwater level contour map depicting groundwater flow directions for the development lands at Mohawk Lake and relevant up-gradient and downgradient areas.
3. The Characterization Report did not consider the water level of Mohawk Lake for the interpretation of groundwater level data. Wood has considered this information and suggests a revised conceptual understanding of groundwater flow in the immediate vicinity of Mohawk Lake. Mohawk Lake is considered a groundwater through-flow feature, likely with some net discharge to surface water. Groundwater flow is primarily along the base of a surficial aquifer comprising sand fill and sand.

5.4.1.2 Linkages (Features and Function)

Potential development within the study area has the potential to impact the groundwater system in the following ways:

- In the short term, construction activities such as dewatering may cause temporary changes to the groundwater flow system.
- In the long term, additional development may cause a change in infiltration and overall water balance.

The effects may include changes to the discharge rates to Mohawk Lake and Mohawk Canal, and the potential to mobilize groundwater contaminants.

The groundwater linkages associated with the potential development land within the study area are as follows:

- Temporary changes during construction such as dewatering, diversion of surface waters or storm water management measures, may cause temporary changes to the groundwater flow system;
- Permanent changes to the surface of the potential development lands may cause a change to infiltration, either a reduction due to the introduction of impervious surfaces, or an increase if engineered infiltration features are introduced [e.g. Low Impact Development Best Management Practices (LID BMPs)], flow through utility trenches) and existing impervious surfaces are removed. A change in vegetation could result in either decreases or increases in infiltration depending on form and function.

The main effects, either temporary or permanent, that may result from these changes to the groundwater system are:

- Changes to groundwater discharge rates to Mohawk Lake and Mohawk Canal;
and

Mobilization of existing groundwater contamination or introduction of new groundwater contamination (e.g. infiltration of deicers from infiltration of storm runoff) causing discharge of poorer-quality water to Mohawk Lake and Mohawk Canal.

5.4.2 Hydrology and Stormwater Management

The Characterization Study (Aquafor Beech Limited, 2019) provides a general overview of the drainage systems and drainage area characteristics of the Mohawk Lake and Mohawk Canal subwatershed. Reference is made to the previously completed Mohawk Lake Rehabilitation Project Reporting Series, specifically the Stormwater Management Study Report (Gore & Storrie Ltd, 1995) . Reference is also made to and the hydrologic/hydraulic analysis work completed as part of the Master Servicing Plan (Volume V – Stormwater Master Plan, BluePlan, 2014).

The Mohawk Lake subwatershed is presented in Figure 9 (more updated subcatchments are presented in Figure 10). As per the Characterization Study, a total drainage area of 873 ha is indicated, which differs from the previous Stormwater Management Study Report, which indicated a total of 754.7 ha (the majority of which (702.7 ha) drains to the West Canal upstream of Mohawk Lake). The drainage area consists of a mixture of land use types, including residential, commercial, industrial, and open space/parklands. The subwatershed does not contain any stormwater management facilities, nor any oil/grit separator units. As noted in the Characterization Study, Mohawk Lake generally serves as an “informal” stormwater management facility for the subwatershed, given the untreated nature of the contributing drainage areas and the permanent pool within the lake.

Beyond Mohawk Lake and Mohawk Canal, there are generally no open channel drainage systems, given the history of development and watercourse enclosures. Two (2) tributaries are noted at the downstream limits of the watershed, however only one (Tributary 1) drains into the Mohawk Canal system; The other (Tributary 2) outlets directly to the Grand River in close proximity to the Mohawk Canal outlet. The balance of the watershed is drained by urban drainage systems, comprised of storm sewers and overland flow (although overland flow paths do not appear to have been specifically designed or assessed in the previous studies).

The Stormwater Management Study Report (Gore & Storrie Ltd., 1995) included the development of an INTERHYMO/OTTHYMO hydrologic model for the watershed, which is a dated modelling platform (typically such models may be executed in the SWMHYMO modelling platform with some minor modifications, or must be migrated to the newer Visual OTTHYMO platform). Simulated peak flow results, as well as the water budget results from that study, were reproduced in the Characterization Study Report (2019). The results of the water budget (which did not consider lake bed seepage) determined that 82% of the annual inflow to Mohawk Lake is sourced from surface runoff, with the balance (18%) from groundwater seepage/baseflow.

As part of the Master Servicing Plan (Volume V – Stormwater Master Plan, BluePlan, 2014), an “all pipes” hydrologic/hydraulic model was developed for the entire City in the InfoSWMM platform. Significant ditches and culverts were also included; open channel transects representing Mohawk Canal and Mohawk Lake are also included in the modelling. The modelling was validated to address any obvious errors or issues, including a comparison to anecdotal information, where available.

The base modelling developed as part of the 2014 study was further refined through the subsequent “Stormwater Flow Monitoring and System Model Calibration Study” (Aquafor Beech Ltd, and Thompson Flow Investigations Inc, January 2018). That study involved flow monitoring at fifteen (15) different locations across the storm sewer system (City-wide) for a 1-year period to provide calibration data. Three (3) of the flow monitors (FM1, FM2, and FM10) were located within the Mohawk Lake watershed, in close proximity to Mohawk Lake and Mohawk Canal (i.e. near storm sewer outfalls). The modelling was subsequently calibrated and validated based on the available monitoring data. Calibration to the sites within the Mohawk Creek subwatershed was noted as “average” (FM2) or “good” (FM1 and FM10).

As part of the Characterization Study, additional flow and precipitation monitoring was completed, beginning in May/June 2018. Three (3) additional flow monitors were installed in proximity to the Mohawk Lake/Mohawk Canal area; two (2) gauges upstream of Mohawk Lake, and one (1) gauge downstream. The monitoring program encountered issues with vandalism/theft, as well as rating curve stability, thus only a limited amount of surface water monitoring data were available/summarized as part of the Characterization Study. As part of the additional 8-months of environmental monitoring, Aquafor Beech prepared an Interim Monitoring Memorandum in February 2019 to provide an update on the ongoing monitoring programs. The stream flow monitoring program included the installation of HOB0 loggers at the three flow monitoring stations and collected data at 15-minute intervals between November 1st and December 4th, 2018, after which it was suspended due to frozen conditions. Flow monitoring was re-commenced in 2019, up until June 18th 2019.

Rating curve development was initiated, however complications due to low-gradient of the lake and canal, and frozen conditions, have not supported the additional spot-flow measurements required to complete the rating curve development. As per the Characterization Report (Oct. 2019), rating curves were only generated for gauge FM1. The rating curve for this location was developed based on a power equation trendline, it is not clear if hydraulic modelling verification was used to confirm reasonableness of the rating curve, particularly at higher elevations. Based on the preceding, the water level monitoring data from the Characterization Study cannot be directly applied for flow calibration, however could be useful for a general verification/validation.

Notwithstanding the preceding, a high level water balance/water budget was also completed as part of the Characterization Study (Aquafor Beech Limited, 2019) using the available flow monitoring data. The report concluded that more water leaves (29%) the Mohawk Lake system through the outlet control structure than enters it from the storm sewer network, suggesting a groundwater flow input. This was noted to be consistent with previous studies (Gore and Storrie, 1995), which concluded that approximately 18% of input flows are sourced from groundwater.

The rainfall monitoring program included the installation of a tipping bucket rain gauge in June 2018 on the roof top of the Pollution Control Centre located at 180 Greenwich Street, located to the south of Mohawk Lake. Continuous data was collected at 15-minute intervals and summarized into daily precipitation totals between November 1st and December 4th, 2018. For 2019, data were collected from May 1st 2019 to June 18th, 2019.

As part of the Characterization Study, the previously noted InfoSWMM modelling was converted to InfoWorks ICM. The Draft Characterization Study Report (October 2018) notes that the InfoWorks ICM modelling indicated some “inconsistencies” as compared to the InfoSWMM modelling, thus the results presented in that report are based on the InfoSWMM modelling platform. As part of the final report (Aquafor Beech Limited, 2019), the issues with the InfoWorks ICM modelling were presumably addressed, as presented results are based on that version of the modelling. The InfoWorks ICM model was applied to assess performance under design storm (2 through 100 Year, 24-Hour Chicago Storms), Regional Storm.

An additional model calibration effort was completed as part of the Characterization Study, focusing on different hydrologic parameters than those applied in the previous “Stormwater Flow Monitoring and System Model Calibration Study” (Aquafor Beech Ltd., 2018). From the discussion in the Characterization Study, it is unclear whether these additional parameter adjustments are reflected in the presented design storm and Regional Storm results, although it is assumed that they would have been incorporated. The resulting flows from this updated modelling were used as input to the subsequent hydraulic modelling of the Mohawk Canal and Mohawk Lake system (discussed further in Section 5.4.3). The modelling was also used to assess the performance of the storm sewer system (to identify the potential for surcharging) for the 2-, 5- and 10-year storm events.

5.4.2.1 Constraints

Constraints related to hydrology and stormwater management for the current study can be separated into two (2) broad categories: those related to overall existing deficiencies in the stormwater management (SWM) systems, and those related to the existing modelling tools available to assess those systems.

With respect to the former, there are currently no SWM systems in place for the upstream drainage areas, either with respect to quantity control (focus of the current section) or quality control (as discussed in subsequent sections). In addition, with the exception of the Mohawk Canal and two (2) minor open channel tributaries, the entirety of the watershed is serviced by urban drainage systems (enclosed storm sewers with catchbasins and overland flow systems). The combination of these two factors greatly affects the hydrologic cycle and water balance within the subwatershed, and ultimately the downstream receiver, Mohawk Lake. Given the lack of infiltration (and associated baseflow/interflow), and absence of runoff management from impervious surfaces, runoff contributions to Mohawk Lake are high, and would also tend to be more peaked and rapid, which would tend to also impact the potential for erosion and modified baseflow contributions and longer-term circulation within the receiver.

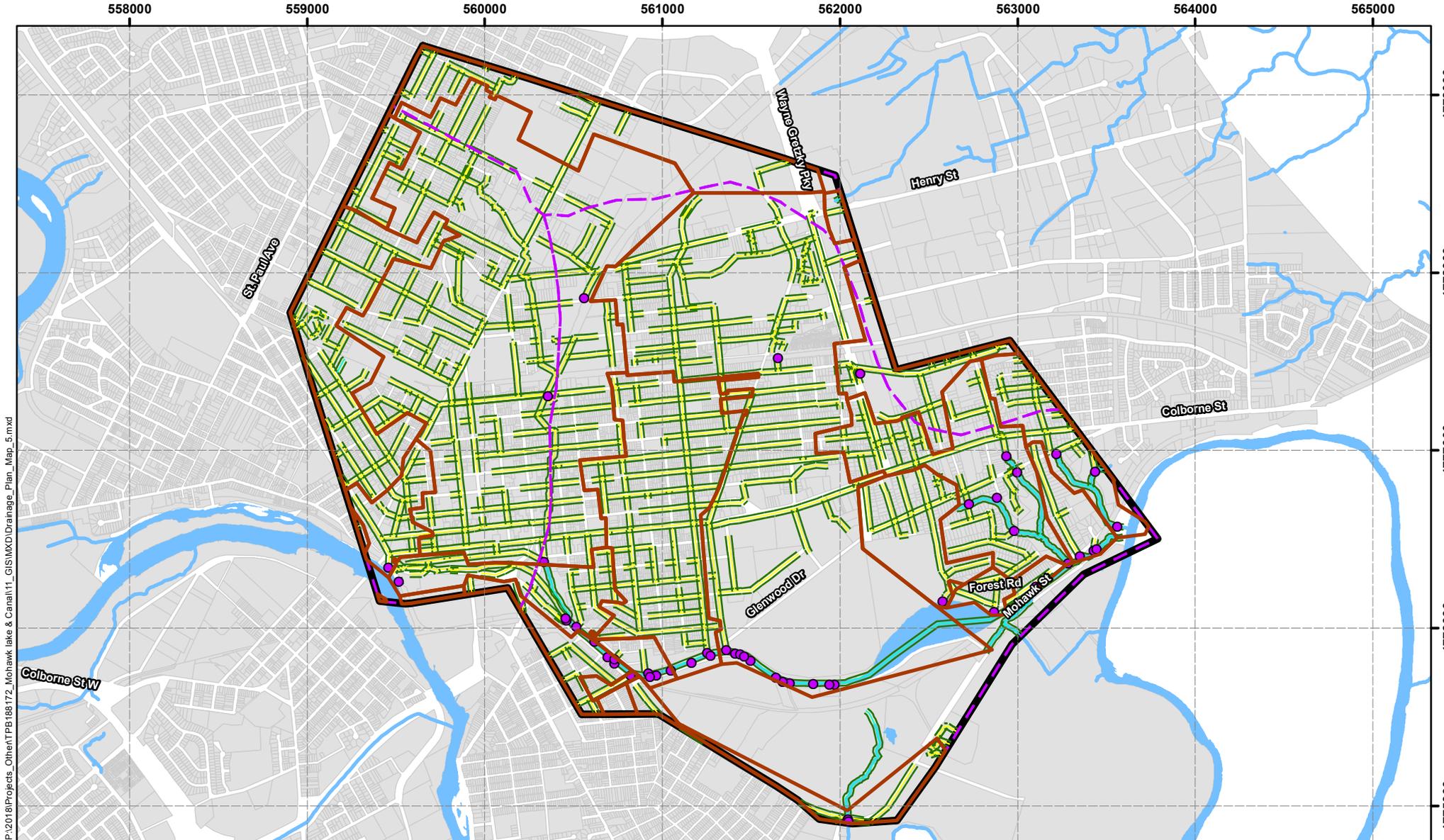
Future re-development/intensification within the subwatershed would provide the opportunity to retroactively provide SWM controls, including quantity and erosion control. Notwithstanding, consideration would need to be given to the overall need and benefit to upstream SWM, and the potential impacts to the overall Mohawk Lake System. This would include the potential benefits of runoff quantities and hydro-period to flow circulation.

Based on a review of the available modelling at the outset of this study (i.e. the InfoSWMM modelling prepared for the October 2018 Draft Characterization Study rather than the InfoWorks ICM modelling applied for the final October 2019 reporting), the following constraints were noted:

- The subcatchments (approximately 2,600 draining to the Mohawk Lake outfall) within the modelling are irregular (Figure 10), with inconsistent boundary shapes and areas (many less than 0.01 ha) which do not typically correlate with roadways and other features. It was noted in the Master Servicing Plan (MSP) that the subcatchments were “delineated and assigned through an automated process”; it is unclear whether or not the boundaries were verified/validated following the application of the automated delineation tool.
- The connection between land use and subcatchment parameterization within the MSP is not clearly explained. The subsequent Stormwater Flow Monitoring and System Model Calibration study makes reference to using land use classification data (zoning by-law) to determine which parameters would require adjustment, but does not suggest that the base parameters from the MSP were altered consistently using this information. In order to reasonably assess different subwatershed-based land use changes and SWM strategies, the basis for the initial model parameterization should be clearly understood, as well as subsequent calibration adjustments.
- Some hydrologic modelling parameters are beyond typically accepted standard values, including:
 - Subcatchment lengths at a ratio of 12:1 length:width (based on Wood’s previous experience, typically the maximum accepted value is 5:1)
 - High values for Manning’s Roughness for overland flow (0.25 and 0.50 for impervious and pervious land segments); the impervious value in particular is approximately an order of magnitude higher than typical values (0.02 or less). Both values also differ from the Characterization Study report (page 92 in Draft/Interim Characterization Report (October 2018)) which suggests values adjusted to between 0.1 and 0.45.
 - Horton’s Drying Time set at a default of 0.001 days, which is not considered to be a realistic result, and would impact any continuous simulation results

- The peak flows generated by the InfoSWMM modelling presented in the Characterization study (interim) are approximately half those from the previous Stormwater Management Study (Gore & Storrie Ltd, 1995). It should be noted that the InfoSWMM modelling also does not include any representation of the storage/attenuation function of Mohawk Lake (open channel sections only).
- Based on an initial re-run of the supplied InfoSWMM modelling, simulated peak flow results for the 2-year storm event do not match the values reported in the Characterization Study (interim report). Although attempts were made to reconcile these differences with the previous consultant (due to potential differences in model setup, etcetera), ultimately the reasons for these differences were not resolved.

As noted in the Characterization Study, there is no major system represented within the modelling (overland flow) or associated assessment of inlet capacity connection between minor/major systems (i.e. catchbasins). There also does not appear to be any surcharge depth or other method applied to minor (storm sewer) nodes to contain flow. As such, the ability of the current modelling to reasonably assess more formative storm events (which would exceed the capacity of the storm sewer system and result in overland flow) is questionable and needs to be addressed.



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LEGEND

Study Area	Subcatchment Basin (GRCA)	Discharge Point
Watercourse	Stormwater Sewershed	
Waterbody	Open Drain	
PropertyParcel	Gravity Pipe	

0 0.3 0.6 1.2 1.8 2.4 3 Kilometres

NOTES:
Regulation Limit from
GRCA Open Data, 2019

Datum: NAD83
Projection: UTM Zone 17N



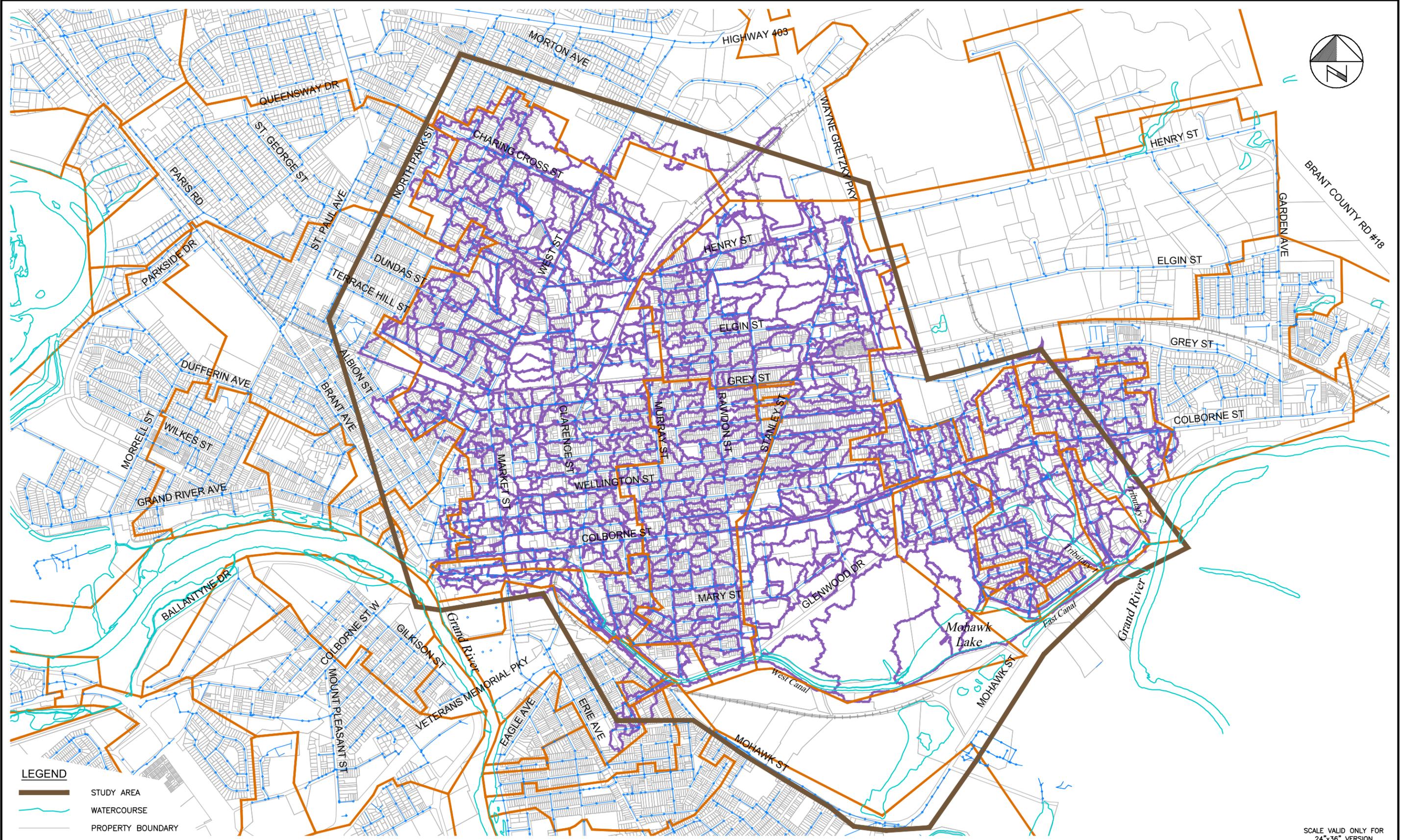
wood.

Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study

Drainage Area Map

PROJECT N ^o : TPB188172	DRAWING: 9
SCALE: 1:30,000	DATE: December 2019

Plotted: 2019-12-04
 Last Saved: 2019-12-04
 mikeloncar
 Last Saved By: mikeloncar
 Path: P:\2018\Projects\TPB188172 - Mohawk Lake & Canal Drainage\06_DES-ENG\01_CAD\02_DWG\05_WR\01_PROJ\2019-09_Dwg 8_SubCatchment.dwg



LEGEND	
	STUDY AREA
	WATERCOURSE
	PROPERTY BOUNDARY
	RAILWAY
	STORM SEWER SYSTEM
	SUBCATCHMENT BOUNDARY (WOOD)
	SEWERSHED BOUNDARY (CITY)

MOHAWK LAKE AND
 MOHAWK CANAL
 SUBWATERSHED STUDY
 CITY OF BRANTFORD

SUBCATCHMENT
 BOUNDARY
 PLAN

SCALE VALID ONLY FOR
 24"x36" VERSION

Scale 1:10000
 0 100 200 400

wood.

Consultant File No.
 TPB188172

Drawing No.
 10

Figure 11: Typical Subcatchment Boundaries within InfoSWMM Modelling

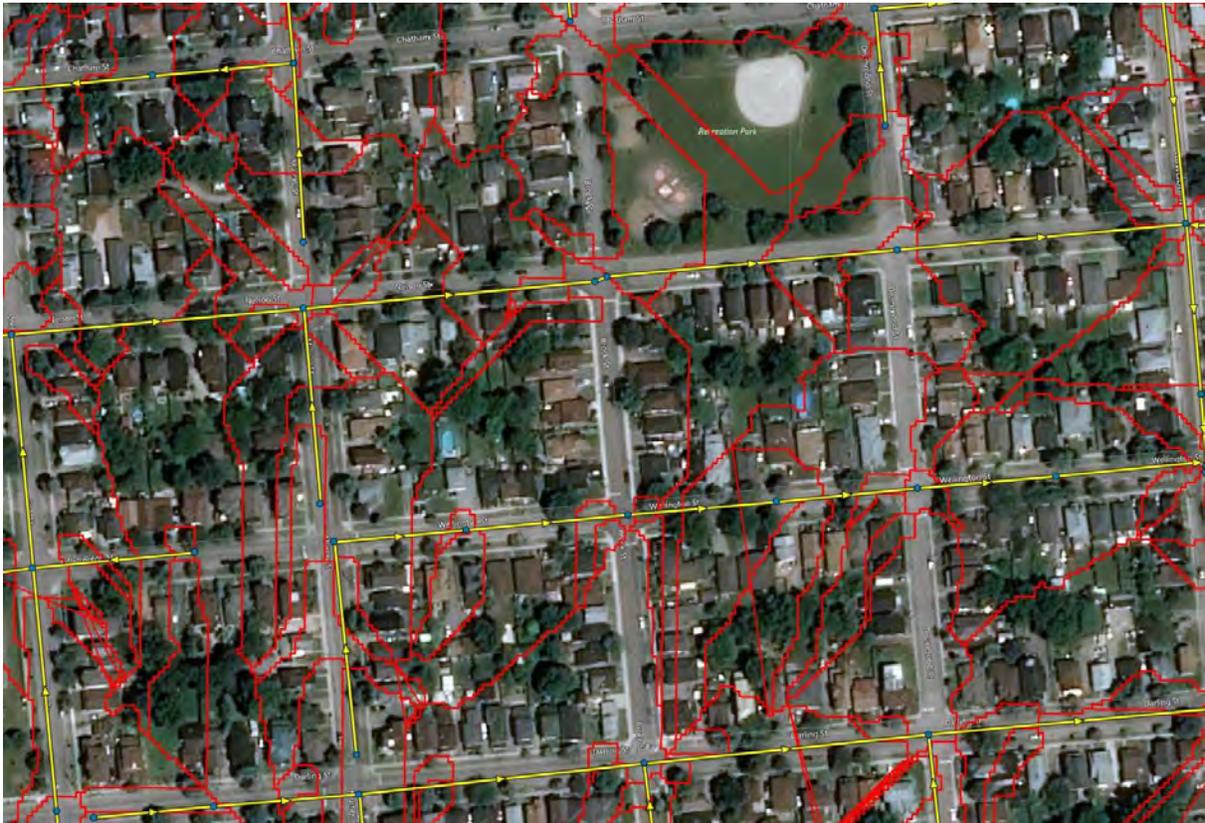
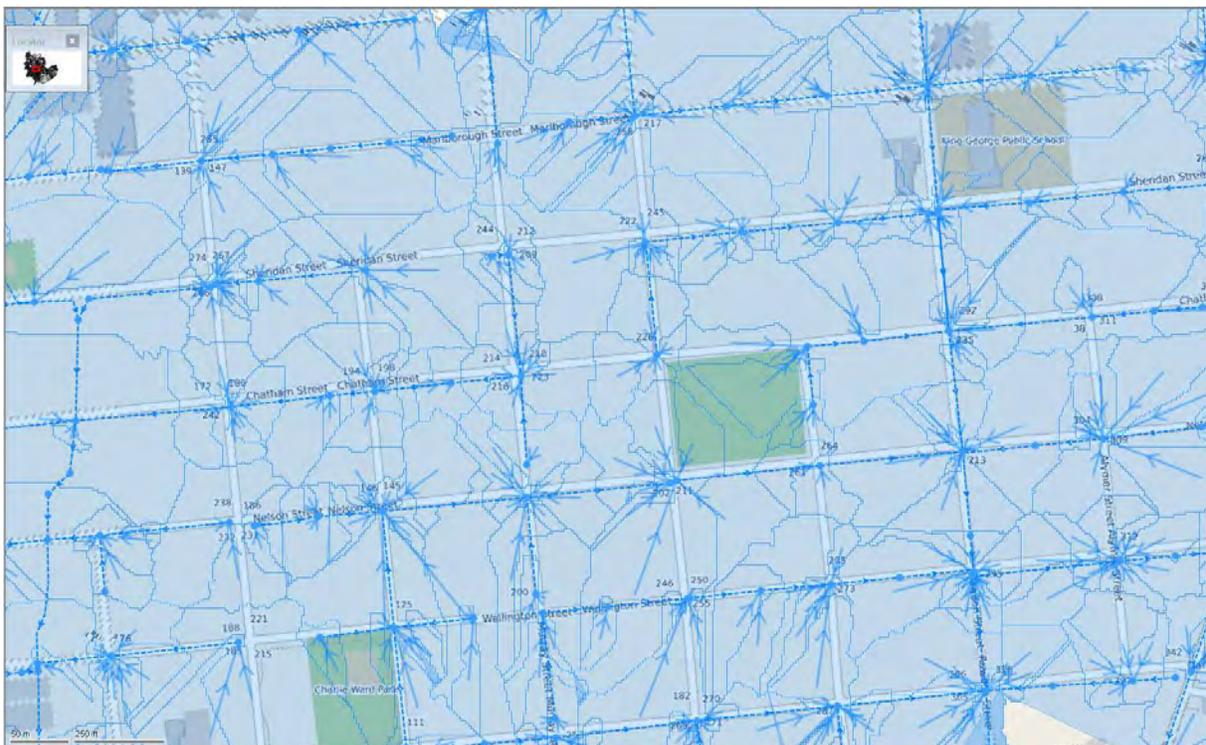


Figure 12: Typical Subcatchment Boundaries within InfoWorks ICM Modelling



Data Constraints

As noted previously, a number of issues have been identified with respect to the hydrologic modelling to be applied for the current study. Given the preceding issues, Wood recommended a supplemental work plan scope to the City (May 17, 2019) to generate a new/updated hydrologic/hydraulic model for the Mohawk Lake subwatershed using the InfoSWMM platform. This scope was subsequently approved by the City. Further model development details are provided within Section 4.0 of the Mohawk Lake and Mohawk Canal Subwatershed Stormwater Plan (Wood, 2020a).

5.4.2.2 Linkages (Features and Function)

The lack of upstream stormwater management (SWM) controls would have the potential for several impacts on the Mohawk Lake and Mohawk Canal systems. As noted previously, the urbanization of the subwatershed in the absence of controls has altered the hydrologic cycle (decreased infiltration, recharge and baseflow, increased runoff). The increased runoff results in larger, more peaked discharges to the receiving system, which also would have negative impacts to erosion and channel stability (as per subsequent discussions with respect to fluvial geomorphology).

The approach to implementing SWM measures for future re-development/intensification will require careful consideration. From a quantity control perspective, current SWM measures include consideration for water balance, as well as peak flow and erosion control, which typically involves infiltration measures (Low Impact Development Best Management Practices, or LID BMPs). These measures would potentially need to consider groundwater impacts (as noted in previous sections), as well as the ultimate benefit/consequence to the receiving system. Impacts on water conservation should also be considered, such as LID BMPs and water efficient landscaping within Mohawk Park, which have the potential to reduce water use related to operations and maintenance. Given the potential desire for circulation and movement of water in Mohawk Lake, in some cases engineered infiltration of upstream water may have unintended negative consequences. This has been considered further as part of subsequent analyses and development of preferred alternatives.

5.4.3 Hydraulics

A new georeferenced hydraulic model (HEC-RAS) was prepared as part of the Mohawk Lake Characterization Study (Aquafor Beech Limited, 2019) for the canal and lake systems. The model does not include Shallow Creek, an upper section of watercourse between East Avenue and the start of the Mohawk Canal.

It is noted that Mohawk Lake and a portion of the Mohawk Canal are also within the Regulatory floodplain for the Grand River (Figure 6). Notwithstanding, the Mohawk Lake area is designated as a Special Policy Area (SPA) by the GRCA. This designation permits development (with restrictions), despite the fact that the area is located within the Regulatory floodplain. There is also a dyke system in place to the south of Mohawk Lake, which connects to the south bank of the East Canal in proximity to the Grand River.

Topographic survey and pond bathymetry were completed as part of the Characterization Study. These data were used to create updated topography and are the basis for developing hydraulic cross-sections of the Lake and Canal. Hydraulic structures (culverts) were also incorporated based on the completed field survey. Obstructions were included in the modelling to account for the blockage associated with structures within the floodplain. Flows from the InfoWorks ICM modelling were applied, with a normal depth boundary condition at the downstream limits, in combination with a rating curve defined within the geometry data for the most downstream cross-section (XS 1240), based on the stage-discharge relationship for Mohawk Lake from the 1995 Stormwater Management Study (Gore & Storrie, 1995).

The resulting floodplain extents for the 2-100 year storm events and the Regulatory event (Hurricane Hazel) were prepared and presented accordingly. The results indicate that the primary floodplain extends beyond Mohawk Lake to the south, towards Mohawk Street and the Water Pollution Control Plan (WPCP). The presented floodplain extents indicate the limits of Mohawk Lake would be exceeded for the 50-year storm event and greater. A comparison to the Stormwater Management Study Report (Gore & Storrie Ltd., 1995) indicates that Regional Storm flood levels from the Characterization Study (2019) is approximately 1.71 m lower than those from the 1995 study (199.36 m from October 2019, as compared to 201.07 m in the 1995 study). This difference may be partially attributable to the notable difference in simulated peak flows prepared as part of the Characterization Study (2019), as compared to those of the Stormwater Management Study (1995).

5.4.3.1 Constraints

Constraints related to hydraulics for the current study can be categorized into two (2) broad types: those related to floodplain extents (i.e. lands which would be impacted by flooding), and those related to the existing modelling tools available to assess those systems.

With respect to the former (floodplain extents), the results presented in the Characterization Study indicate that lands to the south of Mohawk Lake would experience flooding for the 50-year storm event and greater, thus would have greater restrictions with respect to potential for re-development and alteration as part of restoration efforts. As noted previously, the Mohawk Lake area is deemed a Special Policy Area by the GRCA, thus development is permitted with conditions, typically involving flood-proofing and allowable types of development.

The floodplain extents within Shallow Creek (upstream of Mohawk Canal) are unknown. As noted previously, the completed hydraulic modelling completed for the Characterization Study (Aquafor Beech Limited, 2019) does not include this uppermost component of the open channel conveyance system.

With respect to modelling tools, a key consideration is the potential impact of updated flows (i.e. hydrology) from the proposed updated of the hydrologic modelling (described further in Section 4.0 of the Mohawk Lake and Mohawk Canal Subwatershed Stormwater Plan (Wood, 2020a)). The potential impacts of revised flows are assessed further as part of the Subwatershed Stormwater Plan Report (Wood, 2020a).

A secondary consideration with respect to the hydraulic modelling tools relates to the approach to modelling and assessment of the impact of the outlet control structure for Mohawk Lake and Canal. The hydraulic modelling (HEC-RAS) completed as part of the Draft Characterization Study (October 2018, Aquafor Beech) terminates approximately 100 m downstream of Locks Road, and employs a “normal depth” boundary condition (slope of 0.000485, or 0.0485%). Separately however as noted previously, a rating curve is incorporated as part of the most downstream cross-section (XS 1240), based on the stage-discharge relationship for Mohawk Lake from the 1995 Stormwater Management Study (Gore & Storrie, 1995). This approach is atypical; the potential impacts are reviewed further as part of the proposed hydrologic and hydraulic modelling updates, as noted in subsequent sections.

A final potential constraint relates to the potential impacts of backwater from the ultimate receiver, namely the Grand River. The hydraulic modelling completed for the Characterization Study does not incorporate such tailwater conditions, although the report does present a general comparison of Regulatory Floodplain Mapping from the GRCA with the results of the Characterization Study. In general, it is considered unlikely that peak water levels within the Grand River would occur simultaneously with peak levels in the Mohawk Lake system, given the large disparity in drainage areas and associated spatial distribution of rainfall. Notwithstanding, it is suggested that the currently available hydraulic model (HEC-RAS) for the Grand River in the vicinity of Mohawk Lake and Canal should be obtained from the GRCA, and reviewed, with the results considered as part of the hydraulic modelling assessment. This is reviewed further in subsequent sections of the report.

Data Constraints

Generally, no critical data constraints are evident with the hydraulic modelling and assessment work completed as part of the Characterization Study. The lack of defined floodplain information for Shallow Creek is notable, however likely not critical for the purposes of the current study. As noted, the modelling has been reviewed and updated as part of the Subwatershed Stormwater Plan (Wood, 2020a).

5.4.3.2 Linkages (Features and Function)

The frequency of flooding inundation within the Mohawk Lake and Mohawk Canal area would potentially impact other disciplines, including ecological considerations associated with natural hydro-periods (i.e. riparian flora and fauna). No direct linkages to other sub-disciplines are evident. Flooding impacts would potentially impact re-development and land usage, as well as related restoration opportunities; this is discussed in greater detail in subsequent sections

5.4.4 Fluvial Geomorphology

The Characterization Study (Aquafor Beech Limited, 2019) included a review of background reports, data and base mapping to document study area conditions, including a historical assessment of aerial photography to support interpretations of historic inputs of sediment to the lake and canal system.

Reach delineation and classification was completed for the lake, canals and tributaries, and was verified through field walks; industry standards were applied.

The geomorphological field assessment specifically included the following:

- Rapid Geomorphic Assessments (RGA) of the tributary (and canal outflow) channels;
- Photographic inventories of the tributary (and canal outflow) channels;
- Mapping of existing erosion control and channel engineering structures; and
- Erosion site observations to inform the erosion risk assessment.

Lead-210 dating was conducted by Flett Research Limited and the results were summarized by Aquafor Beech in a technical memorandum (Re: City of Brantford, Mohawk Lake- Lead-210 Dating Sediment Core) in May 2019. Two sediment core samples of approximately 2 meters were collected, with recovery lengths of 1.2 metres (i.e. 40% compaction) and sectioned into a total of 100 samples. Lead-210 dating was confirmed using Cesium-127 (Cs-137) and Radiocarbon ¹⁴C validation.

5.4.4.1 Constraints

Background Reports

The available background reports did not identify erosion concerns within the canal or lake, however much of the Mohawk Lake and Mohawk Canal surrounding area has been classified as Riverine Erosion Hazard lands by the GRCA due to oversteepened banks (Figure 6). This designation generally prohibits active development and will affect the future land use and development options for the area. This will require further investigation to determine potential constraints to future development and the Master Plan.

Reach Characterization

The Mohawk Lake system is within the Grand River watershed with surficial sediments locally dominated by till deposits of sand and silt which are currently affecting fluvial processes. Mohawk Lake is a remnant oxbow of the Grand River and historically (prior to dredging and canal construction) would have been an alluvial floodplain, with marsh/wetland characteristics. Shallow Creek forms the upstream reaches of the canal and is an alluvial channel in fair to poor condition. Shallow Creek is in a transitional state with ongoing widening evident. The tributary downstream of Mohawk Lake is an engineered channel with only the most upstream reach in a natural state. Upstream reaches of the tributary are in a stable state, while downstream reaches are unstable and degraded. The downstream reach was recommended in the Characterization Study for immediate restoration. The outflow channel of Mohawk Lake to the Grand River is an alluvial channel with grade control structures and a historic weir. The channel is in a transitional state with evidence of degradation observed. The north shore of Mohawk Lake is predominantly natural, while the south shore is artificially constructed.

Erosion Assessment and Sedimentation

The erosion assessment identified and prioritized three (3) erosion sites for environmental restoration: Shallow Creek Park (Erosion Site #1), Tributary 1 at Glenwood Drive (Erosion Site #2) and Outflow Channel (Erosion Site #3). Due to the location and scale of these sites in relation to Mohawk Lake, reducing sediment supply

from within the tributary reaches would have a marginal benefit on the canal-lake system.

The Mohawk Lake and Mohawk Canal embankments were determined to be generally geomorphologically stable based on a visual assessment; detailed geotechnical assessments were recommended to confirm.

The Characterization Study investigations indicated that the storm sewer network upstream of the outfall in Shallow Creek Park may be a potential source of sand supply, as sand was found within the culvert pipes. A mobile sand bed was identified in the channel, however minimal bank sources of sand exist within the reach.

It was noted that stormwater management controls would not likely be effective in reducing sand and finer sediments transported in open-channel flow and fluvial processes, and would not be effective in reducing sediment loading without implementing stream restoration and identifying the primary sediment source(s). Significant physical modifications would be required to reduce the sediment attenuation, storage and flushing within the canal-lake system. As the primary source of sediment has not been identified, the degree of physical modifications required to mitigate the sediment source remains unknown.

The Pb-210 dating analysis was completed for the core sample from a single location (Location 14). The results provided the following key conclusions regarding sedimentation:

- The top 30 centimetres of sediment was deposited in the last 55 years;
- The top 40-50 centimetres of sediment was deposited in the last 90 years;
- Pb-210 sedimentation rate is between 0.3-0.5 cm/year
- Radiocarbon ¹⁴C sedimentation is approximately 0.65 cm/year for the previous 300 years; and
- Recommend average sedimentation rate is approximately 0.5 ±0.1 cm/year

Data Constraints

The Characterization Report (2019) recommended several additional studies be undertaken in order to gain a better understanding of the geomorphological context of Mohawk Lake, including:

- Identification of sediment sources from the urban drainage network (potentially the primary source);
- Investigation of existing sediment sources within local drainage area (i.e. lake, adjacent roads, gullies);
- A suspended sediment monitoring program;
- Several detailed geotechnical investigations to support:
 - Detailed engineering design at Erosion Site #2;
 - Risk assessment of local geotechnical hillslope hazards in Tributary 1; and
 - Stability of embankments along the canal.

The Pb-210 dating analysis included some significant limitations and uncertainties, potentially due to irregularities in the sedimentation rate and/or lake dredging that have not been accounted. The Cs-137 and radiocarbon ¹⁴C validation methods however support the Pb-210 CRS age model results. The Lead-210 Dating of Sediment Core technical memorandum prepared by Aquafor Beech indicated that the reliability of the Pb-210 results at Location 14 may be sufficient for the purposes of the overall study. However, analysis of the second core (Location 8) would provide further clarification regarding the variability of the sedimentation rates.

5.4.4.2 Linkages (Features and Function)

Areas identified as Riverine Erosion Hazard lands generally prohibit development; recommendations for development options will thus be restricted accordingly. Where development is permitted, future development has the potential to exacerbate erosion conditions of the canal-lake system. The north shore of Mohawk Lake and Mohawk Canal is predominately natural and is designated as a Core Natural Area in the Draft Official Plan 2016, therefore is less likely to allow significant development and restoration options may be viable. The south shore of Mohawk Lake and Mohawk Canal conversely is predominately artificial and abuts areas identified for future development. Development and restoration alternatives in this area will need to consider stormwater management controls to mitigate potential impacts of development, such as increased sedimentation and reduction in natural bank characteristics. Restoration alternatives should consider locations where improvements to erosion hazards will also benefit other systems, such as aquatic habitat improvements and targeting areas of contaminated sediment.

Potential strategic sediment management to address sediment quantity and quality constraints related to contamination provide an opportunity to reconfigure the channels and restore the canal-lake system to a more natural state. The recommended CHL designation for the canal-lake system however represents a potential constraint to naturalizing the channel, as the meander belt width variations will be limited.

5.4.5 Water Quality

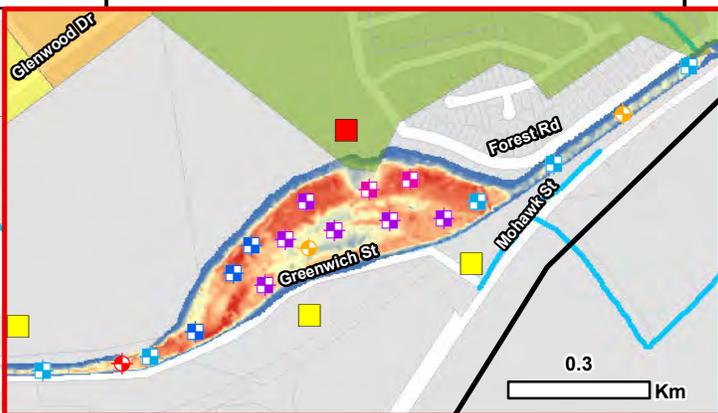
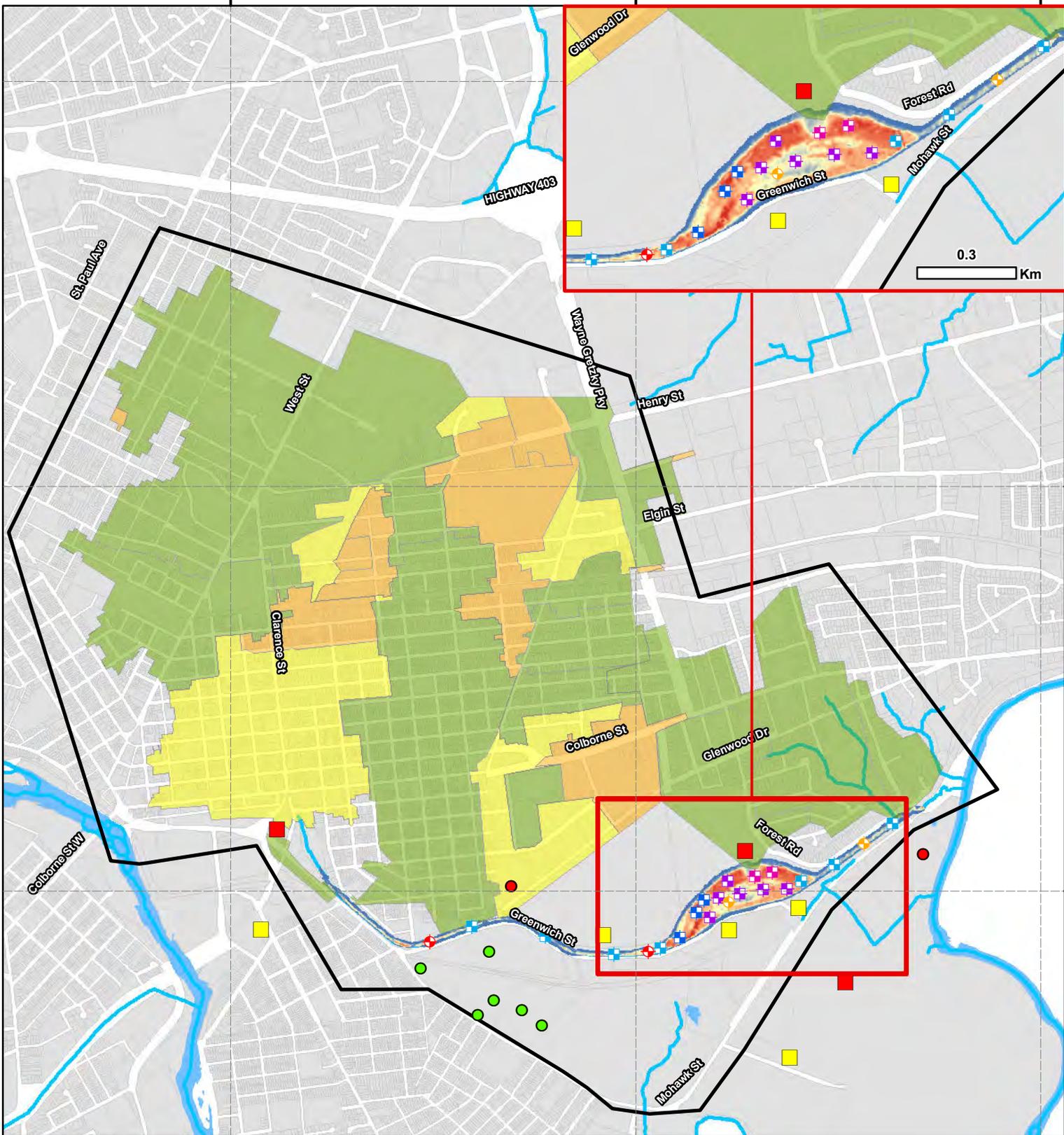
5.4.5.1 Mohawk Lake and Mohawk Canal

The Characterization Study (Aquafor Beech Limited, 2019) included a background review of previous water quality condition reports of Mohawk Lake, complemented by a water quality monitoring program. Water quality monitoring included sampling and analyses at four (4) stations located throughout the study area (Figure 13). The four (4) monitoring stations, listed from east to west, included: the outflow of Mohawk Lake and contributing outfalls (WQ1), Mohawk Lake (WQ2), the inflow to Mohawk Lake and contributing outfalls (WQ3), and the West Canal (WQ4). The sampling program included grab sampling during two (2) dry weather base flow events and four (4) wet-weather high flow events, distributed throughout a 6-month period between May and October 2018. The same sampling regime was implemented for six additional grab sample events between spring and summer 2019 for a total of twelve monitoring events.

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P:\2018\Projects_Other\TPB188172_Mohawk lake & Canal\11_GIS\MXD\Contamination_Map_4.mxd

LEGEND

- Study Area
- Watercourse
- Waterbody
- Property Parcel
- Water Quality in Lake and Canal**
 - WQ Standard Exceedances
 - WQ Standard Significant Exceedances
- Water Quality in Upstream Watershed**
 - Good
 - Fair
 - Poor
- Identified Pollutant Sources**
 - Active Industrial Site
 - Remediated Site
 - Active Landfill
 - Abandoned Landfill
- Sediment Sampling Station**
 - Pending Results
 - Severe - 2 Parameter Exceedances
 - Severe - 1 Parameter Exceedances
 - Exceeds Lowest Effect Exceedances
- Sediment Depth**
 - High : 2.34
 - Low : -0.38

NOTES:

Datum: NAD83
Projection: UTM Zone 17N



Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study

Stormwater Quality and Contamination Map

PROJECT N^o: TPB188172

DRAWING: 13

SCALE: 1:26,000

DATE: December 2019



Constraints

Background Review Findings

A water quality study (ref. 1983 by Roff, Emerson, Dorey and Bisset) determined the water in the study area to be fairly hard and slightly alkaline, and temperature distribution to be fairly uniform. High levels of phosphorus, nitrogen, suspended solids, copper, cadmium and nickel were detected. Extremely high levels of magnesium were detected in Mohawk Canal, and aluminum in East Ward Creek.

A subsequent water quality study conducted in 1994 by Ecological Services for Planning detected high levels of phenols, copper, zinc, nitrogen, phosphorus and BOD loadings. Concentrations of phosphorus, ammonia, phenols, copper, and zinc exceeded the Provincial Water Quality Objectives (PWQO's).

Annual testing of storm outfalls conducted in 2014 by the City, identified high bacteria levels for Mohawk Lake and Mohawk Canal, however not unusually high. It was identified that aquatic biota in the lake have likely been affected by the poor water quality, indicated by the various parameter exceedances of the PWQO's.

Characterization Study Water Quality Monitoring Program Findings

Water samples were analyzed for total suspended solids, nutrients (including nitrate and total phosphorus), and a range of metals, bacteria, and polycyclic aromatic hydrocarbons. While concentrations were variable, the following parameters commonly exceeded their respective concentration guidelines at all four (4) monitoring stations:

- Total Suspended Solids
- Nitrate
- Total Phosphorus
- E. coli
- Total Coliforms
- Aluminum
- Copper
- Iron
- Zinc
- Manganese
- Anthracene
- Benzo(a)anthracene
- Benzo(g,h,i)perylene
- Benzo(k)fluoranthene
- Chrysene
- Dibenzo(a,h)anthracene
- Fluoranthene
- Phenanthrene

The Characterization Study indicates that water quality generally improves from the west to the east of Mohawk Lake and Mohawk Canal, with lower concentrations of the exceeded parameters occurring at WQ-1 and WQ-2 compared to WQ-3 and WQ-4. This observation may be a result of dilution as the water moves eastward into Mohawk Lake, and potentially indicates sources of contamination are entering the system in the west canal. This is further supported by the extreme PWQO guideline exceedances for PAHs at WQ-4, indicating that contamination may be a result of local runoff from nearby industrial lands. The Characterization Study identified similar parameter results as the 1994 study, with the exception of increased concentrations of phosphorus, iron, manganese and zinc.

Poor water quality was also identified from an aesthetic perspective, with substantial levels of trash and debris observed in the West Canal (e.g. grocery carts, computer monitors), the deterioration of which may also be contributing to the poor water quality. Effectively reducing trash in the canal-lake system would require a multi-pronged approach, however, removing the existing trash is a recommended short-term solution. Ongoing maintenance and a shift in the actions of park users would be required to maintain the state of the system.

Due to the high concentrations of E. Coli and Total Coliforms, it was recommended to monitor for these contaminants in the future, particularly due to the potential use of Mohawk Lake for recreational purposes such as swimming. The potential link between E. Coli and Total Coliforms with phosphorus and nitrogen, was also identified.

5.4.5.2 Upstream Watershed

An adaptive monitoring program was developed to identify potential point and non-point pollution sources within the upstream watershed, which involved a background review and water quality sampling for a series of dry and wet weather events at ten (10) locations throughout the Mohawk Lake subwatershed. The water quality monitoring locations were selected based on a five (5) step approach: desktop assessment of contributing drainage areas and land uses, risk assessment of land uses, preliminary ranking of sewershed risk to water quality within Mohawk Lake and Mohawk Canal, and preliminary (followed by refined) water quality sampling. Preliminary sampling occurred for three (3) dry weather base flow events and three (3) wet weather high flow events over a 6-month period. Refined sampling was divided into three (3) rounds, each consisting of one (1) dry event and one (1) wet event at ten (10) strategically chosen sampling sites. Following each round, sampling locations were refined to upstream sites exhibiting high contamination to isolate potential pollution sources. Sewersheds were ranked as *good*, *fair* or *poor* based on their pollution scores.

Constraints

The water quality monitoring program for the upstream subwatershed identified drainage areas with the greatest parameter exceedances, which also indicate potential contaminant sources for Mohawk Lake and Mohawk Canal. The third and final round of water quality sampling was taken in October 2018. Four (4) significant pollutant “hotspots” were identified as PSM-9,2,6C and 7 (Figure 13) and are generally located to the north of Mohawk Lake and the West Canal, between Rawdon Street and Wayne Gretzky Parkway. Two (2) of the sewershed areas identified as pollutant hotspots are located in known industrial sectors, which could be the potential pollution source. One (1) identified pollutant hotspot drains into another, which could be the potential source of the pollution. The fourth pollutant hotspot consists of commercial, institutional and residential sectors, however is a high traffic area which could be the source of the pollution. Sewersheds were ranked as *poor*, *fair* and *good*, however it should be noted these classifications are relative, and all sewersheds exceeded PWQO’s. The parameters which demonstrated exceedances were similar to those identified in the Mohawk Lake and Mohawk Canal.

Identifying whether the contaminant sources are due to legacy sources versus ongoing activities will need to be determined in order to mitigate the source and improve the water quality. If the pollutant source is identified to be due to on-going activities, remediation measures will not be sufficient, and action will be required on behalf of the City to regulate the source.

Data Constraints

The Characterization Report recommended the following investigations within the upstream watershed:

- Investigations to determine potential storm sewer and sanitary sewer cross connections near the intersection of Rawdon Street and Bruce Street.
- Further investigations to isolate pollution “hotspots”.

Water quality data collected and evaluated in the Characterization Report were aimed at understanding how various stormwater pollutants respond after being discharged to surface water. Additional long-term seasonal evaluation of limnological response variables such as chlorophyll-a and dissolved oxygen is recommended. Water quality conditions may vary significantly at different depths depending on whether the lake is frequently stratified. Without these data, it is difficult to assess the effects of stormwater pollutants on the ecological condition of the waterbody and what role internal recycling may play.

5.4.5.3 Linkages (Features and Function)

Mohawk Lake and Mohawk Canal is primarily sourced by stormwater runoff from the surrounding urban area and adjacent outfalls. As suggested by the significant exceedances in PAH's at WQ-4, contaminants may be entering the system through local stormwater runoff from the industrial uses adjacent to the West Canal. Identifying the contaminant sources and applying stormwater controls to treat the runoff prior to entering the system may play a significant role in improving the water quality of the lake and canal over the long term.

The form of restoration measures will be dependent on contaminant source type (non-point vs. point) and whether the activity is ongoing. An active industrial site (Sonoco Products of Canada) is on the north shores of the West Canal and has been recommended for monitoring.

Mohawk Lake and Mohawk Canal feed directly into the Grand River, which the City and Six Nations of the Grand River use as a primary drinking water source (GRCA, 2018). The potential of the degraded water quality within the canal-lake system to affect the drinking water source, emphasizes the importance of improving the water quality of the system prior to entering the Grand River. The impacts of climate change on Canadian water resources are predicted to be more impactful for those municipalities sourcing water from local surface or groundwater supplies as opposed to Lake Ontario (Natural Resources Canada, 2016). Stormwater controls and restoration measures should consider the impacts on sustaining water quality within the lake-canal system, the Mohawk Lake and Oxbow Wetland Complex, and the overall subwatershed, in order to positively contribute to the conservation of water quality within the Grand River.

Sedimentation, as a result of erosion of Mohawk Lake and Mohawk Canal, as well as the contributing tributaries and outflows, has a direct effect on water quality, as the accumulated sediment has been identified to contain concentrations of various contaminants that exceed the severe effect levels for benthic organisms. While the implications for human health and the current degree of internal contaminant recycling have yet to be determined, dredging and alternative sediment quantity and sediment quality restoration alternatives could provide near-term water quality improvements that may extend the benefits from prior and future pollution source control efforts. The linkages between the two features should be considered as part of the selection of restoration alternatives. Similarly, restoration alternatives targeted at improving the water quality of Mohawk Lake and Mohawk Canal should consider the corresponding benefits to the natural heritage system, specifically aquatic habitat, as the parameter exceedances of various Provincial Sediment Quality Guidelines (PSQGs), have been identified to negatively impact aquatic biota due to impacted water quality.

Degraded water quality will have a negative effect on the recreational activities that are safe to occur within Mohawk Lake, particularly for swimming due to the high concentrations of *E. coli* and total coliforms. Degraded water quality from an aesthetic perspective will further influence the recreational potential of the lake and surrounding area, due to the high levels of trash and debris which will reduce the appeal of the area as a park and the ability of users to swim and boat in the lake.

Development and increased impervious area can negatively impact water quality due to surface water runoff that transports contaminants. Future development that increases the amount of impervious area can also further degrade the runoff water quality, and stormwater management controls such as LID BMPs should be considered to partially treat or retain the water at source.

5.4.6 Sediment Quantity and Quality

A background review was conducted for sediment quantity and quality reports completed between 1972 and 1994. The sediment assessment conducted as part of the Characterization Study (Aquafor Beech Limited, 2019) included both sediment quantity and quality.

5.4.6.1 Sediment Quantity

The sediment quantity assessment for the Characterization Study included a bathymetric survey and sediment profiling following the “rod and measure” approach and using GPS survey equipment. Cross-sections were completed at a minimum of 20 m along the canal, with points every 3.0 to 5.0 meters along the cross-section.

5.4.6.2 Sediment Quality

The sediment quality assessment consisted of a sampling program that included the collection of surficial sediment and sediment core samples at twenty (20) locations within the Mohawk Lake and Mohawk Canal. Two (2) different sample collection methods were used; the surficial samples were collected using Petite Ponar, whereas the deeper sediments were collected with core sampling using Pollutech’s hammer core

technique. At each location, three (3) samples were taken at varying depths, resulting in a total of sixty (60) individual samples.

5.4.6.3 Constraints

Sediment Quantity

The bathymetric survey results were digitized into a digital terrain model (DTM) depicting the top of sediment and unconsolidated lake bottom. The findings indicated:

- The sediment thickness is greatest toward the north half of the lake.
- The water in the lake gets progressively deeper from the west to east.
- The deepest portion of the lake forms a general band along the middle, which reaches depths of approximately 4.4 m.

Table 5-1: Sediment Quantity			
Location	Approximate amount of unconsolidated sediment	Sediment thickness	Water depth
Mohawk Lake	155,000 m ³	0 – 2.4m	0 – 2.5m
Canals	30,000 m ³	0 – 1.5m	0 – 1.0m

Sediment Quality

The sampling results from eighteen (18) stations and three sampling intervals collected from Mohawk Lake and the east and west canals were compared against two (2) provincial regulatory guidelines: *Guidelines for Identifying, Assessing and Managing Contaminated Sediments in Ontario (MECP, 2008)* to assess sediment quality, and *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the ‘Environmental Protection Act’* to assess the acceptability of the soils related to various land disposal sites and approaches.

In accordance with the PSQG’s, the sediment samples from the upper 10 cm collection interval were analyzed for nutrients, metals, PAHs, organochlorine pesticides and PCBs, and assigned to categories including *No Effect Level*, *Lowest Effect Level (LEL)*, or *Severe Effect Level (SEL)*, in relation to the potential effect of the parameter exceedance to impair the aquatic environment. The majority of the parameters fell within the *LEL* category, except for the following:

- All metals exceeded the *LEL* at the majority of sampling locations within the lake, except for arsenic which exceeded at one (1) location;
- Copper exceeded *SEL* at four (4) locations (towards the west end of the lake);
- Lead exceeded *SEL* at eight (8) locations (towards the west and south end of the lake);
- All locations exceeded *LEL* for one (1) or more PAHs, with the majority exceeding for eight (8) or more; no samples reached *SEL*; and
- PCBs exceeded *LEL* at all locations, with the exception of two (within the east canal).

Sediment quality is most significantly impacted at the west end of Mohawk Lake and Mohawk Canal and improves towards the east end. Several sediment samples contained Copper and Lead concentrations that were identified to exceed *SEL* as per the PSQG's. Additionally, sediment samples at all sampling locations exceeded 'Lowest Effect' for PCB concentrations, all metals (with the exception of arsenic), and one (1) or more PAHs.

Sediment samples from all three collection intervals were tested against O. Reg. 153/04 soil standards to determine acceptability for future disposal. The results of the sediment sample analyses found the following:

- Metals: cadmium, lead and zinc generally exceeded Table 3 standards for Industrial/ Commercial land use in the top and middle intervals; several additional metals exceeded Table 1 standards for the top and middle sampling interval;
- VOCs: Marginally exceeded Table 1 standards;
- PAHs: Seven (7) PAHs exceeded Table 3 standards for Industrial/ Commercial land use. Acenaphthylene exceeded Table 5 standards at four (4) locations (towards the west and south of the lake);
- PHCs: Approximately half of the locations exceeded Table 3 standards for Industrial/ Commercial (towards the west and south end of lake);
- Organochlorine Pesticides: Zero locations were above the detection limits; and
- PCBs: Twelve (12) locations exceeded Table 3 standards for Residential/ Parkland/ Institutional and were found primarily within the middle sampling interval.

The Characterization Study indicated that Mohawk Lake sediment is non-hazardous based on three samples and the results of the Ontario Reg. 347 Toxicity Characteristic Leaching Procedure (TCLP). Sampling results indicated that the contamination levels within a significant portion of the sediment is sufficiently elevated that disposal sites are restricted to Table 3 and Table 5 standards. Due to the significant quantity of impacted sediment (185,000m³), locating an acceptable disposal site may represent a major financial and logistical constraint. Strategic removal of sediment "hot-spots" may provide a more economical and effective means of restoration.

Data Constraints

The sediment chemistry results provided in the Characterization Report cover a wide range of pollutants which have been compared to regulatory thresholds. Regulatory thresholds, while useful to assess specific toxic affects to a narrow range of species, may not be suitable by themselves to determine the need for restoration work. Therefore, additional evaluations are recommended to assess and identify the linkages of contaminated sediment to ecological health and sustainable restoration of the system.

5.4.6.4 Linkages (Features and Function)

Impacted sediment and the associated long-term storage of contaminated material has undoubtedly contributed to the degradation of the water quality in Mohawk Lake and Mohawk Canal due to long-term exposure and has the potential to negatively influence surface and groundwater quality due to contamination migration. Strategic removal of

material to reduce problematic sediment accumulation, along with activities to reduce erosion, may be restricted due to sediment areas that are highly contaminated. Moving the sediments may result in the mobilization of contaminants, therefore the advantages and disadvantages of restoration alternatives will need to be carefully assessed across disciplines. A further consideration related to the impact of sediment quality on water quality relates to the impact on ecological systems and recreational uses, due to concern for public safety.

Development activities upstream, and adjacent to, the canal-lake system should be monitored to determine the primary sources of sediment loading, in order to develop a long-term solution for Mohawk Lake and Mohawk Canal.

5.5 Built Environment

5.5.1 Cultural Heritage

A Cultural Heritage Landscape (CHL) Feasibility Study was conducted for Mohawk Canal and Alfred Watts Hydro Generation Station Ruins by ASI in 2016, which included a review of relevant mapping, review of municipal heritage inventories, contact with relevant agencies and authorities, and fieldwork in the form of a walking survey.

The CHL Feasibility Study area focused on the Mohawk Lake and Mohawk Canal between the Grand River and Shallow Creek, and either side of the canal banks. A large portion of the Mohawk Lake study area upstream of the lake and canals was not included.

5.5.1.1 Constraints

The CHL Feasibility Study identified forty-seven (47) resources as having cultural heritage value, of which twenty-four (24) were identified as being strong candidates for conservation, nineteen (19) as being candidates for conservation, and four (4) as being weak candidates for conservation. Of these resources, twenty-seven (27) cultural heritage landscapes, and twenty (20) built heritage resources were identified.

The Mohawk Canal and Alfred Watts Hydro Generating Stations Ruins were previously identified as meeting the criteria for designation under the Ontario Heritage Act (OHA Regulation 9/06). The CHL Feasibility Study confirmed this finding and recommended that the Mohawk Canal and Alfred Watts Hydro Generation Station Ruins area be recognized as a CHL through an Official Plan Amendment (OPA), accounting for approximately the entirety of Mohawk Lake and Mohawk Canal.

The Cockshutt Timekeeper's Building is designated under the Ontario Heritage Act, and Shallow Creek Park and a cottage along the West Canal are listed on the City's Heritage Inventory. In addition, the following heritage structures and landscapes have the potential to be recommended for designation as part of the ongoing Cultural Heritage Study: the Canadian Military Heritage Museum, the Kanata Village, Mohawk Park, Mohawk Chapel and the Woodland Cultural Centre (Figure 14).

The recommended implementation process of the CHL includes the preparation of a CHL Technical Study and Conservation Plan, an OPA for the designation of the CHL, public consultation and stakeholder engagement, and an update of the City of Brantford

Archaeological Master Plan and mapping of areas of archaeological potential. A CHL designation is intended to conserve a property and promote further understanding of the cultural heritage value of the area, in order to create a framework for its conservation and management in the future. The CHL designation may impose constraints on future development options, as well as potential remediation options by restricting site modifications. The designation is not intended to stop or prevent change, nor is it intended to stop or prevent legitimate traditional uses.

The CHL Feasibility Study recommended a CHL designation be assigned for the entire area; the recommendation did not provide specific recommendations or differentiate between resources that were identified as being *strong* candidates for conservation versus *weak* candidates, or built resources versus cultural heritage landscapes. Some of the cultural heritage resources include bridges and the abandoned locks, which may be assigned greater restrictions, in order to ensure their conservation.

Data Constraints

The Cultural Heritage Study that is underway will provide further insight into the potential influences in the management recommendations that are being proposed for Mohawk Lake and Mohawk Canal to promote its conservation. However, until the CHL Feasibility Study, OPA and management framework have been established, understanding the full constraints relative to potential development and management options for Mohawk Lake and Mohawk Canal will not be fully understood. The uncertainty of an OPA further represents a risk to effectively planning for the future conditions of the site.

The CHL Feasibility Study recommended a CHL designation be assigned for the entire area; the recommendation did not provide specific recommendations or differentiate between resources that were identified as being *strong* candidates for conservation versus *weak* candidates, or built resources versus cultural heritage landscapes. Some of the cultural heritage resources include bridges and the abandoned locks, which may be assigned greater restrictions, in order to ensure their conservation.

5.5.2 Archaeology

Stage 1 Archaeological Assessment Report (Appendix C) was completed by Wood in support of the Project (Wood, 2019). The study area examined encompasses the entire subwatershed area for the Mohawk Lake and Canal. Within the overall subwatershed area, only certain portions of the study area have been determined to exhibit archaeological potential, and the study area for the purposes of this report is limited to the areas within the subwatershed identified by the City's Planning Department's Archaeological Potential Mapping as having archaeological potential. In addition to these areas of potential, the Mohawk Lake District Study Area has been included as part of the study area. The combined study area for the Stage 1 Archaeological Assessment Report, as determined by the above, measures 232.45 ha and is shown in Figure 15.

The study area was historically described as Part of Lots 1, 2, 5, 19, 25, 26, and Lovejoy Lot, Mohawk Parsonage Lot, School Lot, Grand River Navigation Co. Lot, Eagles Nest Tract, Smith Tract, Lots A and B, Concession 4, and the Town of Brantford, in the Geographic Township of Brantford, County of Brant.

The Stage 1 archaeological assessment was carried out in accordance with the Ontario Ministry of Tourism, Culture and Sport's ("MTCS") Standards and Guidelines for Consultant Archaeologists (2011), under an Ontario Professional Licence to Conduct Archaeological Fieldwork (P348) held by Barbara Slim, Senior Archaeologist at Wood. The project information was acknowledged by the MTCS on 03 September 2019 with the approval of PIF number P348-0068-2019 (Stage 1).

The study area is situated within a designated CHL and along Mohawk Lake and Mohawk Canal. Portions of the study area have already been subject to archaeological assessments which have resulted in the documentation of numerous sites. The Stage 1 background study and property inspection indicated that undisturbed portions of the study area have archaeological potential and warrant Stage 2 property assessment based on: 1) the presence of a natural water source, Mohawk Canal, within the study area; 2) the known presence of 317 registered archaeological sites within a 1-km radius, providing direct evidence that this general area had been exploited by both pre-contact Aboriginal and historic Euro-Canadian peoples; 3) the proximity of historical transportation routes, including the Mohawk Canal, Greenwich Street and Mohawk Street; and 4) the previous identification of archaeological potential in the western portion, eastern portion, as well as in areas south of Mohawk Lake according to the City of Brantford Archaeological Potential Map.

On the basis of the Stage 1 property inspection and a review of recent land use history, Wood identified that: 1) 35% (81.65 hectares) of the study area consists of structures, railroad tracks, concrete lots, brownfield area, and reclaimed land (Shallow Creek Park) where it is assumed that archaeological potential has been removed; 2) 6% (14.75 hectares) is permanently wet, or now part of Mohawk Lake and Canal, and therefore has low archaeological potential; and 3) 59% (136.06 hectares) has archaeological potential and warrants Stage 2 assessment.

Of the 136.06 hectares that retain archaeological potential, 128.91 hectares are unploughable lands that should be assessed by means of test-pit survey, and 7.15 hectares are ploughable lands that should be assessed by means of pedestrian survey.

In light of the results presented above, the following recommendations are made, subject to the conditions outlined below and the advice on compliance with legislation provided in the Stage 1 Archaeological Assessment Report (Wood, 2019):

1. Stage 2 archaeological assessment in the form of a test-pit survey should be conducted within landscaped areas/woodlots (128.91 hectares) that retain archaeological potential, as shown in Figure 16. The test pits should be excavated by hand at regular 5 m intervals in a grid-pattern and to a depth of 5 cm into the subsoil. The stratigraphy of soils excavated during test pitting should be examined in order to detect cultural soil horizons and excavated soils are to be screened through 6-mm mesh to facilitate the recovery of artifacts.

The pattern and intensity of test pit placement may be altered due to changes in archaeological potential in different parts of a study area and/or the presence of disturbed soils indicating impacts to, or removal of, archaeological potential. Any such areas of disturbance should be evaluated and photo-documented.

If archaeological resources are found, their exact distribution should be documented and any diagnostic artifacts recovered and inventoried. Upon the discovery of cultural materials, the survey grid should be continued to determine whether there are enough archaeological resources to meet the criteria for making a recommendation to carry out Stage 3 assessment. In the event that insufficient archaeological resources are recovered, eight additional test pits are to be dug in a 2–2.5-m radius around the isolated positive test pit, followed by the hand excavation of a 1-m by 1-m test unit over the positive test pit. As with the test pits, soil fills within the test unit should be screened for artifacts through 6-mm mesh. These artifacts are to be recovered and recorded by provenience.

2. Stage 2 archaeological assessment in the form of a pedestrian survey at 5-m intervals should be conducted on open agricultural lands that retain archaeological potential (7.15 ha) as shown in Figure 16. These fields must first be freshly ploughed by means of mouldboard ploughing (and may require disk harrowing in heavy clay) to provide for at least 80% ground surface visibility. Prior to the pedestrian survey, the newly ploughed fields should also be allowed to weather through one heavy rainfall or several light rainfalls.

If archaeological resources are encountered, the 5 m transects should be decreased to 1 m over a minimum radius of 20 m around the archaeological find(s) until the full extent of the scatter has been identified or the find is determined to be isolated. In the case of a discrete scatter of artifacts, all formal artifact types and diagnostic categories are to be collected, but enough undiagnostic artifacts should be left in-situ to allow them to be relocated in the event that further assessment is required. The exact location of archaeological resources should be documented using one or more of a combination of: the Global Positioning System, topographic survey or other precision measurements. As with test-pit finds, surface finds should be recovered and recorded by provenience.

3. Stage 4 mitigation is warranted for Site AgHb-371, located within the study area. The following was recommended as the result of ARA's Stage 3 investigations (ARA 2014: 17):

The Stage 3 archaeological assessment of the proposed corridor at Findspot 1 yielded data which was clearly sufficient to trigger further Stage 4 work. Given that the existing sewer is in need of replacement, site impacts may be unavoidable. A Ministry of Culture-sanctioned strategy involving a mixture of both targeted Stage 4 excavations, within the corridor, and site avoidance and protection, for the remainder of Findspot 1, is strongly recommended. In the future, should any portion of these lands be

threatened by construction activities a full Stage 4 excavation should be undertaken. (ARA 2014: 17).

4. Stage 4 mitigation is also warranted for Site AgHa-181, located within the study area. As a result of ARA's Stage 3 investigations, Findspots 1a, 1b, 1c, 1d, 1f, 1g, 2, 3, 4a, 5, 7, 9, 11 and 15 were recommended for Stage 4 mitigation of development impacts as follows: Block excavation, undisturbed midden documentation and mechanical topsoil removal for Findspots 1a, 1b, 1c, 1d, 1f and 1g; Block excavation and mechanical topsoil removal for Findspot 2; Feature excavation and mechanical topsoil removal for Findspots 3, 4a, 5, 11 and 15; and Block/feature excavation and mechanical topsoil removal for Findspot 9.
5. No further assessment is required at Site AgHb-217, located within the study area (MTCS 2019).
6. The remainder of the study area does not require further archaeological assessment as these lands have either been fully assessed or exhibit low archaeological potential due to permanently wet conditions or the prior removal of archaeological potential.

5.5.2.1 Linkages (Features and Function)

5.5.2.1.1 Cultural Heritage Linkages

The CHL Feasibility Study conducted by ASI recommended the Mohawk Canal and Alfred Watts Hydro Generation Station Ruins be designated a CHL, which includes the majority of Mohawk Lake and Mohawk Canal and the entirety of Mohawk Park. The subject CHL for this area consists of an evolved cultural heritage landscape, where the evolutionary process is still in progress. A CHL designation does not mean the landscape cannot be changed or altered, but it must consider the cultural heritage value of the site and provide justification for alterations. Restoration and development recommendations, intended to remove contamination from the canal-lake system, that result in modifications to the landscape, may be justifiable, as safety takes precedence over cultural heritage considerations. An accepted approach to preserving CHLs, while permitting alterations, is the memorialization of the landscape through interpretive signage and photographs. Strategic sediment removal is not anticipated to be restricted as it occurs beyond the sight line and therefore would not affect the cultural heritage value.

5.5.2.1.2 Archaeological Linkages

Recommendations for restoration and development alternatives must account for the recommendations of the Stage 1 Archaeological Assessment Report (Wood 2019) (as outlined in Section 5.5.2 of this report), including carrying out Stage 2 Archaeological Assessment on areas that retain archaeological potential (Figure 16 – Stage 2 Arch) and Stage 4 mitigation for Site AgHb-371 and Site AgHa-181.

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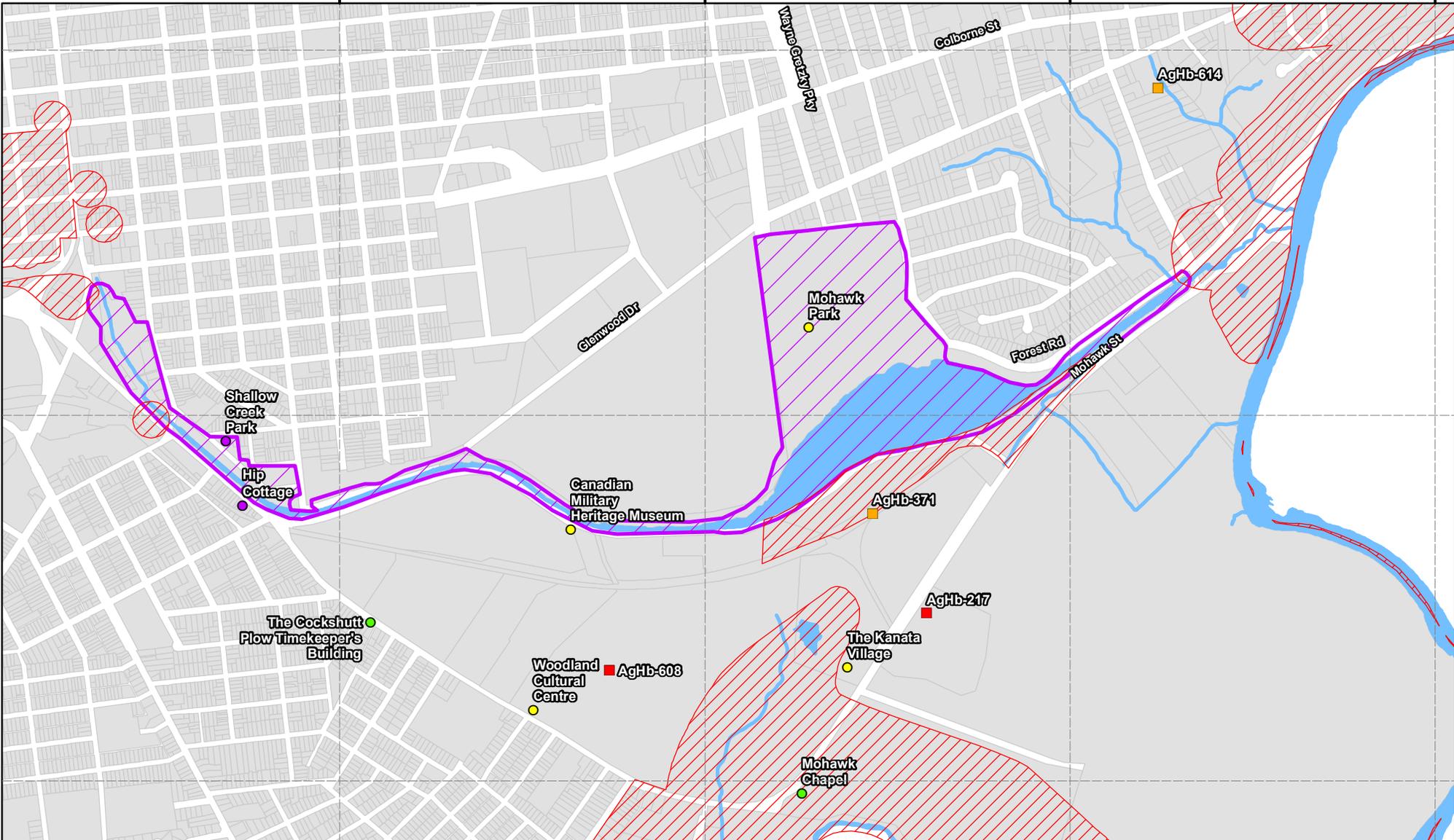
564000

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LEGEND

- Watercourse
- Waterbody
- Property Parcel
- Archaeological Potential
- Cultural Heritage Landscape Designation
- Cultural Heritage Site of Significance**
 - Designated
 - Listed
 - Potential for Designation
- Archaeological Assessment (AA) Status**
 - No Further AA Required
 - Stage 4 AA Required

NOTES:



Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study

Cultural Heritage and Archaeological Constraints Mapping

Datum: NAD83
Projection: UTM Zone 17N

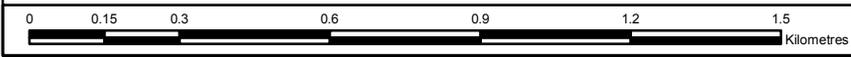


PROJECT N^o: TPB188172

DRAWING: 14

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DATE: December 2019

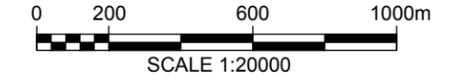


PROJECT: STAGE 1 ARCHAEOLOGICAL ASSESSMENT
 MOHAWK LAKE AND MOHAWK CANAL FUNCTIONAL MASTER
 DRAINAGE AND RESTORATION STUDY
 GEOGRAPHIC TOWNSHIP OF BRANTFORD
 COUNTY OF BRANT
 NOW IN THE CITY OF BRANTFORD, ONTARIO

TITLE:
 DEVELOPMENT PLAN

- LEGEND:
- STUDY AREA
 - SUBWATERSHED STUDY AREA
 - MOHAWK LAKE DISTRICT STUDY AREA
 - ARCHAEOLOGICAL POTENTIAL (CITY OF BRANTFORD, ARCHAEOLOGICAL MASTER PLAN, 2006)

NOTES:
 THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE
 WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS
 REPORT No. TPB188172.6002.
 ALL LOCATIONS ARE APPROXIMATE.
ORIGINAL PAPER SIZE: 11 x 17.
 REFERENCES:
 2017 AERIAL PHOTOGRAPHS BY THE COUNTY OF BRANT;
 CANMAP STREETFILES V2008.4.



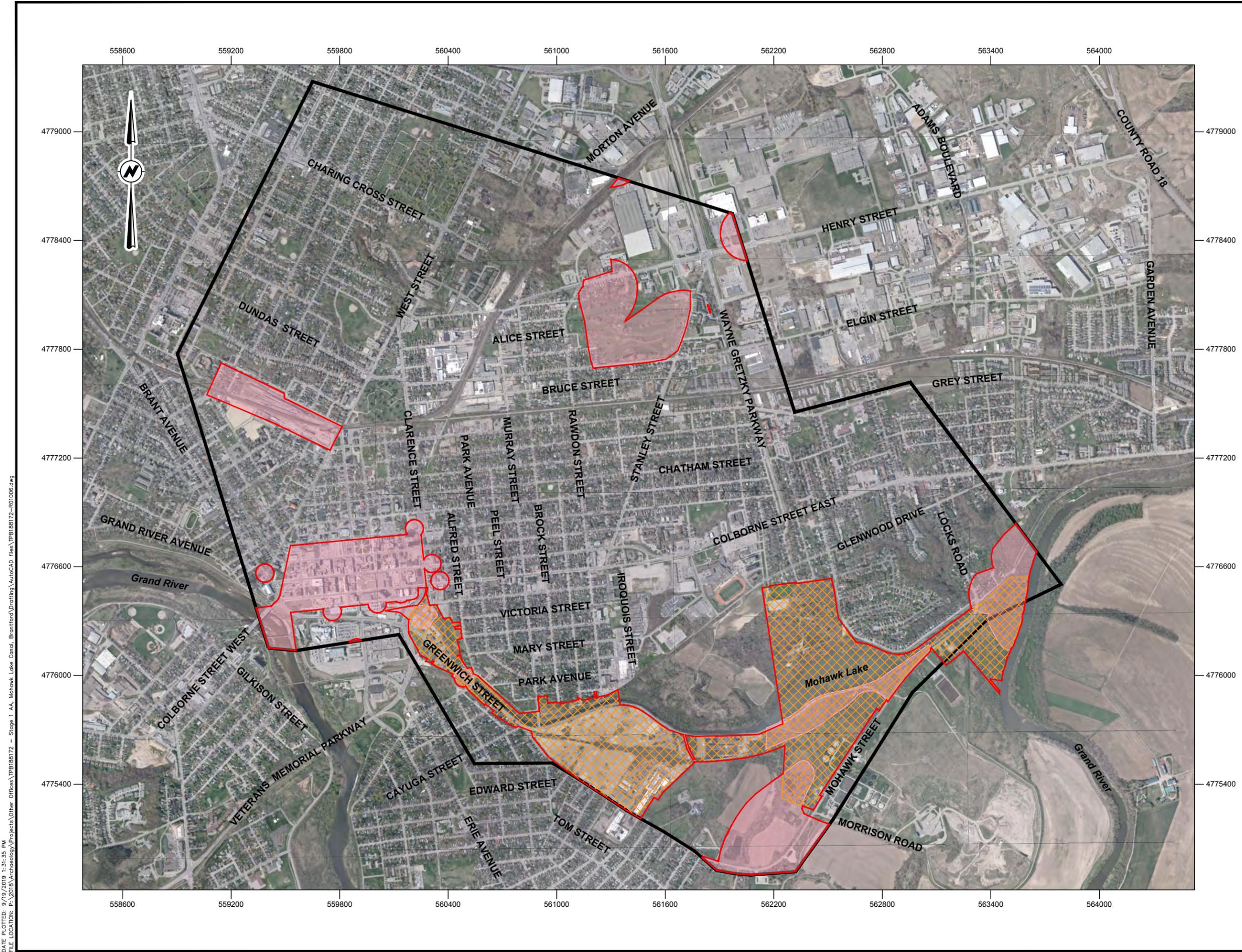
The Corporation of the City of Brantford
 100 WELLINGTON SQUARE
 BRANTFORD, ONTARIO, N3T 2M2



Wood
 Environment & Infrastructure Solutions
 201 KING STREET, 4TH FLOOR
 LONDON, ONTARIO, N6A 1C9
 519-681-2400



DWN BY:	CHK'D BY:	DATE:
SJL	KO	SEP. 17, 2019
DATUM:	PROJECTION:	PROJECT No:
NAD83	UTM Zone 17	TPB188172.6002
REV No:		FIGURE No:
0		15



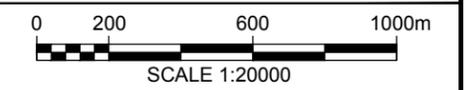
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PROJECT: STAGE 1 ARCHAEOLOGICAL ASSESSMENT
 MOHAWK LAKE AND MOHAWK CANAL FUNCTIONAL MASTER
 DRAINAGE AND RESTORATION STUDY
 GEOGRAPHIC TOWNSHIP OF BRANTFORD
 COUNTY OF BRANT
 NOW IN THE CITY OF BRANTFORD, ONTARIO

TITLE:
 SUGGESTED STAGE 2 STRATEGY

- LEGEND:
- STUDY AREA
 - LOW ARCHAEOLOGICAL POTENTIAL
 DISTURBED/PREVIOUSLY SUBJECT TO STAGE 2
 ASSESSMENT - NO FURTHER WORK RECOMMENDED
 - PERMANENTLY WET - NO FURTHER WORK
 RECOMMENDED
 - ARCHAEOLOGICAL POTENTIAL
 - UNPLOUGHABLE LAND - STAGE 2 AA RECOMMENDED
 (TEST PITTED AT 5m INTERVALS)
 - PLOUGHABLE LAND - STAGE 2 AA RECOMMENDED
 (PEDESTRIAN SURVEYED AT 5m INTERVALS)

NOTES:
 THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE
 WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS
 REPORT No. TPB188172.6002.
 ALL LOCATIONS ARE APPROXIMATE.
 ORIGINAL PAPER SIZE: 11 x 17.
 REFERENCES:
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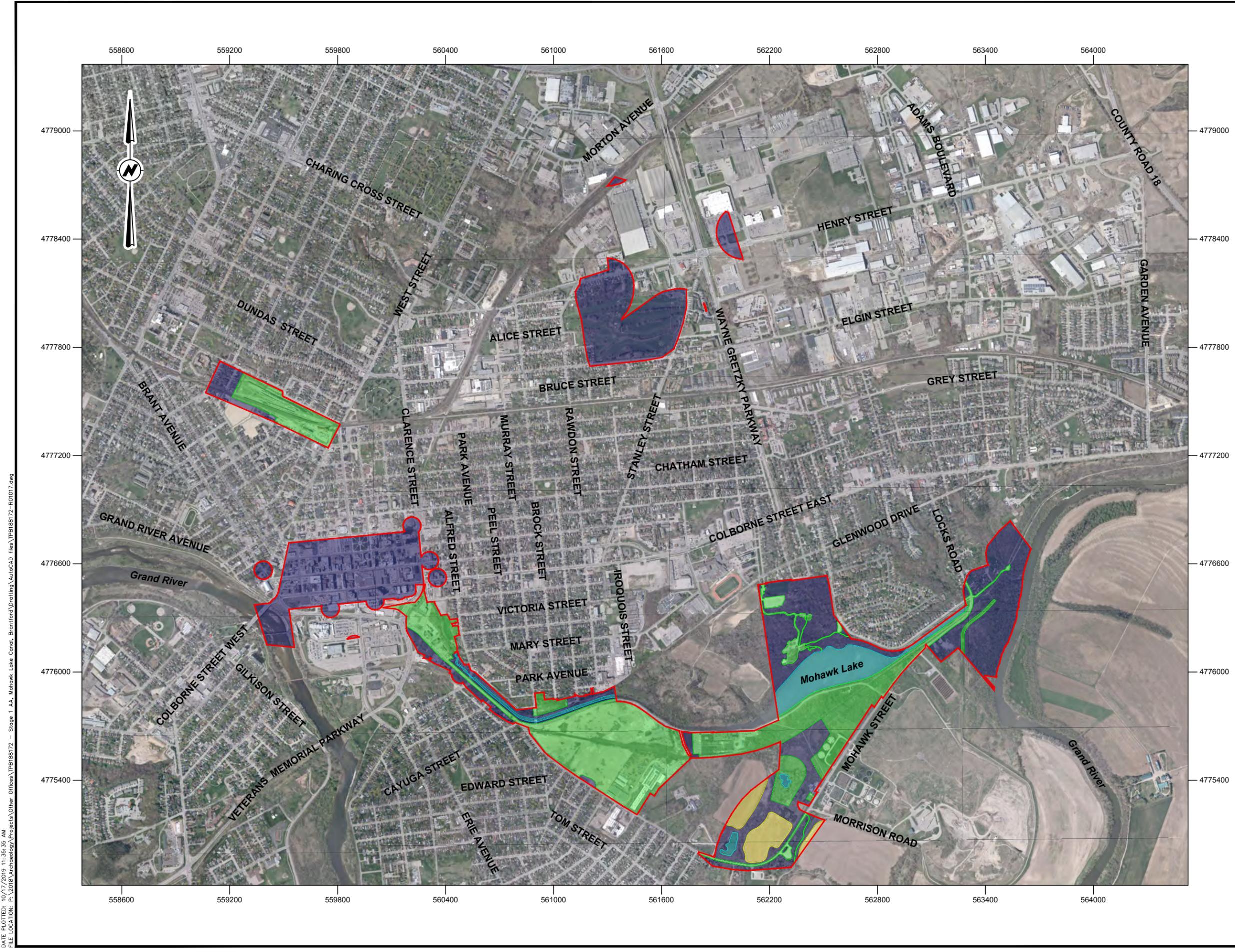
The Corporation of the City of Brantford
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 BRANTFORD, ONTARIO, N3T 2M2



Wood
 Environment & Infrastructure Solutions
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 519-681-2400



DWN BY:	CHK'D BY:	DATE:
SJL	KO	SEP. 17, 2019
DATUM:	PROJECTION:	PROJECT No:
NAD83	UTM Zone 17	TPB188172.6002
REV No:		FIGURE No:
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5.6 Potential Sources of Contamination

As part of the Characterization Study (Aquafor Beech Limited, 2019), industrial properties and landfill sites surrounding Mohawk Lake and Mohawk Canal were assessed as potential contaminant sources. Seven (7) abandoned landfills, one (1) active landfill, and eighteen (18) industrial properties were assessed by Gore & Storrie (1995) based on relative location to Mohawk Lake and Mohawk Canal, groundwater flow, historical and current uses of the site and the associated manufacturing processes.

5.6.1 Landfill Sites

The impact from the majority of landfill sites is expected to be minimal due to the size of the sites, distance from Mohawk Lake and Mohawk Canal, and direction of groundwater flow. Monitoring of groundwater is recommended, as well as the stabilization of erosion sites to reduce the potential for contaminant transport. Three (3) landfill sites were identified as having potential impacts on Mohawk Lake and Mohawk Canal (Figure 13).

The landfill located adjacent to Shallow Creek is the site of the former canal turning basin and a former coal gasification plant. A subsurface soil and fill investigation determined the site was significantly contaminated with PAHs, and groundwater samples were also contaminated. Groundwater was identified to be flowing towards Shallow Creek Park, but not contributing to the baseflow of East Ward Creek. Remedial action was not deemed necessary at the time of assessment, as there was no direct contact with the waste, however PAH contamination may have occurred by physical transport of the contaminated soils through erosion and transport from upstream areas.

Recommendations by Gore & Storrie (1995) to reduce potential further contamination included:

- Monitor future construction work to avoid hydraulic transportation of the soils from the construction site;
- Remediate identified erosion sites to reduce potential for contamination transport;
- Continue to monitor groundwater flow to understand groundwater system; and
- Analyze sediment samples from upstream tributary storm sewers to identify PAH contaminated sediments and potential contribution sources.

The landfill located in Mohawk Park has been used for tree, leaf and street sweeping remnants, which do not pose a significant source of contamination. It is recommended however that dumping be ceased, and erosion sites be stabilized.

The Mohawk Street Landfill, located to the southeast of Mohawk Lake, is active and the only municipally owned landfill in Brantford. Groundwater flows generally to the southeast, away from Mohawk Lake, with leachate collection systems and a bentonite barrier installed around much of the landfill. Mohawk Lake is not considered to be significantly impacted, however landfill leachate has somewhat affected the upper aquifer and there is potential for the contaminant plume to move towards the Grand River and Morrison Road, near Mohawk Road.

5.6.2 Industrial Properties

The majority of the industrial properties proximate to Mohawk Lake and Canal were identified as not expected to have a significant impact on Mohawk Lake or Mohawk Canal, with the exception of the following sites:

- Sonoco Products of Canada is located on the north banks of Mohawk Canal with stormwater discharging from the property into the canal. Water from the canal is used as non-contact cooling water and discharged back into the canal and lake; ongoing monitoring is recommended to ensure discharge is of an acceptable quality and temperature.
- The former P.U.C. building, also sited on the north banks of Mohawk Canal, has likely impacted the quality of the surface soils and the West Canal, however impacts are expected to be minimal.
- The Canada Glue Company site, located to the south of the East Canal, has likely impacted the surface soils however due to the direction of groundwater flow is unlikely to impact Mohawk Lake and Mohawk Canal.
- The Greenwich Mohawk Brownfield site underwent a remediation program to address soil contaminants, including petroleum, hydrocarbons, xylenes, lead and underground storage tanks, which was completed in 2017.

6.0 Alternatives: Identification, Screening and Evaluation

6.1 Overview

As part of Phase 2 of the Municipal Class EA process, a wide range, and types, of alternatives are developed and assessed. Alternative solutions for this Project were developed to consider all aspects of the environment (natural, cultural, social, and economic), and were reviewed through consultation with the public, Indigenous communities, and regulatory agencies throughout the planning and design process. Solutions included recommendations for structural and non-structural, short/long-term improvements within the Study Area including retrofits and restoration work.

The multi-pronged approach to the identification of alternative solutions is comprised of three (3) components:

1. Restoration strategies for Mohawk Lake and Mohawk Canal consisting of Alternative Remedial Solutions.
2. Subwatershed protection strategies consisting of Upstream Stormwater Management Alternatives (Quality and Quantity)
3. Existing and Future Land Use Plans and Policies

Components of each of these solutions have been considered as distinct scenarios to create a comprehensive plan for short-term remediation of the Mohawk Lake and Mohawk Canal and their natural resources, and long-term restoration of the Mohawk Lake subwatershed.

6.2 Evaluation of Alternatives

A review of category specific information was undertaken which identified general impacts under natural, social and cultural environmental categories. Direct and indirect impacts to each of these categories have been further examined as part of the evaluation of alternatives.

6.2.1 Evaluation Criteria

The evaluation criteria set out in Table 6-1 have been used to determine the viability and preferability of each proposed alternative solution. They are built on the potential impacts with the addition of economic and technical evaluations.

The alternatives described herein have been assessed on the basis of evaluation criteria established specifically for the current study. As required by the Municipal Environmental Assessment process, the selected criteria relate to the consideration of potential impacts and opportunities generated by the alternatives within four (4) distinct environments:

Natural Environment Impacts or opportunities that an alternative may have related to the natural environment (i.e., fisheries, wildlife, water quality, etc.).

- Social/Cultural Environment** Impacts or opportunities created by the alternative as related to the people and their current or historic relationship with the study area
- Economic Environment** Capital, operation and maintenance costs associated with an alternative, both in the short-term and long-term.
- Functional (Technical) Environment** Considers the ability of the alternative to address the Problem Statement and how it may impact existing physical systems.

Within each environment, relevant and representative criteria have been considered for the evaluation. Each evaluation criterion has been assessed to ensure it is quantifiable and results in a meaningful comparison between the short-listed alternatives.

Table 6-1: Assessment of Management Alternatives				
Component	Category	Evaluation Criteria	Factor	Potential Measure
Natural Environment	Water Quality	Water Chemistry & Temperature	Quality of water for fish and wildlife, recreation, or human use	Provincial Water Quality Objectives (PWOQ) and Stream Management Objectives
	Hydrology and Stormwater Management	Water Quantity	Environmental flows for recreation or wildlife	Flow rate (m ³ /s)
	Natural Heritage	Aquatic Habitat	Improvements or impacts to habitat viability	Area of impacted habitat in m ²
		Wildlife Habitat	Potential effects wildlife due to changes in habitat	Area of impacted habitat in m ²
		Wetland Impacts ¹ .	Impacts to identified wetland areas	Area of impacted wetland in m ²
		Species at Risk (SAR) Impacts ¹ .	Impacts to species at risk and habitat	SAR affected area of impacted wetland in m ²



Table 6-1: Assessment of Management Alternatives

Component	Category	Evaluation Criteria	Factor	Potential Measure
	Fluvial Geomorphology	Fluvial Stability / Sediment Transport	Potential adverse effect on stream stability	Loss of fluvial function (length in m)
	Geology, Hydrogeology and Groundwater	Groundwater/ Source Protection ¹ .	Potential adverse effect on groundwater including groundwater discharge and recharge	TBD
Social/ Cultural	Cultural Heritage and Archaeology	Archaeological Resources ² .	Potential adverse effects on archaeological resources	Extent of impact
		Cultural Heritage Resources ² .	Potential adverse effects on cultural heritage resources	Extent of impact
	Future Land Use and Growth Impacts	Recreational Use	Ability to support recreation, including access	TBD
		Impacts on Adjacent Properties	Potential adverse impacts to adjacent properties due to changes in water levels, construction of solutions etc.	Number of private or public properties
		Land Use	Impact to current plans, policies, and regulations	TBD
	Hydraulics	Flooding - Canal and Lake	Impacts on flood potential in Mohawk lake and Mohawk canal	Flood extents (floodplain) and hazard lands

Table 6-1: Assessment of Management Alternatives

Component	Category	Evaluation Criteria	Factor	Potential Measure
		Flooding - Streets and Sewers	Impacts on flood potential and elevation for water from streets and sewers	Flood depth
Economic		Capital Cost	Design and construction costs	Estimated cost (\$)
		Contaminant Management	Sediment quantity and quality management costs	Estimated cost (\$)
		Maintenance Cost	Asset management costs (lifecycle)	Estimated cost (\$)
		Utilities ³ .	Ability to minimize effects on existing and proposed utilities	Number and extent of potential impacts on utilities
		Property Acquisition	Amount of private property required to achieve solution	Area in ha
Technical		Stormwater Management	Ability to achieve SWM standards	TBD
		Hydrology	Control of runoff	TBD
		Constructability	The degree of ability to construct the improvements in a simple and cost-effective manner	Duration/ cost
		Community Resilience and Sustainability	Ability of the solution to mitigate	TBD

Table 6-1: Assessment of Management Alternatives

Component	Category	Evaluation Criteria	Factor	Potential Measure
			climate change impacts	

1. Advanced for consideration but screened following application to alternatives due to a lack of data for distinguishing alternatives.
2. Combined into a single criterion due to common potential for impacts (spatially).
3. More related to detailed design versus planning stages.

6.3 Restoration Strategies

The purpose of the remediation alternatives assessment has been to facilitate a review of possible alternatives to improve water quality within the Mohawk Lake and Mohawk Canal leading to a healthier and more sustainable system. The primary remediation options for sediment management are to either remove (dredge) and dispose of contaminated sediments or carry out treatment (cap or treat) sediment on site. Furthermore, alternatives connected to sediment management which involve lake bed re-contouring to optimize function have also been examined. Restoration strategies targeted at improving the inflow water quality, have also been considered for the linear reach of the Mohawk Canal and the lake shoreline, as has consideration of altering water depths in the lake. Restoration efforts will have corresponding benefits to the natural heritage system, and specifically aquatic habitat.

6.3.1 Long-List of Alternatives

Mohawk Lake and Mohawk Canal and their tributaries have been impacted by more than a century of hydrologic manipulation, adjacent landfill activities, and industrial discharges. Mohawk Lake is no longer used for turning barges and could support significant recreational and ecotourism activities once a remediation plan is implemented and water quality is improved. Brownfield restoration activities have been actively undertaken in the subwatershed and many of the previous industrial discharges have been eliminated, or significantly reduced. However, the storm sewer system still directs untreated stormwater runoff to Mohawk Canal and Mohawk Lake. In addition, legacy pollutants remain in the Mohawk Lake sediments and are an ongoing source of internal water quality issues (ref. Characterization Study, 2019). Erosion also continues to play a significant part in adverse sediment loading to Mohawk Lake which is expected to limit the benefits from potential restoration projects, unless shoreline and stream stabilization projects are implemented as well.

Mohawk Lake was once a part of the Grand River, however natural fluvial processes resulted in the formation of an oxbow which severed the lake from the river's direct flow path. It is unclear exactly how much natural connectivity remained after the formation of the oxbow, however a commercially navigable connection existed after construction of the Mohawk Canal. Removal of a dam (post mid-1980's) at the upstream end of the

West Mohawk Canal eliminated inflow from the Grand River and any associated flushing effectively cutting off the lake and canal.

Mohawk Lake has a surface area of approximately 15 hectares with water depth ranging from 1 to 3 meters. The Mohawk Lake watershed is approximately 873 hectares (to Mohawk Lake and Canal) and includes one tributary at the downstream limits of the watershed and a second tributary discharging downstream of the connection between Mohawk Lake and the Grand River. Drainage of the remaining watershed is achieved through a network of storm sewer conveyance systems. Mohawk Lake Characterization Study, 2019 indicates approximately 30 discharge structures drain to the Mohawk Canal system upstream of Mohawk Lake, two drain directly into Mohawk Lake, and an additional 18 discharge into Mohawk Canal downstream of Mohawk Lake. All outfalls discharge untreated stormwater directly to Mohawk Canal or Mohawk Lake. Based on that study, surface runoff contributes approximately 2,748,000 m³ per year or approximately 82% of the total Mohawk Lake hydrologic budget.

Groundwater contribution to Mohawk Lake is also a potential source of contamination as there are seven (7) abandoned landfills and an additional partially restored landfill, that are immediately adjacent to the waterbody. According to the Mohawk Lake Characterization Study, 2019, most landfills appear downgradient of the lake, however several may be contributing a significant amount of groundwater and associated pollutants to Mohawk Lake. The Characterization Study estimates groundwater seepage contributes approximately 589,000 m³ or about 18% of the Mohawk Lake hydrologic budget.

Water quality samples collected from Mohawk Canal and Mohawk Lake and the surrounding subwatershed by Aquafor Beech in 2018 were analyzed for a wide range of potential contaminants including nutrients; bacteria; metals; petroleum hydrocarbons (PHCs); polycyclic aromatic hydrocarbons (PAHs); benzene, toluene, ethyl benzene, and xylenes (BTEX); organochlorine pesticides; PCBs; and volatile organic carbons (VOCs). Water quality results from the lake and canal indicate significant bacterial exceedances from all stations and exceedances of total suspended solids, aluminum, iron, manganese, copper, and zinc at a least one station. Several samples had PAHs that exceeded the PWQO limits at each station. No quantifiable exceedance of PCB or organochlorine pesticides was indicated; however, results were largely inconclusive because the detection limits were generally considerably higher than the corresponding PWQO guideline.

Aquafor Beech also completed sediment quality sampling within Mohawk Lake and Mohawk Canal. Results have been interpreted by Aquafor Beech and are summarized in the following.

Nutrient concentrations within the Mohawk Lake and Canal sediments fall into the “Lowest Effect” PSQG threshold. All metals exceeded the “Lowest Effect” threshold in most locations and copper and lead exceeded the “Severe Effect” threshold at several locations. The “Lowest Effect” threshold was exceeded for at least one PAHs at all sampling locations, however all PAH concentrations were several orders of magnitude

less than the “Severe Effect” threshold. OCPs and PCBs were generally higher than the “Lowest Effect” threshold as a result of laboratory minimum detection limits.

Aquafor Beech provided an analysis of sediment quality as compared to the soil standards described in the April 2011 *“Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act”, Ontario Regulation 153/04*. In general, top and middle sampling intervals exceeded Table 3 Site Conditions Standards (SCS) for Industrial/Commercial land uses for cadmium, lead, and zinc. PAHs exceeded the Table 3 SCS in all intervals. One PAH exceeded Table 5 SCS in the bottom and middle sampling interval. Nearly half of the samples exceeded Table 3 SCS for F3. No OCPs were detected in the sediments above method detection limits. PCBs exceeded Table 3 SCS for the middle sampling interval at seven (7) of the sample locations.

Based on the findings from the Characterization Study, 2019, sediments should be classified as non-hazardous material but there will likely be considerable restrictions on placement options. Water quality sampling from the surrounding subwatershed indicates a similar pollutant profile which suggests that untreated stormwater discharges will likely continue to contribute contaminated sediments unless these sources are controlled.

Remediation of Mohawk Lake will require a multi-faceted subwatershed and lake management approach involving internal strategic restoration and external pollution and erosion control measures. Remediation alternatives range from large-scale whole-lake dredging to simple curb inlet devices. Best Management Practices (BMPs) promoting groundwater infiltration may be effective at reducing surface runoff and erosion, however careful consideration should be given to groundwater conditions that may be influenced by these types of BMPs, due to potential existing groundwater contamination and opportunities for migration. Furthermore, those BMPs with a focus on ‘infiltration’ will inherently be expected to reduce water delivery to the lake, which can have a potential negative effect on its water budget.

Wood has developed a long list of available remediation options that have been evaluated using the evaluation matrix. Alternatives that address the internal lake pollution are included in the “In-Lake Restoration” section while alternatives addressing contributions from the subwatershed are included in the “Structural BMP Retrofits” and “Non-Structural BMPs” sections. All evaluated alternatives are listed in Table 6-2, along with an initial description of the alternative, comparative effectiveness, and relative cost.

6.3.1.1 In-Lake/In-Canal Restoration

Sedimentation as a result of contaminant transport from the surrounding Mohawk Lake subwatershed has a direct effect on water quality. The accumulated sediment has been identified to contain high concentrations of various contaminants which are often the same contaminants identified in stormwater runoff draining to the lake.

The surface water quality monitoring events provided as part of the Characterization Study (Aquafor Beech Limited, 2019) provide a reasonable short-term assessment of the selected contaminants as they relate to stormwater inputs. However, many limnological processes occur slowly and impacts to lake water quality from activities

within the watershed generally take place over several decades. This is particularly evident in lakes similar to Mohawk Lake where the water volume is exchanged slowly over several months. Management of both the external and internal lake processes can significantly expedite lake restoration efforts.

An ambient water quality monitoring program is recommended to provide an understanding of how limnological variables (e.g. chlorophyll-*a*) respond to external stormwater inputs and a variety of internal processes including sediment nutrient flux, sediment resuspension, thermal stratification, and sediment toxicity. The ambient water quality monitoring program would consist of periodic collection of field parameters including transparency (Secchi depth), pH, dissolved oxygen, specific conductance, and oxidation/reduction potential. This information would assist in determining whether Mohawk Lake undergoes regular thermal stratification and would help develop associated dissolved oxygen profiles which can play a significant role in release of nutrients and contaminants from sediment. Additional water chemistry information including chlorophyll-*a*, turbidity, total suspended solids, alkalinity, hardness, colour, and a variety of nutrient parameters including ammonia nitrogen, total Kjeldahl nitrogen, nitrite+nitrate nitrogen, total phosphorus and orthophosphate would provide quantitative data that could be used to evaluate and manage both external and internal pollutant sources. In addition, future efforts to quantify nutrient loading from sediment flux could be useful in sediment management efforts if the ambient water quality data suggests that internal loading may be significant.

As part of the Mohawk Lake Characterization Study (Aquafor Beech Limited, 2019), a preliminary bathymetric survey and sediment profile was completed to determine general sediment quantities and sediment distribution. The bathymetric survey results indicate that approximately 185,000 m³ of unconsolidated sediment has accumulated within the Mohawk Lake study area. Most of the unconsolidated sediment (155,000 m³) lies within the lake itself, with the remainder of the material approximately 30,000 m³ lies within the canals. The corresponding unconsolidated sediment thickness ranges from 0 - 2.4 m in the lake and 0 - 1.5 m within the canals, respectively.

However, according to the Mohawk Lake Characterization Study, 2019, a report by Ecological Services for Planning (1994) reported the total volume of sediment to be nearly twice that amount (300,000 m³). That same report indicated that the upper 0.3 m of the unconsolidated sediment profile consists of poorly consolidated, organic material, and the underlying material was generally observed to be compact, dark brown, silty sand.

As part of the Mohawk Lake Characterization Study, 2019, preliminary surficial sediment and sediment core samples were collected at twenty (20) locations within Mohawk Lake study area. In total, twelve (12) sampling locations were established within Mohawk Lake; four (4) sampling locations within Mohawk West Canal; and, two (2) locations within Mohawk East Canal. An additional two sampling locations were included for quality assurance/quality control (QA/QC) purposes from within lake itself.

Importantly, two (2) different collection methods were used to collect the required sediment samples within the Mohawk Lake study area. The surficial samples (0 – 10 cm) were collected via Petite Ponar, whereas the deeper sediments, 10 cm to a

maximum depth of 1.5 m, were collected via core sampling using the Pollutech hammer core technique. At each location, three (3) distinct samples were collected/formed (i.e., one (1) surficial sample and two (2) samples representing two (2) distinct depth intervals) for a total of 60 individual samples. This approach allows for a rough vertical evaluation of the pollutant levels within the waterbody.

The Mohawk Lake Characterization Study, 2019 preliminary surficial sediment findings indicated that current sediment quality for the Mohawk Lake study area is generally consistent with previously completed sediment quality investigations. Those previous sediment quality investigations demonstrated that collected sediments should be deemed 'nonhazardous' based upon the results of the TCLP testing. Three additional TCLP analyses were performed as part of the Characterization Study and also concluded that the sediments should be classified as non-hazardous.

Chemical sediment characterization completed by Aquafor Beech in 2019 as part of the Mohawk Lake Characterization Study was utilized to prepare Figure 17 to Figure 22 showing the concentrations of select contaminants compared to their *Lowest Effect Levels* (toxic effects for sediment organisms), or *LEL*, for the three sediment sampling intervals. It should be noted that depth ranges for the second and third sampling intervals are variable and future effort will be required to refine these data. The figures provide a convenient assessment of some of the potential cumulative impacts from contaminants which have only been assessed individually to-date. Furthermore, the figures indicate where targeted efforts could be focused for future strategic restoration efforts.

Heavy metals were mapped by sampling interval based on the hazard index (HI) which included data for all metals with established *LELs* (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn). The HI is the sum of individual quotients of metal concentrations divided by the *LEL* for each metal at a given location. A HI above 1 indicates potential ecological impacts. The HI analysis suggests that the *LEL* was exceeded in the upper two intervals over most of the lake bottom. The hazard quotients (HQ), or the quotient of the single concentration divided by the *LEL*, for total polycyclic aromatic hydrocarbons (PAHs) also are shown in the figures. The highest PAH HQ is within the upper sediment interval of the west canal near its confluence with Mohawk Lake.

Although the sediment screening levels are for sediment-dwelling organisms, those organisms form the base of many aquatic food webs. Further, the sediments often are a continuing source of legacy contaminants in lakes, and an understanding of sediment contamination patterns is important in considering restoration activities. Future efforts to evaluate the potential risks associated with in-situ sediments and potential for increase wildlife and recreational interaction is recommended. These risk evaluations will be important for determining the suitability of future lake management plans.

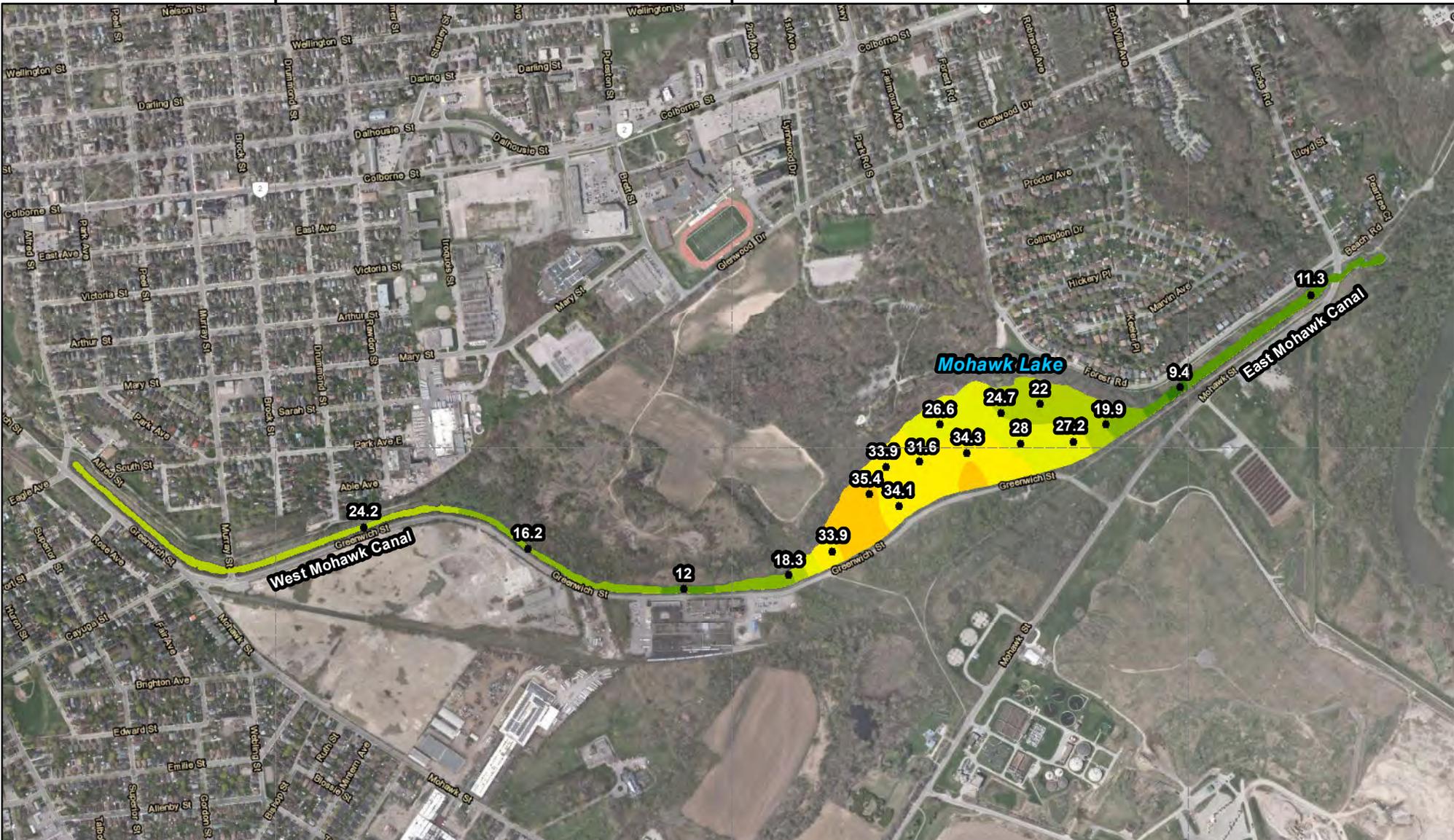
In its current condition, a layer of silty, organic sediment overlies the mineral soil bottom of the lake, degrading water quality within the Lake and causing a decline in benthic habitat. Based on the data provided, additional field and laboratory work would be necessary at the time of preliminary and detailed design, to determine the final sediment removal template, based both on sediment physical and chemical quality parameters. In addition, a detailed bathymetric survey and a detailed program of surficial sediment and

sediment core samples combined with previous hydrologic and hydraulic modelling and geomorphological assessments, will be necessary to determine the most efficient canal configuration and the final contours of the proposed altered lake bottom. It is noteworthy, that the ultimate scale of any sediment removal works will need to focus on those contaminants of highest concern; hence inherently not all sediment is likely to be removed, rather this will need to be strategic based on supplemental study. Further, the lake bed will be expected to be re-contoured to optimize hydrologic and ecologic functions, through the strategic sediment removal.

The strategic sediment removal and potential reconfiguration of the lake bottom can be accomplished by several means, including drawdown/pumpdown of the lake with mechanical dredging, hydraulic dredging, and some combination of either an excavation method, or the strategic use of physical capping, to address:

- sediment quantity and quality constraints related to contamination;
- reconfigure the channels; and,
- restore the canal-lake system to a more natural state with improved and sustainable function.

V:\TPB188172_2020_40_Mohawk_Lake\MXD\Report\Cumulative Criterion Unit (Metals) for Lowest Effect Limit\Int. 1 (Top).mxd



LEGEND

- Sediment Sample Locations

Metals	
5	25
10	30
15	35
20	40
	45
	50
	55
	60

Note – All values are calculated using Provincial Sediment Quality Guidelines for Lowest Effect Level. Sediment intervals are based on the Aquafor Beech Mohawk Lake Characterization Study (2019). The range of values includes all three sediment intervals and the range of colors is only intended to provide a visual reference of values from lowest (green) to highest (red).

NOTES:
 - Wood, ABL
 - ESRI 2017 Imagery



**Mohawk Lake and Mohawk Canal
 Functional Master Drainage and Restoration Study**

**Figure 17
 Mohawk Lake Hazard Quotient (Metals)
 Sediment Interval 1 (Top)**

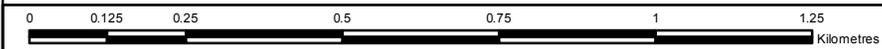
Datum: NAD83 CSRS
 Projection: UTM Zone 17N

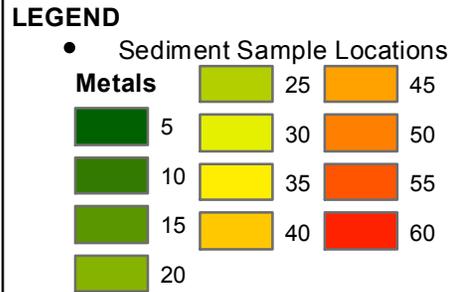
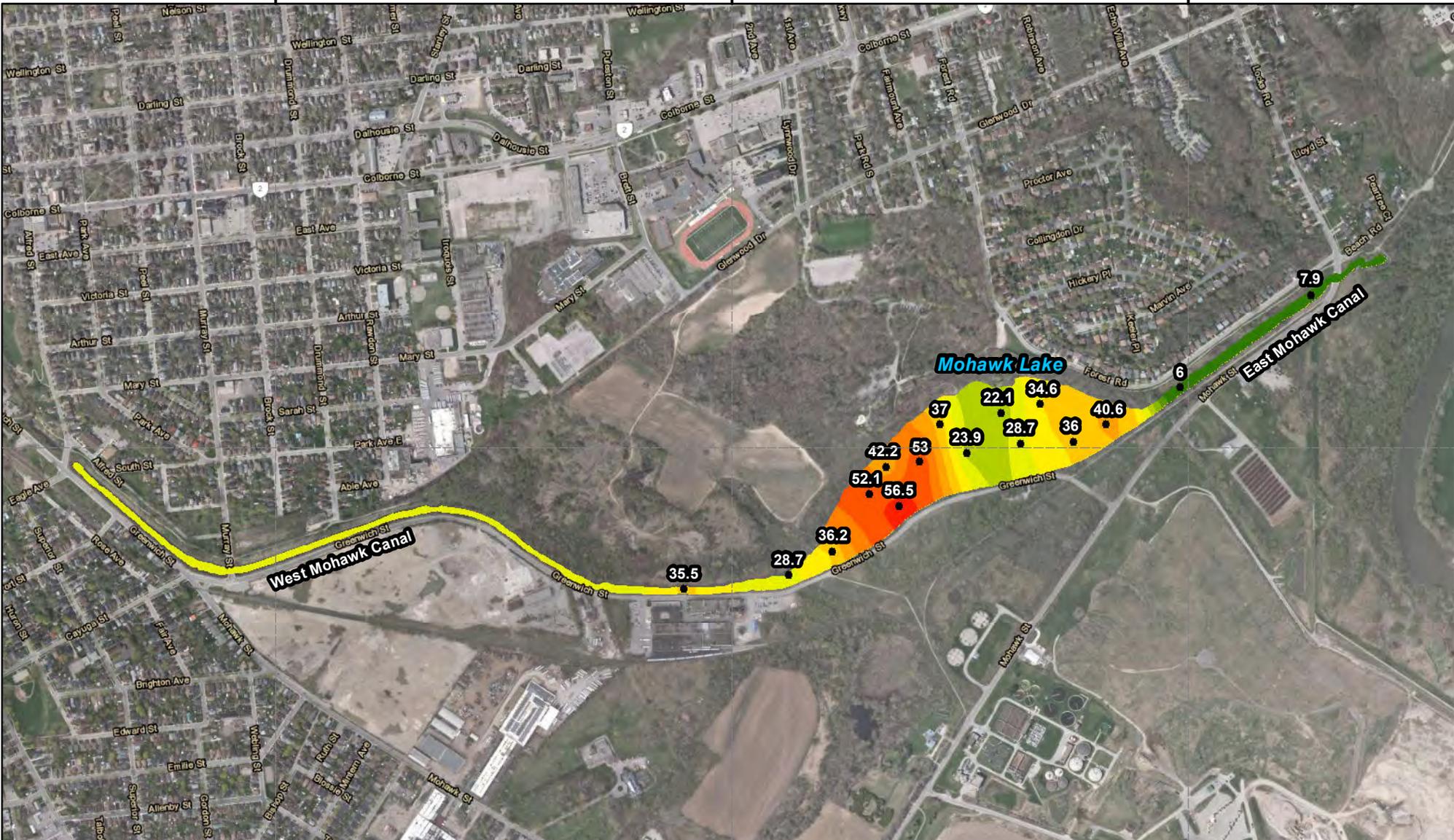


PROJECT N°: TPB188172

SCALE: 1:12,000

DATE: December 2019





Note – All values are calculated using Provincial Sediment Quality Guidelines for Lowest Effect Level. Sediment intervals are based on the Aquafor Beech Mohawk Lake Characterization Study (2019). The range of values includes all three sediment intervals and the range of colors is only intended to provide a visual reference of values from lowest (green) to highest (red).

NOTES:
 - Wood, ABL
 - ESRI 2017 Imagery



**Mohawk Lake and Mohawk Canal
 Functional Master Drainage and Restoration Study**

**Figure 18
 Mohawk Lake Hazard Quotient (Metals)
 Sediment Interval 2 (Middle)**

Datum: NAD83 CSRS
 Projection: UTM Zone 17N



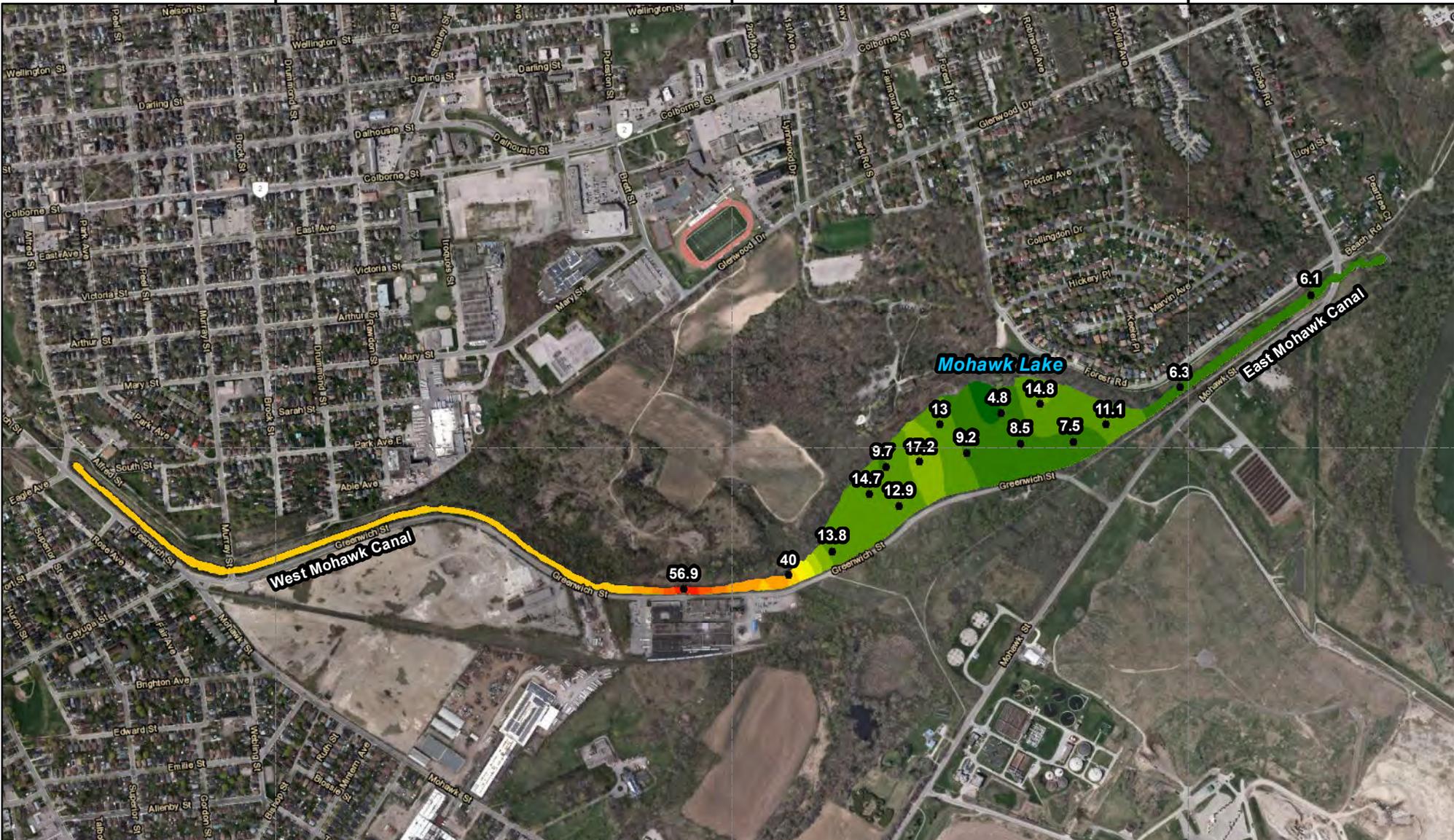
PROJECT N^o: TPB188172

SCALE: 1:12,000

DATE: December 2019



V:\TPB188172_2000_40_Mohawk_Lake\MXD\Report\Cumulative Criterion Unit (Metals) for Lowest Effect Limit\Int 3 (Bottom).mxd



LEGEND

● Sediment Sample Locations

Metals	25	45
5	30	50
10	35	55
15	40	60
20		

Note – All values are calculated using Provincial Sediment Quality Guidelines for Lowest Effect Level. Sediment intervals are based on the Aquafor Beech Mohawk Lake Characterization Study (2019). The range of values includes all three sediment intervals and the range of colors is only intended to provide a visual reference of values from lowest (green) to highest (red).

NOTES:
 - Wood, ABL
 - ESRI 2017 Imagery



**Mohawk Lake and Mohawk Canal
 Functional Master Drainage and Restoration Study**

**Figure 19
 Mohawk Lake Hazard Quotient (Metals)
 Sediment Interval 3 (Bottom)**



Datum: NAD83 CSRS
 Projection: UTM Zone 17N



PROJECT N^o: TPB188172

SCALE: 1:12,000

DATE: December 2019

V:\TPB\188172_2020_40_Mohawk_Lake\MXD\Report\Total Polyaromatic Hydrocarbon Concentration above Lowest Effect Level-Int 1 (Top).mxd



LEGEND

● Sediment Sample Locations

Hydrocarbon	12	24
2	14	26
4	16	28
6	18	30
8	20	32
10	22	

Note – All values are calculated using Provincial Sediment Quality Guidelines for Lowest Effect Level. Sediment intervals are based on the Aquafor Beech Mohawk Lake Characterization Study (2019). The range of values includes all three sediment intervals and the range of colors is only intended to provide a visual reference of values from lowest (green) to highest (red).

NOTES:
 - Wood, ABL
 - ESRI 2017 Imagery



**Mohawk Lake and Mohawk Canal
 Functional Master Drainage and Restoration Study**

**Figure 20
 Mohawk Lake Hazard Quotient (Total PAH)
 Sediment Interval 1 (Top)**

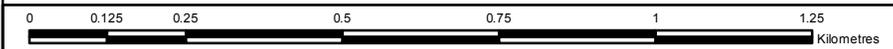
Datum: NAD83 CSRS
 Projection: UTM Zone 17N



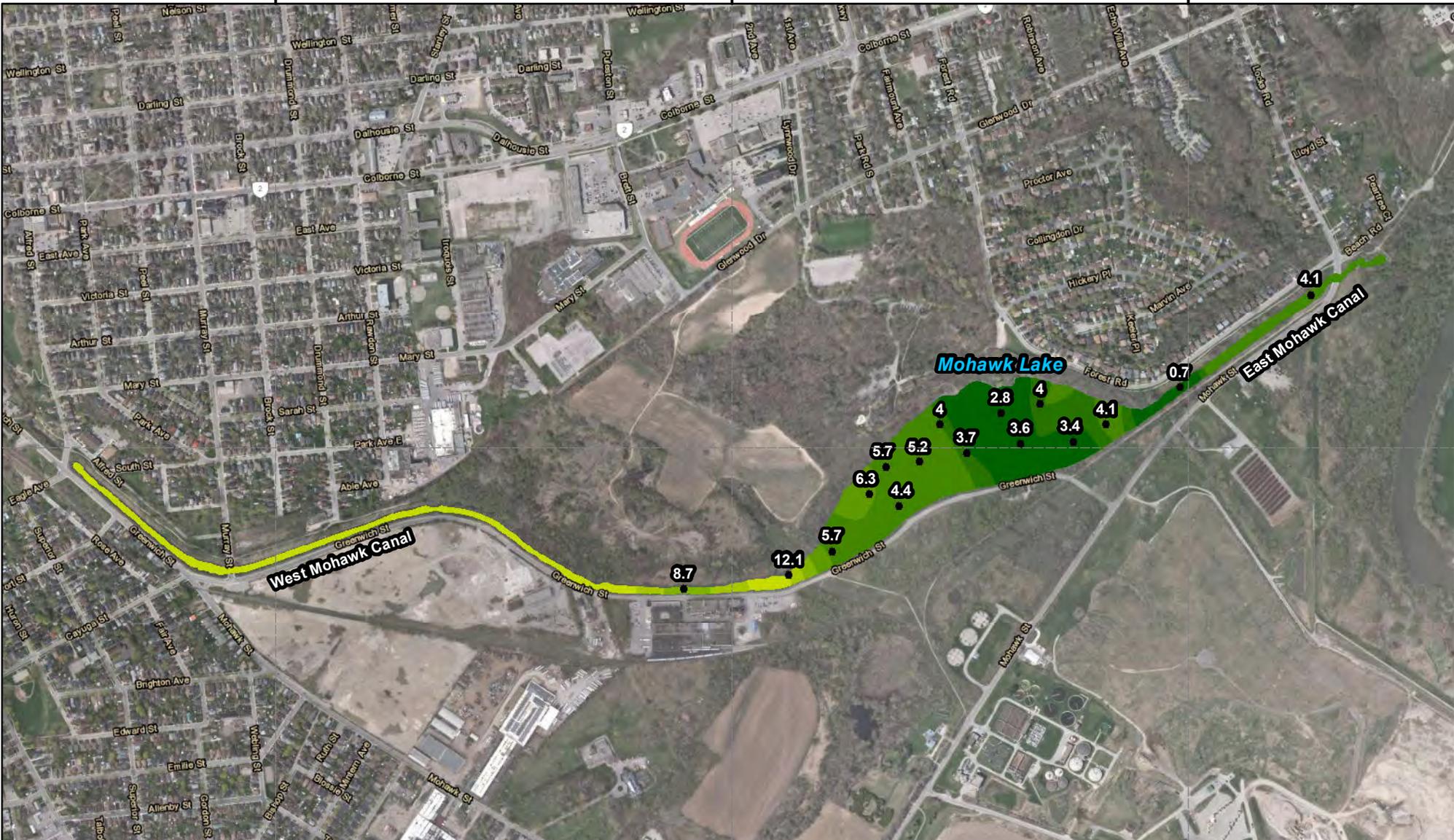
PROJECT N^o: TPB188172

SCALE: 1:12,000

DATE: December 2019



V:\TPB\188172_2000_40_Mohawk_Lake\MXD\Report\Total Polyaromatic Hydrocarbon Concentration above Lowest Effect Level-Int 1 (Middle).mxd



LEGEND

- Sediment Sample Locations

Hydrocarbon	12	24
2	14	26
4	16	28
6	18	30
8	20	32
10	22	

Note – All values are calculated using Provincial Sediment Quality Guidelines for Lowest Effect Level. Sediment intervals are based on the Aquafor Beech Mohawk Lake Characterization Study (2019). The range of values includes all three sediment intervals and the range of colors is only intended to provide a visual reference of values from lowest (green) to highest (red).

NOTES:
 - Wood, ABL
 - ESRI 2017 Imagery



**Mohawk Lake and Mohawk Canal
 Functional Master Drainage and Restoration Study**

**Figure 21
 Mohawk Lake Hazard Quotient (Total PAH)
 Sediment Interval 2 (Middle)**

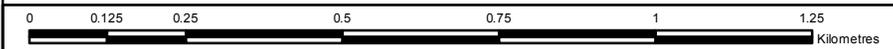
Datum: NAD83 CSRS
 Projection: UTM Zone 17N



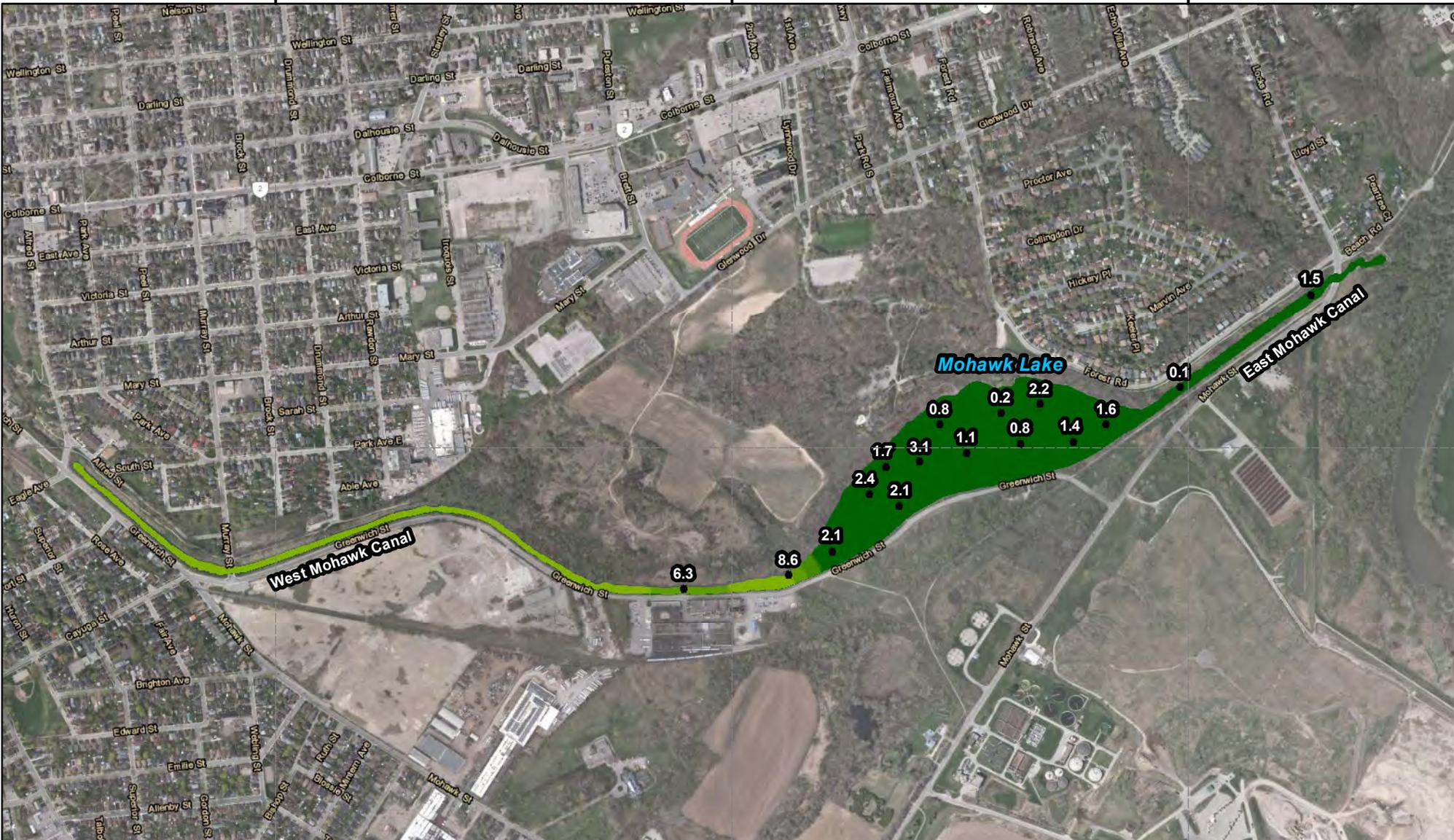
PROJECT N^o: TPB188172

SCALE: 1:12,000

DATE: December 2019

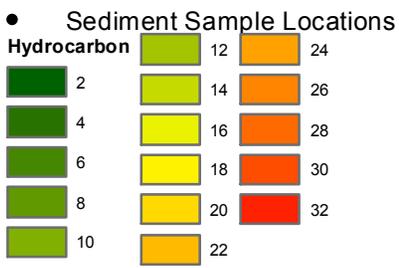


V:\TPB188172_2010_40_Mohawk_Lake\MXD\Report\Total Polyaromatic Hydrocarbon Concentration above Lowest Effect Level-Int 1 (Bottom).mxd



4776000

LEGEND



Note – All values are calculated using Provincial Sediment Quality Guidelines for Lowest Effect Level. Sediment intervals are based on the Aquafor Beech Mohawk Lake Characterization Study (2019). The range of values includes all three sediment intervals and the range of colors is only intended to provide a visual reference of values from lowest (green) to highest (red).

NOTES:
 - Wood, ABL
 - ESRI 2017 Imagery



**Mohawk Lake and Mohawk Canal
 Functional Master Drainage and Restoration Study**

**Figure 22
 Mohawk Lake Hazard Quotient (Total PAH)
 Sediment Interval 3 (Bottom)**

Datum: NAD83 CSRS
 Projection: UTM Zone 17N



PROJECT N^o: TPB188172

SCALE: 1:12,000

DATE: December 2019



6.3.1.1.1 Alternative 1: Drawdown/Pumpdown and Mechanical Dredging

The use of dry excavation methods is a very common approach to dredging smaller lakes, ponds, and riverine systems when conditions are suitable. To effectively implement this approach, the dredge footprint must be exposed by drawing down the water surface elevation in the waterbody. Depending on site conditions, drawing down the water surface elevation may also include the use of dewatering pumps to control the infiltration of groundwater into the site, and diverting the flow from existing streams that may normally be feeding into the dredge footprint. These control measures maintain the required conditions to facilitate safe access and the effective operation of heavy machinery.

The drawdown/pumpdown and mechanical dredging alternative involves dewatering the lake, allowing the targeted organic sediments to dry, excavation of the targeted organic sediments from the lake bottom and side slopes, the removal of the targeted excavated organic sediments, re-grading portions of the lake bottom to provide improved habitat structure, construction of drainage channel features to facilitate future lake drawdown and mechanical dredging events, placement of gravel/coarse sediment bars in select locations for habitat enhancement, and moving submerged timber to create fish habitat or removal and disposal of degraded submerged timber.

Under this alternative the lake and canal system will be completely drained using a series of constructed sumps. During subsequent mechanical excavation, these sumps will be connected to assist with future mechanical or hydraulic maintenance dredging. Once the lake is drained, the selected contractor would use pumps, or other means, to remove excess water that may not drain due to existing lake bottom contours. As noted, additional field and laboratory work will be necessary prior to detailed design to determine the final sediment removal template, based both on sediment physical and chemical quality parameters. In addition, prior to detailed design, a detailed bathymetric survey and a detailed program of surficial sediment and sediment core samples, combined with previous hydrologic and hydraulic modelling and geomorphologic assessments, will be necessary to determine the most efficient canal configuration and the final contours of the proposed altered lake bottom to optimize hydrologic performance and ecological potential. The lake will then be graded using existing material within the lake to minimize hauling or disposing of material, to match the approved design and permitted construction drawings.

During construction activities, the selected contractor would be responsible for maintaining all access roads, parking areas, and construction staging areas in good condition, including grading, drainage, and debris removal.

A suggested sequence of construction is presented below; the contractor may suggest a modification to the sequence provided the access and operation requirements are satisfied and compliance with the overall contract period is achieved.

- 1) Install erosion and sedimentation control around, and within, the construction and staging areas and the sediment land application areas.
- 2) Construct staging/laydown areas.

- 3) Dewater Mohawk Lake and allow organic sediment to consolidate through partial drying.
- 4) During the drawdown process, there will be pockets of standing water that will remain, requiring either portable pumps or connection to larger sumps to dewater the pockets of water.
- 5) Excavate and haul organic sediment to approved disposal sites.
- 6) Grade habitat enhancement features, stabilize, and haul excess native material to designated disposal area.
- 7) Place gravel/coarse sediment bars in designated areas.
- 8) Collect timber from bottom of the lake, and construct fish habitat features
- 9) Repair any damage or degradation caused by construction activities.
- 10) Obtain final approval from the City and regulators.
- 11) Rehydrate Lake.
- 12) Remove temporary erosion and sedimentation controls.

Assuming the lakeshore and canal can be accessed at key locations for sediment removal, the drawdown/pumpdown and mechanical dredging options would be the least expensive dredging option for Mohawk Lake and Mohawk Canal. Regardless, backwatering and inflow water management control will be key. However, this option is also the most disruptive and presents the greatest risk to the public due to potential odour and aesthetic conditions. Cost of material disposal will depend on amount of strategic sediment removal and the selected location and transport distance.

6.3.1.1.2 Alternative 2: Hydraulic Dredging

Dredging may also be accomplished within Mohawk Lake and Mohawk Canal using hydraulic dredge equipment. Hydraulic dredging may be more suitable for Mohawk Lake restoration than mechanical means for several reasons including the significant width of Mohawk Lake, the density of riparian vegetation, and potential lack of continuous access. Although slightly more expensive, there are multiple advantages to the use of hydraulic dredging in Mohawk Lake.

Hydraulic dredging provides the advantage of nearly complete containment of the dredge slurry along the pumping route, which reduces exposure of the sediments to the atmosphere which could cause odour or other problems if the material were to be handled by an excavator. Additionally, the dredge slurry from a hydraulic dredge could easily be routed to an adjacent wastewater system for dewatering and ultimate disposal if available. This alternative assessment for Mohawk Lake assumes that access to, and use of, a wastewater system is not available.

Hydraulic dredging provides an efficient means to remove the target sediments down to a specific elevation without the need to disturb areas outside of the necessary dredge footprint. As noted above, the volume of targeted organic material is not precisely defined and this will need to be established based on factors cited earlier with respect to

contaminant concentrations and hydrologic function, subject to future study. However, it is recommended that at least some portion of the natural sand or gravel bottom be removed as sub-excavation to effectively capture any migrated pollutants in the upper layers. For the Mohawk Lake study area remediation effort, the dredging template is proposed to extend down approximately 15 to 20 cm below the natural sand or gravel bottom to ensure the targeted sediments are effectively removed. The proposed overdepth dredging (15 – 20 cm) is partially based on dredging industry standards and partially on the reasonable and practical pipeline size of the hydraulic dredge equipment that would likely be deployed in this remediation effort.

Additional detailed pre- and post-dredge surveys will be required before project commencement and following project completion.

Given the importance of maintaining workable water depths for sediment removal by hydraulic dredging, the canal would likely be divided into at least two sections or “management units.” Management unit sizes and number will vary based on the size of the hydraulic dredging equipment and pumps proposed by the selected contractor.

At the end of each management unit section, starting with unit one, the selected contractor would install a cofferdam system. As part of the dredging, the water level in each management unit would need to be maintained at an elevation 2 to 3 m above the top of the sediments to allow a hydraulic dredge to be deployed and operated. The majority of any water to maintain this depth would be pumped from Mohawk Lake, while some portion of that water would be expected to come from that discharged through the existing storm sewer system and precipitation. Care must be taken not to raise the water levels to the point that could cause local flooding and disrupt the operation of the rest of the system.

Given the potential risks associated with public contact and need for special handling and disposal of any contaminated sediments, the standard methodology for upland dewatering and stockpiling of dredged solids (e.g., belt presses) is not recommended. Areas of approximately 1,000 m² or larger with potential hydraulic pipeline access to Mohawk Lake, which lay adjacent to Mohawk Lake in the park, will be reviewed as possible material handling locations. Determining the final project area, operational lake heights, site layouts, etc. will require agreements with the City and users of the selected project area. Additional data collection, and analysis of the proposed sites designated upland handling area footprint will also be required. Following this site-specific data collection, it will be necessary to perform the necessary engineering design, acquire permits, and develop final tender and construction documents (plans and specifications).

As with most dredge projects, dredged material transportation, dewatering, and final placement of the dredged material are generally the most challenging and costly elements. The conceptual project details are discussed below and assume that a designated upland handling area is available within the adjacent parkland and suitable for the project needs.

During the dredging operation within each management unit, the hydraulic dredge is proposed to sweep the lake bottom and send a slurry of dredged material, and mostly water, to the temporary work yard area. The inflowing dredged slurry will be fed to a

series of mechanical dewatering equipment (filter presses, sand shakers, hydrocyclones, etc.), of the contractor's choosing, to separate debris, gravel, sand, from the incoming slurry. The separated debris, gravel, and sand can then either be stored and used as needed, returned to the lake bottom, or used in future remediation projects within the surrounding area. The remaining effluent, comprised of the targeted sediments and dredged water, would then be routed for final processing and disposal.

Preliminary calculations, based only on the amount and types of sediment to be dredged, indicate that a dredge material management area (DMMA) would need to cover approximately 6,000 to 12,000 m² (+/-) and consist of several small temporary storage areas and a larger open work area. While additional storage areas may prove to be beneficial, to reduce overall transportation costs, it is not at this point considered necessary.

The chosen alternative should allow for direct road access, movement of construction equipment, and direct hydraulic pipeline access for the transportation of the dredge slurry and the return of targeted sediments for final processing and disposal.

As noted earlier, the DMMA will require direct hydraulic pipeline access from, and to, Mohawk Lake. The DMMA will require direct road access for the movement of construction equipment. The DMMA will ideally have a total temporary storage capacity of at least 7,500 m³ (+/-) which would allow continuous dredging seven days a week during daylight hours. The DMMA site should also be partially lighted to allow the selected contractor the ability to continuously dewater and decant the dredged material seven days a week, 24 hours a day.

The slurry stream would be directed through the selected contractor's series of traditional mechanical dewatering techniques (e.g., hydrocyclones, filter presses) at the DMMA site. The coarse dredged material (gravel, sandy sediments, and debris) needs to be captured by the mechanical dewatering techniques and would be sorted, stacked, and temporarily stored. Afterward, this coarse dredged material would be transported to the final disposal location (to be determined).

The remaining processed slurry stream would then be dewatered for final treatment and disposal. As the slurry stream leaves the mechanical dewatering area, the selected contractor will have the opportunity to introduce chemical additives (flocculants or coagulants) to the slurry stream. Any flocculants or coagulants will require pre-approval through the permitting process. Notwithstanding, introducing chemical additives is not anticipated to be necessary. However, it may be deemed beneficial, following a complete review of the outlined process.

The dredging project should be designed to avoid unnecessary impacts to the existing ecosystem within Mohawk Lake and downstream. Turbidity control is of primary concern with any dredging project. Hydraulic dredging is generally much less prone to turbidity issues than mechanical dredging because most of the disturbed sediments are entrained by the suction head. Turbidity will be controlled by the contractor using the cofferdam systems, which will be arranged to maximize settling time within the work area prior to releasing discharges downstream.

The dredge and associated equipment will need to be staged, deployed, and operated in a way that limits disturbance of the riparian habitat surrounding the lake and canal. In most cases, it is likely that the dredge and associated equipment, will be transferred to Mohawk Lake using a crane. Pipelines will be transported, installed, and fixed in place using a corridor that results in the least ecological disturbance to the local area, including the park.

Additional impact avoidance measures will be reviewed during the pre-design and detailed design stages. This review will also include an assessment of the pumping and sand removal process that will likely be a part of the overall dredge process stream. Ultimate placement of sandy material will be evaluated based on its physical and chemical properties.

6.3.1.1.3 Alternative 3: Sediment Management – Physical Capping

Physical capping is accomplished by applying a cover of clean material on top of the polluted or contaminated sediment to effectively eliminate or reduce biogeochemical and physical interaction with the overlying water column. The type of material used depends on the targeted pollutants and degree of isolation needed, however could include bentonite clay, uncontaminated organic material, or sand. Some remediation projects have successfully utilized cleaner organic material as a cover to reduce pesticide contamination. Sand caps have been used effectively to improve water quality in canal systems where nutrient contamination has been problematic.

Capping may be suitable for lentic systems where bottom conditions are relatively uniform and water depth is sufficient to reduce scouring, sediment transport, and resuspension. This is particularly true of lower density material such as bentonite and organic sediments. Irregular channel morphology, low water depths, and periodic high flows within Mohawk Canal in particular would provide highly variable settling velocities, which would limit the effectiveness of any attempt to effectively cap the existing organic material. Capping challenges also exist for Mohawk Lake, since dense capping material, such as sand tends to displace the more fluid organic or silty material, thereby limiting the effectiveness of this alternative in the lotic portions of the Mohawk Lake system. Sediment capping is not recommended as the selected remediation alternative within the canal portion of the Mohawk Lake study area, and its usefulness within the lake portion would depend on the bottom composition.

6.3.1.1.4 Alternative 4: Sediment Management – Chemical Capping and Nutrient Inactivation

Chemical capping of sediment is used worldwide to reduce the release of phosphorus from sediments to the water column via processes such as diffusion and resuspension. Based on sampling during the Characterization Phase, Mohawk Lake and Mohawk Canal sediment exhibits orthophosphate concentrations between 0.2 and 0.7 mg/kg which is consistent with relatively high phosphorus concentrations in the water column, and suggests that internal sources of phosphorus could be significant. Should this alternative be advanced, prior to final design, Wood recommends additional characterization of sediments for total phosphorus and phosphorus species, which may be present in the sediments in a variety of conditions and potential biological availability.

This information would be critical to understanding internal phosphorus recycling processes within the lake.

Several chemical capping methods are available, but the primary chemicals applied are liquid aluminum sulfate (alum) and lanthanum-based clay mixes. Similar to physical capping, chemical inactivation is typically used in lentic systems with deeper water. This generally prolongs the effectiveness of the binding process and limits the release of sediment-derived phosphorus. However, unlike capping, chemical inactivation treatments have a defined capacity to bind phosphorus regardless of their ultimate disposition. While internal sources of phosphorus are likely important water quality factors in Mohawk Canal and Mohawk Lake, chemical capping would have little impact on other pollutants. Furthermore, shallow conditions within the Mohawk Canal and Mohawk Lake system would likely limit the effectiveness of a chemical capping project. Cost of chemical capping for phosphorus control will depend on the concentration of phosphorus that may be released from the water column within the sediment. This information is currently unavailable.

6.3.1.1.5 Alternative 5: Revegetation of Riparian Areas and Tributary Streams

This alternative has a focus on ecological restoration through the planting of beneficial emergent and submerged vegetation. Shallow zone plantings have a quality treatment effect through the uptake of contaminants resident in the watercourse substrate, in particular nutrients and heavy metals. This approach may be effective as a standalone restoration project in shallow areas with high groundwater discharge. This is a relatively low-cost alternative to implement, however, plantings should be monitored, and re-plantings may be required until the restored area becomes established. The targeted locations would be open tributary waterways including Shallow Creek and East Ward Creek.

6.3.1.1.6 Alternative 6: Watercourse Restoration (Mohawk Canal)

The watercourse restoration alternative includes an assessment to determine if the Mohawk Canal channel can be restored, and if so, to what extent. It would also be expected that this alternative will be combined with sediment removal (all or part) since the Characterization Study has identified upwards of 30,000 m³ to be resident in the canal. This may also be combined with a future stormwater management retrofit of some portion of the upper West Canal to incorporate explicit online stormwater quality control of suspended solids.

Field observations and 2-dimensional modelling can provide restoration conceptual designs for the canal, which will focus on developing approaches to address urban stream degradation and associated water quality issues. Along with nutrient reduction, the assessment should consider approaches to alleviate the flashiness of the system by increasing upgradient storage. It is understood that the canal is controlled hydraulically by surface runoff, however, groundwater elevations are also important. As summarized in the Characterization Study, the subsurface conditions in the area are complex due to the Quaternary glacial processes and the depositional environment that were created from the Grand River. Field observations regarding geomorphology, erosion, habitat and flows from the Characterization Study and updated modelling provide information to conceptualize canal restoration that will reduce erosion and contaminant transport and

thus sediment load that is associated with pollutant loading to Mohawk Lake and other receiving waters.

Based on a general understanding of the Mohawk Canal and Subwatershed, the geomorphological characteristics of the canal are consistent with an urban stream, which includes consistently observed biophysical and water quality degradation, including a flashier hydrograph, elevated concentrations of nutrients and contaminants, altered channel morphology, excessive erosion, excessive sedimentation, loss of floodplain functions, reduced resiliency, reduced flood capacity at road crossings, reduced pollutant reduction functions, and reduced biological integrity and biodiversity (Walsh et al, 2005).

6.3.1.1.7 Alternative 7: Living Shorelines, Shoreline/Riparian Restoration, Shoreline Softening (Mohawk Lake), including Water Level Adjustments

This practice involves vegetating bare and eroded shorelines and riparian zones to provide a vegetative and structural buffer which reduces scour and re-suspension of sediments and associated nutrients into the water column. This approach can also provide water quality treatment of locally-generated overland runoff and can enhance carbon concentrations in Mohawk Lake, which can help mitigate phytoplankton growth and reduce chlorophyll-a concentrations. The eroded shorelines identified along the Mohawk Lake would be ideal locations for this type of stabilization and re-vegetation BMP. Emergent aquatic vegetation (EAV) and SAV can also be planted within lake fringes to enhance biological uptake of pollutants and promote habitat and enhance ecological conditions. As noted, lake bed re-contouring can assist in adding this biodiversity and habitat improvement along the littoral zone in the Lake, as well as Lake Level modification/adjustments to optimize the potential for vegetation growth along the shorelines (Note: this would involve modification of the outlet structure). In areas where depth or slope are not suitable for planting, the littoral shelf can be constructed with fill material or engineered structures to allow optimal depth to support EAV and SAV and promote a living shoreline design. Living shorelines are an effective tool to reduce shoreline erosion, increase nutrient removal and enhance habitat diversity in water bodies. This type of BMP offers a significant opportunity for implementation in Mohawk Lake due to abundant shallow conditions and could easily be combined with a dredging project to promote a wide range of habitat within the lake. These types of BMPs are relatively inexpensive as they are primarily biological.

6.3.1.2 Screening of Remediation Alternatives

Table 6-2 presents a high-level screening of the remediation alternatives with the intent to advance the long list of techniques and actions available to restore Mohawk Lake and Mohawk Canal, and identify those better suited to form part of the preferred integrated solution. In this instance all 7 of the alternatives warrant further consideration, with a more detailed assessment of net benefits, and presentation to stakeholders for review and comment.

Table 6-2: Screening of Lake / Canal Remediation Alternatives

Alternative	Description	Treatment Type	Pollutant Addressed	Potential Water Quality Impact	Potential Cost Rank
Lake / Canal Treatment Remediation					
1. Drawdown/Pumpdown and Mechanical Dredging	Reduce water level in Mohawk Lake to provide access to heavy equipment for mechanical removal of accumulated sediment. Semi-dry material transported to adjacent areas for blending and incorporation into processes for beneficial use	Internal	All	High potential for positive water quality impacts following dredging, however, downstream water quality may decrease temporarily during pumpdown although water quality treatment measures could be employed	Medium
2. Hydraulic Dredging	Removal of lake sediment without the need for drawdown/pumpdown. Requires a DMMA for dewatering	Internal	All	High potential for positive water quality impacts. Does not impact water quality downstream	High
3. Sediment Capping	Application of a clean sand layer to isolate pollutants and prevent interaction with water column	Internal	All	High potential water quality impact due to reduced interaction with water column.	Medium
4. Sediment Nutrient Inactivation	Chemical application to bind and prevent release of bio-available phosphorus from sediment	Internal	Dissolved phosphorus	High potential for reduction of algal blooms but no affect on other pollutants	Low
5. Revegetation of riparian areas and tributary streams	Planting of beneficial emergent and submerged vegetation	Internal	Nutrients and heavy metals	Moderate water quality impacts. May be effective as a standalone restoration project in shallow areas with high groundwater discharge. More effective in conjunction with dredging or capping to stabilize sediments and provide habitat and structure	Low

Table 6-2: Screening of Lake / Canal Remediation Alternatives

Alternative	Description	Treatment Type	Pollutant Addressed	Potential Water Quality Impact	Potential Cost Rank
Lake / Canal Treatment Remediation					
6. Canal Restoration	Stabilization of canal reaches contributing sediment load potential incorporation of SWM quality control to reduce sediment load to downstream receivers.	External	TSS and pollutants specific to stream reach	High potential for reduction of bed load to Mohawk Lake	Medium
7. Living Shorelines, Shoreline Restoration, Shoreline Softening and Water level Adjustments	Vegetate bare and eroded shorelines and riparian zones to provide a vegetative and structural buffer which reduces scour and re-suspension of sediments and associated nutrients into the water column. Provides water quality treatment of local overland runoff and enhances carbon and color concentrations in the lake, which can help mitigate phytoplankton growth and reduce chlorophyll-a concentrations.	Internal	Promotes SAV and EAV growth. Improves TSS, Turbidity, and DO of water quality.	High Beneficial Impact to vegetative and aquatic life, and water quality.	Low

Legend

Treatment Type		Potential Water Quality Impact and Potential Cost Rank	
External	External	Low	Low
Internal	Internal	Medium	Medium
		High	High
		To be determined	

6.4 Subwatershed Management Strategies

The Stormwater Management (SWM) Alternatives within the tributary subwatershed to Mohawk Lake and Mohawk Canal serve to address issues related to stormwater runoff quantity and quality that inflows to Mohawk Lake and Mohawk Canal. Modelling data (based on existing land use) have been used to develop integrated SWM alternative scenarios applying quantity and quality solutions. These scenarios have been evaluated based on those alternatives which involve growth impact management and City capital works. The approach involves retroactively providing water quality practices in strategic locations across the subwatershed, as well as for any re-development, including private and public works. For the latter, it is important to consider the extent and form of redevelopment/intensification potential within the Mohawk Lake and Mohawk Canal Subwatershed Area.

6.4.1 Long List of Stormwater Management Alternatives

6.4.1.1 Structural BMP Retrofits

Structural Best Management Practices (BMPs) are projects involving the installation of physical systems to provide mechanical, biological, or chemical control of the target water quality pollutant. Structural BMPs are generally placed in locations within the subwatershed where pollutant concentration and water flow produce the greatest load to the waterbody. Structural BMPs can be buried or incorporated in the urban landscape and require varying degrees of maintenance. Structural BMPs placed in urbanized areas generally require modelling to ensure no impacts to upstream flooding. Structural BMPs are generally compared in terms of \$/kg of target pollutant removed, which is different than a focussed restoration project like dredging and lake bed re-profiling. Furthermore, each BMP has a project-specific load reduction based on the amount of water treated and the site-specific pollutant concentration.

Alternative 1: Upflow Media Filtration

Upflow media filters are buried concrete vault structures containing various types of media that can be used to address a variety of water quality problems. Upflow media filters can be configured in-line or off-line depending on the hydraulic conditions. When designed for nutrient reduction, upflow media filters have been shown to significantly reduce total nitrogen and phosphorus loading. Upflow media filtration applications can also be effective at reducing metals and total PAH concentrations when incorporating activated carbon or other adsorptive media designed for these pollutants.

Upflow media filters can generally be constructed within the existing right-of-way of roadways and require relatively little maintenance as long as sand and sediment is removed using a standard baffle box upstream. Media is replaced every 5 to 10 years depending on the type of formulation and target pollutant concentration. These types of BMPs are generally quite expensive though and require considerable underground structures and maintenance.

Alternative 2: Baffle Boxes (Settling Chambers and OGS)

Baffle boxes are buried concrete or fiberglass structures comprised of several small sedimentation chambers capable of trash collection, sedimentation of debris, and removal of suspended solids. Baffle boxes operate by slowing down flow velocity in stormwater runoff by the use of baffle walls and settling chambers. As stormwater enters the larger volume of the baffle box, the hydraulic retention time is increased and the flow velocity decreases. The decreased velocity allows heavier suspended solids to settle. Heavier solids will then settle in the first chamber while lighter solids will settle in the last chamber. Incorporation of a trash collector enables the screened capture of floatable debris such as trash and vegetation. Baffle boxes are usually installed just prior to discharge to receiving water bodies which are sensitive to suspended solids concentrations, such as lakes and rivers. They are also used to retrofit existing drainage systems to reduce the discharge of pollutants in conjunction with other BMPs (treatment train) for new development.

Baffle boxes are generally easy to install within an existing right-of-way and are very effective at removing sediments and contaminants that are associated with the entrained sediments. However, pollutant removal efficiencies depend on factors such as land use, drainage basin area, soil types, storm water velocities through the box, and the frequency and thoroughness of box cleaning. Typically, baffle boxes have limited impact on dissolved nutrients and other dissolved water quality pollutants.

Baffle boxes are moderately expensive stormwater treatment solutions for sediment load reduction and very expensive when considering only nutrient load reduction.

Alternative 3: Eliminate Cross-Connections

The City's sanitary and storm sewer systems are separated within the Mohawk Lake subwatershed. The Characterization Study has noted that cross-connections may exist which direct sanitary sewage directly to a stormwater discharge system. Decreasing cross connections would provide direct water quality benefits to Mohawk Canal and Mohawk Lake. Costs associated with this BMP would typically be part of an overall sewage system maintenance plan.

Alternative 4: Wetland Treatment

The wetland treatment restoration alternatives include a broad array of options such as using existing natural wetland pockets to either route portions of the canal water, or pump water from the lake to the wetlands to provide additional treatment prior to discharge back into the lake. Alternatively, a constructed treatment wetland could be designed to further treat stormwater runoff from the subwatershed and/or canal before it flows into Mohawk Lake.

Natural and constructed treatment wetlands provide a microbially-mediated and ecologically-sustainable method to polish stormwater runoff, which also provides additional vegetative (aquatic emergent) habitat for birds and wildlife. After the stormwater runoff is treated by the treatment wetland, it would then be routed to Mohawk Lake carrying a significantly lower pollutant load.

As part of the conceptual design of a treatment wetland, long term average effluent pollutant concentration values will be needed to develop a preliminary estimate of the wetland area required to achieve target water quality standards. The wetland area would need to be modelled using the k-C* Model (Kadlec and Knight 1996) primarily based on nutrient concentrations and design flow rates. A design effluent concentration that would discharge out of the treatment wetland can then be set at the water quality standard values, so that the water would not further impact Mohawk Lake's impaired water quality status. The size of a treatment wetland can vary based on the design flow rates, input and expected effluent concentrations.

A feasibility study would be necessary to evaluate detailed and recent data, which would include an assessment of infiltration rates, depending on the soils and groundwater connectivity of the wetland to the lake. Depending on the scale and land availability, wetland treatment systems are often the least expensive BMP treatment types, and the contaminants within that runoff because they are capable of treating high volumes of water.

Alternative 5: Infiltration/Exfiltration BMPs

Infiltration and exfiltration BMPs recharge the groundwater and are designed to reduce surface runoff and the contaminants within that runoff. If used in the Mohawk Lake subwatershed, careful consideration must be given to surrounding and downgradient groundwater conditions which could be affected by changes to the groundwater conditions caused by these types of BMPs. These BMPs can mitigate impervious surface impacts by allowing runoff to infiltrate to the groundwater slowly. This mitigates higher runoff volumes and retains water within the subwatershed thereby recharging the groundwater instead of contributing runoff directly to the receiving water during storm events. This also helps reduce peak flows which can cause erosion and mitigates low post-storm base flows in receiving waters since replenished groundwater ultimately feeds stream baseflows. Infiltration also provides pollutant removal via filtration and microbial action through the soil column.

There are many designs for this type of BMP which can be retrofitted into several locations in developed areas such as the Mohawk Lake subwatershed. Recharge BMPs include surface systems, such as retention basins, and underground systems, such as infiltration galleries and leaching catch basins. These systems are typically installed at the end of a stormwater collection system and operate by temporarily storing stormwater and allowing it to percolate into the ground. The siting of recharge BMPs is primarily dependent on two factors: soil hydraulic conductivity and groundwater elevations. Effective recharge systems must be located in soils with sufficient permeability to allow groundwater to recharge between storm events. Generally, a soil hydraulic conductivity of 10 – 15 mm/hr or greater is desired for recharge BMPs. Effective recharge systems must also be located with sufficient vertical separation from the groundwater table.

Infiltration basins are prone to clogging and failure, so it is imperative to develop and implement aggressive maintenance plans and schedules. To avoid compromising the integrity of the receiving groundwater, recharge/exfiltration BMPs should not be used alone for mitigating runoff from high-pollutant areas but should be used in conjunction

with pretreatment BMPs. Installing the required pretreatment BMPs will significantly reduce maintenance requirements for the basin and prolong the lifespan of the recharge/exfiltration BMPs.

Similarly, soil conditions and water table depth affect exfiltration BMPs. Effective exfiltration BMPs should drain between storm events and this is possible only with soils with moderate to high hydraulic conductivity, such as sandy soils. In addition, the depth of the water table must be great enough to provide separation between the recharge system and water table during all conditions. Without adequate separation, infiltration rates are significantly reduced and pollutant removal that would normally occur as the water filters through the soil matrix is lessened.

Recharge/exfiltration BMPs should be sized to ensure that no runoff occurs during the initial abstraction storm. This volume is calculated as the pre-existing initial abstraction depth multiplied by the directly connected impervious area, as this is the area that contributes to runoff. The volume can be possibly less than this value depending on the recharge rate of the underlying soils. The soil recharge rate will affect the ability of the BMP to mitigate the design storm volume.

Infiltration basins are highly effective treatment systems that remove many contaminants, including TSS. However, infiltration basins are not intended to remove coarse particulate pollutants. A pre-treatment device is recommended to remove coarse material before it enters the basin. The pollutant removal efficiency of the basin depends on how much runoff is exfiltrated by the basin. Infiltration basins can be made to control peak discharges by incorporating additional stages in the design. The basins can also be designed to achieve exfiltration of storms greater than the required recharge volume.

These types of BMPs are moderately expensive depending on the footprint.

Alternative 6: Modular Wetlands

Modular Wetlands are underground structures designed to provide mechanical, biological and chemical treatment in a compact space. As the name implies these units can be configured to treat all contaminants by introducing discrete filter media. On an individual unit basis there is low potential for a beneficial water quality impact, however moderate benefits can be achieved if units are installed in multiple locations. Unit costs are high, and the benefit to cost ratio diminishes as more units are installed.

Alternative 7: Offline Alum Polymer Treatment

Aluminum sulfate (alum) injection is one of the most effective and efficient means of reducing nutrients and suspended sediments in stormwater runoff. Alum typically removes between 70 and 90% of total phosphorus and 95% or more TSS. Aluminum sulfate injection is most effective in an offline configuration where flocculant and target pollutants can be retained in a settling basin and treated water is returned to the main flow path. Water is diverted to the offline treatment system via gravity using a weir or it can be pumped to the system. Gravity flow systems can be configured with a flow sensor to control an automated alum dosing system. Alum can be dosed into pumped systems based on the pump operation.

The footprint required for an alum injection system depends on the treatment volume. Settling ponds are typically sized based on a minimum six-hour retention time to allow appropriate settling at peak flow. Alum is generally stored in above-ground tanks which are filled, as needed, by truck.

Disposal of the settled flocculant (floc) is generally conducted by drawdown of the settling pond and mechanical removal. Other options for floc disposal involve hydraulic dredging and mechanical dewatering which provides a semi-dry solid which can be transported to the ultimate placement location.

This type of BMP is generally moderately expensive if land is available and if pumps are not required. If land acquisition or pumping is necessary, offline alum treatment is very expensive.

Alternative 8: Bioreactor Walls and Beds

Bioreactor walls and beds employ soil amendments containing biosorption activated media (BAM) such as Bold & Gold® or modified analogs that include carbon. These may be particularly useful near the perimeter of Mohawk Lake and can potentially be used to treat groundwater and mobile pollutants depending on depth. Biochemically active substances such as carbon amendments can be added to typical BMPs such as vertical (wall) or horizontal (bed) bioreactors, which use microbially mediated processes to remove pollutants. These bioreactors are very effective in removing nitrogen in particular. It is recommended to use BAM as an amendment to almost any proposed Low Impact Development (LID) practices and/or other BMP conceptual designs that are targeting treatment of water that could infiltrate groundwater. The incorporation of BAM allows for enhanced nutrient removal beyond what typical dry retention facilities provide, prior to infiltration to groundwater. These types of BMPs are moderately expensive since they do not require placement of concrete structures but do require use of heavy equipment and specialized soil material over considerable distances.

Alternative 9: Bioretention

This type of structural BMP is commonly recommended in association with LID practices but it can be implemented as a retrofit project as well. Shallow depressions are used to capture, treat and infiltrate stormwater runoff. Nutrient adsorption media, soils, and vegetation facilitate pollutant removal. Bioretention systems (including bio-infiltration basins, rain gardens, and biofiltration basins with underdrains) would be well suited for use in commercial parking lots, schools, community centres, and other public buildings. They should be considered as a general concept when planning new developments (Infill/intensification) and can be constructed in existing open areas with permeable soils. Bioretention is generally one of the least expensive structural BMPs particularly when using existing landscape features.

Alternative 10: Permeable Concrete/Pavement

Pervious concrete and pavement allow stormwater infiltration through roadway surfaces. Reduced runoff volume as compared to conventional impervious roadway surfaces. If pervious pavement areas are built to include infiltration beds, BAM layers, and sediment traps, they can be used to provide upgradient storage, nutrient treatment, and sediment removal. There are many existing roads, parking lots, driveways, boat

ramps, and multi-modal paths within the Mohawk Lake subwatershed that could be replaced with enhanced pervious pavement systems as they reach their design life and require repairs. For planned future developments, appropriate impervious surfaces (roads, sidewalks, driveways) can be integrated into the initial design and construction.

Interlocking grid pavement and brick pavers also provide an alternative to standard impervious road surfaces, thus reducing runoff volume as compared to conventional roadway surfaces. This is another form of pervious pavement that can also be enhanced with an underlying infiltration bed, BAM treatment, or sediment removal. Pervious pavers can be used in most places that impervious concrete or asphalt is used but are often preferred for areas where aesthetic details are important, such as public parks, patios, or new residential or commercial developments. Pervious concrete and other types of pervious surfaces are expensive to incorporate as standalone retrofit projects; however, the expense is significantly reduced when incorporated with other maintenance or road reconstruction projects requiring removal/restoration of existing impervious surfaces.

Alternative 11: Stormwater Wet/Irrigation Ponds

Wet ponds can include design elements specifically for reuse of stormwater in the irrigation of onsite vegetation. Volume of demand translates to pollutant load removed. These can be well-suited for dispersed neighborhood ponds common in suburban watersheds. Stormwater runoff contained in the pond contains nutrients, so as an additional benefit, urban fertilizer usage can be reduced if stormwater is used for irrigation. Stormwater irrigation ponds would also be ideal for school grassed areas or sports fields. As in most cases, system and cost efficiency would be maximized if stormwater irrigation ponds are included in initial planning and design of new or re-developed residential, commercial, recreational, or institutional properties. This option may provide substantial opportunities for irrigation at the many existing and planned parks surrounding Mohawk Lake. This type of BMP is moderately expensive since it requires stormwater infrastructure to collect and hold stormwater runoff, as well as a and pumping systems and distribution piping.

Alternative 12: Energy Dissipaters

These structural BMPs are designed to reduce outlet erosion and associated sediment re-suspension at culverts, BMP outlets, and storm drains. There are a total of sixteen (16) +/- storm sewer outfalls to the Mohawk Canal or Mohawk Lake and may be contributing to localized bank erosion, scour, and downstream sediment load. Preventing erosion and sediment re-suspension at these outfalls can reduce nutrients in the water column, decrease sediment transport, stabilize the stream bed, and reduce the turbidity of the water, which may promote the growth of submerged aquatic vegetation (SAV). These BMPs are relatively inexpensive and require only a small amount of space.

Alternative 13: Grassed swales, Bioswales

These BMPs are shallow-depth vegetated swales, which capture runoff for infiltration during conveyance from directly connected impervious areas to receiving waters. Bioswales are ideal as medians or along roadsides. In new developments, roads can be

designed to drain to the center, with bioswale medians capturing, treating, and infiltrating runoff. For existing roads, curbs can convey runoff to bioswales along the edges of the road, where they will capture, treat, and infiltrate the runoff. There are many locations in the Mohawk Lake subwatershed, which provide opportunities to capture and treat runoff, in addition to roadway pollutants, while also slowing, storing, and infiltrating stormwater to reduce flooding risk and to recharge the aquifers. Bioswale nutrient removal performance efficiency can also be enhanced (i.e. enhanced bioswale) if amended with BAM and would be beneficial in areas with high groundwater recharge rates. These BMPs are relatively inexpensive if the appropriate right-of-way is available.

Alternative 14: Stormwater Inlet Treatment

Stormwater inlet treatment such as a curb inlet device or catch basin inserts treat runoff where stormwater enters the catch basin and a sump captures sediment, debris and associated pollutants. In some cases, a curb inlet device is the only structure added to the curb inlet. These BMPs are also used in combined sewer watersheds to capture floatables and settle some solids. Catch basin inserts can provide pretreatment for other treatment practices by capturing large sediment. The performance of catch basins in removing sediment and other pollutants depends on the design of the catch basin (e.g., the size of the sump), and routine maintenance to retain the storage available in the sump to capture sediment. Drain inlets are suitable along paved roads, parking lots, paved swales, or rock-lined ditches where a permanent storm drain system currently exists.

The performance of catch basins relates to the volume in the sump (i.e., the storage in the catch basin below the outlet). Catch basins can also be sized to accommodate the volume of sediment that enters the system. The catch basin sump is sized, with a factor of safety, to accommodate the annual sediment load to the catch basin with a factor of safety. The basic design should also incorporate a hooded outlet to prevent floatable materials and trash from entering the storm drain system. Adding a screen to the top of the catch basin would not likely improve the performance of catch basins for pollutant removal but would help capture trash entering the catch basin and flowing through the outlet.

Typical maintenance of catch basins includes trash removal if a screen or other debris capturing device is used, and periodic removal of sediment using a vacuum truck. Operators need to be properly trained in catch basin maintenance. Maintenance should include keeping a log of the amount of sediment collected, and the data of removal. Some cities have incorporated the use of GIS systems to track sediment collection, and to optimize future catch basin cleaning efforts. Inlet baskets are relatively inexpensive to install and are generally designed to work inside of existing stormwater structures with little modification. However, maintenance expenses can be significant unless incorporated with additional stormwater maintenance functions. Catch basin debris is typically disposed of as non-hazardous waste at an approved waste disposal site at a unit cost by volume and weight.

6.4.1.2 Screening of Structural Stormwater Management BMPs

Table 6-3 presents a high-level screening of the Stormwater Management Best Management Practices constituting the long list of structural and non-structural alternatives available to manage stormwater flows within the Mohawk Lake subwatershed, and provide some degree of treatment, and identify those BMPs better suited to form part of the preferred integrated solution. In this instance there are three alternatives that have been screened from further assessment due to comparative costs and feasibility, as well as projected environmental benefits in the Mohawk Lake subwatershed (Table 6-3):

1. Upflow media filters;
6. Modular wetlands; and
7. Offline alum treatment

The remaining 11 alternatives warrant further consideration, with a more detailed assessment of net benefits.

Table 6-3: Screening of Structural Stormwater Management Best Management Practices

Alternative	Description	Treatment Type	Pollutant Addressed	Potential Water Quality Impact	Potential Cost Rank
Subwatershed Runoff Treatment / Management					
Structural Retrofits					
1. Upflow media filter	Pipe-end stormwater BMP provides biological treatment of nutrients and special media can be utilized to target many other pollutants	External	Dissolved pollutants	Low individual potential water quality impact but medium impact if installed at all untreated outfalls	High
2. Baffle Box	Pipe-end stormwater BMP provides containment of heavy particulate material	External	TSS and adsorbed pollutants	Low individual potential water quality impact but medium impact if installed at all untreated outfalls	High
3. Eliminate Cross-Connections	Assessment of cross connections and overflows	External	All	High beneficial impact in areas where overflows are known to occur and particularly in areas with industrial contributions	High
4. Wetland/Stormwater treatment	Intercept tributaries or stormwater outfalls and divert flow to areas where there is existing area to provide wetland treatment or stormwater retention	External	All	Water quality benefit will vary depending on the size of the discharge	Medium
5. Exfiltration / Infiltration	Convert existing stormwater pipes to exfiltration systems /storage vault for stormwater treatment	External	All	Benefits depend on position in watershed. Exfiltration/storage systems installed upstream of a discharge to a stream reach will limit erosion in the stream reach	Medium
6. Modular wetlands	Underground structures designed to provide mechanical, biological and chemical treatment in a compact space	External	All	Low individual potential water quality impact but medium impact if installed in many locations	High
7. Offline alum/polymer treatment	Intercept tributaries or stormwater outfalls and treat with alum or polymer to reduce TSS and P	External	P, TSS and other pollutants adsorbed to particulates	High beneficial impacts if paired with high loading locations.	Medium
8. Bioreactor Walls and Beds	Bioreactor walls and beds employ soil amendments containing biosorption activated media (BAM) such as Bold & Gold® or modified analogs that include carbon. Biochemically active substances such as carbon amendments can be added to typical BMPs such as vertical (wall) or horizontal (bed) bioreactors, which use microbially mediated processes to remove pollutants.	External	Nutrients and heavy metals	High beneficial impacts if paired with high loading locations.	High

Table 6-3: Screening of Structural Stormwater Management Best Management Practices

Alternative	Description	Treatment Type	Pollutant Addressed	Potential Water Quality Impact	Potential Cost Rank
9. Bioretention	Shallow depressions used to capture, treat and infiltrate stormwater runoff. Nutrient adsorption media, soils, vegetation facilitate pollutant removal. Bioretention systems (including bioinfiltration basins, rain gardens, and biofiltration basins with underdrains) would be well suited for use in commercial parking lots and in front of schools, community centers, and public buildings.	External	TSS and possibly nutrients when paired with BAM	Medium beneficial impact. Dependent on utilizing BAM in conjunction with Bioretention	Medium
10. Alternative Concrete/Pavement	Pervious concrete and pavement allow stormwater infiltration through drivable surfaces. Reduced runoff volume as compared to conventional impervious driving surfaces. If pervious pavement areas are built to include infiltration beds, BAM layers, and sediment traps, they can be used to provide upgradient storage, nutrient treatment, and sediment removal	External	TSS and possibly nutrients when paired with BAM	Medium beneficial impact. Dependent on utilizing BAM in conjunction with alternative paving material.	Medium
11. Stormwater wet/ Irrigation Ponds	Wet ponds that include design elements specifically for reuse of stormwater in the irrigation of onsite vegetation. Volume of demand translates to pollutant load removed.	External	Nutrients.	Impacts dependent on volume of water stored and reused as irrigation.	Medium
12. Energy Dissipaters	These structural BMPs are designed to reduce outlet erosion and associated sediment re-suspension for culverts, BMP outlets, storm drains.	External	TSS and possibly nutrients, dependent of land use and soil type.	Medium Beneficial Impact. Dependent on runoff volume and land use.	Low
13. Grass Swales/Bioswales	Shallow vegetated swales which capture runoff for infiltration during conveyance from directly connected impervious areas to receiving waters. Bioswales are ideal as medians or along roadsides. In new developments, roads can be designed to drain to the center, with bioswale medians capturing, treating, and infiltrating runoff.	External	TSS and Nutrients. Increased treatment when paired with exfiltration trench and/or BAM.	High beneficial impact, dependent on drainage area, treatment area, and additions of other BMP technologies.	Low
14. Stormwater Inlet Treatment/Catch Basins	Curb inlet devices, absorbent booms and other devices used to capture gross pollutants, litter, and organic matter. The nutrients associated with the materials collected may be prevented from discharging into the storm sewer and ultimately the receiving body.	External	TSS and Nutrients. Increased treatment dependent on operation and maintenance and when paired with other BMP technologies.	Medium Beneficial Impact. Dependent on operation and maintenance. Increased treatment when paired with other BMP technologies	Low

Legend

Treatment Type		Potential Water Quality Impact and Potential Cost Rank	
External	External	Low	Low
Internal	Internal	Medium	Medium
		High	High
		To be determined	

6.4.1.3 Non-structural BMPs

Alternative 1: Public Education/Outreach

Public education on water conservation and nutrient load prevention practices, teacher training/campus projects. There are many public facilities within the Mohawk Lake subwatershed where BMPs could be implemented and used for educational purposes. Additionally, any LID practices implemented in public parks or recreational facilities can be accompanied by educational signage describing the importance of LID and nutrient management. Educational signage on stormwater inlets or existing stormwater infrastructure can also educate the public and prevent excess litter in storm sewers. Plans can also be developed to inform existing and prospective property owners of the various City by-laws related to SWM.

Alternative 2: Street Sweeping

Streets, roads, highways and other large paved surfaces are significant sources of pollutants in storm water discharges. Operations and maintenance practices, if not conducted properly, can contribute to the problem. Street sweeping uses mechanical pavement cleaning practices to reduce sediment, litter and other debris washed into storm sewers by runoff. This can reduce pollutant loading to receiving waters and reduce clogging of storm sewers and prolong the life of infiltration oriented BMPs and reduce clogging of outlet structures in detention BMPs. The City already has an extensive street sweeping program but given the high degree of imperviousness and extensive stormwater collection system within the Mohawk Lake subwatershed, additional strategic street sweeping may have a significant impact on pollutant loading to Mohawk Lake and Mohawk Canal. For roads with bike lanes, this maintenance activity has the added benefit of clearing debris from the active travel lane.

Alternative 3: Salt Management Plan

As noted previously, streets, roads, highways and other large paved surfaces are significant sources of pollutants in storm water discharges. The City, similar to other municipalities, is responsible for road management, including plowing and de-icing roadways during the winter to ensure safe travel conditions for residents and visitors. Road salt dissolves in stormwater runoff and ultimately can have negative impacts to aquatic systems. Opportunities to minimize road salt therefore benefits aquatic health, and potentially also reduces costs for the City. The City should explore the preparation of a salt management plan which includes consideration of application criteria and looking at alternative salt delivery methods (such as brines) or salt alternatives (such as beet juice and other alternatives).

Alternative 4: Wildlife Management

It is well-documented that invasive species such as carp in lake or pond settings can cause adverse conditions with respect to water clarity which by extension can influence the health of the aquatic systems, particularly emergent vegetation. As such, this alternative would involve managing or excluding carp from the Mohawk Lake and Canal. The approaches are not defined, however, they may involve a combination of culling existing wildlife and modifying access points to exclude the potential for re-population.

Alternative 5: Landfill Contamination Monitoring & Study

The Characterization Study identified up to seven (7) legacy landfills in proximity to Mohawk Lake and Mohawk Canal. The potential for contaminated groundwater migration to the lake and canal has also been identified, however, limited information exists with respect to the specific landfills of concern nor the need for supplementary management. Therefore, it is proposed that an investigation involving monitoring of the potential, amount and quality of groundwater migration from the landfills be conducted. The information collected from this effort can then be used to develop approximate management plans, including in the worst case leachate collection systems.

6.4.1.4 Screening of Non-Structural Stormwater Management BMPs

All of non-structural stormwater management BMPs will be carried for further consideration, with high importance given to receiving input from stakeholders on the public education and outreach opportunities that can form part of an integrated solution, and long-term engagement strategy. Similarly, discussions with City maintenance and operations staff will aid in assessing how street sweeping can contribute to improved stormwater quality in a cost effective manner. Street sweeping can have the added benefit of removing roadside debris, and making cycling safer. Establishing a higher standard in the Mohawk Lake Subwatershed can be beneficial to the Lake's long-term management.

6.4.1.5 Flow Augmentation – Reconnection to the Grand River

Poor water quality conditions within Mohawk Lake are considered likely exacerbated by lack of connection with the Grand River and the associated flushing that would occur. Restoring some flow through Mohawk Lake could reduce the hydraulic residence time and may also dilute the concentrated sources of stormwater runoff that currently discharge to the lake. Both of these factors could also reduce algal growth and improve clarity and ecological conditions within the lake. Notwithstanding, internal pollutant sources should be addressed prior to any reconnection attempts.

The Characterization Study, 2019, reported Mohawk Lake exchange rates between 16 and 17 times per year which corresponds to a residence time of approximately 22 days. Phytoplankton growth has been studied in larger impounded riverine systems including Lake Allegan in Michigan over a range of residence times as high as 14 days and as low as two days (Reid and Hamilton 2007). This study found that chlorophyll-*a* and total phosphorus concentrations were highest during the longest residence times and also found that residence times of around 7 days or less tend to limit phytoplankton production. Reducing the current residence time to 7 days would require slightly more than twice the current mean annual discharge of $1.8 \text{ m}^3 / \text{s}$ or approximately $3.6 \text{ m}^3 / \text{sec}$. This would require approximately 9% of the Grand River's $21 \text{ m}^3/\text{s}$ summer low flow based on the Brantford monitoring station (Grand River Conservation Authority 2019). Additional study is needed to investigate the optimal residence time that could reduce algal growth while protecting downstream water supply.



Based on a review of the Grand River water surface elevations at the former inlet to the Canal system, it is apparent due to the elimination of the former dam in this location that the river is now considerably below the elevation of the Mohawk Canal and Mohawk Lake. Given that there would be no expected support for a water supply dam on the Grand River, and further that a pumping station at this scale would have prohibitively high costs for construction and operation, this alternative has been screened from further consideration.



Table 6-4: Screening of Non-structural Stormwater Management Best Management Practices

Alternative	Description	Treatment Type	Pollutant Addressed	Potential Water Quality Impact	Potential Cost Rank
Subwatershed Runoff Treatment / Management					
Non-Structural BMPs					
1. Public Education & Outreach	Public Education/Outreach: Public education on water conservation and nutrient load prevention practices, teacher training/campus projects	External	Dependent on Community outreach and involvement. Need to evaluate current city ordinances in regards to lawn care, stormwater, and waste disposal	Potential for High Impact, dependent on community outreach and involvement	Low
2. Street Sweeping	Increase frequency and coverage of street sweeping to reduce sediment load	External	Suspended Solids	High potential for beneficial water quality impacts particularly in areas with high sediment loading	Low
3. Salt Management Plan	Develop a salt management plan for City roadways to minimize use to the extent possible.	External	Salt (Chloride)	High potential water quality benefit, also potential cost savings to City from reduced salt usage.	Low
4. Wildlife Management (Carp)	Measures to reduce/exclude carp from Mohawk Lake and Mohawk Canal	External	Water clarity	Improve opportunity for emergent and submergent plantings	Low
5. Landfill Contamination Study	Field monitoring of legacy landfills to isolate those contributing contamination to Mohawk Lake and Mohawk Canal, and use this data to develop management plans	External	Leachate from landfills	High potential for addressing key parameters of concern	Low

Legend

Treatment Type		Potential Water Quality Impact and Potential Cost Rank	
External	External	Low	Low
Internal	Internal	Medium	Medium
		High	High
		To be determined	

6.5 Evaluation of Remediation and Restoration Alternatives

As discussed in previous sections, the alternatives considered for remediation fall into three (3) basic categories:

A. Mohawk Lake/Mohawk Canal Restoration

1. Strategic Sediment Removal/Lake Bed Re-contouring
2. Shoreline Restoration
3. Riparian Restoration
4. Natural Channel Design of Canal and Potential SWM Retrofit
5. Wildlife Management (Carp Control)

B. Subwatershed Management (Runoff)

1. Source/Conveyance Controls
 - Roadway Reconstructions (Public)
 - Redevelopment (Private)
 - Incentive-based (Existing Private holdings)
2. End-of-Pipe
 - OGS (smaller areas)
 - Outfall Retrofits (larger areas)
 - Online treatment within West Canal
3. Other (Non-Structural)
 - Disconnection of cross-connections to sanitary system

C. Other

1. Enhanced Street sweeping
2. Salt Management plan
3. Public Education
4. Reconnection to Grand River (screened)
5. Landfill Contamination Study

In order to assess the foregoing, various criteria have been considered under the Natural Environment, Social/Cultural Environment, Economic Environment and Technical Environment. For each environment associated categories, criteria, factors and measures have been advanced specific to the objectives of the Mohawk Lake and Mohawk Canal project. Furthermore, these criteria have been weighted High, Medium, Low based on inferred importance for which the subject criteria relates to project objectives. Each alternative has thus been evaluated leading to a set of preferred preliminary management strategies.

Table 6-5 and Table 6-6 provide the details related to the quantitative/qualitative review of the potential for positive, negative or neutral impacts associated with the respective alternative, including recommendations.

Table 6-5: Assessment of Alternative Design Concepts - Stormwater Management

Component	Category	Evaluation Criteria	Factor	Measure	Weight	Alternative 1: Source / Conveyance (Public Roads)	Alternative 2: Source / Conveyance (Private Redevelopment)	Alternative 3: Source (Private Incentive-based)	Alternative 4: End-of-Pipe (Retrofits)
Natural Environment	Water Quality	Water Quality & Temperature	Quality of Water for Fish and Wildlife, Recreation, or Human Use	Provincial Water Quality Objectives (PWOQ) and stream management objectives	H	1.0 Potential for recovered capacity	1.0 Potential for recovered capacity	0.5 Potential treatment	0.5 Potential treatment
	Hydrology & Stormwater Management	Water Quantity	Environmental flows for recreation or wildlife	Flow rate (cubic metres per second, m ³ /s)	L	0.5 Minor benefit potential	0.5 Minor benefit potential	0.5 Minor benefit potential	0.5 Minor benefit potential
	Natural Heritage	Aquatic Habitat	Improvements or impacts to habitat viability	Area of impacted habitat (square metres, m ²)	H	0.0 No direct change	0.0 No direct change	0.0 No direct change	0.0 No direct change
		Wildlife Habitat	Potential effects wildlife due to changes in habitat	Area of impacted habitat (square metres, m ²)	M	0.0 No direct change	0.0 No direct change	0.0 No direct change	0.0 No direct change
	Fluvial Geomorphology	Fluvial Stability / Sediment Transport	Potential adverse effect on surface water due to drawdown or flow disruption	Extent of impact	M	0.0 Negligible change	0.0 Negligible change	0.0 Negligible change	0.5 Potential for minor benefit

Table 6-5: Assessment of Alternative Design Concepts - Stormwater Management

Component	Category	Evaluation Criteria	Factor	Measure	Weight	Alternative 1: Source / Conveyance (Public Roads)	Alternative 2: Source / Conveyance (Private Redevelopment)	Alternative 3: Source (Private Incentive-based)	Alternative 4: End-of-Pipe (Retrofits)
	Geology, Hydrogeology & Groundwater	Groundwater / Source Protection	Potential adverse effect on groundwater and wells including groundwater discharge and recharge	Extent of impact	L	0.5 Minor water balance benefit	0.5 Minor water balance benefit	0.5 Minor water balance benefit	0.0 No change
Social/Cultural	Cultural Heritage & Archaeology	Archaeological & Cultural Heritage Resources	Potential adverse effects on archaeological and cultural heritage resources	Extent of impact	L	0.0 No direct impact (right-of-way)	0.0 No direct impact (redeveloping land base)	0.0 No direct impact (private property)	-0.5 Minor potential
	Future Land Use & Growth Impacts	Recreation Use	Ability to support recreation, including access	E. coli concentrations	M	0.5 Improved water quality	0.5 Improved water quality	0.5 Improved water quality	0.5 Improved water quality
		Shoreline Access	Access points to lake and canal	Access points	L	0.0 No influence on shoreline	0.0 No influence on shoreline	0.0 No influence on shoreline	0.0 No influence on shoreline
		Impacts on Adjacent Properties	Changes to properties resulting from changes to water levels, construction of alternatives, etc.	Private and public properties (number of)	M	0.0 None will occur in road right-of-ways	0.0 None will occur withing footprint of redevelopment lands	-0.5 May impact existing properties; however, may reduce fugitive stormwater charge	-0.5 Minor impacts to local area
	Hydraulics	Flooding - Lake & Canal	Impacts on flood potential in Mohawk Lake and Mohawk Canal	Floodplain extents	M	0.0 No impact to quantity	0.0 No impact to quantity	0.0 No impact to quantity	0.0 No impact to quantity

Table 6-5: Assessment of Alternative Design Concepts - Stormwater Management

Component	Category	Evaluation Criteria	Factor	Measure	Weight	Alternative 1: Source / Conveyance (Public Roads)	Alternative 2: Source / Conveyance (Private Redevelopment)	Alternative 3: Source (Private Incentive-based)	Alternative 4: End-of-Pipe (Retrofits)				
		Flooding - Streets & Sewers	Impacts on flood potential and elevation for water from streets and sewers	Flood depth	M	0.5 Potential to concurrently address local flood risk	0.5 Potential to concurrently address local flood risk	0.5 Potential to concurrently address local flood risk	0.5 Potential to concurrently address local flood risk				
Economic		Capital Cost	Design and construction costs	estimated cost (\$)	H	-0.5 Public cost at time of road works	0.5 Private cost at time of redevelopment	0.0 Private LO cost	-0.5 Standalone capital cost				
		Contaminant Management	Sediment quantity and quality	Disposal cost (\$ / m ³)	M	0.5 Minor reduction	0.5 Minor reduction	0.5 Minor reduction	0.5 Minor reduction				
		Maintenance Cost	Asset management costs (Lifecycle)	estimated cost (\$)	H	-0.5 City responsibility	0.0 Private redevelopment	0.0 Landowner responsibility	-0.5 City responsibility				
		Property Acquisition	Amount of private property required to achieve solution	Area (hectares, ha)	M	0.0 Within road right-of-way	0.0 Within industrial / institutional lands	-0.5 On private property	-0.5 Will require public land repurposing				
Technical		Stormwater Management	Ability to achieve stormwater management standards	To be determined	H	1.0 Meet Provincial Guidelines	1.0 Meet Provincial Guidelines	0.5 Likely only partially effective	0.5 Likely only partially effective				
		Constructability	The ability to construct the improvements in a simple and cost effective manner	Duration / cost	M	-0.5 Retrofit of existing roads and infrastructure	0.0 As part of new development	-0.5 Retrofit of private property	-0.5 Repurposing of existing land and infrastructure				
		Community Resilience & Sustainability	Ability of the solution to mitigate climate change impacts	To be determined	M	0.5 Recovers system capacity	0.5 Recovers system capacity	0.5 Recovers system capacity	0.0 Marginal change				
Summary						3.5	Preferred	5.5	Preferred	2.5	Complementary	0.5	Preferred

Table 6-5: Assessment of Alternative Design Concepts - Stormwater Management

Component	Category	Evaluation Criteria	Factor	Measure	Weight	Alternative 1: Source / Conveyance (Public Roads)	Alternative 2: Source / Conveyance (Private Redevelopment)	Alternative 3: Source (Private Incentive-based)	Alternative 4: End-of-Pipe (Retrofits)
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Score Legend

-1.0	Negative
-0.5	Negative-Neutral
0.0	Neutral
0.5	Positive-Neutral
1.0	Positive

Table 6-6: Assessment of Alternative Design Concepts - Mohawk Lake & Canal Restoration

Component	Category	Evaluation Criteria	Factor	Measure	Weight	Alternative 1: Drawdown / Pump down & Mechanical Dredging	Alternative 2: Hydraulic Dredging	Alternative 3: Sediment Management (Physical Capping)	Alternative 4: Chemical Capping & Nutrient Inactivation	Alternative 5: Revegetation of Riparian Areas and Tributary Streams	Alternative 6: Canal Restoration & Sediment Removal ²	Alternative 7: Living Shorelines, Shoreline Restoration, Shoreline Softening							
Natural Environment	Water Quality	Water Quality & Temperature	Quality of Water for Fish and Wildlife, Recreation, or Human Use	Provincial Water Quality Objectives (PWOQ) and stream management objectives	H	1.0	Risk of contamination from sediment reduced	1.0	Risk of contamination from sediment reduced	0.5	Contaminants contained	0.5	Contaminants contained	0.5	Indirect habitat	1.0	Direct habitat improvements	0.5	Indirect habitats
	Hydrology & Stormwater Management	Water Quantity	Environmental flows for recreation or wildlife	Flow rate (cubic metres per second, m ³ /s)	L	0.5	Additional capacity in Lake	0.5	Additional capacity in Lake	-0.5	Loss of capacity	0.0	No change	0.0	No change	0.5	Potential to improve capacity / sustained flows	0.0	No change
	Natural Heritage	Aquatic Habitat	Improvements or impacts to habitat viability	Area of impacted habitat (square metres, m ²)	H	1.0	Additional habitat	1.0	Additional habitat	0.5	Contaminants contained	0.5	Contaminants contained	0.5	Indirect habitat	1.0	Direct habitat improvements	0.5	Indirect habitats
		Wildlife Habitat	Potential effects wildlife due to changes in habitat	Area of impacted habitat (square metres, m ²)	M	0.0	No change	0.0	No change	0.0	No change	0.0	No change	1.0	Direct habitat	0.5	Riparian zone impact	0.5	Indirect habitat
	Fluvial Geomorphology	Fluvial Stability / Sediment Transport	Potential adverse effect on surface water due to drawdown or flow disruption	Extent of impact	M	0.5	Increased Lake capacity will reduce adverse sediments being transported to Grand River	0.5	Increased Lake capacity will reduce adverse sediments being transported to Grand River	-0.5	Loss of capacity	0.0	No change	0.5	Minor benefit to stability	1.0	Significant potential benefit	0.0	No change
	Cultural Heritage & Archaeology	Archaeological & Cultural Heritage Resources	Potential adverse effects on archaeological and cultural heritage resources	Extent of impact	L	0.0	All below water works	0.0	All below water works	0.0	All below water works	0.0	All below water works	-0.5	Minor potential	-0.5	Minor potential	0.0	No impact
	Future Land Use & Growth Impacts	Recreation Use	Ability to support recreation, including access	E. coli concentrations	M	0.5	Contaminated sediment removed	0.5	Contaminated sediment removed	0.0	Contaminated sediment contained	0.0	Contaminated sediment contained	0.0	Limited benefit	0.0	Limited benefit	0.0	Limited benefit
Shoreline Access		Access points to lake and canal	Access points	L	0.0	No impact	0.0	No impact	0.0	No impact	0.0	No impact	0.0	No impact	0.5	Potential to integrate ingress / egress	0.5	Potential to integrate ingress / egress	

² Includes consideration for an online, linear stormwater management facility.

Table 6-6: Assessment of Alternative Design Concepts - Mohawk Lake & Canal Restoration

Component	Category	Evaluation Criteria	Factor	Measure	Weight	Alternative 1: Drawdown / Pump down & Mechanical Dredging	Alternative 2: Hydraulic Dredging	Alternative 3: Sediment Management (Physical Capping)	Alternative 4: Chemical Capping & Nutrient Inactivation	Alternative 5: Revegetation of Riparian Areas and Tributary Streams	Alternative 6: Canal Restoration & Sediment Removal ²	Alternative 7: Living Shorelines, Shoreline Restoration, Shoreline Softening							
		Impacts on Adjacent Properties	Changes to properties resulting from changes to water levels, construction of alternatives, etc.	Private and public properties (number of)	M	-1.0	Likely odour, truck traffic and other short-term impacts	-0.5	Laydown area will be disruptive in the short-term	0.0	Limited external impacts	0.0	Limited external impacts	0.0	Minor impacts	0.5	Potential to reduce water levels	0.0	Minor impacts
	Hydraulics	Flooding - Lake & Canal	Impacts on flood potential in Mohawk Lake and Mohawk Canal	Floodplain extents	M	0.5	Increased Lake capacity	0.5	Increased Lake capacity	-0.5	Minor loss of capacity	0.0	No change	0.0	No change	0.5	Potential to reduce water levels	0.0	No change
		Flooding - Streets & Sewers	Impacts on flood potential and elevation for water from streets and sewers	Flood depth	M	0.0	No change	0.0	No change	0.0	No change	0.0	No change	0.0	No change	0.5	Minor potential to reduce tail water in sewers	0.0	No change
Economic		Capital Cost	Design and construction costs	estimated cost (\$)	H	-0.5	High	-1.0	Highest	-0.5	High	-0.5	High	-0.5	Moderate	-1.0	High	-0.5	Moderate
		Contaminant Management	Sediment quantity and quality	Disposal cost (\$ / m ³)	M	-0.5	High	-1.0	Highest	-0.5	High	-0.5	High	0.0	Moderate	0.0	High	0.0	Moderate
		Maintenance Cost	Asset management costs (Lifecycle)	estimated cost (\$)	H	0.5	Significant capacity added	0.5	Significant capacity added	-0.5	Expect follow-up	-0.5	Expect follow-up	0.5	Long-term reduction in maintenance anticipated	0.5	Long-term reduction in maintenance anticipated	0.5	Long-term reduction in maintenance anticipated
		Property Acquisition	Amount of private property required to achieve solution	Area (hectares, ha)	M	0.0	None required	0.0	None required	0.0	None required	0.0	None required	-0.5	Depends on extent, may require some land	0.0	Restricted to available lands	0.0	None required
Technical		Stormwater Management	Ability to achieve stormwater management standards	To be determined	H	0.5	Lake is an informal stormwater management system	0.5	Lake is an informal stormwater management system	0.5	Lake is an informal stormwater management system	0.5	Lake is an informal stormwater management system	0.0	Limited benefit	0.0	Canal will function better	0.0	Limited benefit
		Constructability	The ability to construct the improvements in a simple and cost effective manner	Duration / cost	M	-0.5	Longer duration	0.0	Time effective	-0.5	Complex	-0.5	Complex	0.5	Longevity straightforward	-0.5	Most complex	0.5	Largely straightforward

Table 6-6: Assessment of Alternative Design Concepts - Mohawk Lake & Canal Restoration

Component	Category	Evaluation Criteria	Factor	Measure	Weight	Alternative 1: Drawdown / Pump down & Mechanical Dredging		Alternative 2: Hydraulic Dredging		Alternative 3: Sediment Management (Physical Capping)		Alternative 4: Chemical Capping & Nutrient Inactivation		Alternative 5: Revegetation of Riparian Areas and Tributary Streams		Alternative 6: Canal Restoration & Sediment Removal ²		Alternative 7: Living Shorelines, Shoreline Restoration, Shoreline Softening	
						Score	Description	Score	Description	Score	Description	Score	Description	Score	Description	Score	Description	Score	Description
		Community Resilience & Sustainability	Ability of the solution to mitigate climate change impacts	To be determined	M	0.5	Provides added Lake capacity	0.5	Provides added Lake capacity	0.0	No change	0.0	No change	0.0	Limited	0.5	Improved capacity / resiliency	0.0	Limited
Summary						3.0	Supportable	3.0	Preferred	-2.0	Screened	-0.5	Screened	2.0	Complementary	5.0	Most Preferred	2.5	Complementary

Score Legend

-1.0	Negative
-0.5	Negative-Neutral
0.0	Neutral
0.5	Positive-Neutral
1.0	Positive

7.0 Preferred Remedial Alternatives

Based upon the evaluation and assessment outlined in Section 6.0, the preferred alternatives have been advanced based upon those works envisioned in the short-term (Figure 23) and those that would be expected to have a longer-term implementation timeframe, or those that would be contingent on additional study (field and/or analytical) (Figure 24).

7.1 Short-Term (Approximately 2020+) Remedial Alternatives

1. Design & Construction of Oil and Grit Separators (OGS)

- Implement the list of preferred locations premised on water quality sampling results and areas discharging directly to Mohawk Lake and Canal, among other factors (refer to list of twelve (12) preferred locations in the Subwatershed Stormwater Plan report)
- To manage runoff from Small scale catchments (generally <10 ha)
- To be Constructed in Public ROWs
- Schedule A/A+ works
- First three (3) priority locations to be constructed in 2020, remaining to be constructed at a rate of about one (1) per year (+/-)

2. Incorporate Stormwater Management (Quality focus) into Roadway Reconstruction

- All roadway reconstruction in Mohawk Lake subwatershed to incorporate stormwater quality treatment going forward (source controls and/or end of pipe measures), targeting at least 50% average annual TSS removal
- Schedule A/A+ works

3. Design of Mohawk Canal Restoration and Sediment Removal

- Potential to consider in logical phases for West Canal (downstream & upstream) – focus on upstream portion of West Canal first (higher priority), and downstream portion thereafter (lower priority).
- The East Canal is less of a priority given the overall lower contaminant concentrations and location downstream of Mohawk Lake. It is recommended that any works in this area potentially be combined with works within Mohawk Lake itself.
- Adopt natural channel design principles
- Incorporate Riparian plantings
- Co-ordinate with any hydraulic structure crossing improvements (Eagle Avenue/Alfred Street as the highest priority)
- Consider scoped/targeted sediment removal

- Consider an online, linear stormwater management facility in upper West Canal. Any potential ecological impacts, including fisheries enhancement opportunities would need to be considered further.
- Schedule B works – requires public and agency consultation

4. Design and Construction of (Selected) Outfall Retrofits (SWM Facilities – Wet Ponds)

- Advance short-listed/preferred SWMF outfall retrofits
 - OF-444A and OF-444B: Shallow Creek Park at upstream limits
 - OF-194: Shallow Creek Trail - Rawdon Street storm sewer to public land between Murray Street and Drummond Street north of the trail
- Consider feasibility of other opportunities for outfall retrofits
 - OF-222: Six Nations Land (Glebe Farm property) – requires further discussions with landowner to determine potential feasibility
 - Arrowdale Public Golf Course – requires further review/discussion with City of Brantford (given planned sale and re-development of these lands)

5. Assessment/Preliminary Design of Mohawk Lake (and East Canal) Sediment Removal and Lake Bed Re-contouring

- Additional assessment required to determine ecological and limnological linkages to lake health. Information will provide direction to locations of strategic sediment removal and also configuration of lake bed recontouring (field/analytic) and lake levels to optimize function/health and improve sustainability
- The East Canal is less of a priority given the overall lower contaminant concentrations and location downstream of Mohawk Lake. It is recommended that any works in this area potentially be combined with works within Mohawk Lake itself.
- Develop preliminary detail on preferred management approach
- Schedule B works – requires public and agency consultation

6. Stormwater Management for Redeveloping Lands (Infill/Intensification – Privately-led)

- Create policy to establish stormwater management criteria for redevelopment lands in Mohawk Lake Subwatershed
- Proposed “Enhanced” (80% average annual TSS removal) water quality treatment
- Incorporate erosion control and quantity control
- Ensure treatment is for whole of property (not just area of change) to recover capacity in system

7. Public Education

- Prepare materials focused on Mohawk Lake area residents and businesses to encourage engagement on practices which the public can implement

8. Wildlife Management (Carp Exclusion)

- Conduct a field study into resident carp invasive species within Mohawk Lake
- Develop appropriate management opportunities including potential modification of Mohawk Lake outfall.

9. Study to Isolate Locations of Sanitary Cross-Connections

- Need to locate where connections are and the potential remediation opportunities
- Focus on identified location from Characterization Study (Aquafor Beech Limited, 2019) – Rawdon Street and Bruce Street area

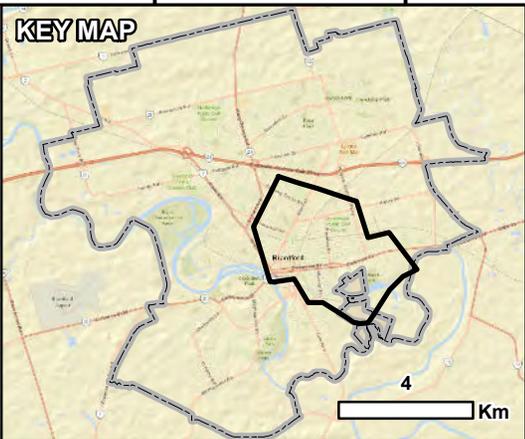
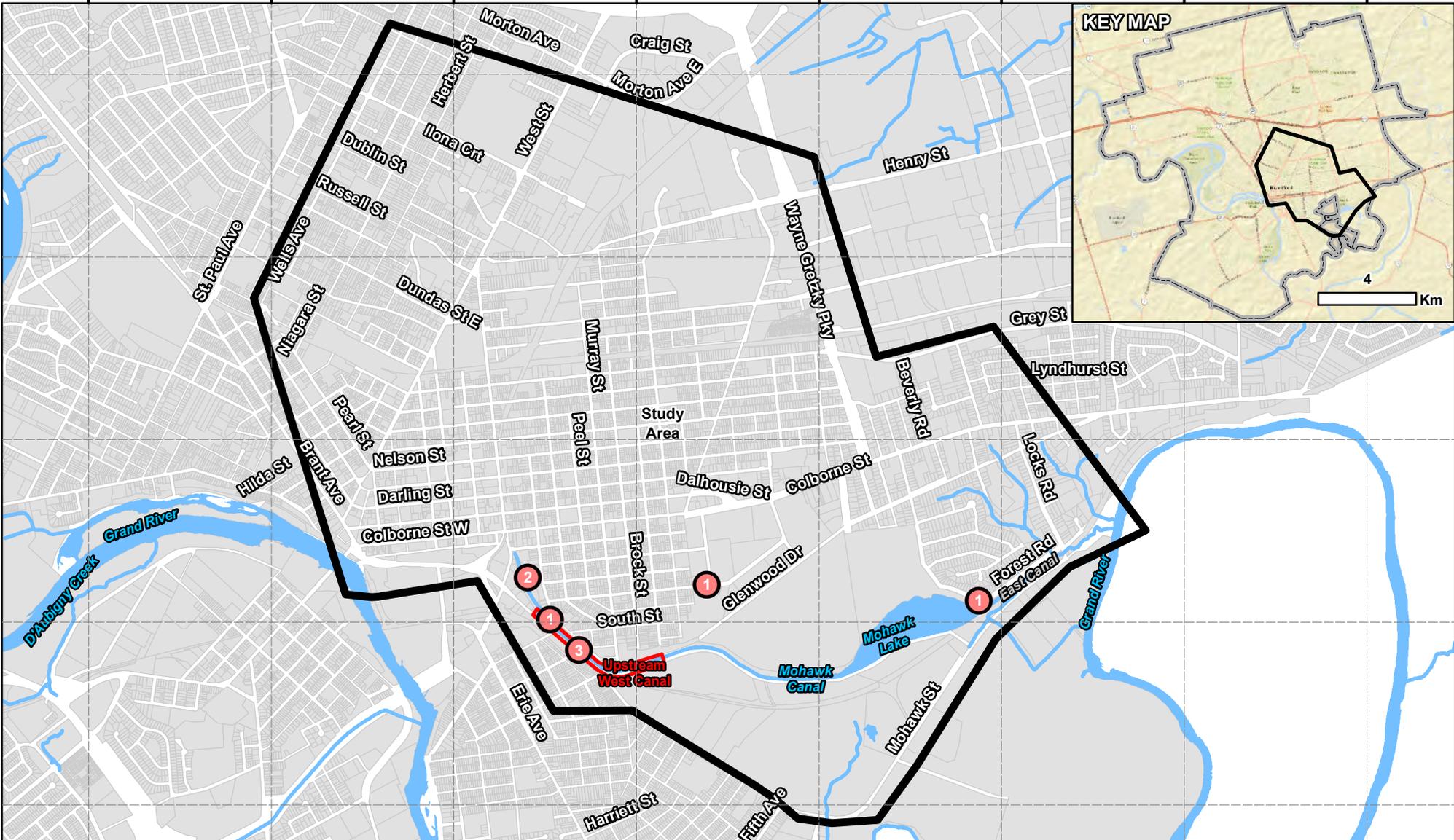
7.2 Medium to Long-Term (Approximately 2022-2029) Remedial Alternatives

1. Construction of West Canal Restoration, Clean-Out and Retrofit (Upstream Section of West Canal)
2. Design and Potential Construction of West Mohawk Canal Restoration and Clean-Out (Downstream Section of West Canal)
3. Construction of Mohawk Lake (and East Mohawk Canal) Strategic Sediment Removal and Lake Bed Re-contouring
4. Construction of Wildlife Management (Carp Exclusion)
5. Construction of Balance Outfall Retrofits
6. Incentive-based program for retrofitting existing properties with SWM practices
7. Ongoing Stormwater Management for Redeveloping Lands (Infill/Intensification)
8. Incorporate Stormwater Management, particularly stormwater quality (including Low Impact Development (LID) design elements and end of pipe measures) into Road Reconstruction (Ongoing)
9. Ongoing Investigation and Disconnection of Cross-Connections (Storm and Sanitary sewers)
10. Study and Construct Landfill Contamination Migration Potential to Mohawk Lake
 - Install field instrumentation upstream and downstream of area landfills to isolate extent, magnitude and severity of potential lake contamination
 - Based on field work, establish preliminary management practices (leachate management)

11. Street Management

- Consider enhanced frequency of street sweeping in Mohawk Lake Subwatershed.
- Develop and implement a Road Salt Management Plan for the subwatershed, or potentially City-Wide. Limit use of road salt to the extent possible; review potential alternative measures.

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- LEGEND**
- Short Term Project Location
 - Study Area
 - Watercourse
 - Waterbody
 - PropertyParcel
 - Upstream West Canal Project

- Short-term (2020+)**
1. 3 High Priority Oil Grit Separators
 2. Shallow Creek Park Retrofit
 3. Upstream West Mohawk Canal Restoration/Retrofit and Sediment Removal
 4. Focused Cross-Connection Investigations

NOTES:
 - Regulation Limit from GRCA Open Data, 2019
 - Key Map topography from ESRI



**MOHAWK LAKE AND CANAL
SUBWATERSHED STORMWATER PLAN REPORT**

**Preferred Solutions
Short Term (2020+)**



Datum: NAD83
Projection: UTM Zone 17N



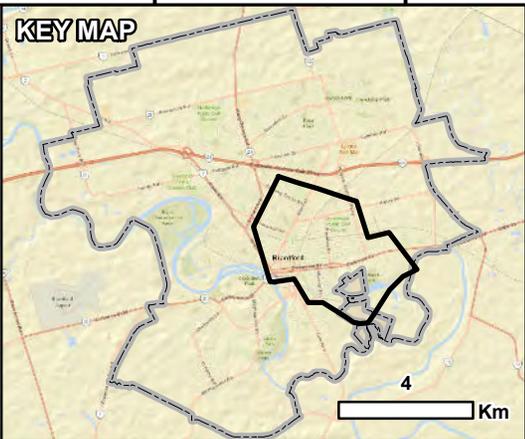
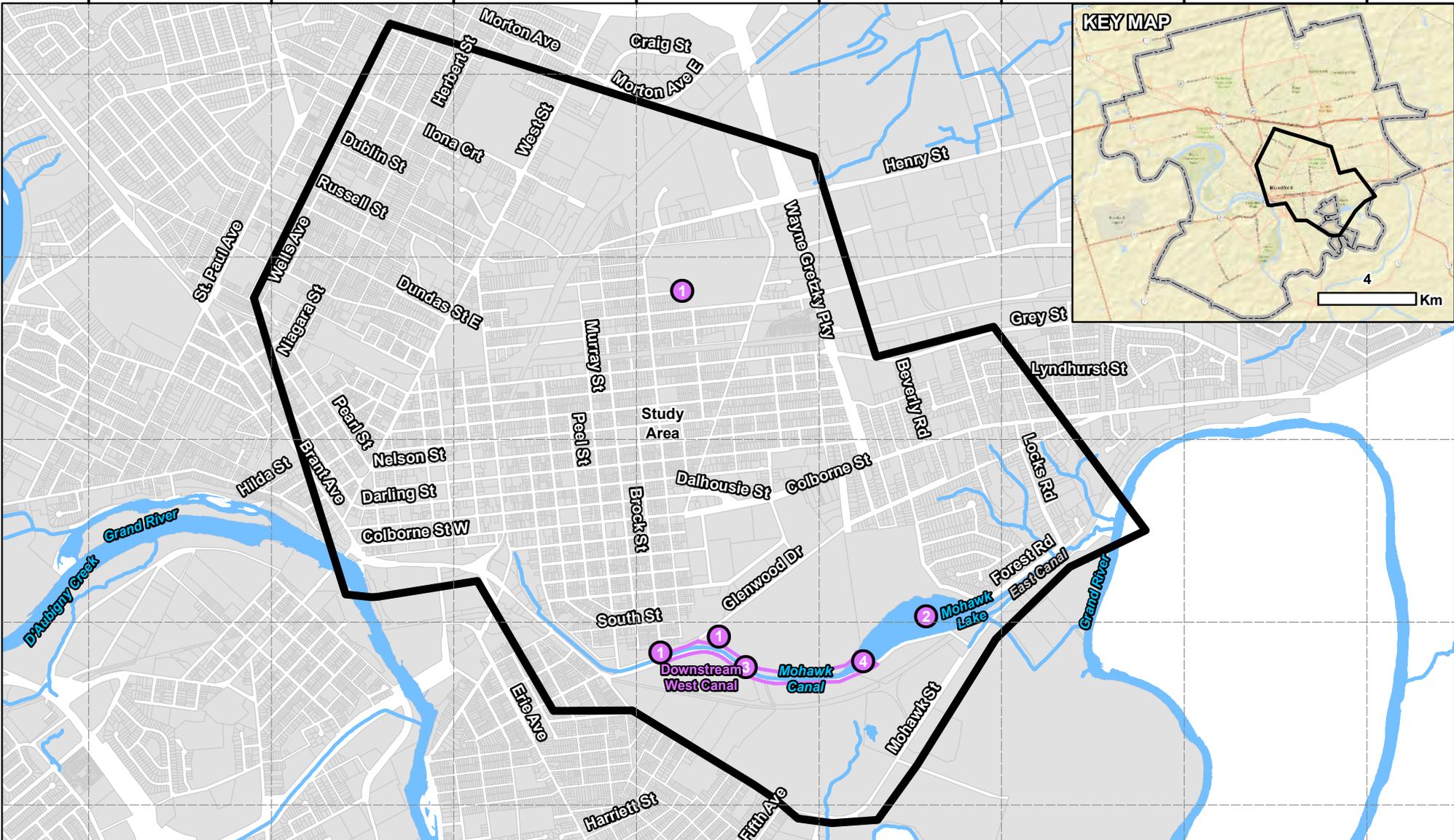
PROJECT N^o: TPB188172

DRAWING: 23

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DATE: June 2020

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- LEGEND**
- Long-term Project Location
 - Study Area
 - Watercourse
 - Waterbody
 - Property Parcel
 - Downstream West Canal Project

- Medium to Long-term (2022-2029)**
1. SWMF Outfall Retrofits
 2. Mohawk Lake (and East Canal) Strategic Sediment Removal and Lake Bed Re-Contouring
 3. West Mohawk Canal Restoration and Clean-Out (Downstream Section)
 4. Carp Exclusion Measures
 5. One (1) high priority OGS retrofit each year
 6. Enhanced SWM for re-developments and roadway re-constructions
 7. Continue to undertake sanitary cross-connection testing in difference areas of subwatershed
 8. Review City street sweeping policies and develop and implement a road salt management plan
 9. Landfill Contamination Study

NOTES:
 - Regulation Limit from GRCA Open Data, 2019
 - Key Map topography from ESRI



**MOHAWK LAKE AND CANAL
SUBWATERSHED STORMWATER PLAN REPORT**

**Preferred Solutions
Medium to Long-term (2022-2029)**

Datum: NAD83
Projection: UTM Zone 17N



PROJECT N^o: TPB188172

DRAWING: 24

SCALE: 1:30,000

DATE: June 2020



8.0 Impact Assessment

8.1 Natural Environment

As noted herein, the Characterization Study provided a focus on existing conditions within Mohawk Lake and in the immediate areas of the canal and outflow channel. The Characterization Study does not cover areas relative to the Shallow Creek pond or Rawdon Street pond (ID#1 and ID#2, respectively). As findings relative to these areas are not well understood, exact impacts cannot be identified at present. As part of the future design for the SWMF retrofit(s) an EIS³ will be required to address associated impacts which may include but not be limited to: impacts to fish and fish habitat during construction, impacts to trees and associated vegetation, impacts to wildlife and wildlife habitat, and potential impacts to SAR (if they exist). The design should include efforts for habitat enhancements where feasible.

In relation to other aspects of the project, the following additional impacts shall be considered:

The Mohawk Lake and Oxbow Wetland has been recommended for a PSW designation in the Characterization Study (2019) (Appendix A) and is situated along the north shores of the West Canal and designated as a Core Natural Area in the Draft Official Plan 2016. A PSW designation would represent a significant constraint to the site, as a 120m PSW adjacent lands setback would restrict development and adjacent land uses. The Glebe Farm Indian Reserve, the Greenwich Mohawk Site, Mohawk Lake and Canal, Shallow Creek Park, the proposed Primary Waterfront Trail and additional adjacent lands would fall under this 120m PSW adjacent lands setback. While development is not prohibited, an impact assessment would be required to demonstrate the functionality of the PSW would not be impacted, along with further additional studies.

The identified osprey nest is located within the Greenwich Mohawk Site in an area designated as Existing Industrial and Other Uses in all three (3) concept plans developed as part of the Mohawk Lake District Plan. The Master Plan represents an opportunity to enhance the nesting location.

Rare Vegetation Communities are located in areas designated Core Natural Area in the Draft Official Plan 2016. Rare Vegetation Communities are a form of SWH and therefore development should include a setback from the edge of the delineated boundary. The setback should be large enough to limit edge effects and not include trails.. Setbacks should include restoration of the Rare Vegetation Communities, to promote the development of the core area of the Rare Vegetation Communities, provides an opportunity to preserve permeable areas to improve water retention, moisture uptake and water quality within the subwatershed.

As noted herein, additional studies have been recommended to further characterize the Mohawk Lake, Canal and additional systems (i.e., Shallow Creek). Findings relative to these studies are not well understood at the present time, and as such, exact impacts

³ Grand River Conservation Authority's *Environmental Impact Study (EIS) Guidelines and Submission Standards for Wetlands (2005)* provide guidance on developing EIS

cannot be identified herein. As part of the design, an EIS will be required to address associated impacts, which may include but not limited to: impacts to fish and fish habitat during construction, impacts to vegetation communities, impacts on wildlife and wildlife habitat, and potential impacts to SAR (if they exist). Further, as noted in Section 4.5, in response to the review of draft project documentation, GRCA noted that wetland boundaries would need to be delineated by a qualified consultant and subsequently verified by the GRCA. The design should include efforts for habitat enhancements where feasible.

8.2 Physical Environment

8.2.1 Geology, Hydrogeology and Groundwater

Shallow Creek Park abuts the north side of the West Canal and was determined by Gore & Storrie (1995) to be affected by coal tar wastes with associated PAH contamination of groundwater. Should remediation works be proposed in this area, the potential for mobilization of existing groundwater contamination or introduction of new groundwater contamination must be considered. Construction in the potential development lands may also cause soil erosion, which may lead to runoff with high, and potentially contaminated suspended load being discharged to Mohawk Lake and Mohawk Canal.

The industrial and land fill sites identified as potential sources of contamination (Figure 13) have likely influenced the groundwater quality in the area. The Greenwich Mohawk Site has undergone remediation and does not require additional site assessment. Development occurring in other potential development lands will require a site condition assessment for soil and groundwater contamination to determine risk of contaminant mobilization in groundwater.

The potential development lands within the study area are a relatively small proportion of the overall subwatershed of Mohawk Lake. Groundwater flow rate and quality changes associated with changes to the potential development lands may have a relatively small effect on the overall water balance and water quality of Mohawk Lake and Mohawk Canal, when compared to the inputs from the urban surface watershed. Given the minor scale of the development, it is considered unlikely to directly affect flow rates or water quality of the Grand River to the south of the study area. Future development in the upstream subwatershed should be required to implement stormwater controls to mitigate potential impacts to the surface and groundwater quality of the overall subwatershed.

8.2.2 Fluvial Geomorphology

The south shore of the West Canal consists of artificial slopes with locally undercut banks. The abutting lands are identified as potential development areas in the Waterfront Master Plan, designated as Residential and General Employment lands in the Draft Official Plan 2016, and include the proposed Primary Waterfront Trail. Future development in these areas has the potential to exacerbate the ongoing erosion conditions of the south shore. Future development works should include stormwater management controls to prevent further bank erosion and improve the existing bank conditions through restoration.

A significant portion of the study area falls within the GRCA's Regulation Limit, including the majority of the potential development areas south of the canal-lake system. Development will be restricted by GRCA policies in these areas and Special Policy Area policies in the Erosion & Hazard Limit SPA areas.

Two (2) of the three (3) erosion sites identified in the Characterization Study (Aquafor Beech Limited, 2019) are located in the tributaries to the Outfall draining to the Grand River and are adjacent to residential properties. Due to the minor scale of these sites and their location downstream of the canal-lake system, they are unlikely to be a cause of sedimentation for the canal-lake system, and accordingly unlikely to be a significant focus of this project. Should restoration works be proposed in these areas, they will need to consider the impacts to adjacent residential properties. The third erosion site is located upstream of the West Canal adjacent to Shallow Creek Park. Should restoration works be proposed in this area, they should consider potential temporary impacts to the use of Shallow Creek Park, as well as potential elements that could be integrated into the design to enhance the aesthetic and recreational value of the park.

8.2.3 Hydrology and Stormwater Management

As noted previously, the Mohawk Lake subwatershed is completely developed, and lacks any formal stormwater management (quantity) or erosion controls. Mohawk Lake itself generally acts as an informal stormwater management facility for the contributing drainage area.

Typically, re-development or intensification within the subwatershed would provide an opportunity to retroactively provide stormwater management controls. While quality controls would be strongly encouraged, quantity controls, and in particular engineered infiltration measures, may require further consideration. Infiltration measures would need to strategically consider existing issues around sub-surface contamination and groundwater, but would also need to consider the potential impacts in reducing direct flows to Mohawk Lake, given their potential benefit with respect to dilution and circulation.

8.2.4 Hydraulics

The updated floodplain mapping for the Mohawk Lake and Mohawk Canal area (as per the Subwatershed Stormwater Report, (Wood, 2020a)) indicates that flooding of the lands to the south of Mohawk Lake would be expected beginning at the 25-year storm event and greater. Typically, re-development within floodplain areas is prohibited by the local Conservation Authority (GRCA). Notwithstanding, as noted the area in question is designated a Special Policy Area (SPA) by the GRCA, which can permit some re-development, subject to certain restrictions/requirements. Typically, flood-proofing is required for any re-developments, and certain types of vulnerable land uses may not be permitted.

8.2.5 Water Quality

Future development in the upstream subwatershed may result in increased impervious area and decreased stormwater runoff water quality, particularly in areas which have been identified in the Characterization Study (Aquafor Beech Limited, 2019), as already containing degraded water quality. The Draft Official Plan 2016 identifies Colborne Street as an Intensification Corridor, located directly upstream of the canal-lake system, which has been identified to contain drainage areas with poor and fair water quality (Figure 13). The Downtown Urban Growth Centre and Intensification Corridor along West Street were also identified as containing areas that exhibit poor and fair water quality (Figure 13). Future development, particularly in areas where water quality is already degraded, should include stormwater management controls to partially treat and retain water on-site. Stormwater control alternatives will be informed by the type of development, as appropriate alternatives will vary for greenfield development north of the lake versus infill development northwest of the West Canal.

The Greenwich Mohawk Site is located adjacent to the West Canal, therefore surface water runoff will drain into the canal-lake system. Due to the site remediation that was completed in 2017, significant contaminants are not anticipated from the site. However, as the redevelopment of the site will result in an increase in impervious area, the design of the site should incorporate stormwater management controls.

The Waterfront Master Plan identified numerous future parking lot locations within the catchment area for the canal-lake system (Figure 7). Similar to the Greenwich Mohawk Site, stormwater management controls, LID BMPs or more porous materials should be considered to mitigate impacts from an increase in impervious area, with due regard for water circulation needs cited earlier for Mohawk Lake.

8.2.6 Sediment Quantity and Quality

Sediment analyses identified a range of metal, PAH, PHC, VOC, and PCB contaminants. The upper sediment sampling interval exceeded the PSQG LEL for Cd, Cu, Pb, Hg, Ni and Zn in most locations and the As LEL was marginally exceeded at one location. Cu exceeded the SEL in several locations on the west side of Mohawk Lake and Pb exceeded the SEL at eight of the sampling locations distributed throughout the lake. Evaluations of the LEL or SEL were not conducted for intervals 2 or 3 since these are likely below the current habitable range of benthic invertebrates.

The Characterization Study (Aquafor Beech Limited, 2019) evaluated potential disposal constraints for sediments using O. Reg 153/04 soil standards. The Table 3 standard for commercial and industrial areas were commonly exceeded by metals including B, Pb, and Zn in the upper two sediment sampling intervals. Table 1 metal standards were commonly exceeded throughout the lake and West Canal for Sb, Ba, Cu, Hg, Se, and Ag. Within the lake, metal exceedances were more common in the upper two sampling intervals. The East Canal had only one Table 1 metal exceedance for Sb. Similarly, a wide range of PAHs and PHCs exceeded Table 3 standards for commercial and industrial areas throughout the sampling area at all three intervals although interval 3 tended to have the least number of exceedances.

The TCLP results provided in the Characterization Study suggest that Mohawk Lake sediments will not need to be treated as hazardous material. However, given the range of soil contaminant exceedances, placement of dredged material will require careful evaluation and may limit the potential number of recipient site alternatives. The proximity of disposal sites and the associated costs of transporting and relocating significant quantities of impacted materials will also need to be considered in the assessment of restoration alternatives.

Future growth is planned upstream of the subwatershed, which may result in the potential for additional sediment loading to the canal-lake system. The form of development, and whether new industrial activities will be introduced, which may result in increased sediment loading and potential contamination, will impact the sediment quality of the system.

8.3 Built Environment

8.3.1 Cultural Heritage and Archaeology

Potential site alterations are anticipated to be primarily related to restoration as opposed to active development, as the principal portions of land included in the designation includes Mohawk Park, which is designated as a Core Natural Area in the Draft Official Plan 2016, and the shorelines, which are designated a SPA within the Draft Official Plan 2016, where development is largely prohibited. The recommendations for Mohawk Park and the proposed Primary Waterfront Trail (Figure 7) will require appropriate design considerations in order to ensure recommendations are in keeping with the intent of the CHL designation.

Consultation should occur between the City's Heritage Planner, the Heritage Committee, and the Indigenous groups to ensure their views are incorporated into the proposed recommendations for the site. The CHL designation area abuts the Glebe Farm Indian Reserve on the east and south sides, further emphasizing the importance of consultation with Six Nations of the Grand River (SNGR).

The ongoing Cultural Heritage Study that is being completed by ASI will provide recommendations for the CHL. Once the Study has been approved by the Ministry of Tourism, Culture and Sport (MTCS), the recommendations will be established. Should investigations, undertaken as part of this project result in recommendations that differ from the Cultural Heritage Study recommendations, consultation should occur with MTCS to determine an appropriate solution, prior to submitting the Class EA to MTCS for approval.

The Woodland Cultural Centre, Canadian Military Heritage Museum, Cockshutt Timekeeper's Building and Kanata Village are located within a potential development area, specifically the Greenwich Mohawk Site. The three (3) preliminary concept plans developed as part of the Mohawk Lake District Area Plan in May 2018 designated all sites as Institutional and Cultural areas, addressing the potential development limitations associated with a cultural heritage designation.

Stage 1 Archaeological Assessment completed by Wood in support of the Project (Wood, 2019), identified that undisturbed portions of the study area have archaeological potential and warrant Stage 2 Archaeological Assessment. In addition, ARA's Stage 3 investigations warranted Stage 4 mitigation for Site AgHb-371 and Site AgHa-181.

8.4 Potential Sources of Pollution

Legacy industrial activities and landfills were likely a pollutant source for the Mohawk Lake and Mohawk Canal. The majority of these sites are no longer active or have undergone remediation (Figure 13). The Greenwich Mohawk Site was remediated in 2017 (ref. Mohawk District Planning Study) and is slated for redevelopment in the Mohawk Lake District Plan. Legacy industrial sites that are identified for redevelopment will require similar remediation activities.

The landfill site located adjacent to Shallow Creek Park was identified to be significantly contaminated but not requiring remedial action at the time of the assessment in 1995. Confirmatory investigations and monitoring for this site are recommended to understand the potential impacts to the canal-lake system. Sediment removal and channel reconfiguration works should consider the potential for contaminant mobilization on site. The site is designated as a Downtown Urban Growth Centre, however due to contamination of the site, remediation works would be required to permit future development.

Sonoco Products of Canada operations include stormwater discharging from the property into the canal and water from the canal being used as non-contact cooling water and discharged back into the canal and lake. Operations should continue to be monitored to ensure discharge is of an acceptable quality and temperature. Should the Mohawk Lake and Oxbow Wetland Complex be designated a PSW, potential restrictions may be applicable.

Should restoration works be proposed in proximity to the abandoned landfills located to the south of Mohawk Lake and Mohawk Canal (Figure 13) the potential for contaminant mobilization must be considered. Dumping has been recommended to be ceased for the landfill located within Mohawk Park which contains street sweeping remnants. Restoration activities or recreational opportunities proposed within Mohawk Park should consider the potential for contaminant mobilization, and potential relocation for the dumping site.

8.5 Impact Analysis Summary

A summary of the preceding review of different disciplines, and the associated impacts associated with re-development and re-construction both within the overall subwatershed and within the Mohawk Lake and Mohawk Canal area, are presented in Table 8-1.

Table 8-1: Impact Analysis Summary

Category/ Discipline	General Impacts	Impact Assessment		Future Analyses
		Direct	Indirect	
Cultural Heritage and Archaeology	Restrictions on development and site alterations	Restrictions on development due to CHL designation Buffers required for sites of archaeological significance	Additional Archaeological Assessment, as required (Stage 2 and Stage 4 AA)	Cultural Heritage Study CHL Designation (OPA) Stage 2 Archaeological Assessment for areas of archaeological potential and Stage 4 mitigation for Site AgHb-371 and Site AgHa- 181
Geology, Hydrogeology and Groundwater	Change in infiltration rates / groundwater recharge rates Mobilization of groundwater contamination Erosion of soils	Change in groundwater discharge in both quantity and quality to Mohawk Lake and canal (IPZ 2/3) Runoff with high, and potentially contaminated suspended load, being discharged to Mohawk Lake and canal (IPZ 2/3)		Detailed surficial geology of potential development lands Groundwater level contour map Groundwater- surface interactions at Mohawk Lake Hydrogeological conceptual cross-sections
Hydrology and Stormwater Management	Increase or decrease in flows and volumes Change in water balance	Change in operation of Mohawk Lake, including water levels,	Potential ecological impacts from changes in operation of Mohawk Lake	Updating of hydrologic modelling; analysis of potential land use changes and mitigation

Table 8-1: Impact Analysis Summary

Category/ Discipline	General Impacts	Impact Assessment		Future Analyses
		Direct	Indirect	
		<p>durations, circulation</p> <p>Impacts to watercourse erosion</p> <p>Changes to groundwater</p>		and overall restoration strategy*
Hydraulics	<p>Flooding extents/impacts to adjacent lands</p> <p>Changes in operation of Mohawk Lake under more frequent storm events</p>	<p>Flooding extents/impacts to adjacent lands</p> <p>Changes in operation of Mohawk Lake under more frequent storm events</p>		Revised floodplain extents depending on changes to flows (hydrology and SWM)*
Fluvial Geomorphology	Erosion of soils Sedimentation	<p>Channel reconfiguration restricted by CHL and PSW designation</p> <p>Stormwater management controls for development to reduce sedimentation and erosion</p>	Development restricted by regulation limit, Erosion & Hazard Limit SPA, and floodline	<p>Identification of sediment sources from the urban drainage network (potentially the primary source);</p> <p>Investigation of existing sediment sources within local drainage area</p>
Water Quality	Impaired water quality	<p>Water quality impaired most significantly in West Canal</p> <p>Pollutant sources require identification</p>	Water quality impacted by sediment contamination	Future ambient water quality monitoring

Table 8-1: Impact Analysis Summary

Category/ Discipline	General Impacts	Impact Assessment		Future Analyses
		Direct	Indirect	
Sediment Quantity and Quality	Significant sedimentation Impaired sediment quality	Sediment quality impaired most significantly in West Canal Potential contaminant mobilization	Additional studies required to identify primary sediment source Dredging and channel reconfiguration influenced by contaminant mobilization	Future risk evaluation
Natural Heritage	Restrictions on development and site alteration due to natural heritage designations (e.g., PSW, SAR, SWH) Changes to substrate and fish habitat Sedimentation during construction activities Disturbance to wildlife (terrestrial and aquatic) during construction activities	Mohawk Lake and Oxbow Wetland PSW Designation SWH and Rare Vegetation Community Environmental permits and associated restrictions	Additional survey requirements Habitat compensation Construction timing windows Aquatic surveys within the Grand River to evaluate habitat potential for the identified SAR to confirm future permitting and approval requirements under applicable provincial and federal legislation	Aquatic ecosystem surveys required for canals and surrounding area Additional terrestrial ecosystem surveys required Confirmation of PSW designation Assessment of project to determine requirement for DFO request for review

* Work largely completed during this study period.

9.0 Implementation

9.1 Mitigation and Monitoring Plan

As noted earlier, impacts associated with the implementation of the preferred solution is anticipated to influence a number of features, functions and characteristics associated with the Mohawk Lake and Canal environment (Table 9-1). Mitigation and monitoring associated with each Category/Discipline have been noted accordingly in the tabular summary for consideration by the City at the implementation stage.

Table 9-1: Impact Analysis and Mitigation and Monitoring Summary

Category/ Discipline	General Impacts	Impact Assessment		Mitigation and Monitoring
		Direct	Indirect	
Cultural Heritage and Archaeology	Restrictions on development and site alterations	Restrictions on development due to CHL designation Buffers required for sites of archaeological significance	Additional Archaeological Assessment required	Each project site will need to be cleared of any cultural heritage or archaeological constraints and conditions of development established accordingly.
Geology, Hydrogeology and Groundwater	Change in infiltration rates / groundwater recharge rates Mobilization of groundwater contamination Erosion of soils	Change in groundwater discharge in both quantity and quality to Mohawk Lake and canal (IPZ 2/3) Runoff with high, and potentially contaminated suspended load, being discharged to Mohawk Lake and canal (IPZ 2/3)		Each project should include further locally directed study to determine the potential influence on groundwater either to, or from, the implementation of the subject remediation works. It may, in certain settings, be necessary to install monitoring wells long-term to track local changes.

Table 9-1: Impact Analysis and Mitigation and Monitoring Summary

Category/ Discipline	General Impacts	Impact Assessment		Mitigation and Monitoring
		Direct	Indirect	
Hydrology and Stormwater Management	<p>Increase or decrease in flows and volumes</p> <p>Change in water balance</p>	<p>Change in operation of Mohawk Lake, including water levels, durations, circulation</p> <p>Impacts to watercourse erosion</p> <p>Changes to groundwater</p>	<p>Potential ecological impacts from changes in operation of Mohawk Lake</p>	<p>The City should consider baseline quantity and quality monitoring at selected outfalls to Mohawk Lake and Mohawk Canal, with the intent to establish current conditions and thereby monitor/track the improvements due to the implemented works.</p>
Hydraulics	<p>Flooding extents/impacts to adjacent lands</p> <p>Changes in operation of Mohawk Lake under more frequent storm events</p>	<p>Flooding extents/impacts to adjacent lands</p> <p>Changes in operation of Mohawk Lake under more frequent storm events</p>		<p>A continuous lake level monitoring system at the inlet to the Lake (mouth of canal) and at the outlet (control structure) would provide valuable data on seasonal variations in lake levels and thereby also provide a basis to update and maintain the local hydrologic and hydraulic models.</p>
Fluvial Geomorphology	<p>Erosion of soils</p> <p>Sedimentation</p>	<p>Channel reconfiguration restricted by CHL and PSW designation</p>	<p>Development restricted by regulation limit, Erosion & Hazard Limit</p>	<p>Post-construction stream restoration projects should incorporate a set of control cross-sections to monitor on-going stream adjustments and ensure</p>

Table 9-1: Impact Analysis and Mitigation and Monitoring Summary

Category/ Discipline	General Impacts	Impact Assessment		Mitigation and Monitoring
		Direct	Indirect	
		Stormwater management controls for development to reduce sedimentation and erosion	SPA, and floodline	that erosion remains within acceptable limits.
Water Quality	Impaired water quality	Water quality impaired most significantly in West Canal Pollutant sources require identification	Water quality impacted by sediment contamination	As noted earlier, a long-term/ continuous water quality sampling program at outfalls and in-lake (inlet/outlet) would serve as a baseline to monitor improvements one time with the objective to use adaptive management practices to address the need to any potential supplemental intervention.
Sediment Quantity and Quality	Significant sedimentation Impaired sediment quality	Sediment quality impaired most significantly in West Canal Potential contaminant mobilization	Additional studies required to identify primary sediment source Dredging and channel reconfiguration influenced by	The Characterization Study collected bathymetric data for the lake/canal. While considered adequate for this study, further subsurface profiling is recommended to serve as a baseline prior to advancing any strategic sediment removal. Similarly, additional testing is also recommended to further isolate the most severely impaired contaminants.

Table 9-1: Impact Analysis and Mitigation and Monitoring Summary

Category/ Discipline	General Impacts	Impact Assessment		Mitigation and Monitoring
		Direct	Indirect	
			contaminant mobilization	
Natural Heritage	Restrictions on development and site alteration due to natural heritage designations (e.g., PSW, SAR, SWH)	<p>Mohawk Lake and Oxbow Wetland PSW Designation</p> <p>SWH and Rare Vegetation Community</p> <p>Environmental permits and associated restrictions</p>	<p>Additional survey requirements</p> <p>Habitat compensation</p> <p>Construction timing windows</p>	<p>Further environmental data collection is recommended to establish current local habitat conditions and gauge improvements over time.</p> <p>Given the works that will likely be associated the project, a project screening process following that outlined by DFO will be required to identify whether a request for review will be required. Similarly, in the event SAR are identified, consultation and review with MECP and potentially DFO (aquatic SAR) will also be required.</p> <p>Post-construction monitoring will be identified within the EIS in relation to additional work proposed and field work findings. This may be further clarified through consultation with regulatory agencies relative to permit and approval requirements.</p>

9.2 Staging and Costs

9.2.1 Short Term Projects (2020+)

9.2.1.1 Stormwater Management Strategy

Table 9-2 and Table 9-3 provide a summary of the estimated staging and costing for Short-Term Stormwater Management Strategy Projects – (approximately 2020/2021). Detailed implementation plan and potential funding sources are discussed in Subwatershed Stormwater Plan (Wood, 2020a).

A key consideration is the availability of a Federal Government funding grant to support the construction of the highest priority measures in 2020/2021. This includes three (3) high priority OGS retrofits, and the Shallow Creek SWMF retrofit.

Table 9-2: EA Recommended SWM Strategy – High Priority Measures for Short-Term Implementation Plan

Priority	Project Type	Project ID	Location	Activity	Class EA	Estimated Cost
1	OGS Retrofits	TBD	3 Highest Priority Locations	Detailed Design	A/A+	\$465,000
2	SWMF Outfall Retrofits	1	Shallow Creek Park	Detailed Design	B	
3	Watercourse Restoration and Retrofit	N/A	Mohawk West Canal Restoration and Retrofit (Upstream)	Detailed Design	B	
1 ²	OGS Retrofits	TBD	3 Highest Priority Locations	Construction	N/A	\$900,000 ¹
2 ²	SWMF Outfall Retrofits	1	Shallow Creek Park	Construction	N/A	\$4,500,000 ¹
3 ²	Watercourse Restoration and Retrofit	N/A	Mohawk West Canal Restoration and Retrofit (Upstream)	Construction	N/A	TBD

1. Construction costs are conceptual estimates only (Class D Cost Estimate as per CCA guidelines) and assumes non-contaminated material for removal (with respect to SWMF outfall retrofits). Refer to Appendix E of the Subwatershed Stormwater Plan for cost breakdown. Construction cost estimate will be further refined as part of detailed design process
2. Construction priority same as design priority

Table 9-3: EA Recommended SWM Strategy – Other Measures for Short-Term Implementation Plan

Priority	Project Type	Project ID	Location	Activity	Class EA	Estimated Cost
4	Development SWM Policy	N/A	Subwatershed (or City-Wide)	SWM Requirements for Developments	N/A	\$0*
5	Cross-Connection Investigation	N/A	Rawdon Street and Bruce Street	Assessment and Potential Remediation	A/A+	\$50,000
6		N/A	Various areas of subwatershed	Assessment	A/A+	\$25,000
7	SWMF Outfall Retrofits	2	Shallow Creek Trail (Rawdon Street)	Detailed Design	B	\$150,000
8		4	Glebe Lands	Feasibility Review	N/A	\$20,000
9		5	Arrowdale Public Golf Course	Feasibility Review	N/A	\$20,000
10	OGS Retrofits	TBD	1 of Remaining High Priority Locations	Design and Construction	A/A+	\$300,000
11	SWM for Road Reconstruction	000870	Elgin Street (CN Overpass to Rawdon Street)	Design and Construction	A/A+	\$150,000
12		001344	Palace Street (Brant to Duke)	Design and Construction	A/A+	\$150,000
13		000349	Chatham Street (Stanley to Fourth)	Design and Construction	A/A+	\$150,000
14		001122	Drummond Street (Dead End to Park)	Design and Construction	A/A+	\$150,000
15		001490	Rawdon Street (Wellington to Grey)	Design and Construction	A/A+	\$150,000

9.2.1.2 Mohawk Lake and Mohawk Canal

9.2.1.2.1 Mohawk Lake

The in-lake restoration alternatives evaluated for Mohawk Lake included dredging, capping, and strategic re-contouring. The specific need for implementation of these alternatives will need to be determined based on future contaminant risk evaluations and water quality data collection. Given the design and permitting complexity that is often associated with these types of projects, the estimated costs are provided as ranges. Furthermore, physical sediment characterization data are required to determine the necessary pumping and dewatering rates and appropriately size the required dredged material management area (DMMA), which will have a significant effect on estimated costs. Disposal costs can also have a significant effect on overall project cost and will be estimated as part of the preliminary design phase once potential disposal areas have been identified.

The estimated conceptual cost for hydraulic dredging within Mohawk Lake is between \$38 and \$52 per m³ exclusive of material disposal cost. If all 155,000 m³ of unconsolidated sediment were removed, the low estimate dredge cost could exceed \$6 to 7 Million, plus disposal.

Strategically targeted dredging of hot-spots could substantially decrease the overall costs. Mechanical dredging may also be an option if the water level can be manipulated appropriately on Mohawk Lake. Mechanical dredging could range between \$26 and \$35 per m³, exclusive of material disposal cost. The cost of the removal of all unconsolidated material using mechanical dredging would range between \$3 and \$4 million plus disposal. Strategically targeted mechanical dredging could similarly reduce the amount of material to be managed.

The cost for clean sand to cap Mohawk Lake sediments would be approximately \$26 per m³ depending on the nearest source. Assuming a 0.2-m cap over a 13 hectare dredging templates, would result in a total of 32,000 m³ of clean sand, approaching a cost of \$1 Million. The efficacy of sand capping has not yet been determined and will need to be evaluated in a future effort.

Re-contouring can be achieved using a combination of any or all of the above alternatives, and cost would depend on the scale. It is conceivable that the targeted hydraulic dredging project could be reduced in size and scale with supplemental capping so that dredging could be reduced to a range between \$1,200,000 and \$1,620,000 (plus disposal) with \$416,000 in capping material. However, in this case, the smaller project scale may result in higher unit removal/placement costs, which could drive the overall project cost higher.

It should be noted that all of the preceding cost estimates are for removal only – they do not include disposal costs. Disposal costs would vary notably depending on the contamination level but would be expected to substantially increase the cost beyond the preceding base removal costs (i.e. \$100 to \$200 per m³). This would likely render full sediment removal cost-prohibitive, as such selected/strategic removal and re-contouring is generally considered a preferred approach.

9.2.1.2.2 Mohawk Canal

For Mohawk Canal, many of the considerations with respect to sediment removal options (as discussed in Section 9.2.1.2.1 for Mohawk Lake) would again apply. The choice of potential removal methodology would need to take into account the overall proposed re-design for the channel. Depending on the scope of potential re-alignment and channel form changes, as well as proposed riparian plantings, different methodologies may be more logical to employ. If a full channel reconstruction is proposed, then removal in the dry (i.e. “dig and dump”) may be the most logical approach. If no major channel re-alignment works are proposed, then a hydraulic dredging approach is likely more logical. If a retrofit to provide online quality control treatment is proposed, the construction approach and cost would depend on the scope of the retrofit.

Similar to Mohawk Lake remediation, the quantity and location of sediment within Mohawk Canal also requires further consideration and would be determined as part of subsequent design efforts. Overall, the quantity of accumulated sediment within Mohawk Canal is notably less than the Lake (30,000 m³ as compared to 155,000 m³), which may render it more financially viable in the short to medium term.

It is recommended that the immediate focus involve the West Canal, given its greater potential to mobilize material into Mohawk Lake, and also the identified issues with sedimentation and sediment quality, including most recently within the Characterization Study (Aquafor Beech Limited, 2019). Elevated concentrations of metals were noted within the lowest sediment depth in the West Canal. In addition, overall the highest PAH concentrations were noted in the West Canal, for all three (3) sampling horizons. This further suggests there is value in sediment removal from the West Canal.

Based on synergies with the planned works in Shallow Creek Park, the potential to incorporate SWM treatment at an upstream location), and other matters related to property ownership and ecological constraints, it is suggested that the short-term focus be upon the most upstream section – i.e. from Shallow Creek to Drummond Street, approximately 1 km +/- in length.

Future work should consider the City’s planned hydraulic structure upgrades along the West Mohawk Canal. As per the Subwatershed Stormwater Plan Report (Wood, 2020a), the Alfred Street crossing in particular is undersized, and the reconstruction of a much wider open span type structure should be combined with associated channel reconstruction works. This section of the West Canal will also require particular consideration for trail linkages.

The downstream portion of West Mohawk Canal (i.e. from Drummond Street to Mohawk Lake) should be considered thereafter. In particular, ownership constraints in this area (i.e. the Glebe Lands are owned by the Six Nations of the Grand River) and would require a collaborative approach. Further, the existing wetland on the north shore of the downstream portion of the West Canal was previously recommended to be designated as a Provincially Significant Wetland (PSW), and would require further consideration including buffer requirements.

The East Canal is less of a priority given the overall lower contaminant concentrations and location downstream of Mohawk Lake. It is recommended that any works in this area potentially be combined with works within Mohawk Lake itself.

Given the uncertainty with respect to final scope of works and potential sediment removal requirements, no cost estimates have currently been generated for the Mohawk Canal restoration works. Sediment removal and disposal costs would be consistent with those discussed previously in Section 9.2.1.2.1. Assuming full removal of all accumulated sediment within Mohawk Canal, removal alone would be expected to cost some \$1.5M; disposal costs could be a further \$6M, not including other constructions costs and the previously noted restoration/channel works. Updated costs estimates should be prepared as part of future design scopes.

Table 9-4: EA Recommended Mohawk Lake and Mohawk Canal Strategy – Short Term Implementation Plan					
Project Type	Project ID	Location	Activity	Class EA	Estimated Cost
Strategic Sediment Removal and Lake Bed Recontouring	N/A	Mohawk Lake (and East Canal)	Assessment / Preliminary Design	Schedule B	TBD
Study / Wildlife Management	N/A	Mohawk Lake	Field Study into Carp Invasive Studies	Schedule B	TBD

9.2.2 Medium to Long Term Projects (2022 to 2029)

9.2.2.1 Stormwater Management Strategy

Table 9-5 provides a summary of the estimated cost for Medium to Long-Term Stormwater Management Strategy Projects – (approximately 2022-2029).

Construction of the proposed Rawdon Street (Shallow Creek Trail) SWMF Outfall retrofit is the largest budget item with respect to medium to long-term projects and would require specific consideration of potential funding sources.

A key unknown relates to the potential construction costs associated with SWMF outfall retrofits at sites 4 and 5 (i.e. Glebe Lands and Arrowdale Golf Course). As noted previously, the potential construction of Sites 4 and 5 remains preliminary and would require a feasibility assessment and consultation, which is proposed to be completed as part of the short-term works. More detailed cost estimates for these projects would be developed as part of those feasibility assessments.

Beyond the estimated annual additional SWM costs for road reconstructions, certain types of projects reflect the same typical annual works – one (1) OGS retrofit per year (\$300,000 annually – Class D Cost Estimate as noted previously; should be refined as part of detailed design) and cross-connection investigations (\$25,000 annually), as well as the estimated budget for additional SWM measures for roadway reconstruction projects (\$150,000 to \$300,000 depending on the estimated project extents).

Table 9-5: EA Recommended SWM Strategy – Medium to Long-Term Implementation Plan						
Priority	Project Type	Project ID	Location	Activity	Class EA	Estimated Cost
20	SWMF Outfall Retrofits	2	Shallow Creek Trail (Rawdon Street)	Construction	N/A	\$4,700,000 ¹
21		5	Arrowdale Public Golf Course	Detailed Design ²	B	\$150,000
22		4	Glebe Lands	Detailed Design ²	B	\$200,000
23		5	Arrowdale Public Golf Course	Construction*	N/A	TBC ²
24		4	Glebe Lands	Construction*	N/A	TBC ²
25	OGS Retrofits	TBD	Remaining High Priority Locations (1 per year - 8 total)	Design and Construction	A/A+	\$2,400,000 ¹
26	Cross-Connection Investigation	N/A	Various areas of subwatershed (annual review)	Annual Assessment	A/A+	\$200,000
27	Studies	N/A	Subwatershed (or City-Wide)	Street Sweeping - Policy and Capability Review	N/A	\$0*
28		N/A	Entire Subwatershed (Potentially City-Wide)	Road Salt Management Plan	N/A	\$50,000
29		N/A	Subwatershed (or City-Wide)	Landfill Contamination Study	N/A	\$100,000
30	SWM for Road Reconstruction	000068	Buffalo Street (Rushton to West)	Design and Construction	A/A+	\$150,000
31	SWM for Road Reconstruction	000343	Grey Street (Fourth to Wayne Gretzky)	Design and Construction	A/A+	\$150,000

Table 9-5: EA Recommended SWM Strategy – Medium to Long-Term Implementation Plan						
Priority	Project Type	Project ID	Location	Activity	Class EA	Estimated Cost
32	SWM for Road Reconstruction	001135	Nelson Street (Stanley to Park)	Design and Construction	A/A+	\$150,000
33	SWM for Road Reconstruction	001343	Drummond Street (Dalhousie to Chatham)	Design and Construction	A/A+	\$150,000
34	SWM for Road Reconstruction	001190	Charlotte Street (Dalhousie to Colborne)	Design and Construction	A/A+	\$150,000
35	SWM for Road Reconstruction	001190	Clarence Street (Dalhousie to Colborne)	Design and Construction	A/A+	\$150,000
36	SWM for Road Reconstruction	001190	Colborne Street (Brant to Dalhousie)	Design and Construction	A/A+	\$300,000
37	SWM for Road Reconstruction	001190	Dalhousie Street (Brant to Colborne)	Design and Construction	A/A+	\$300,000
38	SWM for Road Reconstruction	001190	King Street (Dalhousie to Colborne)	Design and Construction	A/A+	\$150,000
39	SWM for Road Reconstruction	001190	Queen Street (Dalhousie to Colborne)	Design and Construction	A/A+	\$150,000
40	SWM for Road Reconstruction	001149	Chatham Street (Park to Murray)	Design and Construction	A/A+	\$150,000
41	SWM for Road Reconstruction	000971	Clarence Street (Colborne to West)	Design and Construction	A/A+	\$300,000
42	SWM for Road Reconstruction	000338	Sheridan Street (Rawdon to Fourth)	Design and Construction	A/A+	\$150,000
43	SWM for Road Reconstruction	001345	Pearl Street (St James to West)	Design and Construction	A/A+	\$150,000
44	SWM for Road Reconstruction	000832	Wayne Gretzky Parkway	Design and Construction	A/A+	\$300,000

Table 9-5: EA Recommended SWM Strategy – Medium to Long-Term Implementation Plan						
Priority	Project Type	Project ID	Location	Activity	Class EA	Estimated Cost
			(Lynden to Colborne)			
45	SWM for Road Reconstruction	000406	Alfred Street (Colborne to Dalhousie)	Design and Construction	A/A+	\$150,000
46	SWM for Road Reconstruction	001342	Aylmer Street (Darling to Chatham)	Design and Construction	A/A+	\$150,000
47	SWM for Road Reconstruction	000015	Brighton Ave (Huron to Superior)	Design and Construction	A/A+	\$150,000
48	SWM for Road Reconstruction	001139	Darling Street (Queen to Market)	Design and Construction	A/A+	\$150,000
49	SWM for Road Reconstruction	001347	Dundas Street (St Paul to West)	Design and Construction	A/A+	\$150,000
50	SWM for Road Reconstruction	00905 and 00906	Stanley Street and Rawdon Street	Design and Construction	A/A+	\$150,000
51	SWM for Road Reconstruction	001142	Usher Street (Main to Dead End)	Design and Construction	A/A+	\$150,000
52	SWM for Road Reconstruction	001349	West Street (Dundas to Charing Cross)	Design and Construction	A/A+	\$150,000
53	SWM for Road Reconstruction	001306	Charing Cross Street (West to Henry)	Design and Construction	A/A+	\$150,000
54	SWM for Road Reconstruction	001138	Rawdon Street (Dalhousie to Wellington)	Design and Construction	A/A+	\$150,000

1. Construction costs are conceptual estimates only (Class D Cost Estimate as per CCA guidelines) and assumes non-contaminated material for removal (with respect to SWMF outfall retrofits). Refer to Appendix E of the Subwatershed Stormwater Plan for cost breakdown. Construction cost estimate will be further refined as part of detailed design process
2. Design costs for SWMF retrofits 4 and 5 are preliminary only and subject to outcomes of further investigations/studies/agreements. Given the uncertainty no construction cost estimates have been prepared for these alternatives.

9.2.2.2 Mohawk Lake and Mohawk Canal

Table 9-6 lists the Medium to Long-Term Projects for Mohawk Lake and Mohawk Canal – (approximately 2022-2029). A high-level discussion with respect to clean-out costing was provided previously in Section 9.2.1.2.

Table 9-6: EA Recommended Mohawk Lake and Mohawk Canal Strategy – Medium to Long-Term Implementation Plan					
Project Type	Project ID	Location	Activity	Class EA	Estimated Cost
Strategic Sediment Removal and Lake Bed Recontouring	N/A	Mohawk Lake (and East Canal)	Detailed Design and Construction	Schedule B	TBD
Wildlife Management	N/A	Mohawk Lake	Detailed Design and Construction of Carp Control Measures	Schedule B	TBD
Strategic Sediment Removal, Channel Naturalization	N/A	West Canal (Downstream Portion)	Study, Detailed Design and Construction of West Mohawk Canal Restoration	Schedule B	TBD

9.3 Class EA Master Plan Requirements

This report along with the Master Plan Report (Wood, 2020b) for this project have satisfied the Phase 1 and Phase 2 requirements of the Municipal Engineers Association Class Environmental Assessment process. The implementation of the preferred remedial solutions advanced in this study should, where the work constitutes a Schedule B undertaking, proceed to a Notice of Completion. All other recommendations that are Schedule A or A+ undertaking are considered to be “pre-approved”. Table 9-7 outlines the Class EA schedules of the preferred remedial solutions covered under this report.

Table 9-7: Environmental Assessment Schedules of the Preferred Remedial Solutions		
Project Description	Class EA Schedule (Where Applicable)	Timeline of Projects
Design & Construction of Oil and Grit Separators	Schedule A/A+	Approximately 2020+ and ongoing

Table 9-7: Environmental Assessment Schedules of the Preferred Remedial Solutions		
Project Description	Class EA Schedule (Where Applicable)	Timeline of Projects
Incorporate Stormwater Management (Quality focus) into Road Reconstruction	Schedule A/A+	Approximately 2020+ and 2022-2029
Design and Construction of Mohawk West Canal Restoration, Sediment Removal and Retrofit (Upstream Portion)	Schedule B	Approximately 2020+
Design and Construction of Mohawk West Canal Restoration and Sediment Removal (Downstream Portion)	Schedule B	Approximately 2022-2029
Design and Construction of Outfall Retrofits <ul style="list-style-type: none"> • Shallow Creek Park • Shallow Creek Trail • Six Nations Land (Glebe Farm property) • Arrowdale Public Golf Course 	Schedule B	Approximately 2020 and 2022-2029
Assessment/Preliminary Design of Mohawk Lake (and East Canal) Strategic Sediment Removal and Lake Bed Recontouring	Schedule B	Approximately 2020+ and 2022-2029
Stormwater Management for Redeveloping Lands (Infill/Intensification – Privately-led)	N/A (Policy)	Approximately 2020+ and ongoing
Public Education	N/A (Program)	Approximately 2020+ and ongoing
Wildlife Management (Carp Exclusion)	Schedule B	Approximately 2020+ and 2022-2029
Study to Isolate Locations of Sanitary Cross-Connections	N/A (Testing)	Approximately 2020+
Study and Construct Landfill Contamination Mitigation Works	Schedule B	Approximately 2022-2029

Table 9-7: Environmental Assessment Schedules of the Preferred Remedial Solutions

Project Description	Class EA Schedule (Where Applicable)	Timeline of Projects
Incentive-based program for retrofitting existing properties with SWM practices (private)	N/A (Policy)	Approximately 2022-2029
Disconnection of Cross-Connections	N/A (Policy)	Approximately 2022-2029
Street Management	N/A (Policy)	Approximately 2022-2029



10.0 References

- Aquafor Beech Ltd. 2019. Mohawk Lake Characterization Study. October 2019.
- Aquafor Beech Ltd., and Thompson Flow Investigations Inc. 2018. Stormwater Flow Monitoring and System Model Calibration Study.
- Archaeological and Cultural Heritage Services (ASI). 2016. Cultural Heritage Landscape Feasibility Study: Mohawk Canal and Alfred Watts Hydro Generating Station Ruins.
- Archaeological Research Associates Ltd. (ARA). 2014. Stage 1 Archaeological Assessment, Laurier Brantford YMCA Athletic Complex, 74 to 147 Colborne Street, Part of Lots 10-18, South Colborne Street, City of Brantford, Geographic Township of Brantford, Former Brant County, Ontario. Report on file, MTCS, Toronto. PIF P007-0596-2014.
- Archaeological Research Associates Ltd. (ARA). 2017. Stage 1, 2, and 3 Archaeological Assessments, Laurier Brantford YMCA Athletics and Recreation Complex, 75 to 151 Colborne Street, Parts 1-2, Plan 2R-7675, Part of Lots 10-18, South of Colborne Street and Mill Street, Plan of the City of Brantford, Geographic Township of Brantford, Former Brant County, Ontario. Report on file, MTCS, Toronto. PIFs P089-0075-2015, P089-0082-2015.
- Canadian Environmental Assessment Agency, 2016. Projects on Federal Lands: Making a determination under section 67 of the *Canadian Environmental Assessment Act, 2012*: <https://ceaa-acee.gc.ca/default.asp?lang=en&n=6E01A733-1&offset=4&toc=hide> Gore & Storrie Ltd. 1995. Mohawk Lake Rehabilitation Project - Mohawk Lake Stormwater Management Study – DRAFT.
- Grand River Conservation Authority. Grand River Information Network (GRIN). <https://data.grandriver.ca>.
- J.C. Roff; C.W. Emerson; J. Dorey; J. Bisset. 1983. Summer 1983 Study of Mohawk Lake: Proposal for Restoration.
- Ministry of Natural Resources and Forestry. 2015. Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E.
- Ministry of Tourism, Culture and Sport. 2019. Ontario Archaeological Sites Database, PastPort.
- M.M. Dillon Limited. 1972. Mohawk Lake Study, Brantford Ontario. Prepared for Grand River Conservation Authority.
- Ecological Services for Planning. 1994. Mohawk Lake (Brantford) Sediment and Water Quality Investigation
- Weslake Inc. 1999. Mohawk Lake Revitalization Plan. Hamilton: Weslake Inc.



Wood Environment & Infrastructure Solutions. 2019. Stage 1 Archaeological Assessment - Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study, formally Part of Lots 1, 2, 5, 19, 25, 26, and Lovejoy Lot, Mohawk Parsonage Lot, School Lot, Grand River Navigation Co. Lot, Eagles Nest Tract, Smith Tract, Lots A and B, Concession 4, and the Town of Brantford, in the Geographic Township of Brantford, County of Brant, Now in the City of Brantford, Ontario.

Wood Environment & Infrastructure Solutions. 2020a. Mohawk Lake and Mohawk Canal Subwatershed Stormwater Plan.

Wood Environment & Infrastructure Solutions. 2020b. Master Plan Report. Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study.



APPENDIX A: Federal Environmental
Assessment Determination



Canadian Environmental
Assessment Agency

Ontario Region
55 York Street,
Suite 600
Toronto ON M5J 1R7

Agence canadienne
d'évaluation environnementale

Région de l'Ontario
55, rue York,
bureau 600
Toronto ON M5J 1R7

March 20, 2019

Sent by email

Bob Felker
Senior Environmental Planner
Wood, Environment and Infrastructure Solutions
bob.felker@woodplc.com

Dear Mr. Felker:

Re: Information on the *Canadian Environmental Assessment Act, 2012*

Thank you for your correspondence of February 22, 2019, regarding the Mohawk Lake and Mohawk Canal Clean Up and Rehabilitation Project.

The *Canadian Environmental Assessment Act, 2012* (CEAA 2012) focuses federal environmental reviews on projects that have the potential to cause significant adverse environmental effects in areas of federal jurisdiction and applies to physical activities described in the *Regulations Designating Physical Activities* (the Regulations). Based on the information provided, your project does not appear to be described in the Regulations. **Kindly review the requirements of CEAA 2012, including the Regulations.** Given the ongoing review of the federal environmental assessment process, if your project does not proceed immediately, please review your project against any future federal legislation and pursuant regulations to confirm applicability to your project.

If you believe the project is not subject to a federal environmental assessment, and do not submit a project description, we kindly request that you remove the Canadian Environmental Assessment Agency from your distribution list.

If you have questions, please get in touch with our office through the switchboard at 416-952-1576. The attachment that follows provides web links to useful legislation, regulation, and guidance documents.

Sincerely,

Anjala Puvananathan, Regional Director

Attachment – Useful Legislation, Regulation, and Guidance Documents



Attachment – Useful Legislation, Regulation, and Guidance Documents

For more information on the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), please access the following links on the Canadian Environmental Assessment Agency's (the Agency) website:

CEAA 2012

<https://www.canada.ca/en/environmental-assessment-agency/corporate/acts-regulations/legislation-regulations.html>

Regulations Designating Physical Activities, and Prescribed Information for a Description of a Designated Project Regulations

<https://www.canada.ca/en/environmental-assessment-agency/corporate/acts-regulations/legislation-regulations.html>

If your project is in a federally designated wildlife area or migratory bird sanctuary please check section 1 of the Regulations, which details the designated projects specific to those locations.

If it appears that CEAA 2012 may apply to your proposed project, you must provide the Agency with a description of the proposed project. Please see the link below to the Agency's guide to preparing a project description.

Guide to Preparing a Description of a Designated Project

<https://www.canada.ca/en/environmental-assessment-agency/services/policy-guidance/guide-preparing-description-designated-project-under-canadian-environmental-assessment-act-2012.html>

For information on the ongoing review of the federal environmental assessment process

<https://www.canada.ca/en/services/environment/conservation/assessments/environmental-reviews.html>



February 22, 2019

Canadian Environmental Assessment Agency – Ontario Region
55 York Street, 6th Floor
Toronto, ON M5J 1R7
Sent by email: CEAA.ontario.ACEE@ceaa-acee.gc.ca

Dear Sir or Madam:

**RE: Request for CEAA 2012 Environmental Assessment Determination
Mohawk Lake and Mohawk Canal Clean Up and Rehabilitation Project
*Functional Master Drainage and Restoration Study***

The City of Brantford (the City) is engaged in the Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project (the Project) with financial support from the Federal Economic Development Agency (FedDev) for Southern Ontario. As a component of this broader initiative the City is undertaking the subject Functional Master Drainage and Restoration Study to recommend sustainable solutions for rehabilitation and restoration of Mohawk Lake and Mohawk Canal.

A stipulation of the FedDev agreement is to confirm requirements under the *Canadian Environmental Assessment Act* (CEAA 2012) for the Project. To help support the Agency's determination we are attaching the study Notice of Commencement, which includes a map of the study area, and a description of the study process being undertaken to fulfil obligations under the *Ontario Environmental Assessment Act*.

As indicated in the Notice, the City has retained Wood Environment & Infrastructure Solutions (Wood) to complete a Municipal Class Environmental Assessment (Class EA) Schedule 'B process', to investigate how to improve the environmental quality of the lake and canal by managing stormwater runoff, providing better habitat for fish and wildlife and enhanced recreational opportunities. Anticipated deliverables of interest include:

- A Subwatershed Stormwater Plan focusing on runoff (quantity/quality) from the Mohawk Lake tributary's basin aimed at understanding the current water resources of Mohawk Lake and Canal, as well as future watershed system (based on intensified land uses)
- A Class EA Report to be carried out in accordance with provincial legislative requirements
- A Mohawk Lake and Canal Master Plan defining the management and restoration activities associated with environmental protection needs and related future park use, and,
- A Community and Agency Engagement program.

At this time we are requesting clarification as to whether or not the Functional Master Drainage and Restoration Study component of the Mohawk Lake and Mohawk Canal Clean Up and Rehabilitation Project is subject to CEAA. Should additional information be required to assist in this regard, we would be pleased to provide.

Sincerely yours,



Nahed Ghbn, P.Eng.

Senior Project Manager
City of Brantford

Tel: 519-759-4150 ext. 5262

Email: NGhbn@brantford.ca



Bob Felker

Senior Environmental Planner

Wood, Environment and Infrastructure Solutions

Tel: (519) 650-7139

Email: bob.felker@woodplc.com

c.c.: Ron Scheckenberger, Wood, Mary Kelly, Wood, Matt Senior, Wood

Encl: Notice of Commencement



NOTICE OF COMMENCEMENT:

Municipal Class Environmental Assessment

Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project

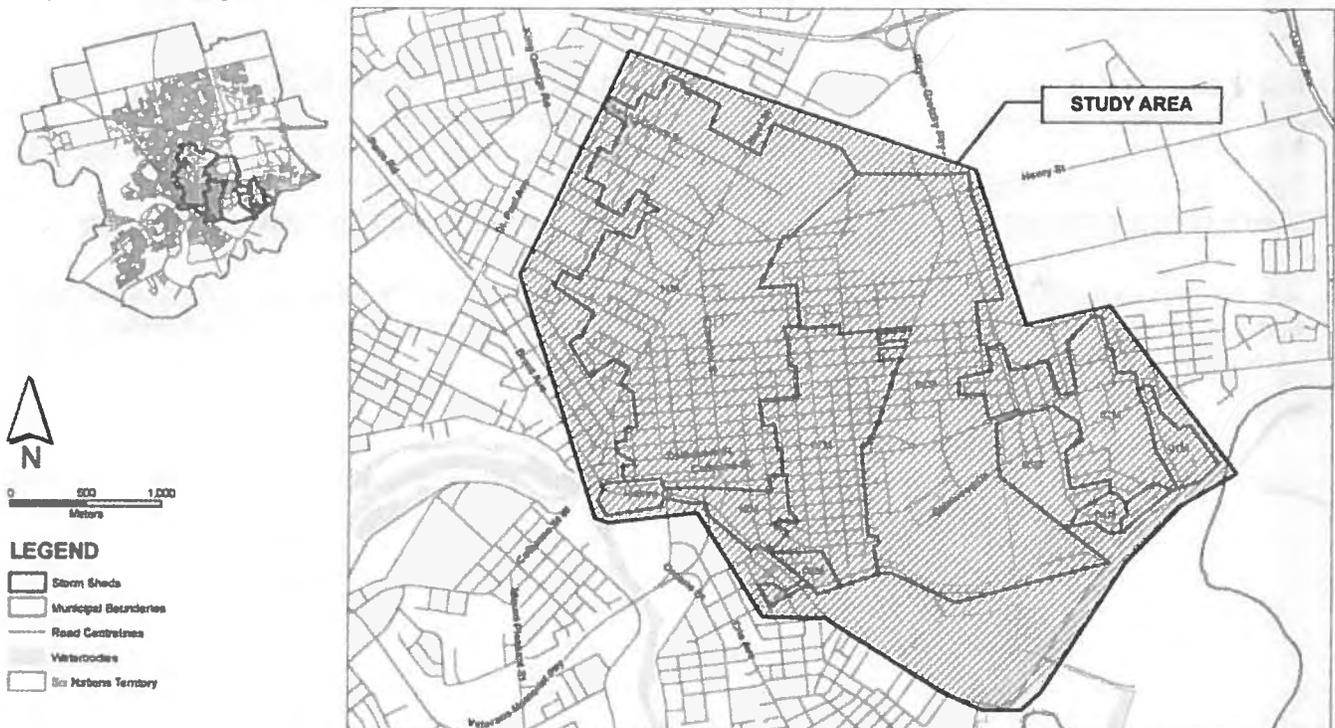
Functional Master Drainage and Restoration Study

The Project

The City of Brantford has initiated the Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project with financial support from the Federal Government. This project will identify rehabilitation measures needed to address accumulated sediments and provide opportunities / recommendations to improve the environmental quality of Mohawk Lake and Mohawk Canal, and protect and enhance its future in our community.

Mohawk Lake is located in an urban area with a drainage area of 839 hectares. The land use within the lake's drainage area is primarily residential and commercial with some industrial properties. Over time, the lake and canal's sediment and water quality have been impacted by stormwater and industrial discharge. Industrial discharges have been discontinued and cleanup efforts have been completed on brownfield lands upstream and adjacent to the canal, however the lake and canal are still negatively impacted. In 2018, the City initiated a Characterization Study documenting the existing physical and environmental conditions of the drainage network, lake, and canal for the study area shown in Figure 1.

Figure 1: Study Area



Environmental Assessment (EA)

The Study is being carried out in accordance with the requirements necessary to receive federal funding and the Ontario Municipal Class Environmental Assessment (Class EA; Schedule "B"), as outlined in the Municipal Engineers Association's Municipal Class Environmental Assessment (October 2000, as amended in 2007, 2011 & 2015). This is an approved process under the Ontario *Environmental Assessment Act*.

The findings from the Characterization Study are expected in early 2019 and will provide background information that will inform various components of the Class EA. Under the Class EA, the City has commenced the investigation of how to improve the environmental quality in the lake and canal by managing stormwater runoff, providing better habitat for fish and wildlife and enhanced recreational opportunities. Anticipated deliverables of interest include:

- A Subwatershed Stormwater Plan focusing on runoff (quantity/quality) from the Mohawk Lake tributary's basin aimed at understanding the current water resources of Mohawk Lake and Canal, as well as future watershed system (based on intensified land uses)
- A Class EA Report to be carried out in accordance with provincial legislative requirements
- A Mohawk Lake and Canal Master Plan defining the management and restoration activities associated with environmental protection needs and related future park use.

Community Engagement

Engagement with the community, agencies and Indigenous groups is considered a key part of any EA. Several opportunities for engagement will occur throughout the Class EA. Public meetings will be held to discuss issues and opportunities, including alternative solutions, evaluation criteria, environmental impacts and mitigation measures. The dates and details of these opportunities will be advertised as the Class EA progresses. You are encouraged to provide your comments to inform Study planning.

To submit a comment or question, or receive additional information related to the Class EA, or have accessibility requirements to participate in this Study, please contact one of the representatives below:

Nahed Ghbn P.Eng.
Senior Project Manager
City of Brantford
Tel: 519-759-4150 ext. 5262
Email: NGhbn@brantford.ca

Ron Scheckenberger M.Eng., P.Eng.
Principal Consultant
Wood, Environment & Infrastructure Solutions
Tel: 905-335-2353
Email: ron.scheckenberger@woodplc.com

All information collected will be used in accordance with the Freedom of Information and Protection of Privacy Act, RSO, 1990, c.F.31. With the exception of personal information, all comments will become part of the public record.

Shams, Aniq

From: Felker, Bob
Sent: Wednesday, April 3, 2019 10:53 AM
To: Nahed Ghbn
Cc: Scheckenberger, Ron; Kelly, Mary K; Senior, Matt; Mcandrew, Louise; Shams, Aniq; Berenkey, Andrea
Subject: FW: EMAIL - Brantford, Mohawk Lake and Mohawk Canal Clean Up - 2019-03-20
Attachments: letter - CEAA to Felker - 2019-03-20.pdf

Hi Nahed, The Canadian Environmental Assessment Agency, through their Ontario Region office, has indicated that the Mohawk Lake and Mohawk Canal Clean Up project "does not appear" to be described in the regulations designating Physical Activities under the Canadian Environmental Assessment Act (2012).

Upon your review of the letter we can discuss how best to proceed given this determination.

Bob

Bob Felker

O: 519-650-7139

M: 226-751-3854

From: Ontario Region / Region d'Ontario (CEAA/ACEE) [mailto:ceaa.ontarioregion-regiondontario.acee@canada.ca]
Sent: March-20-19 2:25 PM
To: Felker, Bob <bob.felker@woodplc.com>
Subject: EMAIL - Brantford, Mohawk Lake and Mohawk Canal Clean Up - 2019-03-20

Dear Mr. Felker,

Please find attached a letter regarding the above mentioned project.

Sincerely,

Jeremy Schultz

Jeremy Schultz

Administrative Officer, Ontario Region
Canadian Environmental Assessment Agency / Government of Canada
Jeremy.Schultz@canada.ca / Tel: 416-952-1576

Agente administrative, Bureau régional de l'Ontario
Agence canadienne d'évaluation environnementale / Gouvernement du Canada
Jeremy.Schultz@canada.ca / Tél: 416-952-1576

APPENDIX B: Consultation Materials



Mailing List



AGENCY CONTACT LIST FOR E.A.'s
(Updated as of **March, 2019**)

CONSULTANTS TO MAIL:

SECTION AProvincial Agencies

SECTION B.....Federal Agencies

SECTION C.....City of Brantford Council
(Email)

SECTION D.....City Staff **(Email)**

SECTION E.....Municipalities

SECTION F.....Other Agencies

SECTION G.....Utilities



**AGENCY CONTACT LIST FOR E.A.'s
(as of March, 2019)**

Agency Name		Contact Person
A. Provincial Agencies		
1	Ministry of the Environment, Conservation and Parks Ellen Fairclough Bldg 119 King Street West, 12 th Floor Hamilton, Ontario L8P 4Y7 Tel: 905-521-7864 Fax: 905-521-7820	Ms. Barbara Slattery Environmental Resource Planner & EA Coordinator Email: barbara.slattery@ontario.ca * only Notice of Completion
4	Ministry of Natural Resources and Forestry Guelph District Office 1 Stone Road West Guelph, Ontario N1G 4Y2 Tel: 519-826-4931 Fax: 519-826-4929	Ms. Tammy Verhaeghe District Manager Email: tammy.verhaeghe@ontario.ca Cc: David Marriott, District Planner
5	Ministry of Tourism, Culture and Sport 401 Bay St. Suite 1700 Toronto, Ontario M7A 0A7	James Hamilton Manager of Heritage Program Unit Email: james.hamilton@ontario.ca James Tel: 416-212-7505 Laura Hatcher Heritage Planner, Cultural Services Email: laura.e.hatcher@ontario.ca Laura Tel: 416-314-3108
6	Ministry of Tourism, Culture & Sport 900 Highbury Avenue London, Ontario N5Y 1A4 Tel: 519- 675-6898 Fax: 519-675-7777	Shari Prowse Archaeology Review Officer Email: shari.prowse@ontario.ca
7	Ministry of Transportation 659 Exeter Road London, Ontario N6E 1L3 Tel: 519-873-4100	Neil Zohorsky Regional Director, West Region Email: neil.zohorsky@ontario.ca
9	Canadian Environmental Assessment Agency Ontario Region 55 York Street, 6 th Floor Toronto, Ontario M4T 1M2 Tel: 416-952-1576	Anjala Puvananathan Director Tel: 416-952-1575 Email: anjala.puvananathan@canada.ca



Agency Name		Contact Person
Fax: 416-952-1573		
10	Ministry of Municipal Affairs and Housing Western Municipal Services Office 659 Exeter Rd 2nd Floor London Ontario N6E 1L3 Tel: 519-873-4020 Fax: 416-585-6470	Ian Kerr Regional Director Email: ian.kerr@ontario.ca
11	Ministry of Municipal Affairs and Housing 777 Bay Street, 14 th Floor Housing) 16 th Floor Municipal Services) Toronto, On M5G 2E5	Marcia Wallace Assistant Deputy Minister Municipal Services Division Tel: 416-585-6427
12	Ministry of Aboriginal Affairs McMurtry-Scott Building 720 Bay Street, 11th Floor Toronto, ON M7A 2S9 Tel: (416) 326-2220 Fax: (416) 326-4007	Counsel
13	Ministry of Indigenous Affairs 400 Bloor St E Suite 160 Toronto, Ontario M7A 2E6 (416) 327-4464	Hon. Greg Rickford Minister
14	Ministry of the Attorney General – Aboriginal Legal Issues Office Crown Law Office-Civil, 720 Bay Street, 8 th Floor Toronto, Ontario M5G 2K1 Tel: (416) 326-4008 Fax: (416) 326-4181	Michael Doi Director of Legal Services (416) 590 7149 Email: michael.doi@fsco.gov.on.ca
B Federal Agencies		
1	Innovation, Science and Economic Development Canada C.D. Howe Building 235 Queen Street Ottawa, Ontario K1A 0H5	Hon. Navdeep Bains Minister of Innovation, Science and Economic Development Email: ised.minister-ministre.isde@canada.ca



Canada
Telephone (Ottawa): 613-954-5031
Fax: 343-291-1913

3	Indigenous and Northern Affairs Canada 10 Wellington, North Tower Gatineau, QC K1A 0H4 Tel: 1-800-567-9604 Fax: 1-866-817-3977	Hon. Carolyn Bennett Minister Email: minister@aadnc-aandc.gc.ca
---	--	---

4	Indigenous Services Canada 25 St. Clair Avenue East, Toronto, Ontario M4T 1M2	Hon. Jane Philpott Minister of Indigenous Services
---	--	---

5	Fisheries and Oceans Canada Central and Arctic Region 520 Exmouth Street Sarnia, ON, N7T 8B1 Toll-free: 1-866-290-3731 Telephone: 519-383-1809 Fax: 519-464-5128 Email: info@dfo-mpo.gc.ca	Regional Manager
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C. City of Brantford Council (Email)

1	City of Brantford 100 Wellington Square P.O. Box 818 Brantford, Ontario N3T 5R7 Tel: 519-759-4150	Kevin Davis, Mayor Email: kdavis@brantford.ca Cc: RMatthews-Osmond@brantford.ca
---	--	---

2	City of Brantford 100 Wellington Square P.O. Box 818 Brantford, Ontario N3T 5R7 Tel: 519-759-4150 Fax: 519-759-7840	City Councillors: Ward 1: Jan Vander Stelt Email: janvanderstelt@brantford.ca Ward 1: Rick Weaver Email: RickWeaver@brantford.ca Ward 2: John Sless Email: JohnSless@brantford.ca Ward 2: John Utley Email: JohnUtley@brantford.ca Ward 3: Dan McCreary Email: DanMcCreary@brantford.ca Ward 3: Greg Martin Email: GregMartin@brantford.ca Ward 4: Richard Carpenter
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Email: RichardCarpenter@brantford.ca
Ward 4: Cheryl Antonski
Email: CherylAntonski@brantford.ca
Ward 5: Brian Van Tilborg
Email: BrianVanTilborg@brantford.ca
Ward 5: Joshua Wall
Email: joshuawall@brantford.ca

D. City Staff (Email)

- | | | |
|---|---|--|
| 1 | City of Brantford
100 Wellington Square
P.O. Box 818
Brantford, Ontario
N3T 5R7
Tel: (519) 759-4150 | Darryl Lee, Chief Administrative Officer
Email: DLee@brantford.ca |
| 2 | City of Brantford
100 Wellington Square
P.O. Box 818
Brantford, Ontario
N3T 5R7
Tel: (519) 759-4150 | Russ Thomson, Director Building Services, Chief Building Officer
Email: RThomson@brantford.ca |
| 3 | City of Brantford
City Clerk's Office
100 Wellington Square
P.O. Box 818
Brantford, Ontario
N3T 5R7
Tel: (519) 759-4150 | Charlene Touzel,
City Clerk & Director of Clerk Services
Email: ctouzel@brantford.ca |
| 4 | City of Brantford
100 Wellington Square
P.O. Box 818
Brantford, Ontario
N3T 5R7
Tel: (519) 759-4150 | Beth Goodger
General Manager Public Works
Email: BGoodger@brantford.ca |
| 5 | City of Brantford
100 Wellington Square
P.O. Box 818
Brantford, Ontario
N3T 5R7
Tel: (519) 759-4150 | Paul Moore
General Manager Community Development
Email: pmoore@brantford.ca |



6	City of Brantford 100 Wellington Square P.O. Box 818 Brantford, Ontario N3T 5R7 Tel: (519) 759-4150	Lucy Hives Director of Planning Email: LHives@brantford.ca
7	City of Brantford 100 Wellington Square P.O. Box 818 Brantford, Ontario N3T 5R7 Tel: (519) 759-4150	Catherine Brubacher General Manger Corporate Services/City Treasurer Email: CBrubacher@brantford
8	City of Brantford 220 Colborne Street Brantford, Ontario N3T 2H1	Jo Atanas General Manager Health & Human Services Email: JAtanas@brantford.ca
9	City of Brantford 100 Wellington Square P.O. Box 818 Brantford, Ontario N3T 5R7 Tel: (519) 759-4150	Sandy Jackson General Manager Community Progrms, Parks & Recreation Email: SJackson@brantford.ca
10	City of Brantford 100 Wellington Square P.O. Box 818 Brantford, Ontario N3T 5R7 Tel: (519) 759-4150	Russel Loukes Director of Engineering Services Email: RLoukes@brantford.ca
11	City of Brantford 100 Wellington Square P.O. Box 818 Brantford, Ontario N3T 5R7 Tel: (519) 759-4150	Wendy Teufel Manager Design and Construction Email: wteufel@brantford.ca



12	City of Brantford 100 Wellington Square P.O. Box 818 Brantford, Ontario N3T 5R7 Tel: (519) 759-4150	Daniel Kreze Manager of Survey Email: DKreze@brantford.ca
13	City of Brantford 180 Greenwich Street Brantford, Ontario N3T 5R7	Selvi Kongara Director Environmental Services Email: SKongara@brantford.ca
14	City of Brantford 10 Earl Avenue Brantford, Ontario N3T 5R7 Tel: (519) 759-4150	Nello Violin Director of Operational Services Email: nviolin@brantford.ca
15	City of Brantford 100 Wellington Square P.O. Box 818 Brantford, Ontario N3T 5R7 Tel: (519) 759-4150	Geoff Linshoten Director Facilities & Asset Management Email: GLinschoten@brantford
16	City of Brantford Parks and Recreation 1 Sherwood Drive Brantford, Ontario N3T 1N3	Brian Hughes Director of Parks Services Email: BHughes@brantford.ca Vicki Armitage, Manager Parks Design Email: varmitage@brantford.ca
17	City of Brantford 100 Wellington Square P.O. Box 818 Brantford, Ontario N3T 5R7 Tel: (519) 759-4150	Maria Visocchi Director of Communications & Community Engagement Email: MVisocchi@brantford.ca



18	City of Brantford 100 Wellington Square P.O. Box 818 Brantford, Ontario N3T 5R7 Tel: (519) 759-4150	Heidi DeVries Director Legal & Real Estate Services Email: HDeVries@brantford.ca
19	City of Brantford 100 Wellington Square P.O. Box 818 Brantford, Ontario N3T 5R7 Tel: (519) 759-4150	Tara Gudgeon Manager of Continuous Improvement Email: TGudgeon@brantford.ca
20	City of Brantford 100 Wellington Square P.O. Box 818 Brantford, Ontario N3T 5R7 Tel: (519) 759-4150	Mike Bradley Director of Fleet and Transit Services Email: mbradley@brantford.ca
21	Brantford Police Services 344 Elgin Street P.O. Box 1116 Brantford, Ontario N3T 5T3 Tel: (519) 756-7050 Or: (519) 756-0113 bps02@police.brantford.on.ca	Geoff Nelson, Chief of Police
22	Brantford Fire Department 60 Clarence Street, P.O. Box 61 Brantford, Ontario N3T 5M3	Shane Caskanette, Fire Chief Email: SCaskanette@brantford.ca
23	Brantford Heritage Committee City of Brantford 100 Wellington Square P.O. Box 818 Brantford, Ontario N3T 5R7 Tel: (519) 759-4150	Victoria Grohn, Policy Planner Email: vgrohn@brantford.ca Chris Gauthier, Deputy Clerk/Manager Email: cgauthier@brantford.ca



24 Environmental Policy Advisory Committee Emma Vokes, Legislative Assistant
City of Brantford Email: evokes@brantford.ca
100 Wellington Square
P.O. Box 818
Brantford, Ontario
N3T 5R7
Tel: (519) 759-4150

E. Municipalities

1 Brant County Health Unit Dr. Malcolm Lock
194 Terrace Hill Street Medical Officer of Health
Brantford, Ontario Ext. 221
N3R 1G7
Tel: (519) 753-4937
Fax: (519) 753-5942

2 ~~Ambulance Services~~ Charles Longway, Director
~~303 Henry Street~~ Email: charles.longway@brant.ca
Brantford, Ontario
~~N3T 5S7~~
Tel: ~~(519) 756-4570~~

3 County of Brant The Clerk
26 Park Avenue
PO Box 160
Burford, Ontario
N0E 1A0
Phone: (519)449-2451

F. Other Agencies

1 Grand River Conservation Authority Jan Ivey
400 Clyde Road Subwatershed Planning Coordinator
P.O. Box 729 Engineering Division.
Cambridge, Ontario Email: jivey@grandriver.ca
N1R 5W6
Tel: 519-621-2763 x.2325
Fax: 519-621-4844

2 Grand Erie District School Board Brenda Blancher
349 Erie Avenue Director of Education
Brantford, Ontario
N3T 5V3
Tel: 519-756-6301
Fax: 519-756-9181



3	Brant Haldimand Norfolk Catholic District School Board P.O. Box 217 322 Fairview Drive Brantford, Ontario N3T 5M8 Tel: (519) 756-6369 Fax: (519) 756-9913 Email: info@bhncdsb.ca	Chris N. Roehrig, Director of Education Office Phone: (519) 756-6505 Email: directorsoffice@bhncdsb.ca
4	Brantford Christian School 7 Calvin Street Brantford, Ontario N3S 3E4	Justin DeMoor, Principal
5	Six Nations of the Grand River 1695 Chiefswood Road P.O. Box 5000 Ohsweken, Ontario NOA 1M0 Tel: 519-445-2201	Chief Ava Hill
6	Six Nations Lands and Resources 2498 Chiefswood Road P.O. Box 5000 Ohsweken, Ontario NOA 1M0 Tel: 519-753-0665	Lonny Bomberry Director of Lands and Resources Department
7	Six Nations Wildlife Management Office 1721 Chiefswood Road Iroquois Village Plaza Unit 109 P.O. Box 5000 Oshweken, Ontario NOA 1M0 Tel: 519 445-0330 Fax: 519-753-3449	Mr. Paul General Wildlife Manager
8	Mississaugas of the Credit Department of Consultation & Accommodation 4065 Hwy 6 Hagersville, Ontario NOA 1H0 Tel: 905-768-4260 Fax: 905-768-9751	Ms. Fawn Sault Consultation Manager Email: fawn.sault@newcreditfirstnation.com



9	Mohawk Lake Working Group 122 Charing Cross St., Suite #1 Brantford, Ontario N3R 2J1	Joy O'Donnell BA, FP Grand Financial Planning Email: joy@grandfinancial.ca
10	East Ward Neighbourhood Association	Maegan Rutten City Staff: Neighbourhood Programming Coordinator
11	Grand River Environmental Clean Up	Tracey Bucci Group Contact person
12	Canadian Military Heritage Museum	Bob Ion
13	Eagle Place Neighbourhood Association	Maegan Rutten City Staff: Neighbourhood Programming Coordinator

G. Utilities

1.	Bell Canada P.O. Box 938 86 Market Street Brantford, Ontario N3T 5S5	Christine Telfer
2.	Rogers Cable 85 Grand Crest Place P.O. Box 488 Kitchener, Ontario N2G 4A8 Tel: (519) 894-8138 Fax: (519) 893-6463	Richard Bolliger Municipal & Utility Relations
3.	Union Gas P.O. Box 340 603 Kumpf Drive Waterloo, Ontario N2J 4A4	John Stauffer
4.	Brantford Hydro Inc. 44 King Street, Suite 207 Brantford, ON N3T 3C7 Tel: (226) 493-1043	James Nagle, Chief Operating Officer
5.	Brantford Power Inc. 84 Market Street Brantford, Ontario N3T 5N8 Tel: (519) 751-3522	Paul Kwasnik, Chief Executive Officer



6	CN Rail 1 Administration Road Concord, Ontario L4K 1B9 Tel: (905) 760-5007 (number kept ringing and no answering machine) Fax: (905) 760-5010	Manager, Community Planning & Real Estate
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Community Needs and Visioning



MOHAWK LAKE WORKING GROUP

Agenda

Friday, April 5, 2019 – 11:00 a.m.

Charlie Ward Room located at City Hall, 100 Wellington Square

- 1.0 Opening Remarks and Review of Agenda –
 - 2.0 Minutes of the Previous Meeting – March 28, 2018
 - 3.0 Business Arising from Previous Minutes
 - 4.0 City of Brantford Technical Report – Nahed Ghbn
 - 4.1 Mohawk Lake Project Update
 - 5.0 Mohawk Lake District Plan – Tara Tran
 - 5.1 Project Update
 - 6.0 Governance & Administration – Review & Update.
 - 7.0 Strategic Planning Committee Report –
 - 7.1 Marketing Plan – On Going Community Outreach Projects
 - 7.1.1 Children’s Water Festival – New Display Required
 - 7.1.2 Yellow Fish Road
 - 7.1.3 Service Clubs and Organizations Presentations
 - 7.1.4 Public Meetings
 - 8.0 Mohawk Lake Working Group’s Mandate for 2019 – Next Steps
 - 9.0 Date of Next Meeting –
- Adjournment

DATE: June 1, 2015

REPORT NO. CD2015-118

TO: Mayor Chris Friel & Members of City Council

FROM: Gregory Dworak, General Manager
Community Services

1.0 TYPE OF REPORT

CONSENT ITEM []
ITEM FOR CONSIDERATION [X]

2.0 TOPIC:

**Mohawk Lake Visioning Workshop Results [Financial Impact – None]
(CD2015-118)**

3.0 RECOMMENDATION

- A. THAT the results of the Mohawk Lake Visioning Workshops that were held on May 5th, May 7th, and May 14th, 2015, and as outlined in Staff Report CD2015-118, BE RECEIVED; and
- B. THAT Staff BE AUTHORIZED to seek out and secure financial assistance for the Mohawk Lake Project from other sources including the Federal and Provincial Governments.

4.0 PURPOSE

The purpose of this report is to provide Council with a summary of the ideas that were heard by the Mohawk Lake Working Group at the three workshops held on May 5th, 7th and 14th, 2015. This report will outline the workshop program, the ideas and comments that were shared from the 64 people who attended the workshops, the 38 people who responded to the online survey, and the 148 people who “Like” the Mohawk Lake Project Facebook page. This report will also discuss the next steps for how the workshop results will be used to develop a vision statement and proposed work plans to address the clean-up of Mohawk Lake, Canal and the associated waterways.

In accordance with the City's Procedural Bylaw, this report is considered urgent and is coming directly to City Council for consideration to provide staff immediate authority to seek and secure funding for the Mohawk Lake Project.

5.0 BACKGROUND

In December 2014, the Mohawk Lake Working Group was formed in response to community interest in re-examining the revitalization of Mohawk Lake, Mohawk Canal and its associated waterways. The Mohawk Lake Working Group is comprised of the ex-officio members MP Phil McColman, MPP Dave Levac, City of Brantford Mayor Friel, County of Brant Mayor Eddy and Six Nations of the Grand River Chief Hill. Councillors from City of Brantford and Six Nations sit on the Working Group, as well as staff members from the City of Brantford, Six Nations, and the Grand River Conservation Authority. Citizen-members representing various agencies and groups are also members of the Working Group.

The Mission Statement of the Mohawk Lake Working Group is:

Advocate for the environmental and historical restoration of Mohawk Lake in a collaborative manner with the City of Brantford and the community. We will explore all options to enhance, restore, create and sustain recreational opportunities within a valued ecosystem.

Through its Strategic Planning Committee, the Mohawk Lake Working Group decided to undertake a public consultation process to gain public input to assist in the development of a vision for the Mohawk Lake Project. This vision would provide the basis for the next steps including any necessary background studies and implementation plans for the revitalization of Mohawk Lake.

6.0 CORPORATE POLICY CONTEXT

This initiative would meet the goals of the City's Community Strategic Plan. In particular, the following Goals are applicable:

Goal 2: High Quality of Life and Caring for All Citizens and the long-term desired outcomes that:

- Brantford citizens and visitors will enjoy a full range of well-supported and maintained arts, heritage, culture, sports and recreational facilities and programs.
- Brantford will be recognized as a safe and healthy community – one that promotes and enables the well-being of its citizens, and supports access of all citizens to a full range of health and community services.

Goal 3: Managed Growth and Environmental Leadership and the long-term desired outcomes that:

- Brantford's built heritage will be protected and enhanced.
- Brantford will be recognized for its environmental stewardship and protection of its natural assets.

7.0 INPUT FROM OTHER SOURCES

Input was received from 64 participants at the workshops and 38 respondents to the online survey and the 148 people who “Like” the Mohawk Lake Project Facebook page.

8.0 ANALYSIS

8.1 Visioning Workshop Program

The purpose of the workshops was to hear from the community about two aspects related to the revitalization of Mohawk Lake:

- What does the community value about Mohawk Lake from the past and present and what existing features are important; and
- What is the vision for Mohawk Lake twenty (20) years from now and what should be maintained, improved or added to meet that vision?

The workshops were held over three evenings, at three separate locations to help attract and enable a wide range of participants. The turnout at each of the workshops is listed below. A total of 64 people attended the workshops.

May 5, 2015	Mohawk Lake Pavilion	29 people
May 7, 2015	Woodlands Cultural Centre	27 people
May 14, 2015	Six Nations Tourism Centre	8 people

The workshop program was designed by John Hall, a professional planner and volunteer on the Mohawk Lake Working Group, and by Pam Hubbard, a graphic facilitator and professional planner retained to record the workshop results. At each of the workshops, the participants were encouraged to write their ideas and comments down in a workbook, as well as participate in a facilitated roundtable discussion moderated by volunteer facilitators. After each question, the ideas were shared among the entire group and graphically summarized by Ms. Hubbard. The graphic results of each of the workshops are presented in Section 8.2 of this Staff Report.

An online survey was also developed and shared through the Mohawk Lake Project website, www.cleanthelake.ca. The survey was available for approximately 4 weeks. A total of 38 people responded to the survey. The survey is a duplication of some of the survey questions that were originally released in 1994. The Mohawk Lake Working Group chose to re-release the same survey questions to compare today’s results with those collected in 1994. The results of the recent survey are shared in Section 8.2 of this Staff Report.

8.2 Workshop Results

8.2.1 What Does the Community Value About Mohawk Lake

The workshop participants had many memories and experiences, both past and present, about Mohawk Lake and Mohawk Park, including the following:

- Many recalled the diverse wildlife that occupied the area in the past;
- Many had participated in a variety of recreational activities, such as canoeing, boating, swimming, and fishing in Mohawk Lake, as well as ice skating on the Lake;
- Several people said they attended dances and concerts at Mohawk Park, as well as picnicked and walked along the trails in the Park;
- In the past, a few people recalled getting to and from the area on the trolley that used to run from Mohawk Park to Downtown;
- Many people fondly remembered Mohawk Park and Lake as a family gathering space. For others, it was a “natural playground” for children in the neighbourhood; and
- In addition to personal experiences, many community members also emphasized the valuable history of both Mohawk Lake and Canal and the significant role these features played in Brantford’s industrial and social history. In particular, the Alfred Watts former hydro-electric power generation station was highlighted as a valuable asset to Brantford’s heritage.

These memories and experiences demonstrated that the workshop participants valued the park as a green space in the community where families and people of all ages could meet and enjoy the natural environment and recreational activities.

These ideas are represented in the following Figures 1, 2 and 3, completed by Pam Hubbard at the workshops:

Figure 1: Sharing Knowledge and Values (May 5, 2015)

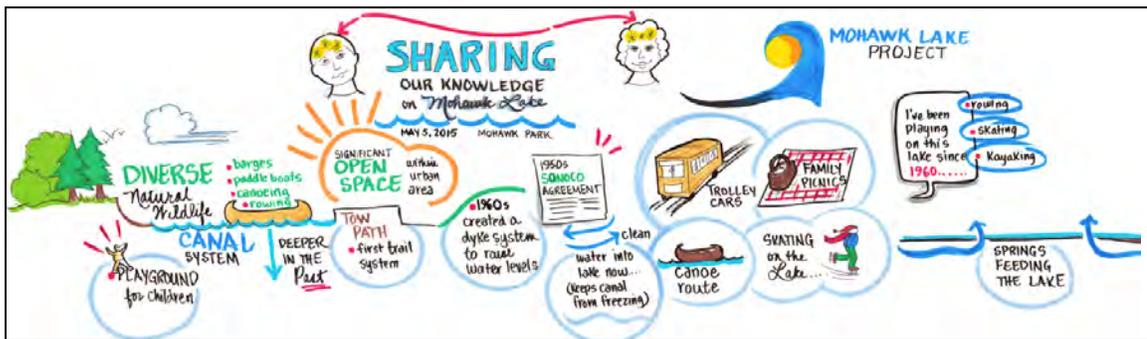


Figure 2: Sharing Knowledge and Values (May 7, 2015)



Figure 3: Sharing Knowledge and Values (May 14, 2015)



8.2.2 What are the Hopes and Fears of the Community

During the workshop community members were asked to release their fears about the project so that they could instead focus on opportunities and visioning. In addition to this, the participants were also encouraged to write down their hopes. The “Our Hopes and Our Fears” charts are available in **Appendix “A”** of this Staff Report.

Some of the common fears that people had were:

- The impact of a possible BSAR route through the area;
- Over-developing the Lake and Park with recreational and tourism amenities that will impact the area’s natural setting;
- The expenses to be spent on the project’s design, especially if the plan is not implemented; and
- Making Mohawk Lake and Canal worse off by disturbing the contaminants that are held in the sediments.

Some of the common hopes that people had were:

- Reconciliation and collaboration with the Six Nations community through this project;
- Using the park for education, recreation, festivals and events;
- An all-season lake and park; and
- A vibrant green space for all ages and people in Brantford.

8.2.3 What is the Vision for Mohawk Lake 20 Years from Now

The primary objective of the workshops was to hear feedback and ideas to help inform a vision for Mohawk Lake, the Canal and the associated waterways. The participants of the workshop were asked to share their vision of Mohawk Lake twenty (20) years from now. A wide range of ideas were heard at the workshops, and which are summarized graphically in Figures 4, 5 and 6 of this Staff Report. Many participants expressed interest in enhancing and broadening recreational activities on the Lake, such as boating (with an emphasis on non-motorized boats), fishing, swimming and adding beaches. Other suggestions to enhance the area were implementing access to the water, improving the shoreline with native vegetation and more trees, particularly around the Canal section, and improving water quality.

At the workshops, the following over-arching statements were heard about the vision for Mohawk Lake and Canal:

- A kind of “Central Park” in Brantford for families and people of all ages to gather and meet;
- A major tourist attraction that is a place for festivals and events, a place for recreation, a place for romance, a place for children, “the place where everyone meets”;
- Change the reputation of the Lake to be known as a safe place and environmentally sound;
- Educational opportunities and research partnerships for school groups and post-secondary institutions and others about the natural environment and about the cultural history of the Canal, Six Nations, and Brantford’s industrial heritage;
- Restore or establish connections with the Grand River and with existing parks and trails; “re-connect people to the Lake”;
- Restore the natural environment, fish habitat, wildlife, and flora; and
- Establish Mohawk Lake as a place for residents of Brantford to have a “stay-cation” and a place which attracts people to visit and discover Brantford.

The Mohawk Lake Working Group also heard many broader comments that expressed the idea that improvement to Mohawk Lake and Canal and its waterways could be a “catalyst for rejuvenation” for the entire city that would be a major attraction to both Brantford residents and visitors. Furthermore, the Mohawk Lake, Canal, and Park could help connect various communities, such as the Eagle Place and Echo Place neighbourhoods as well as the Six Nations community.

The following Figures 4, 5 and 6 are a graphic summary of the ideas heard for the participants’ vision for Mohawk Lake.

8.3 Survey Results

An online survey was released as part of the public consultation program. The survey questions were a repeat of some of the questions used on a survey issued in 1994 as part of an earlier initiative to revitalize Mohawk Lake and Canal. The 1994 survey had 81 respondents. In 2015, 38 respondents answered the online survey. The following is a highlight of the results of both the 1994 and the 2015 survey to compare how the results have changed or stayed the same. A detailed summary of the survey results is available in **Appendix “B”**.

Question	1994 Results	2015 Results
Would you like Mohawk Lake water quality improved?	100% Yes	95% Yes 5% No
What level of water quality improvement would you like? High Quality (for sport fishing) Good Quality (for canoeing/sailing) Acceptable (for viewing)	27% High Quality	57% High
	67% Good Quality	37% Good
	6% Acceptable	3% Acceptable
	-	3% N/A
Would you like Mohawk Lake and Canal developed for recreations purposes?	100% Yes	89% Yes 11% No
What recreation activities would you like to participate in at Mohawk Lake and Canal? Top 3 choices were:	<ul style="list-style-type: none"> • Boating (including canoeing, paddle boats, sailing) • Fishing • Swimming 	<ul style="list-style-type: none"> • Canoeing • Walking/Hiking • Fishing
What facilities would enhance the Lake? Top 3 choices were:	<ul style="list-style-type: none"> • Beach • Wildlife Area • Skating Facility 	<ul style="list-style-type: none"> • Trails • Look-outs • Docks

The 2015 survey asked the following additional question: What are the barriers or constraints, if any, that prevent community members from visiting Mohawk Lake more often? Some of the common responses were:

- Senior citizens felt that the park was meant only for young children and there are no amenities or activities for seniors;
- There is not enough to do at the park or activities to attract people to the park;
- Difficult to access the water and no shoreline; and
- The perception that Mohawk Park is unsafe.

8.4 Next Steps

The Mohawk Lake Working Group will continue to summarize and review the results of the workshop and the surveys with the intention of developing a vision statement that reflects the feedback received from the community. The Working Group will also use this information to help guide the development of some preliminary work plans to achieve the vision statement.

A Staff Report in the Fall of 2015 will share the proposed vision statement of the Mohawk Lake Working Group and the preliminary work plans to implement the proposed vision.

9.0 FINANCIAL IMPLICATIONS

There are presently no further financial implications to proceeding with the development of a vision statement for Mohawk Lake. The Working Group and City staff continue to seek funding opportunities from other sources to assist in financing this project.

10.0 CONCLUSION

This Report summarizes the results of the Mohawk Lake visioning workshops held in May 2015. The Mohawk Lake Working Group heard many ideas from the community about how they value Mohawk Lake and what they envision for the future of Mohawk Lake in 20 years. The Mohawk Lake Working Group will develop a vision statement out of the workshop results and share this, as well as preliminary work plans to Council in the Fall of 2015.

Tara Tran, MCIP, RPP
Policy Planner
Community Services

Nicole Wilmot, MCIP, RPP
Manager of Policy Planning
Community Services

Paul Moore, MCIP, RPP
Director of Planning
Community Services

Gregory Dworak, MCIP, RPP
General Manager,
Community Services

In adopting this report, is a by-law or agreement required? If so, it should be referenced in the recommendation section.

By-law required	<input type="checkbox"/> yes	<input checked="" type="checkbox"/> no
Agreement(s) or other documents to be signed by Mayor and/or City Clerk	<input type="checkbox"/> yes	<input checked="" type="checkbox"/> no
Is the necessary by-law or agreement being sent concurrently to Council?	<input type="checkbox"/> yes	<input checked="" type="checkbox"/> no

cc: Geoff Linschoten, Director of Facilities and Asset Management

APPENDIX "A"
Our Hopes and Our Fears Charts

May 5, 2015 Our Hopes and Fears

Mohawk Lake

OUR HOPES

- That the lake will lose its public reputation as an unsafe waterspace for recreation, and be used again.
- Designate Mohawk lake & the Canal system, & all as "Cultural Heritage Landscape" under the Ontario Heritage Act.
- Eco destination for tourists & bird watchers
- Storm pond management new technology maintain
- Stop the storm water
- Conduit from the Grand River
- Substantial clean(er) clean water being produced by some companies into canal
- → a natural "swimming hole"
- → Vital + vibrant part of Brantford Socially + environmentally + even economically (via tourism)

OUR FEARS

- take over
- Remove green lake / park and build "space, lake, etc. condo."
- BSAR.
- Anything that disconnects Eco Price from Eagle Place, it all connects via Mohawk lake / Canal system.
- That more dredging will set back eco-system development in the lake bed. (i.e. existing life is in the top few inches of soil)
- → Costs \$ to enter park
- funding to do all this

Mohawk Lake

OUR HOPES

- Community Inclusion
- - accessibility right down to lake front
- ↑ Recreational Use = ↑ tourism to Brantford
- - water sports, tours - canoe/kayak
- - keeping of vital green spaces
- All "AGE-FRIENDLY ENVIRONMENT"
- - GREEN, SPACES + BOWLING FACILITIES
- TEACHING RENATURAL HABITAT

OUR FEARS

- spending \$ on fixing up then
- losing sight of plan + no plan for future or maintenance
- BSAR + Brawnfields - how will they effect Mohawk Lake
- NO BSAR!!!

May 7, 2015 Our Hopes and Fears

Mohawk Lake



OUR HOPES

First Nations
reconciliation
forums



OUR FEARS

- stirring up toxic chemicals, ie. herbicides, agent orange (RR)
- in the past used as an open sewer for industrial, chemical waste
- even though you may "filter" the lake water, these chemicals are still in the lake sediment

Mohawk Lake



OUR HOPES

RECREATION & EDUCATION
FAIRS & EVENTS

high school fishing Teams and Clubs

- OUT DOOR SWIMMING SAND BOTTOM LAKE
- the Southern Access Road finds a different Route. AND NOT CLOSE to MOHAWK PARK "NOISE"
- RAIL Route to GRENICH INDUSTRIAL AREA WILL BE ELIMINATED! IF CUTS THE AREA IN 2 AND DISRUPTS DOWN DOWN BRANTFORD
- WINTER-MOTO CROSS ON THE LAKE
 - LAKE HOCKEY TOURNAMENT



OUR FEARS

~~NO~~ BSAR near MOHAWK PARK & LAKE

- DISTURBING SILT COULD EXPOSE MORE CONTAMINANTS TO CAUSE MORE DAMAGE
- Will become an attractive that Mohawk Lake (a Park) will evolve into a "touristic" attraction or maybe high-tech activity centre, rather than a place of peace, serenity, + harmony with nature + wildlife + experiences for all to enjoy.
- TOO MUCH COMMERCIAL DEVELOPMENT
- CLOSE PROXIMITY to WASTE WATER TREATMENT PLANT
- OUT DOOR MUSIC VENUES "SMELL" the size LIKE "WOODSTOCK"

May 14, 2015 Our Hopes and Fears

Mohawk Lake

OUR HOPES

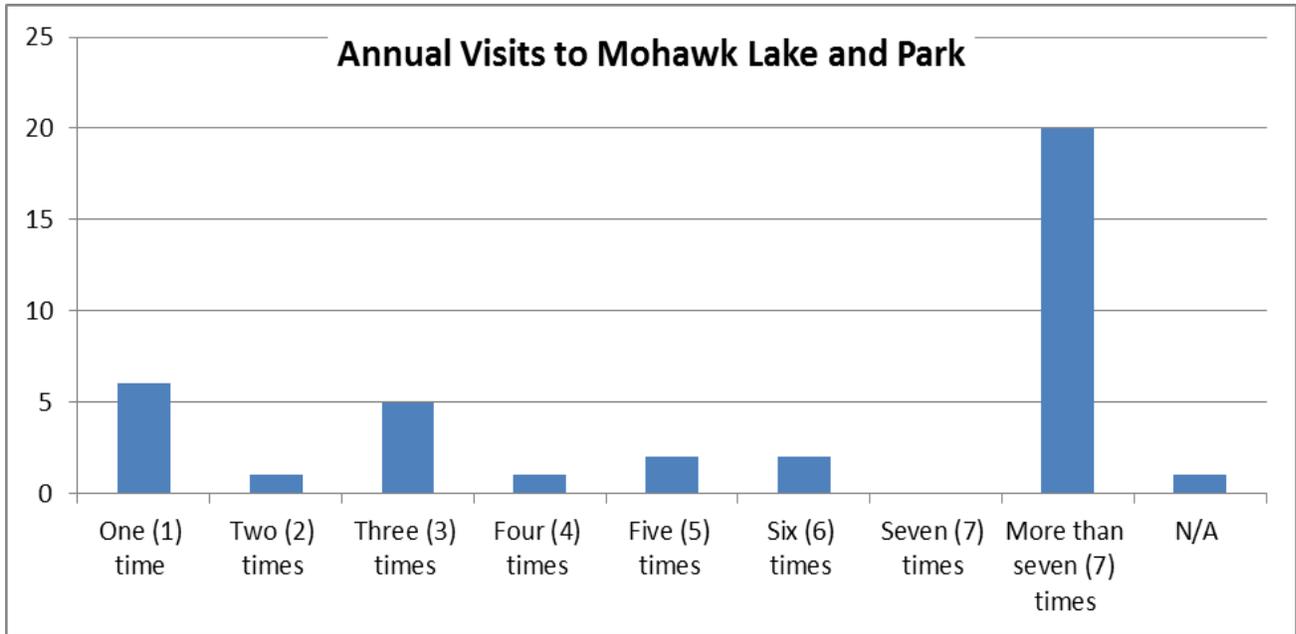
- Free Access for families
- Safe from traffic
- CLEAN
- NEW BANDSHELL ON SOUTH SHORE
- REMOVE GREENWICH STREET
- ADD REPAIRIAN ZONE & WALK/BIKWAY -

OUR FEARS

- Gasoline in water, from motor boats
- No WATERFRONT HOUSING OR DEVELOPMENT
- Not getting the funding to complete the project.
- It taking too long... causing community to lose interest.
- Don't over develop Mohawk Lake
- TO MUCH POLITICAL INVOLVEMENT

APPENDIX "B"
2015 Survey Results

2015 Survey 1



APPENDIX "B"
2015 Survey Results

2015 Survey 2

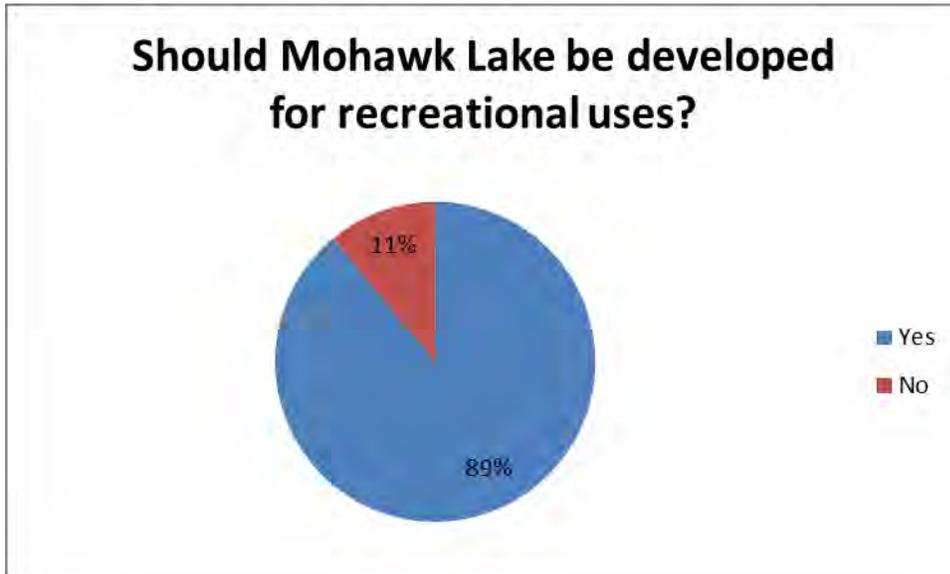


2015 Survey 3

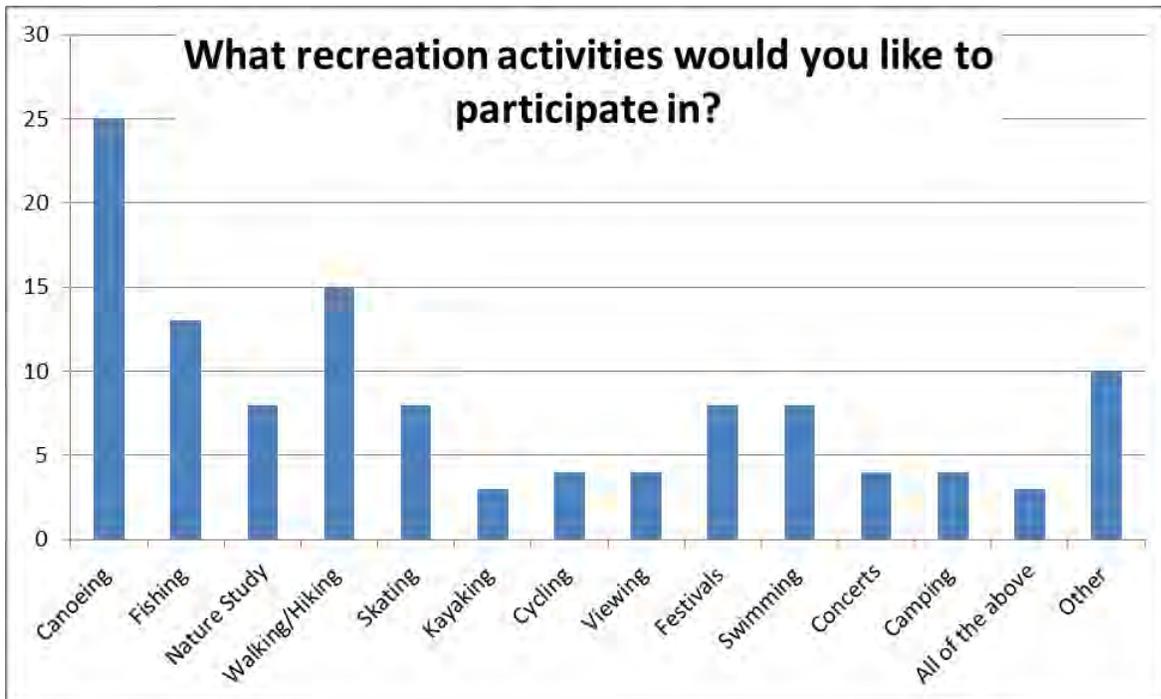


APPENDIX "B"
2015 Survey Results

2015 Survey 4

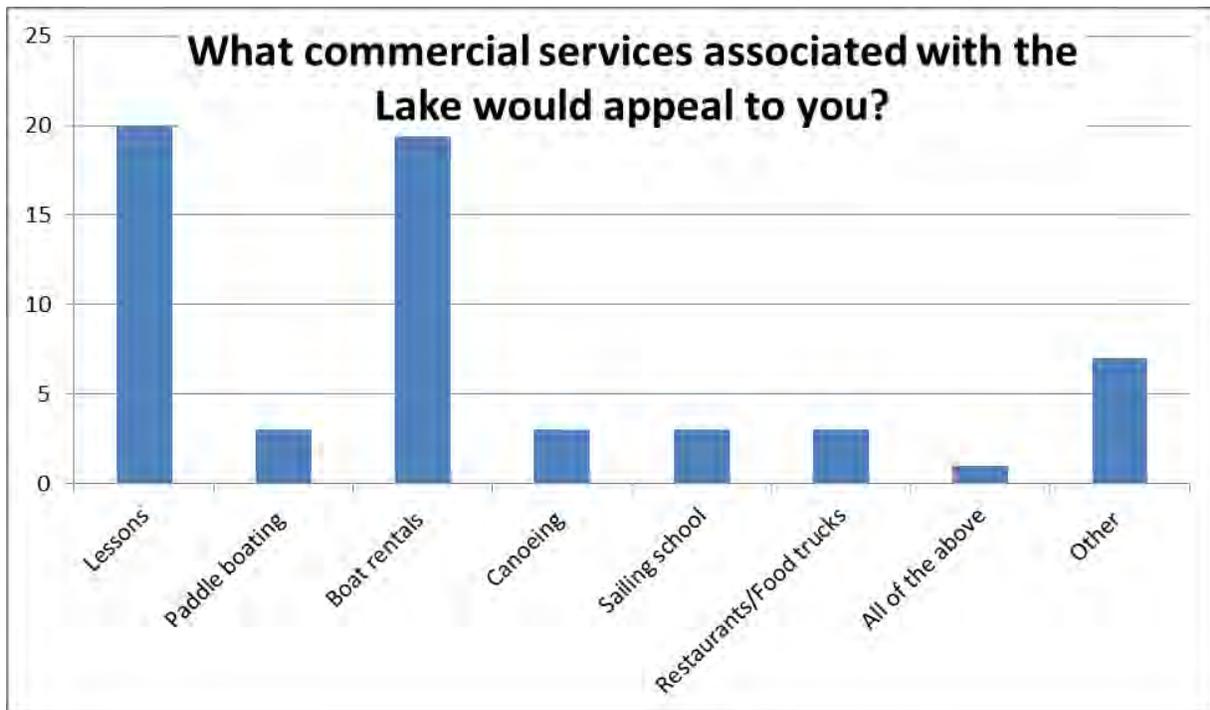


2015 Survey 5

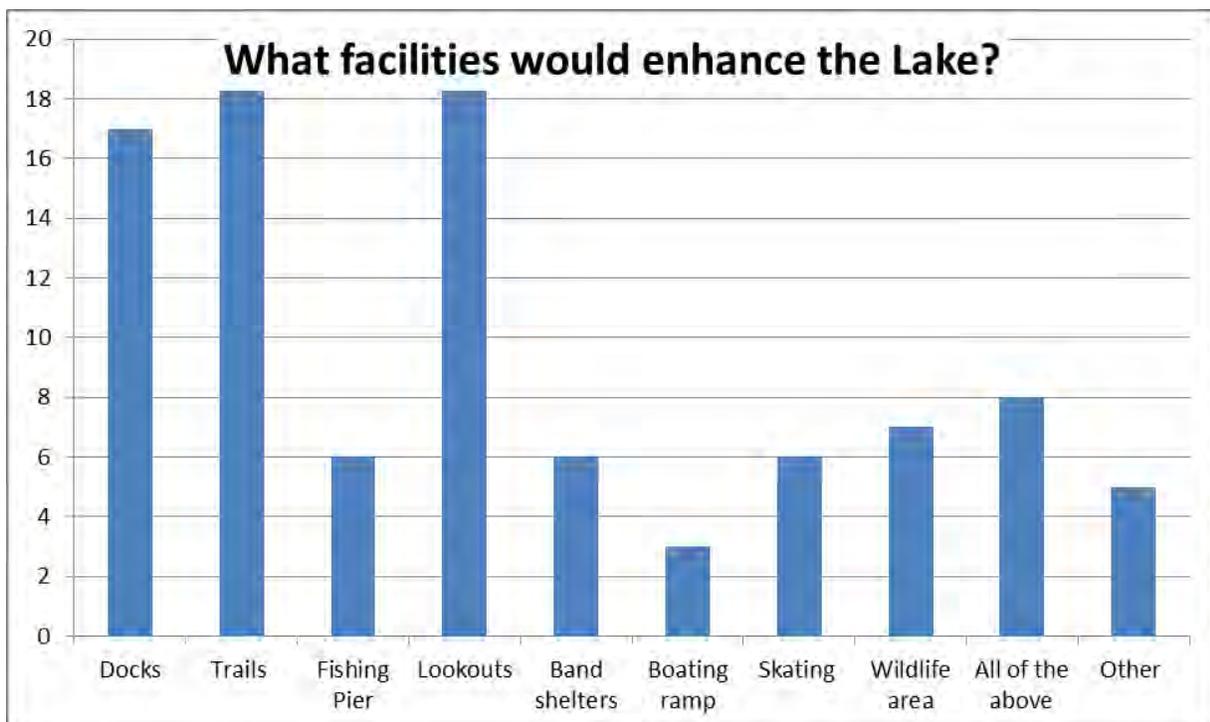


APPENDIX "B"
2015 Survey Results

2015 Survey 6



2015 Survey 7





Alternative formats and communication supports available upon request. Please contact accessibility@brantford.ca or 519-759-4150 for assistance.

Date June 4, 2019 **Report No.** 2019-265
To Chair and Members
Committee of the Whole – Community Development
From Paul Moore
General Manager, Community Development

1.0 Type of Report

Consent Item
Item For Consideration

2.0 Topic **Mohawk Lake District Plan – Draft Preferred Plan** **[Financial Impact: None]**

3.0 Recommendation

- A. THAT Staff Report 2019-265 regarding the Mohawk Lake District Plan – Draft Preferred Plan BE RECEIVED; and
- B. THAT the draft preferred Mohawk Lake District Plan, provided in **Appendix F** to Report 2019-265, BE ENDORSED by Council; and
- C. THAT Staff BE DIRECTED to continue with the technical studies to evaluate and support the endorsed Preferred Plan.

4.0 Purpose and Overview

The purpose of this Report is to share the results of the Mohawk Lake District Plan community engagement program and to present the draft preferred plan for Council’s consideration and endorsement. This is a key decision point in the ongoing Mohawk Lake District Plan work program that will result in a plan for revitalization and redevelopment of the study area, as provided in **Appendix A** of this Report. The next stage in the Mohawk Lake District Plan work program

will be the completion of technical studies to evaluate the feasibility of the draft preferred plan. Later stages will result in recommended land use policies, zoning regulations, and a strategy for the implementation of the Plan.

5.0 Background

The study area for the Mohawk Lake District, provided in **Appendix A** of this Report, includes lands directly adjacent to Mohawk Canal from Shallow Creek Park to Alfred Watts hydro generating station ruins, and includes:

- The Greenwich Mohawk former brownfield site;
- Mohawk Park;
- Mohawk Lake;
- Active industries;
- The Time Keepers Building; and
- A privately owned rail spur line.

It is noted that two large parcels of land adjacent to the study area are part of the Six Nations of the Grand River Territory. The Mohawk Lake District Plan will not have jurisdiction over any lands governed by Six Nations of the Grand River.

The Mohawk Lake District was formed by Council through the 2014-2018 City of Brantford Community Strategic Plan as a result of concurrent initiatives around Mohawk Lake, the Canal, and the Greenwich Mohawk former brownfield site.

It is important to note that past Council direction has also been received for the following related projects:

- Implement a municipal-led \$42 million remediation program that would achieve the applicable provincial standard, and which would maximize the future redevelopment potential of the 50-acre Greenwich Mohawk brownfield site (Reports CD2014-095 and CD2017-023);
- Implement a cultural heritage landscape designation for Mohawk Canal and the Alfred Watts hydro generating station ruins (Report CD2016-129);
- Initiate a lease agreement with the Canadian Industrial Heritage Centre for the use of the Cockshutt Timekeepers Building as part of an overall plan (Report CD2013-035);
- Implement the Mohawk Lake and Canal Rehabilitation project funded in part by Federal funding (Report PW2017-024); and

- Investigate route options for the potential extension of the Veterans Memorial Parkway, which may include alignments that are adjacent to or could pass through the Mohawk Lake District study area.

These initiatives prompted Council to direct the revitalization of this area to be considered together within an overall District Plan to coordinate revitalization efforts throughout. As a result, in 2017, the Mohawk Lake District Plan work program was initiated. To assist in developing a comprehensive District Plan, Planning Staff retained the consulting firm WSP Group to provide technical expertise, to prepare the necessary reports and drawings, and to assist with the community engagement program.

It should be noted that within the District, there are active industrial operations. Additionally, there is an active railway spur line owned and operated by one of the industrial companies within the District. While it is Planning Staff's understanding that the spur line is used approximately once a week for one or two slow moving rail cars, this spur line will be accommodated within the overall final District Plan, along with the other industrial operations.

6.0 Corporate Policy Context

6.1 Shaping our Future: Brantford's Community Strategic plan Context (2014-2018)

One of the actions identified within the Community Strategic Plan, Shaping Our Future 2014-2018, is: *"Explore the establishment of a Mohawk Lake District that includes a wide range of options for revitalization and redevelopment of the Greenwich-Mohawk Site as well as areas surrounding Mohawk Lake through community consultation. Complete existing remediation projects."*

Another applicable section is "Goal 3: Managed Growth and Environmental Leadership". It includes the long-term desired outcome that *"Brantford will be known as a city that manages growth wisely, makes optimum use of its infrastructure and is a leader in infill and brownfield redevelopment."*

7.0 Input From Other Sources

The project technical team includes staff from several City Departments who have reviewed project materials at key milestones throughout the work program. These Departments include: Parks Services, Engineering Services, Facilities and Asset Management, Fleet and Transit Services, Legal and Real Estate Services, and Economic Development and Tourism Services.

In 2017 Council also created the Mohawk Lake District Working Group, comprised of the Mayor and a councillor representative from each ward. The mandate of the Working Group is to address the requests of community groups who are interested in re-locating to the Mohawk Lake District (i.e. to the Greenwich Mohawk brownfield site). The Working Group has held seven (7) meetings to receive project updates, review the latest draft concepts, and hear input from community groups. To meet its mandate, the Working Group implemented an expression of interest process to identify the land uses and space requirements (building square footage and/or land area) requested by those who have an interest in re-locating to the Mohawk Lake District. A summary of the expressions of interest submissions provided by nine (9) community groups is attached as **Appendix B**. In addition, the Working Group has added the potential for a mid-sized performance space, as well as new headquarters for Brantford Police Services, to the list of uses to be considered for potential locations within the Mohawk Lake District. On May 1, 2019, Six Nations Polytechnic sent a letter of intent to the Mayor and Council indicating that they will be submitting an expression of interest with regard to re-locating to the Mohawk Lake District area (included in **Appendix B**). When available, this submission will be provided to the Mohawk Lake District Working Group to be added to the list for consideration.

The information gathered through the expression of interest process helped to identify the general land uses and space requirements that the community groups are requesting. In response, the draft preferred Mohawk Lake District Plan takes into consideration the requested land uses. The Mohawk Lake District Plan will not include any specific recommendations regarding the nine community group's requests for land or space within the District. Once the Mohawk Lake District Plan is completed, Council may wish to consider a process to determine which requests, if any, may be accommodated based on the outcome of the technical studies to be completed as part of the next stage of the work program.

The Mohawk Lake District Working Group met on May 3, 2019. At the meeting, the delegation from the Lansdowne Children Centre reported that efforts by the agency to seek funding from the province and other sources are contingent on securing a decision on a location. General discussion around this topic confirmed that other community groups have the same concern about their fundraising efforts. It was noted at the meeting, that some community groups are requesting land (either through donation, lease or purchase) to construct new purpose-built facilities and others are requesting space for lease or rent within

other multi-use buildings. Table 1 summarizes the approximate land area or building square footage requested by the various groups (where known).

Table 1 Summary of Land or Space Requests by Community Groups

Community Group	Requested Square Footage	Requesting Land for a purpose-built facility
De dwa da dehs nye>s Aboriginal Health Centre	45,720	Yes, 5 acres
Lansdowne Children Centre	102,000	Yes, 9 acres
Children Safety Village	n/a	Yes, 3 acres
Participation Support Services	7,000	Yes, to be determined
Brant Theatre Workshops	3,000	No
Brantford Symphony Orchestra	14,000	No
Brant Historical Society	15,000	No
Personal Computer Museum	5,000	No
Canadian Industrial Heritage Centre	N/a	Yes, 2 acres
Mid-Size Performance Space	To be determined	Yes, to be determined
Brantford Police Services Headquarters	To be determined	Yes, 10 acres
Six Nations Polytechnic	To be determined	Yes, to be determined
TOTAL SQUARE FOOTAGE	191,720	29 acres

As summarized in Table 1 of this Report, if each group's proposal was considered individually, more than 29 acres would be required to accommodate approximately 191,720 square feet of known space requirements requested by the community groups, representing 58% of the total available area of the 50 acre Greenwich Mohawk site. Section 8.2.5 of this Report outlines further

analysis on how the land or space requests of the community groups may be considered within the draft preferred Mohawk Lake District Plan.

Community engagement is also a significant component of this project. Several meetings and outreach initiatives were organized that successfully gathered feedback from citizens, property owners, and respective staff members of Six Nations of the Grand River and Mississaugas of the Credit First Nation. These meetings and outreach initiatives took place at two strategic stages of the project: Stage 1: Vision and Principles; and Stage 2: Preferred Land Uses. The following sections of this Report provide additional details regarding the objectives of these project stages and the community engagement that took place.

7.1 Stage 1: Vision and Principles

The objective of the first stage of this project was to hear from the community about its overall Vision for the revitalization of this area. The Project Team wanted to know what existing features in the area were valued, what other goals did the community have for the area, and ultimately what over-arching principles might be used to guide the redevelopment of the District.

The Project Team organized a public information meeting on March 29, 2018 at S.C. Johnson - T.B. Costain Community Centre, which was attended by approximately 80 people who participated in round table discussions. Over the subsequent months, additional feedback was gathered through the Project Team's participation at a family event on April 21, 2018 hosted by the East Ward Neighbourhood Association held at Major Ballachey School, at an open house BBQ on May 18, 2018 hosted by Six Nations of the Grand River held at the Six Nations Tourism Centre, and at two BBQ events on June 15 and August 3, 2018 hosted by Mississaugas of the Credit First Nation held at the Department of Consultation and Accommodation office in Hagersville. At these additional events, the Project Team engaged with approximately 50 people at each event. These informal gatherings attracted families and young people, representing a demographic that does not typically attend conventional project meetings, thereby broadening the feedback received.

The Project Team reviewed and analyzed the comments we heard from Stage 1: Vision and Principles and summarized the results in a word cloud called "What We Heard" attached as **Appendix C**. Some of the key themes expressed by the public, which informed the Vision Statement are as follows:

- Vibrant;

-
- Community;
 - Arts and Culture;
 - Water
 - Connectivity
 - Recreation; and
 - Industrial Heritage.

Based on the key themes noted above, the project team developed a draft Vision Statement to guide the development of the District Plan, and this is further discussed in Section 8.1 of this Report.

7.2 Stage 2: Preferred Land Uses

While the Mohawk Lake District Plan will consider all the lands that comprise the District, the 50 acre Greenwich Mohawk former brownfield site has the greatest potential for redevelopment and will act as a catalyst to stimulate the revitalization of the entire area. Accordingly, the objective of the second stage of this project was to focus on refining which various land uses (e.g. residential, commercial, institutional, parks, etc.) are desired by the community, as well as determine in what relative proportion are these land uses to be allocated throughout the redevelopment area. Three draft concepts were prepared for the Greenwich Mohawk lands that offered options for different ways that land uses could be arranged on the site and what type of theme or focus these land uses could address. The three draft concept plans are provided in **Appendix D** to this Report, and a brief description of the options are:

- Option 1: Outdoor Events and Festival Focus
 - A destination for major cultural events and festivals. The primary land uses include a large purpose-built event area with associated parks and open spaces, an institutional area, and some mixed commercial and institutional uses.
- Option 2: Culture and Community Focus
 - A destination for both cultural gatherings and community and commercial services. A balance of land uses that include a multi-purpose open space, several options for mixed commercial and institutional uses with potential upper-storey residential uses, and an institutional area.

- Community Services Focus
 - Primarily a destination for community services, including large institutional areas, and options for mixed commercial and institutional uses with potential upper-storey residential uses. The space could have a campus format with smaller scale public gathering spaces.

A public information meeting was held on November 28, 2018 at S.C. Johnson - T.B. Costain Community Centre, which was attended by approximately 120 people. Participants were invited to vote for their most preferred draft concept, as well as share any feedback on the draft vision statement. A total of 72 people voted on the concepts presented that evening. Additionally, an online survey was also produced and released to the public over three weeks in December and January. An additional 544 participants voted through the online survey and provided comments. As well, the Project Team attended a family-oriented pancake breakfast on December 8, 2018 hosted by the East Ward Neighbourhood Association, at which approximately 80 people attended and an additional 25 votes were received.

The results of the voting exercise are summarized in a memo dated February 15, 2019 from WSP Group and attached as **Appendix E** to this Report. The voting results and comments received are discussed in detail in Section 8.0 of this Report.

7.3 Continuous Community Engagement

Throughout the work program, the Project Team met with individuals and groups to provide on-going project updates. A brief summary of these meetings are described in the following sub-sections. It is also noted that previous community engagement for the former brownfield lands, as well as for Mohawk Lake and Park also took place in 2015, and the results of earlier engagement sessions have also been incorporated and considered as part of this latest project.

7.3.1 Six Nations of the Grand River Staff

The Project Team met with staff members of the Six Nations Consultation and Accommodation Process (CAP) Team on February 8, 2018 and January 10, 2019. At these meetings, project updates, the latest draft redevelopment concepts, and public engagement results were shared. The Six Nations CAP Team commented that the lands within the District are subject to land claims. Planning Staff were also encouraged to engage with Six Nations Tourism and Economic Development Staff regarding

potential feedback that may affect or be coordinated with the adjacent cultural sites to the study area. The Project Team has spoken with the Six Nations Director of Tourism and Cultural Initiatives, as well as the Executive Director of the Woodland Cultural Centre on two occasions to share project updates and receive comments.

7.3.2 Mississaugas of the Credit First Nation Staff

The Project Team met with staff members from Mississaugas of the Credit First Nation on March 27, 2018 and January 16, 2019. At these meetings, a project update, the latest draft concept plans, and public engagement results were shared. Mississauga First Nation Staff asked questions and shared historical information.

7.3.3 Presentations to Community Groups

The Project Team also presented information to various community organizations to promote the project and to provide further opportunities for community feedback. Planning Staff presented this project at the 2019 Heritage Day Workshop, at meetings of the Kiwanis Club and the Brantford Sunrise Rotary Club, at the Eagle Place Neighbourhood walk during Jane's Walk weekend, and to the citizen-led Mohawk Lake Steering Committee.

8.0 Analysis

The purpose of the Mohawk Lake District Plan is to develop a comprehensive land use structure and policy framework to guide the future redevelopment and revitalization of the Mohawk Lake District area. This Plan will help to harmonize several related initiatives to maximize these investments and opportunities. The District Plan will review the existing land uses and consider appropriate future land uses and include official plan policies, urban design guidelines and corresponding zoning regulations. A transportation network plan and servicing report will address demand and future growth of the study area. The District Plan will also provide options and recommendations regarding the retention or sale of the City-owned lands to support the recommendations of the Plan.

The Mohawk Lake District Plan work program includes the following stages:

-
- Visioning
 - Draft District Plan
 - Technical Feasibility Analysis
 - Supporting Reports for Implementation
 - Finalization of the Mohawk Lake District Plan and Approval

Presently, the Project Team has completed the Visioning stage and is in the process of developing the Draft District Plan. Further details of the completed stages of the work program are provided in Sections 8.1 and 8.2 of this Report. Section 8.3 outlines next steps to complete subsequent stages of the work program.

8.1 Vision Statement and Guiding Principles

The Vision Statement represents what the Mohawk Lake District Plan will ideally achieve. The Vision Statement was developed from extensive community input at the first public workshop and affirmed at subsequent community engagement meetings and through the online survey. This Vision Statement also reinforces what has been heard in previous public consultations in 2015 that took place at the onset of the remediation program for the Greenwich Mohawk site. Specific comments received throughout the engagement process were considered and incorporated accordingly. The Project Team proposes to move forward with the following Vision Statement:

“Mohawk Lake District will be...

A welcoming place for residents, families and visitors of all ages to explore, shop, eat, learn, and gather. Parks and trails along Mohawk Lake and Canal and throughout the District will provide a beautiful and healthy way to connect with nature. Mohawk Lake District will be where we honour the past, but also a place to be inspired for the future. As a popular destination where history, culture, recreation, and tourism meet, Mohawk Lake District will be a place of pride in the community.”

In addition to the Vision Statement, the following guiding principles identify the overall values that are desired and intended to be achieved by the Plan:

- Vibrant Neighbourhood
- Centre for Tourism
- City’s Recreational Centre

-
- Conserve and Celebrate Heritage
 - Holistic and Connected
 - Sustainable Community

The guiding principles to achieve the Vision are provided in **Appendix C**. As noted in Section 7.1 of this Report, community feedback helped to inform these guiding principles which were then used by the Project Team to shape the draft preferred Mohawk Lake District Plan.

8.2 Mohawk Lake District Plan: Draft Preferred Plan

The Project Team has prepared a draft preferred Mohawk Lake District Plan, provided in **Appendix F**, which is an illustration of what was heard based on extensive community feedback. The draft preferred District Plan, and the proposed land uses and locations are conceptual, and are intended to demonstrate how the District may develop. To ensure that the vision of the community is realistic, the draft preferred District Plan will require further evaluation for technical feasibility. While a preliminary technical review by City Staff has taken place, a detailed analysis by the project consultants is required. This will involve the completion of several technical studies to identify any matters that may require changes to the draft preferred Plan. The studies will address the feasibility of implementing the Plan by evaluating environmental impact, the need for transportation or infrastructure upgrades or alterations, as well as an assessment of compatibility with surrounding land uses, and the economic market conditions to support the preferred Plan. As noted, the results of the technical reports may result in revisions to the final draft preferred District Plan.

At this stage, the Project Team is seeking endorsement of the draft preferred District Plan and direction from Council to proceed to the Technical Feasibility Analysis phase in the work program. Selecting a draft preferred District Plan is necessary to proceed with the work program, and will allow staff to focus the technical studies to a single preferred option. This is a more cost-effective approach that will allow for modifications to the District Plan, if deemed necessary.

8.2.1 Description of the Details of the Draft Preferred District Plan

The map in **Appendix F** illustrates the overall draft preferred Mohawk Lake District Plan, which identifies improvements to existing recreation and destination points, the creation of new features, as well as strategies

to enhance connectivity throughout the District. The District Plan intends to create a complete experience for residents and visitors through the inclusion of multiple amenities and attractions. Movement from one end of the District to the other is intended to be easy and attractive for a range of transportation types – whether walking, cycling, use of public transit or by car. The draft preferred Mohawk Lake District Plan also identifies potential canal crossings to enhance connectivity and movement north and south of the canal to facilitate integration of the Plan with the existing residential neighbourhoods.

The vision for the District is that this will be a welcoming place, where residents and visitors alike will explore all aspects of the District, including recreational activities, cultural facilities, institutional, commercial, and entertainment amenities. Community feedback highlighted the potential that visitors and tourists may spend multiple days within the District. For example, people can spend the day canoeing or cycling through the area and return the next day to visit a museum or other cultural or historical attraction, including those that are located just outside the District on neighbouring Six Nations territory. Or people who are using services provided by one or more community agencies may also have a meal at a nearby café or restaurant or seek respite in the landscaped open spaces. The vision for the District Plan is that this area becomes a multi-faceted destination that will provide people with a sense of community pride through connections to the history and culture of the area and to the surrounding natural and recreational features that already exist within this part of the City.

There are three main areas that comprise the structure of the overall Mohawk Lake District Plan. These areas are identified on the map attached as **Appendix G** and they are referred to as:

- Gateway Area
- Culture and Community Destination Area
- Mohawk Lake and Park Recreational Area

Details of each area are described in the following sub-sections of this Report.

8.2.2 Gateway Area

The Gateway Area at the western part of the District is intended to be a welcoming entrance to the District and provide a transition to and from Downtown Brantford. Improvements to landscaping, urban design, and pathways for pedestrians and cyclists can improve Greenwich Street as a safe and accessible connection throughout the District and to existing Downtown amenities. There are also several options to help increase activity and generate vibrancy along this corridor by encouraging a mix of medium to higher density mixed commercial and residential development. Presently the draft preferred Plan accounts for the possible extension of the Veterans Memorial Parkway according to the historical 1991 alignment. The Project Team continues to engage with the City's Transportation and Parking Services Department to address any updates regarding the extension of the Veterans Memorial Parkway.

8.2.3 Culture and Community Destination Area

The Culture and Community Destination Area is located in the central portion of the District, where the 50 acre municipally-owned former Greenwich Mohawk brownfield is located. A significant component of achieving the overall vision for the Mohawk Lake District Plan is through the redevelopment and revitalization of the former brownfield lands, and a detailed draft preferred concept for these lands is provided in **Appendix H** of this Report.

The draft Preferred Plan recommends a mix of land uses in the Culture and Community Destination Area. This addresses a wide range of community needs, taking into consideration the breadth of community input which consistently provided the following types of comments:

- *Be a destination for more recreational, cultural, historical facilities, that are supported by commercial retail, restaurants, cafés, etc.;*
- *Be a hub of services for the entire community;*
- *Create beautiful landscaped open spaces for all ages to enjoy; and*
- *Generate economic development, taxes and improve property values.*

As noted in Section 7.2 of this Report, the public was invited to vote on three options of the draft concept plans, and the results showed that the greatest number of people preferred Option 1 (as shown in **Appendix D**), which emphasized an Outdoor Events and Festival Focus District.

While the public preferred Option 1, Staff also received written feedback regarding the green spaces, as some residents were concerned that these spaces may be underutilized or only seasonally used. As well, other written comments indicated there was a need for more options for housing, in particular affordable housing. There were also several comments received in support of community agencies which have expressed interest in relocating to the District, some of which are listed in **Appendix B**. General comments also noted the importance of generating economic activity through tourism and commercial/retail uses that included evening functions.

To address community feedback and taking into account additional technical review by City Staff, the Project Team developed a hybrid of Options 1 and 2, as illustrated in **Appendix H**. A report, titled “Land Use Options Evaluation Report” prepared by the project consultants, outlines the rationale for how the revised hybrid concept responds to the community feedback. This Report is provided in **Appendix I**. This hybrid Culture and Community Destination Area is comprised of the following land uses as described in Table 2 below:

Table 2: Types and Approximate Area of Land Uses within the Culture and Community Destination Area

Land Use	Land Area (approximate)	Percentage of Total Land Area
Parks and Open Space	18.5 acres (7.5 hectares)	39%
Mixed Commercial, Institutional & Residential Uses (residential on upper storeys only)	9.9 acres (4.0 hectares)	21%
Institutional Uses	10 acres (4.1 hectares)	21%
Transitional Institutional (a combination of institutional & commercial uses, excl. residential uses on the upper storey)	3.1 acres (1.3 hectares)	6%
Museum Uses	6.4 acres (2.6 hectares)	13%
	Total area: 47.9 acres (19.5 hectares)	

It is noted that all land areas are approximate and subject to change. However, generally in response to voting results by the community on their preferred option, the predominant land use within the hybrid Culture and Community Destination concept is for parks and open space, representing 39 % of the total land area. Key features included in the Culture and Community Destination Area are described below:

- An enhanced promenade is recommended to improve public access to the Mohawk Canal waterfront. The enhanced promenade is intended to have wider sidewalks and may include dedicated bike paths. Landscaped boulevards would slow down traffic through this section of Greenwich Street to provide a leisurely route to access additional views of Mohawk Lake further east along Greenwich Street. Community feedback was consistently in support of creating this promenade feature that provides connectivity to new and existing trails and other recreational activities.
- As indicated by the dashed pink arrows, there are several recommended potential connections to facilitate pedestrian and some vehicle movement throughout the area. The District Plan recommends that the intersection of Mohawk Street, Greenwich Street, and Murray Street be reviewed to assess the feasibility of re-configuring the intersection to improve traffic flow. To accommodate this, some land has been left vacant to allow the intersection to be redeveloped should the opportunity arise. As mentioned, the draft preferred Plan also identifies potential canal crossings to improve connectivity and integration of the Plan with the existing residential neighbourhoods.
- The District Plan takes into consideration the continued operation of the railway spur line which bisects the majority of the District Area. Presently there is no rail crossing within the former brownfield site, but future implementation of the final Mohawk Lake District Plan may consider negotiating with the owners of the spur line to implement one or more crossings where appropriate. In the short term, the draft Mohawk Lake District Plan recommends that a potential new trail be installed north of the existing rail line to provide east-west connectivity for pedestrians and cyclists through the study area.
- The mixed commercial and institutional land uses, which include the potential for upper storey residential units, are indicated by an orange colour on the plan. These blocks meet the desire for retail,

restaurants and office uses on the ground-floor providing a range of amenities and services. These land uses, together with the proposed institutional and transitional institutional land uses form a “main street” spine of activity on both sides of a potential north-south connectivity route that helps to integrate and connect the new development to the existing neighbourhoods adjacent to the study area. It is generally good design for any new internal street or driveway to be “double-loaded” meaning that commercial or office-front activity occurs on both sides of the street and enhances the street’s ability to be active with day and evening uses. The potential for upper storey residential uses, and how many storeys, will be confirmed through the technical studies. The mixed commercial, institutional, and upper storey residential blocks are dispersed into a larger 7.2 acre size block south of the spur line, with frontage intended on Mohawk Street and a future internal street or driveway, and a 2.7 acre block north of the rail line, with frontage intended on Mohawk Street and a future internal street or driveway. In the finalized Mohawk Lake District Plan, a more detailed demonstration plan will identify how these blocks can be further sub-divided for various building sizes, parking areas, and landscaped open spaces.

- The institutional uses and transitional institutional uses are indicated by a blue colour on the plan. These blocks are intended to help address the requests of several community agencies to re-locate their services to the Mohawk Lake District. The 10 acre blue institutional use may accommodate such uses as education centres, health facilities, or offices, that some of the community agencies that are proposing. This larger area may be sub-divided into various building blocks of one or more storeys. The 3.1 acre transitional institutional space north of the spur line is for a mix of ground-level commercial options, as well as upper-storey office space and storage facilities that could be used by various community agencies, but unlike the orange mixed-use blocks, there are no upper storey residential options in the transitional institutional use. Both blocks could be further sub-divided for various building sizes, parking areas, and landscaped open spaces.
- As noted, the draft Preferred Plan proposes approximately 39% of the Culture and Community Destination Area to be dedicated for parks and open space type uses. Further Council direction to develop a detailed plan and budget would be required to program new park spaces. The 15.3 acre park and open space area located

north of the spur line addresses the strong community support for a purpose-built outdoor events or festival space that could accommodate very large community events such as the Canada Day celebrations and Rib-Fest, etc., which attract between 3,000 – 15,000 people. Approximately 6 events of this scale take place each year, with varying attendance numbers. The largest event is the City-hosted Canada Day celebration, followed by the privately sponsored WTFest music event, the Kinsmen Ribest, the privately-sponsored Jazz Festival, and several other community celebrations. Staff anticipates that additional festivals and events would desire a purpose-built venue once built. Through the years, the City has had to turn down over a dozen events due to size restrictions in of the current venue. Recognizing that transportation and on-site parking is a common issue with these large events, a purpose built space would be one that accommodates public transit and other shuttle services to minimize parking requirements. Shared parking could be considered as well. This large area may accommodate a band shell or other permanent stage, landscaped paths and gardens, parking, and other facilities, such as washrooms, playgrounds, general open space, and administrative space. Currently, most large events in the City are held at the Steve Brown Sports Complex which is approximately 10 acres in size and depending on the event, may require stage equipment to be constructed at a cost to the City.

Apart from the Steve Brown Sports Complex, the City often holds large community events at Lion's Park. However this location is challenging due to its size, limited patron and vendor access, parking limitations, proximity to residential neighbors, and disruption/damage to the City's sports field which often require repairs following events. Additionally many sports groups are displaced as a result of field damage.

When not being used for large community events, it is envisioned that the 15.3 acre park could be used for multiple functions, such as informal recreation and sports practices, music in the park, art shows, cultural exhibits, markets, community fireworks, car shows, re-enactment events, filming, family parties and picnics. This large park and open space area as well as the smaller 1.8 acre park and open space area near the intersection of Greenwich Street and Mohawk Street are intended to support the promenade function and facilitate landscaping and activity on both sides of Greenwich

Street. The smaller area will also function as a gathering area and will help to create a defined entrance and provide an edge to the development area. Lastly, a 1.4 acre strip of open space in the south-east of the study area south of the spur line is intended to provide a landscaped buffer from the existing industrial use located southeast of the City's property.

- A 4.4 acre museum block in the north-western portion of the lands would accommodate the existing Canadian Military Heritage Museum and could allow for an expansion beyond its current leased area of approximately 2.0 acres (if requested by the Museum and approved by Council). Another 2.0 acre museum block in the south portion has been set aside for the Canadian Industrial Heritage Centre's proposal to create an outdoor landscaped facility or the display of artifacts, such as historical tractors, that represent some of the products previously manufactured on site.

8.2.4 Mohawk Lake and Park Recreational Area

The eastern portion of the Mohawk Lake District Plan includes the existing 50 acre (20 hectare) Mohawk Park, and the 32 acre (13 hectare) Mohawk Lake. The draft preferred Mohawk Lake District Plan intends to enhance connectivity to Mohawk Park and Mohawk Lake from other parts of the District. At this location south of Mohawk Lake, preliminary consideration has been given to potentially shifting Greenwich Street to the south, thereby creating a new open space area adjacent to Mohawk Lake, which, depending on water quality, could be considered for a future boat launch. The realignment of Greenwich Street will be explored further through the technical studies.

It is noted that Public Works Staff are leading a separate project to examine water quality and to implement any future rehabilitation of Mohawk Lake and Canal. The Mohawk Lake District Plan Project Team shares information and collaborates with the necessary Public Works Staff when necessary. Following the rehabilitation of Mohawk Lake, Council direction would be required to complete a separate detailed study of the potential for creating an area that could accommodate a boat launch.

Lastly, as noted in Section 5.0 of this Report, the Alfred Watts Ruins and the entire Mohawk Canal corridor are recognized to have cultural heritage significance. The draft Preferred Plan recommends enhancing access to

the existing Alfred Watts Ruins as a destination to learn about Brantford's industrial heritage through the extension of trails and creation of new open spaces. As per the 2016 Cultural Heritage Feasibility Study of Mohawk Canal and Alfred Watts Hydro Generating Station Ruins, the Mohawk Lake District Plan may also recommend the designation and preservation of historical features as a cultural heritage landscape.

8.2.5 Community Groups' Land or Space Requests

As summarized in Table 1 of this Report, more than 29 acres would be required to accommodate approximately 191,720 square feet of known space requested by various community groups. The draft preferred plan includes several options to accommodate the land and space requests of the community groups. The community groups may rent or lease space or land within the mixed commercial and institutional spaces with upper storey residential (orange blocks) or the transitional institutional and commercial spaces (blue blocks with orange hatching) or the dedicated institutional spaces (blue blocks), which offers a total of approximately 23 acres of land. If multi-storey buildings are constructed and facilities such as parking are shared, the gross floor area of the community groups requests could likely be accommodated within a smaller area. Therefore, the combined request of 29 acres to accommodate all the community groups may be reduced if some of the groups construct multi-storey buildings and share facilities.

As noted previously, the draft Preferred Plan is not intended to recommend approval of the community requests for land or space at this time. Rather, the draft Preferred Plan identifies areas and approaches that may accommodate these proposals should Council approve them. The technical feasibility studies will review the land use options, including those requested by the Community groups to ensure compatibility with existing neighbouring industrial land uses, and further examine the transportation and infrastructure requirements to support the Plan. Accordingly, Planning Staff recommends that until the technical studies are completed, that no decision is made on any community group request for land or space. It is anticipated that the technical studies will be completed in the third quarter of 2019, at which time, Staff will bring forward recommendations and work with the Mohawk Lake Working Group to develop a process to consider the community groups' proposals for Council consideration.

8.3 Next Steps

8.3.1 Technical Feasibility Studies

As noted in Section 4.0, the purpose of this Report is to seek Council's endorsement of the draft preferred Mohawk Lake District Plan in order to proceed to the next phase of in the work program, the Technical Feasibility Analysis. Endorsement of the draft District Plan is not the final approval of the Plan. The technical studies are anticipated to be completed in the third quarter of 2019 and will include the following:

- Traffic Impact Study
- Functional Servicing Review / Storm Water Management
- Noise, Odour, Dust, and Vibration Study and Compatibility with Industry
- Environmental Impact Study
- Economic Analysis of the Preferred District Plan

As noted previously, the results of the technical studies may change the types, sizes, and location of land uses within the draft preferred District Plan. The results will also inform Council in regards to any decision-making process to address the land and space requests by the community groups.

8.3.2 Supporting Reports for Implementation

The Project Team will prepare related reports to support the implementation of the Mohawk Lake District Plan. The supporting documents will include:

- A Planning Analysis and Rationale Report;
- Urban Design Guidelines;
- Draft Amendments to the Official Plan and Zoning By-law 160-90;
- A Cultural Heritage Landscape Conservation Plan; and
- Development Staging Plan and Implementation Strategy.

These documents will be part of the finalized Mohawk Lake District Plan for Council's review.

8.3.3 Finalized Mohawk Lake District Plan and Approval

It is anticipated that in the first quarter of 2020, the project team will organize a public information meeting to share the latest project information with the community and any other stakeholders. A presentation and final report to Council seeking approval of the Mohawk Lake District Plan is anticipated to follow in the second quarter of 2020.

9.0 Financial Implications

There are no financial implications at this time.

10.0 Conclusion

This stage of the Mohawk Lake District Plan is an important milestone for the City. The community has demonstrated its continued support for this project through the extensive quantity and quality of feedback received throughout the District work program. The draft preferred District Plan outlines the Vision to achieve the revitalization of an area that already has important historical, cultural, and recreational significance to the community. The Mohawk Lake District Plan is an opportunity to both strengthen and grow this part of the City of Brantford even further. At this stage, the Project Team is seeking endorsement of the draft preferred Mohawk Lake District Plan, illustrated in **Appendix F** of this Report, and to receive direction to move forward with the technical studies to evaluate and support this Plan prior to finalization.



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Community Development



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Lucy Hives, MCIP, RPP
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Community Development



Paul Moore, MCIP, RPP
General Manager
Community Development

Attachments

Appendix A: Mohawk Lake District Plan Study Area

Appendix B: List of Community Groups that responded with an Expression of Interest

Appendix C: Vision Statement “What We Heard” Summary

Appendix D: Three Options for Draft Redevelopment Concepts of the Former Greenwich Mohawk Brownfield Site

Appendix E: Community Engagement Results Memo (February 2019)

Appendix F: Mohawk Lake District Plan: Overall Draft Preferred Plan

Appendix G: Mohawk Lake District Plan: Vision and Areas

Appendix H: Culture and Community Destination District Draft Preferred Plan

Appendix I: Land Use Options Evaluation Report

Copy to:

Mohawk Lake District Plan Working Group

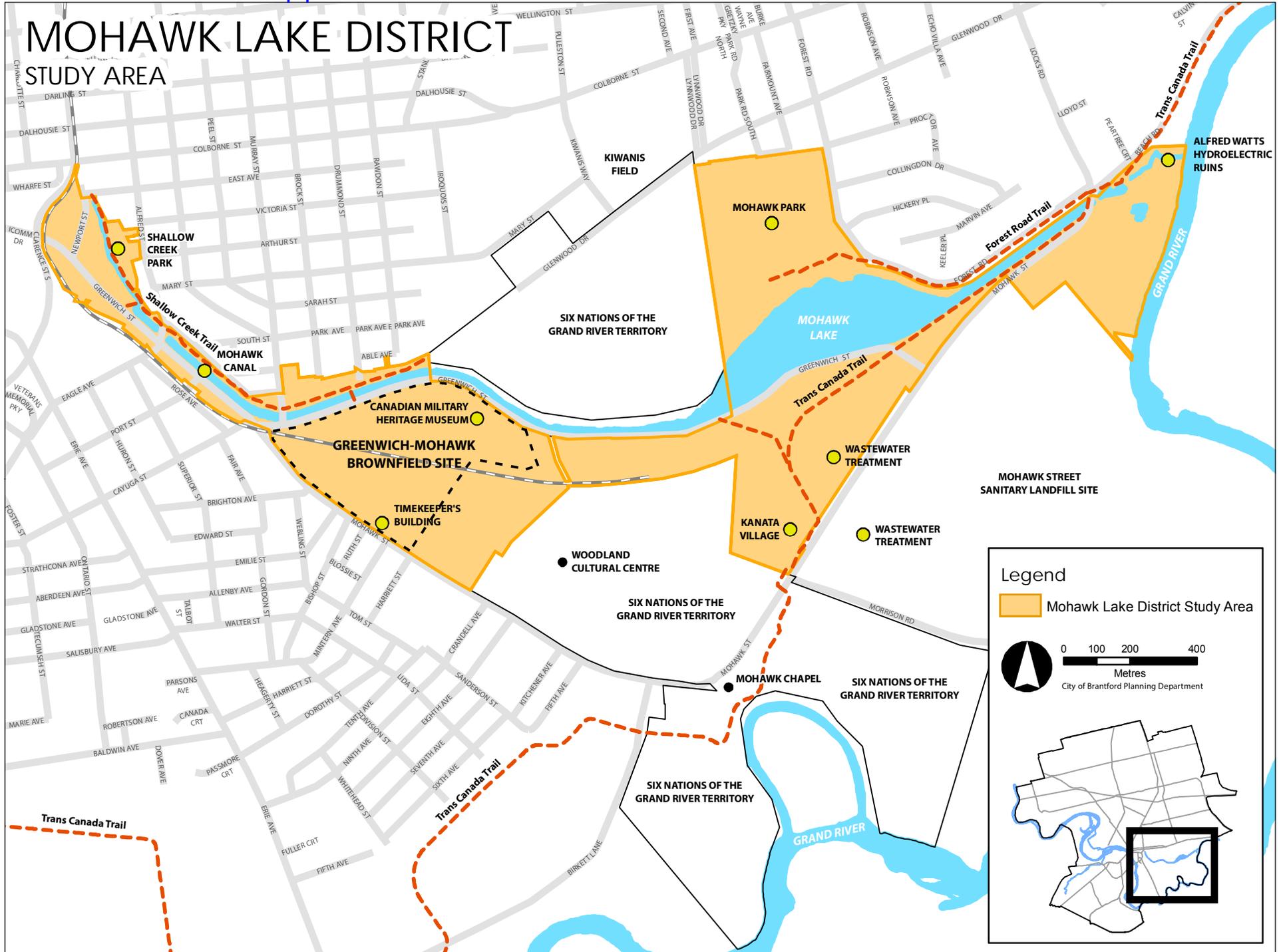
In adopting this report, is a by-law or agreement required? If so, it should be referenced in the recommendation section.

By-law required yes no

Agreement(s) or other documents to be signed by Mayor and/or City Clerk yes no

Is the necessary by-law or agreement being sent concurrently to Council? yes no

MOHAWK LAKE DISTRICT STUDY AREA



Legend

- Mohawk Lake District Study Area

0 100 200 400
Metres
City of Brantford Planning Department



EXPRESSION OF INTEREST SUBMISSIONS (MAY 2018)

- 1 Aboriginal Health Centre**
- 2 Lansdowne Children Centre**
- 3 Children's Safety Village**
- 4 Participation Support Services**
- 5 Brant Theatre Workshops**
- 6 Brantford Symphony Orchestra**
- 7 Brant Historical Society**
- 8 Personal Computer Museum**
- 9 Canadian Industrial Heritage Centre**
- 10 Six Nations Polytechnic (May 2019 Notice of Intent)**

ADDITIONAL LAND USES TO BE CONSIDERED:

- 1 Potential Brantford Police Services Headquarters**
- 2 Potential Mid-size Performance Space**



SIX NATIONS
POLYTECHNIC

May 1, 2019

Mayor Kevin Davis and Council
City of Brantford
100 Wellington Square
Brantford, Ontario
N3T 2M2

Re: Interest in Land - Mohawk Lake District

Dear Mayor Davis and Council

Please accept this letter as notification of Six Nations Polytechnic's (SNP) intent to submit a formal expression of interest for a parcel of land located in the Mohawk Lake District, in the City of Brantford.

As your Council may know, SNP has a ten-year lease agreement at 411 Elgin Street that expires in April 2025. While there is a provision in our lease to extend the lease for an additional 5 years, we have been notified by our landlord that this provision will not be executed.

The land we are seeking will be used to provide educational offerings that model current programs including skilled trades, college, and university.

Respectfully,

Linda Parker
A/Director of Operations and Advancement

MOHAWK LAKE DISTRICT PLAN

EXPRESSION OF INTEREST SUBMISSION SUMMARY (discussed JUNE 2018)

COMMUNITY GROUP	LAND REQUEST	SPACE REQUEST (tenant in a building)	PROPOSAL / LAND USES	CITY FUND REQUEST	FUNDING REQUIRED	TIMING
<p>1/ De dwa da dehs nye>s Aboriginal Health Centre (DAHC)</p>	<ul style="list-style-type: none"> • 3 to 5 acres • Min. building size: 45,720 sq.ft • Max. building size: total of 50,000 sq. ft for additional community hub partnerships • One storey building preferred, but would consider multiple storey building • Outdoor landscaped area, possibly a sweat lodge • On-site parking • Existing facility size: 5,545 sq. ft over 3 storeys; 0.125 acres • Request to re-locate and expand existing facility (36 King St) 		<ul style="list-style-type: none"> • A hub for Indigenous People to access a range of health and social services <p><u>Land uses</u></p> <ul style="list-style-type: none"> • Health centre • Administrative offices • Multi-purpose meeting and event rooms • Kitchen and laundry rooms • Classrooms • Gymnasium and fitness rooms • Complementary retail uses, including pharmacy services, cafe 	<ul style="list-style-type: none"> • Donation of land to build purpose-built building 	<ul style="list-style-type: none"> • \$15.6 million for new build <p><u>Funding sources include:</u></p> <ul style="list-style-type: none"> • Ministry of Health & Long Term Care will provide capital funding for various eligible components • DAHC will fundraise \$4.1 million 	<ul style="list-style-type: none"> • Confirmation of site selection in 2019. • DAHC occupancy of new building in 2020-2021 fiscal year.
<p>2/ Lansdown Children Centre (LCC)</p>	<ul style="list-style-type: none"> • 9 acres • Approximate building size: 102,000 sq.ft • Two storey building can be considered • Outdoor play and therapy space • On-site parking • Existing facility size: 26,596 sq.ft • Request to re-locate and expand existing facility (39 Mount Pleasant St) 		<ul style="list-style-type: none"> • An educational centre for children and youth with physical, communications and developmental challenges for rehabilitation, respite, and recreation. <p><u>Land uses</u></p> <ul style="list-style-type: none"> • Classrooms • Administrative offices • Respite rooms (weekend live-in respite) (2000 sq.ft) • Gymnasium and fitness rooms, including pools • Multi-purpose meeting and event rooms 	<ul style="list-style-type: none"> • Donation of land to build purpose-built building • Notional capital support towards capital construction • Support regarding future soil and groundwater monitoring, if required • By-law support around zoning • Public transportation access 	<ul style="list-style-type: none"> • \$53.8 million for new build and related project costs <p><u>Funding sources include:</u></p> <ul style="list-style-type: none"> • Ministry of Children and Youth Services will provide some funding • Annual Fundraising campaigns 	<ul style="list-style-type: none"> • Construction implementation: June 2020 • LCC occupancy of new building: Nov. 2024

MOHAWK LAKE DISTRICT PLAN

EXPRESSION OF INTEREST SUBMISSION SUMMARY (discussed JUNE 2018)

COMMUNITY GROUP	LAND REQUEST	SPACE REQUEST (tenant in a building)	PROPOSAL / LAND USES	CITY FUND REQUEST	FUNDING REQUIRED	TIMING
<p>3/ Children's Safety Village (CSV)</p>	<ul style="list-style-type: none"> • 2 to 2.5 acres • Outdoor village, plus a building for classrooms, bathrooms, kitchen, offices, storage • On-site parking, including buses • Consideration that the site might be a location for community emergency operations • Existing facility size: 2 acres • Request to re-locate existing facility (407 Elgin St) 		<ul style="list-style-type: none"> • A miniature village educational centre specially designed to teach the fundamentals of safety for children ages 4-12. <p><u>Land uses</u></p> <ul style="list-style-type: none"> • Outdoor education facility with miniature buildings, roads, sidewalks, etc. • Classrooms • Administrative offices • Kitchen • Multi-purpose meeting and event rooms • Storage area 	<ul style="list-style-type: none"> • Donation of land to build purpose-built building • Long term lease (25 years +) • Financial contribution for capital construction • Continued partnership with local police, fire departments 	<ul style="list-style-type: none"> • \$2-3million to move existing village and build new classroom/office space <p><u>Funding sources include:</u></p> <ul style="list-style-type: none"> • Kiwanis Club of Brantford • Annual fundraising campaigns 	<ul style="list-style-type: none"> • Construction implementation: Spring 2021 • CSV grand opening: Spring 2022
<p>4/ Participation Support Services</p>	<ul style="list-style-type: none"> • Land to accommodate a new purpose-built building, approx. 6,000-7,000 sq. feet • Existing facility size: approx. 6,000 sq.ft • Request to re-locate and expand existing facility (10 Bell Lane) 		<ul style="list-style-type: none"> • A centre that provides supports and services to individuals with a physical disability, as well as individuals with complex health care needs, and seniors. Supports include day-use facilities, as well as specially-designed supportive housing, long term, transitional, and respite care. <p><u>Land uses</u></p> <ul style="list-style-type: none"> • Administrative offices • Apartments (long-term housing) • Senior's supportive housing • Common areas (kitchen) • Laundry facility • Spa • Multi-purpose meeting rooms 	<ul style="list-style-type: none"> • Donation of land to build purpose-built building • Similar lease as the current arrangement at 10 Bell Lane • Financial contribution for capital construction • Financial contribution for development fees, etc. • Support with the re-purposing of the existing facility at 10 Bell Lane 	<ul style="list-style-type: none"> • \$1.17 million for new build <p><u>Funding sources include:</u></p> <ul style="list-style-type: none"> • Possible grants for affordable housing and mortgage financing • Annual fundraising campaigns 	<ul style="list-style-type: none"> • 5 years til shovel ready (~2023)

MOHAWK LAKE DISTRICT PLAN

EXPRESSION OF INTEREST SUBMISSION SUMMARY (discussed JUNE 2018)

COMMUNITY GROUP	LAND REQUEST	SPACE REQUEST (tenant in a building)	PROPOSAL / LAND USES	CITY FUND REQUEST	FUNDING REQUIRED	TIMING
<p>5/ Brant Theatre Workshops</p>		<ul style="list-style-type: none"> • 3000 sq.ft • Outdoor Theatre, amphitheatre facility, rehearsal hall, office, storage. • Existing office and storage size: 1,400 sq.ft • Request to re-locate existing office and storage (340 Henry St) 	<ul style="list-style-type: none"> • A mid-size performance space; also offices and storage, and production space for light construction of sets and props. <p><u>Land uses</u></p> <ul style="list-style-type: none"> • Administrative offices • Theatre • Rehearsal hall • Storage • Potentially other cultural activities (art, museum, music) 	<ul style="list-style-type: none"> • A lease agreement for space 	<ul style="list-style-type: none"> • Currently renting all required space and would continue to do so 	<ul style="list-style-type: none"> • When space is available
<p>6/ Brantford Symphony Orchestra</p>		<ul style="list-style-type: none"> • 14,000 sq.ft space • Warehouse/storage • Offices • Parking for 100 cars • Existing facility size: Office space is 1,775 sq.ft • Request to have a guaranteed space to rent for 2 months (current office space at 99 Chatham St) 	<ul style="list-style-type: none"> • A facility to prepare for and hold an annual 2 month book sale, including parking, storage, washrooms. Year-round offices and storage <p><u>Land uses</u></p> <ul style="list-style-type: none"> • Warehouse/Storage • Large multi-purpose room • Kitchen 	<ul style="list-style-type: none"> • A lease agreement for space for 2 months of the year 		<ul style="list-style-type: none"> • New facility in operation for April 2021 Book Sale
<p>7/ Brant Historical Society</p>		<ul style="list-style-type: none"> • 15,000 sq.ft space • Existing facility size: 7,000 sq.ft • Request to re-locate and expand existing facility (57 Charlotte St) 	<ul style="list-style-type: none"> • A museum and archives <p><u>Land uses</u></p> <ul style="list-style-type: none"> • Museum • Storage • Administrative offices 			
<p>8/ Personal Computer Museum</p>		<ul style="list-style-type: none"> • 5,000 sq.ft space • Existing facility size: 1,700 sq.ft • Request to re-locate and expand existing facility (13 Alma St) 	<ul style="list-style-type: none"> • A museum <p><u>Land uses</u></p> <ul style="list-style-type: none"> • Museum • Storage • Administrative offices 			

MOHAWK LAKE DISTRICT PLAN

EXPRESSION OF INTEREST SUBMISSION SUMMARY (discussed JUNE 2018)

COMMUNITY GROUP	LAND REQUEST	SPACE REQUEST (tenant in a building)	PROPOSAL / LAND USES	CITY FUND REQUEST	FUNDING REQUIRED	TIMING
9/ Canadian Industrial Heritage Centre	<ul style="list-style-type: none"> • 2 acres • Creation of a new facility 		<ul style="list-style-type: none"> • An outdoor, landscaped space to preserve, promote, and honour industrial heritage <p><u>Land uses</u></p> <ul style="list-style-type: none"> • Outdoor display of artifacts and information • Preservation of existing Timekeepers building • Multi-purpose landscaped outdoor open space/park 	<ul style="list-style-type: none"> • A lease agreement for land 	<p><u>Funding sources include:</u></p> <ul style="list-style-type: none"> • Possible grants • Fundraising 	When space is available and a lease agreement is executed



WHAT WE HEARD

at the Public Design Workshop #1 on March 29, 2018

PRINCIPLES



VIBRANT NEIGHBOURHOOD

Mohawk Lake District will be a vibrant and beautiful district that will attract residents and visitors to the area.



CENTRE FOR TOURISM

Mohawk Lake District will be a key attraction and destination for artistic, recreational and cultural tourism.



CITY'S RECREATIONAL CENTRE

Mohawk Lake District will provide for a wide range of recreational uses and activities available to the public.



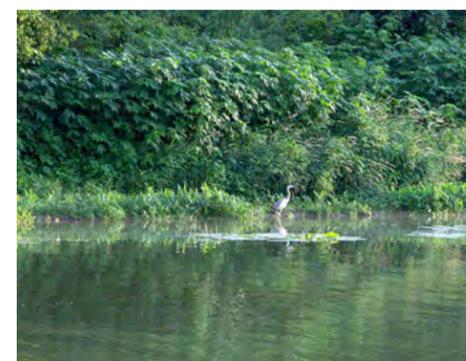
CONSERVE AND CELEBRATE HERITAGE

Mohawk Lake District has a strong natural, cultural and industrial heritage that will be respected and enhanced.



HOLISTIC & CONNECTED

The Mohawk Lake District will be designed and connected as a unified, welcoming place.



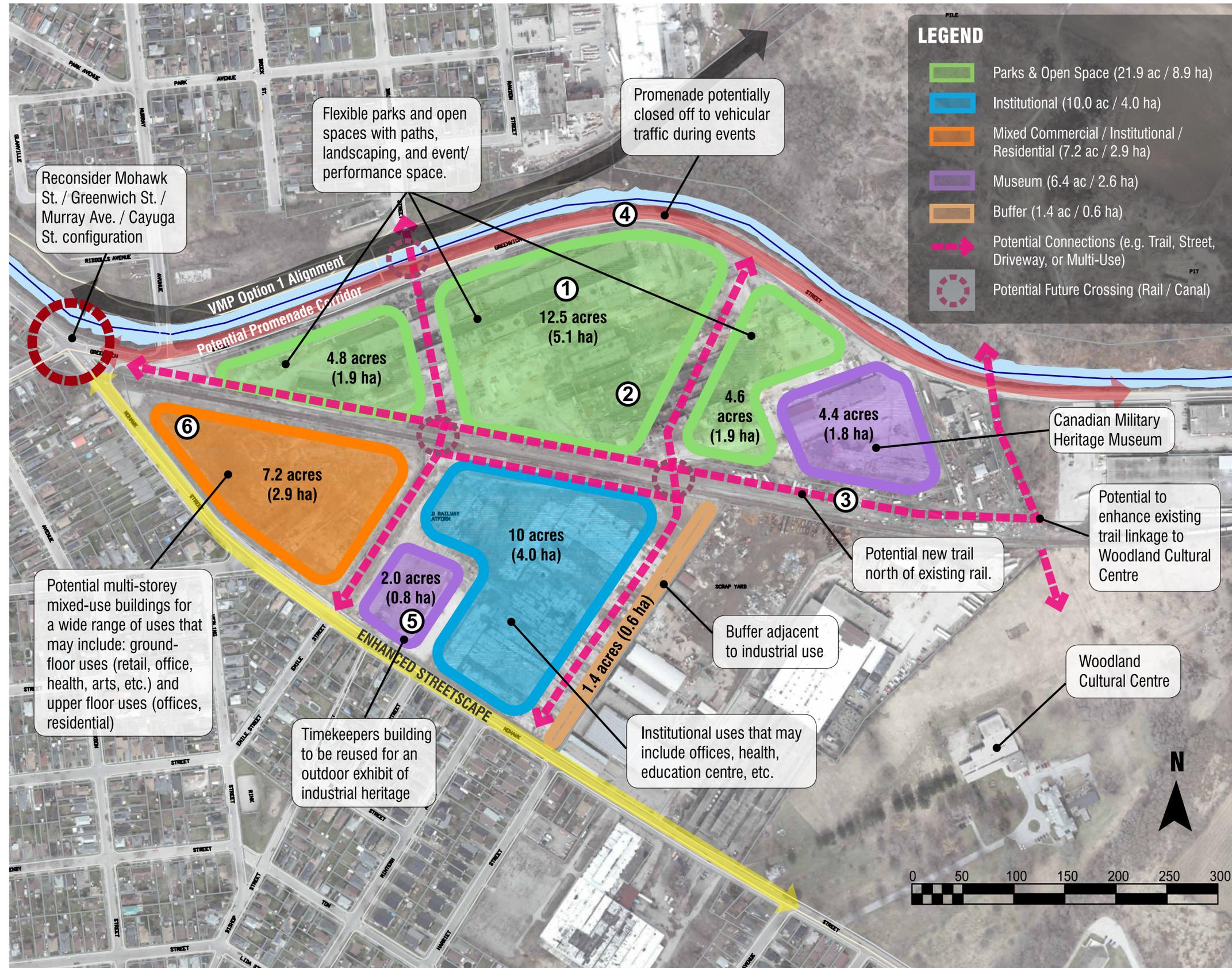
SUSTAINABLE COMMUNITY

Development in Mohawk Lake District will incorporate innovative, sustainable practices to create a greener community.

OPTION 1

OUTDOOR EVENTS AND FESTIVAL FOCUS

A destination for major cultural events and festivals. The primary land uses include a large purpose-built event area with associated parks and open spaces, an institutional area, and some mixed commercial and institutional uses.

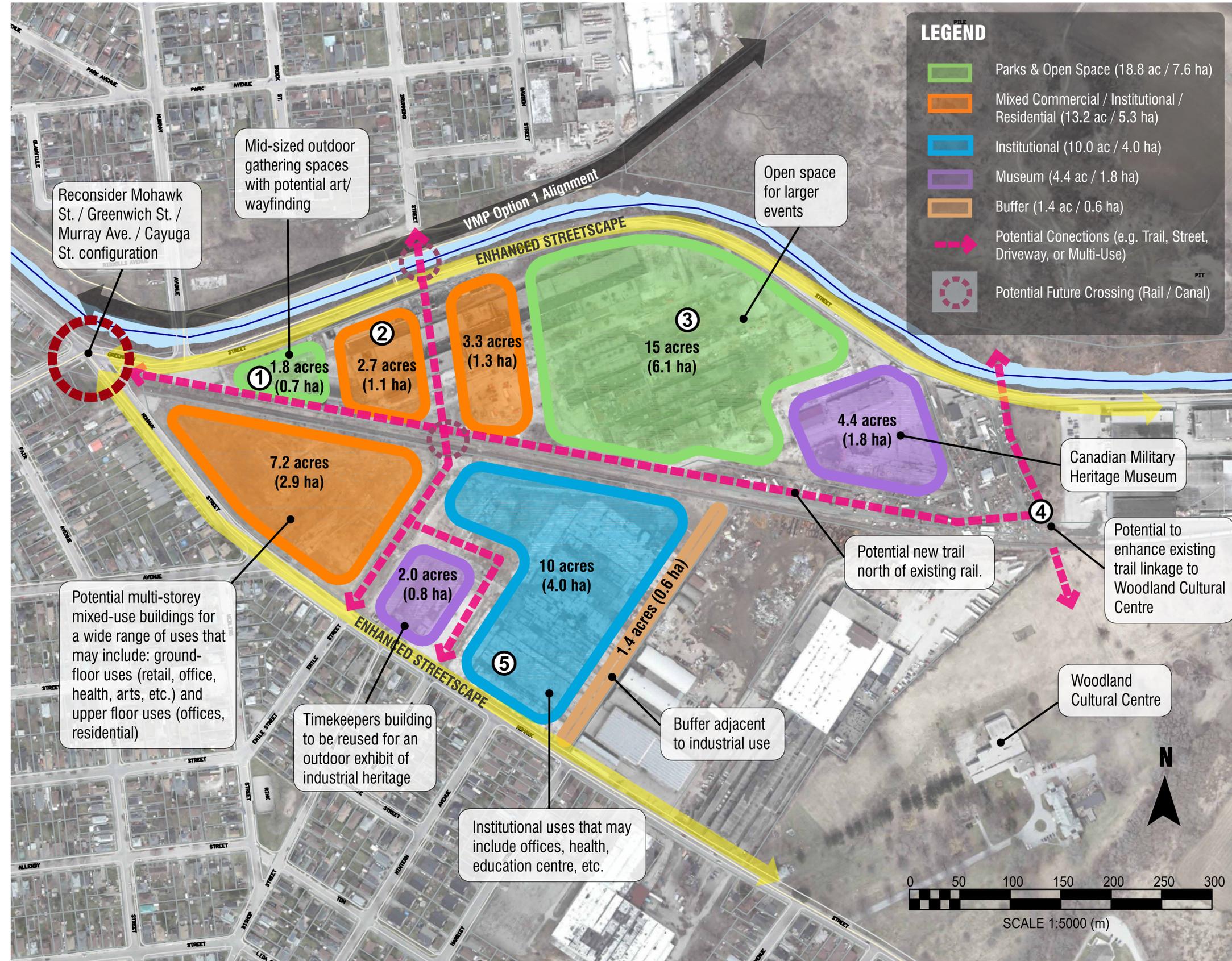


October 2018

OPTION 2

CULTURE AND COMMUNITY FOCUS

A destination for both cultural gatherings and community and commercial services. A balance of land uses that include a multi-purpose open space, several options for mixed commercial and institutional uses with potential upper-story residential, and an institutional area.

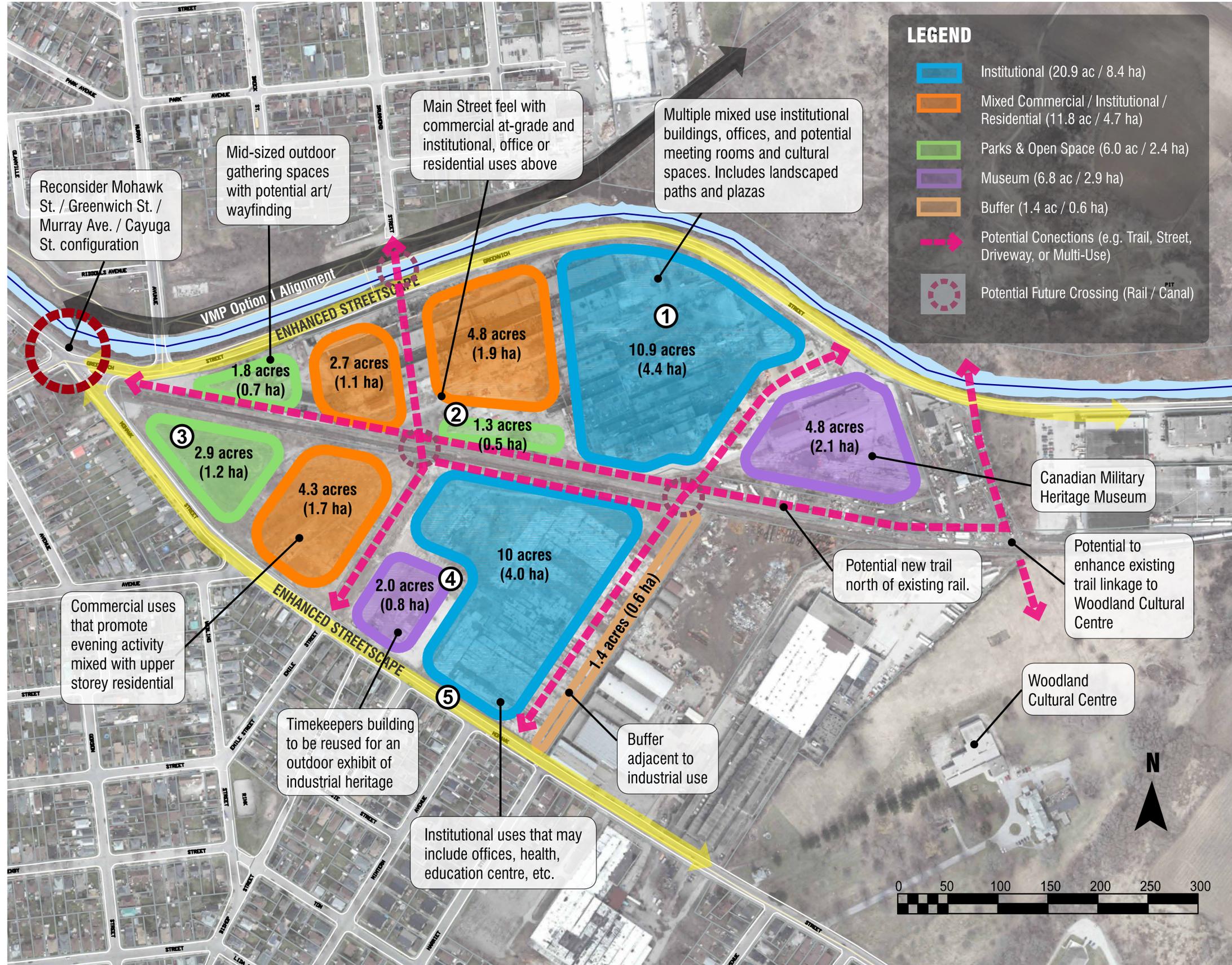


October 2018



OPTION 3 COMMUNITY SERVICES FOCUS

Primarily a destination for community services, including large institutional areas, and options for mixed commercial and institutional uses with potential upper-story residential. The space may be campus format with smaller scale public gathering spaces



October 2018

MEMO

TO: Tara Tran
FROM: John Tassiopoulos and Valentina Chu
SUBJECT: Mohawk Lake District Plan – Results and Analysis of Public Open House #2 and Online Survey Voting
DATE: February 15, 2019

Introduction & Purpose

Three land use concepts for the Mohawk Lake District Plan area were developed based on extensive input provided by City staff and from the public at the Public Open House Meeting #1, held on March 29, 2018. These concepts were further developed and refined over the course of the year from comments by City staff and our study team into three conceptual plan options:

- **Option 1 – Outdoor Events & Festival Focus** - *A destination for major cultural events and festivals. The primary land uses include a large purpose-built event area with associated parks and open spaces, an institutional area, and some mixed commercial and institutional uses;*
- **Option 2 – Culture and Community Focus** - *A destination for both cultural gatherings and community and commercial services. A balance of land uses that include a multi-purpose open space, several options for mixed commercial and institutional uses with potential upper-story residential, and an institutional are; and,*
- **Option 3 – Community Services Focus** - *Primarily a destination for community services, including large institutional areas, and options for mixed commercial and institutional uses with potential upper-story residential. The space may be campus format with smaller scale public gathering spaces.*

These options were presented at Public Open House #2 (November 28, 2018) and posted on the City's website, with an online survey, to receive comments on the option most preferred. In both instances the engagement of the public included:

1. a simple **voting process** of selecting which option was most preferred; and
2. asking respondents to **comment** on what they liked about their selected option.

The Public Open House #2 was attended by over 100 residents (92 signed -in but more than one hundred were counted) and the online survey was completed by 544 respondents. This robust response required that we not only review the general preferred voting, but also look at

the commentary in order to inform our team’s determination of which option(s) should be further developed into a preferred plan for the study.

The purpose of this memorandum is to provide a general outline of the public feedback received at the Public Open House #2 and from the on-line survey that was posted on the City’s website (December 13, 2018 to January 14, 2019) with respect to the three conceptual plan options developed for the Mohawk Lake District Plan’s brownfield area. As part of the process of identifying a preferred or hybrid plan option, the review of voting selection of most preferred and least preferred option, along with identifying common themes of why an option was preferred, is essential. The review and the results of the comments will help inform next steps and assist in the selection of a preferred plan that will be more fully developed into a demonstration plan for the study area. The memo and tables below provide a summary of the results and the major themes that were identified in the review of the comments received. The following sections provide an analysis and highlight recurring themes in the comments received from the public engagement session and survey.

PART A – PUBLIC OPEN HOUSE MEETING #2

The Public Open House Meeting #2 was held on November 28, 2018 in which 92 people signed in. Not every participant signed in on the attendance sheets which suggests that the actual number of participants was beyond 100 attendees. The three conceptual plan Options were presented to those in attendance providing highlights of their respective land use structure and their differences.

1. Results of Voting for the Preferred Option

Following the presentation, the public was asked to vote on their preferred Option out of either Option 1 (Outdoor Events and Festivals), Option 2 (Culture and Community), and Option 3 (community services). The participants were each given one large green dot sticker to represent their most preferred option and one large red dot sticker to represent their least preferred option. Table 1 shows the results of votes for and against each with respect to each option.

Table 1 – Most Preferred vs. Least Preferred Option Votes (November 28, 2018)

OPTION	MOST PREFERRED	LEAST PREFERRED
Option 1: Outdoor Events and Festival Focus	35	14
Option 2: Culture and Community Focus	26	4
Option 3: Community Services Focus	8	35

Based on the voting activity, most participants indicated a preference towards Options 1 and 2 with 35 and 26 votes, respectively, selecting it as them “most preferred” options. Option 2 is distinguished from the other Option 1 by having only 4 votes, the fewest, within the “least preferred” category. Option 3 was given 35 the “least preferred” votes and the lowest “most preferred” assignment with only 8 votes.

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The participants were also each given three small green dot stickers to indicate their “likes” and three small red dots to indicate their “dislikes” of the land uses proposed within each Option. Tables 2 to 4, below, summarize the results of land use type “likes” and “dislikes” of each option (See Appendix A for photos of the activity boards).

Although this portion of the public voting was not as clear as the simple voting for the preferred Option, as noted in Table 1 above, it did provide some general preferences with respect to land use allocations in each Option. Following each table, we have provided a brief analysis with respect to the voting.

Table 2 – Option 1 Outdoor Events and Festival Focus: Likes and Dislikes

LOCATION OF VOTING DOT	LIKES	DISLIKES
4.8 Acre Park & Open Space	3	3
12.5 Acre Park & Open Space	9	12
4.6 Acre Park & Open Space	2	2
4.4 Acre Museum	7	0
7.2 Acre Mixed Use	7	3
2.0 Acre Museum	6	0
10.0 Acre Institutional	1	3

The results of land use preference for Option 1 was interesting because although it was the most preferred concept plan the park and open space land uses that are the focus of this Option were generally equal in terms of likes and dislikes with the exception of the largest park and open space. The mixed-uses were positive while the museum uses were the only uses that had no “dislikes”. The Institutional use had more negative than positive votes even though there were only four total votes.

Table 3 – Option 2 Culture and Community Focus: Likes and Dislikes

LOCATION OF VOTING DOT	LIKES	DISLIKES
1.8 Acre Park & Open Space	3	0
2.7 Acre Mixed Use	0	4
3.3 Acre Mixed Use	4	7
15.0 Acre Park & Open Space	10	1
4.4 Acre Museum	2	1
10.0 Acre Institutional	4	0
2.0 Acre Museum	2	1
7.2 Acre Mixed Use	8	5

The results of land use preference for Option 2 were also interesting because whereas in Option 1 large park and open space use had more dislikes than likes, the largest space in this Option had the largest number of "likes" and the smaller park space also received only positive votes. With respect to the Mixed Uses it appears that the larger area was preferred while the smaller areas, on the north side of the Option, were not. What was slightly puzzling was that in this Option the same 10.0 acre Institutional use indicated in all three Options, received only positive votes. The Museum uses were again positively selected but with fewer overall votes and not unanimously as per Option 1.

Table 4 – Option 3 Community Services Focus: Likes and Dislikes

LOCATION OF VOTING DOT	LIKES	DISLIKES
1.8 Acre Park & Open Space	1	0
2.7 Acre Mixed Use	0	3
4.8 Acre Mixed Use	3	2
1.3 Acre Park & Open Space	2	3
10.9 Acre Institutional	2	8
4.9 Acre Museum	2	0
10.0 Acre Institutional	0	1
2.0 Acre Museum	0	0
4.3 Acre Mixed Use	2	0
2.9 Acre Park & Open Space	3	0

The results of land use preference for Option 3 were not generally definitive because of the very low number of votes for both "likes" and "dislikes" which indicates a lower interest by participants which is consistent with the Table 1 results noting that this was the least preferred of all the Options. Compared to the number of votes for land uses observed for Options 1 and 2 (58 and 48 respectively) only 23 total votes, 12 of which were "dislikes", were counted for Option 3. The majority of the "dislikes" centred on the 10.9 acre Institutional use on the north side of the Option. The other uses 3 votes or less so it was difficult to discern clear preference due to the low number of votes.

2. Results of the Review of Comments Posted on the Options

In addition to the voting process that took place during the Public Open House, participants were also provided with adhesive notes were also distributed to participants to allow them to provide more detailed comments and feedback on the three Options. These comments were placed on the Options by participants and were recorded by the Study Team. Although not all the comments were specific to land uses in each option and preference there were some recurrent commentary themes that were identified in each Option.

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a. General Comments for Option 1

A total of 42 comments were provided and recorded for Option 1 and included the following general themes:

- The provision of green spaces was appreciated and there was a concern about ensuring that they are not underutilized and that they include indoor and outdoor uses to ensure that use is not only seasonal;
- Ensure connectivity to surrounding trails and to connect to the Canal area;
- There was general support for the creation of a promenade along the north edge of the Option and adjacent to a naturalized Canal area;
- Provision of commercial/retail that contributes to evening or night life uses; and,
- Desire for more residential uses and interest in what types of residential uses will be introduced in this Option.

b. General Comments for Option 2

A total of 19 comments were provided and recorded for Option 2 and included the following general themes:

- There was general interest and support with respect to trails; and,
- There were a few instances where it was asked if a promenade as per Option 1 could be introduced in this Option to ensure increased foot traffic.

c. General Comments for Option 3

A total of 20 comments were provided and recorded for Option 3 and included the following general themes:

- There was general interest and support with respect to new trails, connection to existing trails and connectivity to the canal and to the adjacent indigenous areas; and,
- There were references to the provision of affordable housing and housing on Mohawk Street; and,
- There was concern about whether there was demand for the extent of Institutional uses in this Option.

3. Conclusions on Voting Results and Comments from Public Open House #2

Given the above voting results and review of the comments received at the Public Open House we arrived at the following conclusions and recommendations:

- Based on the Table 1 results, Option 1: Outdoor Events and Festival Focus garnered the largest number of “most preferred” votes (35 votes) while Option 2: Culture and Community Focus was second in voting (26 votes) and had the lowest number of “least preferred” votes (4 votes) compared to Option 1’s (14 votes). Option 3

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- overwhelmingly received the most “least preferred” votes (35 votes) with the lowest “most preferred” votes (8 votes). **Based on the simple voting process we can conclude that both Options 1 and 2 were the “most preferred”;**
- Noting that Options 1 and 2 were the “most preferred”, we can turn to the finer grain of voting for land use “likes” and “dislikes” as indicated in Tables 2 and 3 above:
 - There was overwhelming support for the Museum uses as indicated in both plans;
 - The Parks and Open Space uses for Option 2 received much more positive support than those in Option 1 which either received equal number of “likes” and “dislikes” for the smaller park spaces while the largest 12.5 acre parcel received more negative as compared to positive votes (12 to 9 votes);
 - With respect to Mixed-Uses the 7.2 acre parcel on the south side of both Options when added received mostly positive votes (15 “likes” vs. 8 “dislikes”). The Mixed-Uses on the north side of Option 2 generally received negative votes; and,
 - The most obvious inconsistency was found in the Institutional use which although being identical in size, configuration and uses on the south side of both Options 1 and 2 only received positive support In Option 2.

Based on the voting on land uses we note that there doesn't appear to be support for the full extent of parks and open space configuration on the north side of Option 1 while there was limited support for Mixed-Uses on the north side. This begs the question then what is actually desired on the north side if Option 1 park spaces, Option 2 mixed uses and Option 3 institutional uses are all not supported, then what is? **Given this conundrum and inconsistencies in response noted we believe that the land use range presented in Option 2 should be provided in Option 1, with adjustments to reduce the Park and Open Space uses could potentially achieve a more supportable Option;**

- The only information to be gleaned from the Option 3 land uses preferences was that the large Institutional 10.9 acre parcel on the north side received the greatest number of “dislike” (8 votes) which was significant as all other land uses received between 0 and 3 votes. **Given that neither Options 1 or 2 include this large Institutional land use, it can be concluded that the participants did not support this use in this location;** and,
- The review of the comments received for each of the Options provided the following themes with respect to preferred uses and activities:
 - Parks and Open Spaces in the Options 1 and 2 were perceived positively but there was concern that if too much is dedicated to this use it may be underutilized;
 - Comments for all three Options noted the need to ensure trail connectivity both within the proposed Options and to existing trails, the Canal and to adjacent Indigenous areas, where possible;
 - There was consistent interest in the development of a Promenade along the north side of the Options;

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- Option 1 was criticized for not including more residential uses while there was an interest in the provision of affordable housing in Options 2 and 3; and,
- Some desire was expressed in the provision of commercial/retail uses that included evening/night time function.

Noting the earlier inconsistencies in bullet 2 above, these general comments provide additional direction and **support for the land use range presented in Option 2 with the addition of a promenade, commercial / retail uses, and trail connectivity.**

PART B – ONLINE SURVEY RESULTS AND COMMENTS

In addition to Public Open House #2, an online survey was undertaken between December 13, 2018 and January 14, 2019. This survey reached 544 participants, of which approximately 15% were from Ward 1, 13% were from Ward 2, 16% were from Ward 3, 13% were from Ward 4 and 26.5% were from Ward 5. The remaining 16.5% were either not from Brantford, didn't know what Ward they resided in or left the answer blank.

Table 5 – Online Survey Participation by Ward (Online Survey – January 14, 2018)

WARDS	Survey Participants	%	Attended POH #2	Duplication %
Ward 1	81	15	6	7
Ward 2	72	13	6	6
Ward 3	84	16	4	5
Ward 4	73	13	4	5
Ward 5	144	26.5	11	8
Non-Resident, Unsure, Blank	90	16.5	4	4
Total	544	100	35	N/A

Ward 5 had the highest number of participants in the survey which is to be expected as the Mohawk Lake District Plan study is located within Ward 5. The distribution of participants from other Wards was fairly evenly distributed which shows that the neighbouring Wards had equal interest in the project.

Out of the 544 online participants, 496 responded that they did not attend the Public Open House Meeting #2 held on November 28, 2018 while 35 participants responded that had attended, and 12 participants did not respond to this question. This shows that the survey was able to reach a great number of participants the majority of whom identified themselves as residents of a City Ward (approximately 83.5%) and that only a small number of participants (6%) indicated that they had also attended Public Open House #2 with the potential for duplication or “being counted twice” was very low (4 to 8%).

1. Results of Voting for the Preferred Option – Online Survey

As per the Public Open House voting on the preferred Option, the same three Options were presented and online participants were asked to select their preferred Option; Table 6 below provides the results of the online voting.

Table 6 – Most Preferred vs. Least Preferred Option Votes (Online Survey – January 14, 2018)

OPTION	MOST PREFERRED	%
Option 1: Outdoor Events and Festival Focus	217	40
Option 2: Culture and Community Focus	129	24
Option 3: Community Services Focus	185	34
No Option Chosen	13	2
TOTAL	544	100

The participants of the online survey were asked to select their preferred option. Option 1 was preferred by 40% of participants, Option 2 was preferred by 24% of participants and Option 3 was preferred by 34% of participants. Similar to the Public Open House Meeting #2, more participants preferred Option 1. What was surprising was that Option 3 garnered preferred votes than Option 2 which differed significantly from the input recorded at Public Open House #2.

2. Review of Comments on Why Option was Chosen

Following the online survey’s request to select a preferred Option, it was followed by the following question:

“Tell us a bit more about why you like the option that you picked in Question 3. Are there any aspects of that option that could be improved?”

To understand the results to this question we reviewed the responses and tried to identify common themes with respect to preferences as they applied to each Option.

a. General Comments for Option 1

The participants that chose Option 1 chose this option due to their preferences for the following attributes they identified in its design:

- More outdoor recreational areas and event spaces for festivals and other community activities;
- More outdoor open green spaces, parks and connection to trails;
- Felt this Option would satisfy needs of a range of Brantford residents;
- A stronger sense of community and providing more family-friendly activities;
- Large green interface with and connectivity potential to the Canal;
- Potential for large outdoor special events and venues;
- Preservation of nature;

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- Potential to attract visitors as a destination for events;

In reviewing the comments, it was noted that of the 217 respondents that preferred Option 1, 75 respondents (approximately 35%) left the comment section, on why they liked that Option, blank.

When asked where the respondents lived, 3 did not live in Brantford and 15 left the response blank, for a total of 18. Of these 18 respondents 13 indicated unanimously that they liked Option 1 because of the significant park and open space areas and the potential of a venue to hold large events.

Some participants who chose Option 1 also highlighted some items to keep note of including:

- There was a general concern about not including too much residential use and what form that residential use may take. Comparatively, the Public Open House #2 respondents, criticized the lack of potential residential in Option 1.

b. General Comments for Option 2

The participants that chose Option 2 chose this option due to their preferences and following attributes they identified in its design:

- Most balanced approach; a good mix/balance of uses between commercial, residential, institutional and green space;
- There is still the opportunity for large outdoor space for festivals and large events;
- A cultural hub;
- Potential new housing and affordable housing opportunities
- Connection with neighbours; and,
- Feeling this Option will generate more tax revenue for the City.

Some participants who chose Option 2 also highlighted some items to keep note of including:

- Have regard for local culture especially with respect to indigenous groups;
- Consider incorporating indigenous design approaches (e.g. Helen Betty Osbourne Ininiw Educational Resource Centre -Norway House - and The Forks, Winnipeg)
- Paying attention to providing enough parking;
- Support for the idea of a “Main Street” as indicated in Option 3;
- Emphasis on connection to trails and walkability and integration with canal, surrounding parks, and trail systems;

In reviewing the comments, it was noted that of the 129 respondents that preferred Option 2, 43 respondents (approximately 33%) left the comment section, on why they liked that Option, blank.

When asked where the respondents lived, 7 did not live in Brantford and 8 left the response blank, for a total of 15. Of these 15 respondents 8 of them provided comments on why they preferred Option 2 and it was generally because of the balanced approach between the mix of uses while maintaining significant park and open space areas.

c. General Comments for Option 3

The participants that chose Option 3 chose this option due to their preferences and following attributes they identified in its design:

- Feel that Brantford requires more community services and those currently serving the community are outgrowing current location and many referred to creating a community services “hub”;
- Many mentioned that the community services focus of this Option was preferred for the accommodation of a new facility for Lansdowne Children’s Centre;
- Preferred this Option over the concern that large park spaces would be dependent on events and festivals leading to underutilization; they are costly to maintain, and that there were already parks/green spaces in the City;
- Many felt this Option would provide greater tax revenue to the City through the Institutional and Mixed Use of the Option;
- Mixed Uses were seen as a chance to provide housing and to support more life and greater activity; and,
- There were suggestions that the Option could benefit from additional park space.

In reviewing the comments, it was noted that of the 185 respondents that preferred Option 2, 69 respondents (approximately 37%) left the comment section, on why they liked that Option, blank.

When asked where the respondents lived, 35 did not live in Brantford and 10 left the response blank, for a total of 45. This was nearly three times the number of either Options 1 or 2. Of these 45 respondents, 30 of them provided comments on why they preferred Option 3. More than half -17 respondents - indicated that the Community Services Focus could provide more space specifically for the Lansdowne Children’s Centre or a children’s treatment centre. The remaining respondents mentioned that more community services were needed in Brantford.

Comments regarding new space for the Lansdowne Children’s Centre (LCC) are highlighted because this specific use was particularly identified 31 times overall (17% or 1 in 6 respondents) as the reason for selecting Option 3. This response level, combined with nearly 19%, or approximately 1 in 5 respondents identifying that they did not reside in Brantford, raises the concern that the results of the survey may have been skewed by a concentrated effort by proponents of the LCC and respondents who were not residents of Brantford. Of the 31 times the LCC was cited in the Option comments, a total of 13 citations were made by non-residents (approximately 42%).

3. Conclusions on Online Survey Results And Comments (January 14, 2019)

Given the above overall voting results and a review and analysis of the comments received from the Online Survey, we arrived at the following conclusions and recommendations:

- Based on the Table 6 results, Option 1: Outdoor Events and Festival Focus garnered the largest number of “most preferred” votes (217 votes, or approximately 40%) while Option 3: Community Services Focus was second in voting (185 votes, or

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approximately 34%) and Option 2: Culture and Community Focus was third (129 votes, or approximately 24%) We believe that the very different result of voting for Option 3 between the online survey and Public Open House #2, where Option 3 overwhelmingly received the highest number of “least preferred” votes (35 votes vs. 14 and 4 for Options 1 and 2 respectively) may be attributed to a large number of respondents who were either not Brantford residents, or who specifically identified this Option as preferred to accommodate the needs of the Lansdowne Children’s Centre. This activity may have skewed the results of voting. Subtracting non-residents (35), brings the total “most preferred” votes (150 adjusted votes) closer to the total votes for Option 2 (129 votes – 7 non-resident = 122). Regardless, Option 3 was still second in voting even with the non-weighted and simple subtraction. **Based on the simple voting process we can conclude that Option 1 again was the “most preferred”. With respect to the results for Options 2 and 3, however, we believe that there may be a need to weight the “most preferred” voting of Brantford residents in comparison to non-residents. This is important because as noted in sections 2 a. and 2 b. above, Options 1 and 2 only had 3 and 7 non-resident votes;**

- As with the concern above regarding the potential skewing of Option 3 results, the **study team and City staff should consider whether all land uses proposed for in Options and 2 should also be weighted evenly;** and,
- There was general support for the following land uses and elements once we consider and consolidate the comments for all three Options:
 - Connectivity to and integrating of proposed Options into the surrounding community, trails, the canal and other park features;
 - Potential for large outdoor special events and venues destination with the ability to attract visitors for such events was mentioned frequently in Option 1 and also Option 2 comments;
 - Criticism of Option 1 centred around the lack of residential uses and concern of utilization of such a large park and green open space area;
 - Option 2 was predominantly selected by respondents because of its balanced approach for all the proposed uses and because it balances the potential for a large event space with the mixed uses that could introduce other forms of housing and housing affordability; a good mix/balance of uses between commercial, residential, institutional and green space;
 - Option 2 respondents generally felt that this Option would be the most sustainable for providing tax revenue to the City;
 - Option 2 respondents indicated an interest in ensuring indigenous areas and uses are considered in the design and that indigenous design be incorporated;
 - Option 3 was predominantly selected by respondents who felt that Brantford was lacking community service facilities or felt existing services had outgrown their current facilities;
 - Option 3 respondents were concerned with large park / event spaces and the potential lack of utilization while the idea of a mixed use “Main Street” that provided greater activity and social amenity were supported; and,

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- Option 3 respondents felt it could benefit from additional park space.

Based on the consolidated comments it appears that Option 1, with the tempering of park and open space uses along with “Main Street” mixed use areas, including additional institutional uses, would address the preferences expressed in the consolidated comments. Interestingly, given the range of comments and criticisms expressed, **we believe that the land use range presented in Option 2 along with additional Institutional uses with could potentially result in a hybrid of the plans, leading to a supportable Option.**

PART C – PUBLIC ENGAGEMENT RESULTS & POSSIBLE PREFERRED OPTION

Having reviewed and analysed the voting preferences and comments with respect to the public engagement events of the November 28th, 2018 Public Open House #2 and the Online Survey results of January 14, 2019 we have been able to gauge preferences with respect to particular Options, as well as, identify the mix of land uses the public participants/respondents would support as a preferred plan for the brownfield area within the Mohawk Lake District Plan. From our review of public engagement results and materials, we have concluded the following:

- In both instances **Option 1 was the preferred plan, however**, the critiques of this Option and desired improvements mentioned by participants and respondents in both sessions suggest that **it requires further refinement**;
- The retention and improvement of the Museum uses was supported;
- The Parks and Open Space uses were highly desired especially with respect to supporting special events and event venues. However, there was concern as to whether the full extent of these uses proposed for Option 1 were excessive, would perhaps be underutilized and be slightly more compact to allow for other uses. It was noted that the green space in Option 2 received greater support;
- The Parks and Open Space uses were seen as a natural interface to the Canal, that could integrate proposed connections with existing trail networks, and could be part of a potential Promenade design for Greenwich Street;
- The Mixed Uses received varying support depending on the Option proposed. Public Open House #2 participants gave the Mixed Use areas either neutral or negative votes for the parcels on the north side of the study area, while the Online Survey respondents indicated a preference for Options 2 and 3 because these uses could potentially provide more housing, general activity and the creation of a “Main Street”. Furthermore, Option 1 received criticism for not including more residential uses in both public engagement forums;
- The Institutional uses, especially those proposed on the north side of the study area in Option 3 received very little support in the Public Open House, however, the respondents to the online survey selected the community services focus of Option 3 ahead of Option 2. Even if we account for potential skewing of results noted in section B.2.c. there was a feeling that existing services had outgrown their current facilities and more space for

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community services should be provided. It suggests that although we do not identify support for a large Institutional use on the north side, we do consider accommodating a more modest Institutional uses, to be appropriate on the north side;

- The Promenade Corridor indicated in Option 1 had consistent interest and support from both public open house participants and online survey respondents. We noted comments from those that preferred Options 2 and 3 that the Promenade be included in those Options as well; and,
- Numerous comments through the public engagement materials spoke to the desire to potentially connect to adjacent indigenous areas through trails and to consider indigenous design in the plan, where possible.

Taking all of these conclusions into account and factoring in the analysis of the public engagement processes, **we recommend that we move forward with a combination of Options 1 and 2, with added modest Institutional uses on the north side, provision of a mixed use “Main Street” and the introduction of a Promenade Corridor for Greenwich Street along the extent of the brownfield area.**

Sincerely,

A handwritten signature in blue ink, appearing to be 'JT', with a large loop at the end.

John Tassiopoulos MCIP, RPP
Senior Project Manager

A handwritten signature in blue ink, appearing to be 'Valentina', written in a cursive style.

Valentina Chu
Project Planner and Urban Designer

MOHAWK LAKE DISTRICT PLAN: OVERALL DRAFT PREFERRED PLAN



Direct pedestrian linkage between Clarence St. S. and primary pedestrian linkage along the Canal

Primary pedestrian gateway between Downtown Brantford and the District

Enhance pedestrian interface with Canal, including recreational opportunity

Identify at least one new pedestrian crossing over the Canal and into Brownfield Site

Institutional use proposed beside large event space to transition to potential "Main Street" mixed use.

Potential realignment of Trans Canada Trail

Enhance waterfront-related recreational opportunity (options will be informed by future water quality assessments)

Enhance Alfred Watts Ruins as a destination with formalized lookout points and consideration for formalized parking areas

Potential trail that connects the overall trail network to the Grand River and the Alfred Watts Ruins

Create a gateway with high quality urban design, a mix of uses, and medium to medium high-density built form (4 - 8 storeys)

Work with Six Nations to identify linkages

Potential lookout point towards Mohawk Lake if the landfill is decommissioned in the future

Enhance Murray Street Crossing for pedestrians/cyclists

Potential new passive open space with southerly access to Mohawk Lake

Legend

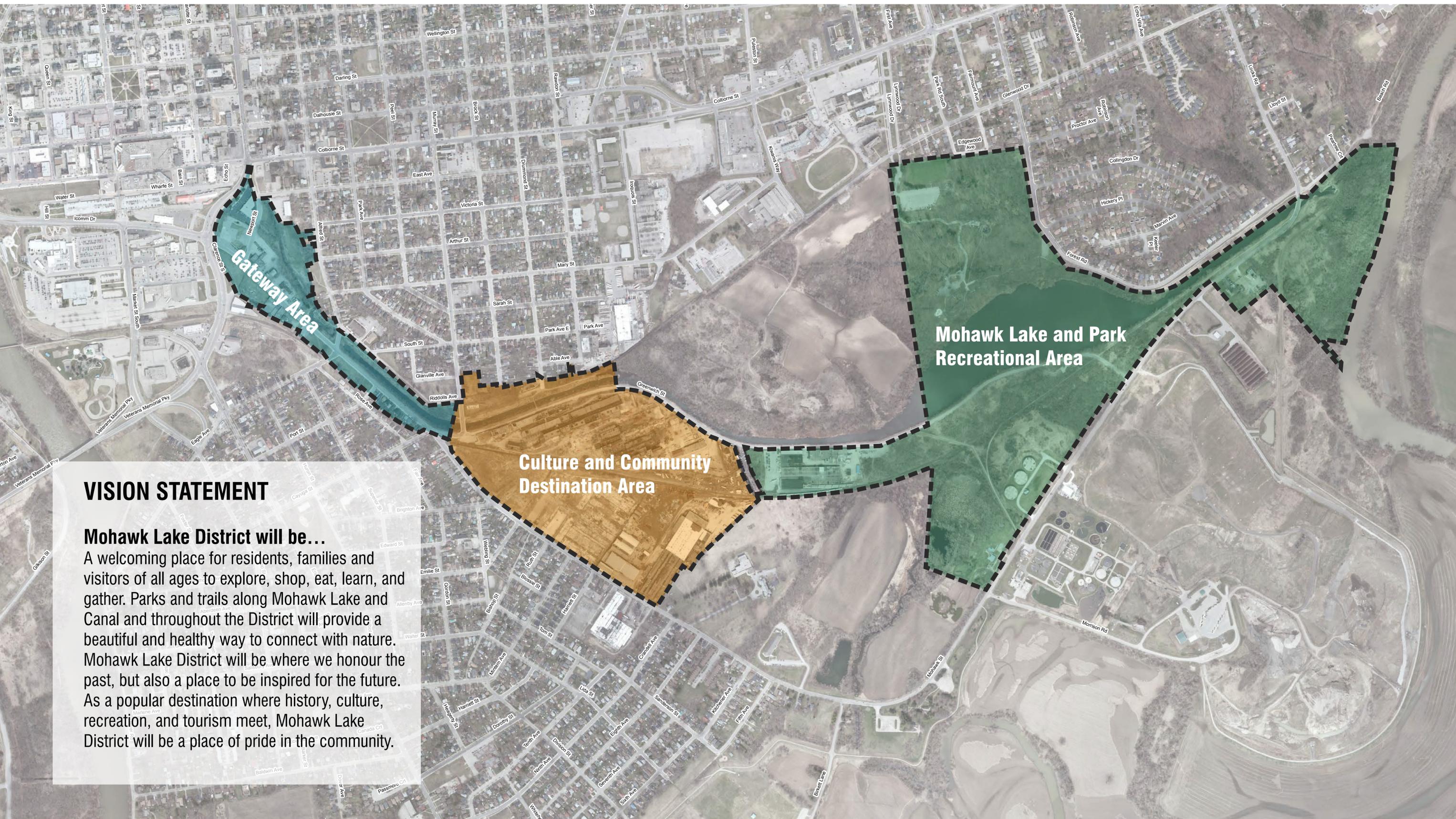
	Veterans Memorial Extension (Option 1)		Existing Parks
	Enhanced Streetscapes		Potential New Park
	Existing Trails		Enhanced Mixed Use Gateway
	Trans Canada Trail		Mixed Use Corridor
	Proposed Enhanced Trails		Mixed Commercial
	Proposed New Trails		Institutional
	Potential/Enhanced Canal or Rail Crossing		Transitional Institutional Mixed Use
	Focal Points		Museum
	Lookout Points		

Discussion with Six Nations regarding potential enhancement of existing trail linkage to Woodland Cultural Centre





MOHAWK LAKE DISTRICT PLAN: VISION AND AREAS



VISION STATEMENT

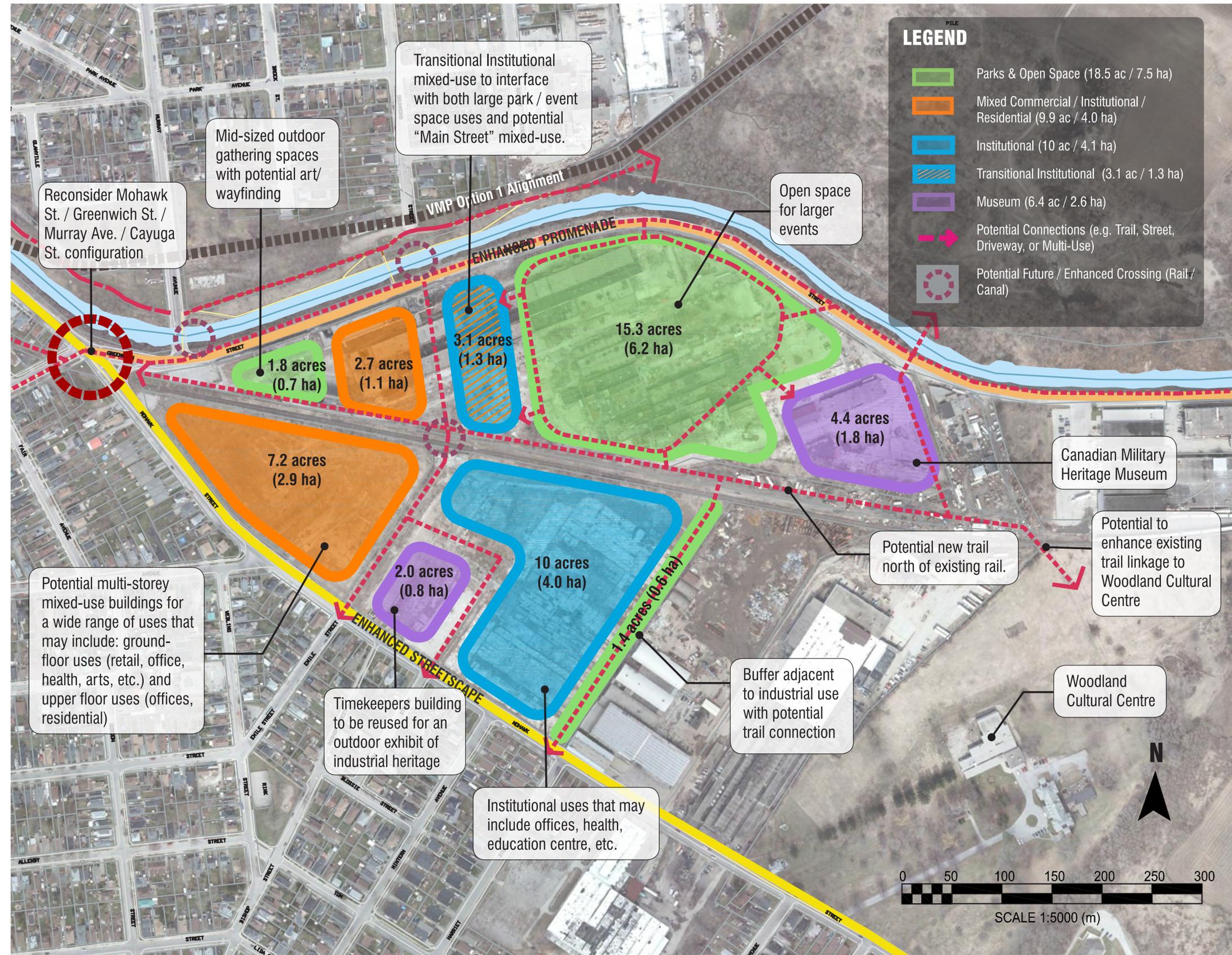
Mohawk Lake District will be...

A welcoming place for residents, families and visitors of all ages to explore, shop, eat, learn, and gather. Parks and trails along Mohawk Lake and Canal and throughout the District will provide a beautiful and healthy way to connect with nature. Mohawk Lake District will be where we honour the past, but also a place to be inspired for the future. As a popular destination where history, culture, recreation, and tourism meet, Mohawk Lake District will be a place of pride in the community.



CULTURE AND COMMUNITY DESTINATION

AREA DRAFT PREFERRED PLAN





CITY OF BRANTFORD
MOHAWK LAKE DISTRICT PLAN
LAND USE OPTIONS EVALUATION REPORT

MAY 2019

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Figure 10: Option 2 – Culture and Community Focus

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Figure 12: Mohawk Lake District Draft Preferred Plan

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APPENDICES

Appendix A: Public Engagement #1 - Design Charrette Presentation Slides (March 29, 2018)

Appendix B: High Level Overall Land Use Concept Plan - Concepts 1 to 3 (March 29, 2018)

Appendix C: 2nd Round of Concepts for Technical Staff Review - Options 1 to 3 (August, 2018)

Appendix D: Staff Technical Meeting Minutes (August 16, 2018)

Appendix E: Mohawk Lake District Plan Brownfield Site - Options 1 to 3 (October, 2018)

Appendix F: Public Engagement #2 – Open House Presentation Slides (November 28, 2018)

Appendix G: Online Survey Summary Report

Appendix H: Memo of Results and Analysis of Public Open House #2 and Online Survey

Appendix I: Preferred Land Use Concept Plan (April, 2019)

Appendix J: Staff Technical Meeting Minutes (April 1, 2019)

1. INTRODUCTION & PURPOSE

The Mohawk Lake District Planning Study (MLDPS) is to provide a comprehensive land use structure and policy framework to guide future development and revitalization in the study area. The study area is made up of diverse land uses, amenities and cultural heritage features and presents many opportunities for the redevelopment and revitalization of the area. There is a unique opportunity for the City to not only create a vibrant community within an existing neighbourhood but to also integrate and reconnect the study area into the surrounding urban fabric.

One of the key deliverables of the MLDPS is to provide a preferred concept plan that will inform the development of a demonstration plan. The demonstration plan borne out of the preferred concept plan will serve as the basis for the vision, goals, and objectives that will be developed for the District Plan report. The preferred demonstration plan will also be the plan that is considered and reviewed for a series of technical studies to support the MLDPS and once finalized, will serve as the basis of the implementing planning documents such as Design Guidelines, an Official Plan Amendment and a Zoning By-law Amendment.

The purpose of this report is to:

- demonstrate the land use option evaluation and refinements of the initial three concept plans for the District Plan as a whole;
- outline the iterative process that led to the concepts for the largest developable area within the Plan, the Greenwich Mohawk Brownfield site;
- provide the results of the public engagement sessions and the online survey with respect to the preferred concept plan; and,
- illustrate the resulting preferred concept plan, which is the culmination of the twelve-month process and will serve to inform the development of the demonstration plan.

2. PUBLIC ENGAGEMENT AND DRAFT PREFERRED LAND USE PLAN

2.1 Public Engagement #1 – Design Charrette (March 29, 2018)

The purpose of the Public Design Charrette #1 was to determine the goals and objectives of the community as well as over-arching development principles to guide the exploration of potential redevelopment concepts for the District. The presentation slides for this meeting are found in Appendix A. The design charrette was held on March 29, 2018 at the S.C. Johnson – T.B. Costain Community Centre, which was attended by approximately 80 residents who participated in round table discussions. Each group was tasked to list out strengths, weaknesses and opportunities within the Mohawk Lake District Plan area.



In general the comments received were positive and highlighted the values of the participants. Some of the **strengths** that were highlighted included:

- The natural and recreational parks including Mohawk Park and Mohawk Park;
- Abundance of wildlife; and
- The history and culture of the area including presence of First Nations.

Some of the **weaknesses** that were highlighted included:

- Concerns for safety in certain areas including trails;
- Awkward intersection at Greenwich Street and Mohawk Street; and
- Potential lack of connectivity to certain areas.

Some of the **opportunities** that were highlighted included:

- Enhanced trails and new connections;
- Enhanced recreational uses and access to the lake and canal;
- Introduce more naturalized areas and parks;
- Create a destination for events and festivals that are family friendly; and
- Introduce a mix of uses including employment and residential.

In addition to the above, three high level land use concepts for the overall Mohawk Lake District Plan area were prepared to further facilitate discussion (see Appendix B) and to assess public reaction to the various land use configurations developed for the study area, as detailed below:

- **Concept 1 – The Cultural Hub** – This concept proposed a principal focus on community uses and sought to enhance the natural and cultural features of the study area. This was done through linking open spaces and introducing institutional uses such as museums and cultural centres as well as the provision of light commercial uses (see Figure 1).

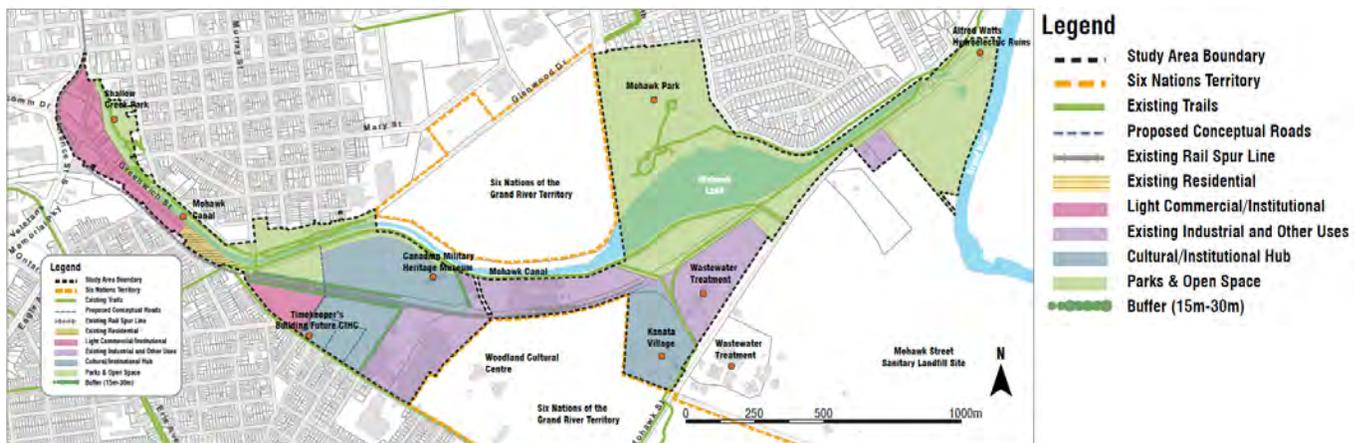


Figure 1: Concept 1 – The Cultural Hub

- Concept 2 – The Housing Concept** – This concept introduced new residential uses, along with parks, open spaces and cultural uses. The focus was to introduce additional residential uses into the Greenwich Mohawk Brownfield site such as semi-detached and townhouses, and to provide transition to the existing residential neighbourhoods to the south (see Figure 2).



Figure 2: Concept 2 – The Housing Concept

- Concept 3 – Balanced Mixed Use** – This concept focused on redeveloping the Greenwich Mohawk Brownfield site to consider a mix of uses such as residential and commercial. The Downtown gateway area along Greenwich Street was proposed to accommodate a mix of commercial, residential and institutional uses of a higher density than shown in other options. The redevelopment projects would range from low-rise residential uses on the south side of the Brownfield site to medium rise buildings while providing a transition to the existing established residential neighbourhoods (see Figure 3).



Figure 3: Concept 3 – Balanced Mixed Use

The design charrette participants were tasked to provide comments and feedback on the three concepts and to conclude the session with a vision statement. The recurring themes identified in the comments received included:

- Creating a destination for family friendly community events and gathering spaces (e.g. music festivals, farmers markets etc.);
- Providing a mix of uses including active frontages such as cafés and patios;
- Highlighting the history and culture of the area and connection with First Nations;
- Enhancing recreational activities (e.g. canoeing, fishing, hiking, snow shoeing etc.);
- Expanding on the amount of natural open spaces and parks;
- Considering appropriate transition between commercial and residential uses;
- Improving connections to trails and providing multi-use trails;
- Hesitation towards too much residential uses in this area;
- Higher densities suggested towards the north side of the tracks; and
- Introducing transit oriented or complete streets.

As part of this exercise, a word cloud was prepared to visually summarize what was heard from the participants at the Public Engagement #1 – Design Charrette (see Figure 4).



Figure 4: “What We Heard” Word Cloud

Using the input gathered from the participants of the Public Engagement #1 – Design Charrette, and working with City staff, the project team developed the following initial draft Vision Statement:

“Mohawk Lake District will be...

A welcoming place for residents and visitors of all ages to explore, shop, eat, learn, and gather. Parks and trails along Mohawk Lake and Canal and throughout the District will provide a beautiful and meaningful way to connect with nature. Mohawk Lake District will be where celebrations of the past, present, and future take place. As a popular destination for cultural heritage, recreation, and tourism, Mohawk Lake District will be a place of pride for everyone.”

2.3 Preparation of Land Use Options – Greenwich Mohawk Brownfield (Summer, 2018)

Following the Public Engagement #1 – Design Charrette the project team worked closely with City staff in the Summer of 2018 to prepare the 2nd round of conceptual land use options for review by City technical staff and in preparation of the Public Engagement #2 – Open House, that was to take place in Autumn 2018. This phase of land use option concepts focused on further refinement of the MLDP’s brownfield area given that its size, general contiguousness and that it would serve as a significant area within the MLDP for redevelopment potential.

Following the comments from the design charrette in Public Engagement #1 it was determined by the study team and City staff that the participants were generally in favour of Concept 3, which displayed a more balanced mixed-use option. There was however concern that the initial concepts presented were not distinct enough from each other in terms of their land use configurations. The study team worked to address this concern in the development of the land use options for the brownfield area. During the process of addressing these comments and refining the conceptual land use options, City staff informed the study team that a 4.0 hectare (10.0 acre) area be dedicated in the study area for potential institutional use.

The 2nd round of concepts took into consideration the input gathered from the Public Engagement #1 – Design Charrette, addressed the concern of more distinct land use mixes and configurations between the options and included the 4.0 hectare (10.0 acre) institutional use. In all the concepts developed for the brownfield area, the institutional use was located on the south side of the rail because it would provide a transition and break between the proposed residential and park space uses to the west. Its positioning could also provide as an additional transition to buffer from the existing industrial uses to the east. In addition, it allowed the larger north portion free for the development of varied land use configurations.

The land use concepts developed were comprised of three options, as follows:

- Option 1 – Outdoor Events and Festival Focus** – This concept focused on creating a cultural / festival hub or destination for large social/community events with an associated mix of cultural spaces, institutional and mixed-use areas with at-grade commercial/retail uses (see Figure 5).

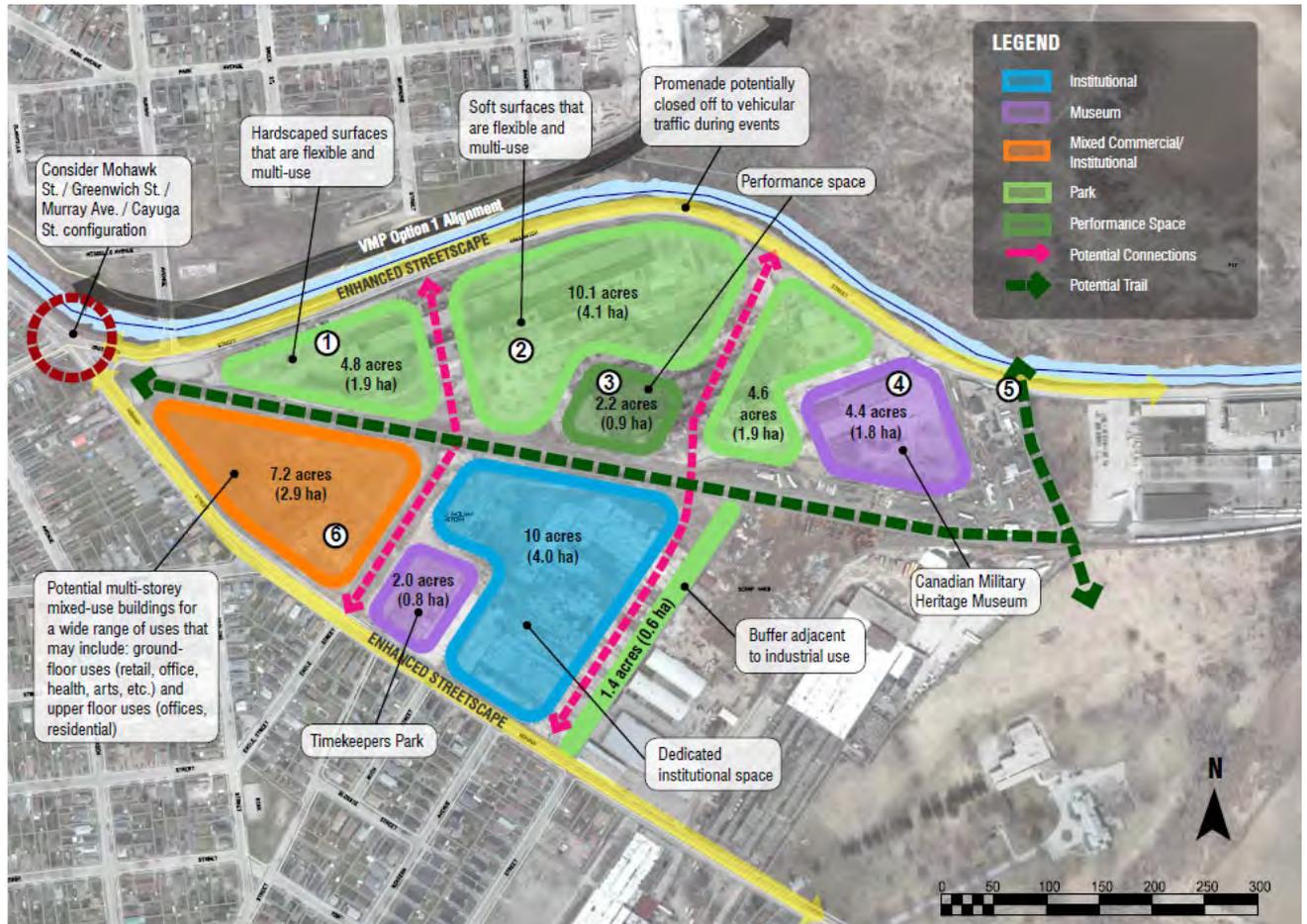


Figure 5: Option 1 – Outdoor Events and Festival Focus

- Option 2 – Culture and Community Focus** – This concept focused on creating a blend between residential and office mixed-uses with at-grade commercial retail, while still maintaining an emphasis on open space / gathering event spaces with ancillary uses (see Figure 6).

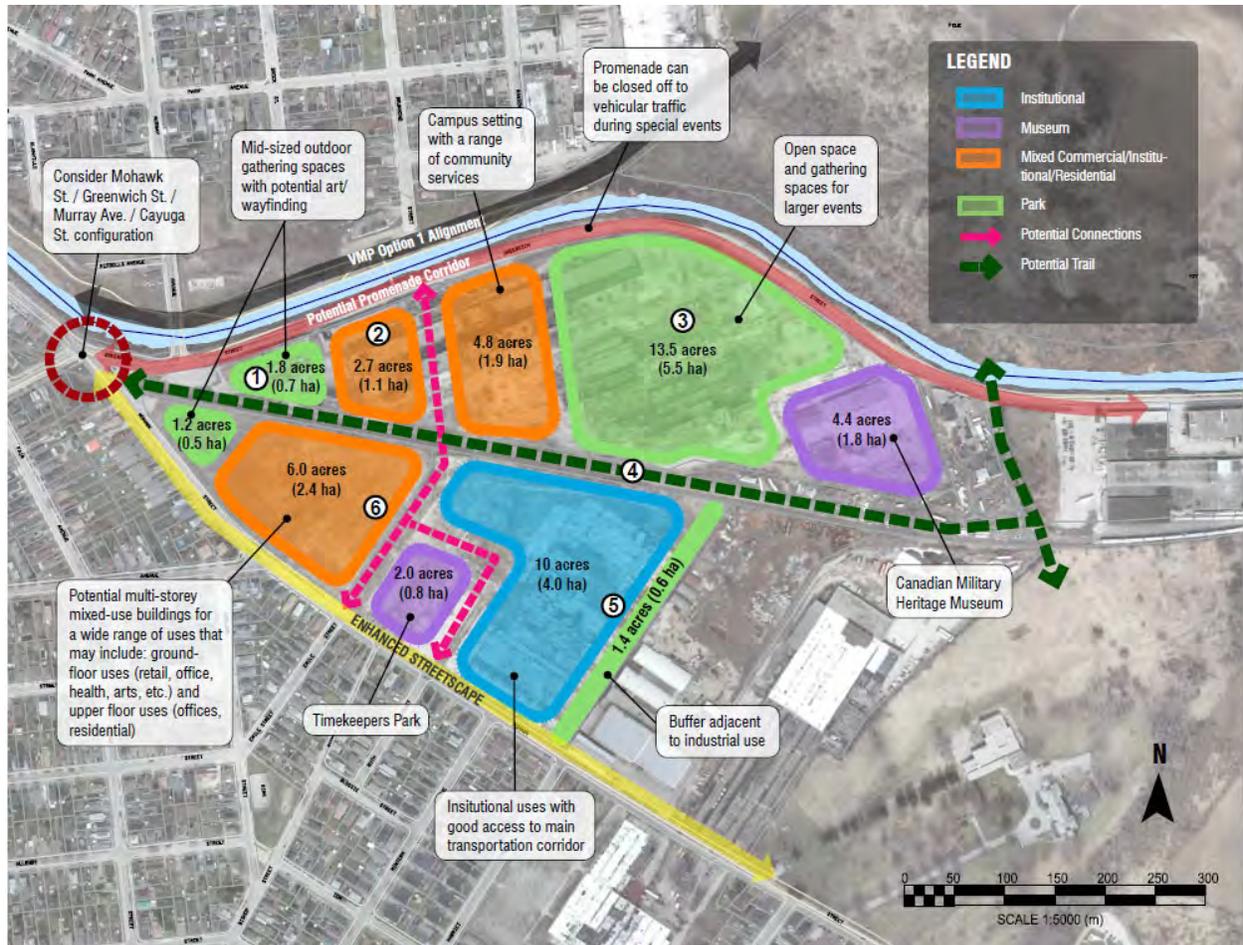


Figure 6: Option 2 – Culture and Community Focus

- Option 3 – Community Services Focus** – This concept focused on creating opportunities for more extensive institutional uses with a community focus. It also included mixed use commercial / residential development opportunities which would include a potential north/south “Main Street” connection and provide more modest park space geared to proposed and surrounding residential uses (see Figure 7).

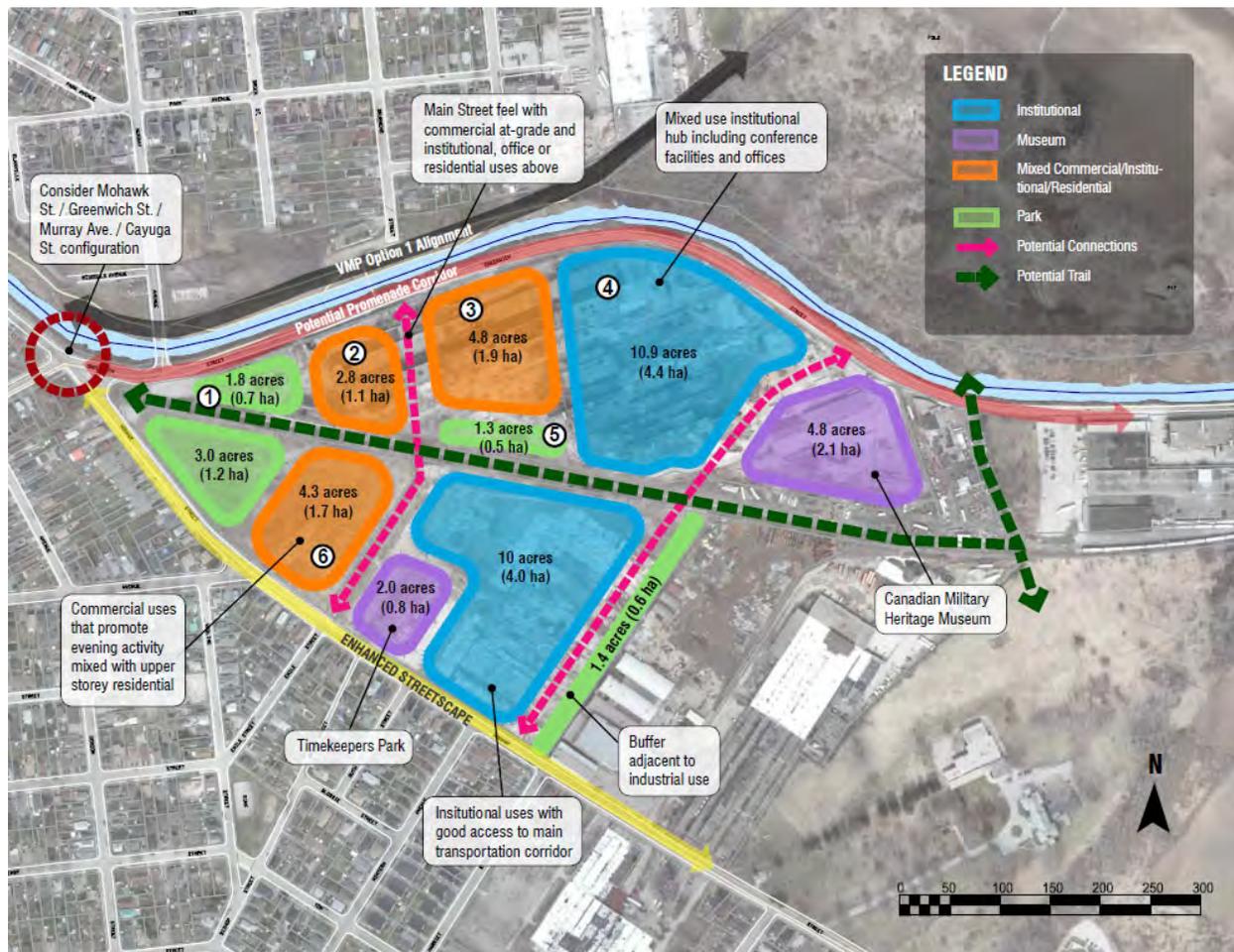


Figure 7: Option 3 – Community Services Focus

Although the three options presented above focused on the Greenwich Mohawk Brownfield site some further refinement was made to the overall district plan in terms of identifying opportunities for connectivity both within the district and to the surrounding area as well as indicating potential future trail and road connections to the existing network (see Figure 8). Some considerations included:

- Proposing a pedestrian creating a gateway towards the west end of the study area with medium to high-density built form and a mix of uses taking advantage of its proximity to Downtown Brantford;
- Identifying potential crossings over the canal for better access and permeability;

- Enhancing waterfront-related opportunities (pending the water quality assessments);
- Identifying potential focal points to draw people into the area;
- Providing potential lookout points overlooking Mohawk Lake and the Grand River; and
- Identifying potential linkages of trails with First Nations lands.



Figure 8: Overall Mohawk Lake District Plan Opportunities and Connectivity Plan

2.4 Staff Technical Meeting #1 – Comments and Feedback (August 16, 2018)

The three land use option concepts and supporting material was presented to the City staff technical team on August 16, 2018. The concepts had been distributed to the team prior to the meeting (see Appendix C). The internal technical staff team included representatives from Parks, Transportation, Transit, Economic Development, and Design and Construction. Minutes for the meeting are found in Appendix D. The key comments or takeaways from this session, that informed the further refinement of the concepts, included the following suggestions:

- That a trail corridor be placed on the north and south sides of the existing rail as a feasible short-term option for connectivity as it was anticipated that Ingenia Polymers use would continue for some time into the future;
- The 1.4 acre buffer in between the institutional use and the industrial use, on the south side, should not be seen as a park and that it should be clearly labelled differently;

- That Option 2, although indicating a smaller event space open space of 13.5 acres should be increased to 15 acres for enhanced event/open space and flexibility; and,
- That titles and description of each option to be refined and clarified.

2.5 Revised Land Use Options (October 2018)

Following the meeting with the internal technical team, the study team prepared further refinements of the proposed land use concepts in preparation of the Public Engagement #2. The study team worked closely with City staff to prepare a refined set of concepts based on the input provided from the Staff Technical Team on August 16, 2018 as well as on-going coordination. These revisions included the suggestions proposed by staff and the titles and descriptions for each option which were further revised to better reflect their proposed land use configurations and mixes.

The following are the three options that were prepared and presented to the public at the Public Engagement #2 – Open House (see Appendix E):

- **Option 1 – Outdoor Events and Festival Focus** – This option focused on creating a destination for major cultural events and festivals. The primary land uses included a large purpose-built event area with associated parks and open spaces, an institutional area, and some mixed commercial and institutional uses (see Figure 9). Changes and revisions from the previous Option 1, summer 2018 concept, included:
 - The removal of the dedicated performance space to allow for more flexibility in its potential future location in the park spaces;
 - Refinement of Option title and text description;
 - Distinguishing the buffer area between the institutional and adjacent industrial uses; and,
 - Identifying potential future trails and roads as potential connection and adding trails.

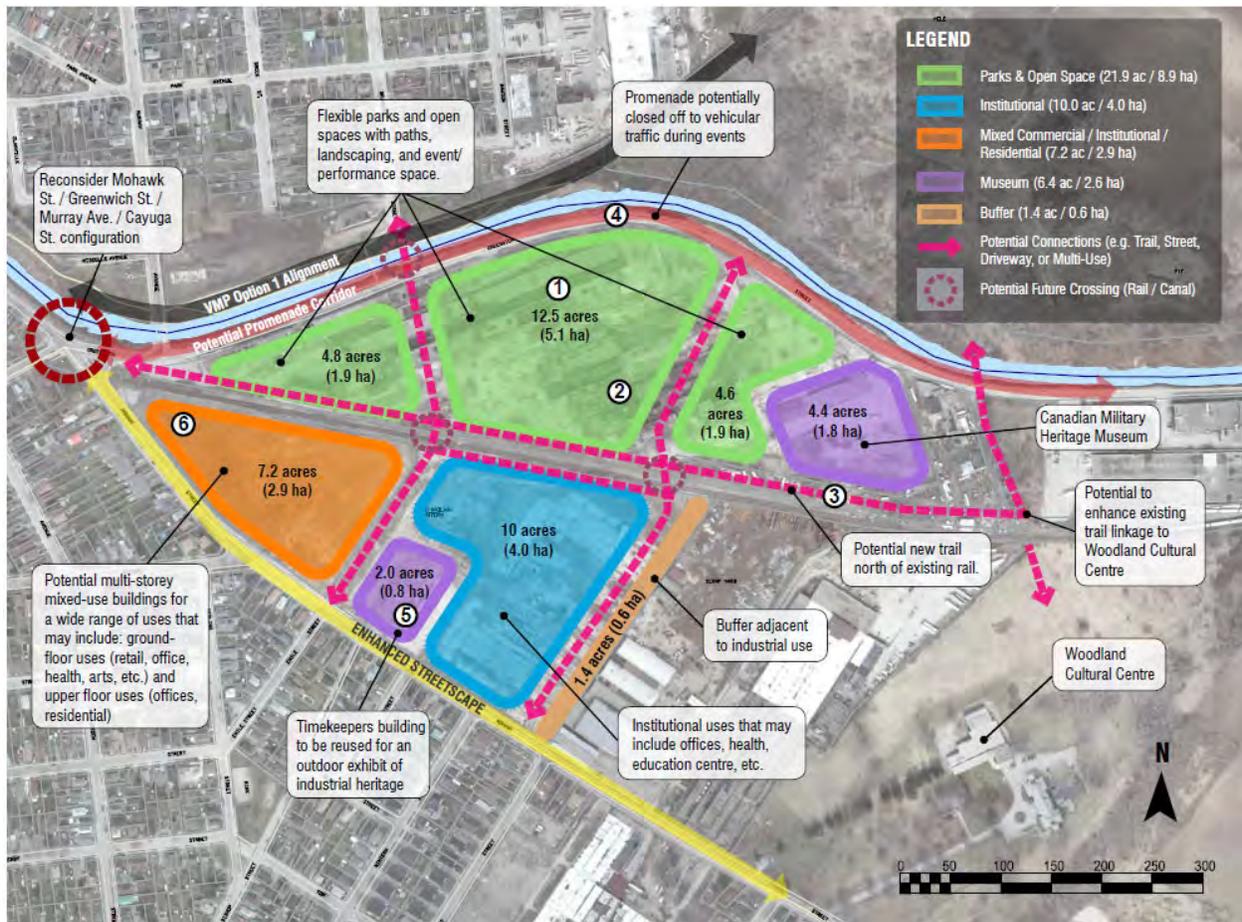


Figure 9: Option 1 – Outdoor Events and Festival Focus

- Option 2 – Culture and Community Focus** – This option focused on creating a destination for both cultural gatherings and community and commercial services. A balance of land uses that included a multi-purpose open space, several options for mixed commercial and institutional uses with potential upper-story residential, and an institutional area (see Figure 10). Changes and revisions from the previous Option 2, summer 2018 concept, included:
 - As per City staff technical team comments, the large open space was increased to 15.0 acres (6.1 ha);
 - Refinement of Option title and text description;
 - Removing smaller green space at the west edge of the brownfield site because of duplication with north side park space separated by existing rail spur;
 - Distinguishing the buffer area between the institutional and adjacent industrial uses; and,
 - Identifying potential future trails and roads as potential connection.



Figure 10: Option 2 – Culture and Community Focus

Option 3 – Community Services Focus – This concept focused on creating a destination primarily for community services, including large institutional areas, and options for mixed commercial and institutional uses with potential upper-storey residential. The space may be proposed in a campus format with smaller scale public gathering spaces (see Figure 11). Changes and revisions from the previous Option 3, summer 2018 concept, included:

- Refinement of Option title and text description;
- Distinguishing the buffer area between the institutional and adjacent industrial uses; and,
- Identifying potential future trails and roads as potential connection and adding trails.

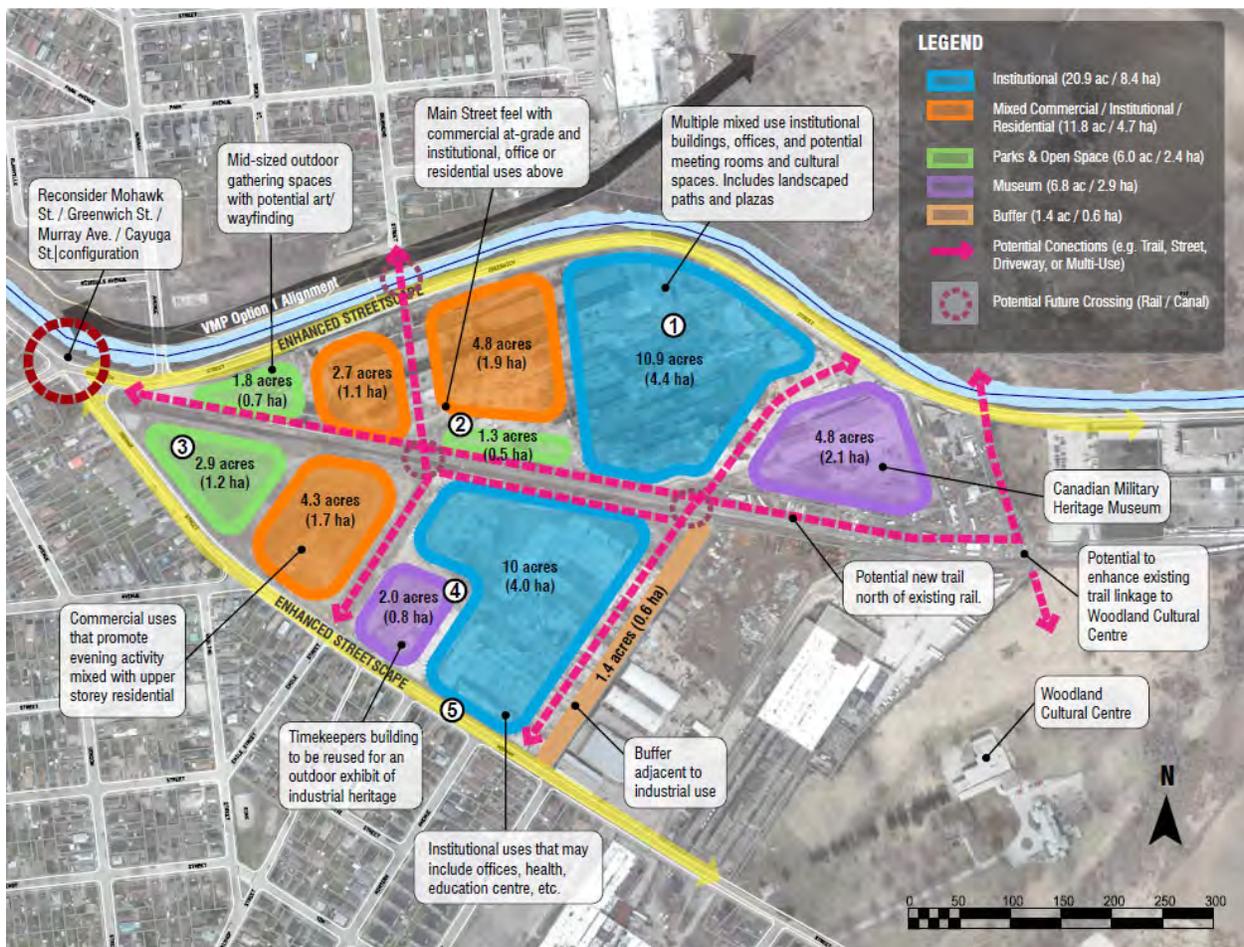


Figure 11: Option 3 – Community Service Focus

2.6 Public Engagement #2 – Open House (November 28, 2018)



The Public Open House Meeting #2 was held on November 28, 2018 at the S.C. Johnson – T.B. Costain Community Centre, which was attended by more than 100 people. The three conceptual plan options illustrated in section 2.5 above, were presented to those in attendance. The purpose of the Open House was to present the land use concept options and to receive comments, input and preferences based on a “dotmocracy” voting process from those in attendance. Participants were provided with a voting package upon entering the meeting and were given multiple ways in which to comment on (e.g. flip charts next to each Option, Options on tables for discussion, and in-person with the study team and City staff).



Following the presentation by the study team, outlining the ideas behind each land use option concept provided (see Appendix F for presentation), the participants were asked to vote (large dot) for their preferred option and to provide comments for their decision. In addition, they were asked to also indicate or vote (small dot) for the most preferred and least preferred land use configurations in each of the Options. The meeting resulted in 121 votes and 81 written comments which are summarized in a memo dated February 15, 2019 (see Appendix H).

Based on the input gathered during the Open House, the following conclusions and recommendations were provided by the study team:

- The preferred option appeared to be a mix between Options 1 and 2;
- Looking only at the voting results it would seem that Option 1 was the most preferred, however, after analyzing in detail the provided written comments, it appeared that the preference was for Option 2 with the addition of a promenade, commercial / retail uses, and trail connectivity, as found in Option 1; and,
- The least preferred was Option 3 and its emphasis on institutional uses.

2.7 Online Survey

In addition to Public Open House #2, an online survey was undertaken between December 13, 2018 and January 14, 2019. This survey reached 544 participants, with representation from all Wards in the City of Brantford as well as a few non-residents. A summary report of the online survey demonstrating the breakdown of Wards and votes can be found in Appendix G. The results and more in depth analysis of the online survey are provided in a memo dated February 15, 2019 (see Appendix H). In summary, given the overall voting results and a review and analysis of the comments received from the online survey, the following conclusions and recommendations were provided by the study team:

- Based on the simple voting process, as per the Public Open House results, Option 1 was again the “most preferred” receiving 40% of the vote;
- Surprisingly Option 3 received more votes than Option 2 but upon further analysis it was determined that this result may have been skewed by non-resident voting for institutional uses and for a particular institutional use that was identified specifically in online responses;
- It was suggested that results for Options 2 and 3 may need to be weighted based on the “most preferred” voting of Brantford residents in comparison to non-residents, or whether all land use types should be weighted evenly;
- Upon closer review of individual comments, it was determined that although Option 1 received the most votes most of the negative comments for that option revolved around lack of residential uses and potential for underutilized large park space;
- Respondents who preferred Options 2 and 3 liked the mixed-use blocks proposed and were supportive of the “Main Street” concept in those options, however, Option 3 supporters indicated need for more community facilities; and,
- Based on the consolidated comments it appears Option 1 with further refinement of park and open space uses along with “Main Street” mixed use areas, and added institutional uses, would address the preferences expressed in the overall online survey comments.

As per the results of Public Engagement #2 it appeared that a hybrid version of Option 2 that included additional institutional uses could result in a more supportable option overall.

2.8 Draft Preferred Plan (March 2019)

Having reviewed and analyzed the voting preferences and comments with respect to the public engagement events of the November 28th, 2018 Public Open House and the Online Survey results of January 14, 2019, the study team was able to gauge preferences with respect to particular options and identify the mix of land uses the public participants/respondents would support as a preferred plan for the brownfield area within the Mohawk Lake District Plan.

The Vision Statement was also modified generally to address comments heard in the Public Engagement #2 which included the notion of achieving the vision sooner than 20 years and adding more descriptive concepts such “inspiration”, “future”, “honouring the past”, and “a place for families.” These additions did not alter the original the vision of the original statement but rather further refined the statement to ensure a clearer and more inclusive vision, resulting in the following:

“Mohawk Lake District will be...

A welcoming place for residents, families and visitors of all ages to explore, shop, eat, learn, and gather. Parks and trails along Mohawk Lake and Canal and throughout the District will provide a beautiful and healthy way to connect with nature. Mohawk Lake District will be where we honour the past, but also a place to be inspired for the future. As a popular destination where history, culture, recreation, and tourism meet, Mohawk Lake District will be a place of pride in the community.”

Upon discussions with City staff regarding the conclusions of the Public Open House #2 and the Online Survey memo it was determined that the draft preferred plan, for the brownfield area, to be put forward to both the City staff Technical Team, the Working Group and ultimately presented to City Council should be comprised of the following:

- a combination of concept Options 1 and 2;
- added modest Institutional uses on the north side of the brownfield area to address additional institutional need;
- reduction of open space to address potential utilizations and consider buffering of potential event space noise;
- provision of a mixed use “Main Street” in the plan;
- and the introduction of a Promenade Corridor for Greenwich Street along the extent of the brownfield area.

Having determined the land use configuration and preferred land uses, the study team updated and refined the overall draft MLDP (Figure 12) and integrated the draft preferred plan concept for the brownfield area into the plan.

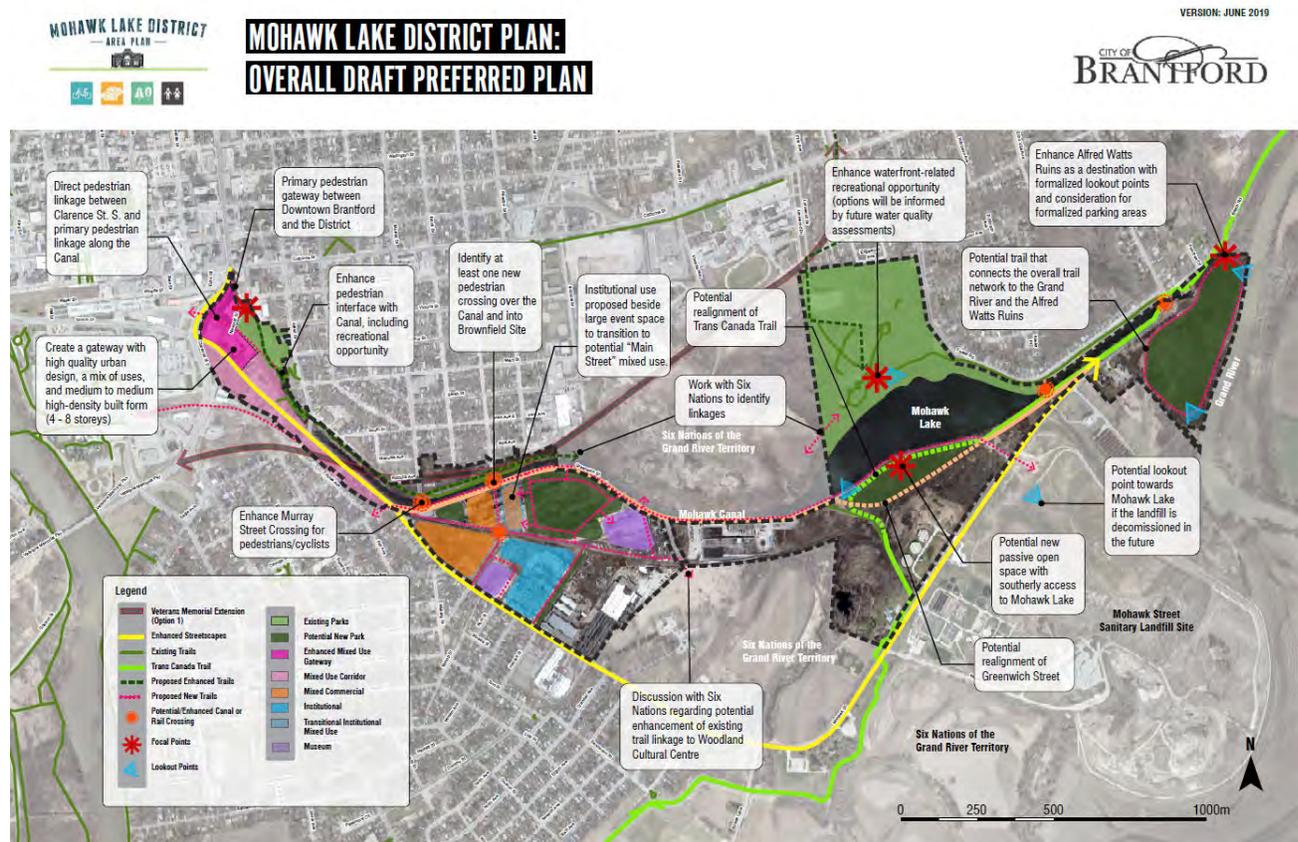


Figure 12: Mohawk Lake District Draft Preferred Plan

The draft preferred plan for the Greenwich Mohawk brownfield area (Figure 13) was developed and informed by the results of the public engagement sessions and the online survey as well as comments from City staff and the technical team. It is also informed by best practices in planning and urban design. The illustrated draft preferred plan includes the following:

- A variety and range of land use types that encourages activity within and connectivity to adjacent existing uses;
- The provision of “Main Street” type mixed uses with at-grade commercial/retail uses and residential or office institutional uses above;
- Added transitional institutional mixed uses on north side of rail to address concern for more community facilities;
- Additional institutional block can provide complimentary / ancillary uses to the large open space / event space while buffering potential noise from events to the proposed “Main Street” and mixed-use residential uses;
- An enhanced Promenade boulevard along Greenwich Street and an enhanced streetscape along Mohawk Street; and,
- Multiple internal trail connections and their connection to surrounding existing trails and links to surrounding cultural amenities/facilities.

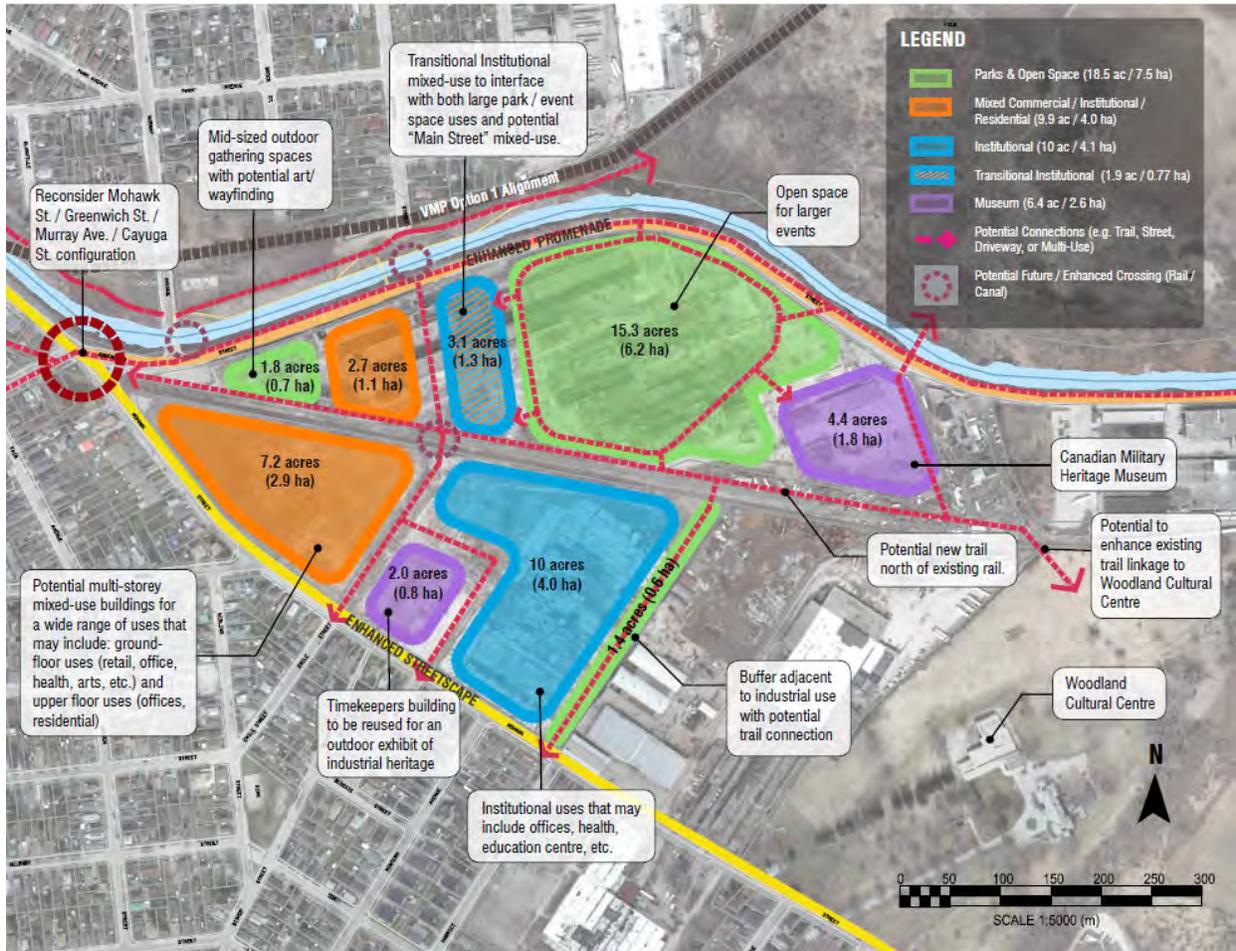


Figure 13: Mohawk Lake District Plan – Brownfield Draft Preferred Plan

2.9 Staff Technical Meeting #2 – Comments and Feedback (April 1, 2019)

On April 1, 2019, the Staff Technical Team, included staff representatives from Planning Services, Parks Services, Engineering Services, Transportation and Parking Services, Facilities and Asset Management, Fleet and Transit Services, Legal and Real Estate Services, and Economic Development and Tourism Services. They were provided a brief presentation by the study team which outlined the results of the Public Engagement #2 Open House and the online survey comments along with a presentation of the draft preferred plan for the overall MLDP study area and the brownfield area. The purpose of the meeting was to gather comments and concerns as they related to the draft preferred plan through a round table discussion. Minutes for the meeting are found in Appendix J. The following are some key considerations and concerns that were provided for the draft preferred plan based on the preliminary staff technical review:

Transportation and Parking Services

- Need to prepare a demonstration plan to determine draft residential target numbers in order for Transportation to better comment on any relevant right of way requirements.
- Due to high water table and the remediation program, all parking is required to be surface parking or in a structure.

Design and Construction

- The promenade concepts may not be feasible or may require a larger setback from the top of canal due to slope stabilization issues. This may cut into the developable area by 20m or more.
- The promenade boardwalk feature may need to be revised to account for 5:1 slope along the canal and/or accommodate water levels for 100 year storm.
- SWM facilities within parks are not appropriate / accepted, especially within the 15.3 acre event space.

Mohawk Lake Water Quality Project

- The draft water quality results are available. The project is currently undertaking the Environmental Assessment.

Parks Services

- City's trail standards shall be considered.
- There is archaeological potential on the lands identified for the Alfred Watts Ruins destination.
- From the Parks and Recreation perspective, the re-alignment of the eastern portion of Greenwich Street presents as a good opportunity for the redesign of this area for enhanced recreational opportunities.

Economic Development and Tourism Services

- Would like to see more First Nations engagement and involvement including positive impacts to investment work at Woodland Cultural Centre.
- Ingenia Polymers continues to invest in their site and into the spur line improvements.

Legal and Real Estate Services

- There is currently private development interest within the gateway corridor on Greenwich Street.

Planning

- Redevelopment plan needs to be driven as a pedestrian-oriented destination.

In addition to the above considerations and pending the results of the technical supporting studies, the types of land uses, and approximate size and location for such uses within the draft preferred plan will be further refined. The comments provided by the technical team will be incorporated, wherever possible, in the development of the demonstration plan. Along with these comments the study team will also be taking into consideration comments that may be provided by the MLDP Working Group in May 2019 and from Council, who will be presented with the draft preferred plan in June 2019.

3. CONCLUSION

The preceding sections provide a chronological summary of the process that led to the current proposed and illustrated draft preferred plan for both the overall Mohawk Lake District Plan and more specifically the Greenwich Mohawk Brownfield site. The draft preferred plans presented (Figures 12 and 13) are the culmination of the process outlined and will serve as the basis for the development of a demonstration plan that will be used for the preparation of the technical support studies and planning implementation documents. This demonstration plan, once developed and finalized, will also serve as the base plan for the development of a simple massing model that will illustrate ideas about built form relationships, heights, and configurations as well as relationship with respect to park spaces.

3.1 Next Steps

As of the preparation of this report, the draft preferred plan had not been commented upon by the Mohawk Lake District Plan Working Group, which will take place in early May 2019. Any comments provided by the Working Group will be considered following the presentation to Council and in preparation of the demonstration plan.

The draft preferred plan, along with the steps and process leading to its development, will be presented to Council in June 2019. Following this presentation, and upon Council endorsement/direction, the study team will begin preparation of a demonstration plan for the Greenwich Mohawk Brownfield site. The demonstration plan will further refine the preferred concept plan to illustrate the potential block pattern, road network (pedestrian and vehicular connectivity), and park and open space locations, and will further refine the land use composition of the Mohawk Lake District Plan. This demonstration plan will then serve as the basis for the preparation of support studies and the development of a general massing plan to serve as a basic visual representation of what is envisioned for this study area.



Notices

CIVIC MEETINGS

TUESDAY, May 28, 2019

• City Council commencing at 6:00 p.m. in the Council Chambers, 100 Wellington Square, Brantford, ON

Staying in touch with Council's activities:

The agendas for Regular Council, Committee of the Whole and Standing Committee meetings are available on the City's Website at www.brantford.ca and at the Brantford Public Library Main Branch Reference Desk. Should a Special Meeting be called for any reason, meeting agendas will be made available on the City's Website only.

Assisted listening device available in the Council Chambers

NOTICE

SALE OF LAND BY PUBLIC TENDER Municipal Act, 2001

THE CORPORATION OF THE CITY OF BRANTFORD

TAKE NOTICE that tenders are invited for the purchase of the land(s) described below and will be received until 3:00 p.m. local time on Monday June 3rd, 2019 at the Reception of the City of Brantford Purchasing Division Office, 1 Market Street, Suite 120, Brantford, ON, N3T 6C8. The tenders will then be opened in public on the same day at 3:10 p.m. in the Purchasing Division Tender Room, 1 Market Street, Suite 120, Brantford, ON, N3T 6C8.

Tenders must be submitted in the prescribed form and must be accompanied by a deposit in the form of a money order or of a bank draft or cheque certified by a bank or trust corporation payable to THE CORPORATION OF THE CITY OF BRANTFORD and representing at least 20 per cent of the tender amount.

Description of Land(s)	Minimum Tender Amount
1. Roll No. 2906-050-004-11300-0000 – Lot 185, Plan 311; Brantford City; Brantford City; In the City of Brantford, being all of the PIN 32087-0093 (LT) Municipal Address: 88 Aberdeen Avenue, Brantford, Ontario, N3S 1S1	\$22,075.16
2. Roll No. 2906-050-003-15400-0000 – Part Lot 8-9, Block F, Plan 35 Brantford City; As in A244604; Brantford City; In the City of Brantford, being all of the PIN 32088-0025 (LT) Municipal Address: 77 Port Street, Brantford, Ontario, N3S 1Y6	\$105,929.79
3. Roll No. 2906-050-001-00400-0000 – Part Lot 19, S/S Greenwich Street, Hulbert Flats, Brantford City; Part Lot 6, W/S Oneida Street, Plan 16, Brantford City; Part Erie Avenue, Plan City of Brantford, September 7th, 1892 Brantford City; Part Alley, Block 5, Plan 16, Brantford City; Part Lot 1, Block 5, Plan 16, Brantford City, Closed CB222; Part 1 & 2 on 2R-823; Brantford City; In the City of Brantford, being all of the PIN 32091-0039 (LT) Municipal Address: 60 Market Street South, Brantford, Ontario, N3S 2E3	\$119,956.92
4. Roll No. 2906-010-009-00200-0000 – Part Lot 4, E/S or N/S Gilkison Street, Plan City of Brantford, September 7th, 1892, Brantford City; Part Lot 5, E/S or N/S Gilkison Street, Plan City of Brantford, September 7th, 1892, Brantford City; As in A449092; Brantford City; In the City of Brantford, being all of the PIN 32089-0005 (LT) Municipal Address: 110 Gilkison Street, Brantford, Ontario, N2T 2A3	\$81,250.03
5. Roll No. 2906-030-019-04200-0000 – Lot 38, Plan 1500; S/T Right in A226153; Brantford City; In the City of Brantford, being all of the PIN 32192-0085 (LT) Municipal Address: 30 Viscount Road, Brantford, Ontario, N3P 1J2	\$34,733.03
6. Roll No. 2906-030-007-04610-0000- Part Lot 18, Plan 1290, Brantford City; Part 1 on 2R-2049; Brantford City; In the City of Brantford, being all of the PIN 32119-0023 (LT) Municipal Address: 436-444 Elgin Street, Brantford, Ontario, N3S 7P7	\$270,726.08
7. Roll No. 2906-030-019-56500-0000 – Lot 65, Plan 1505; Brantford City; In the City of Brantford; being all of the PIN 32187-0093 (LT) Municipal Address: 26 Tamara Place, Brantford, Ontario, N3P 1M8	\$107,603.29
8. Roll No. 2906-020-004-19800-0000 – Part Lot 1, W/S Pearl Street, Plan City of Brantford, September 7th, 1892, As in A343508; S/T and T/W A343508; S/T and T/W Right in A288077, A291418, A343508; Brantford City; In the City of Brantford, being all of the PIN 32158-0025 (LT) Municipal Address: 10 Pearl Street, Brantford, Ontario, N3T 3N4	\$22,280.60
9. Roll No. 2906-040-003-26000-0000 – Part Lot 30, N/S Darling Street, Plan City of Brantford, September 7th, 1892, Brantford City; As in A384751; Brantford City; In the City of Brantford, being all of the PIN 32131-0147 (LT) Municipal Address: 238 ½ Darling Street, Brantford, Ontario, N3S 3X2	\$24,967.35

The municipality makes no representation regarding the title to or any other matters relating to the land(s) to be sold. Responsibility for ascertaining these matters rests with the potential purchasers.

This sale is governed by the Municipal Act, 2001 and the Municipal Tax Sales Rules made under that Act. The successful purchaser will be required to pay the amount tendered plus accumulated taxes and the relevant land transfer tax.

The municipality has no obligation to provide vacant possession to the successful purchaser.

Title: Manager of Purchasing	Name of Municipality: The Corporation of the City of Brantford
Address of The Municipality: 1 Market Square, Suite 120, Brantford, Ontario, N3T 6C8 Telephone: 519-759-4150 extension 5395	

For further information regarding this sale and a copy of the prescribed form of tender contact:

NOTICE

Notice of Public Information Centre Fifth Avenue Wastewater Pumping Station Upgrades

As part of the ongoing efforts by the City of Brantford to maintain and improve its municipal infrastructure, the Fifth Avenue Wastewater Pumping Station has been approved for upgrades. The project is currently in the planning and preliminary design stages.

The main objectives of the upgrades are to:

- maintain a state of good repair
- meet current standards and,
- accommodate future community needs

A public and stakeholder information meeting will be held on:

TODAY, May 23, 2019

6:30 p.m. to 8:30 p.m.

Doug Snooks Eagle Place Community Centre

– Upper Room

333 Erie Ave., Brantford

If you have any comments or questions regarding this project, please contact:

Priya Persaud, H.B.Sc., P.Eng.
Design Engineer

Design and Construction
Public Works Commission
City of Brantford
100 Wellington Square
519-759-4150 Ext 5745
ppersaud@brantford.ca

Colin Wiebe, M.A.Sc., P.Eng.
Project Manager

GM BluePlan Engineering Ltd.
330 Trillium Dr., Unit D
Kitchener, ON N2E 3J2
519-748-1440
colin.wiebe@gmblueplan.ca



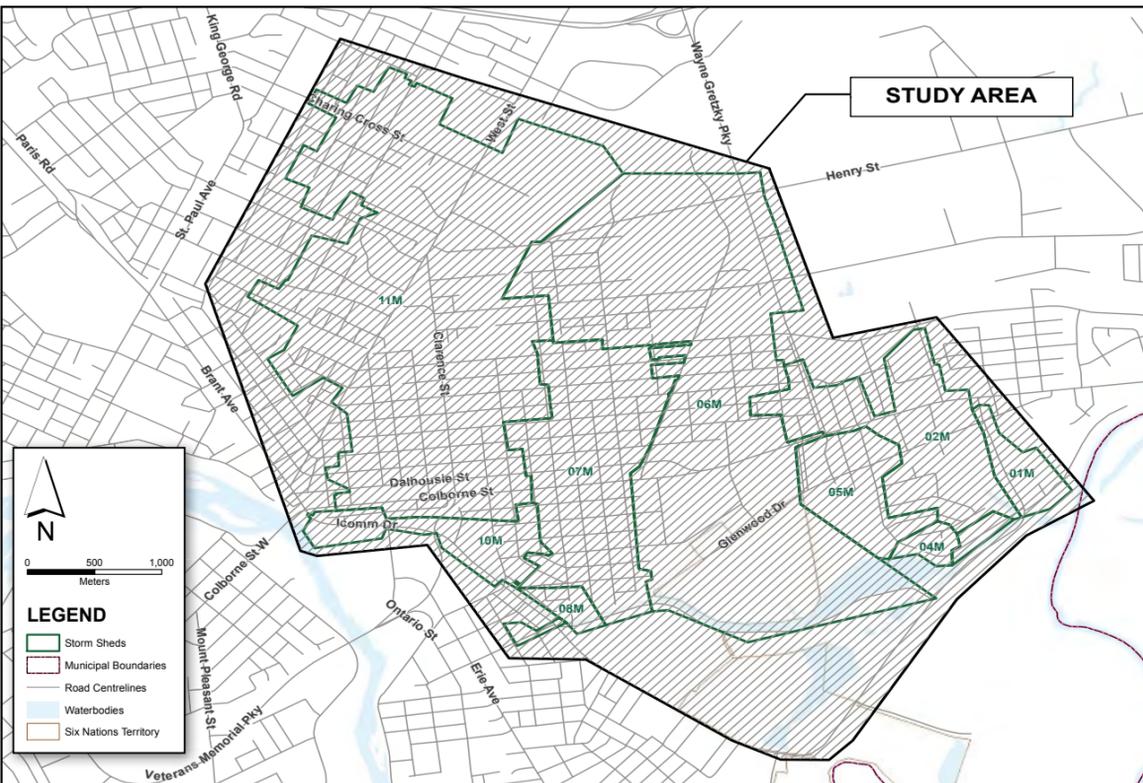
NOTICE

NOTICE OF PUBLIC INFORMATION CENTRE Municipal Class Environmental Assessment Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project Functional Master Drainage and Restoration Study

The City of Brantford has initiated the Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project with financial support from the Federal Government. This Functional Master Drainage and Restoration Study will identify rehabilitation measures needed to address accumulated sediments and provide opportunities/recommendations to improve the environmental quality of Mohawk Lake and Mohawk Canal, and protect and enhance its future in the community.

The Study is being carried out in accordance with the

Ontario Municipal Class Environmental Assessment (Class EA; Schedule "B") process, as outlined in the Municipal Engineers Association's Municipal Class Environmental Assessment. This is an approved process under the Ontario Environmental Assessment Act. Under the Class EA, the City has commenced the investigation of how to improve the environmental quality in the lake and canal by managing stormwater runoff, providing better habitat for fish and wildlife and enhanced recreational opportunities.



Public Information Centres (PICs) are planned to allow the public and interested stakeholders to learn more about the Study and provide input and comments on the preliminary investigations, the need for improvements and the assessment of planning alternatives. Representatives from the City and its consultant will be present to answer questions and discuss next steps. The first PIC is to be held as follows:

Wednesday, June 5, 2019

5:00 p.m. to 7:00 p.m.

Mohawk Park Pavilion,
51 Lynnwood Dr., Brantford

Engagement with the public is considered a key part of any Class EA. To submit a comment or question, or receive additional information related to the Class EA, or if you have accessibility requirements to participate in this Study, please contact one of the representatives below:

Information relating to the Study and consultation process will also be posted on the City of Brantford's website, brantford.ca/MohawkLakeCanalEA

NOTICE

IMPORTANT NOTICE TO USERS OF THE MOHAWK STREET LANDFILL SITE

Effective **April 1st, 2019**, the following Tipping Fee Schedule will apply at the Mohawk Street Landfill.

WASTE MATERIAL	TIPPING FEE RATE
RESIDENTIAL, INDUSTRIAL & COMMERCIAL GENERAL WASTE	\$73.00
YARD & LANDSCAPING (including leaves and grass clippings) (January 1 - March 31 & December)	\$40.00
YARD & LANDSCAPING (including leaves and grass clippings) (April 1 to November 30)	No Charge
BRUSH	\$65.00
WOOD SKIDS & PALLETS	\$120.00
ASBESTOS	\$140.00
REGISTERABLE NON-HAZARDOUS WASTE SOIL	\$30.00
MIXED CLEARING WASTE/SOD	\$30.00
CONCRETE, ASPHALT & BRICK RUBBLE	\$21.00
BANNED MIXED WASTE PRODUCTS (corrugated cardboard, recyclable wood, recyclable metal)	\$140.00
APPLIANCES / WHITE METAL GOODS	\$10.00 ea.
TIRES WITH RIMS	\$5.00 ea.
TIRES WITHOUT RIMS	No Charge
MINIMUM LOAD FEE for loads 150kg (330lbs) or less	\$10.00 ea.
Large Scale Disposal Project Surcharge (per tonne) (Residential and I, C & I)	1.5 X Applicable Tipping Rate

If you have any questions, please contact Solid Waste Operations at 519-759-4150.

For more information on the City's Waste Management Programs please visit us at www.brantford.ca

Nahed Ghbn, P.Eng.
Senior Project Manager

City of Brantford
519-759-4150 ext. 5262
NGhbn@brantford.ca

Ron Scheckenberger, M.Eng., P.Eng.
Consultant

Wood Environment & Infrastructure Solutions
905-335-2353
Principaron.scheckenberger@woodplc.com

All information collected will be used in accordance with the Freedom of Information and Protection of Privacy Act, RSO, 1990, c.F.31. With the exception of personal information, all comments will become part of the public record.

All information collected will be used in accordance with the Municipal Freedom of Information and Protection of Privacy Act, RSO, 1990, s. 10(1). With the exception of personal information, all comments will become part of the public record.

Ohsweken Man Arrested for Having a Loaded Firearm in a Vehicle

While investigating a robbery that occurred earlier in the night at a Smoke Shop on Fifth Line Road, Six Nations Police spotted a vehicle parked at a Smoke Shop on Sixth Line Road on Friday May 3rd, 2019. A male and female exited the vehicle as police approached identifying themselves as security at the business and had been there all night. Police spotted

a pump action 12-gauge shotgun with a wooden stock in plain view near the passenger side of the vehicle. Upon investigation, police determined that the gun was loaded with three 12-gauge shotgun shells. Police seized the firearm and arrested the occupants of the car. Police have charged Larry Longboat Jr. 39, of Ohsweken with three counts of Possession

of Firearms While Prohibited, Knowledge of Unauthorized Possession, Careless Storage of a Firearm, and Breach of Undertaking. He was held for weekend bail hearing. The 50-year-old Hamilton woman was not charged.

Please contact the Six Nations Police at 519-445-2811 or Crime Stoppers at 1-800-222-8477(TIPS).

Women turned away from underfunded shelters: new national report

By Teresa Wright
THE CANADIAN PRESS
OTTAWA- Women who are victims of violence are being turned away from shelters across Canada due to a chronic lack of resources and funding, according to two new national studies, including one by the House of Commons committee on the status of women. Female victims of violence have been studied specifically to determine the scope of services and supports provided by shel-

ters and transition houses to women and children fleeing violence in Canada.

One in five shelters report they have not received funding increases in 10 years or more, a situation that is unsustainable, said Kaitlin Bardswich, communications and development co-ordinator for Women's Shelters Canada, which led one of the studies.

"Shelters are not funded adequately, they've never really been funded adequately," Bardswich said.

"They're essentially doing the same work year after year with less money, because things like rent and taxes and food costs are all increasing, but funding is not increasing."

More than 400 shelters took part in that three-year study. Responses were received from shelters in every province, as well as from facilities in rural, northern and remote communities.

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NOTICE OF STUDY COMMENCEMENT Municipal Class Environmental Assessment Mohawk Lake and Mohawk Canal Clean-up and Rehabilitation Project Functional Master Drainage and Restoration Study



The Project

The City of Brantford has initiated the Mohawk Lake and Mohawk Canal Clean-up and Rehabilitation Project with financial support from the Federal Government. This project will identify rehabilitation measures needed to address accumulated sediments and provide opportunities/recommendations to improve the environmental quality of Mohawk Lake and Mohawk Canal and protect and enhance its future in the community.

Mohawk Lake is located in an urban area with a drainage area of 839 hectares. The land use within the lake's drainage area is primarily residential and commercial with some industrial properties. Over time, the lake and canal's sediment and water quality have been impacted by stormwater and industrial discharges. Industrial discharges have been discontinued and clean-up efforts have been completed on brownfield lands upstream and adjacent to the canal, however, the lake and canal are still negatively impacted. In 2018, the City initiated a Characterization Study documenting the existing physical and environmental conditions of the drainage network, lake, and canal for the study area shown in Figure 1.

Environmental Assessment (EA)

The Study is being carried out in accordance with the requirements necessary to receive federal funding and the Ontario Municipal Class Environmental Assessment (Class EA; Schedule "B"), as outlined in the Municipal Engineers Association's Municipal Class Environmental Assessment (October 2000, as amended in 2007, 2011 & 2015). This is an approved process under the Ontario Environmental Assessment Act.

The findings from the Characterization Study are expected to provide background information that will inform various components of the Class EA. Under the Class EA, the City has commenced the investigation of how to improve the environmental quality in the lake and canal by managing stormwater runoff, providing better habitat for fish and wildlife and enhanced recreational opportunities. Anticipated deliverables of interest include:

- A Subwatershed Stormwater Plan focusing on runoff (quantity/quality) from the Mohawk Lake tributary's basin aimed at understanding the current water resources of Mohawk Lake and Canal, as well as future watershed system (based on intensified land uses)

- A Class EA Report to be carried out in accordance with provincial legislative requirements
- A Mohawk Lake and Canal Master Plan defining the management and restoration activities associated with environmental protection needs and related future park use.

Community Engagement

Engagement with the community, agencies and Indigenous groups is considered a key part of any Class EA. Several opportunities for engagement will occur throughout the Class EA. Public meetings will be held to discuss issues and opportunities, including alternative solutions, evaluation criteria, environmental impacts and mitigation measures. The dates and details of these opportunities will be advertised as the Class EA progresses. You are encouraged to provide your comments to inform Study planning.

Figure 1



To submit a comment or question, or receive additional information related to the Class EA, or have accessibility requirements to participate in this Study, please contact one of the representatives below:

Nahed Ghbn P.Eng. Senior Project Manager
City of Brantford
519-759-4150 ext. 5262 NGhbn@brantford.ca

Ron Scheckenberger M.Eng., P.Eng. Principal Consultant
Wood, Environment & Infrastructure Solutions
905-335-2353 ron.scheckenberger@woodplc.com

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NOTICE OF PUBLIC INFORMATION CENTRE

Municipal Class Environmental Assessment

Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project

Functional Master Drainage and Restoration Study



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Public Information Centres (PICs) are planned to allow the public and interested stakeholders to learn more about the

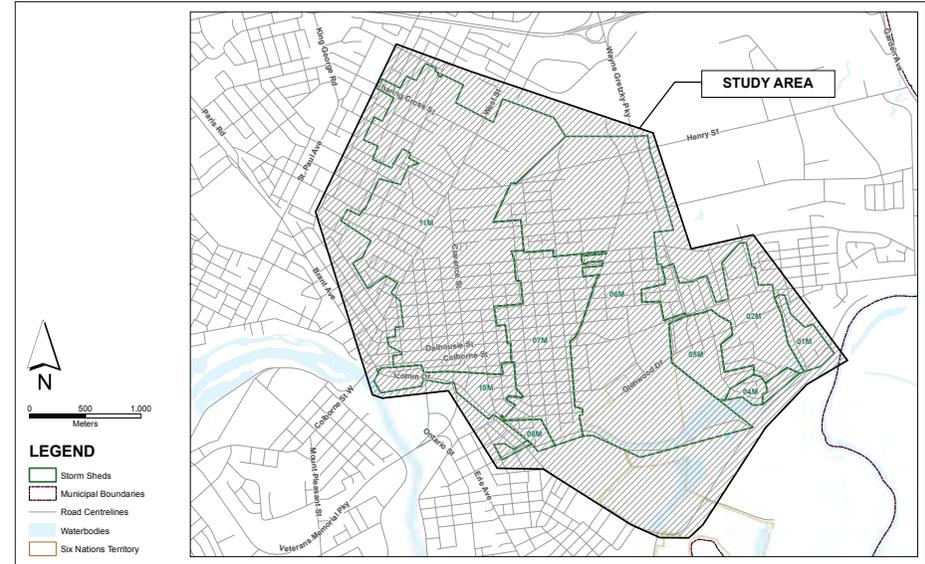
Study and provide input and comments on the preliminary investigations, the need for improvements and the assessment of planning alternatives. Representatives from the City and its consultant will be present to answer questions and discuss next steps. The first PIC is to be held as follows:

Wednesday, June 5, 2019
5:00 p.m. to 7:00 p.m.
Mohawk Park Pavilion,
51 Lynnwood Dr., Brantford

Engagement with the public is considered a key part of any Class EA. To submit a comment or question, or receive additional information related to the Class EA, or if you have accessibility requirements to participate in this Study, please contact one of the representatives below:

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NOTICE OF PUBLIC INFORMATION CENTRE

Municipal Class Environmental Assessment

Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project

Functional Master Drainage and Restoration Study



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Two Public Information Centres (PICs) are planned to allow the public and interested stakeholders to learn more about the

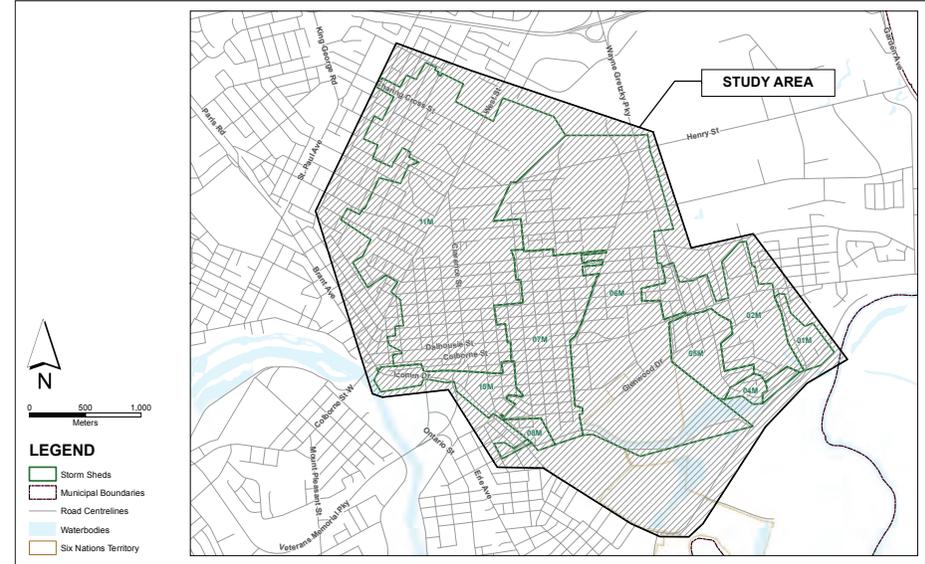
Study and provide input and comments to inform the Study. Representatives from the City and its consultant will be present to answer questions and discuss next steps. The second PIC is to be held as follows:

Wednesday, October 23, 2019
5:00 p.m. to 7:00 p.m.
Mohawk Park Pavilion,
51 Lynnwood Dr., Brantford

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City of Brantford
519-759-4150 ext. 5262
NGhbn@brantford.ca

Ron Scheckenberger M.Eng., P.Eng.
Principal Consultant,
Wood, Environment & Infrastructure Solutions
905-335-2353 ron.scheckenberger@woodplc.com



Information relating to the Study and consultation process will also be posted on the City of Brantford's website, brantford.ca/MohawkLakeCanalEA

All information collected will be used in accordance with the Freedom of Information and Protection of Privacy Act, RSO, 1990, c.F.31. With the exception of personal information, all comments will become part of the public record.

All information collected will be used in accordance with the Municipal Freedom of Information and Protection of Privacy Act, RSO, 1990, s. 10(1). With the exception of personal information, all comments will become part of the public record.

PUBLIC MEETING

DUFFERIN PARK MASTER PLAN

Join us for an upcoming public meeting to review the proposed Master Plan concept for Dufferin Park:

Tuesday, October 15, 2019
5:00 p.m. to 7:00 p.m.

T.B. Costain/ SC Johnson Community Centre
16 Morrell Street, Brantford

Can't make it to the meeting?
Email parksandtrails@brantford.ca
or phone 519-759-4150 with your suggestions.



NOTICE

NOTICE OF PUBLIC INFORMATION CENTRE GREYFIELDS REVITALIZATION STRATEGY

The City of Brantford is preparing a Greyfields Revitalization Strategy to promote and assist in the redevelopment of greyfield sites. Greyfields are previously developed commercial sites that are in a state of neglect or disrepair, vacant, or underutilized.

The draft Greyfields Revitalization Strategy includes a Greyfields Community Improvement Plan (CIP) with three proposed financial incentive programs:

- The Commercial, Façade, Landscaping and Connectivity Improvement Grant to facilitate improvements to the aesthetic appeal and functionality of existing commercial and mixed use properties;
- The Mixed Use Building Improvement Grant to support the conversion of existing buildings into mixed use buildings; and
- The Tax-Increment Based Grant to promote the transformative redevelopment of greyfields into new mixed use developments.

Please join us for a Public Information Centre

Wednesday, October 23, 2019 6:00 pm
T.B. Costain/SC Johnson Community Centre
16 Morrell Street, Brantford

This is an opportunity for residents, business owners, and landowners to learn about Brantford's draft Greyfields Revitalization Strategy and the proposed financial incentive programs.

For more information please contact:

Victoria Coates
Intermediate Planner, Long Range Planning
Planning Department
519-759-4150, ext. 5712
vcoates@brantford.ca

NOTICE

NOTICE OF PUBLIC INFORMATION CENTRE NORTH-EAST END FLOOD REMEDIATION STUDY

In August 2017 and in April of 2018, the City of Brantford experienced severe storm events. This resulted in flooding in some areas of Brantford, predominantly in the North East Area.

In response to these storm events, the City has commenced the North-East End Flood Remediation Study to investigate the causes of flooding, identify any deficiencies in the infrastructure, and recommend solutions to reduce the risk of future flooding in the area.

Public consultation

As part of the study, the City will be hosting a Public Information Centre (PIC) to provide an opportunity for residents, property owners, tenants, and agencies in the North-East End area to meet with City staff and the consultant from the Remediation Study project team. The purpose of this PIC is to introduce the project to the community, learn about flooding, present existing stormwater infrastructure and environmental conditions, identify existing issues and opportunities and potential solutions for the identified issues.

All information collected will be used in accordance with the Freedom of Information and Protection of Privacy Act. RSO, 1990, c.F.31. With the exception of personal information, all comments will become part of the public record.

All information collected will be used in accordance with the Municipal Freedom of Information and Protection of Privacy Act. RSO, 1990, s. 10(1). With the exception of personal information, all comments will become part of the public record.

The PIC will be held on:

Thursday, October 17, 2019
5:00 p.m. to 7:00 p.m.

Branlyn Community Centre
(238 Brantwood Park Road, Brantford)

Comment sheets will also be made available for you to share your thoughts at brantford.ca/NorthEastStudy. Please submit completed comment sheets by October 31, 2019.

More information

If you have any comments or questions regarding this study, please contact:

- | | |
|---|--|
| Nahed Ghbn, P.Eng.
<i>Senior Project Manager</i>
City of Brantford
519-759-4150 ext. 5262
NGhbn@brantford.ca | Dave Maunder, P.Eng.
<i>Aquafor Beech Limited</i>
905-629-0099 ext. 290
maunder.d@aquaforbreech.com |
|---|--|

NOTICE



If you are a team player who is interested in meeting new people, taking on a new challenge and committed to making our city a better place to live, work and play you may be a good fit for one of the following volunteer opportunities:

- Active Transportation Sub-Committee
- Community Safety and Well-being Advisory Committee
- Brantford Heritage Committee
- Environmental and Sustainability Policy Advisory Committee

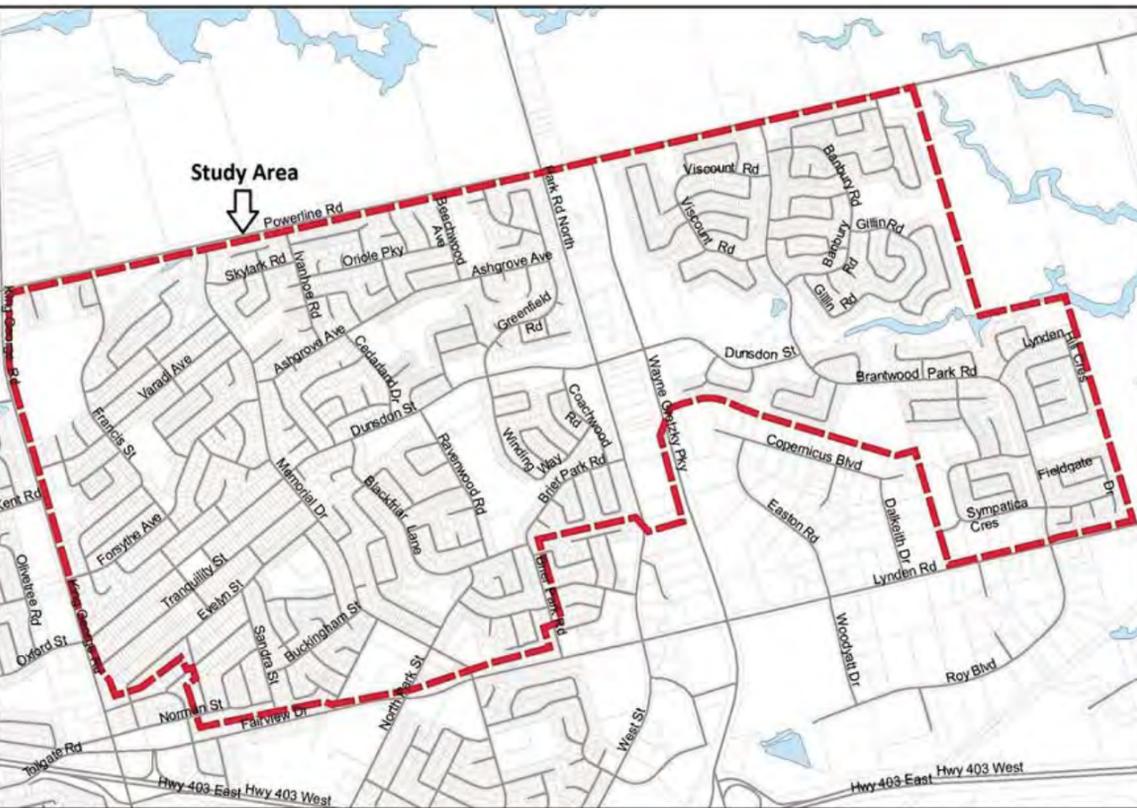


APPLICATION FORMS AND DEADLINE

Applications will be received until **4:30 p.m.** on **Wednesday, November 6, 2019.**

Application forms and general information is available in the City Clerk's Department, Brantford City Hall during regular business hours, on the City's website at brantford.ca/CommitteeApplication.

If you have any questions about applying to sit on one of the Committees listed, please contact 519-759-4150 ext. 5731, or send an email with your questions to Appointments@brantford.ca.



NOTICE

City of Brantford Grants Program

Capacity Grant applications now open until November 29, 2019

The City of Brantford is proud to work with local not-for-profit organizations to help build a stronger and more vibrant community. The City of Brantford Grants Program is part of our commitment to facilitating opportunities to enhance community wellbeing through the support of arts, culture, heritage, recreation, the environment and health and human services.

ORGANIZATIONAL CAPACITY BUILDING GRANTS

City of Brantford Capacity Building Grants are provided to non-profit organizations to enable non-profit leaders and organizations to develop the skills and resources they need to make a meaningful difference for the residents of our community.

- **One-time maximum funding** up to \$50,000 over three consecutive years with a maximum limit of \$20,000 per year
- **Program Deadline** – November 29

CAPACITY GRANT INFORMATION SESSIONS:

Information sessions will be held at the Brant Community Foundation located at 30 Brant Avenue, Brantford:

- Wednesday, October 23, 2019, at 4:00 p.m.
- Friday, October 25, 2019, at 1:00 p.m.
- Friday, November 8, 2019, at 1:00 p.m.



Administered by the Brant Community Foundation, program grants are distributed to qualifying organizations based on specific criteria. Not-for-profit applicants who are interested in learning more are encouraged to visit the City's website for more information at brantford.ca/grants or contact the Brant Community Foundation at 519-756-2499 or info@brantcf.ca.



Building our Community. Investing in the Future.



Public Information Centres

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Public Information Centre No. 1
Municipal Class Environmental Assessment



**Mohawk Lake and Mohawk Canal Cleanup
and Rehabilitation Project**

Date: June 5, 2019

Time: 5:00 pm – 7:00 pm

**Location: Mohawk Park Pavilion,
51 Lynnwood Drive, Brantford**



Purpose and Objectives

Public Information Centre (PIC)



Introduce the Study and preliminary findings of existing conditions



Share insights from the Characterization Study



Receive input on the Draft Problem and Opportunity Statement



Brainstorm the vision for Mohawk Lake



Outline the next steps in the Study process



Hear from you! Your input is very important to us!

Study

The purpose of the Study is to consider ways to improve the environmental quality of Mohawk Lake and Mohawk Canal by providing:

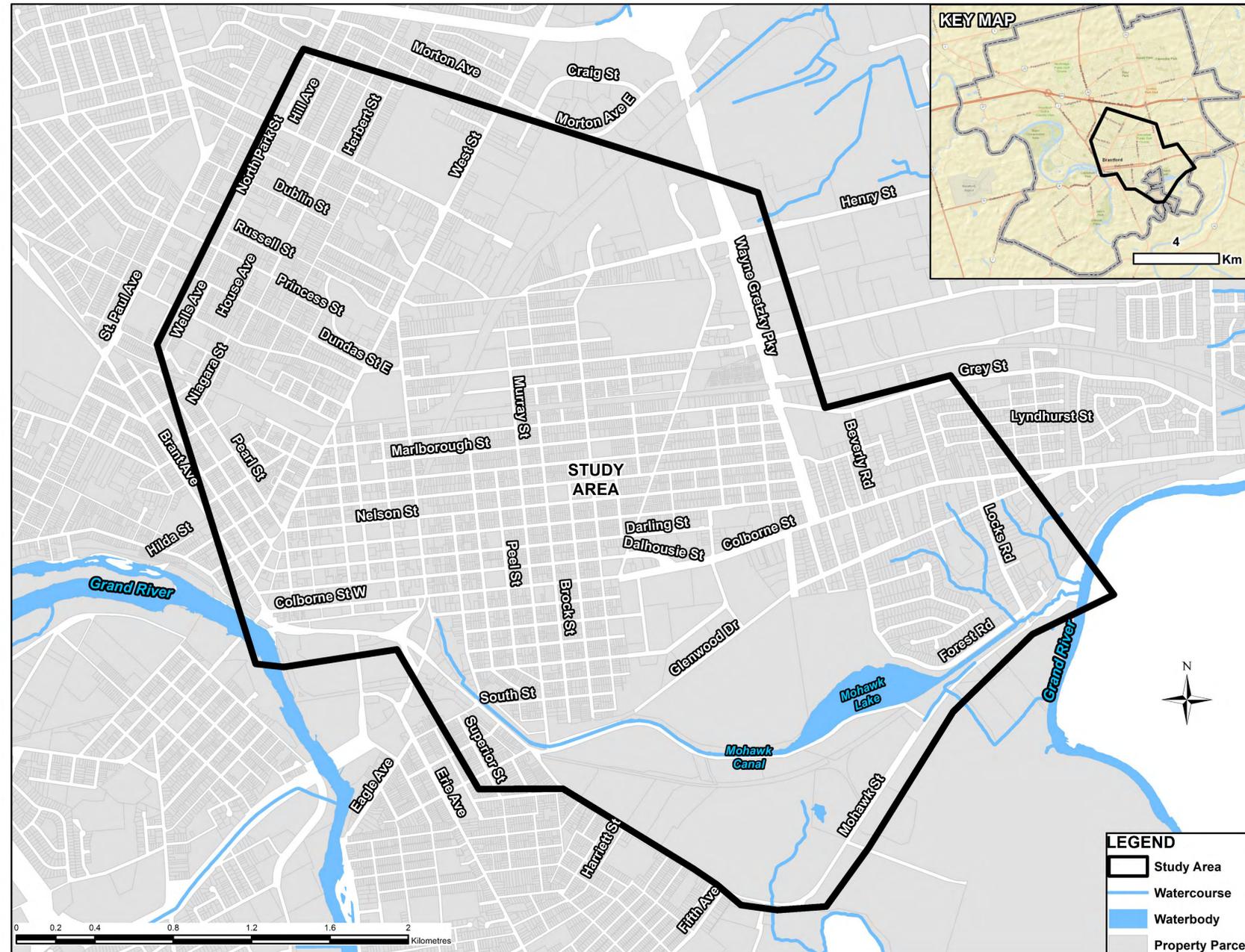
- Enhanced recreational opportunities
- Enhanced fish & wildlife habitat
- Improved water quality conditions

Potential benefits that remediation and restoration can provide to Mohawk Lake and Mohawk Canal may include:

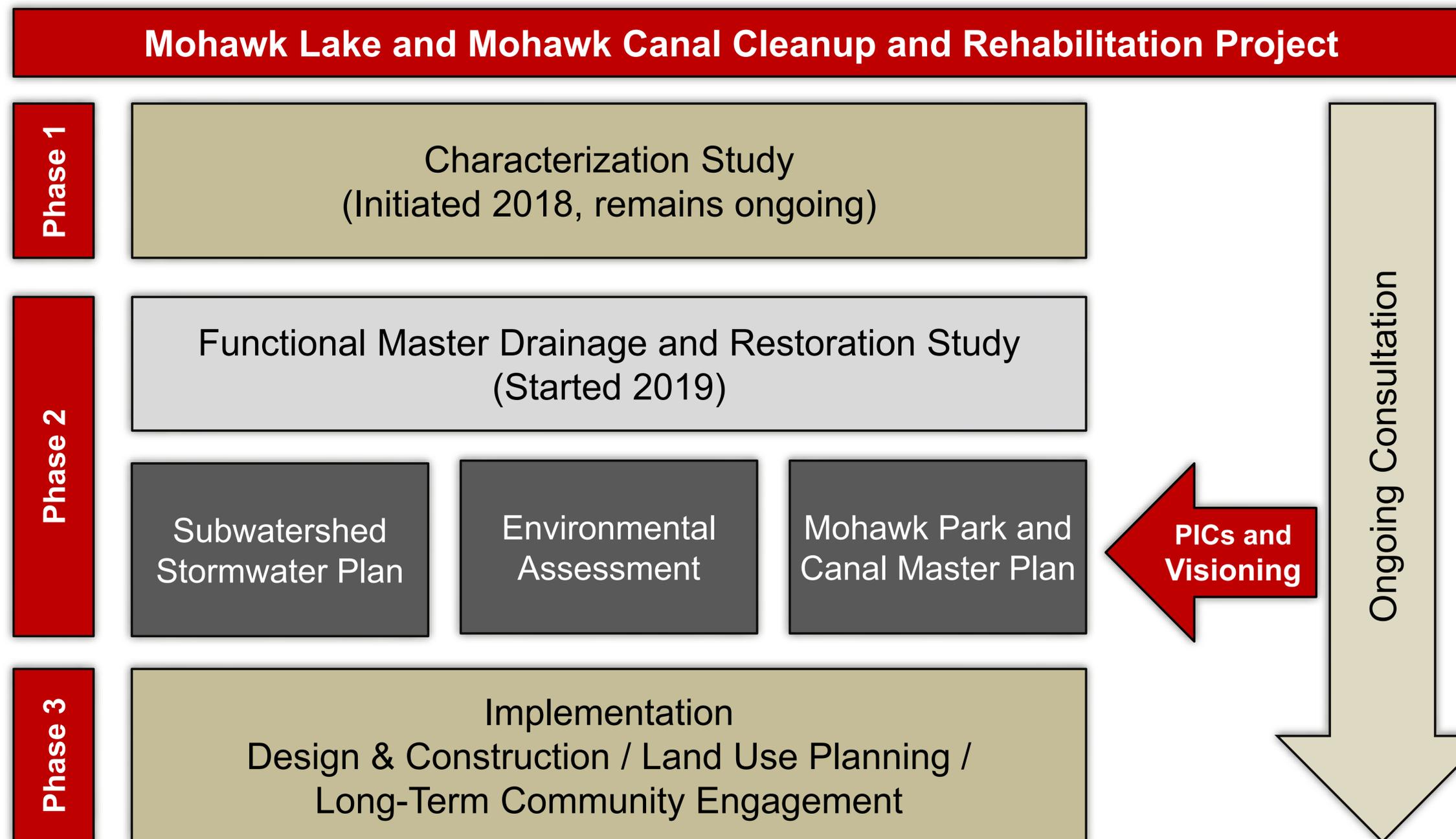
- Improved aquatic & wildlife habitat
- Protection & interpretation of cultural heritage resources
- Opportunities for water recreation

Study Area

Boundary of the area that drains to Mohawk Lake via East Ward Creek and the West Canal



Project Phases



Subwatershed Study, EA & Master Plan

Subwatershed Study

- Recommend actions to maintain, restore or enhance the health of the Mohawk Lake subwatershed
- Assess potential alternatives to assist in identifying a preferred subwatershed protection and restoration strategy
- Define environmental requirements such as design criteria and targets, priority phasing, mitigation measures, implementation and monitoring plans

Environmental Assessment (EA)

- Consider all aspects of the environment: physical, natural, social, cultural and economic, including cost/benefit analyses
- Consult with the public, Indigenous groups, affected parties and review agencies throughout the process
- Define the problem and opportunity (i.e., remediation of the lake and canal offers improved environment and habitat, and recreational amenity for the community)
- Identify, develop and evaluate potential remediation options
- Document the selection of the Preferred Remedial Option(s)

Mohawk Park and Mohawk Canal Master Plan

Master Plans (part of the Municipal Class EA framework) are long range plans that integrate infrastructure requirements for existing and future land use with environmental assessment planning principles. For the Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study, the Master Plan approach broadens the perspective for implementation of the preferred solution, by:

- Looking beyond the infrastructure and remediation components
- Considering the land use and park use policy direction
- Translating community visions into actions and commitments, including long-term engagement



Historical Overview

- Mohawk Lake was constructed in the 1800's as part of a canal system to provide access for barges traveling through Brantford and to enable the barges to turn around
- In the early 1900s, the lake and the surrounding parkland provided the community with recreational opportunities for residents and continues to offer valuable natural heritage for the City
- For decades, concern has been expressed about the deteriorating environmental conditions in the lake and canal
- As early as 1950, studies were conducted to improve the flow and to address siltation issues in the lake and canal
- The *Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project* was partly initiated in response to these concerns



Timeline

1800s

Mohawk Lake and Mohawk Canal Constructed

- Part of the canal system to provide access for barges traveling through Brantford and to enable the barges to turn around

Early 1900s

Recreational Area

- The lake and the surrounding parkland provided the community with recreational opportunities

1950s

Early Cleanup Studies

- Conducted to improve the flow and to combat the silting problems in the lake and canal

1970s

Mohawk Canal Disconnected from Grand River

- Inflow from the Grand River diverting flow to the canal was disconnected with the removal of a dam

2015

Visioning for Mohawk Lake

- Visioning workshops provided the basis for a vision statement and work plans to address the clean-up

2018

Characterization Study

- Study to define the current (baseline) environmental conditions to support future rehabilitation measures

2019

Functional Master Plan Drainage and Restoration Study

- Study to define actions to enhance recreational opportunities, fish & wildlife habitat and improve water quality conditions



Project Environmental Assessment Process



Characterization Phase

- Water quality concentration varies, with some parameters exceeding the guidelines at all monitoring stations.
- Approximately 185,000 m³ of unconsolidated sediment has accumulated within Mohawk Lake and Mohawk Canal.
 - Sediment thickness within the Mohawk Canal ranged up to 1.5 m whereas sediment thickness within Mohawk Lake ranged from up to 2.4 m.
 - Sediment Quality for Mohawk Lake is generally consistent with previously completed sediment quality investigations with almost the same contamination levels.
- Confirmed the presence of high quantities of organic mud / silt and very low dissolved oxygen (DO) levels.
- Identified a number of erosion sites.
- Observed and recorded a number of significant and designated wildlife habitat, species, vegetation and fish community with the Mohawk Lake area.



Environmental Conditions

This **Project** draws upon past studies and recent comprehensive field investigations that were undertaken to determine the environmental conditions of the Mohawk Lake and Mohawk Canal based on the following components.

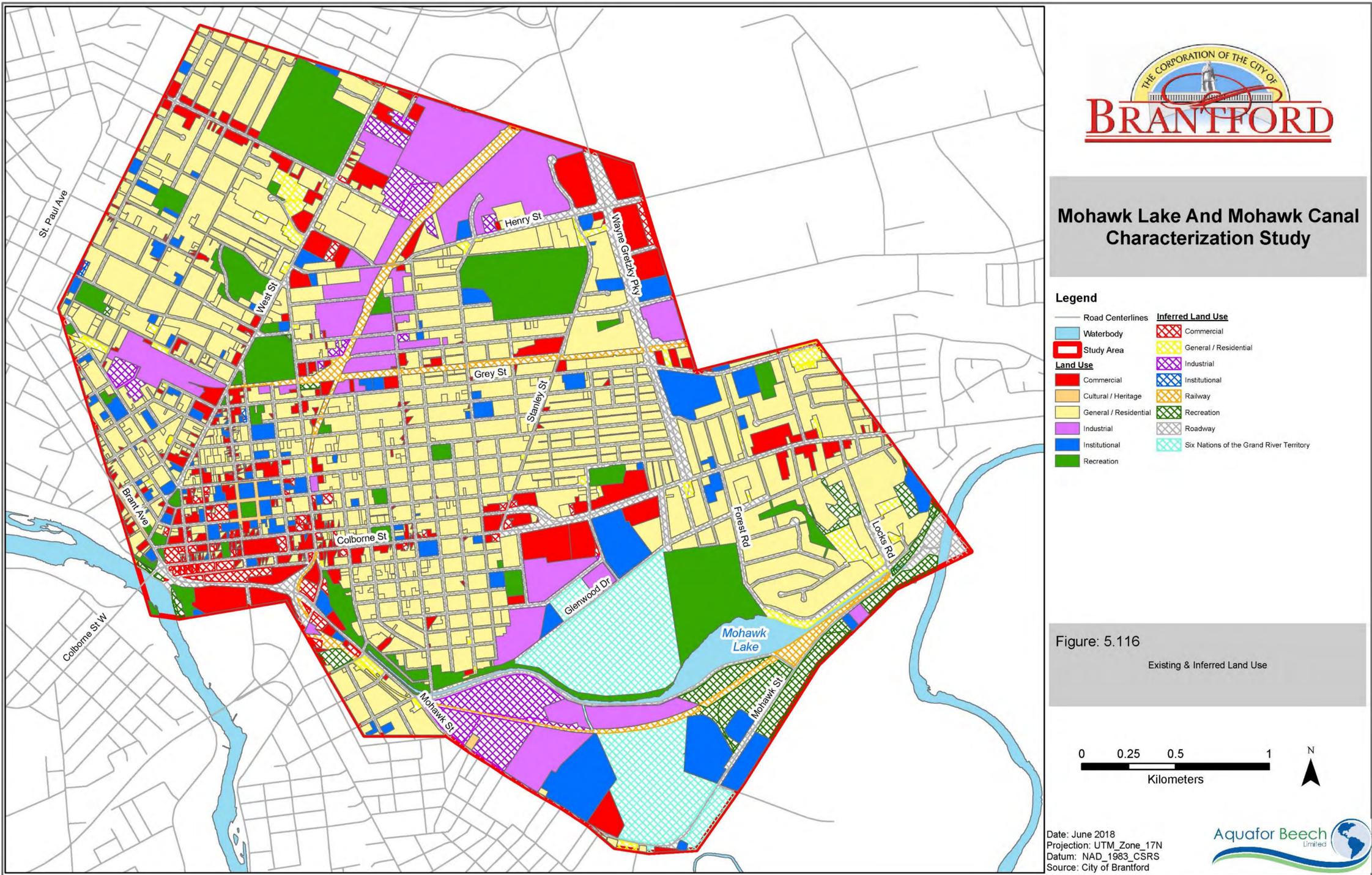


What We Know

Category/ Discipline	General Impacts	Impact Assessment	
		Direct	Indirect
Cultural Heritage & Archaeology	<ul style="list-style-type: none"> Restrictions on development and site alterations 	<ul style="list-style-type: none"> Restrictions on development due to designation Buffers required for sites of archaeological significance 	<ul style="list-style-type: none"> Requires archaeological assessment
Geology, Hydrogeology & Groundwater	<ul style="list-style-type: none"> Change in infiltration rates / groundwater recharge rates Mobilization of groundwater contamination Erosion of soils 	<ul style="list-style-type: none"> Change in groundwater discharge (quantity & quality) Runoff with high, and potentially contaminated suspended load 	<ul style="list-style-type: none"> Potential ecological impacts, baseflow impacts and water quality impacts
Hydrology & Stormwater Management	<ul style="list-style-type: none"> Increase / decrease in flows and volumes Change in water balance 	<ul style="list-style-type: none"> Change in operation of the lake, including water levels, durations, circulation Impacts to watercourse erosion Changes to groundwater 	<ul style="list-style-type: none"> Potential ecological impacts from changes in operation
Hydraulics	<ul style="list-style-type: none"> Flooding extent / impact to adjacent lands Changes in operation with more frequent storm events 	<ul style="list-style-type: none"> Flooding extent / impact to adjacent lands Changes in operation with more frequent storm events 	<ul style="list-style-type: none"> Potential ecological impacts due to changes in lake levels
Water Quality	<ul style="list-style-type: none"> Impaired water quality 	<ul style="list-style-type: none"> Water quality impaired most significantly in West Canal Pollutant sources 	<ul style="list-style-type: none"> Water quality impacted by sediment contamination
Sediment Quantity & Quality	<ul style="list-style-type: none"> Significant sedimentation Impaired sediment quality 	<ul style="list-style-type: none"> Sediment quality impaired most significantly in West Canal Potential contaminant mobilization 	<ul style="list-style-type: none"> Dredging and channel reconfiguration influenced by contaminant mobilization
Natural Heritage	<ul style="list-style-type: none"> May involve sites with natural heritage designations 	<ul style="list-style-type: none"> Provincially Significant Wetland Significant Wildlife Habitat and Rare Vegetation Community Environmental permits and associated restrictions 	<ul style="list-style-type: none"> Habitat compensation Construction timing windows



Existing Land Uses



Problems and Opportunities

The Problems

Many years of industrial discharge and municipal stormwater drainage (drainage from roadways, parking areas and individual properties) have resulted in the deterioration of Mohawk Lake and Mohawk Canal. The City has made significant efforts to improve the lake including discontinuing industrial discharges as much as possible. Recent efforts for upstream brownfield remediation have eliminated any new potential occurrences of legacy contaminants to migrate from former industrial lands. However, water quality in Mohawk Lake still remains affected by incoming waterflow from stormwater runoff and the subdrainage catchment areas, and contaminated sediments that have accumulated over decades in Mohawk Lake and Mohawk Canal.

The Opportunities

The Class EA process provides an opportunity to develop various alternative solution(s) to enhance features and environmental conditions in Mohawk Lake and Mohawk Canal, as well as strengthen and improve the resource protection, community use and quality of life.



Tell us what you think about the draft Problem and Opportunity Statement!

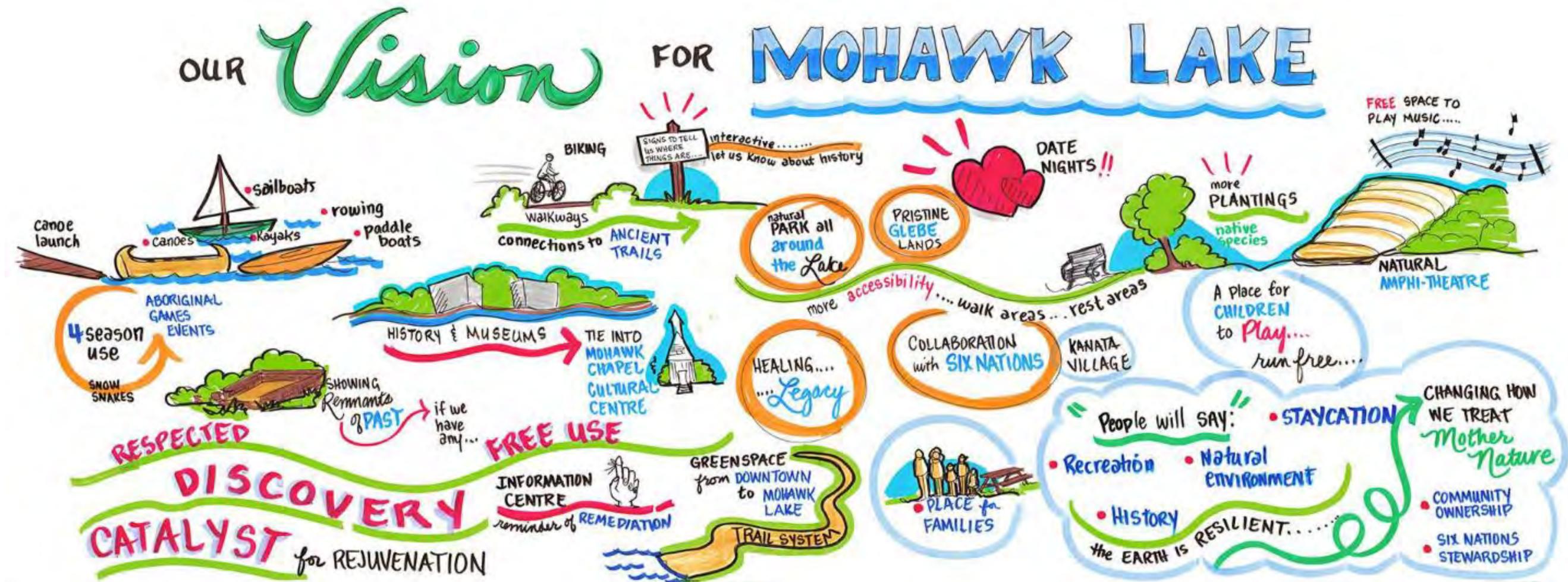
(Use post-it notes to write your comments here)



Visioning Exercise

Mohawk Lake Vision Statement (2015)

“I will be the place of vibrancy I was yesterday. I am the heart of our communities and our place for reflection, healing, and celebration. I am both Mother Earth’s refuge and your family’s natural playground. I am Mohawk Lake.”



Future of Mohawk Lake and Mohawk Canal



*Tell us about your vision for the future of Mohawk Lake and Mohawk Canal!
Based on 2015 Mohawk Lake visioning exercise, what aspects of the 2015
visioning do you want to highlight as the most important? What are the least
important? Any additional ideas to add to this vision?*

(Use post-it notes to write your comments here)

Website: <https://www.brantford.ca/en/your-government/mohawk-lake-and-mohawk-canal-cleanup-and-rehabilitation-project.aspx>



Next Steps and Schedule

- Review comments received and prepare a PIC#1 summary report
- Create Long-Term Community Engagement Plan
- Develop alternative design concepts
- Conduct PIC#2 Fall 2019 (date will be communicated)
- Prepare and file the Project File Report, summarizing the Study
 - Publish study completion for 30 days (notice will be provided)

**Comment
Deadline
June 21, 2019**

**Thank you for
your
participation!**

Contact Us

By Mail: **Nahed Ghbn, P.Eng.**
Senior Project Manager
City of Brantford

By Phone: 519-759-4150 ext. 5262

By Email: NGhbn@brantford.ca

Ron Scheckenberger, M.Eng., P.Eng.
Principal Consultant
Wood Environment & Infrastructure Solutions

905-335-2353

Ron.Scheckenberger@woodplc.com

Website: <https://www.brantford.ca/en/your-government/mohawk-lake-and-mohawk-canal-cleanup-and-rehabilitation-project.aspx>





Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project

wood.

Functional Master Drainage and Restoration Study

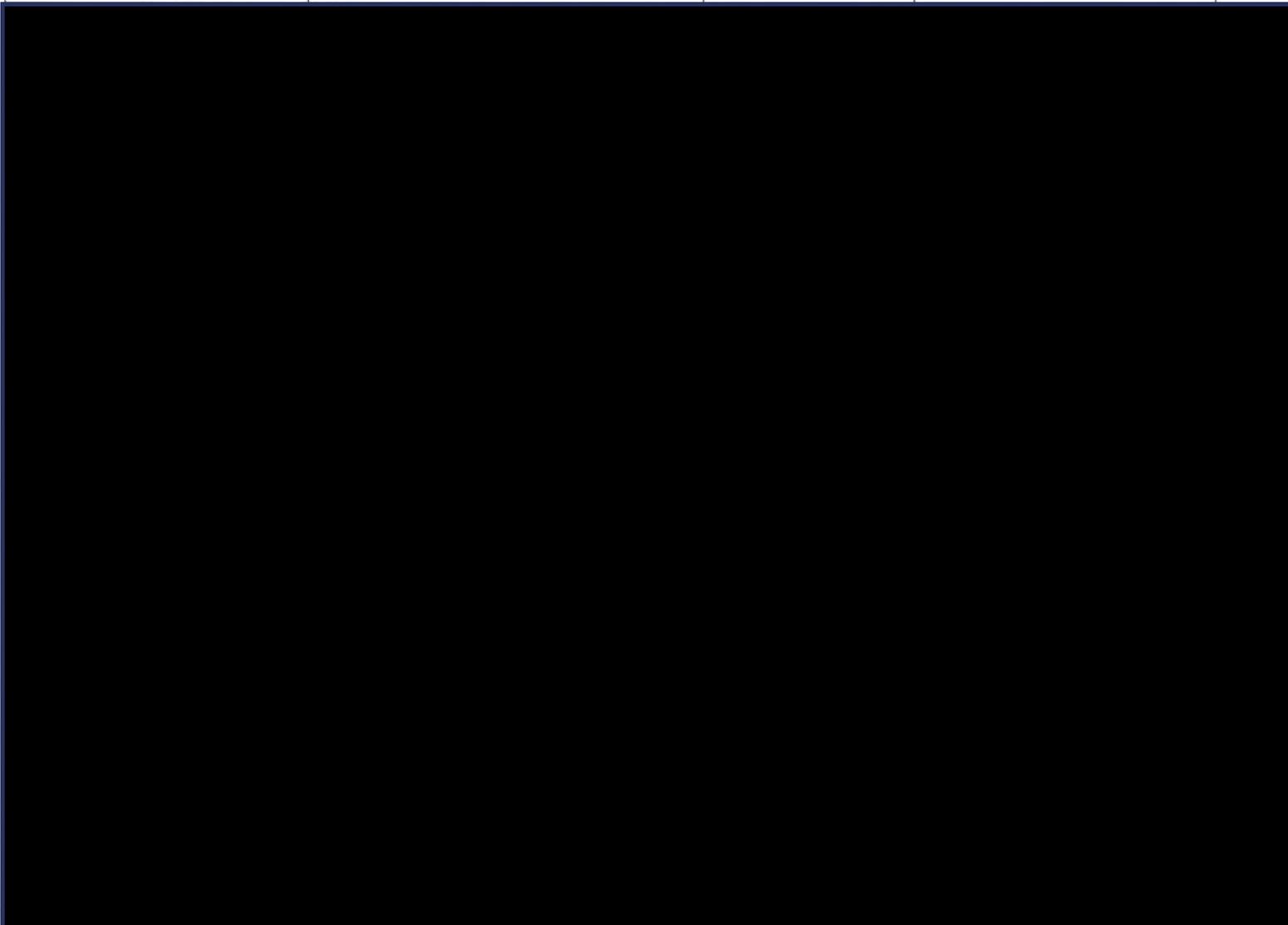
Public Information Centre

June 5th, 2019
5:00 p.m. – 7:00 p.m.

SIGN-IN SHEET

Please Print Clearly

Name	Address	Phone #	E-mail
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Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project

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Functional Master Drainage and Restoration Study

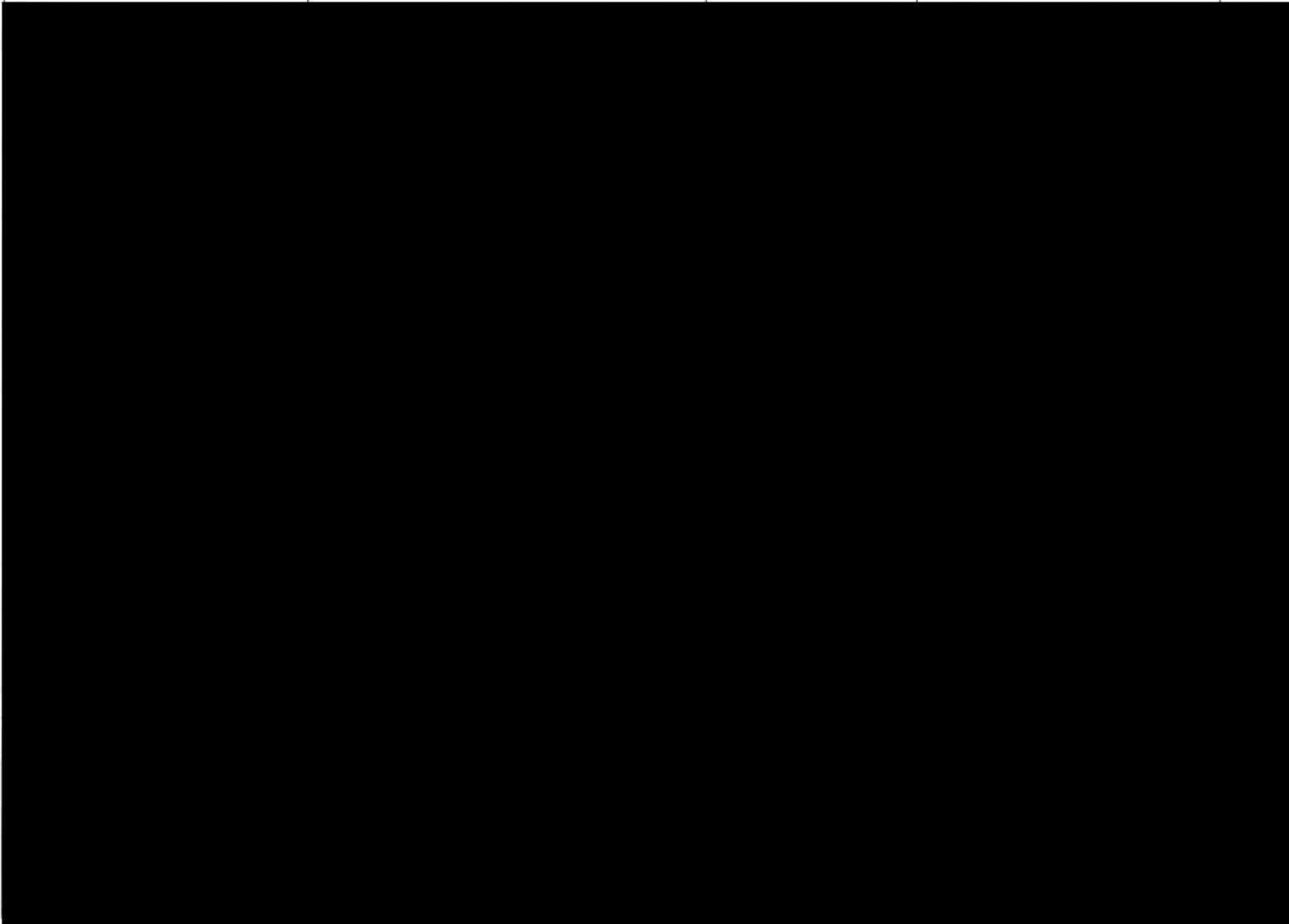
Public Information Centre

June 5th, 2019
5:00 p.m. – 7:00 p.m.

SIGN-IN SHEET

Please Print Clearly

Name	Address	Phone #	E-mail
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Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project



Functional Master Drainage and Restoration Study

Public Information Centre

June 5th, 2019
5:00 p.m. – 7:00 p.m.

SIGN-IN SHEET

Please Print Clearly

Name	Address	Phone #	E-mail



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Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project

Functional Master Drainage and Restoration Study

Public Information Centre

June 5th, 2019
5:00 p.m. – 7:00 p.m.

SIGN-IN SHEET

Please Print Clearly

Name	Address	Phone #	E-mail

wood.

Public Information Centre No. 2
Municipal Class Environmental Assessment



Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project

Date: October 23, 2019

Time: 5:00 pm – 7:00 pm

Location: Mohawk Park Pavilion,
51 Lynnwood Drive, Brantford



Welcome to Public Information Centre #2

This evening we will:



Share Study purpose, problem and opportunity statement and historical context



Confirm the community vision for Mohawk Lake



Share the evaluation criteria used to assess alternatives: stormwater management, remediation and other solutions



Share the evaluation results and identify preliminary preferred alternatives



Share Long-Term Community Engagement Plan



Outline the next steps in the Study process



Hear from you! Your input is very important to us!



Problems and Opportunities

The Problems

Years of industrial discharge and municipal stormwater runoff (drainage from roadways, parking areas and individual properties) have resulted in the degradation of Mohawk Lake and Mohawk Canal. The City has made significant efforts to improve the lake including discontinuing industrial discharges, as much as possible. Recent efforts to remediate previously developed upstream lands have removed the potential for new migration of historic contaminants. However, water quality in Mohawk Lake remains affected by stormwater runoff and drainage, and the historic accumulation of contaminated sediments in Mohawk Lake and Mohawk Canal.

The Opportunities

The Class EA process provides an opportunity to consider various alternative solution(s) to enhance features and functions including environmental conditions in Mohawk Lake and Mohawk Canal, as well as strengthen and improve the resource protection, community use and quality of life.



Community Needs and Vision

Mohawk Lake District Plan Vision Statement

Mohawk Lake District will be: A welcoming place for residents, families and visitors of all ages to explore, shop, eat, learn, and gather. Parks and trails along Mohawk Lake and Mohawk Canal and throughout the District will provide a beautiful and healthy way to connect with nature. Mohawk Lake District will be where we honour the past, but also a place to be inspired for the future. As a popular destination where history, culture, recreation, and tourism meet, Mohawk Lake District will be a place of pride in the community.

What we've heard so far...

Potential Recreational Uses:

- A vibrant green space for all ages and people
- An all-season lake and park for boating, fishing, canoeing, hiking, walking, picnicking, ice skating, biking
- A place to hold charity events (i.e. Dragon Boat Races), dances and concerts

Potential Cultural Uses:

- Mohawk Canal is a cultural corridor that will be a focal point for Cultural Heritage interpretation
- Educational and research opportunities for students based on the Mohawk Canal, Six Nations of the Grand River, and Brantford's industrial heritage

Priorities:

- Enhance the landscape for fish, wildlife, birds and vegetation
- Avoid significantly altering the landscape for human activities
- Improve recreational opportunities, while maintaining the natural beauty of the area



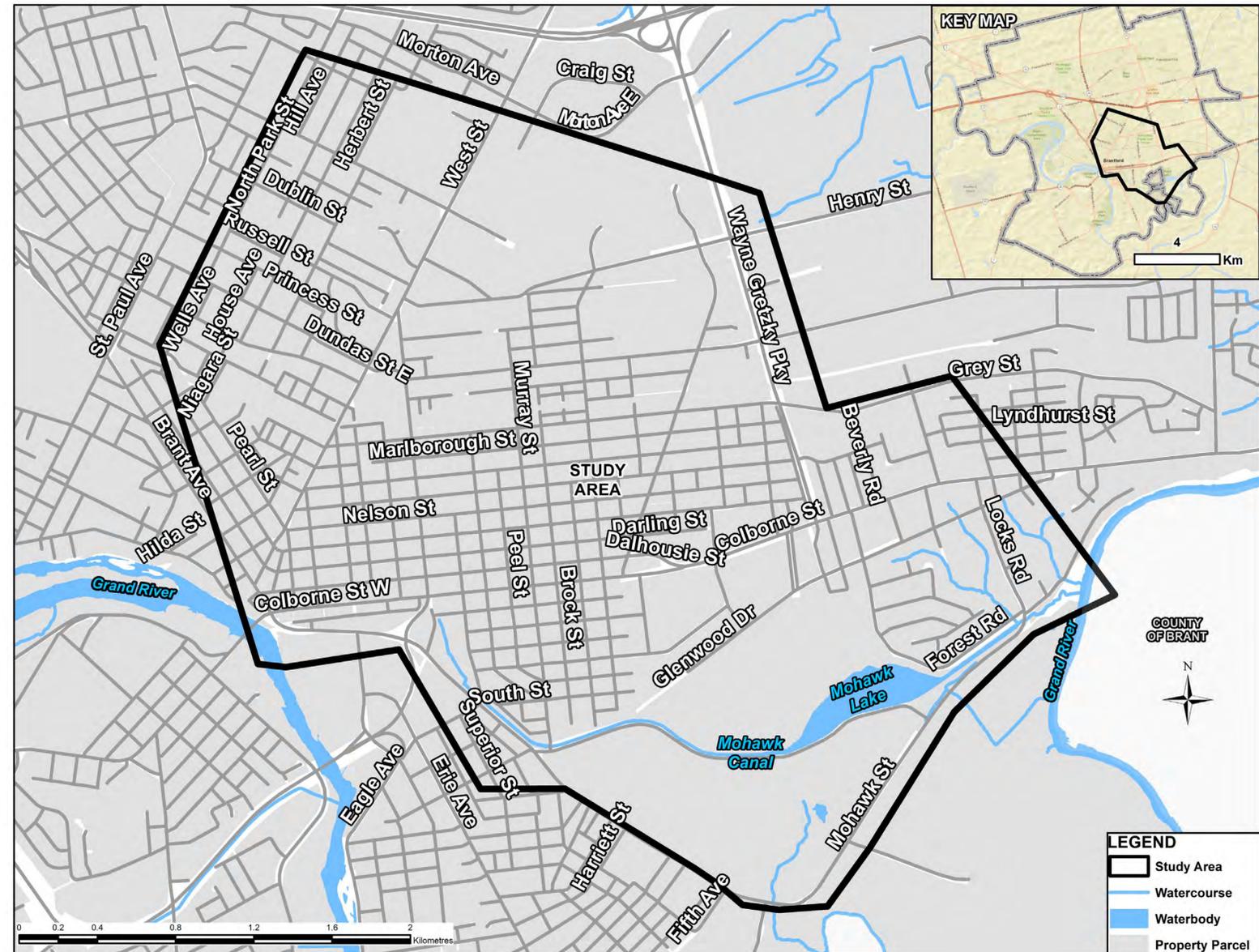
Study Area and Purpose

The purpose of the Study is to consider ways to improve the environmental quality of Mohawk Lake and Mohawk Canal by providing:

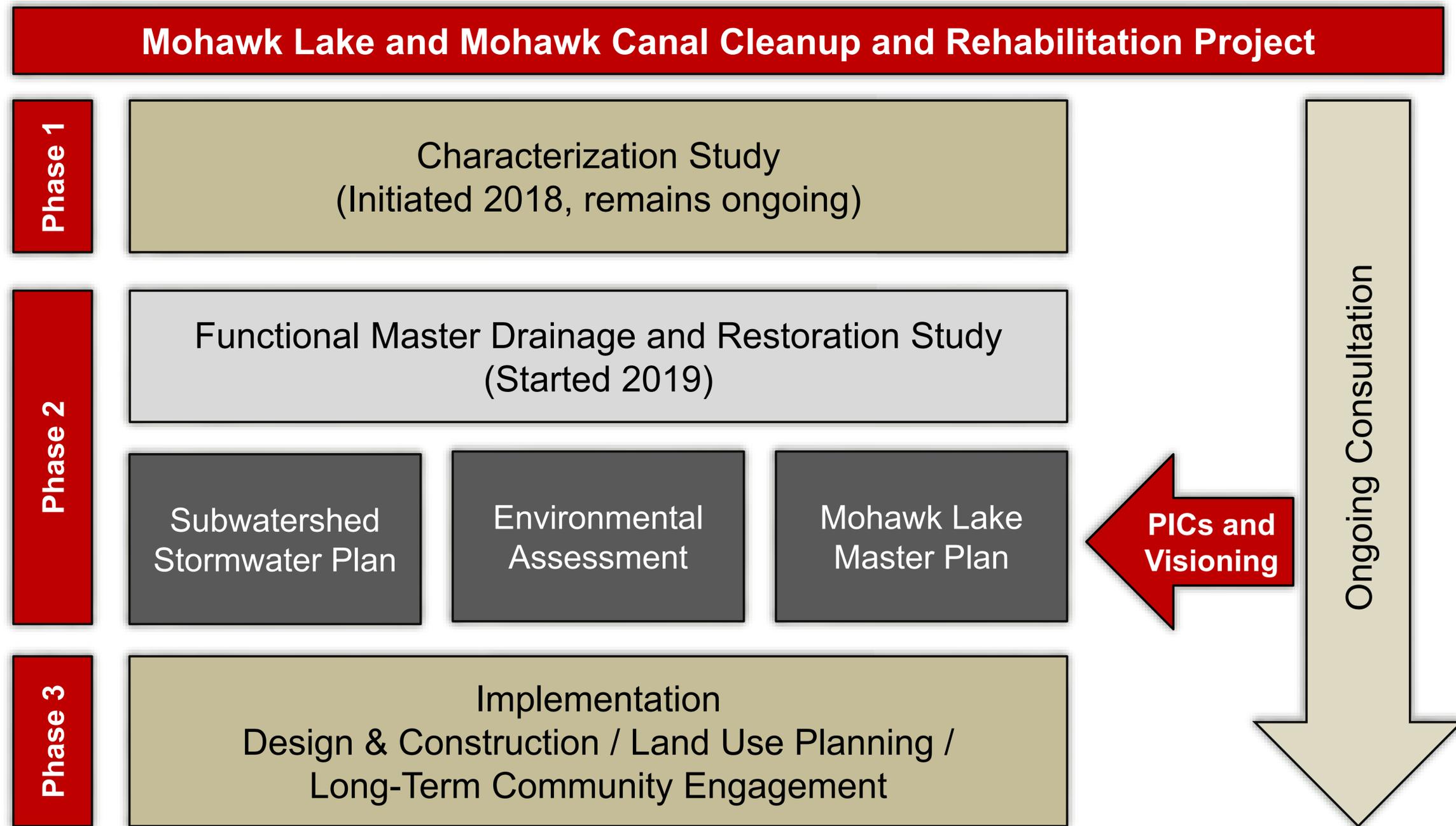
- Improved water quality conditions
- Enhanced recreational opportunities
- Enhanced fish & wildlife habitat

Potential benefits that remediation and restoration can provide to Mohawk Lake and Mohawk Canal may include:

- Improved aquatic & wildlife habitat
- Protection & interpretation of cultural heritage resources
- Opportunities for enhanced water recreation



Project Phases



Subwatershed Study, EA & Master Plan

Subwatershed Study

- Recommend actions to maintain, restore or enhance the health of the Mohawk Lake subwatershed
- Assess potential alternatives to identify a preferred subwatershed protection and restoration strategy
- Define environmental requirements such as design criteria and targets, priority phasing, mitigation measures, implementation and monitoring plans

Environmental Assessment (EA)

- Consider all aspects of the environment: physical, natural, social, cultural and economic, including cost/benefit analyses
- Consult throughout the process
- Define the problem and opportunity
- Identify, develop and evaluate alternative solutions
- Document the selection of the Preferred Remedial Option(s)

Mohawk Lake Master Plan

Develop a long range plan that integrates infrastructure requirements for existing and future land use with environmental assessment planning principles. The process of developing the Master Plan involves:

- Looking beyond the infrastructure and remediation components
- Considering the land use and park use policy direction
- Translating community visions into actions and commitments, including long-term engagement

Community Engagement



Environmental Assessment Process

Municipal Class Environmental Assessment, Schedule B



**We
are
here**



Historical Overview

- Mohawk Lake was constructed in the 1800s as part of a canal system to provide access for barges traveling through Brantford and to enable the barges to turn around
- In the early 1900s, the lake and the surrounding parkland provided the community with recreational opportunities for residents and continues to offer valuable natural heritage for the City
- For decades, concern has been expressed about the deteriorating environmental conditions in the lake and canal
- As early as 1950, studies were conducted to improve the flow and to address siltation issues in the lake and canal
- The *Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project* was partly initiated in response to these concerns



Timeline

1800s

Mohawk Lake and Mohawk Canal Constructed

- Part of the canal system to provide access for barges traveling through Brantford and to enable the barges to turn around

Early 1900s

Recreational Area

- The lake and the surrounding parkland provided the community with recreational opportunities

1950s

Early Cleanup Studies

- Conducted to improve the flow and to combat the silting problems in the lake and canal

1980s

Mohawk Canal Disconnected from Grand River

- Inflow from the Grand River diverting flow to the canal was disconnected with the removal of a dam

2015

Visioning for Mohawk Lake

- Visioning workshops provided the basis for a vision statement and work plans to address the clean-up

2019

Characterization Study

- Study to define the current (baseline) environmental conditions to support future rehabilitation measures

2019 (in progress)

Functional Master Plan Drainage and Restoration Study

- Study to define actions to enhance recreational opportunities, fish & wildlife habitat and improve water quality conditions



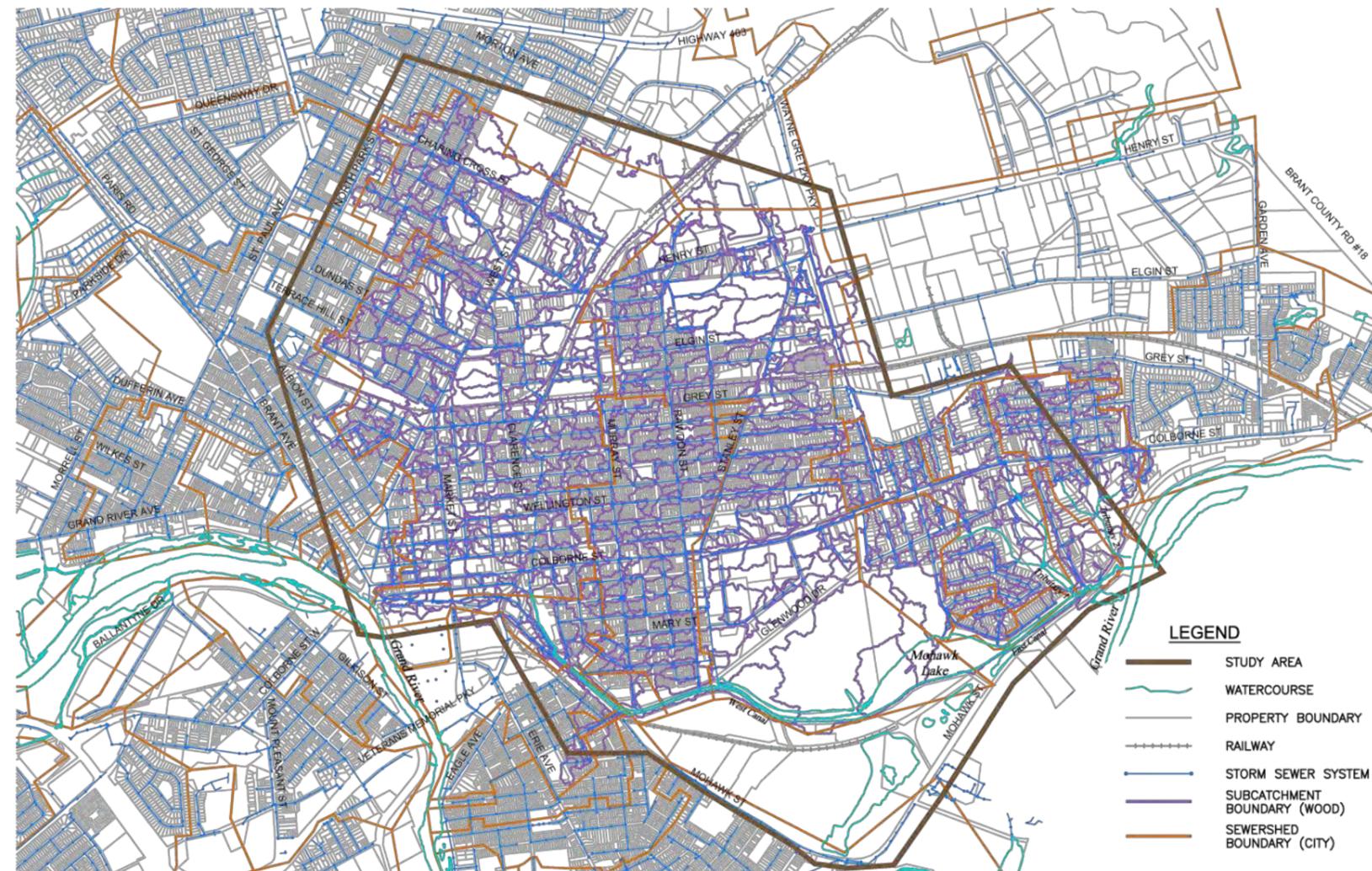
Characterization Findings

- Water quality concentrations vary, with some parameters exceeding the guidelines at all monitoring stations
- Approximately 185,000 cubic metres (m³) of sediment has historically accumulated in the lake and canal
 - Sediment thickness in the canal ranges up to 1.5 metres and in the lake ranges from up to 2.4 metres
 - Sediment Quality for Mohawk Lake is generally consistent with previous sediment quality investigations with similar contamination levels
- Confirmed the presence of high quantities of organic mud / silt and very low dissolved oxygen (DO) levels
- Identified a number of erosion sites
- Observed and recorded a number of significant and designated wildlife habitat, species, vegetation and fish community



Water Flow and Movement into Mohawk Lake

- Evaluated the amount of water, including peak flows and runoff volumes, to develop an understanding of the amount of water that feeds into Mohawk Lake and Mohawk Canal
- Understanding the water flow and movement has supported the assessment of alternative water management solutions



Alternatives Overview

Three main management approaches have been identified based on the study purpose:

- Improved water quality conditions
- Enhanced recreational opportunities
- Enhanced fish & wildlife habitat

1. Stormwater Management Alternatives

- Source/Conveyance Control
(Public / Private)
- End-of-pipe (Retrofits)



Stormwater Management

2. Mohawk Lake & Mohawk Canal Remediation Alternatives

- Sediment Removal from Lake & Canal
- Shoreline / Edge Treatment of Lake Perimeter
- Natural Channel Design of Canal



Shoreline Restoration Activities

3. Other Management Alternatives

- Street Sweeping
- Public Education
- Recirculation / Re-connection with Grand River



Street Sweeping

Evaluation Criteria

Natural Environment

- Water Quality (Chem. & Temp.)
- Water Quality
- Natural Heritage (Habitat, Wetlands and SAR)
- Fluvial Geomorphology
- Geology, Hydrogeology & Groundwater



Economic Environment

- Capital Cost
- Contaminant Management Cost
- Maintenance Cost
- Utilities Impacts
- Property Acquisition



Social/Cultural Environment

- Archaeology & Cultural Heritage
- Future Land Use & Growth Impacts
- Hydraulics - Flooding



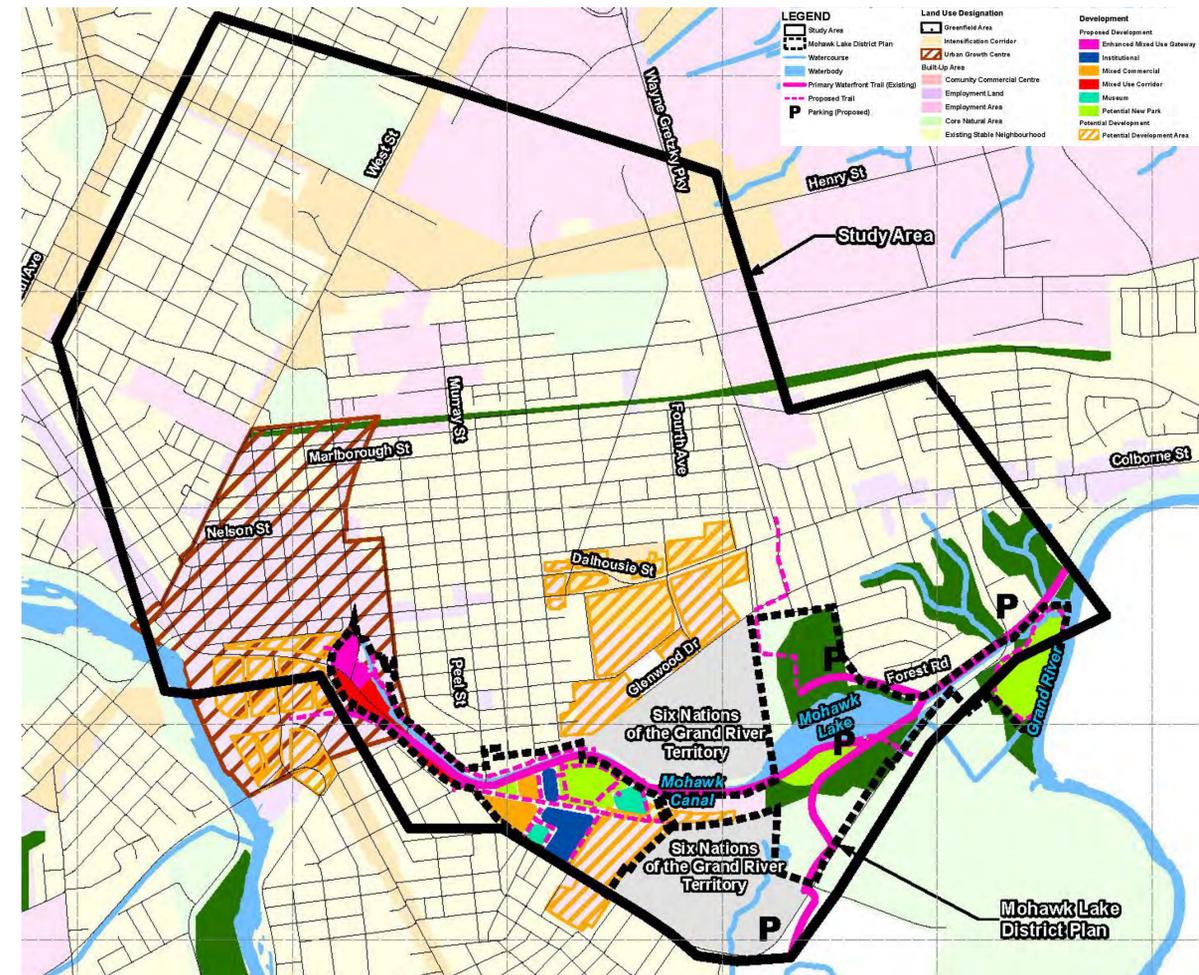
Technical Environment

- Stormwater Management
- Hydrology
- Constructability
- Community Resilience & Sustainability



Stormwater Management Alternatives

- Treat water at source for:
 - Redeveloping lands
 - Existing lands (incentive program)**Preference to filtrative vs. infiltrative*
- Treat water in Road Right-of-Ways
 - At time of road reconstruction
 - Use source / conveyance techniques
- Build new end-of-pipe treatment facilities at outfalls:
 - Oil & grit separators for smaller areas
 - Wet ponds for larger areas



Future Redevelopment Areas in Mohawk Lake Subwatershed



Stormwater Management Alternatives Evaluation

Component	Category	Evaluation Criteria	Factor	Measure	Weight	Alternative 1: Source / Conveyance (Public Roads)	Alternative 2: Source / Conveyance (Private Redevelopment)	Alternative 3: Source (Private Incentive-based)	Alternative 4: End-of-Pipe (Retrofits)
Natural Environment	Water Quality	Water Quality & Temperature	Quality of Water for Fish and Wildlife, Recreation, or Human Use	Provincial Water Quality Objectives (PWOQ) and stream management objectives	H	Potential for recovered capacity	Potential for recovered capacity	Potential treatment	Potential treatment
	Hydrology & Stormwater Management	Water Quantity	Environmental flows for recreation or wildlife	Flow rate (cubic metres per second, m ³ /s)	L	Minor benefit potential	Minor benefit potential	Minor benefit potential	Minor benefit potential
	Natural Heritage	Aquatic Habitat	Improvements or impacts to habitat viability	Area of impacted habitat (square metres, m ²)	H	No direct change	No direct change	No direct change	No direct change
		Wildlife Habitat	Potential effects wildlife due to changes in habitat	Area of impacted habitat (square metres, m ²)	M	No direct change	No direct change	No direct change	No direct change
	Fluvial Geomorphology	Fluvial Stability / Sediment Transport	Potential adverse effect on surface water due to drawdown or flow disruption	Extent of impact	M	Negligible change	Negligible change	Negligible change	Potential for minor benefit
	Geology, Hydrogeology & Groundwater	Groundwater / Source Protection	Potential adverse effect on groundwater and wells including groundwater discharge and recharge	Extent of impact	L	Minor water balance benefit	Minor water balance benefit	Minor water balance benefit	No change
Social/Cultural	Cultural Heritage & Archaeology	Archaeological & Cultural Heritage Resources	Potential adverse effects on archaeological and cultural heritage resources	Extent of impact	L	No direct impact (right-of-way)	No direct impact (redeveloping land base)	No direct impact (private property)	Minor potential
	Future Land Use & Growth Impacts	Recreation Use	Ability to support recreation, including access	E. coli concentrations	M	Improved water quality	Improved water quality	Improved water quality	Improved water quality
		Shoreline Access	Access points to lake and canal	Access points	L	No influence on shoreline	No influence on shoreline	No influence on shoreline	No influence on shoreline
		Impacts on Adjacent Properties	Changes to properties resulting from changes to water levels, construction of alternatives, etc.	Private and public properties (number of)	M	None will occur in road right-of-ways	None will occur withing footprint of redevelopment lands	May impact existing properties; however, may reduce fugitive stormwater charge	Minor impacts to local area
	Hydraulics	Flooding - Lake & Canal	Impacts on flood potential in Mohawk Lake and Mohawk Canal	Floodplain extents	M	No impact to quantity	No impact to quantity	No impact to quantity	No impact to quantity
		Flooding - Streets & Sewers	Impacts on flood potential and elevation for water from streets and sewers	Flood depth	M	Potential to concurrently address local flood risk	Potential to concurrently address local flood risk	Potential to concurrently address local flood risk	Potential to concurrently address local flood risk
Economic	Capital Cost	Design and construction costs	estimated cost (\$)	H	Public cost at time of road works	Private cost at time of redevelopment	Private LO cost	Standalone capital cost	
	Contaminant Management	Sediment quantity and quality	Disposal cost (\$ / m ³)	M	Minor reduction	Minor reduction	Minor reduction	Minor reduction	
	Maintenance Cost	Asset management costs (Lifecycle)	estimated cost (\$)	H	City responsibility	Private redevelopment	Landowner responsibility	City responsibility	
	Property Acquisition	Amount of private property required to achieve solution	Area (hectares, ha)	M	Within road right-of-way	Within industrial / institutional lands	On private property	Will require public land repurposing	
Technical	Stormwater Management	Ability to achieve stormwater management standards	To be determined	H	Meet Provincial Guidelines	Meet Provincial Guidelines	Likely only partially effective	Likely only partially effective	
	Constructability	The ability to construct the improvements in a simple and cost effective manner	Duration / cost	M	Retrofit of existing roads and infrastructure	As part of new development	Retrofit of private property	Repurposing of existing land and infrastructure	
	Community Resilience & Sustainability	Ability of the solution to mitigate climate change impacts	To be determined	M	Recovers system capacity	Recovers system capacity	Recovers system capacity	Marginal change	
Summary						Preferred	Preferred	Complementary	Preferred

	Negative
	Negative-Neutral
	Neutral
	Positive-Neutral
	Positive



Mohawk Canal and Tributaries

Remedial Alternatives

- Restoration using natural channel design techniques to improve stability, reduce erosion and sedimentation
- Enhance habitat through revegetation
- Remove excess sediment



Mohawk Canal and Tributaries Remedial Alternatives Evaluation

Component	Category	Evaluation Criteria	Factor	Measure	Weight	Alternative 5: Revegetation of Riparian Areas and Tributary Streams	Alternative 6: Canal Restoration & Sediment Removal	Alternative 7: Living Shorelines, Shoreline Restoration, Shoreline Softening
Natural Environment	Water Quality	Water Quality & Temperature	Quality of Water for Fish and Wildlife, Recreation, or Human Use	Provincial Water Quality Objectives (PWOQ) and stream management objectives	H	Indirect habitat	Direct habitat improvements	Indirect habitat
	Hydrology & Stormwater Management	Water Quantity	Environmental flows for recreation or wildlife	Flow rate (cubic metres per second, m ³ /s)	L	No change	Potential to improve capacity / sustained flows	No change
	Natural Heritage	Aquatic Habitat	Improvements or impacts to habitat viability	Area of impacted habitat (square metres, m ²)	H	Indirect habitat	Direct habitat improvements	Indirect habitat
		Wildlife Habitat	Potential effects wildlife due to changes in habitat	Area of impacted habitat (square metres, m ²)	M	Direct habitat	Riparian zone impact	Indirect habitat
	Fluvial Geomorphology	Fluvial Stability / Sediment Transport	Potential adverse effect on surface water due to drawdown or flow disruption	Extent of impact	M	Minor benefit to stability	Significant potential benefit	No change
	Cultural Heritage & Archaeology	Archaeological & Cultural Heritage Resources	Potential adverse effects on archaeological and cultural heritage resources	Extent of impact	L	Minor potential	Minor potential	No impact
	Future Land Use & Growth Impacts	Recreation Use	Ability to support recreation, including access	E. coli concentrations	M	Limited benefit	Limited benefit	Limited benefit
		Shoreline Access	Access points to lake and canal	Access points	L	No impact	Potential to integrate ingress / egress	Potential to integrate ingress / egress
		Impacts on Adjacent Properties	Changes to properties resulting from changes to water levels, construction of alternatives, etc.	Private and public properties (number of)	M	Minor impacts	Potential to reduce water levels	Minor impacts
	Hydraulics	Flooding - Lake & Canal	Impacts on flood potential in Mohawk Lake and Mohawk Canal	Floodplain extents	M	No change	Potential to reduce water levels	No change
Flooding - Streets & Sewers		Impacts on flood potential and elevation for water from streets and sewers	Flood depth	M	No change	Minor potential to reduce tail water in sewers	No change	
Economic	Capital Cost	Design and construction costs	estimated cost (\$)	H	Moderate	High	Moderate	
	Contaminant Management	Sediment quantity and quality	Disposal cost (\$ / m ³)	M	Moderate	High	Moderate	
	Maintenance Cost	Asset management costs (Lifecycle)	estimated cost (\$)	H	Long-term reduction in maintenance anticipated	Long-term reduction in maintenance anticipated	Long-term reduction in maintenance anticipated	
	Property Acquisition	Amount of private property required to achieve solution	Area (hectares, ha)	M	Depends on extent, may require some land	Restricted to available lands	None required	
Technical	Stormwater Management	Ability to achieve stormwater management standards	To be determined	H	Limited benefit	Canal will function better	Limited benefit	
	Constructability	The ability to construct the improvements in a simple and cost effective manner	Duration / cost	M	Longevity straightforward	Most complex	Largely straightforward	
	Community Resilience & Sustainability	Ability of the solution to mitigate climate change impacts	To be determined	M	Limited	Improved capacity / resiliency	Limited	
Summary						Complementary	Most Preferred	Complementary

	Negative
	Negative-Neutral
	Neutral
	Positive-Neutral
	Positive



Mohawk Lake Remediation Alternatives

- Strategic removal of contaminated sediment / lake bed re-contouring
- Shoreline restoration
- Wildlife management (i.e., Grand River outlet control modification to manage invasive species such as carp)



Shoreline Restoration Activities



Mohawk Lake Remediation Alternatives Evaluation

Component	Category	Evaluation Criteria	Factor	Measure	Weight	Alternative 1: Drawdown / Pump down & Mechanical Dredging	Alternative 2: Hydraulic Dredging	Alternative 3: Sediment Management (Physical Capping)	Alternative 4: Chemical Capping & Nutrient Inactivation
Natural Environment	Water Quality	Water Quality & Temperature	Quality of Water for Fish and Wildlife, Recreation, or Human Use	Provincial Water Quality Objectives (PWOQ) and stream management objectives	H	Positive	Positive	Positive	Positive
	Hydrology & Stormwater Management	Water Quantity	Environmental flows for recreation or wildlife	Flow rate (cubic metres per second, m ³ /s)	L	Positive	Positive	Negative	Neutral
	Natural Heritage	Aquatic Habitat	Improvements or impacts to habitat viability	Area of impacted habitat (square metres, m ²)	H	Positive	Positive	Positive	Positive
		Wildlife Habitat	Potential effects wildlife due to changes in habitat	Area of impacted habitat (square metres, m ²)	M	Neutral	Neutral	Neutral	Neutral
	Fluvial Geomorphology	Fluvial Stability / Sediment Transport	Potential adverse effect on surface water due to drawdown or flow disruption	Extent of impact	M	Positive	Positive	Negative	Neutral
	Cultural Heritage & Archaeology	Archaeological & Cultural Heritage Resources	Potential adverse effects on archaeological and cultural heritage resources	Extent of impact	L	Neutral	Neutral	Neutral	Neutral
	Future Land Use & Growth Impacts	Recreation Use	Ability to support recreation, including access	E. coli concentrations	M	Positive	Positive	Neutral	Neutral
		Shoreline Access	Access points to lake and canal	Access points	L	Neutral	Neutral	Neutral	Neutral
		Impacts on Adjacent Properties	Changes to properties resulting from changes to water levels, construction of alternatives, etc.	Private and public properties (number of)	M	Negative	Negative	Neutral	Neutral
	Hydraulics	Flooding - Lake & Canal	Impacts on flood potential in Mohawk Lake and Mohawk Canal	Floodplain extents	M	Positive	Positive	Negative	Neutral
Flooding - Streets & Sewers		Impacts on flood potential and elevation for water from streets and sewers	Flood depth	M	Neutral	Neutral	Neutral	Neutral	
Economic	Capital Cost	Design and construction costs	estimated cost (\$)	H	Negative	Negative	Negative	Negative	
	Contaminant Management	Sediment quantity and quality	Disposal cost (\$ / m ³)	M	Negative	Negative	Negative	Negative	
	Maintenance Cost	Asset management costs (Lifecycle)	estimated cost (\$)	H	Positive	Positive	Negative	Negative	
	Property Acquisition	Amount of private property required to achieve solution	Area (hectares, ha)	M	Neutral	Neutral	Neutral	Neutral	
Technical	Stormwater Management	Ability to achieve stormwater management standards	To be determined	H	Positive	Positive	Positive	Positive	
	Constructability	The ability to construct the improvements in a simple and cost effective manner	Duration / cost	M	Negative	Neutral	Negative	Negative	
	Community Resilience & Sustainability	Ability of the solution to mitigate climate change impacts	To be determined	M	Positive	Positive	Neutral	Neutral	
Summary						Supportable	Preferred	Screened	Screened

	Negative
	Negative-Neutral
	Neutral
	Positive-Neutral
	Positive



Other Management Alternatives

1. Public Education/Outreach
2. Street Sweeping (Enhanced)
3. Recirculation/Re-Connection with Grand River
4. Historic/Abandoned Landfill Investigations



Remnant Of The Past – This is all that remains of the Grand River Navigation Canal which once flowed from the river, north of Greenwich Street, to Mohawk Lake. The sluice gate allows water to run through a buried pipeline to Mohawk Lake, whenever the river rises.

Photo Credit: The Grand River Navigational Company (Bruce Emerson. 1938)



Reconnection with Grand River Alternative

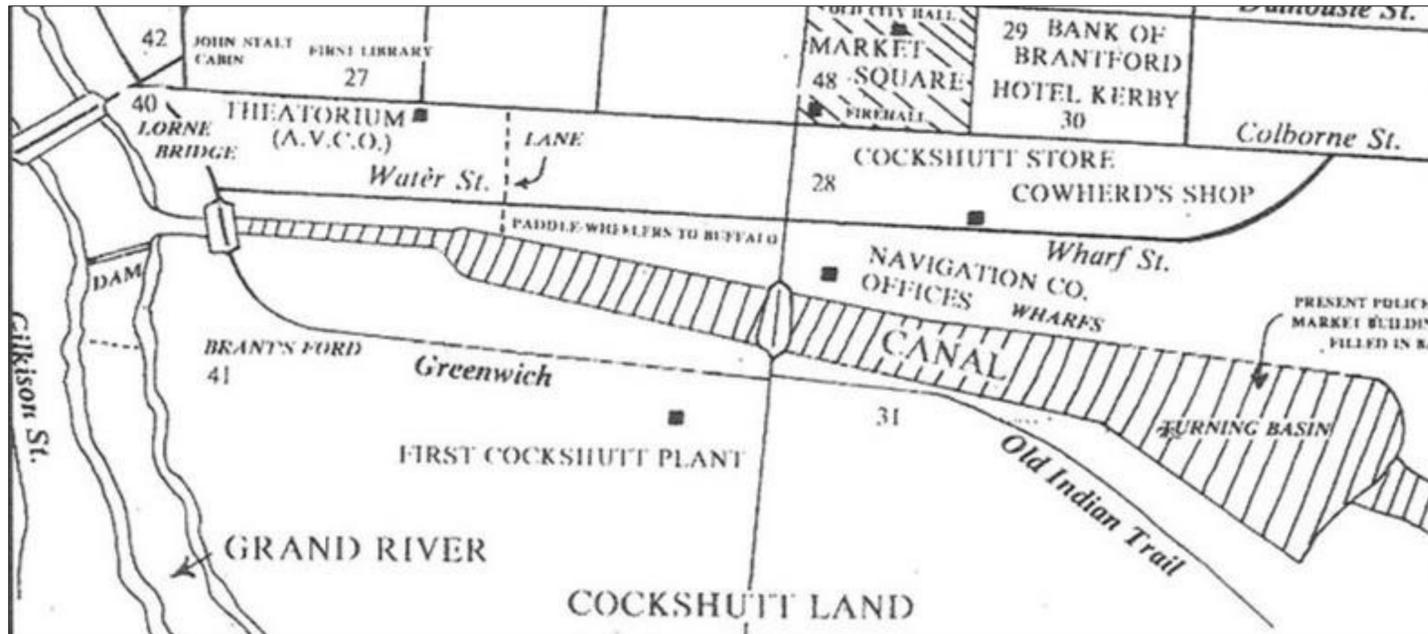
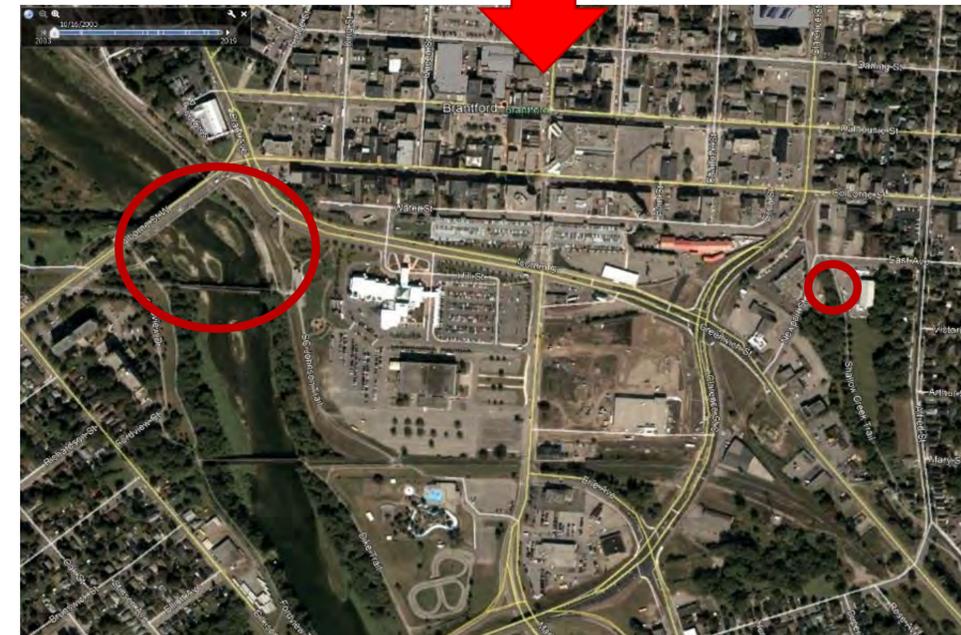


Photo Credit: The Grand River Navigational Company (Bruce Emerson, 1938)

- Grand River Navigation Canal
 - Previously connected Grand River at upstream limits to Mohawk Lake
 - Provided turning basin for boats
- Air Photos
 - Historical air photos up to 1986 show the upstream dam structure between Colborne Street and Dike Trail but no watercourse connection
- Due to reduced Grand River water level (at former dam) potential gravity inflow to Mohawk Canal and Lake is not feasible



Preliminary Preferred Solution(s) Short-term (2020+)



Preliminary Preferred Solution(s) Medium and Long-term

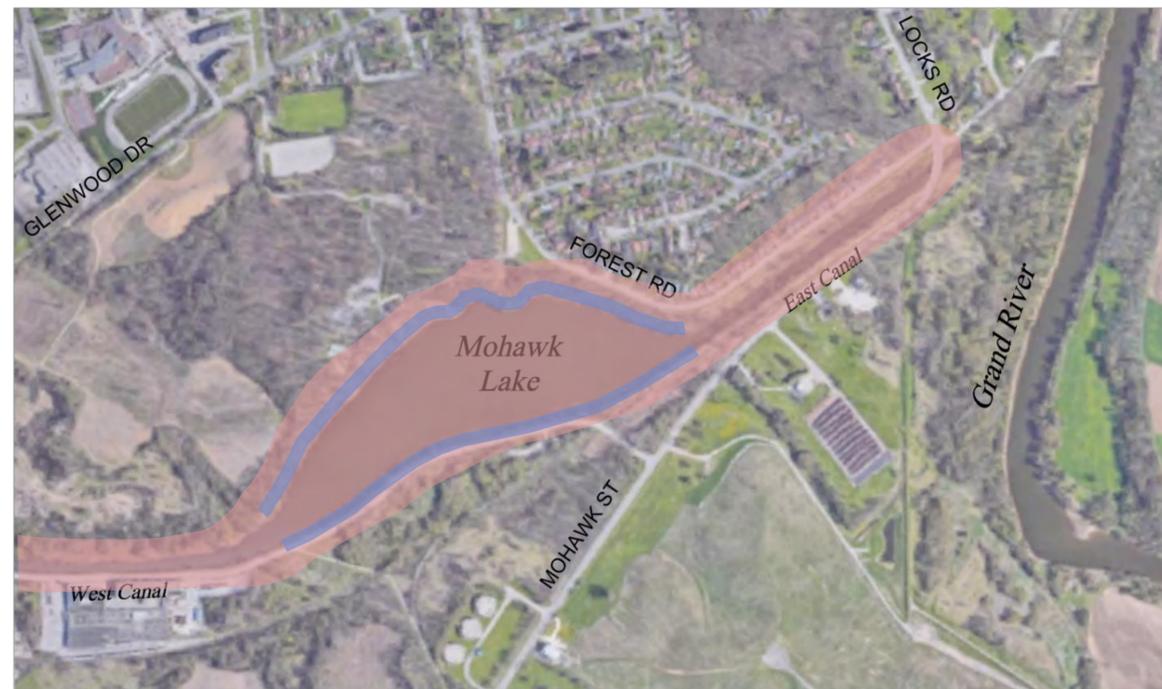


Mohawk Lake Strategic Sediment Removal / Bed Recontouring

- Characterization Study tested the water and sediment in the Lake and Canal and determined that they reflect highly urbanized conditions, with some not meeting Provincial Standards and Objectives
 - Preliminary estimates of historically deposited sediment are in the range of 185,000 m³ but data suggest that not all of this material needs to be removed
- Additional sampling is required to define specific locations with the ‘worst’ contaminants and develop a *strategic* removal plan
- Lake bed ‘recontouring’ would provide a more functional littoral shelf (near shore zone) offering opportunity for more submerged and emergent aquatic vegetation and improved habitat
 - Detailed bathymetric (underwater ground surface) surveys will be required



Dredging Activities – From Land



Future of Mohawk Lake and Mohawk Canal



*Tell us about your vision for the future of Mohawk Lake and Mohawk Canal!
What aspects are most important? What are the least important?
Any additional ideas to add to this vision?*

(Use post-it notes to write your comments here)

Mohawk Lake District Plan Vision Statement

Mohawk Lake District will be: A welcoming place for residents, families and visitors of all ages to explore, shop, eat, learn, and gather. Parks and trails along Mohawk Lake and Canal and throughout the District will provide a beautiful and healthy way to connect with nature. Mohawk Lake District will be where we honour the past, but also a place to be inspired for the future. As a popular destination where history, culture, recreation, and tourism meet, Mohawk Lake District will be a place of pride in the community.



Long-Term Community Engagement Plan

The Long-term Community Engagement Plan will be formulated around the proposed alternatives.



Next Steps and Schedule

- Review comments received and prepare a PIC#2 summary report
- Finalize Long-Term Community Engagement Plan
- Prepare and file the Project File Report, summarizing the Study
 - Publish study completion and have available for public review for 30 days (notice will be provided)

**Comment
Deadline
November 6,
2019**

**Thank you for
your
participation!**

Contact Us

By Mail: **Nahed Ghbn, P.Eng.**
Senior Project Manager
City of Brantford

By Phone: 519-759-4150 ext. 5262

By Email: NGhbn@brantford.ca

Ron Scheckenberger, M.Eng., P.Eng.
Principal Consultant
Wood Environment & Infrastructure Solutions

905-335-2353

Ron.Scheckenberger@woodplc.com

Website: <https://www.brantford.ca/en/your-government/mohawk-lake-and-mohawk-canal-cleanup-and-rehabilitation-project.aspx>





Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project

Functional Master Drainage and Restoration Study

2nd Public Information Centre

October 23rd, 2019
5:00 p.m. – 7:00 p.m.

SIGN-IN SHEET

Please Print Clearly

Name	Address	Phone #	E-mail



Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project

Functional Master Drainage and Restoration Study

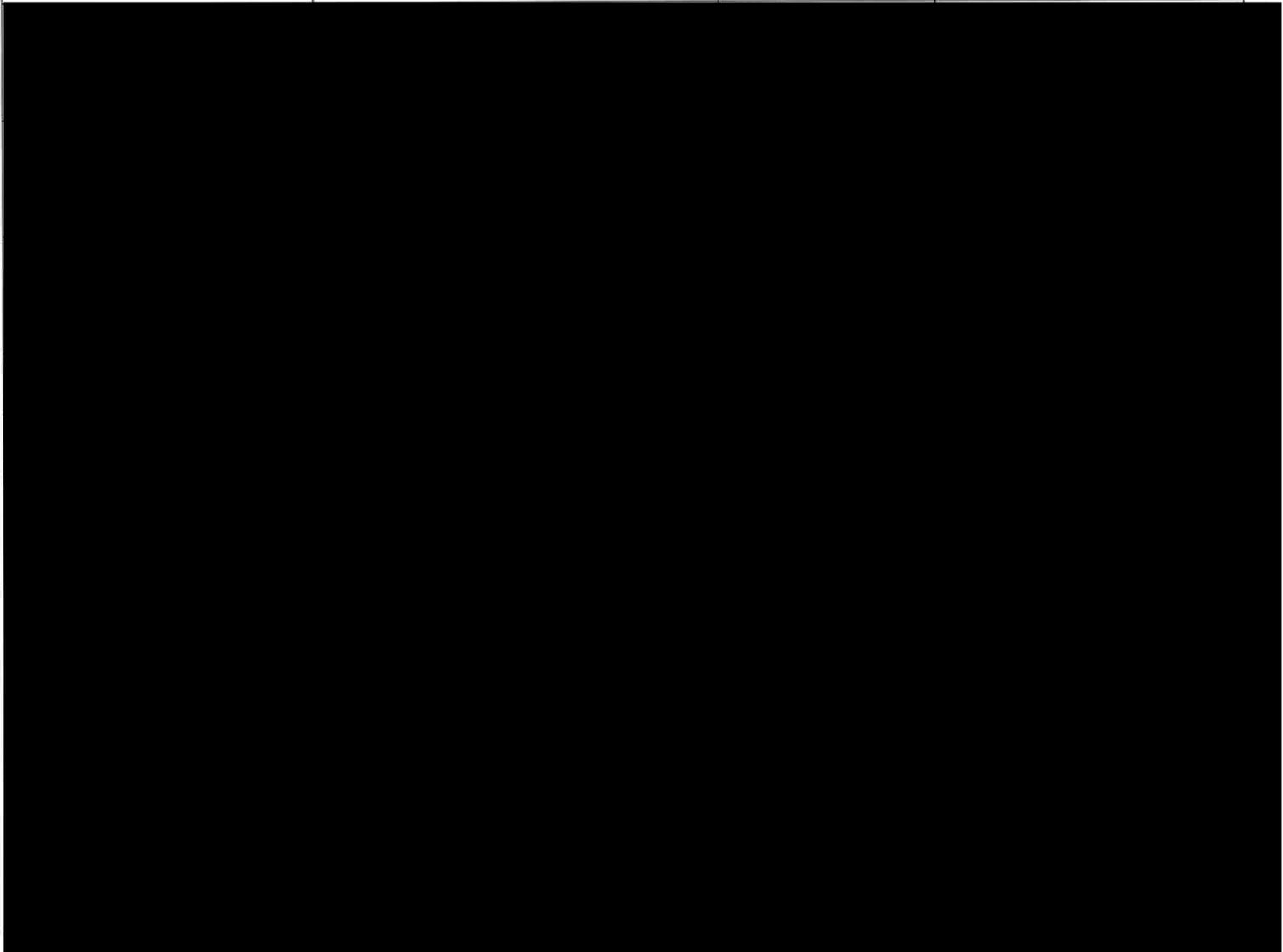
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Please Print Clearly

Name	Address	Phone #	E-mail
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Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project

Functional Master Drainage and Restoration Study

2nd Public Information Centre

October 23rd, 2019
5:00 p.m. – 7:00 p.m.

SIGN-IN SHEET

Please Print Clearly

Name	Address	Phone #	E-mail



Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project

Functional Master Drainage and Restoration Study

2nd Public Information Centre

October 23rd, 2019
5:00 p.m. – 7:00 p.m.

SIGN-IN SHEET

Please Print Clearly

Name	Address	Phone #	E-mail
			



Agency Comments

A PROPONENT'S INTRODUCTION TO THE DELEGATION OF PROCEDURAL ASPECTS OF CONSULTATION WITH ABORIGINAL COMMUNITIES

DEFINITIONS

The following definitions are specific to this document and may not apply in other contexts:

Aboriginal communities – the First Nation or Métis communities identified by the Crown for the purpose of consultation.

Consultation – the Crown's legal obligation to consult when the Crown has knowledge of an established or asserted Aboriginal or treaty right and contemplates conduct that might adversely impact that right. This is the type of consultation required pursuant to s. 35 of the *Constitution Act, 1982*. Note that this definition does not include consultation with Aboriginal communities for other reasons, such as regulatory requirements.

Crown – the Ontario Crown, acting through a particular ministry or ministries.

Procedural aspects of consultation – those portions of consultation related to the process of consultation, such as notifying an Aboriginal community about a project, providing information about the potential impacts of a project, responding to concerns raised by an Aboriginal community and proposing changes to the project to avoid negative impacts.

Proponent – the person or entity that wants to undertake a project and requires an Ontario Crown decision or approval for the project.

I. PURPOSE

The Crown has a legal duty to consult Aboriginal communities when it has knowledge of an existing or asserted Aboriginal or treaty right and contemplates conduct that may adversely impact that right. In outlining a framework for the duty to consult, the Supreme Court of Canada has stated that the Crown may delegate procedural aspects of consultation to third parties. This document provides general information about the Ontario Crown's approach to delegation of the procedural aspects of consultation to proponents.

This document is not intended to instruct a proponent about an individual project, and it does not constitute legal advice.

II. WHY IS IT NECESSARY TO CONSULT WITH ABORIGINAL COMMUNITIES?

The objective of the modern law of Aboriginal and treaty rights is the *reconciliation* of Aboriginal peoples and non-Aboriginal peoples and their respective rights, claims and interests. Consultation is an important component of the reconciliation process.

The Crown has a legal duty to consult Aboriginal communities when it has knowledge of an existing or asserted Aboriginal or treaty right and contemplates conduct that might adversely impact that right. For example, the Crown's duty to consult is triggered when it considers issuing a permit, authorization or approval for a project which has the potential to adversely impact an Aboriginal right, such as the right to hunt, fish, or trap in a particular area.

The scope of consultation required in particular circumstances ranges across a spectrum depending on both the nature of the asserted or established right and the seriousness of the potential adverse impacts on that right.

Depending on the particular circumstances, the Crown may also need to take steps to accommodate the potentially impacted Aboriginal or treaty right. For example, the Crown may be required to avoid or minimize the potential adverse impacts of the project.

III. THE CROWN'S ROLE AND RESPONSIBILITIES IN THE DELEGATED CONSULTATION PROCESS

The Crown has the responsibility for ensuring that the duty to consult, and accommodate where appropriate, is met. However, the Crown may delegate the procedural aspects of consultation to a proponent.

There are different ways in which the Crown may delegate the procedural aspects of consultation to a proponent, including through a letter, a memorandum of understanding, legislation, regulation, policy and codes of practice.

If the Crown decides to delegate procedural aspects of consultation, the Crown will generally:

- Ensure that the delegation of procedural aspects of consultation and the responsibilities of the proponent are clearly communicated to the proponent;
- Identify which Aboriginal communities must be consulted;
- Provide contact information for the Aboriginal communities;
- Revise, as necessary, the list of Aboriginal communities to be consulted as new information becomes available and is assessed by the Crown;
- Assess the scope of consultation owed to the Aboriginal communities;

- Maintain appropriate oversight of the actions taken by the proponent in fulfilling the procedural aspects of consultation;
- Assess the adequacy of consultation that is undertaken and any accommodation that may be required;
- Provide a contact within any responsible ministry in case issues arise that require direction from the Crown; and
- Participate in the consultation process as necessary and as determined by the Crown.

IV. THE PROPONENT'S ROLE AND RESPONSIBILITIES IN THE DELEGATED CONSULTATION PROCESS

Where aspects of the consultation process have been delegated to a proponent, the Crown, in meeting its duty to consult, will rely on the proponent's consultation activities and documentation of those activities. The consultation process informs the Crown's decision of whether or not to approve a proposed project or activity.

A proponent's role and responsibilities will vary depending on a variety of factors including the extent of consultation required in the circumstance and the procedural aspects of consultation the Crown has delegated to it. Proponents are often in a better position than the Crown to discuss a project and its potential impacts with Aboriginal communities and to determine ways to avoid or minimize the adverse impacts of a project.

A proponent can raise issues or questions with the Crown at any time during the consultation process. If issues or concerns arise during the consultation that cannot be addressed by the proponent, the proponent should contact the Crown.

a) What might a proponent be required to do in carrying out the procedural aspects of consultation?

Where the Crown delegates procedural aspects of consultation, it is often the proponent's responsibility to provide notice of the proposed project to the identified Aboriginal communities. The notice should indicate that the Crown has delegated the procedural aspects of consultation to the proponent and should include the following information:

- a description of the proposed project or activity;
- mapping;
- proposed timelines;
- details regarding anticipated environmental and other impacts;
- details regarding opportunities to comment; and
- any changes to the proposed project that have been made for seasonal conditions or other factors, where relevant.

Proponents should provide enough information and time to allow Aboriginal communities to provide meaningful feedback regarding the potential impacts of the project. Depending on the nature of consultation required for a project, a proponent also may be required to:

- provide the Crown with copies of any consultation plans prepared and an opportunity to review and comment;
- ensure that any necessary follow-up discussions with Aboriginal communities take place in a timely manner, including to confirm receipt of information, share and update information and to address questions or concerns that may arise;
- as appropriate, discuss with Aboriginal communities potential mitigation measures and/or changes to the project in response to concerns raised by Aboriginal communities;
- use language that is accessible and not overly technical, and translate material into Aboriginal languages where requested or appropriate;
- bear the reasonable costs associated with the consultation process such as, but not limited to, meeting hall rental, meal costs, document translation(s), or to address technical & capacity issues;
- provide the Crown with all the details about potential impacts on established or asserted Aboriginal or treaty rights, how these concerns have been considered and addressed by the proponent and the Aboriginal communities and any steps taken to mitigate the potential impacts;
- provide the Crown with complete and accurate documentation from these meetings and communications; and
- notify the Crown immediately if an Aboriginal community not identified by the Crown approaches the proponent seeking consultation opportunities.

b) What documentation and reporting does the Crown need from the proponent?

Proponents should keep records of all communications with the Aboriginal communities involved in the consultation process and any information provided to these Aboriginal communities.

As the Crown is required to assess the adequacy of consultation, it needs documentation to satisfy itself that the proponent has fulfilled the procedural aspects of consultation delegated to it. The documentation required would typically include:

- the date of meetings, the agendas, any materials distributed, those in attendance and copies of any minutes prepared;
- the description of the proposed project that was shared at the meeting;
- any and all concerns or other feedback provided by the communities;
- any information that was shared by a community in relation to its asserted or established Aboriginal or treaty rights and any potential adverse impacts of the proposed activity, approval or disposition on such rights;

- any proposed project changes or mitigation measures that were discussed, and feedback from Aboriginal communities about the proposed changes and measures;
- any commitments made by the proponent in response to any concerns raised, and feedback from Aboriginal communities on those commitments;
- copies of correspondence to or from Aboriginal communities, and any materials distributed electronically or by mail;
- information regarding any financial assistance provided by the proponent to enable participation by Aboriginal communities in the consultation;
- periodic consultation progress reports or copies of meeting notes if requested by the Crown;
- a summary of how the delegated aspects of consultation were carried out and the results; and
- a summary of issues raised by the Aboriginal communities, how the issues were addressed and any outstanding issues.

In certain circumstances, the Crown may share and discuss the proponent's consultation record with an Aboriginal community to ensure that it is an accurate reflection of the consultation process.

c) Will the Crown require a proponent to provide information about its commercial arrangements with Aboriginal communities?

The Crown may require a proponent to share information about aspects of commercial arrangements between the proponent and Aboriginal communities where the arrangements:

- include elements that are directed at mitigating or otherwise addressing impacts of the project;
- include securing an Aboriginal community's support for the project; or
- may potentially affect the obligations of the Crown to the Aboriginal communities.

The proponent should make every reasonable effort to exempt the Crown from confidentiality provisions in commercial arrangements with Aboriginal communities to the extent necessary to allow this information to be shared with the Crown.

The Crown cannot guarantee that information shared with the Crown will remain confidential. Confidential commercial information should not be provided to the Crown as part of the consultation record if it is not relevant to the duty to consult or otherwise required to be submitted to the Crown as part of the regulatory process.

V. WHAT ARE THE ROLES AND RESPONSIBILITIES OF ABORIGINAL COMMUNITIES' IN THE CONSULTATION PROCESS?

Like the Crown, Aboriginal communities are expected to engage in consultation in good faith. This includes:

- responding to the consultation notice;
- engaging in the proposed consultation process;
- providing relevant information;
- clearly articulating the potential impacts of the proposed project on Aboriginal or treaty rights; and
- discussing ways to mitigate any adverse impacts.

Some Aboriginal communities have developed tools, such as consultation protocols, policies or processes that provide guidance on how they would prefer to be consulted. Although not legally binding, proponents are encouraged to respect these community processes where it is reasonable to do so. Please note that there is no obligation for a proponent to pay a fee to an Aboriginal community in order to enter into a consultation process.

To ensure that the Crown is aware of existing community consultation protocols, proponents should contact the relevant Crown ministry when presented with a consultation protocol by an Aboriginal community or anyone purporting to be a representative of an Aboriginal community.

VI. WHAT IF MORE THAN ONE PROVINCIAL CROWN MINISTRY IS INVOLVED IN APPROVING A PROPONENT'S PROJECT?

Depending on the project and the required permits or approvals, one or more ministries may delegate procedural aspects of the Crown's duty to consult to the proponent. The proponent may contact individual ministries for guidance related to the delegation of procedural aspects of consultation for ministry-specific permits/approvals required for the project in question. Proponents are encouraged to seek input from all involved Crown ministries sooner rather than later.

Ministry of the Environment,
Conservation and Parks
Drinking Water and Environmental
Compliance Division
West Central Region

119 King Street West
12th Floor
Hamilton, Ontario L8P 4Y7
Tel.: 905 521-7640
Fax: 905 521-7820

Ministère de l'Environnement
de la Protection de la nature et des Parcs
Division de la conformité en matière d'eau
potable et d'environnement
Direction régionale du Centre-Ouest

119 rue King Ouest
12^e étage
Hamilton (Ontario) L8P 4Y7
Tél. : 905 521-7640
Télec. : 905 521-7820



February 15, 2019

Mr. Nahed Ghbn
City of Brantford

Mr. Bob Felker
Wood.

Dear Messrs. Ghbn and Felker

Re: Mohawk Lake and Mohawk Canal and Rehabilitation Project
City of Brantford, MEA Schedule B Project
Response to Notice of Commencement

This letter is in response to the Notice of Commencement for the above noted project. The Ministry of the Environment, Conservation and Parks (MECP) acknowledges that the City of Brantford has indicated it is undertaking this study to improve the environmental quality of Mohawk Lake and Mohawk Canal, assess remediation alternatives, and engage the public, review agencies, and indigenous communities in the process. The City is proposing to meet the requirements by following the Master Plan Approach #2 as this approach fulfills Phases 1 and 2 of the Municipal Class EA process for any Schedule B projects and will identify any Schedule C projects that will require further project-specific assessment.

The Crown has a legal duty to consult Aboriginal communities when it has knowledge, real or constructive, of the existence or potential existence of an Aboriginal or treaty right and contemplates conduct that may adversely impact that right. Before authorizing this project, the Crown must ensure that its duty to consult has been fulfilled, where such a duty is triggered. Although the duty to consult with Aboriginal peoples is a duty of the Crown, the Crown may delegate procedural aspects of this duty to project proponents while retaining oversight of the consultation process.

Your proposed project may have the potential to affect Aboriginal or treaty rights protected under Section 35 of Canada's *Constitution Act* 1982. Where the Crown's duty to consult is triggered in relation to your proposed project, **MECP is delegating the procedural aspects of rights-based consultation to you through this letter.** The Crown intends to rely on the delegated consultation process in discharging its duty to consult and maintains the right to participate in the consultation process as it sees fit.

Based on information you have provided to date and the Crown's preliminary assessment you are required to consult with the following communities who have been identified as potentially affected by your proposed project:

- Six Nations of the Grand River
- Haudenosaunee Confederacy Chiefs Council
- Mississauga of the Credit First Nation

Steps that you may need to take in relation to Aboriginal consultation for your proposed project are outlined in the “Code of Practice for Consultation in Ontario’s Environmental Assessment Process” which can be found at the following link: <https://www.ontario.ca/document/consultation-ontarios-environmental-assessment-process> while additional information related to Ontario’s Environmental Assessment Act is available online at: www.ontario.ca/environmentalassessments

You must contact the Director of Environmental Approvals Branch under the following circumstances subsequent to initial discussions with the communities identified by MECP:

- Aboriginal or treaty rights impacts are identified to you by the communities
- You have reason to believe that your proposed project may adversely affect an Aboriginal or treaty right
- Consultation has reached an impasse
- A Part II Order request or elevation request is expected

The Director of the Environmental Approvals Branch can be notified either by email with the subject line “Potential Duty to Consult” to EAASIBgen@ontario.ca or by mail or fax at the address provided below:

Email:	EAASIBGen@ontario.ca Subject: Potential Duty to Consult
Fax:	416-314-8452
Address:	Environmental Approvals Branch 135 St. Clair Avenue West, 1 st Floor Toronto, ON, M4V 1P5

The MECP will then assess the extent of any Crown duty to consult for the circumstances and will consider whether additional steps should be taken, including what role you will be asked to play in them.

Due to the focus of this project and the potential involvement of the ministry as an approval authority, we would like to be more actively involved during the course of the master planning process at strategic points (as determined by the study team) in order to update us on the status and progress and to enable ministry staff to provide comments and input as may be appropriate. As always, ministry staff will be available to answer any questions or provide assistance to the project team upon request. Please do not hesitate to contact me should you have questions or wish to discuss the project by calling (905) 521-7864 or by email at Barbara.slattery@ontario.ca

Sincerely,



Barbara Slattery
EA/Planning Coordinator

cc. Ms. J. Volpato, District Engineer, GDO, MECP (via email only)

Shams, Aniq

From: Scheckenberger, Ron
Sent: Thursday, June 6, 2019 5:11 PM
To: Stokke, Samantha; Felker, Bob; Shams, Aniq
Cc: Senior, Matt
Subject: FW: 0010716 -Brantford -Mohawk Lake and Canal Project -MTCS Ltr
Attachments: 0010716 -Mohawk Lake and Mohawk Canal -MTCS Ltr.pdf

FYI

From: Kirzati, Katherine (MTCS) [mailto:Katherine.Kirzati@ontario.ca]
Sent: June-06-19 2:46 PM
To: Scheckenberger, Ron <ron.scheckenberger@woodplc.com>; nghbn@brantford.ca
Subject: 0010716 -Brantford -Mohawk Lake and Canal Project -MTCS Ltr

Good Afternoon Ron:

Attached please find our acknowledgement letter for the above-note project.

Also, is it possible to obtain a copy of the display boards for PIC 1, that was held on June 05, 2019?

Regards, Katherine

Katherine Kirzati
Heritage Planner
Programs and Services Branch
Ministry of Tourism, Culture and Sport
401 Bay St, Suite 1700
Toronto, ON M7A 2R9
416.314.7643
katherine.kirzati@ontario.ca

Programs and Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7
Tel: 416.314.7643

Direction des programmes et des services
401, rue Bay, Bureau 1700
Toronto ON M7A 0A7
Tél: 416.314.7643

06 June 2019

EMAIL ONLY

Ron Scheckenberger, M.Eng., P.Eng.
Principal Consultant
Wood, Environment and Infrastructure Solutions
3215 North Service Road
Burlington, ON L7R 3Y2
ron.scheckenberger@woodplc.com

MTCS File : **0010716**
Proponent : **City of Brantford**
Subject : **Notice of Commencement**
Project : **Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project**
Location : **Study Area as Depicted in the Notice of Commencement, City of Brantford**

Dear Mr. Scheckenberger:

Thank you for providing the Ministry of Tourism, Culture and Sport (MTCS) with the Notice of Commencement for the above-referenced project. MTCS's interest in this Environmental Assessment (EA) project relates to its mandate of conserving Ontario's cultural heritage, which includes:

- Archaeological resources, including land and marine;
- Built heritage resources, including bridges and monuments; and,
- Cultural heritage landscapes.

Under the EA process, the proponent is required to determine a project's potential impact on cultural heritage resources.

Project Summary

The City of Brantford has initiated a project for cleaning and rehabilitating Mohawk Lake and Mohawk Canal due to accumulated sediments and to address the environmental quality of the lake and canal.

This project is proceeding as a Schedule B undertaking via the Municipal Class Environmental Assessment process.

Identifying Cultural Heritage Resources

While some cultural heritage resources may have already been formally identified, others may be identified through screening and evaluation. Indigenous communities may have knowledge that can contribute to the identification of cultural heritage resources, and we suggest that any engagement with Indigenous communities includes a discussion about known or potential cultural heritage resources that are of value to these communities. Municipal Heritage Committees, historical societies and other local heritage organizations may also have knowledge that contributes to the identification of cultural heritage resources.

Archaeological Resources

MTCS finds that this EA project may impact archaeological resources, as it meets the criteria of proximity to water and to a registered archaeological site. As an initial step, the project should be screened using the MTCS [Criteria for Evaluating Archaeological Potential](#) and [Criteria for Evaluating Marine Archaeological Potential](#) to determine if an archaeological assessment is needed. MTCS archaeological sites data are available at archaeology@ontario.ca. An archaeological assessment (AA) should be undertaken by an archaeologist licenced under the OHA, who is responsible for submitting the report directly to MTCS for review.

Built Heritage and Cultural Heritage Landscapes

The MTCS [Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes](#) should be completed to help determine whether this EA project may impact cultural heritage resources. The Clerk for the City of Brantford can provide information on property registered or designated under the *Ontario Heritage Act*. Municipal Heritage Planners can also provide information that will assist in completing the checklist.

If potential or known heritage resources exist, MTCS recommends that a Heritage Impact Assessment (HIA), prepared by a qualified consultant, should be completed to assess potential project impacts. Our Ministry's [Info Sheet #5: Heritage Impact Assessments and Conservation Plans](#) outlines the scope of HIAs. Please send the HIA to MTCS and the City of Brantford for review and make it available to local organizations or individuals who have expressed interest in review.

Please provide a copy of the completed checklists to MTCS.

Environmental Assessment Reporting

All technical cultural heritage studies and their recommendations are to be addressed and incorporated into EA projects. Please advise MTCS whether any technical cultural heritage studies will be completed for this EA project, and provide them to MTCS before issuing a Notice of Completion or commencing any work on the site. If screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists and supporting documentation in the EA report or file.

Thank you for consulting MTCS on this project and please continue to do so throughout the EA process. If you have any questions or require clarification, do not hesitate to contact me.

Sincerely,

Katherine Kirzati
Heritage Planner
Heritage Planning Unit
katherine.kirzati@ontario.ca

c: Nahed Ghbn, Senior Project Manager, City of Brantford

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. MTCS makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MTCS be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Please notify MTCS if archaeological resources are impacted by EA project work. All activities impacting archaeological resources must cease immediately, and a licensed archaeologist is required to carry out an archaeological assessment in accordance with the *Ontario Heritage Act* and the *Standards and Guidelines for Consultant Archaeologists*.

If human remains are encountered, all activities must cease immediately and the local police as well as the Registrar, Burials of the Ministry of Government and Consumer Services (416-326-8800) must be contacted. In situations where human remains are associated with archaeological resources, MTCS should also be notified to ensure that the site is not subject to unlicensed alterations which would be a contravention of the *Ontario Heritage Act*.

Shams, Aniq

From: Scheckenberger, Ron
Sent: Thursday, May 30, 2019 9:18 AM
To: Felker, Bob; Kelly, Mary K; Stokke, Samantha; Shams, Aniq
Cc: Senior, Matt
Subject: FW: Mohawk Lake and Canal cleanup and rehabilitation project
Attachments: NEATS 49899.pdf

fyi

From: EnviroOnt [mailto:EnviroOnt@tc.gc.ca]
Sent: May-27-19 10:12 AM
To: NGhbn@brantford.ca; Scheckenberger, Ron <ron.scheckenberger@woodplc.com>
Subject: Mohawk Lake and Canal cleanup and rehabilitation project

Greetings,

Thank you for your correspondence.

Please note Transport Canada **does not** require receipt of all individual or Class EA related notifications. We are requesting project proponents to self-assess if their project:

1. Will interact with a federal property and/or waterway by reviewing the Directory of Federal Real Property, available at www.tbs-sct.gc.ca/dfrp-rbif/; **and**
2. Will require approval and/or authorization under any Acts administered by Transport Canada* available at <http://www.tc.gc.ca/eng/acts-regulations/menu.htm>.

Projects that will occur on federal property prior to exercising a power, performing a function or duty in relation to that project, will be subject to a determination of the likelihood of significant adverse environmental effects, per Section 67 of the *Canadian Environmental Assessment Act, 2012*.

If the aforementioned does not apply, the Environmental Assessment program should not be included in any further correspondence and future notifications will not receive a response. If there is a role under the program, correspondence should be forwarded *electronically* to: EnviroOnt@tc.gc.ca with a **brief description of Transport Canada's expected role**.

*Below is a summary of the most common Acts that have applied to projects in an Environmental Assessment context:

- **Navigation Protection Act (NPA)** – the Act applies primarily to works constructed or placed in, on, over, under, through, or across scheduled navigable waters set out under the Act. The Navigation Protection Program administers the NPA through the review and authorization of works affecting scheduled navigable waters. Information about the Program, NPA and approval process is available at: <http://www.tc.gc.ca/eng/programs-621.html>. Enquiries can be directed to NPPONT-PPNONT@tc.gc.ca or by calling (519) 383-1863.
- **Railway Safety Act (RSA)** – the Act provides the regulatory framework for railway safety, security, and some of the environmental impacts of railway operations in Canada. The Rail Safety Program develops and enforces regulations, rules, standards and procedures governing safe railway operations. Additional information about the Program is available at: <https://www.tc.gc.ca/eng/railsafety/menu.htm>. Enquiries can be directed to RailSafety@tc.gc.ca or by calling (613) 998-2985.

- **Transportation of Dangerous Goods Act (TDGA)** – the transportation of dangerous goods by air, marine, rail and road is regulated under the TDGA. Transport Canada, based on risks, develops safety standards and regulations, provides oversight and gives expert advice on dangerous goods to promote public safety. Additional information about the transportation of dangerous goods is available at: <https://www.tc.gc.ca/eng/tdg/safety-menu.htm>. Enquiries can be directed to TDG-TMDOntario@tc.gc.ca or by calling (416) 973-1868.
- **Aeronautics Act** – Transport Canada has sole jurisdiction over aeronautics, which includes aerodromes and all related buildings or services used for aviation purposes. Aviation safety in Canada is regulated under this Act and the Canadian Aviation Regulations (CARs). Elevated Structures, such as wind turbines and communication towers, would be examples of projects that must be assessed for lighting and marking requirements in accordance with the CARs. Transport Canada also has an interest in projects that have the potential to cause interference between wildlife and aviation activities. One example would be waste facilities, which may attract birds into commercial and recreational flight paths. The *Land Use In The Vicinity of Aerodromes* publication recommends guidelines for and uses in the vicinity of aerodromes, available at: <https://www.tc.gc.ca/eng/civilaviation/publications/tp1247-menu-1418.htm>. Enquires can be directed to at tc.aviationservicesont-servicesaviationont.tc@tc.gc.ca or by calling 1 (800) 305-2059 / (416) 952-0230.

Please advise if additional information is needed.

Thank you,

Environmental Assessment Program, Ontario Region

Transport Canada / Government of Canada / 4900 Yonge St., Toronto, ON M2N 6A5

EnviroOnt@tc.gc.ca / Facsimile : (416) 952-0514 / TTY: 1-888-675-6863

Programme d'évaluation environnementale, Région de l'Ontario

Transports Canada / Gouvernement du Canada / 4900, rue Yonge, Toronto, ON, M2N 6A5

EnviroOnt@tc.gc.ca / télécopieur: (416) 952-0514

From: EA Notices to WCRegion (MECP) <eanotification.wcregion@ontario.ca>
Sent: Friday, February 01, 2019 3:19 PM
To: Shams, Aniq; EA Notices to WCRegion (MECP)
Cc: Scheckenberger, Ron; Kelly, Mary K; NGhbn@brantford.ca; Senior, Matt; Felker, Bob
Subject: RE: City of Brantford, MEA Class EA, Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project - Functional Master Drainage and Restoration Study

Good afternoon folks,

I've put in the request for identification of FN communities for consultation and will get back to you with those names as soon as I have them.

Barb Slattery, EA/Planning Coordinator
Ministry of the Environment, Conservation and Parks
West Central Region
(905) 521-7864

From : Shams, Aniq [mailto:aniqa.shams@woodplc.com]
Sent : January 31, 2019 5:21 PM
To : EA Notices to WCRegion (MECP)
Cc : Scheckenberger, Ron; Kelly, Mary K; NGhbn@brantford.ca; Senior, Matt; Felker, Bob
Subject : City of Brantford, MEA Class EA, Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project - Functional Master Drainage and Restoration Study

The City of Brantford has initiated a Municipal Class Environmental Assessment (Class EA) study for the Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project, with financial support from the Federal Government. This project will identify rehabilitation measures needed to address accumulated sediments and provide opportunities / recommendations to improve the environmental quality of Mohawk Lake and Mohawk Canal, and protect and enhance its future in the community.

Please find attached the Notice of Commencement and Project Information Form for this Project. Once we have received confirmation from the MECP regarding the Indigenous communities to contact, the Protect team will publish and distribute the Notice.

If you should have any questions, please contact either the City of Brantford's Project Manager (Nahed Ghbn, 519-759-4150 ext.5262, NGhbn@brantford.ca) or the Principal Consultant (Ron Scheckenberger, 905-335-2353, ron.scheckenberger@woodplc.com).

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From: Kelly, Mary K
Sent: Tuesday, February 05, 2019 9:32 AM
To: Shams, Aniq; Felker, Bob
Subject: FW: City of Brantford, MEA Class EA, Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project - Functional Master Drainage and Restoration Study

FYI and file

From: Nahed Ghbn <NGhbn@brantford.ca>
Sent: Monday, February 04, 2019 1:15 PM
To: EA Notices to WCRegion (MECP) <eanotification.wcregion@ontario.ca>
Cc: Kelly, Mary K <mary.k.kelly@woodplc.com>; Scheckenberger, Ron <ron.scheckenberger@woodplc.com>; Felker, Bob <bob.felker@woodplc.com>
Subject: City of Brantford, MEA Class EA, Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project - Functional Master Drainage and Restoration Study

Hi Barb,

I would like to provide the following update to explain the rationale behind using the MEA Class EA in this project as requested.

Mohawk Lake was constructed in the 1800s as part of the canal system to provide access for barges traveling through Brantford and to enable barges to turn around. In the early 1900s, the lake and the surrounding parkland provided the community with large recreational opportunities to residents city-wide and continue to offer valuable natural heritage for the City.

Years of uncontrolled drainage and a legacy of industrial discharges of former industrial lands adjacent to the canal have resulted in the deterioration of the lake and migration of contaminants to the Lake. Industrial discharges have been discontinued for many years, and recently upstream brownfield remediation has eliminated.

The City of Brantford is seeking to improve the environmental quality of Mohawk Lake and Mohawk Canal to provide enhanced recreational, fish and wildlife and improved water quality conditions.

The primary objective of the Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project is to protect and enhance the environment in a manner which is in harmony with the natural features of the Mohawk Lake watershed. Through remedial measures, to be proposed as part of the EA phase of the project, it is expected to restore and maintain the natural water quality and ecological integrity of Mohawk Lake to an acceptable level.

The Municipal Class Environmental Assessment process will be carried out following the requirements of the Master Plan Approach #2- phase 1 & 2 of the municipal EA process.

The project will consider and evaluate the environmental effects that will have specific planning and design process requirements including problem statement, EA development phases (One and Two), and examination of alternatives & selecting the preferred options.

Consultation with agencies, public and aboriginal communities are considered to be an essential component of the Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project.

Please do not hesitate to contact us if you have any questions.

Regards,
Nahed

Nahed Ghbn, PMP, P.Eng.
Senior Project Manager, Water Resources
Engineering Services- Public Works Commission
City of Brantford

City Hall, 100 Wellington Square, Brantford, N3T 2M2
Mailing Address: P.O. Box 818, Brantford, N3T 5R7
Phone: (519) 759-4150 Fax: (519) 752-6775
Email: nghbn@brantford.ca www.brantford.ca

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Public Comments

**Mohawk Lake and Mohawk Canal
Cleanup and Rehabilitation Project
Functional Master Drainage and Restoration Study
Public Information Centre 1 – Wednesday June 5, 2019**

1. From the list of possible environmental issues and concerns commonly related to natural systems and function affected by urban uses, please identify which you consider important to the Mohawk Lake and Mohawk Canal Study and why.

	Importance			Why?
	Very	Somewhat	Not	
Quality of water for human use	✓			
Quality of water for fish & wildlife habitat	✓			
Quality / quantity of water for recreation			✓	
Aquatic habitat (fish, invertebrates)	✓			
Terrestrial habitat (wildlife, birds)	✓			
Vegetation	✓			
Flooding from streams and rivers		?		need more info
Flooding from streets / sewers		?		" " "
Stream erosion & sediment accumulation	✓			

2. Do you have any other environmental issues or concerns related to the Mohawk Lake and Mohawk Canal Study Area?

Yes - Through decades of happy neglect, area has become a green corridor & is important wildlife habitat for dozens upon dozens of species of amphibians, reptiles, birds & mammals.

3. What recommendations might you suggest to address your key issues or concerns?

Keep the green!
Turn part of Greenwich (easternmost) into part of Mohawk Lake & eliminate that section of road.

4. Do you have any background information about the Study Area that you believe would be useful to the Study Team? (Examples: impacts from existing urban areas on the health of the Study Area, flooding locations/incidents, erosion location, natural features of interest or in a poor state of health, other areas of interest or concern, etc.)

Yes - provided species count from 2018-

5. Which criteria or factors do you think the alternatives should be evaluated by?

?

6. How do you want to be engaged in this Study (i.e. by email, letter, social media)?

email



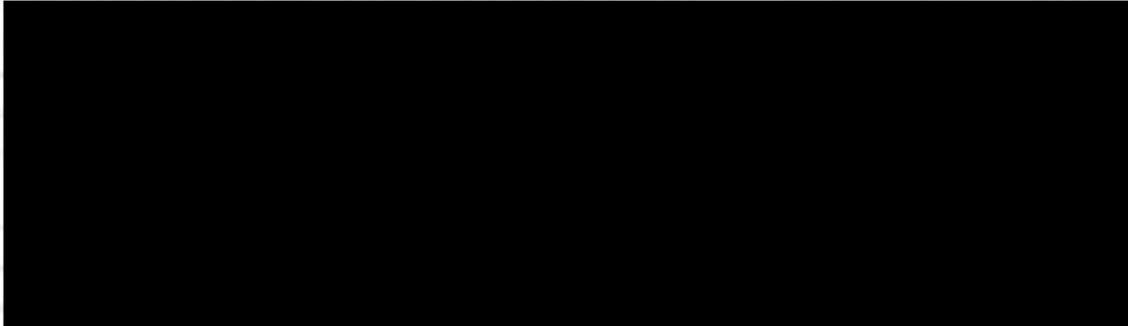
The City of Brantford welcomes your comments. Please drop your completed Comment Form in the box provided. You can also mail or email to either of the following individuals:

Nahed Ghbn P.Eng.
Senior Project Manager
City of Brantford
Tel: 519-759-4150 ext. 5262
Email: NGhbn@brantford.ca

Ron Scheckenberger M.Eng., P.Eng.
Principal Consultant
Wood Environment & Infrastructure Solutions
Tel: 905-335-2353
Email: ron.scheckenberger@woodplc.com

Thank you for your participation. Please PRINT your contact information below.

Name:
Address:
City:
Postal
Code:
Phone:
Email:



Do you wish to be added to our *Project Mailing List* to be kept informed about the Study?

YES / NO *already on list, Thanks*

Thank you for taking the time to complete this comment sheet!

Please return the completed comment sheet by **June 21, 2019**

Nahed Ghbn P.Eng, City of Brantford
City Hall, 100 Wellington Square, Brantford, Ontario N3T 2M2
Tel: 519-759-4150 ext. 5262
By Email: nghbn@brantford.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this study are being collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act and with the exception of personal information, all information provided will become part of the public record.

**Mohawk Lake and Mohawk Canal
Cleanup and Rehabilitation Project
Functional Master Drainage and Restoration Study
Public Information Centre 1 – Wednesday June 5, 2019**

1. From the list of possible environmental issues and concerns commonly related to natural systems and function affected by urban uses, please identify which you consider important to the Mohawk Lake and Mohawk Canal Study and why.

	Importance			Why?
	Very	Somewhat	Not	
Quality of water for human use			X	Allowing beaches / swimming opens up liabilities / re: water testing, risk of sharps & needles etc etc
Quality of water for fish & wildlife habitat	X			Natural refuge for turtles, frogs, fish & birds, sm. mammals etc.
Quality / quantity of water for recreation		X		Canoeing & kayaking yes but no motorized watercraft.
Aquatic habitat (fish, invertebrates)	X			Completes the circle or chain of nature.
Terrestrial habitat (wildlife, birds)	X			As above
Vegetation	X			Environmentally & habitat - friendly species (non-invasive)
Flooding from streams and rivers		X		A natural occurrence.
Flooding from streets / sewers	X			← Once the dredging & clean-up or remediation is complete it will be vital to prevent more of the same problems in the future.
Stream erosion & sediment accumulation	X			

2. Do you have any other environmental issues or concerns related to the Mohawk Lake and Mohawk Canal Study Area?

Presumably with the topography & infrastructure within the 'catchment area', it would not be feasible to re-route ^{any} storm drains & so on.

3. What recommendations might you suggest to address your key issues or concerns?

Obviously dredging & cleanup of water quality IS THE Priority - assuming funding (federal, provincial, municipal) can be obtained.

4. Do you have any background information about the Study Area that you believe would be useful to the Study Team? (Examples: impacts from existing urban areas on the health of the Study Area, flooding locations/incidents, erosion location, natural features of interest or in a poor state of health, other areas of interest or concern, etc.)

I think it is wise to include the indigenous influence or aspect of "mother Earth" with regard to values & prioritizing ways of people 'using' Mohawk Lake.

5. Which criteria or factors do you think the alternatives should be evaluated by?

? what alternatives

6. How do you want to be engaged in this Study (i.e. by email, letter, social media)?

Expositor newspaper
City website
Newsletter mailing.



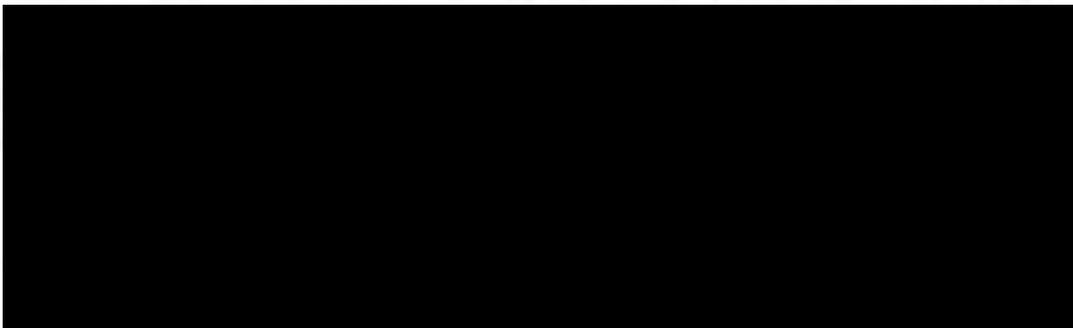
The City of Brantford welcomes your comments. Please drop your completed Comment Form in the box provided. You can also mail or email to either of the following individuals:

Nahed Ghbn P.Eng.
Senior Project Manager
City of Brantford
Tel: 519-759-4150 ext. 5262
Email: NGhbn@brantford.ca

Ron Scheckenberger M.Eng., P.Eng.
Principal Consultant
Wood Environment & Infrastructure Solutions
Tel: 905-335-2353
Email: ron.scheckenberger@woodplc.com

Thank you for your participation. Please PRINT your contact information below.

Name:
Address:
City:
Postal Code:
Phone:
Email:



Do you wish to be added to our *Project Mailing List* to be kept informed about the Study?

YES / NO

Thank you for taking the time to complete this comment sheet!

Please return the completed comment sheet by **June 21, 2019**

Nahed Ghbn P.Eng, City of Brantford
City Hall, 100 Wellington Square, Brantford, Ontario N3T 2M2
Tel: 519-759-4150 ext. 5262

By Email: nghbn@brantford.ca

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**Mohawk Lake and Mohawk Canal
Cleanup and Rehabilitation Project
Functional Master Drainage and Restoration Study
Public Information Centre 1 – Wednesday June 5, 2019**

1. From the list of possible environmental issues and concerns commonly related to natural systems and function affected by urban uses, please identify which you consider important to the Mohawk Lake and Mohawk Canal Study and why.

	Importance			Why?
	Very	Somewhat	Not	
Quality of water for human use			✓	you would require strict regulations for testing, keep lake natural for wildlife
Quality of water for fish & wildlife habitat	✓			encourages habitat of wildlife -
Quality / quantity of water for recreation		✓	✓	would like to see canoe + kayaking on lake and is motorized
Aquatic habitat (fish, invertebrates)	✓			
Terrestrial habitat (wildlife, birds)	✓			to maintain peaceful environment
Vegetation	✓			to attract wildlife
Flooding from streams and rivers	✓			to maintain present landsite from future erosion
Flooding from streets / sewers	✓			at difficult to reroute storm sewers
Stream erosion & sediment accumulation	✓			

2. Do you have any other environmental issues or concerns related to the Mohawk Lake and Mohawk Canal Study Area?

to ~~locate~~ eliminate using the Park for drug users & syringes

3. What recommendations might you suggest to address your key issues or concerns?

4. Do you have any background information about the Study Area that you believe would be useful to the Study Team? (Examples: impacts from existing urban areas on the health of the Study Area, flooding locations/incidents, erosion location, natural features of interest or in a poor state of health, other areas of interest or concern, etc.)

5. Which criteria or factors do you think the alternatives should be evaluated by?

6. How do you want to be engaged in this Study (i.e. by email, letter, social media)?

social media

The City of Brantford welcomes your comments. Please drop your completed Comment Form in the box provided. You can also mail or email to either of the following individuals:

Nahed Ghbn P.Eng.
Senior Project Manager
City of Brantford
Tel: 519-759-4150 ext. 5262
Email: NGhbn@brantford.ca

Ron Scheckenberger M.Eng., P.Eng.
Principal Consultant
Wood Environment & Infrastructure Solutions
Tel: 905-335-2353
Email: ron.scheckenberger@woodplc.com

Thank you for your participation. Please PRINT your contact information below.

Name:
Address:
City:
Postal
Code:
Phone:
Email:



Do you wish to be added to our *Project Mailing List* to be kept informed about the Study?

YES / NO

Thank you for taking the time to complete this comment sheet!

Please return the completed comment sheet by **June 21, 2019**

Nahed Ghbn P.Eng, City of Brantford
City Hall, 100 Wellington Square, Brantford, Ontario N3T 2M2
Tel: 519-759-4150 ext. 5262
By Email: nghbn@brantford.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this study are being collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act and with the exception of personal information, all information provided will become part of the public record.

**Mohawk Lake and Mohawk Canal
Cleanup and Rehabilitation Project
Functional Master Drainage and Restoration Study
Public Information Centre 1 – Wednesday June 5, 2019**

1. From the list of possible environmental issues and concerns commonly related to natural systems and function affected by urban uses, please identify which you consider important to the Mohawk Lake and Mohawk Canal Study and why.

	Importance			Why?
	Very	Somewhat	Not	
Quality of water for human use		✓		As a natural area, people are not using the water for drinking
Quality of water for fish & wildlife habitat	✓			Top quality water needed to support fish/wildlife
Quality / quantity of water for recreation		✓		
Aquatic habitat (fish, invertebrates)	✓			water, fish, wildlife, vegetation + trees all exist together.
Terrestrial habitat (wildlife, birds)	✓			" "
Vegetation	✓			" "
Flooding from streams and rivers	✓			Controls are needed to keep the area from being damaged.
Flooding from streets / sewers	✓			Flooding will likely bring sediment.
Stream erosion & sediment accumulation	✓			The area might be damaged

2. Do you have any other environmental issues or concerns related to the Mohawk Lake and Mohawk Canal Study Area?

My concept is that of a natural recreation area that has healthy fauna and flora, and opportunities for recreation (swimming, canoeing, hiking and walking)

3. What recommendations might you suggest to address your key issues or concerns?

4. Do you have any background information about the Study Area that you believe would be useful to the Study Team? (Examples: impacts from existing urban areas on the health of the Study Area, flooding locations/incidents, erosion location, natural features of interest or in a poor state of health, other areas of interest or concern, etc.)

NO

5. Which criteria or factors do you think the alternatives should be evaluated by?

- Sustainability of fish, wildlife, birds, vegetation
- potential for human recreation

6. How do you want to be engaged in this Study (i.e. by email, letter, social media)?

Email is fine.



The City of Brantford welcomes your comments. Please drop your completed Comment Form in the box provided. You can also mail or email to either of the following individuals:

Nahed Ghbn P.Eng.

Senior Project Manager

City of Brantford

Tel: 519-759-4150 ext. 5262

Email: NGhbn@brantford.ca

Ron Scheckenberger M.Eng., P.Eng.

Principal Consultant

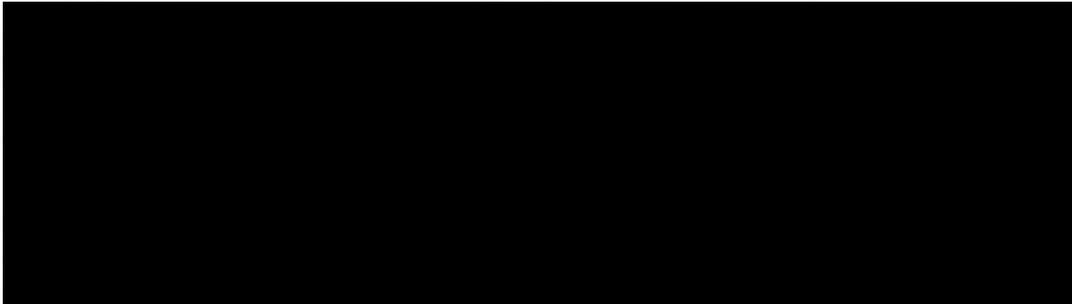
Wood Environment & Infrastructure Solutions

Tel: 905-335-2353

Email: ron.scheckenberger@woodplc.com

Thank you for your participation. Please PRINT your contact information below.

Name:
Address:
City:
Postal
Code:
Phone:
Email:



Do you wish to be added to our *Project Mailing List* to be kept informed about the Study?

YES / NO

Thank you for taking the time to complete this comment sheet!

Please return the completed comment sheet by **June 21, 2019**

Nahed Ghbn P.Eng, City of Brantford

City Hall, 100 Wellington Square, Brantford, Ontario N3T 2M2

Tel: 519-759-4150 ext. 5262

By Email: nghbn@brantford.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this study are being collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act and with the exception of personal information, all information provided will become part of the public record.

**Mohawk Lake and Mohawk Canal
Cleanup and Rehabilitation Project
Functional Master Drainage and Restoration Study
Public Information Centre 1 – Wednesday June 5, 2019**

1. From the list of possible environmental issues and concerns commonly related to natural systems and function affected by urban uses, please identify which you consider important to the Mohawk Lake and Mohawk Canal Study and why.

	Importance			Why?
	Very	Somewhat	Not	
Quality of water for human use		X		Not consumable Swimming Limited
Quality of water for fish & wildlife habitat	✓			Wildlife + fish habitat Req'd for Balance + cleaning
Quality / quantity of water for recreation	✓			Opportunity for tourism, Relaxation for residents.
Aquatic habitat (fish, invertebrates)	✓			Habitat is important for filtering and cleaning water.
Terrestrial habitat (wildlife, birds)	✓			Plant and insect control Provided by wildlife & Birds
Vegetation	✓			Vegetation Essential for erosion + Wildlife + Floodcontrol.
Flooding from streams and rivers		X		Need to invest in upstream Floodcontrols
Flooding from streets / sewers	✓			Full Review of crossover from sanitary to Storm sewers / Treat runoff.
Stream erosion & sediment accumulation	✓			Rem: drive to restrict erosion and thus reduce Sediment.

**Mohawk Lake and Mohawk Canal
Cleanup and Rehabilitation Project
Functional Master Drainage and Restoration Study
Public Information Centre 1 – Wednesday June 5, 2019**

1. From the list of possible environmental issues and concerns commonly related to natural systems and function affected by urban uses, please identify which you consider important to the Mohawk Lake and Mohawk Canal Study and why.

	Importance			Why?
	Very	Somewhat	Not	
Quality of water for human use		✓		
Quality of water for fish & wildlife habitat	✓			<i>Species have adapted and used the lake/canal/park as it is.</i>
Quality / quantity of water for recreation		✓		
Aquatic habitat (fish, invertebrates)	✓			"
Terrestrial habitat (wildlife, birds)	✓			"
Vegetation	✓			"
Flooding from streams and rivers	✓			
Flooding from streets / sewers		✓		
Stream erosion & sediment accumulation		✓		

2. Do you have any other environmental issues or concerns related to the Mohawk Lake and Mohawk Canal Study Area?

Yes - we are park neighbours. A lot of wildlife/species/migratory/mating species use Mohawk Lake/Canal/Park as it is - it has overgrown and become "wild" despite contamination and degradation. Examples: mating pair Great Horned Owls, mating pair Red-tailed Hawks, family of Cooper's Hawks → multi year basis.

3. What recommendations might you suggest to address your key issues or concerns?

Don't clear away too much, don't "fix" too much. Just clean up garbage, provide minimal safe access. We already walk the trails and canoe/kayak on the lake, canal + river. We ski on the lake, park, trails in winter. We walk + bike in the summer, spring, and fall.

4. Do you have any background information about the Study Area that you believe would be useful to the Study Team? (Examples: impacts from existing urban areas on the health of the Study Area, flooding locations/incidents, erosion location, natural features of interest or in a poor state of health, other areas of interest or concern, etc.)

See above for birds - mating pairs of raptors (Great Horned Owls, Red-tailed Hawks, Cooper's Hawks) - also we have observed/heard Indigo Buntings, Wood Thrushes, Rose-breasted Grosbeaks, Ospreys, Great Blue Herons, Common Terns, Coyotes, many Deer (white-tailed), Beavers, Bass, Painted Turtles, snapping Turtles, Bobcats, many Woodpeckers + Flickers, also wildflowers such as Trillium, Jack-in-the-Pulpit, Trout Lily, etc.

5. Which criteria or factors do you think the alternatives should be evaluated by?

Wildlife Habitat + Refuge. That is what makes the park such a wild, special place. Make it a somewhat more accessible but do not change the positives - wildlife has adapted to this place as it is now.

6. How do you want to be engaged in this Study (i.e. by email, letter, social media)?





wood.

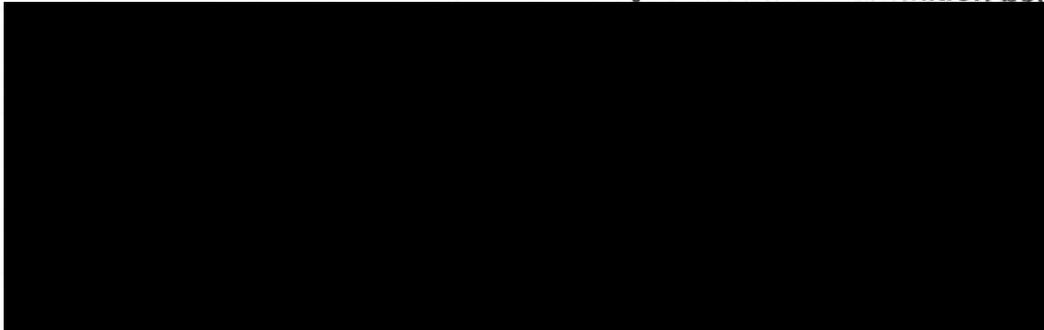
The City of Brantford welcomes your comments. Please drop your completed Comment Form in the box provided. You can also mail or email to either of the following individuals:

Nahed Ghbn P.Eng.
Senior Project Manager
City of Brantford
Tel: 519-759-4150 ext. 5262
Email: NGhbn@brantford.ca

Ron Scheckenberger M.Eng., P.Eng.
Principal Consultant
Wood Environment & Infrastructure Solutions
Tel: 905-335-2353
Email: ron.scheckenberger@woodplc.com

Thank you for your participation. Please PRINT your contact information below.

Name:
Address:
City:
Postal
Code:
Phone:
Email:



Do you wish to be added to our *Project Mailing List* to be kept informed about the Study?

YES / NO

Thank you for taking the time to complete this comment sheet!

Please return the completed comment sheet by **June 21, 2019**

Nahed Ghbn P.Eng, City of Brantford
City Hall, 100 Wellington Square, Brantford, Ontario N3T 2M2
Tel: 519-759-4150 ext. 5262

By Email: nghbn@brantford.ca

All comments and information received from individuals, stakeholder groups and agencies regarding this study are being collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act and with the exception of personal information, all information provided will become part of the public record.

Future of Mohawk Lake and Mohawk Canal

Tell us about your vision for the future of Mohawk Lake and Mohawk Canal! Based on 2015 Mohawk Lake visioning exercise, what aspects of the 2015 visioning do you want to highlight as the most important? What are the least important? Any additional ideas you want to add to this vision? (Use post-it notes to write your comments here)

DONT FORGET THE TOWPATH

Turn eastern-most end of Greenwich into part of Mohawk Park + get rid of road there.

If the bucks can be found dredge the lake put in a beach then lots of parking will be needed.

Most important is dredging and clean-up of water quality, to be fish + reptile and bird + sm. mammal friendly for a natural habitat and 'sanctuary'.

Least important is the 'over development' of Mohawk Lake, so that it doesn't become an artificial entertainment centre. It should be peace + quiet for two + four legged animals.

not necessary for information center

Keep parking as is to encourage more walking in the park.

A big concern is health + safety of the public in using Mohawk Lake + Park, as well as vandalism + the 'patrolling' protection of same.

- CLEAN IT UP
- INCREASE PUBLIC TRANSIT OPTIONS
- MAKE USE OF THE LAKE BY PUBLIC

Keep the lake "wild" and the surrounding lands / trails, as much as possible.

(* COMMUNITY INVOLVEMENT *)
RECREATIONAL OPPORTUNITIES
ie. canoeing
Charity - DRAGON BOAT RACES

Continue to keep natural environment

HAVE A SAFE ACCESS TO LAKE FROM THE PARK

strict enforcement for dog walkers

increased police patrolling

work on invasive plant species

Keep natural habitat

Problems and Opportunities

Tell us what you think about the draft Problem and Opportunity Statement!
(Use post-it notes to write your comments here)

Just get the fallen trees out of the West Canal so that nature can start the healing process

Would opening the canal back at the Grand River by the Civic Centre help with water flow and the movement of debris/sediment that has accumulated in the canal?

Rather Vague
Opp. Statement.

How many people are expected to use "Festival" site.

What is geographical Division Between Survey Replies For/Against Festival ground
Implications are VS Far extent of City

Shams, Aniq

From: Felker, Bob
Sent: Wednesday, June 19, 2019 6:03 PM
To: [REDACTED]
Cc: Nahed Ghbn; Kelly, Mary K; Shams, Aniq; Mcandrew, Louise; Scheckenberger, Ron; Stokke, Samantha
Subject: RE: Wildlife, Mohawk Lake Brantford

Dear [REDACTED] was a pleasure meeting you at the June 5th Open House for the Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project. I'm glad you shared your wealth of information about the plants and animals you have observed in the Study Area. We will be taking this information into careful consideration as we move into the stage of the Environmental Assessment where we evaluate the alternatives to clean up and restore the lake and canal.

With respect to the study website on the City webpage, here is a [link](#) to the Functional Master Drainage and Restoration Study work we are doing as part of the overall Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project. I apologize that I may have misspoke about the findings from the Phase 1 Characterization Study being available online. My understanding is that this report is still in draft, and not yet released. When the report information on wildlife is available to the public, I will let you know.

Once again thank you for your involvement in the Study, and we hope you will continue to participate in future stages, especially the visioning exercises we have planned.

Sincerely,

Bob

Bob Felker

Senior Environmental Planner
900 Maple Grove Road
Cambridge, ON, N3H 4R7
Direct: +1 519 650 7139
Mobile: +1 226 751 3854

www.woodplc.com

bob.felker@woodplc.com

www.woodplc.com

wood.

From: [REDACTED]
Sent: June-16-19 4:54 PM
To: Felker, Bob <bob.felker@woodplc.com>
Subject: RE: Wildlife, Mohawk Lake Brantford

Hello Mr. Felker,

I met you at the open house for the Mohawk Lake environmental assessment on June 5, 2019.

I had provided you with a print copy of my flora and fauna sightings in 2018.

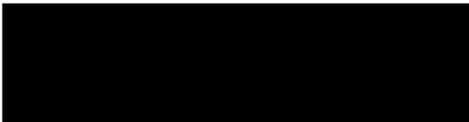
You said that there is an existing documentation of area wildlife, which I could access online.

I have not been able to find any documents pertaining to the planned environmental assessment. The website for the City of Brantford does not provide documents beyond a map; the former website for the Mohawk Lake rehabilitation project has disappeared.

Could you kindly send me the document you were referring to? I would greatly appreciate the opportunity to read it.

Attached is a pdf of my flora and fauna sightings from 2018. I've also taken the liberty to attach a copy of the cover of my book, just finished, Guide to Nature & Green Spaces in Brantford & Brant County, now available for sale (\$6.95, ebook, 60 pages including cover, full colour, original photographs).

Thanks for your assistance,



Mohawk Canal and Lake Nature Report for 2018

By [REDACTED]

Summary of Highlights:

- 1 fawn born this year
- Possibly 1 coyote pup born this year
- Over 60 species of birds seen, including two rare to the area species: Slaty-back Gull and Iceland Gull
- Two red tailed hawks have taken up residence in the Mohawk-Greenwich area, part of their territory includes the Mowhawk-Greenwich brownfield
- A mated pair of Wood Ducks successfully raised a small brood of chicks in a hollow tree in Mohawk Park this summer
- A mated pair of Great Horned Owls successfully raised at least 2 chicks (possibly 3) this summer in the Mohawk Park/Glebe area
- A mated pair of Cooper's Hawks successfully hatched 5 chicks this summer in Mohawk Park or very nearby (the chicks, accompanied often by 1 adult spent most of their time learning to hunt in the upper east quadrant of Mohawk Park, so presumably the nest was nearby)

Findings:

3 separate pairs of Red Tailed Hawks have staked out a part of the Mohawk Canal/Lake area as part of their territory

While there were at least 5 Canada Goose nests created in the spring of 2018, all with eggs, the geese abandoned their nests, and I was not able to discern why. There were no goslings raised on the canal or lake in 2018, which is very unusual.

The Osprey successfully raised 2 chicks in 2018. The nest was not removed by Rogers earlier in the year and it was much easier to discern the chicks in the nest when they became larger. By the way, every August the Military Museum holds an open house, part of that day includes the firing of guns, large and small, which do disturb the Osprey noticeably during that event.

There are at least 2 pairs of Belted Kingfishers who claim the east and west ends of Mohawk Lake and Canal as part of their territory respectively.

I understand from a pair of reliable birders that at least one Eastern Screech Owl resides in Mohawk Park, possibly has a mate. I have not yet seen the screech owl (nor heard it), so it is not included on my list for 2018.

Observation Area: 8.93 kilometres total (including Mohawk Park).

Frequency of monitoring:

Generally speaking, I regularly monitor the area from Murray Street to the eastern-most point where the canal continues once a week, sometimes several times a week (depending on time of year and my availability), a route of approximately 3 km. This ramble often (but not always) includes a walk on the train tracks. If one is to take the tracks to explore,

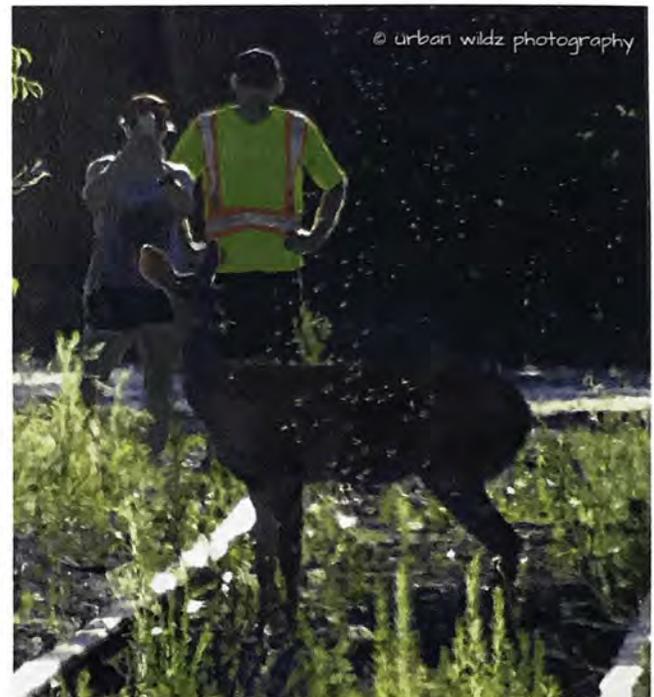
urban wildz photography



13. Osprey
14. Bald Eagle
15. Cooper's Hawk
16. Red Tailed Hawk
17. Killdeer
18. Yellowlegs (not sure if Greater or Lesser)
19. Ring Billed Gull
20. Herring Gull
21. Great Black-backed Gull
22. Caspian Tern
23. Rock Pigeon
24. Mourning Dove
25. Great Horned Owl
26. Belted Kingfisher
27. Red-bellied Woodpecker
28. Downey Woodpecker
29. Hairy Woodpecker
30. Northern Flicker
31. Least Flycatcher
32. Eastern Phoeble
33. Eastern Kingbird
34. Blue Jay
35. American Crow
36. Northern Rough Winged Swallow
37. Tree Swallow
38. Black Capped Chickadee
39. White Breasted Nuthatch
40. Brown Creeper
41. House Wren
42. Carolina Wren
43. Golden-crowned Kinglet
44. Unknown Thrush (hermit or wood, heard singing)
45. American Robin
46. Gray Catbird
47. European Starling
48. Cedar Waxwing
49. House Sparrow
50. Yellow Warbler
51. American Tree Sparrow
52. Chipping Sparrow
53. White-throated Sparrow
54. Song Sparrow
55. Dark-eyed Junco
56. Northern Cardinal
57. Rose-breasted Grossbeak
58. Indigo Bunting
59. Red-winged Blackbird
60. Common Grackle
61. Brown-headed Cowbird



Adult and juvenile Yellowlegs, Greenwich Mohawk Brownfield, 2018.



A doe from the "Mohawk herd" of white tail deer. She was grazing along the tracks dividing the brownfield with her fawn, and panicked by my approach, the duo ran to the exit between Murray and Greenwich Streets. 2018.

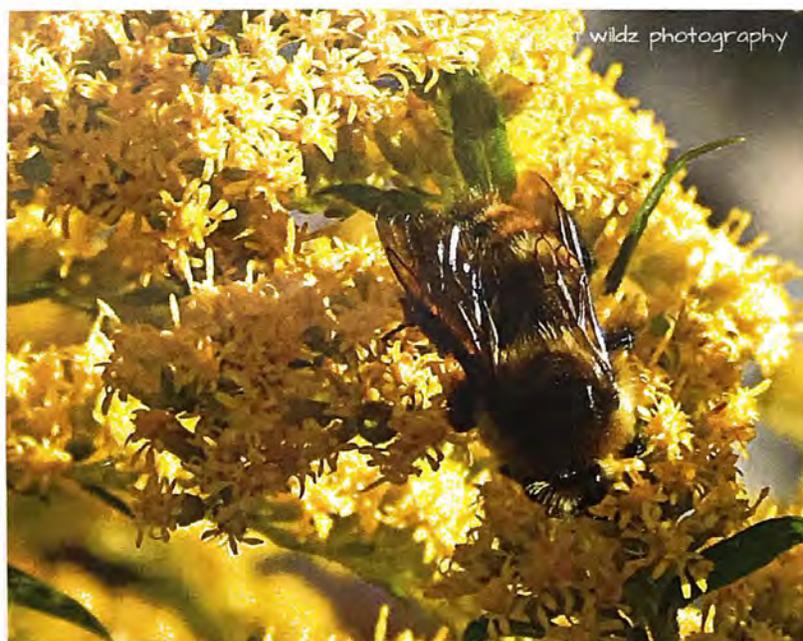
- Hornet
- Grasshopper
- Bumblebee
- Eastern Amberwing Dragonfly

Plants:

- Golden Rod
- Bullrush
- Lilac
- Wild Grape
- Sumac (Staghorn)
- Aster
- Milkweed
- Deadly Nightshade
- Virginia Creeper
- Alder
- Willow
- Garlic Mustard
- Phragmites (quite a lot)
- Common Tansy
- Black-eyed Susan
- Purple Loosestrife
- Yellow Iris
- Catalpa
- Queen Anne's Lace
- Teasels
- Chicory
- Hackberry Tree



A small number of Eastern Amberwing Dragonflies were found along the shores of Mohawk Lake in the summer of 2018.



An Orange-striped Bumblebee seen on Golden Rod blossoms in the fall of 2018 in the Greenwich Mohawk Brownfield.

The page features two large, light grey, curved shapes that resemble thick, partial arcs. One arc is positioned in the upper left quadrant, and the other is in the lower left quadrant, both curving towards the right side of the page. The text is centered between these two arcs.

Indigenous Consultation

Shams, Aniq

From: Sarah Hewitt <SHewitt@brantford.ca>
Sent: Friday, October 18, 2019 3:04 PM
To: weylinbomberry@sixnations.ca
Subject: Mohawk Lake & Mohawk Canal Cleanup and Rehabilitation Project
Attachments: Mohawk_SNGRLetterOct2019.pdf

Good afternoon Mr. Bomberry,

As per our earlier conversation, please find attached a copy of the Mohawk Lake & Mohawk Canal Cleanup and Rehabilitation Project letter sent to Chief Ava Hill earlier today.

Thanks,
Sarah.

Sarah Hewitt
Administration & Customer Service
Public Works Commission
City of Brantford
Phone: 519-759-4150 Ext. 5114
Email: shewitt@brantford.ca
P.O. Box 818 • Brantford, Ontario • N3T 5R7 • www.brantford.ca



Shams, Aniq

From: Sarah Hewitt <SHewitt@brantford.ca>
Sent: Friday, October 18, 2019 2:53 PM
To: Ava Hill (avahill@sixnations.ca)
Subject: Mohawk Lake & Mohawk Canal Cleanup and Rehabilitation Project
Attachments: Mohawk_SNGRLetterOct2019.pdf

Good afternoon Chief Hill,

Please find attached a copy of the letter sent to you today via Canada Post in regards to the Mohawk Lake & Mohawk Canal Cleanup and Rehabilitation Project.

Thanks,
Sarah.

Sarah Hewitt
Administration & Customer Service
Public Works Commission
City of Brantford
Phone: 519-759-4150 Ext. 5114
Email: shewitt@brantford.ca
P.O. Box 818 • Brantford, Ontario • N3T 5R7 • www.brantford.ca



Shams, Aniq

From: Sarah Hewitt <SHewitt@brantford.ca>
Sent: Friday, October 18, 2019 2:37 PM
To: weylinbomberry@sixnations.ca
Subject: PIC Notice - Mohawk Lake and Mohawk Canal Rehabilitation Project
Attachments: PICNotice_Mohawk Lake Rehabilitation Project.pdf

Good afternoon Mr. Bomberry,

Please find attached the notice for the second Public Information Centre (PIC) for the Mohawk Lake and Mohawk canal Rehabilitation Project that you should have received last week. Thank you for providing your correct email address, and apologies for the delay in receiving the notice.

The PIC will be held on Wednesday October 23rd from 5:00 pm to 7:00-pm at Mohawk Park Pavilion, 51 Lynnwood Drive, Brantford.

Thanks,
Sarah.

Sarah Hewitt

Administration & Customer Service

Public Works Commission

City of Brantford

Phone: 519-759-4150 Ext. 5114

Email: shewitt@brantford.ca

P.O. Box 818 • Brantford, Ontario • N3T 5R7 • www.brantford.ca





April 26, 2019

Mississaugas of the Credit First Nation
6 First Line Rd., R.R. #6
Hagersville, ON N0A 1H0

Attn: Fawn Sault, Consultation Manager

**RE: Notice of Study Commencement
Municipal Class Environmental Assessment Study
Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project –
Functional Master Drainage and Restoration Study**

Dear Ms. Fawn Sault,

The City of Brantford (the City) has initiated a Municipal Class Environmental Assessment (Class EA) for Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project – Functional Master Drainage and Restoration Study (the Study). The City has retained Wood Environment & Infrastructure (Wood) to undertake this Class EA Study.

The City has received direction from the Provincial Crown that the Mississaugas of the Credit First Nation may have an interest in learning more about the Class EA Study. The City is committed to involving stakeholders and Indigenous groups in the Class EA Study. The Provincial Crown has delegated the procedural aspects of the Duty to Consult to the City. For information, the City has attached a summary of the Class EA Study and the Notice of Commencement. Please feel free to share this information within your community as you feel appropriate.

We are interested in understanding any interests or questions the Mississaugas of the Credit First Nation may have about the Class EA Study and if there is a potential for the Class EA Study to affect Aboriginal and Treaty rights. We are also interested to know if there are any sites of cultural significance to your community, within, or near the study area. The City welcomes the opportunity to meet with you and your community to provide more information about the Class EA Study and discuss any interests or questions you may have.

You will be contacted by one of the project representatives below:

Nahed Ghbn, P.Eng.
Senior Project Manager
City of Brantford
Tel: 519-759-4150 ext. 5262
Email: NGhbn@brantford.ca

Mary Kathryn Kelly, B.Sc.
Indigenous Relations and Partnerships Lead
Wood Environment & Infrastructure Solutions
Tel: (705) 493-9393
Email: mary.k.kelly@woodplc.com



We will contact you by telephone in the near future to determine your interest in a potential meeting. Please do not hesitate to contact me if you have any questions or concerns.

Sincerely,

Yours truly,

A handwritten signature in blue ink that reads "Wendy Teufel".

Wendy Teufel
Manager, Design and Construction

cc:

E. (Beth) Goodger, General Manager, Public Works Commission
Russ Loukes, P. Eng., Director, Engineering Services
Nahed Ghbn, P. Eng., Senior Project Manager, Engineering Services
Ron Scheckenberger P. Eng., Wood
Bob Felker BES, MCIP, RPP, Wood
Mary Kelly B.Sc., Wood

Encl: Project Information Sheet, Notice of Commencement

Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project - Functional Master Drainage and Restoration Study (City of Brantford)

Project Background

The City of Brantford (the City) initiated the Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project to understand the current conditions within the Study Area (identified below) and establish / assess opportunities / recommendations to improve environmental quality and to protect and enhance Study Area features. While industrial discharges have been discontinued and cleanup has occurred on brownfield lands, the lake and canal's sediment and water quality have been impacted by these industrial activities as well as stormwater runoff.



The Rehabilitation project is being conducted as the following-step process:

1. Characterization Study

The Characterization Study documents the current environmental conditions of the lake and canal, which will support the development of improvement measures. This work is underway under a separate contract and expected to be completed in early 2019.

2. Subwatershed Stormwater Plan

The Subwatershed Stormwater Plan will focus on the tributary basin's runoff (quantity / quality) aimed at understanding the current water resources of the Mohawk Lake and Mohawk Canal, as well as the future watershed system (based on intensified land uses).

3. Mohawk Lake and Mohawk Canal Master Plan

The Master Plan will define management and restoration activities associated with environmental protection needs and related future park uses.

4. Class Environmental Assessment (Class EA) Report

The Class EA to be carried out in accordance with provincial legislative requirements

5. Design and Construction of the Cleanup and Remedial Work

This is a future step that will implement the recommended activities, the preferred improvement alternatives, determined in Steps 2 and 3.

The Functional Master Drainage and Restoration Study (Study) includes steps 2, 3 and 4 identified above. The City has retained Wood Environment & Infrastructure Solutions (Wood) to complete this work.

Class Environmental Assessment

The Study will follow a Schedule 'B' Municipal Class EA process that will take input from the Characterization Study and Subwatershed Study Stormwater Plan, to form the basis for the evaluation of a set of management and restoration practices for the Mohawk Lake and Mohawk Canal.

The purpose of this Class EA Study is to:

- Confirm the need for improvements;
- Determine improvement alternatives; and
- Evaluate alternatives and identify the preferred improvement plan.

The Class EA planning process helps identify potential effects of proposed projects. Each of the proposed alternatives are assessed against baseline conditions to determine the potential effects, and where necessary, identify mitigation measures. From these alternatives, a preferred alternative (s) will be identified.

A Class EA and Master Plan are a decision-making and planning process that allows for systematic assessment of alternatives and stakeholder engagement. A key component of this Study is to engage with regulatory agencies, stakeholders and Indigenous groups.

Schedule and Next Steps

- Public Information Sessions tentatively planned for spring and fall 2019.
- Project File Report and Master Plan Report, planned for filing on the Public Record in late 2019.

Contact Information

City of Brantford

Nahed Ghbn, P.Eng.
Senior Project Manager
100 Wellington Square
Brantford, ON N3T 5R7
519-759-4150 ext. 5262
NGhbn@brantford.ca

Wood

Ron Scheckenberger M.Eng., P.Eng.
Principal Consultant
3450 Harvester Road, Suite 100
Burlington, ON L7N 3W5
905-335-2353
ron.scheckenberger@woodplc.com



April 26, 2019

Six Nations of the Grand River
2498 Chiefswood Road, P.O. Box 5000
Ohsweken, ON N0A 1M0

Attn: Ava Hill, Chief

**RE: Notice of Study Commencement
Municipal Class Environmental Assessment Study
Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project –
Functional Master Drainage and Restoration Study**

Dear Chief Ava Hill,

The City of Brantford (the City) has initiated a Municipal Class Environmental Assessment (Class EA) for Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project – Functional Master Drainage and Restoration Study (the Study). The City has retained Wood Environment & Infrastructure Solutions (Wood) to undertake this Class EA Study.

The City has received direction from the Provincial Crown that Six Nations of the Grand River may have an interest in the Class EA Study. The City is committed to involving stakeholders and Indigenous groups in the Class EA Study. The Provincial Crown has delegated the procedural aspects of the Duty to Consult to the City. For information, the City has attached a summary of the Class EA Study and the Notice of Commencement. Please feel free to share this information within your community as you feel appropriate.

We are interested in understanding any interests or questions Six Nations of the Grand River may have about the Class EA Study and if there is a potential for the Class EA Study to affect Aboriginal and Treaty rights. We are also interested to know if there are any sites of cultural significance to your community, within, or near the study area. The City welcomes the opportunity to meet with you and your community to provide more information about the Class EA Study and discuss any interests or questions you may have.

You will be contacted by one of the project representatives below:

Nahed Ghbn, P.Eng.
Senior Project Manager
City of Brantford
Tel: 519-759-4150 ext. 5262
Email: NGhbn@brantford.ca

Mary Kathryn Kelly, B.Sc.
Indigenous Relations and Partnerships Lead
Wood Environment & Infrastructure Solutions
Tel: (705) 493-9393
Email: mary.k.kelly@woodplc.com



We will contact you by telephone in the near future to determine your interest in a potential meeting. Please do not hesitate to contact me if you have any questions or concerns.

The City of Brantford is committed to ensuring adequate and appropriate consultation occurs where required and, to that end, with all members and groups of the Six Nations of the Grand River. As such, all inquiries and consultation with the Six Nations of the Grand River concerning this project will be directed through the Consultation and Accommodation Process (CAP) Team established by the Six Nations Elected Council to carry out the process of consultation and accommodation in accordance with the Consultation & Accommodation Policy.

Sincerely,

Yours truly,

A handwritten signature in blue ink, appearing to read "W. Teufel".

Wendy Teufel
Manager, Design and Construction

cc:

Todd E. Williams, Haudenosaunee Development Institute (HDI), representing the Haudenosaunee Confederacy Chiefs Council
W. Paul General, Six Nations of the Grand River
E. (Beth) Goodger, General Manager, Public Works Commission
Russ Loukes, P. Eng., Director, Engineering Services
Nahed Ghbn, P. Eng., Senior Project Manager, Engineering Services
Ron Scheckenberger P. Eng., Wood
Bob Felker BES, MCIP, RPP, Wood
Mary Kelly B.Sc., Wood

Encl: Project Information Sheet, Notice of Commencement

Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project - Functional Master Drainage and Restoration Study (City of Brantford)

Project Background

The City of Brantford (the City) initiated the Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project to understand the current conditions within the Study Area (identified below) and establish / assess opportunities / recommendations to improve environmental quality and to protect and enhance Study Area features. While industrial discharges have been discontinued and cleanup has occurred on brownfield lands, the lake and canal's sediment and water quality have been impacted by these industrial activities as well as stormwater runoff.



The Rehabilitation project is being conducted as the following-step process:

1. Characterization Study

The Characterization Study documents the current environmental conditions of the lake and canal, which will support the development of improvement measures. This work is underway under a separate contract and expected to be completed in early 2019.

2. Subwatershed Stormwater Plan

The Subwatershed Stormwater Plan will focus on the tributary basin's runoff (quantity / quality) aimed at understanding the current water resources of the Mohawk Lake and Mohawk Canal, as well as the future watershed system (based on intensified land uses).

3. Mohawk Lake and Mohawk Canal Master Plan

The Master Plan will define management and restoration activities associated with environmental protection needs and related future park uses.

4. Class Environmental Assessment (Class EA) Report

The Class EA to be carried out in accordance with provincial legislative requirements

5. Design and Construction of the Cleanup and Remedial Work

This is a future step that will implement the recommended activities, the preferred improvement alternatives, determined in Steps 2 and 3.

The Functional Master Drainage and Restoration Study (Study) includes steps 2, 3 and 4 identified above. The City has retained Wood Environment & Infrastructure Solutions (Wood) to complete this work.

Class Environmental Assessment

The Study will follow a Schedule 'B' Municipal Class EA process that will take input from the Characterization Study and Subwatershed Study Stormwater Plan, to form the basis for the evaluation of a set of management and restoration practices for the Mohawk Lake and Mohawk Canal.

The purpose of this Class EA Study is to:

- Confirm the need for improvements;
- Determine improvement alternatives; and
- Evaluate alternatives and identify the preferred improvement plan.

The Class EA planning process helps identify potential effects of proposed projects. Each of the proposed alternatives are assessed against baseline conditions to determine the potential effects, and where necessary, identify mitigation measures. From these alternatives, a preferred alternative (s) will be identified.

A Class EA and Master Plan are a decision-making and planning process that allows for systematic assessment of alternatives and stakeholder engagement. A key component of this Study is to engage with regulatory agencies, stakeholders and Indigenous groups.

Schedule and Next Steps

- Public Information Sessions tentatively planned for spring and fall 2019.
- Project File Report and Master Plan Report, planned for filing on the Public Record in late 2019.

Contact Information

City of Brantford

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100 Wellington Square
Brantford, ON N3T 5R7
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Wood

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905-335-2353
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wood.



Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project

Project Update
October 2019



Outline

1. Introduction
2. Background & Study Overview
3. Community Needs & Visioning
4. Alternative Remediation Alternatives / Evaluation Criteria
5. Discussion & Action Items



Introduction



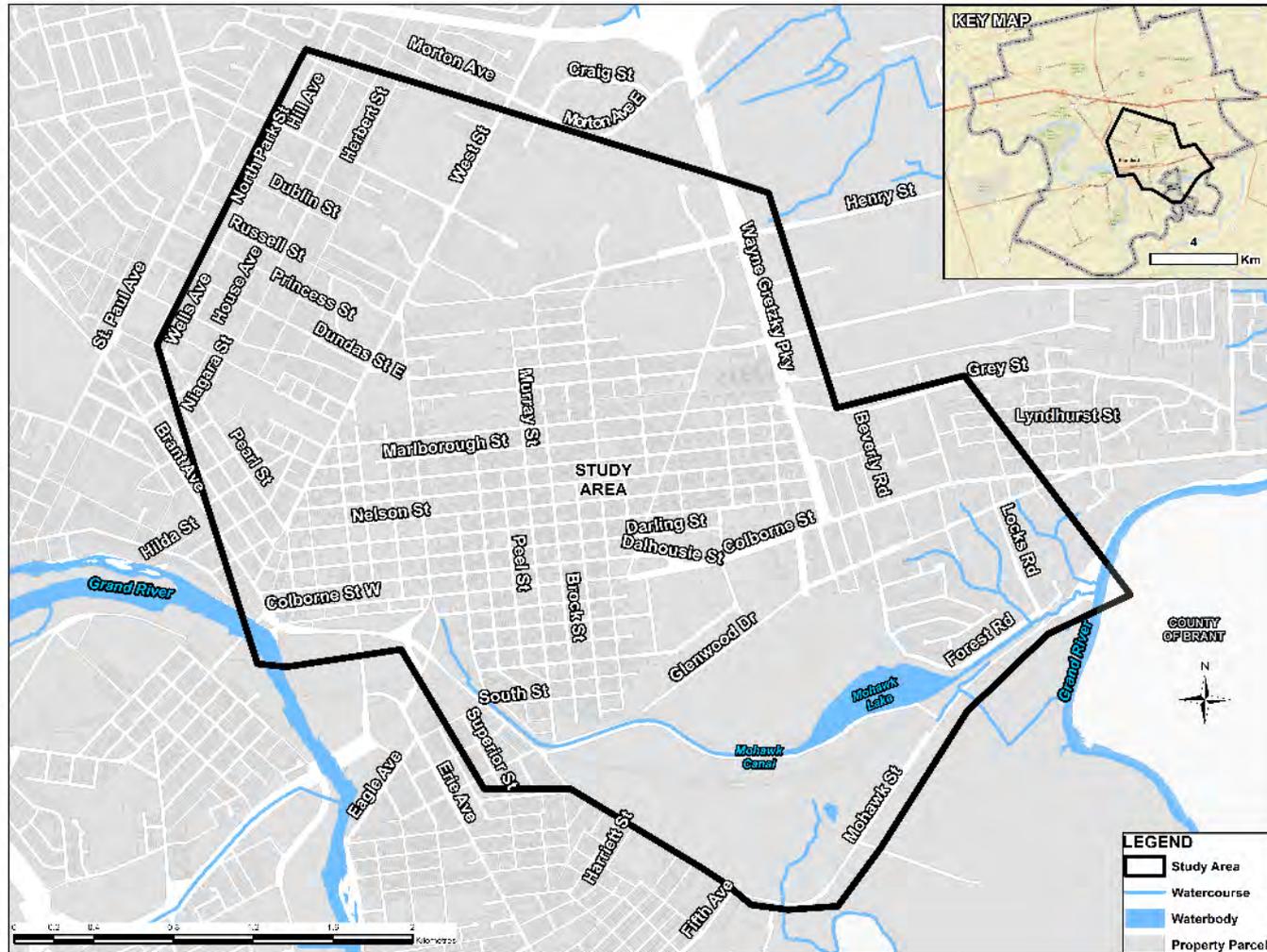
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- **The purpose of the Study is to consider ways to improve the environmental quality of Mohawk Lake and Mohawk Canal by providing:**
 - Improved water quality conditions
 - Enhanced recreational opportunities
 - Enhanced fish & wildlife habitat
- **Potential benefits that remediation and restoration can provide to Mohawk Lake and Mohawk Canal may include:**
 - Improved aquatic & wildlife habitat
 - Protection & interpretation of cultural heritage resources
 - Opportunities for water recreation



Introduction: Study Area



Background & Study Overview



Background & Study Overview:

Historical Overview

- Mohawk Lake was constructed in the 1800's as part of a canal system to provide access for barges traveling through Brantford and to enable the barges to turn around
- In the early 1900s, the lake and the surrounding parkland provided the community with recreational opportunities for residents and continues to offer valuable natural heritage for the City
- For decades, concern has been expressed about the deteriorating environmental conditions in the lake and canal
- As early as 1950, studies were conducted to improve the flow and to address siltation issues in the lake and canal
- The *Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project* was in part initiated in response to these concerns



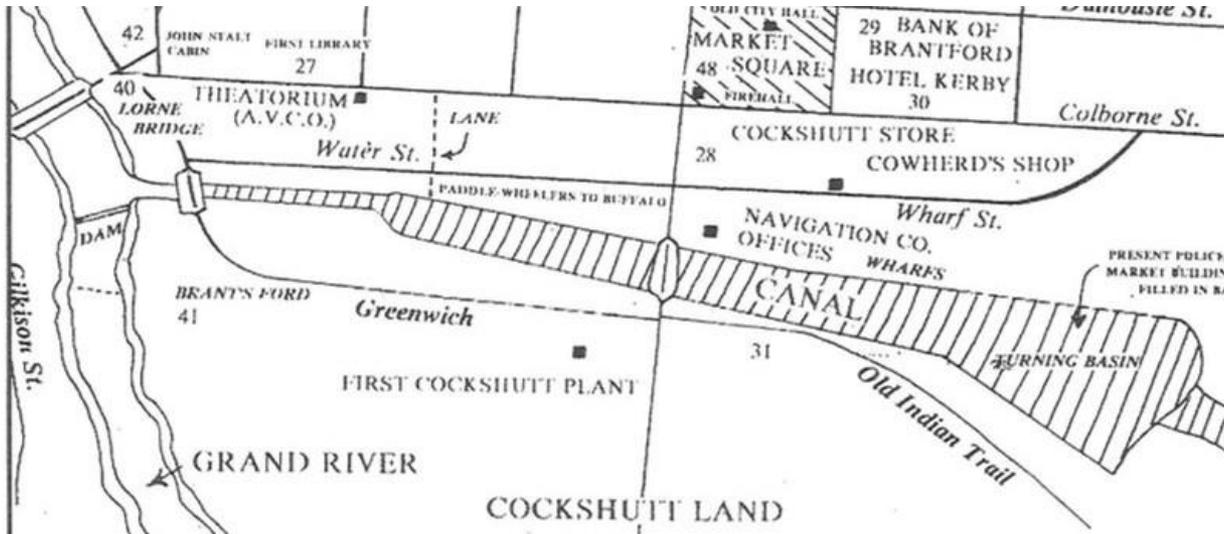
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Historical Connection with the Grand River

- Grand River Navigation Canal
 - Previously connected Grand River at upstream limits to Mohawk Lake
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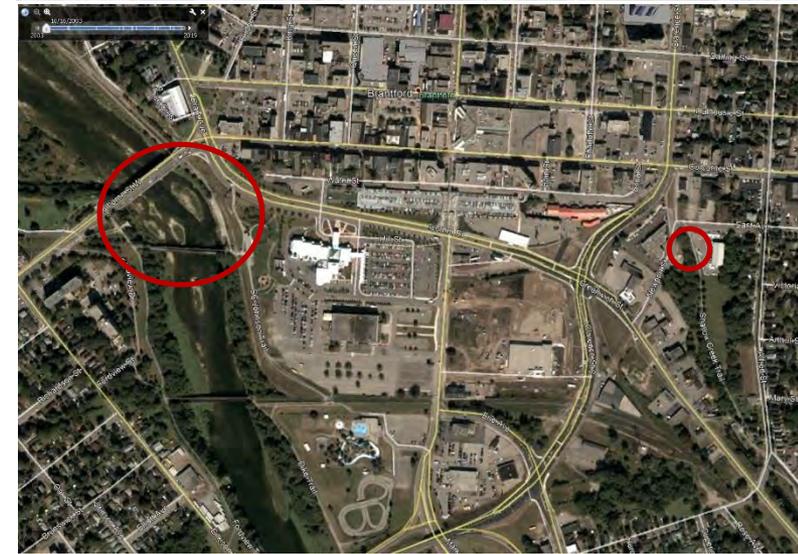


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Background & Study Overview: Historical Connection with the Grand River

- Historical Air Photos
 - Historical air photos show the upstream dam structure between Colborne Street and Dike Trail (1955, 1965, 1971, 1976, 1981, 1986)
 - No watercourse evident in any of the photos
 - Status of any pipeline unknown
- Dam is not evident in Google Earth 2003 images
 - Unclear as to exact date of removal or rationale
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Background & Study Overview:

Timeline

1800s

Mohawk Lake and Mohawk Canal Constructed

- Part of the canal system to provide access for barges traveling through Brantford and to enable the barges to turn around

Early 1900s

Recreational Area

- The lake and the surrounding parkland provided the community with recreational opportunities

1950s

Early Cleanup Studies

- Conducted to improve the flow and to combat the silting problems in the lake and canal

1980s

Mohawk Canal Disconnected from Grand River

- Inflow from the Grand River diverting flow to the canal was disconnected with the removal of a dam

2015

Visioning for Mohawk Lake

- Visioning workshops provided the basis for a vision statement and work plans to address the clean-up

2018 (in progress)

Characterization Study

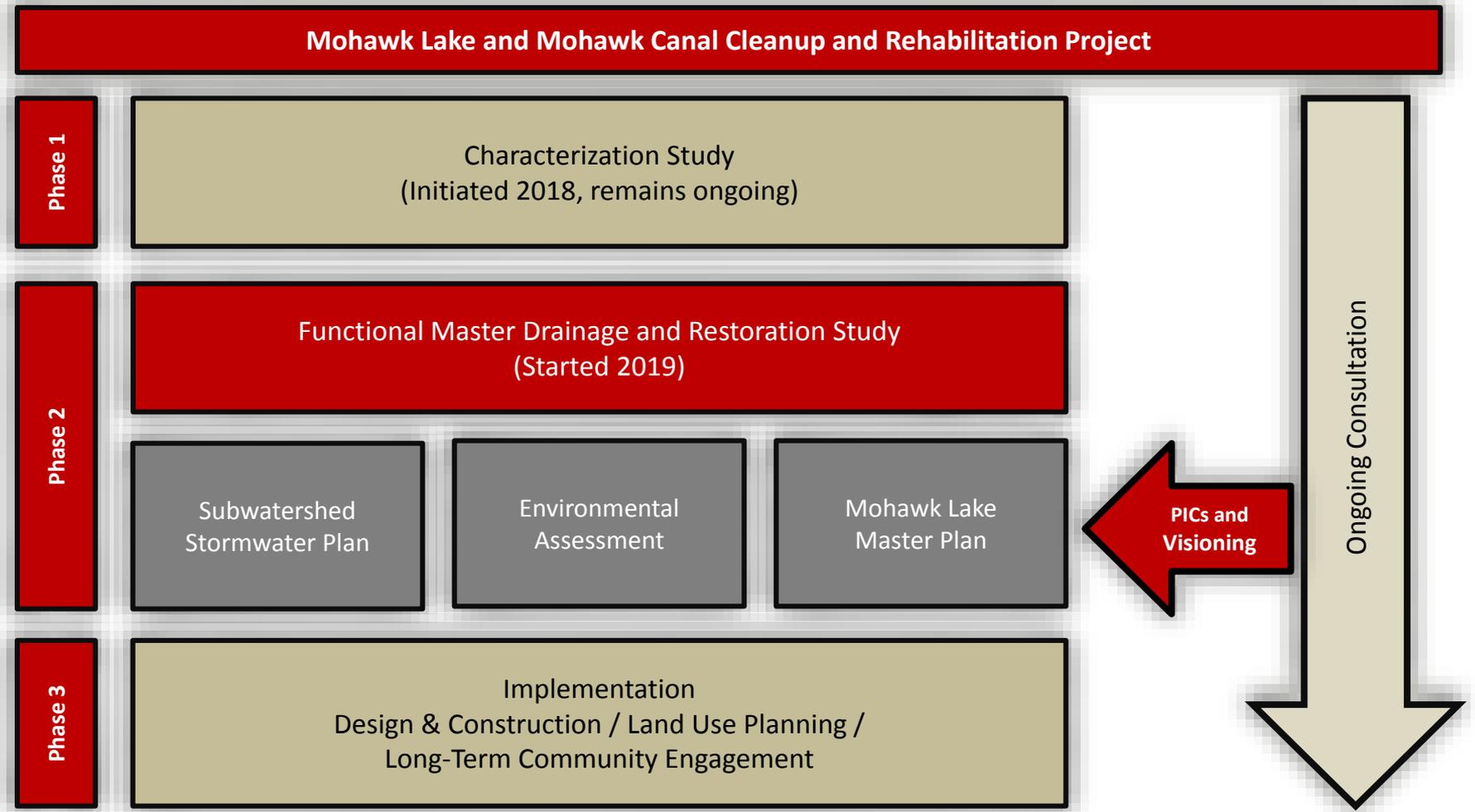
- Study to define the current (baseline) environmental conditions to support future rehabilitation measures

2019 (in progress)

Functional Master Plan Drainage and Restoration Study

- Study to define actions to enhance recreational opportunities, fish & wildlife habitat and improve water quality conditions

Background & Study Overview: Process & Phases



Background & Study Overview:

Process & Phases

Subwatershed Study

- Recommend actions to maintain, restore or enhance the health of the Mohawk Lake subwatershed
- Assess potential alternatives to identify a preferred subwatershed protection and restoration strategy
- Define environmental requirements such as design criteria and targets, priority phasing, mitigation measures, implementation and monitoring plans

Environmental Assessment

- Consider all aspects of the environment: physical, natural, social, cultural and economic, including cost/benefit analyses
- Consult throughout the process
- Define the problem and opportunity
 - Identify, develop and evaluate potential remediation options
- Identify, develop and evaluate potential remediation options
- Document the selection of the Preferred Remedial Option(s)

Mohawk Lake Master Plan

- Develop a long range plan that integrate infrastructure requirements for existing and future land use with environmental assessment planning principles, and:
 - Looks beyond the infrastructure and remediation components
 - Considers land use and park use policy direction
 - Translates community vision into actions and commitments, including long-term engagement

Community Engagement/ Project Management

- Communication and Engagement Plan

- PIC 1
- PIC 2

- Workshops
- Meetings



Background & Study Overview: Process & Phases

Municipal Class Environmental Assessment, Schedule B



Community Needs & Visioning



Community Needs & Visioning

Community Engagement Findings

- Past Engagement:
 - Reviewed information from Mohawk Lake Working Group (2014 & 2015), Mohawk Lake District Plan (information available from 2018) and this project's PIC #1
- Future Engagement:
 - TM#5 will be updated based on the findings from PIC #2 and related engagement (i.e., Mississaugas of the Credit First Nation and Six Nations of the Grand River)
- Community Vision:
 - Vision statement from Mohawk Lake Working Group (2015) and Mohawk Lake District Plan (Ongoing) was reviewed.
 - A revised and updated vision statement will be determined for this project through engagement.
- Potential Recreational / Cultural Uses:
 - Boat; Fish; Canoe; Hike; Walk; Ice Skate; Bike; Picnic
 - Community / Charity events and festivals, such as Dragon Boat Races
 - Education and research opportunities for students, specifically based on the natural and cultural environment / history of Mohawk Canal, Six Nations of the Grand River, and Brantford's industrial heritage
 - Dances and concerts
- Summary of Identified Priorities:
 - Enhance the landscape for fish, wildlife, birds and vegetation
 - Preference not to significantly alter the landscape for human activities
 - Improve recreational opportunities, while maintaining the natural beauty of the area



Community Needs & Visioning: Long-Term Engagement Plan

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 - Construction Completion (e.g., communication, Notices for Ribbon cutting ceremony)
- **Post Construction Phase**
 - Five-Year Review (e.g., Community survey / Next steps)



Remediation Alternatives / Evaluation Criteria



Remediation Alternatives / Evaluation Criteria: Alternatives

Three main management approaches have been identified, and alternatives evaluated at a high level:

1. Mohawk Lake & Mohawk Canal Remediation

- *Sediment Removal from Lake*
- *Shoreline/Edge Treatment of lake perimeter*
- *Natural Channel Design of Canal*

2. Subwatershed Management

- *Source/Conveyance Control (Public/Private)*
- *End-of-pipe (Retrofits)*

3. Other

- *Street sweeping*
- *Public Education*
- *Recirculation/Re-connection with Grand River*



Remediation Alternatives / Evaluation Criteria: Mohawk Lake and Canal Remediation

- In-Lake/In-Canal Restoration
 - Address issues of water and sediment quality within Mohawk Lake and Mohawk Canal
- Alternatives:
 1. Drawdown/Pumpdown and Mechanical Dredging
 2. Hydraulic Dredging
 3. Sediment Management – Physical Capping
 4. Sediment Management – Chemical Capping and Nutrient Inactivation
 5. Revegetation of Riparian Areas and Tributary Streams
 6. Watercourse Restoration (Mohawk Canal)
 7. Living Shorelines, Shoreline/Riparian Restoration, Shoreline Softening (Mohawk Lake)



Dredging Activities – From Land



Shoreline Restoration Activities

Remediation Alternatives / Evaluation Criteria: Subwatershed Management

- Subwatershed Management Strategies
 - Address issues related to stormwater runoff quantity and quality that inflows to Mohawk Lake and Mohawk Canal
- Structural BMP Retrofits
 - Projects involving the installation of physical systems to provide mechanical, biological, or chemical control of the target water quality pollutant
- Long list of Alternatives:
 1. Upflow Media Filtration
 2. Baffle Boxes
 3. Eliminate Cross-Connections
 4. Wetland Treatment
 5. Infiltration/Exfiltration BMPs
 6. Modular Wetlands
 7. Offline Alum Polymer Treatment
 8. Bioreactor Walls and Beds
 9. Bioretention
 10. Permeable Concrete/Pavement
 11. Stormwater Wet/Irrigation Ponds
 12. Energy Dissipaters
 13. Grassed swales, Bioswales
 14. Stormwater Inlet Treatment
 15. Oil/Grit and Hydrodynamic Separators



**Stormwater
Management**



Remediation Alternatives / Evaluation Criteria: Subwatershed Management

- Source/Conveyance Controls

1. Upflow Media Filtration
2. Baffle Boxes
5. Infiltration/Exfiltration BMPs
8. Bioreactor Walls and Beds
9. Bioretention
10. Permeable Concrete/Pavement
12. Energy Dissipaters
13. Grassed swales, Bioswales
14. Stormwater Inlet Treatment

- End of Pipe Controls

4. Wetland Treatment
6. Modular Wetlands
11. Stormwater Wet/Irrigation Ponds
15. Oil/Grit and Hydrodynamic Separators

- Other

3. Eliminate Cross-Connections
7. Offline Alum Polymer Treatment



Remediation Alternatives / Evaluation Criteria: Other

- Subwatershed Management Strategies
 - Non-Structural BMPs
- Alternatives
 1. Public Education/Outreach
 2. Street Sweeping
 3. Recirculation/Re-connection with Grand River



Remediation Alternatives / Evaluation Criteria:

Criteria



Natural Environment

- Water Quality (Chem. & Temp.)
- Water Quality
- Natural Heritage (Habitat, Wetlands and SAR)
- Fluvial
- Geomorphology
- Geology, Hydrogeology, and Groundwater



Economic Environment

- Capital Cost
- Contaminant Management Cost
- Maintenance Cost
- Utilities Impacts
- Property Acquisition



Social/Cultural Environment

- Cultural Heritage and Archaeology
- Future Land Use and Growth Impacts
- Hydraulics - Flooding



Technical Environment

- Stormwater Management
- Hydrology
- Constructability
- Community Resilience and Sustainability

Remediation Alternatives / Evaluation Criteria

Preliminary Preferred Alternatives

- Preliminary Preferred Alternatives provided for discussion purposes – not yet formally analyzed or assessed

A. Mohawk Lake and Canal Remediation

1. Sediment Removal
 - Hydraulic Dredging considered preferred approach (minimize disturbance)
2. Shoreline Restoration
 - Plantings and re-grading
3. Natural Channel Design
 - Fluvial enhancements



Remediation Alternatives / Evaluation Criteria

Preliminary Preferred Alternatives

- Preliminary Preferred Alternatives provided for discussion purposes – not yet formally analyzed or assessed

B. Subwatershed

1. Source/Conveyance Controls
 - Roadway reconstructions (Public)
 - Redevelopment (Private)
2. End-of-Pipe (Retrofits)
 - Smaller more urban drainage systems
 - Public land availability
3. Other
 - Disconnection of Cross-Connections



Remediation Alternatives / Evaluation Criteria

Preliminary Preferred Alternatives

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C. Other

1. Street Sweeping
 - Potential to enhance in subwatershed
2. Public Education
 - Avoid discharging pollutants to storm drainage system
3. Reconnection with Grand River considered screened
 - Grades are not physically viable for a gravity pipe
 - Pumping not cost effective given magnitude of flow required
 - Negative impacts associated with lowering Mohawk Lake (reduced footprint, additional sediment removal, etcetera)

Discussion & Action Items



Shams, Aniq

From: Kelly, Mary K
Sent: Monday, October 28, 2019 8:58 PM
To: Fawn Sault; Mark LaForme
Cc: Nahed Ghbn (nghbn@brantford.ca); Scheckenberger, Ron; Shams, Aniq
Subject: RE: City of Brantford - Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study
Attachments: 201910_IndigenousInformationSharing_Final.pdf

Good afternoon Fawn,

As a follow-up to our communications, I've attached the presentation we intended to share at our October meeting that was postponed (wishing you a speedy recovery). Per your direction I have included Mark LaForme on this email.

Further information, including poster boards from the two public information centres, is available on the City's website: <https://www.brantford.ca/en/your-government/mohawk-lake-and-mohawk-canal-cleanup-and-rehabilitation-project.aspx>

If you should have any questions or wish to discuss please do not hesitate to let us know.

Cheers, Mary

From: Kelly, Mary K
Sent: Tuesday, August 13, 2019 3:37 PM
To: Fawn Sault <Fawn.Sault@mncfn.ca>
Cc: Nahed Ghbn (nghbn@brantford.ca) <nghbn@brantford.ca>; Scheckenberger, Ron <ron.scheckenberger@woodplc.com>; Senior, Matt <matt.senior@woodplc.com>; Felker, Bob <bob.felker@woodplc.com>; Shams, Aniq <aniqa.shams@woodplc.com>
Subject: City of Brantford - Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study

Good afternoon Fawn,

Thanks so much for the chat today. As discussed, you are interested in meeting in October to discuss the alternatives, visioning and long-term engagement associated with the City of Brantford's Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study.

I will reach out to the team and share some potential dates for a meeting.

If you do have questions please do not hesitate to reach out at any time. Cheers, Mary

Mary Kathryn Kelly, B.Sc.

Indigenous Relations & Partnerships Lead / Senior Human

Environment Consultant

Direct/Mobile: 705-493-9393

mary.k.kelly@woodplc.com

www.woodplc.com

wood.



October 18, 2019

Six Nations of the Grand River
2498 Chiefswood Road, P.O. Box 5000
Ohsweken, ON NOA 1M0

Attn: Ava Hill, Chief

**RE: Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project –
Functional Master Drainage and Restoration Study
Municipal Class Environmental Assessment Study**

Dear Chief Ava Hill,

In April 2019, the City shared that it had initiated a Municipal Class Environmental Assessment (Class EA) for the Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project - Functional Master Drainage and Restoration Study (the Study). The City has retained Wood Environment & Infrastructure Solutions (Wood) to undertake this Class EA Study.

We have spoken with Weylin Bomberry and he has advised that he would like to receive updates via email, and that if there are any questions or comments that he will advise. To provide an update of where the City is at in the Study, we have attached a Project Update information package. If there are comments or an interest in meeting, the City would welcome this.

We will contact you by telephone soon to confirm receipt. Please do not hesitate to contact us if you have any questions or concerns.

You will be contacted by one of the project representatives below:

Nahed Ghbn, P.Eng.
Senior Project Manager
City of Brantford
Tel: 519-759-4150 ext. 5262
Email: NGhbn@brantford.ca

Mary Kathryn Kelly, B.Sc.
Indigenous Relations and Partnerships Lead
Wood Environment & Infrastructure Solutions
Tel: (705) 493-9393
Email: mary.k.kelly@woodplc.com



The City of Brantford is committed to ensuring adequate and appropriate engagement and consultation occurs where required and delegated to the City by the Crown. To that end, all inquiries and consultation with the Six Nations of the Grand River, and the various stakeholders who form part of the Six Nations community, concerning this project will be directed through the Consultation and Accommodation Process (CAP) Team established by the Six Nations Elected Council to carry out the process of consultation and accommodation in accordance with the Consultation & Accommodation Policy.

Yours truly,

A handwritten signature in blue ink, appearing to read "Wendy Teufel".

Wendy Teufel
Manager, Design and Construction

cc:

Weylin Bomberry, Six Nations of the Grand River
Russ Loukes, P. Eng., A/ General Manager, Public Works Commission
Inderjit Hans, P. Eng., A/ Director, Engineering Services
Nahed Ghbn, P. Eng., Senior Project Manager, Engineering Services
Ron Scheckenberger P. Eng., Wood
Bob Felker BES, MCIP, RPP, Wood
Mary Kelly B.Sc., Wood

Encl: Project Update Information

wood.

CITY OF
BRANTFORD

Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project

Project Update
October 2019



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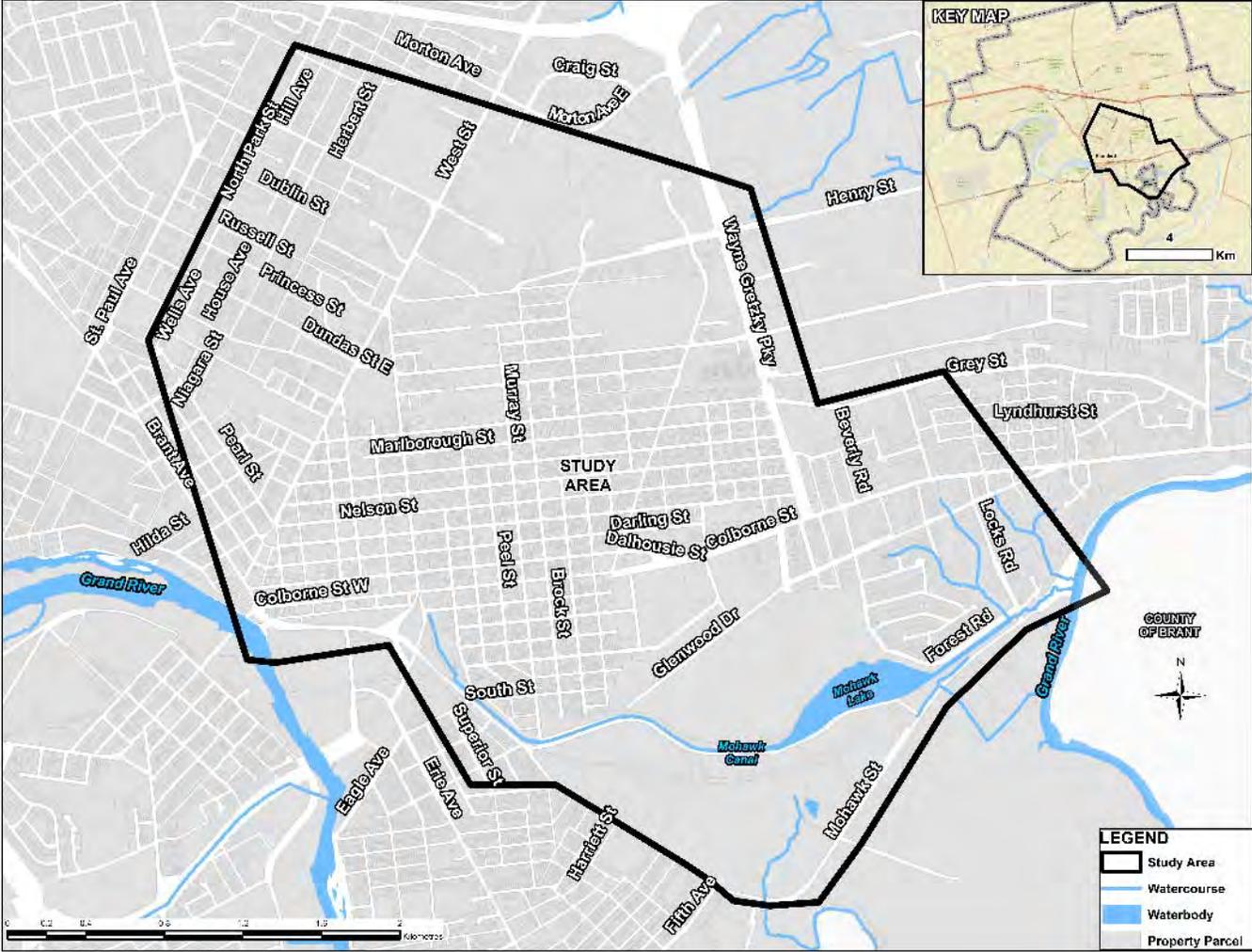


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Introduction: Study Area



Background & Study Overview



Background & Study Overview:

Historical Overview

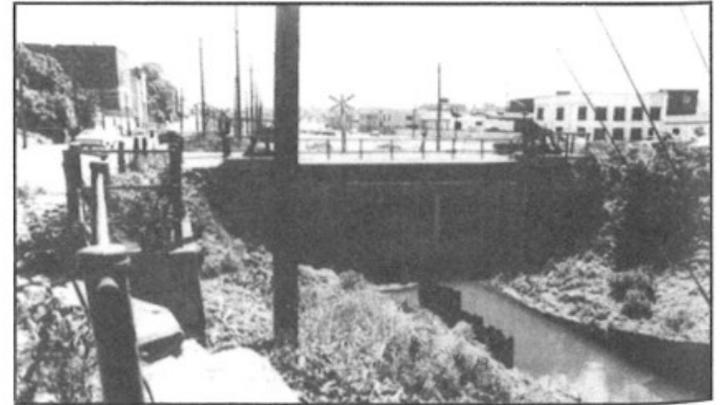
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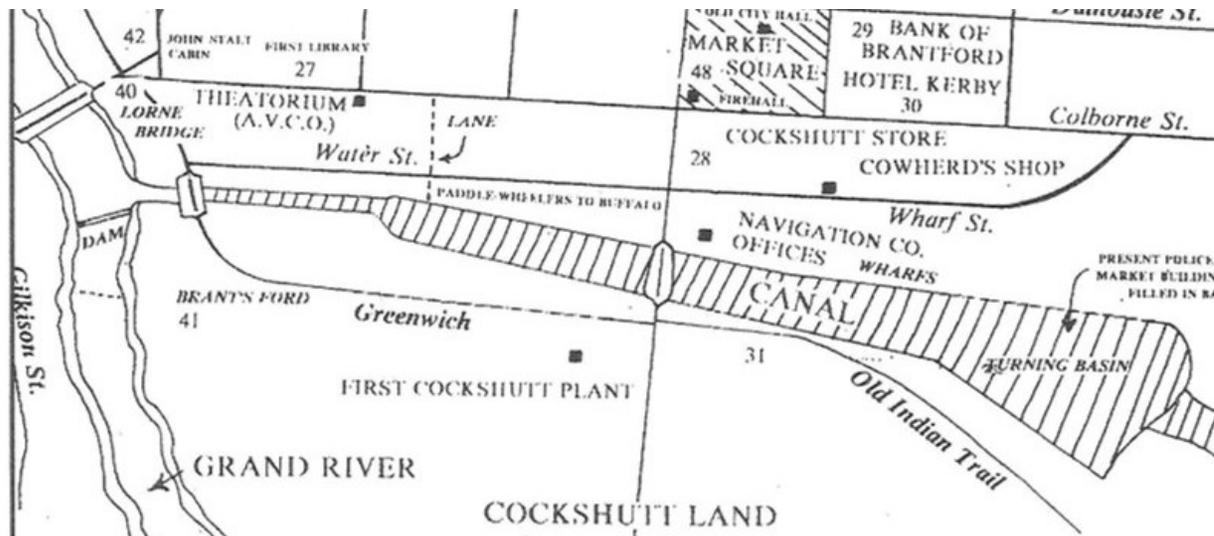
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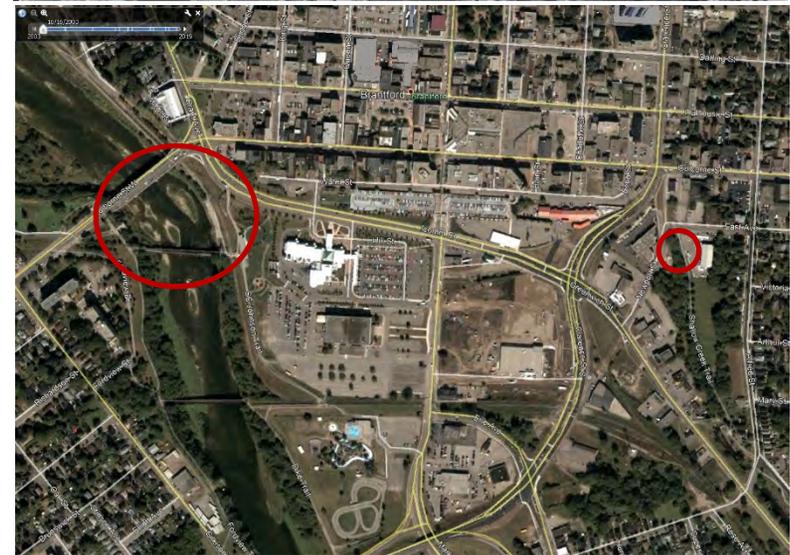


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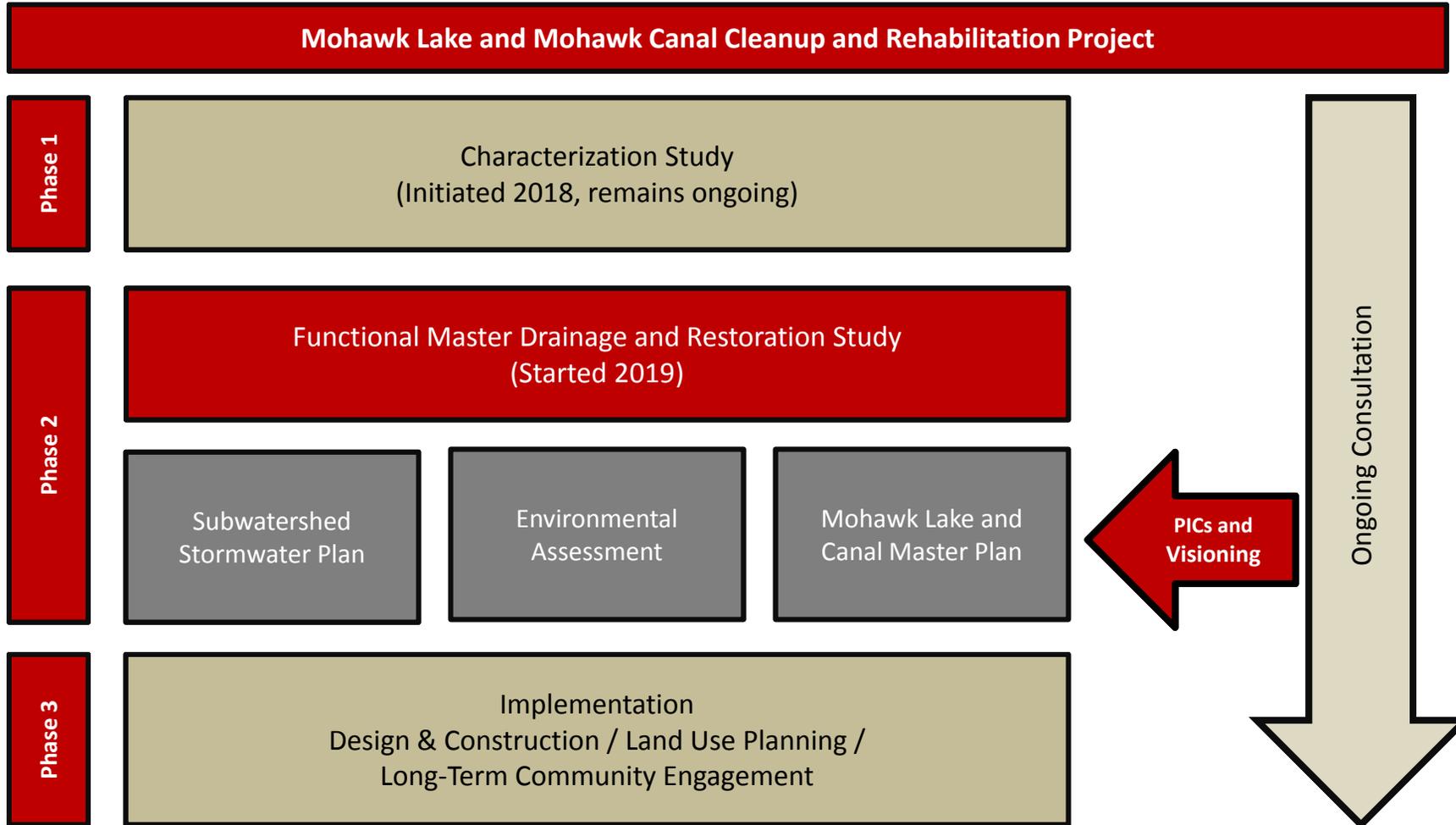
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Background & Study Overview: Process & Phases



Background & Study Overview:

Process & Phases

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Background & Study Overview: Process & Phases

Municipal Class Environmental Assessment, Schedule B



Community Needs & Visioning



Community Needs & Visioning

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Community Needs & Visioning: Long-Term Engagement Plan

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Shoreline Restoration Activities



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 10. Permeable Concrete/Pavement
 11. Stormwater Wet/Irrigation Ponds
 12. Energy Dissipaters
 13. Grassed swales, Bioswales
 14. Stormwater Inlet Treatment
 15. Oil/Grit and Hydrodynamic Separators



Stormwater Management



Remediation Alternatives / Evaluation Criteria: Subwatershed Management

- Source/Conveyance Controls

- | | |
|-----------------------------------|---------------------------------|
| 1. Upflow Media Filtration | 10. Permeable Concrete/Pavement |
| 2. Baffle Boxes | 12. Energy Dissipaters |
| 5. Infiltration/Exfiltration BMPs | 13. Grassed swales, Bioswales |
| 8. Bioreactor Walls and Beds | 14. Stormwater Inlet Treatment |
| 9. Bioretention | |

- End of Pipe Controls

- | | |
|----------------------|--|
| 4. Wetland Treatment | 11. Stormwater Wet/Irrigation Ponds |
| 6. Modular Wetlands | 15. Oil/Grit and Hydrodynamic Separators |

- Other

- | | |
|--------------------------------|-----------------------------------|
| 3. Eliminate Cross-Connections | 7. Offline Alum Polymer Treatment |
|--------------------------------|-----------------------------------|



Remediation Alternatives / Evaluation Criteria: Other

- Subwatershed Management Strategies
 - Non-Structural BMPs
- Alternatives
 1. Public Education/Outreach
 2. Street Sweeping
 3. Recirculation/Re-connection with Grand River



Remediation Alternatives / Evaluation Criteria:

Criteria



Natural Environment

- Water Quality (Chem. & Temp.)
- Water Quality
- Natural Heritage (Habitat, Wetlands and SAR)
- Fluvial
- Geomorphology
- Geology, Hydrogeology, and Groundwater



Economic Environment

- Capital Cost
- Contaminant Management Cost
- Maintenance Cost
- Utilities Impacts
- Property Acquisition



Social/Cultural Environment

- Cultural Heritage and Archaeology
- Future Land Use and Growth Impacts
- Hydraulics - Flooding



Technical Environment

- Stormwater Management
- Hydrology
- Constructability
- Community Resilience and Sustainability



Remediation Alternatives / Evaluation Criteria

Preliminary Preferred Alternatives

- Preliminary Preferred Alternatives provided for discussion purposes – not yet formally analyzed or assessed

A. Mohawk Lake and Canal Remediation

1. Sediment Removal

- Hydraulic Dredging considered preferred approach (minimize disturbance)

2. Shoreline Restoration

- Plantings and re-grading

3. Natural Channel Design

- Fluvial enhancements



Remediation Alternatives / Evaluation Criteria

Preliminary Preferred Alternatives

- Preliminary Preferred Alternatives provided for discussion purposes – not yet formally analyzed or assessed

B. Subwatershed

1. Source/Conveyance Controls
 - Roadway reconstructions (Public)
 - Redevelopment (Private)
2. End-of-Pipe (Retrofits)
 - Smaller more urban drainage systems
 - Public land availability
3. Other
 - Disconnection of Cross-Connections



Remediation Alternatives / Evaluation Criteria

Preliminary Preferred Alternatives

- Preliminary Preferred Alternatives provided for discussion purposes – not yet formally analyzed or assessed

C. Other

1. Street Sweeping
 - Potential to enhance in subwatershed
2. Public Education
 - Avoid discharging pollutants to storm drainage system
3. Reconnection with Grand River considered screened
 - Grades are not physically viable for a gravity pipe
 - Pumping not cost effective given magnitude of flow required
 - Negative impacts associated with lowering Mohawk Lake (reduced footprint, additional sediment removal, etcetera)



Discussion & Action Items





October 18, 2019

Six Nations of the Grand River
2498 Chiefswood Road, P.O. Box 5000
Ohsweken, ON NOA 1MO

Attn: Ava Hill, Chief

**RE: Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project –
Functional Master Drainage and Restoration Study
Municipal Class Environmental Assessment Study**

Dear Chief Ava Hill,

In April 2019, the City shared that it had initiated a Municipal Class Environmental Assessment (Class EA) for the Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project - Functional Master Drainage and Restoration Study (the Study). The City has retained Wood Environment & Infrastructure Solutions (Wood) to undertake this Class EA Study.

We have spoken with Weylin Bomberry and he has advised that he would like to receive updates via email, and that if there are any questions or comments that he will advise. To provide an update of where the City is at in the Study, we have attached a Project Update information package. If there are comments or an interest in meeting, the City would welcome this.

We will contact you by telephone soon to confirm receipt. Please do not hesitate to contact us if you have any questions or concerns.

You will be contacted by one of the project representatives below:

Nahed Ghbn, P.Eng.
Senior Project Manager
City of Brantford
Tel: 519-759-4150 ext. 5262
Email: NGhbn@brantford.ca

Mary Kathryn Kelly, B.Sc.
Indigenous Relations and Partnerships Lead
Wood Environment & Infrastructure Solutions
Tel: (705) 493-9393
Email: mary.k.kelly@woodplc.com



The City of Brantford is committed to ensuring adequate and appropriate engagement and consultation occurs where required and delegated to the City by the Crown. To that end, all inquiries and consultation with the Six Nations of the Grand River, and the various stakeholders who form part of the Six Nations community, concerning this project will be directed through the Consultation and Accommodation Process (CAP) Team established by the Six Nations Elected Council to carry out the process of consultation and accommodation in accordance with the Consultation & Accommodation Policy.

Yours truly,

A handwritten signature in blue ink, appearing to read "Wendy Teufel".

Wendy Teufel
Manager, Design and Construction

cc:

Weylin Bomberry, Six Nations of the Grand River
Russ Loukes, P. Eng., A/ General Manager, Public Works Commission
Inderjit Hans, P. Eng., A/ Director, Engineering Services
Nahed Ghbn, P. Eng., Senior Project Manager, Engineering Services
Ron Scheckenberger P. Eng., Wood
Bob Felker BES, MCIP, RPP, Wood
Mary Kelly B.Sc., Wood

Encl: Project Update Information

wood.

CITY OF
BRANTFORD

Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project

Project Update
October 2019



Outline

1. Introduction
2. Background & Study Overview
3. Community Needs & Visioning
4. Alternative Remediation Alternatives / Evaluation Criteria
5. Discussion & Action Items



Introduction

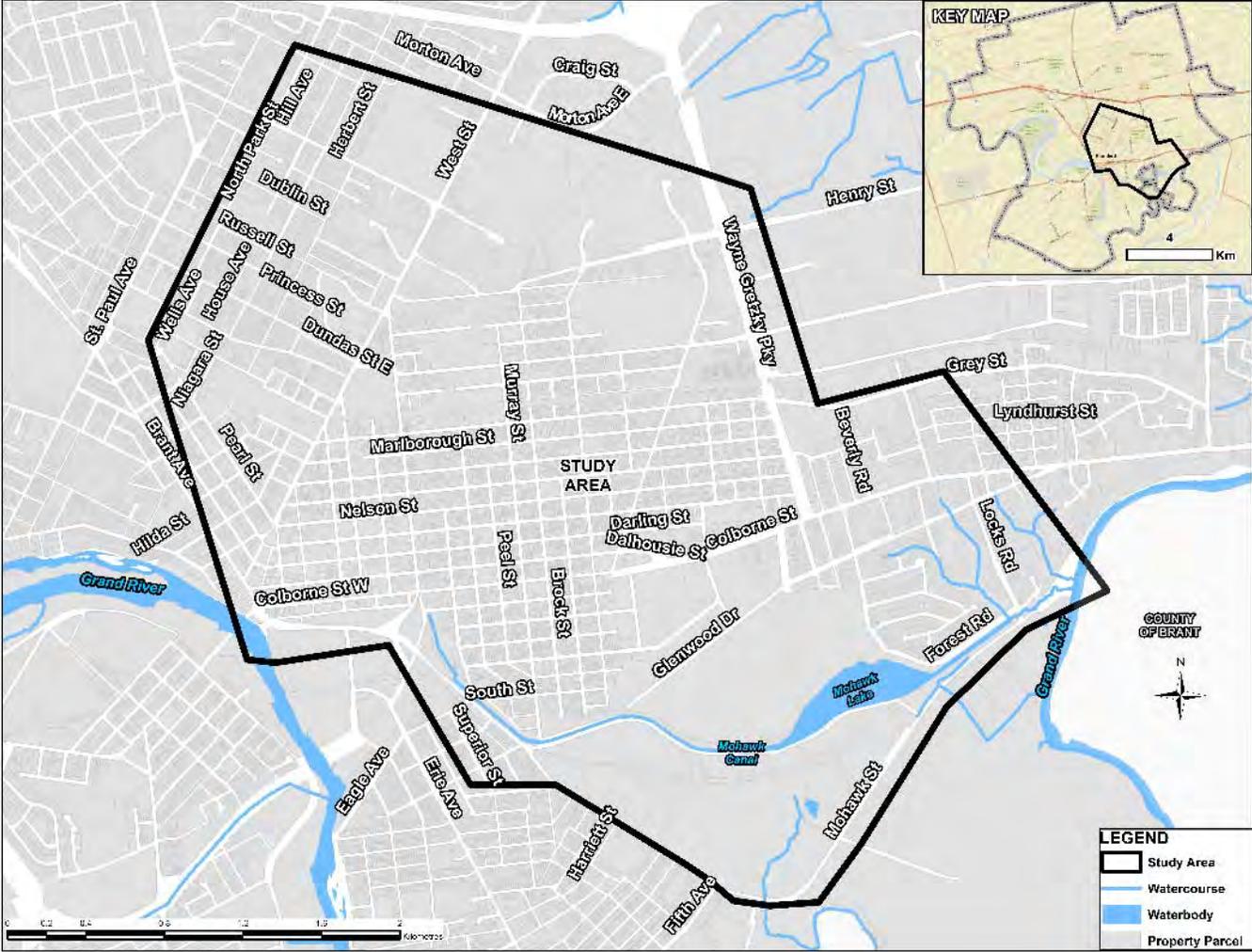


Introduction: Study Purpose

- **The purpose of the Study is to consider ways to improve the environmental quality of Mohawk Lake and Mohawk Canal by providing:**
 - Improved water quality conditions
 - Enhanced recreational opportunities
 - Enhanced fish & wildlife habitat
- **Potential benefits that remediation and restoration can provide to Mohawk Lake and Mohawk Canal may include:**
 - Improved aquatic & wildlife habitat
 - Protection & interpretation of cultural heritage resources
 - Opportunities for water recreation



Introduction: Study Area



Background & Study Overview



Background & Study Overview:

Historical Overview

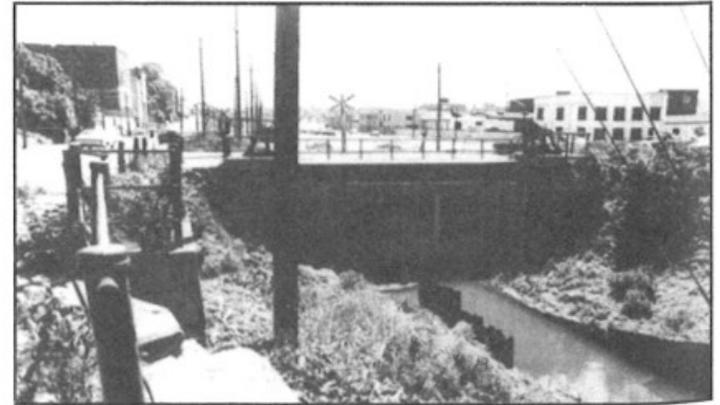
- Mohawk Lake was constructed in the 1800's as part of a canal system to provide access for barges traveling through Brantford and to enable the barges to turn around
- In the early 1900s, the lake and the surrounding parkland provided the community with recreational opportunities for residents and continues to offer valuable natural heritage for the City
- For decades, concern has been expressed about the deteriorating environmental conditions in the lake and canal
- As early as 1950, studies were conducted to improve the flow and to address siltation issues in the lake and canal
- The *Mohawk Lake and Mohawk Canal Cleanup and Rehabilitation Project* was in part initiated in response to these concerns



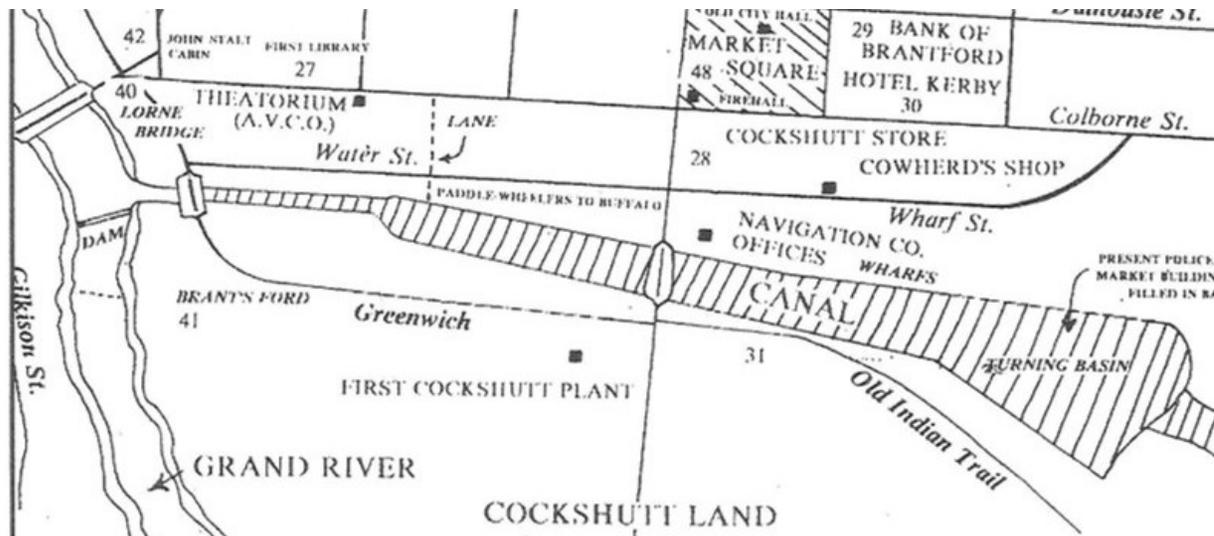
Background & Study Overview:

Historical Connection with the Grand River

- Grand River Navigation Canal
 - Previously connected Grand River at upstream limits to Mohawk Lake
 - Provided turning basin for boats
 - Eventually the canal was abandoned/filled but diversion sluice gate remained with buried pipeline?

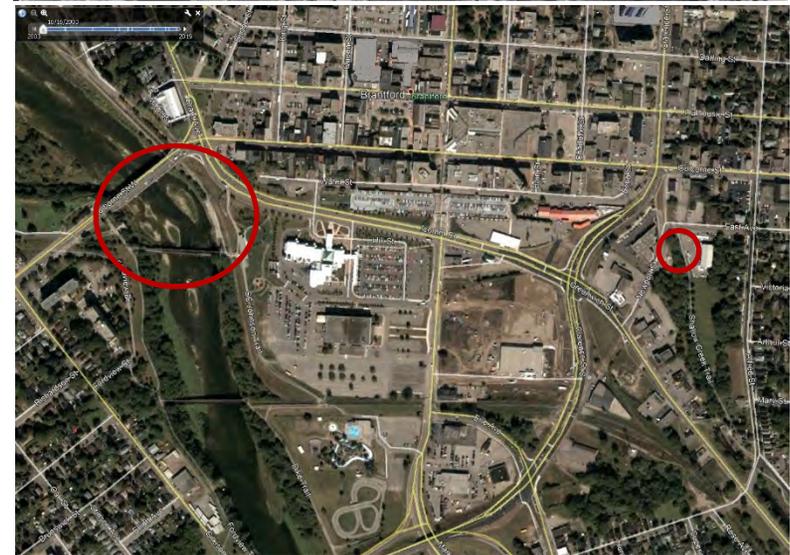


Remnant Of The Past – This is all that remains of the Grand River Navigation Canal which once flowed from the river, north of Greenwich Street, to Mohawk Lake. The sluice gate allows water to run through a buried pipeline to Mohawk Lake, whenever the river rises.



Background & Study Overview: Historical Connection with the Grand River

- Historical Air Photos
 - Historical air photos show the upstream dam structure between Colborne Street and Dike Trail (1955, 1965, 1971, 1976, 1981, 1986)
 - No watercourse evident in any of the photos
 - Status of any pipeline unknown
- Dam is not evident in Google Earth 2003 images
 - Unclear as to exact date of removal or rationale
 - Status of pipeline unknown



Background & Study Overview: Timeline

1800s

Mohawk Lake and Mohawk Canal Constructed

- Part of the canal system to provide access for barges traveling through Brantford and to enable the barges to turn around

Early 1900s

Recreational Area

- The lake and the surrounding parkland provided the community with recreational opportunities

1950s

Early Cleanup Studies

- Conducted to improve the flow and to combat the silting problems in the lake and canal

1980s?

Mohawk Canal Disconnected from Grand River

- Inflow from the Grand River diverting flow to the canal was disconnected with the removal of a dam

2015

Visioning for Mohawk Lake

- Visioning workshops provided the basis for a vision statement and work plans to address the clean-up

2018 (in progress)

Characterization Study

- Study to define the current (baseline) environmental conditions to support future rehabilitation measures

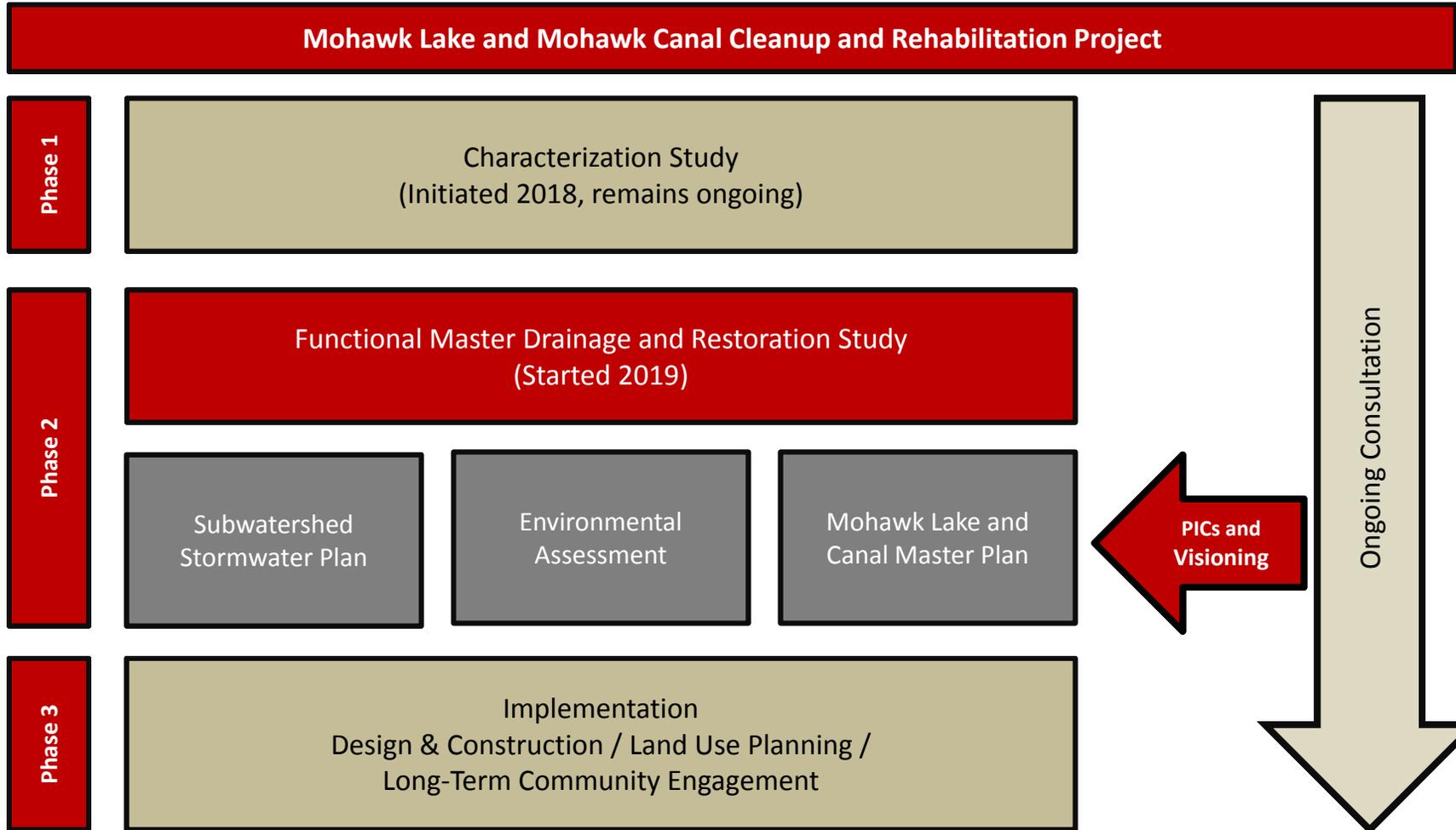
2019 (in progress)

Functional Master Plan Drainage and Restoration Study

- Study to define actions to enhance recreational opportunities, fish & wildlife habitat and improve water quality conditions



Background & Study Overview: Process & Phases



Background & Study Overview:

Process & Phases

Subwatershed Study

- Recommend actions to maintain, restore or enhance the health of the Mohawk Lake subwatershed
- Assess potential alternatives to identify a preferred subwatershed protection and restoration strategy
- Define environmental requirements such as design criteria and targets, priority phasing, mitigation measures, implementation and monitoring plans

Environmental Assessment

- Consider all aspects of the environment: physical, natural, social, cultural and economic, including cost/benefit analyses
- Consult throughout the process
- Define the problem and opportunity
 - Identify, develop and evaluate potential remediation options
- Identify, develop and evaluate potential remediation options
- Document the selection of the Preferred Remedial Option(s)

Mohawk Lake Master Plan

- Develop a long range plan that integrate infrastructure requirements for existing and future land use with environmental assessment planning principles, and:
 - Looks beyond the infrastructure and remediation components
 - Considers land use and park use policy direction
 - Translates community vision into actions and commitments, including long-term engagement

Community Engagement/ Project Management

- Communication and Engagement Plan

- PIC 1
- PIC 2

- Workshops
- Meetings



Background & Study Overview: Process & Phases

Municipal Class Environmental Assessment, Schedule B



Community Needs & Visioning



Community Needs & Visioning

Community Engagement Findings

- Past Engagement:
 - Reviewed information from Mohawk Lake Working Group (2014 & 2015), Mohawk Lake District Plan (information available from 2018) and this project's PIC #1
- Future Engagement:
 - TM#5 will be updated based on the findings from PIC #2 and related engagement (i.e., Mississaugas of the Credit First Nation and Six Nations of the Grand River)
- Community Vision:
 - Vision statement from Mohawk Lake Working Group (2015) and Mohawk Lake District Plan (Ongoing) was reviewed.
 - A revised and updated vision statement will be determined for this project through engagement.
- Potential Recreational / Cultural Uses:
 - Boat; Fish; Canoe; Hike; Walk; Ice Skate; Bike; Picnic
 - Community / Charity events and festivals, such as Dragon Boat Races
 - Education and research opportunities for students, specifically based on the natural and cultural environment / history of Mohawk Canal, Six Nations of the Grand River, and Brantford's industrial heritage
 - Dances and concerts
- Summary of Identified Priorities:
 - Enhance the landscape for fish, wildlife, birds and vegetation
 - Preference not to significantly alter the landscape for human activities
 - Improve recreational opportunities, while maintaining the natural beauty of the area



Community Needs & Visioning: Long-Term Engagement Plan

Table of Contents (Draft)

- **Introduction**
- **Scope and Administration**
 - Roles and Responsibilities (i.e., City, Community Stakeholders / Indigenous Communities)
 - Communication and Engagement activities
 - Adaptive Management
- **Design Phase**
 - Inform (e.g., educate using interactive boards/ plaques throughout park, sculpture etc.)
 - Engage (e.g., advisory committee, workshops, community meetings, surveys, social media)
- **Construction Phase**
 - Pre-Construction (e.g., Notices for Groundbreaking Ceremony and potential Indigenous ceremonies such as Sunrise or Water)
 - During Construction (e.g., website / e-newsletter; community events (BBQ's, plantings etc.); notices; complaints procedure)
 - Construction Completion (e.g., communication, Notices for Ribbon cutting ceremony)
- **Post Construction Phase**
 - Five-Year Review (e.g., Community survey / Next steps)



Remediation Alternatives / Evaluation Criteria



Remediation Alternatives / Evaluation Criteria: Alternatives

Three main management approaches have been identified, and alternatives evaluated at a high level:

1. Mohawk Lake & Mohawk Canal Remediation

- *Sediment Removal from Lake*
- *Shoreline/Edge Treatment of lake perimeter*
- *Natural Channel Design of Canal*

2. Subwatershed Management

- *Source/Conveyance Control (Public/Private)*
- *End-of-pipe (Retrofits)*

3. Other

- *Street sweeping*
- *Public Education*
- *Recirculation/Re-connection with Grand River*



Remediation Alternatives / Evaluation Criteria: Mohawk Lake and Canal Remediation

- In-Lake/In-Canal Restoration
 - Address issues of water and sediment quality within Mohawk Lake and Mohawk Canal
- Alternatives:
 1. Drawdown/Pumpdown and Mechanical Dredging
 2. Hydraulic Dredging
 3. Sediment Management – Physical Capping
 4. Sediment Management – Chemical Capping and Nutrient Inactivation
 5. Revegetation of Riparian Areas and Tributary Streams
 6. Watercourse Restoration (Mohawk Canal)
 7. Living Shorelines, Shoreline/Riparian Restoration, Shoreline Softening (Mohawk Lake)



Dredging Activities – From Land



Shoreline Restoration Activities



Remediation Alternatives / Evaluation Criteria: Subwatershed Management

- Subwatershed Management Strategies
 - Address issues related to stormwater runoff quantity and quality that inflows to Mohawk Lake and Mohawk Canal
- Structural BMP Retrofits
 - Projects involving the installation of physical systems to provide mechanical, biological, or chemical control of the target water quality pollutant
- Long list of Alternatives:
 1. Upflow Media Filtration
 2. Baffle Boxes
 3. Eliminate Cross-Connections
 4. Wetland Treatment
 5. Infiltration/Exfiltration BMPs
 6. Modular Wetlands
 7. Offline Alum Polymer Treatment
 8. Bioreactor Walls and Beds
 9. Bioretention
 10. Permeable Concrete/Pavement
 11. Stormwater Wet/Irrigation Ponds
 12. Energy Dissipaters
 13. Grassed swales, Bioswales
 14. Stormwater Inlet Treatment
 15. Oil/Grit and Hydrodynamic Separators



Stormwater Management



Remediation Alternatives / Evaluation Criteria: Subwatershed Management

- Source/Conveyance Controls

- | | |
|-----------------------------------|---------------------------------|
| 1. Upflow Media Filtration | 10. Permeable Concrete/Pavement |
| 2. Baffle Boxes | 12. Energy Dissipaters |
| 5. Infiltration/Exfiltration BMPs | 13. Grassed swales, Bioswales |
| 8. Bioreactor Walls and Beds | 14. Stormwater Inlet Treatment |
| 9. Bioretention | |

- End of Pipe Controls

- | | |
|----------------------|--|
| 4. Wetland Treatment | 11. Stormwater Wet/Irrigation Ponds |
| 6. Modular Wetlands | 15. Oil/Grit and Hydrodynamic Separators |

- Other

- | | |
|--------------------------------|-----------------------------------|
| 3. Eliminate Cross-Connections | 7. Offline Alum Polymer Treatment |
|--------------------------------|-----------------------------------|



Remediation Alternatives / Evaluation Criteria: Other

- Subwatershed Management Strategies
 - Non-Structural BMPs
- Alternatives
 1. Public Education/Outreach
 2. Street Sweeping
 3. Recirculation/Re-connection with Grand River



Remediation Alternatives / Evaluation Criteria: Criteria



Natural Environment

- Water Quality (Chem. & Temp.)
- Water Quality
- Natural Heritage (Habitat, Wetlands and SAR)
- Fluvial
- Geomorphology
- Geology, Hydrogeology, and Groundwater



Economic Environment

- Capital Cost
- Contaminant Management Cost
- Maintenance Cost
- Utilities Impacts
- Property Acquisition



Social/Cultural Environment

- Cultural Heritage and Archaeology
- Future Land Use and Growth Impacts
- Hydraulics - Flooding



Technical Environment

- Stormwater Management
- Hydrology
- Constructability
- Community Resilience and Sustainability



Remediation Alternatives / Evaluation Criteria

Preliminary Preferred Alternatives

- Preliminary Preferred Alternatives provided for discussion purposes – not yet formally analyzed or assessed

A. Mohawk Lake and Canal Remediation

1. Sediment Removal

- Hydraulic Dredging considered preferred approach (minimize disturbance)

2. Shoreline Restoration

- Plantings and re-grading

3. Natural Channel Design

- Fluvial enhancements



Remediation Alternatives / Evaluation Criteria

Preliminary Preferred Alternatives

- Preliminary Preferred Alternatives provided for discussion purposes – not yet formally analyzed or assessed

B. Subwatershed

1. Source/Conveyance Controls
 - Roadway reconstructions (Public)
 - Redevelopment (Private)
2. End-of-Pipe (Retrofits)
 - Smaller more urban drainage systems
 - Public land availability
3. Other
 - Disconnection of Cross-Connections



Remediation Alternatives / Evaluation Criteria

Preliminary Preferred Alternatives

- Preliminary Preferred Alternatives provided for discussion purposes – not yet formally analyzed or assessed

C. Other

1. Street Sweeping
 - Potential to enhance in subwatershed
2. Public Education
 - Avoid discharging pollutants to storm drainage system
3. Reconnection with Grand River considered screened
 - Grades are not physically viable for a gravity pipe
 - Pumping not cost effective given magnitude of flow required
 - Negative impacts associated with lowering Mohawk Lake (reduced footprint, additional sediment removal, etcetera)



Discussion & Action Items



Shams, Aniq

From: Kelly, Mary K
Sent: Monday, September 9, 2019 11:11 AM
To: weylin.bomberry@sixnations.ca
Cc: Nahed Ghbn (nghbn@brantford.ca); Scheckenberger, Ron; Senior, Matt; Felker, Bob; Shams, Aniq
Subject: RE: City of Brantford - Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study

Good morning Weylin,

Thanks for the chat this morning. As discussed, we will share copies of the poster boards for the October public meeting once finalized with a brief summary of the status and next steps. If you have any questions or comments at that point we can discuss over the phone or set up a face-to-face meeting as necessary.

If you do have questions please do not hesitate to reach out at any time. Cheers, Mary

From: Kelly, Mary K
Sent: Wednesday, July 24, 2019 2:00 PM
To: weylin.bomberry@sixnations.ca
Cc: Nahed Ghbn (nghbn@brantford.ca) <nghbn@brantford.ca>; Scheckenberger, Ron <ron.scheckenberger@woodplc.com>; Senior, Matt <matt.senior@woodplc.com>; Felker, Bob <bob.felker@woodplc.com>; Shams, Aniq <aniqa.shams@woodplc.com>
Subject: City of Brantford - Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study

Good afternoon Weylin,

Thanks so much for the chat today. As discussed, you are interested in being kept informed about the City of Brantford's Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study, and would like to receive copies of reports prepared. You will comment as needed on the shared information and may wish to have a face-to-face meeting about the details at a later date.

If you do have questions please do not hesitate to reach out at any time. Cheers, Mary

Mary Kathryn Kelly, B.Sc.

Indigenous Relations & Partnerships Lead / Senior Human

Environment Consultant

Direct/Mobile: 705-493-9393

mary.k.kelly@woodplc.com

www.woodplc.com

The logo for Wood PLC, featuring the word "wood." in a bold, lowercase, sans-serif font.

APPENDIX C: Stage 1 Archaeological
Assessment

Original Report:

Stage 1 Archaeological Assessment

Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study, formally Part of Lots 1, 2, 5, 19, 25, 26, and Lovejoy Lot, Mohawk Parsonage Lot, School Lot, Grand River Navigation Co. Lot, Eagles Nest Tract, Smith Tract, Lots A and B, Concession 4, and the Town of Brantford, in the Geographic Township of Brantford, County of Brant, Now in the City of Brantford, Ontario

Project # TPB188172

Archaeological Consulting License # P348 (Slim)

P.I.F. # P348-0068-2019 (Stage 1)

{Associated with PIFs: 95GO-10 (Stage 2), P057-607-2010 (Stage 1), P083-122-2011 (Stages 1 & 2), P083-169-2011 (Stage 3), P007-0596-2014 (Stage 1), P089-0062-2014 (Stage 4), P089-0075-2015 (Stages 1 & 2), P809-0082-2015 (Stage 3), P007-096-2016 (Stages 1 & 2), P007-101-2016 (Stage 3), P027-0308-2017 (Stages 1 & 2), P027-314-2017 (Stage 3)}

Prepared for:

City of Brantford

100 Wellington Square Brantford, Ontario N3T 2M2

24-Oct-19



Stage 1 Archaeological Assessment

Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study, formally Part of Lots 1, 2, 5, 19, 25, 26, and Lovejoy Lot, Mohawk Parsonage Lot, School Lot, Grand River Navigation Co. Lot, Eagles Nest Tract, Smith Tract, Lots A and B, Concession 4, and the Town of Brantford, in the Geographic Township of Brantford, County of Brant, Now in the City of Brantford, Ontario

Project # TPB188172

Prepared for:

City of Brantford
100 Wellington Square
Brantford, Ontario N3T 5R7

Prepared by:

Wood Environment & Infrastructure Solutions,
a Division of Wood Canada Limited
201 King Street, 4th Floor
London, Ontario, N6A 1C9
Canada
T: 519-681-2400

24-Oct-19

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Executive Summary

Wood Environment & Infrastructure (“Wood”) was retained by the City of Brantford (the Client) to conduct a Stage 1 archaeological assessment in support of the Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study. This assessment was completed under a Municipal Class Environmental Assessment.

The property is located in the southeast sector of Brantford, draining to the Grand River, in the City of Brantford, Brant County, Ontario (“study area”). The property to be examined encompasses the entire subwatershed area for the Mohawk Lake and Canal (Appendix A: Figure 1). The City of Brantford maintains a Master Plan of Archaeological Resources as part of their Official Plan (City of Brantford 2014; Appendix A: Figure 2). Within the overall subwatershed area, only certain portions of the study area have been determined to exhibit archaeological potential, and the study area for the purposes of this report is limited to the areas within the subwatershed identified by the City of Brantford Planning Department’s Archaeological Potential Mapping as having archaeological potential. In addition to these areas of potential, the Mohawk Lake District Study Area (Appendix A; Figure 3) has been included as part of the study area. The combined study area for this report, as determined by the above, measures 232.45 ha and is shown in Appendix A: Figures 4–6.

The study area was historically described as Part of Lots 1, 2, 5, 19, 25, 26, and Lovejoy Lot, Mohawk Parsonage Lot, School Lot, Grand River Navigation Co. Lot, Eagles Nest Tract, Smith Tract, Lots A and B, Concession 4, and the Town of Brantford, in the Geographic Township of Brantford, County of Brant.

The Stage 1 archaeological assessment was carried out in accordance with the Ontario Ministry of Tourism, Culture and Sport’s (“MTCS”) *Standards and Guidelines for Consultant Archaeologists* (2011), under an Ontario Professional Licence to Conduct Archaeological Fieldwork (P348) held by Barbara Slim, Senior Archaeologist at Wood. The project information was acknowledged by the MTCS on 03 September 2019 with the approval of PIF number P348-0068-2019 (Stage 1). Permission to enter the study area for the purposes of the assessment was granted to Wood by the Client on 29 August 2019.

The Stage 1 property inspection was conducted by Nicole Gavin (R353), with the assistance of Kristy O’Neal (P066), on 09 September 2019. The weather was cool and overcast (21°C) and did not impede the inspection in any way.

The study area is situated within a designated Cultural Heritage Landscape and along Mohawk Lake and Mohawk Canal. Portions of the study area have already been subjected to archaeological assessments which have resulted in the documentation of numerous sites. The Stage 1

background study and property inspection indicated that undisturbed portions of the study area have archaeological potential and warrant Stage 2 property assessment based on: 1) the presence of a natural water source, Mohawk Canal, within the study area; 2) the known presence of 317 registered archaeological sites within a 1-km radius, providing direct evidence that this general area had been exploited by both pre-contact Aboriginal and historic Euro-Canadian peoples; 3) the proximity of historical transportation routes, including the Mohawk Canal, Greenwich Street and Mohawk Street; and 4) the previous identification of archaeological potential in the western portion, eastern portion, as well as in areas south of Mohawk Lake according to the City of Brantford Archaeological Potential Map (City of Brantford 2017; Appendix A: Figure 2).

On the basis of the Stage 1 property inspection and a review of recent land use history, Wood identified that: 1) 35% (81.65 hectares) of the study area consists of structures, railroad tracks, concrete lots, brownfield area, and reclaimed land (Shallow Creek Park) where it is assumed that archaeological potential has been removed; 2) 6% (14.75 hectares) is permanently wet, or now part of Mohawk Lake and Canal, and therefore has low archaeological potential; and 3) 59% (136.06 hectares) has archaeological potential and warrants Stage 2 assessment.

Of the 136.06 hectares that retain archaeological potential, 128.91 hectares are unploughable lands that should be assessed by means of test-pit survey, and 7.15 hectares are ploughable lands that should be assessed by means of pedestrian survey.

In light of the results presented above, the following recommendations are made, subject to the conditions outlined below and the advice on compliance with legislation provided in Section 4.0:

1. Stage 2 archaeological assessment in the form of a test-pit survey should be conducted within landscaped areas/woodlots (128.91 hectares) that retain archaeological potential, as shown in Appendix A: Figure 17. The test pits should be excavated by hand at regular 5-m intervals in a grid-pattern and to a depth of 5 cm into the subsoil. The stratigraphy of soils excavated during test pitting should be examined in order to detect cultural soil horizons and excavated soils are to be screened through 6-mm mesh to facilitate the recovery of artifacts.

The pattern and intensity of test pit placement may be altered due to changes in archaeological potential in different parts of a study area and/or the presence of disturbed soils indicating impacts to, or removal of, archaeological potential. Any such areas of disturbance should be evaluated and photo-documented.

If archaeological resources are found, their exact distribution should be documented and any diagnostic artifacts recovered and inventoried. Upon the discovery of cultural materials, the survey grid should be continued to determine whether there are enough archaeological resources to meet the criteria for making a recommendation to carry out

Stage 3 assessment. In the event that insufficient archaeological resources are recovered, eight additional test pits are to be dug in a 2–2.5-m radius around the isolated positive test pit, followed by the hand excavation of a 1-m by 1-m test unit over the positive test pit. As with the test pits, soil fills within the test unit should be screened for artifacts through 6-mm mesh. These artifacts are to be recovered and recorded by provenience.

2. Stage 2 archaeological assessment in the form of a pedestrian survey at 5-m intervals should be conducted on open agricultural lands that retain archaeological potential (7.15 ha) as shown in Appendix A: Figure 17). These fields must first be freshly ploughed by means of mouldboard ploughing (and may require disk harrowing in heavy clay) to provide for at least 80% ground surface visibility. Prior to the pedestrian survey, the newly ploughed fields should also be allowed to weather through one heavy rainfall or several light rainfalls.

If archaeological resources are encountered, the 5-m transects should be decreased to 1-m over a minimum radius of 20 m around the archaeological find(s) until the full extent of the scatter has been identified or the find is determined to be isolated. In the case of a discrete scatter of artifacts, all formal artifact types and diagnostic categories are to be collected, but enough undiagnostic artifacts should be left *in-situ* to allow them to be relocated in the event that further assessment is required. The exact location of archaeological resources should be documented using one or more of a combination of: the Global Positioning System, topographic survey or other precision measurements. As with test-pit finds, surface finds should be recovered and recorded by provenience.

3. Stage 4 mitigation is warranted for Site AgHb-371, located within the study area. The following was recommended as the result of ARA's Stage 3 investigations:

The Stage 3 archaeological assessment of the proposed corridor at Findspot 1 yielded data which was clearly sufficient to trigger further Stage 4 work. Given that the existing sewer is in need of replacement, site impacts may be unavoidable. A Ministry of Culture-sanctioned strategy involving a mixture of both targeted Stage 4 excavations, within the corridor, and site avoidance and protection, for the remainder of Findspot 1, is strongly recommended. In the future, should any portion of these lands be threatened by construction activities a full Stage 4 excavation should be undertaken. (ARA 2014: 17).

4. Stage 4 mitigation is also warranted for Site AgHa-181, located within the study area. As a result of ARA's Stage 3 investigations, Findspots 1a, 1b, 1c, 1d, 1f, 1g, 2, 3, 4a, 5, 7, 9, 11 and 15 were recommended for Stage 4 mitigation of development impacts as follows: Block excavation, undisturbed midden documentation and mechanical topsoil removal for

Findspots 1a, 1b, 1c, 1d, 1f and 1g; Block excavation and mechanical topsoil removal for Findspot 2; Feature excavation and mechanical topsoil removal for Findspots 3, 4a, 5, 11 and 15; and Block/feature excavation and mechanical topsoil removal for Findspot 9.

5. No further assessment is required at Site AgHb-217, located within the study area (MTCS 2019).
6. The remainder of the study area does not require further archaeological assessment as these lands have either been fully assessed or exhibit low archaeological potential due to permanently wet conditions or the prior removal of archaeological potential.

The above recommendations are subject to Ministry of Tourism, Culture and Sport approval, and it is an offence to alter any of the Study Area without Ministry of Tourism, Culture, and Sport concurrence.

No grading or other activities that may result in the destruction or disturbance of the Study Area is permitted until notice of Ministry of Tourism, Culture, and Sport approval has been received.

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Project Personnel

Project Director:	Barbara Slim, M.A. (P348)
Project Manager:	Barbara Slim, M.A. (P348)
Field Director:	Nicole Gavin, M.A. (R353)
Field Archaeologist:	Kristy O'Neal, M.A. (P066)
Report Preparation:	Nicole Gavin, M.A. Kristy O'Neal, M.A.
Graphics:	Steve LaBute, CAD
Report Reviewer:	Shaun Austin, Ph.D. (P141)

1.0 Project Context

1.1 Development Context

Wood Environment & Infrastructure (“Wood”) was retained by the City of Brantford (the Client) to conduct a Stage 1 archaeological assessment in support of the Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study. This assessment was completed under a Municipal Class Environmental Assessment.

The property is located in the southeast sector of Brantford, draining to the Grand River, in the City of Brantford, Brant County, Ontario (“study area”). The property to be examined encompasses the entire subwatershed area for the Mohawk Lake and Canal (Appendix A: Figure 1). The City of Brantford maintains a Master Plan of Archaeological Resources as part of their Official Plan (City of Brantford 2014; Appendix A: Figure 2). Within the overall subwatershed area, only certain portions of the study area have been determined to exhibit archaeological potential, and the study area for the purposes of this report is limited to the areas within the subwatershed identified by the City of Brantford Planning Department’s Archaeological Potential Mapping as having archaeological potential. In addition to these areas of potential, the Mohawk Lake District Study Area (Appendix A; Figure 3) has been included as part of the study area. The combined study area for this report, as determined by the above, measures 232.45 ha and is shown in Appendix A: Figures 4–6.

The study area was historically described as Part of Lots 1, 2, 5, 19, 25, 26, and Lovejoy Lot, Mohawk Parsonage Lot, School Lot, Grand River Navigation Co. Lot, Eagles Nest Tract, Smith Tract, Lots A and B, Concession 4, and the Town of Brantford, in the Geographic Township of Brantford, County of Brant.

The Stage 1 archaeological assessment was carried out in accordance with the Ontario Ministry of Tourism, Culture and Sport’s (“MTCS”) *Standards and Guidelines for Consultant Archaeologists* (2011), under an Ontario Professional Licence to Conduct Archaeological Fieldwork (P348) held by Barbara Slim, Senior Archaeologist at Wood. The project information was acknowledged by the MTCS on 03 September 2019 with the approval of PIF number P348-0068-2019 (Stage 1). Permission to enter the study area for the purposes of the assessment was granted to Wood by the Client on 29 August 2019.

The Stage 1 property inspection was conducted by Nicole Gavin (R353), with the assistance of Kristy O’Neal (P066), on 09 September 2019. The weather was cool and overcast (21°C) and did not impede the inspection in any way.

This report presents the results of the Stage 1 background study and makes pertinent recommendations.

1.2 Scope of Work

This Stage 1 archaeological assessment was carried out in accordance with the Terms of Reference provided in Wood's work agreement dated 28 August 2019.

A Stage 1 archaeological assessment is a systematic qualitative process executed in order to assess the archaeological potential of a property based on its historical use and its potential for early Euro-Canadian (early settler) and pre-contact Aboriginal occupation. The objectives of a Stage 1 background study are: 1) to provide information about the property's geography, history, previous archaeological fieldwork and current land condition; 2) to evaluate in detail the property's archaeological potential which will support recommendations for Stage 2 property assessment for all or parts of the property if warranted; and, 3) to recommend appropriate strategies for Stage 2 property assessment if warranted.

The Stage 1 background study was conducted in accordance with the *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011), and the Ontario Heritage Act, R.S.O. 1990, c.0.18.

The scope of work for the Stage 1 background study consisted of the following tasks:

- Contacting the MTCS to determine if recorded archaeological sites exist in the vicinity (typically a 1-km radius) of the property, through a search of the Ontario Archaeological Sites Database maintained by that Ministry;
- Contacting the MTCS to determine if there are any known reports of previous archaeological field work within a radius of 50 m around the study area;
- A desktop review of the study area's physical setting to determine its potential for both historic and pre-contact human occupation, including its topography, hydrology, soils, and proximity to important resources and historical transportation routes and settlements;
- A review of the potential for historic period occupation as documented in historical atlases and other archival sources;
- A visual inspection of the study area to gather first-hand and current evidence of the property's physical setting, and to aid in delineating areas where archaeological potential may have been impacted or removed by recent land-use practices.
- A review of any available geotechnical or environmental boreholes to understand the stratigraphy of the study area;
- A review of historical land-use practices that may have impacted the preservation of potential archaeological resources;
- Mapping, photography and production of other relevant graphics; and,

- Preparing a Stage 1 report of findings with recommendations regarding the need for further archaeological assessment.



2.0 Stage 1 Background Study

As part of the Stage 1 background research, Wood searched MTCS’s PastPort system to determine if archaeological sites have been registered within 1 km of the subject property (Section 2.1.1), and if previous archaeological assessments have been carried out within a 50-m radius (Section 2.1.2). Secondly, the principal determinants of archaeological potential—proximity to water, topography, drainage, soils, and proximity to important resources and historical transportation routes and settlements—were examined to evaluate the property’s overall archaeological potential (Sections 2.1, 2.1.3, 2.2, and 2.2.1). Thirdly, the specific potential for historic period archaeological resources was assessed through an examination of available historical maps and other archival sources (Section 2.2).

2.1 Archaeological Context

2.1.1 Registered Archaeological Sites

Wood conducted the requisite Stage 1 background research. First, Wood searched MTCS’s PastPort system to ascertain if previously registered archaeological sites have been identified in close proximity to the study area.

In Ontario, information concerning archaeology sites is stored in the Ontario Archaeological Sites Database (OASD) maintained by the MTCS. This database contains archaeological registered sites within the Borden system. Under the Borden system, Canada has been divided into grid blocks based on longitude and latitude. A Borden block is approximately 13 km east to west, and approximately 18.5 km north to south. Each Borden block is referred to by a four-letter designation and sites located within the block are numbered sequentially as they are found. The subject property is located within the *AgHb*, *AhHb*, and *AgHa* Borden Blocks. On the basis of a search of the OASD through PastPort on 02 September 2019, there are 317 registered archaeological sites within a 1-km radius. Table 1 provides a summary of these sites.

Borden Number	Site Name	Cultural Affiliation	Site Type	Development Review Status
AgHa-181	Laurier YMCA	Aboriginal, Woodland	Other, Hillside Midden, Other, South Colborne Occupation	Further CHVI
AgHb-1	Porteous	Aboriginal, Middle Woodland	Village	
AgHb-10	Miller	Aboriginal, Late Woodland, Neutral		
AgHb-11	Hunt	Aboriginal, Paleo-Indian, Early Archaic, Late Woodland		
AgHb-12	Hatchburn	Aboriginal, Paleo-Indian		



Table 1: Registered Archaeological Sites within a 1-km Radius				
Borden Number	Site Name	Cultural Affiliation	Site Type	Development Review Status
AgHb-13	Popple	Aboriginal, Paleo-Indian		
AgHb-131	Rogers Ossuary	Aboriginal, Late Woodland	Ossuary	
AgHb-136	Hebrew	Aboriginal	Unknown, Hunting	
AgHb-137	Colborne St	Aboriginal, Middle Woodland	Other, Camp/Campsite, Cache	
AgHb-138	Linear A	Aboriginal	Unknown	
AgHb-14	Oxbow Flats 1	Aboriginal, Middle Woodland		
AgHb-146		Aboriginal, Early Woodland	Unknown	
AgHb-147		Aboriginal, Late Archaic	Unknown	
AgHb-148		Other	Other, Unknown	
AgHb-149		Other	Other, Unknown	
AgHb-15	Oxbow Flats 2	Aboriginal, Woodland		
AgHb-150		Euro-Canadian	Unknown	
AgHb-151				
AgHb-152		Aboriginal, Middle Archaic	Unknown	
AgHb-153		Aboriginal, Middle Archaic	Scatter	
AgHb-154				
AgHb-155		Aboriginal, Late Woodland	Scatter	
AgHb-156		Other	Other, Unknown	
AgHb-157		Aboriginal, Late Paleo-Indian, Early Archaic	Unknown	
AgHb-158	Location 2	Aboriginal, Middle Archaic, and Euro-Canadian	Other, Camp/Campsite, Homestead	
AgHb-159	Location 1	Other, Onondaga	Other, Unknown	
AgHb-16	Mission	Aboriginal, Woodland		
AgHb-160		Aboriginal, Late Paleo-Indian, Archaic, Early Woodland	Unknown	
AgHb-161		Aboriginal, Late Paleo-Indian	Scatter	
AgHb-162		Euro-Canadian	farmstead, Homestead	
AgHb-163		Aboriginal Middle to Late Archaic	Other, Camp/Campsite	
AgHb-164		Aboriginal, Middle Woodland	Findspot	
AgHb-165	Location 3	Aboriginal, Late Woodland, Iroquoian	Other, Camp/Campsite	



Table 1: Registered Archaeological Sites within a 1-km Radius				
Borden Number	Site Name	Cultural Affiliation	Site Type	Development Review Status
AgHb-166	Location 4	Aboriginal, Early Woodland	Other, Camp/Campsite	
AgHb-168				
AgHb-169	Location 7	Aboriginal, Early Archaic, and Euro-Canadian	Unknown, Scatter	
AgHb-18	Cooper	Aboriginal, Late Woodland, and Euro-Canadian, Iroquoian	Other, Camp/Campsite, Village	
AgHb-183		Aboriginal	Scatter	
AgHb-184		Aboriginal	Scatter	
AgHb-185		Aboriginal	Scatter	
AgHb-189		Aboriginal	Scatter	
AgHb-19	Cooper Cemetery	Aboriginal, Neutral	Cemetery	
AgHb-2	Mohawk Chapel	Aboriginal, Middle Woodland, Iroquoian	Church/Chapel, Village	
AgHb-215	Waste Not	Aboriginal, Late Woodland, Iroquoian	midden, Village	
AgHb-216	Findspot 1	Aboriginal, Late Archaic	Other, Camp/Campsite	
AgHb-217	Findspot 2	Euro-Canadian	Findspot	
AgHb-218	Findspot 3	Aboriginal, Archaic, and Euro-Canadian	Findspot, Homestead	
AgHb-219	Findspot 4	Aboriginal, Late Archaic, and Euro-Canadian	Other, Camp/Campsite, Unknown	
AgHb-220	Findspot 5	Euro-Canadian	platform	
AgHb-222		Aboriginal	Other, Camp/Campsite	
AgHb-223		Aboriginal, Early Woodland	Other, Camp/Campsite	
AgHb-224		Aboriginal	Other, Camp/Campsite	
AgHb-225		Aboriginal, Late Archaic	Other, Camp/Campsite	
AgHb-226		Aboriginal, Early Woodland	Other, Camp/Campsite	
AgHb-227		Aboriginal, Late Archaic	Scatter	
AgHb-228	Crosby	Aboriginal, Late Paleo-Indian	Scatter	
AgHb-229	Stills	Aboriginal, Early Archaic	Scatter	
AgHb-230	Nash	Aboriginal, Late Paleo-Indian	Scatter	
AgHb-231	Brantford Northeast Industrial Park 4	Aboriginal, Euro-Canadian	Homestead, Scatter	
AgHb-232	Young	Aboriginal	Scatter	
AgHb-233	(Joni) Mitchell	Aboriginal, Late Paleo-Indian, Late Archaic	Scatter	



Table 1: Registered Archaeological Sites within a 1-km Radius				
Borden Number	Site Name	Cultural Affiliation	Site Type	Development Review Status
AgHb-234	(Joe) Cocker	Aboriginal, Late Archaic	Scatter	
AgHb-235	Morrison	Aboriginal, Late Archaic	Scatter	
AgHb-236	Clapton	Aboriginal	Scatter	
AgHb-237	Brantford Northeast Industrial Park 10			Further CHVI
AgHb-245		Aboriginal, Late Archaic	Scatter	
AgHb-246		Aboriginal	Other, Camp/Campsite	
AgHb-247		Aboriginal, Middle Archaic	Other, Camp/Campsite	
AgHb-248		Aboriginal	Camp / Campsite, Scatter	No Further CHVI
AgHb-249		Aboriginal	Unknown, Scatter	No Further CHVI
AgHb-250		Euro-Canadian	Homestead	No Further CHVI
AgHb-263				
AgHb-264		Aboriginal, Late Archaic, Early Woodland	Findspot	
AgHb-265				
AgHb-266	Ruijs & Kirchberger	Aboriginal, Late Archaic, Early Woodland		
AgHb-267	Kennedy	Euro-Canadian	Homestead	No Further CHVI
AgHb-268		Euro-Canadian	midden	
AgHb-269	Cayuga Heights	Euro-Canadian		
AgHb-270		Aboriginal	Scatter	
AgHb-271		Aboriginal	Scatter	
AgHb-272				
AgHb-273		Aboriginal	Scatter	
AgHb-274		Euro-Canadian	Homestead	
AgHb-276	D'Aubigny Park	Aboriginal	Other, Camp/Campsite	
AgHb-278	P1	Aboriginal, Early to Middle Archaic, Early Woodland		
AgHb-279		Aboriginal, Middle Archaic	Findspot	
AgHb-280	P4	Aboriginal, Early to Middle Archaic		
AgHb-282		Aboriginal, Euro-Canadian		
AgHb-283		Aboriginal, Euro-Canadian	House	



Table 1: Registered Archaeological Sites within a 1-km Radius				
Borden Number	Site Name	Cultural Affiliation	Site Type	Development Review Status
AgHb-284		Aboriginal, Middle Woodland	Findspot	
AgHb-285		Aboriginal	Other, Camp/Campsite, Scatter	
AgHb-286		Aboriginal, Late Archaic	Other, Camp/Campsite, Scatter	
AgHb-287		Euro-Canadian	Homestead	
AgHb-288		Aboriginal, Middle Woodland	Other, Camp/Campsite, Scatter	
AgHb-289		Aboriginal, Euro-Canadian	Other, Camp/Campsite	
AgHb-290				
AgHb-297				
AgHb-3	Cameron	Aboriginal, Archaic		
AgHb-30	Babineau	Aboriginal, Late Woodland	Village	
AgHb-31	Lynn River site			
AgHb-32	Black			
AgHb-33	Blossom	Aboriginal, Early Paleo-Indian, Late Paleo-Indian, Archaic, Middle to Late Woodland	Village	
AgHb-34	Bow Park	Aboriginal, Archaic, Middle Woodland	Village	
AgHb-341	Papple A	Aboriginal, Late Woodland	Unknown	
AgHb-344	Story	Euro-Canadian	House	No Further CHVI
AgHb-350		Aboriginal, Middle Archaic	Findspot	
AgHb-351		Aboriginal, Late Archaic	Findspot	
AgHb-352		Aboriginal, Late Archaic	Findspot	
AgHb-353		Aboriginal	Findspot	
AgHb-354		Aboriginal, Late Archaic	Other, Camp/Campsite	
AgHb-355		Aboriginal	Findspot	
AgHb-36	Coleman			
AgHb-360				
AgHb-369		Aboriginal, Late Archaic	Unknown	No Further CHVI
AgHb-37	Hunt Bush			
AgHb-371		Aboriginal, Middle Woodland	Unknown	
AgHb-38	Marshall			



Table 1: Registered Archaeological Sites within a 1-km Radius				
Borden Number	Site Name	Cultural Affiliation	Site Type	Development Review Status
AgHb-39	Massey	Aboriginal, Archaic	Other, Camp/Campsite, Hunting	
AgHb-396	Stone Wiggins	Aboriginal, Late Archaic	Other, equipment retooling/refurbishment activities likely occurred at this locale	Further CHVI
AgHb-397	Howard Hunter			
AgHb-398				
AgHb-399	A.H. Dymond	Euro-Canadian	Homestead	
AgHb-40	Mohawk College			
AgHb-400	Bursar's House	Euro-Canadian	Midden	
Aghb-401	Race	Euro-Canadian	Homestead	
AgHb-402	Gatekeeper's House	Euro-Canadian	Midden	
AgHb-403	Gardiner	Euro-Canadian		
AgHb-404	Armstrong	Euro-Canadian	House	
Aghb-405	Valentine	Euro-Canadian	House	
AgHb-406	James	Euro-Canadian	House	
AgHb-407	W. Ross Macdonald	Euro-Canadian	House	
AgHb-408	Willow Barn	Euro-Canadian	Outbuilding, Workshop	
AgHb-409	School Dump	Other, not a bone fide site but artifacts in landscape fill	Other, not a bonafide site but artifacts in landscape fill	No Further CHVI
AgHb-410		Aboriginal, Euro-Canadian	Scatter	Further CHVI
AgHb-411		Aboriginal, Late Archaic, Late Woodland	Unknown, Scatter	Further CHVI
AgHb-412		Aboriginal, Late Archaic, Late Woodland	Unknown, Scatter	Further CHVI
AgHb-413	Tutela Heights	Euro-Canadian, Iroquoian, Late Woodland	Unknown	
AgHb-414	H4	Euro-Canadian	Homestead	
AgHb-415	Blacker's Brickworks			
AgHb-416	Blacker I	Euro-Canadian	Homestead	
AgHb-417	Blacker II	Euro-Canadian	Farmstead	
AgHb-418	P1			
AgHb-419		Aboriginal	Findspot	
AgHb-420		Aboriginal	Findspot	
AgHb-421		Aboriginal, Middle Archaic	Scatter	
AgHb-422		Aboriginal	Findspot	



Table 1: Registered Archaeological Sites within a 1-km Radius				
Borden Number	Site Name	Cultural Affiliation	Site Type	Development Review Status
AgHb-423	P9	Aboriginal, Middle to Late Archaic, Early Woodland, Late Woodland	Camp/Campsite, Scatter	No Further CHVI
AgHb-427		Aboriginal, Early to Middle Archaic, Woodland	Camp/Campsite, Scatter	No Further CHVI
AgHb-429		Aboriginal	Unknown	Further CHVI
AgHb-43	Orchard			
AgHb-432		Aboriginal, Middle Archaic	Scatter	
AgHb-433		Aboriginal	Scatter	No Further CHVI
AgHb-434		Aboriginal, Late Paleo-Indian, Middle to Late Archaic, Middle Woodland	Scatter	
AgHb-435		Aboriginal	Unknown	Further CHVI
AgHb-436		Aboriginal, Late Archaic	Unknown	Further CHVI
AgHb-437		Aboriginal	Unknown	Further CHVI
AgHb-438		Aboriginal	Findspot	
AgHb-439		Aboriginal	Findspot	
AgHb-44	Papple	Aboriginal, Archaic, Woodland	Other, Camp/Campsite	
AgHb-440		Aboriginal, Middle Archaic	Scatter	
AgHb-441		Aboriginal	Scatter	
AgHb-442	P65	Aboriginal	Scatter	
AgHb-443	P67	Aboriginal	Scatter	
AgHb-444		Aboriginal	Unknown	Further CHVI
AgHb-445		Aboriginal	Scatter	
AgHb-446				
AgHb-447		Aboriginal	Scatter	
AgHb-448		Aboriginal	Scatter	
AgHb-449		Aboriginal, Late Woodland	Scatter	
AgHb-450		Aboriginal	Scatter	
AgHb-451		Aboriginal	Scatter	
AgHb-452		Aboriginal	Scatter	
AgHb-453		Aboriginal	Scatter	
AgHb-454		Aboriginal, Early Woodland	Findspot	
AgHb-455		Aboriginal	Scatter	No Further CHVI



Table 1: Registered Archaeological Sites within a 1-km Radius				
Borden Number	Site Name	Cultural Affiliation	Site Type	Development Review Status
AgHb-456		Aboriginal	Scatter	
AgHb-457	P104			
AgHb-458				
AgHb-459	P108	Aboriginal, Late Archaic	Scatter	No Further CHVI
AgHb-460	P116			
AgHb-461		Aboriginal, Early to Late Archaic, Early Woodland	Scatter	No Further CHVI
AgHb-462		Aboriginal, Early Woodland	Scatter	
AgHb-463		Aboriginal	Scatter	
AgHb-464		Aboriginal	Findspot	
AgHb-465		Aboriginal, Late Archaic	Scatter	
AgHb-466		Aboriginal, Middle Archaic, Late Archaic, Late Woodland	Camp/Campsite	Further CHVI
AgHb-467	P132	Aboriginal, Middle Woodland	Scatter	
AgHb-468		Aboriginal	Findspot	
AgHb-469		Aboriginal	Findspot	
AgHb-47	Twin Maple	Aboriginal, Middle Archaic	Other, Camp/Campsite	
AgHb-470		Aboriginal		
AgHb-471		Aboriginal, Early Archaic	Scatter	
AgHb-472		Aboriginal, Late Archaic		
AgHb-473				
AgHb-474		Aboriginal	Scatter	
AgHb-475		Aboriginal	Scatter	
AgHb-476		Aboriginal	Scatter	Further CHVI
AgHb-477		Aboriginal	Findspot	
AgHb-478		Aboriginal	Scatter	
AgHb-479		Aboriginal	Scatter	
AgHb-480		Aboriginal	Scatter	
AgHb-481		Aboriginal	Scatter	
AgHb-482				
AgHb-483		Aboriginal, Middle Archaic		
AgHb-484		Aboriginal	Scatter	
AgHb-485		Aboriginal	Findspot	
AgHb-486		Aboriginal, Early Woodland	Findspot	
AgHb-488				



Table 1: Registered Archaeological Sites within a 1-km Radius				
Borden Number	Site Name	Cultural Affiliation	Site Type	Development Review Status
AgHb-489		Aboriginal, Middle Archaic, and Euro-Canadian	Unknown, Scatter	No Further CHVI
AgHb-490		Aboriginal	Scatter	
AgHb-491		Aboriginal, Early Woodland	Scatter	
AgHb-492		Aboriginal, Late Archaic	Scatter	
AgHb-493		Aboriginal	Scatter	
AgHb-494		Aboriginal	Scatter	
AgHb-495		Aboriginal	Scatter	
AgHb-496		Aboriginal	Scatter	
AgHb-497		Aboriginal, Middle Woodland	Scatter	
AgHb-498		Aboriginal	Scatter	
AgHb-499		Aboriginal, Late Archaic, Early Woodland	Scatter	
AgHb-5	Glass 1			
AgHb-50	Stratford Flats	Aboriginal, Middle Woodland	Other, Camp/Campsite	
AgHb-500		Aboriginal, Late Archaic	Findspot	
AgHb-501		Aboriginal, Late Woodland	Findspot	
AgHb-502		Aboriginal, Late Archaic	Findspot	
AgHb-503	D'Aubigny Creek	Aboriginal, Late Archaic, Early Woodland		
AgHb-504				
AgHb-505				
AgHb-506				
AgHb-508				
AgHb-530		Aboriginal, Late Woodland	Scatter	No Further CHVI
AgHb-531		Aboriginal, Middle Archaic	Findspot	No Further CHVI
AgHb-532		Aboriginal, Middle Archaic	Findspot	No Further CHVI
AgHb-533		Aboriginal, Paleo-Indian, Middle Archaic, Late Woodland	Camp/Campsite, Scatter	No Further CHVI
AgHb-534		Aboriginal	Unknown	No Further CHVI
AgHb-535		Aboriginal	Findspot	No Further CHVI
AgHb-536		Aboriginal, Late Paleo-Indian	Scatter	No Further CHVI



Table 1: Registered Archaeological Sites within a 1-km Radius				
Borden Number	Site Name	Cultural Affiliation	Site Type	Development Review Status
AgHb-537		Aboriginal	Scatter	No Further CHVI
AgHb-538		Other, Historic and precontact	Other, Secondary deposit	No Further CHVI
AgHb-539		Aboriginal	Scatter	No Further CHVI
AgHb-557		Aboriginal	Scatter	No Further CHVI
AgHb-558		Aboriginal, Middle Archaic	Findspot	No Further CHVI
AgHb-559		Aboriginal	Scatter	No Further CHVI
AgHb-560		Aboriginal	Scatter	No Further CHVI
AgHb-561		Aboriginal	Scatter	No Further CHVI
AgHb-6	Tutela	Aboriginal, Iroquoian, Late and Middle Woodland		
AgHb-608	Mohawk Institute	Aboriginal, Middle Archaic, Woodland	Other, Residential School, Scatter	Further CHVI
AgHb-614	Eagle's Nest 1	Aboriginal	Other, possible chipping station, Scatter	No Further CHVI
AgHb-670	H1	Euro-Canadian	Homestead	No Further CHVI
AgHb-671	H2	Euro-Canadian	Homestead	No Further CHVI
AgHb-672	H3	Euro-Canadian, Iroquoian	Cabin, Homestead	No Further CHVI
AgHb-673	P1	Aboriginal	Scatter	No Further CHVI
AgHb-674	P4	Aboriginal	Scatter	No Further CHVI
AgHb-676	Wellington Block East	Euro-Canadian	House, Midden, Outbuilding, Residential	No Further CHVI
AgHb-681	Ruggles	Euro-Canadian	Unknown	Further CHVI
AgHb-7	Glass 2	Aboriginal, Paleo-Indian, Archaic		
AgHb-8	Onondaga B	Aboriginal, Archaic		
AhHb-118	Hatcher	Euro-Canadian	Homestead	
AhHb-119	Hopewell A			
AhHb-120	Hopewell B			
AhHb-121	Hopewell C			
AhHb-122	Hopewell D			



Table 1: Registered Archaeological Sites within a 1-km Radius				
Borden Number	Site Name	Cultural Affiliation	Site Type	Development Review Status
AhHb-123	Hopewell E			
AhHb-124	Hopewell F	Aboriginal, Early Archaic	Scatter	
AhHb-125	Hopewell G			
AhHb-126	Hopewell H			
AhHb-127	Hopewell I	Aboriginal, Early Archaic, Woodland	Scatter	
AhHb-128	Hopewell J	Aboriginal, Middle Archaic	Scatter	
AhHb-129	Hopewell K	Aboriginal, Euro-Canadian	Homestead, Scatter	
AhHb-13	Railroad	Aboriginal	Scatter	
AhHb-130	Hopewell L	Aboriginal, Late Woodland	Scatter	
AhHb-132	Hopewell N	Aboriginal, Late Woodland	Scatter	
AhHb-133	Hopewell O			
AhHb-134	Hopewell P			
AhHb-135	Hopewell Q			
AhHb-136	Hopewell R			
AhHb-137	Hopewell S			
AhHb-138				
AhHb-139				
AhHb-14	Novak	Aboriginal, Woodland	Village	
AhHb-140				
AhHb-141				
AhHb-142				
AhHb-143	Innes-Welton A	Aboriginal	Other, No artifacts recovered from site.	No Further CHVI
AhHb-144	Innes-Welton B	Aboriginal	Camp / Campsite	No Further CHVI
AhHb-145	Innes-Welton C	Aboriginal, Middle Archaic	Camp / Campsite, Scatter	No Further CHVI
AhHb-146	Innes-Welton D	Aboriginal, Other2 X Euro Canadian artifacts were found, attributed to plough drag.	Camp / Campsite	No Further CHVI
AhHb-147	Innes-Welton E			
AhHb-148	Innes-Welton F			
AhHb-149	Innes-Welton G			
AhHb-150	Innes-Welton H			
AhHb-151	Innes-Welton I			
AhHb-152	Innes-Welton J			
AhHb-17	Francis St.	Other	Other, Camp/Campsite_	
AhHb-22	Featherstone 1	Aboriginal		



Table 1: Registered Archaeological Sites within a 1-km Radius				
Borden Number	Site Name	Cultural Affiliation	Site Type	Development Review Status
AhHb-23	Makwyko A & B	Aboriginal, Early and Late Archaic		
AhHb-27	Featherstone 2	Euro-Canadian	Cabin, Homestead	
AhHb-42		Aboriginal	Unknown	
AhHb-43		Aboriginal	Unknown	
AhHb-61	Northridge 1	Aboriginal	Findspot	
AhHb-64	Luciani 1	Aboriginal	Other, Camp/Campsite	
AhHb-65	Luciani 2	Aboriginal	Unknown	
AhHb-66		Aboriginal, Euro-Canadian	Scatter	No Further CHVI
AhHb-67	John Cole Homestead	Aboriginal, Euro-Canadian	Findspot, Homestead	No Further CHVI
AhHb-68		Aboriginal, Euro-Canadian	Findspot, Homestead	No Further CHVI
AhHb-69		Aboriginal, Middle – Late Archaic		No Further CHVI
AhHb-70		Aboriginal, Euro-Canadian	Scatter	No Further CHVI
AhHb-71		Aboriginal, Late Archaic	Findspot	No Further CHVI
AhHb-72		Aboriginal, Late Archaic		No Further CHVI
AhHb-73		Aboriginal, Late Archaic	Findspot	
AhHb-8	Fonger	Neutral	Village	
AhHb-82		Aboriginal, Early Archaic	Findspot	
AhHb-83		Aboriginal	Findspot	
AhHb-84		Aboriginal, Early Archaic	Findspot	
AhHb-85		Aboriginal	Findspot	
AhHb-88	Garden Avenue	Aboriginal	Other, Camp/Campsite	
AhHb-89		Euro-Canadian	Scatter	
AhHb-90	Smokey Hollow Cemetery	Euro-Canadian	Cemetery, Settlement	

Of key interest to determining archaeological potential are the eight sites identified in the OASD as being located within 250 m of the study area: AgHa-181, AgHb-2, AgHb-215, AgHb-217, AgHb-284, AgHb-371, AgHb-608, and AgHb-614. Supplementary Documentation: Figure 18 shows the location of these sites, along with other historic locations of interest (MTCS 2019).

Site AgHa-181, the Laurier YMCA Site, is located within the study area. It is a Woodland period hillside midden that has been partially excavated. The portion that has been excavated is situated on a steep slope and has over 300 distinct soil layers. The remainder of the site has been subjected to Stage 4 long-term protection as it retains cultural heritage value or interest.



Site AgHb-2, the Mohawk Chapel Site, is located 250 m from the study area. The site is a village dating to the Transitional Woodland (Princess Point) period. The site was investigated in 1974 and its cultural heritage value or interest is unknown.

Site AgHb-215, the Waste Not Site, is located 230 m from the study area. This is a Glen Meyer Early Iroquoian (Glen Meyer) habitation site and midden. This site retains cultural heritage value or interest and is currently being protected by the City of Brantford.

Site AgHb-217, identified as Findspot 2, is located 50 m from the study area. This is a Euro-Canadian scatter of artifacts, including a clay pipe bowl and glass fragments. The site is disturbed and has no further cultural heritage value or interest.

Site AgHb-284, located within 50 m of the study area and within the subwatershed plan, is a Middle Woodland findspot consisting of a Flint Ridge chalcedony Vanport projectile point. No further fieldwork was recommended.

Site AgHb-371 is located within the limits of the current study area. It dates to the Transitional Woodland (Princess Point) period and may represent an encampment. This site retains cultural heritage value or interest (ARA 2007).

Site AgHb-608, the Mohawk Institute Site, is located 140 m from the study area. It is multi-component and contains a Middle Archaic (Brewerton) lithic scatter, a Woodland period scatter, and a post-contact Residential School. A Stage 3 assessment is currently ongoing, and Stage 4 will be recommended. This site retains cultural heritage value or interest.

Site AgHb-614 is located within 50 m of the study area. AgHb-614 contained lithic artifacts dating to the Archaic Period as well as Euro-Canadian artifacts. Through Stage 3 excavations the Euro-Canadian component was determined to have no cultural heritage value or interest. Stage 4 excavations fully documented the Archaic Period component and no further assessment is required at this site.

In addition to these eight sites, it should be noted that an Early Archaic findspot was recorded within the study area limits by Timmins Martelle Heritage Consultants Inc. (TMCH 2011a, b). Originally registered as Site AgHb-487, it was later removed from the OASD (and therefore does not appear in Table 1 above) because this isolated find was made in a disturbed context and thus lacks any cultural heritage value or interest.

2.1.2 History of Archaeological Investigations

An Archaeological Master Plan was developed in 1997 by ASI for the City of Brantford, which included a compilation of archaeological sites within Brantford, development of an archaeological site potential model, and review of relevant policies and guidelines. The Archaeological Master Plan and associated archaeological potential mapping was updated in 2006 and again in 2014 as

part of the City's Official Plan Review. The City of Brantford Archaeological Potential Map (City of Brantford 2017; Appendix A: Figure 2), indicates that only small portions of the study area retain archaeological potential, including in the west, in the east and to the south of Mohawk Lake.

Wood completed a search for reports directly on PastPort on 17 September 2019. Based on this search (by address, lot and concession and the above-mentioned archaeological sites), the following 13 archaeological assessments have been conducted within 50 m of the subject lands (Appendix A: Figure 8).

Stage 1-3 Archaeological Assessment Proposed Greenwich Street Trunk Sanitary Sewer Replacement, Brantford Ontario. Prepared by Archaeological Research Associates Ltd. (ARA). Prepared for Conestoga-Rovers & Associates. Report dated January 2007. PIFs P007-101-2006, P007-096-2006 (ARA 2007)

ARA conducted a Stage 1 & 2 assessment for the proposed Greenwich Street trunk sanitary sewer replacement (ARA 2007). The 1,620-m by 10-m study corridor, which is entirely within the current study area, was assessed by means of shovel test pit survey method. One site was found, containing 45 positive test pits. Additional Stage 2 work was carried out on either side of the proposed corridor in an attempt to locate a pipeline route that would not impact the site. This work resulted in the identification of seven additional positive test pits. Identified as Findspot 1, this site was subjected to Stage 3 assessment through the hand excavation of 41 1-m square test units. Temporally diagnostic artifacts recovered include Princess Point pottery and a Levanna projectile point dating to the Transitional Woodland period (ARA 2007: 15–16). This site was registered in the OASD as AgHb-371. It measures 150 m by 120 m overall and was recommended for Stage 4 mitigation. The report recommended a combined strategy of avoidance and protection and partial excavation (to permit completion of the trunk sewer replacement) (ARA 2007 17–18).

A Stage 2 Archaeological Resources Assessment of Mohawk Lake Rehabilitation Plan and Proposed Park Development, City of Brantford, Ontario. Prepared by Archaeological Services Inc. (ASI). Prepared for Gore and Storrie Limited. Report dated June 1995. PIF 95GO-10 (ASI 1995).

ASI conducted a Stage 2 assessment for the proposed Mohawk Lake Rehabilitation Plan and Proposed Park Development (ASI 1995). The study area for this project is entirely within the limits of the current study area (ASI 1995: 3–4). Portions of ASI's study area were observed to be disturbed, with topsoil having been previously removed. Undisturbed sections were subjected to test-pit assessment. No archaeological resources were recovered, and no further assessment was recommended (ASI 1995: 7).

Stage 1 Archaeological Resources Assessment, Lot 26, Eagles Nest Tract, Township of Brantford, County of Brant, Now at 7 Calvin Street, City of Brantford, Ontario. Prepared by Wood (then Amec Foster Wheeler). Prepared for Brantford Christian School. Report dated 11 September 2017. PIF P219-0034-2017 (Wood 2017).

Wood conducted a Stage 1 assessment for a proposed addition to the Brantford Christian School, located 50 m east of the current study area. The study area was found to be an entirely disturbed existing paved parking lot and no further fieldwork was recommended (Wood 2017: 15).

Stage 1 Archaeological Assessment for the Proposed Development of 225 Henry Street Within Part of Lots 37 to 39, Concession 3, in the Geographic Township of Brantford, Former County of Brant, City of Brantford, Ontario. Prepared by Archaeoworks Inc. (Archaeoworks). Prepared for EXP Services Inc. Report dated 20 July 2017. PIF P390-0234-2016 (Archaeoworks 2017).

Stage 2 Archaeological Assessment for the Proposed Development of 225 Henry Street Within Part of Lots 37 to 39, Concession 3, in the Geographic Township of Brantford, Former County of Brant, City of Brantford, Ontario. Prepared by Archaeoworks Inc. (Archaeoworks). Prepared for EXP Services Inc. Report dated 20 July 2017. PIF P029-0929-2017 (Archaeoworks 2018).

Archaeoworks conducted a Stage 1 assessment for a proposed subdivision development located 50 m from the current study area. Portions of the Archaeoworks study area appeared to be disturbed (and were confirmed to be disturbed during the subsequent Stage 2 assessment). Areas that retained archaeological potential were recommended for Stage 2 assessment. A registered site (AgHb-12) on the property was noted and recommended for intensified testing during the Stage 2 assessment (Archaeoworks 2017: 20).

The Stage 2 assessment was conducted using pedestrian survey and test-pit survey, including intensification around Site AgHb-12. As a result of the Stage 2 assessment, three Euro-Canadian sites and six Aboriginal findspots were identified. No additional fieldwork was recommended for the findspots, but all three Euro-Canadian sites warranted Stage 3 assessment. No artifacts were identified in the vicinity of Site AgHb-12 (Archaeoworks 2018: 32).

Stage 3 fieldwork for this project was completed under PIF P390-0234-2016, in a report entitled: *Stage 3 Archaeological Assessment for the Proposed Development of 225 Henry Street Within Part of Lots 37 to 39, Concession 3, in the Geographic Township of Brantford, Former County of Brant, City of Brantford, Ontario.* A copy of this report was requested from MTCS on 19 September 2019 but was not made available at the time of the preparation of this report.

Stage 1 Archaeological Assessment (Background Research and Property Inspection), Redevelopment of the South Side of Colborne Street, City of Brantford, Ontario. Prepared by

ASI. Prepared for Urban & Environmental Management Inc. Report dated March 2010. PIF P057-607-2010 (ASI 2010).

ASI conducted a Stage 1 assessment for the proposed redevelopment of the south side of Colborne Street. The study area for this project is entirely within the current study area limits. As a result of the Stage 1 assessment, the majority of the study area was determined to be disturbed. Areas that retained archaeological potential were recommended for Stage 2 assessment (ASI 2010: Figure 10). It was recommended that Stage 2 assessment be carried out by means of test-pit survey and by the excavation of test trenches using a backhoe (ASI 2010: Figure 11).

Stage 1 Archaeological Assessment, Laurier Brantford YMCA Athletic Complex, 74 to 147 Colborne Street, Part of Lots 10-18, South Colborne Street, City of Brantford, Geographic Township of Brantford, Former Brant County, Ontario. Prepared by ARA. Prepared for Wilfrid Laurier University. Report dated 15 May 2014. PIF P007-0596-2014 (ARA 2014).

This Stage 1 study, completed by ARA, encompasses the eastern portion of the study area described above in ASI's 2010 report. The study area for this project is entirely within the current study area limits. As a result of studying geotechnical data, historical land use, and demolition records, the Stage 1 assessment determined that there is a possibility of deeply buried archaeological material. Thus, the excavation of test trenches using a backhoe was recommended (ARA 2014: Map 32).

Stage 1, 2, and 3 Archaeological Assessments, Laurier Brantford YMCA Athletics and Recreation Complex, 75 to 151 Colborne Street, Parts 1-2, Plan 2R-7675, Part of Lots 10-18, South of Colborne Street and Mill Street, Plan of the City of Brantford, Geographic Township of Brantford, Former Brant County, Ontario. Prepared by ARA. Prepared for Wilfrid Laurier University. Report dated 03 August 2017. PIFs P089-0075-2015, P089-0082-2015 (ARA 2017).

Stage 4 Mitigation of Development Impacts, Preliminary Excavation Report, Laurier YMCA (AgHa-181), Laurier Brantford YMCA Athletics and Recreation Centre, 75 to 151 Colborne Street, Parts 1-2, Plan 2R-7675, Part of Lots 10-18, South of Colborne Street and Mill Street, Plan of the City of Brantford, Geographic Township of Brantford, Former Brant County, Ontario. Prepared by ARA. Prepared for Wilfrid Laurier University. Report dated April 2018. PIF P089-0062-2014 (ARA 2018).

ARA completed a Stage 1 to 3 study as part of a site plan application for the proposed Laurier Brantford YMCA Athletics and Recreation Complex. Much of the study area had been subjected to previous Stage 1 assessments completed by ARA (2014) and ASI (2010). The study area for this project is entirely within the current study area limits. Stage 1 research determined that there is a possibility of deeply buried archaeological material. The Stage 2 and 3 assessments were

conducted via the mechanical excavation of test trenches and the excavation of test units using a backhoe (ARA 2014: Map 32). As a result, 14 locations containing archaeological materials were identified, and were determined to comprise one large multi-component site. The site was registered as AgHa-181 and was recommended for Stage 4 mitigation (ARA 2017: 62).

The Stage 4 fieldwork documented the partial excavation of Site AgHa-181, a Woodland period hillside midden. The remainder of the site has been subjected to Stage 4 long-term protection as it retains cultural heritage value or interest (ARA 2018).

Stage 1 and 2 Archaeological Assessment, Proposed Subdivision Development, 9 Lloyd Street, Part of Lot A, Plan 315, Part of Lot 25, Eagles Nest Tract, City of Brantford, Township of Brantford, Brant County, Revised Report. Prepared by Scarlett Janusas Archaeology Inc. (SJA). Prepared for IBI Group. Report dated 11 August 2017. PIF P027-0308-2017 (SJA 2017a).

Stage 3 Archaeological Assessment, AgHb-614, 9 Lloyd Street, Part of Lot A, Plan 315, Part of Lot 25, Eagles Nest Tract, City of Brantford, Township of Brantford, Brant County, Revised Report. Prepared by Scarlett Janusas Archaeology Inc. (SJA). Prepared for IBI Group. Report dated 02 December 2017. PIF P027-0314-2017 (SJA 2017b).

SJA completed a Stage 1 & 2 assessment for a residential subdivision development, the southeastern portion of which overlaps the current study area. One site, registered as AgHb-614, was found as a result of the Stage 2 test-pit survey (SJA 2017a). The site was recommended for Stage 3 site-specific assessment, which was also conducted by SJA. Site AgHb-614 contained Archaic period lithics and Euro-Canadian artifacts. The Euro-Canadian component was determined to have no cultural heritage value or interest, but the Aboriginal component was recommended for Stage 4 assessment (SJA 2017b: 26–27). Stage 4 fieldwork was completed under PIF P027-0327-2017 in a report entitled *Stage 4 Archaeological Assessment, AgHb-614, Part of Lot A, Plan 315, Part of Lot 25, Eagles Nest Tract, City of Brantford, Township of Brantford, Brant County, Ontario*. A copy of this report was requested from MTCS on 19 September 2019 but was not made available at the time of writing this report. The site has been fully excavated and has no further cultural heritage value or interest (MTCS 2019).

Stage 1 & 2 Archaeological Assessment, 144 Henry Street Development, City of Brantford, Brant County, Ontario, Official Plan Application NO. OP-04-11, Rezoning Application No. PZ-11-11. Prepared by Timmins Martelle Heritage Consultant Inc. (TMHC). Prepared for Prepared for J.H. Cohoon Engineering Ltd. Report dated 2011. PIF P083-122-2011 (TMHC 2011a).

Stage 3 Archaeological Assessment, 144 Henry Street Development, City of Brantford, Brant County, Ontario, Official Plan Application NO. OP-04-11, Rezoning Application No. PZ-11-

11. Prepared by Timmins Martelle Heritage Consultant Inc. (TMHC). Prepared for J.H. Cohoon Engineering Ltd. Report dated 23 November 2011. PIF P083-169-2011 (TMCH 2011b).

TMHC conducted Stage 1 & 2 assessment of a 0.4-ha parcel of land in support of a proposed residential development (TMHC 2011a). During the Stage 2 assessment, an Early Archaic projectile point was recovered. This find was registered as Site AgHb-487. Due to the age of the find, a Stage 3 assessment was recommended. During the Stage 3 assessment it became apparent that the point was found in a secondary fill context and therefore had no further cultural heritage value or interest (TMHC 2017b: 8).

The following 13 reports are believed to document fieldwork conducted within 50 m of the study area. A copy of each report was requested from MTCS between 16 and 19 September 2019. At the time this report was written, a copy of each report had not been made available.

An Archaeological Assessment of the Flood Protection Dyke Expansion Area Within the Brantford Sanitary Landfill. Prepared by W.C. Noble, 1994. PIF unknown.

Noble's 1994 assessment, which appears to have been conducted on lands in the southern portion of the current study area, documented Sites AgHb-215 and AgHb-217. Site AgHb-217 is known to have no further cultural heritage value or interest.

Stage 1 & 2 Archaeological Assessment of Brantford #2, Part of Lot 37, Concession 3. Geographic Township of Brantford East, Brant County, Ontario. Prepared by ASI. PIF unknown (MTCS 2019).

Stage 1 & 2 Archaeological Assessment of 255 Henry Street, Part of Lot 37, Concession 3. Geographic Township of Brantford East, Brant County, Ontario. Prepared by ASI. PIF P141-073-2006 (MTCS 2019).

Archaeological Resource Assessment Brantford Southern Access Road Market Street to Colborne Street East, Stage 1 – Background Research. PIF 92-008-LIC-1992-013 (MTCS 2019).

Stage 1-2 Archaeological Resource Assessment Newport Street Extension, From BSAR/Market Street to Clarence Street/Colborne Street, City of Brantford, R.M. of Brant, Ontario. PIF 2001-030-002 (MTCS 2019).

Stage 1-2 Archaeological Resource Assessment Newport Street Extension, From BSAR/Market Street to Clarence Street/Colborne Street, City of Brantford, R.M. of Brant, Ontario. PIF 2001-030-002 (MTCS 2019).

Stage 3 Archaeological Resource Assessment of the Mount Pleasant Site (AgHb-200), Brantford Southern Access Road (BSAR) From West of Mt. Pleasant Street to Colborne Street West, City of Brantford, R.M. of Brant, Ontario. PIF 2002-084-001 (MTCS 2019).

Stage 1-2 Archaeological Resource Assessment Newport Street Extension, From BSAR/Market Street to Clarence Street/Colborne Street, City of Brantford, R.M. of Brant, Ontario. PIF 2001-030-002 (MTCS 2019).

Stage 1-2 Archaeological Assessment, Grand River Slope Stabilization, Colborne Street, City of Brantford, R.M. of Brant, Ontario. Prepared by Golder Associates Ltd. PIF unknown (MTCS 2019).

An Archaeological Resource Assessment of Proposed Sanitary Sewer Route for the Northwest Industrial Area, City of Brantford. PPIF 1990-021-001-1990-PIF2 (MTCS 2019).

Report on the 2006 Stage 1-2 AA of the Proposed Development, 218 & 234 Henry Street, Part of Lot 37, Concession 4 (Geo. Twp. Of Brantford), City of Brantford, County of Brant, Ontario. PIF P058-115-2006, P058-115-2006-STG3, P058-087-2006, P058-087-2006-STG3 (MTCS 2019).

Stage 3 Archaeological Assessment for the Proposed Development of 225 Henry Street Within Part of Lots 37 to 39, Concession 3, in the Geographic Township of Brantford, Former County of Brant, City of Brantford, Ontario. Prepared by Archaeoworks Inc. PIF P390-0234-2016 (MTCS 2019).

Stage 4 Archaeological Assessment, AgHb-614, Part of Lot A, Plan 315, Part of Lot 25, Eagles Nest Tract, City of Brantford, Township of Brantford, Brant County, Ontario. Prepared by SJA.I. PIF P027-0327-2017(MTCS 2019).

2.1.3 Environmental Context

The study area (Appendix A: Figures 1–3) is situated in the Norfolk Sand Plain physiographic region of Ontario (Chapman and Putnam 1984: 113). This wedge-shaped area has a curved base along the coast of Lake Erie and tapers to a point at Brantford. The region is made up of sand deposited from meltwater of the Grand River that formed a delta of glacial Lakes Whittlesey and Warren and comprised of light textured soils left behind by retreating glaciers.

It is crucial to consider the proximity of water sources in any evaluation of archaeological potential because the availability of water is arguably the single most important determinant of human land use, past and present. The *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011) lists proximity to water as one of the prime indicators of potential for the presence of archaeological sites. Distance from potable water has been one of the most commonly used variables for predictive modeling of site location. Water, both potable and non-potable, also

facilitated the transportation of people and goods and served to focus animal and vegetable resources. According to the 2011 *Standards and Guidelines for Consultant Archaeologists*, lands within 300 m of an extant or formerly mapped river or creek have potential for the presence of early Aboriginal and Euro-Canadian archaeological sites. The eastern edge of the study area is situated directly west of the Grand River, while the western edge is 650 m from the Grand River. A tributary of the Grand River, Shallow Creek is located within the study area. Shallow Creek extends into Mohawk Lake (approximately 220 m in width by 820 m in length) and continues west. This Lake is situated approximately 560 m west of Grand River (Appendix A: Figure 3). Additional tributaries of the Grand River are located within 300 m of the study area to the northeast and south.

Mohawk Lake and the adjoining canal were built in the nineteenth century. Historical mapping indicates that, prior to the construction of the canal, the area was marshy. What is now Mohawk Lake and Shallow Creek Park were both marshlands prior to development (Appendix A: Figures 8–10). These marshes would have represented secondary water sources and resource extraction areas.

In summary, a review of the archaeological context supports a conclusion of overall archaeological potential and the need for Stage 2 assessment prior to land alterations. The study area is situated along a tributary of Grand River, with the river itself in close proximity. Moreover, we have direct evidence that this general area had been intensively exploited by both pre-contact Aboriginal and historic Euro-Canadian peoples in that 317 sites have previously been registered within a 1-km radius. Five of these sites are located within 250 m, including one within the study area limits.

2.2 Historical Context

2.2.1 A Cultural History for Southern Ontario

The majority of interpretations of pre-contact Aboriginal adaptations in Ontario derive from the analysis and interpretation of stone tools. Stone tools are made from specific types of rocks that fracture in ways that can be controlled, so that they are easily shaped into useful forms. These rocks include chert, chalcedony, quartzite, petrified wood, and volcanic glass, known as obsidian. Most stone tools found in southern Ontario are formed from types of chert that outcrop in local limestone formations, such as: Onondaga and Haldimand cherts, found near the north shore of Lake Erie; Kettle Point chert, which outcrops near Lake Huron; and Collingwood chert, which outcrops along the Niagara Escarpment near Georgian Bay.

Stone tools used as spear tips and arrowheads are the most commonly studied tool type. These are referred to as projectile points. As projectile point technology changed over time, styles and shapes of points changed also. Studying these changing point types has resulted in the development of a chronological framework for pre-contact times prior to 3,000 years ago, when

First Nations groups began to make clay pottery. Later periods are defined both by point types and pottery characteristics. Radiocarbon dating of archaeological sites can only be done when organic materials are collected from those sites, so the dating of most sites is done by comparing the artifacts from dated sites to those from undated sites. The following is an overview of the pre-contact history of southern Ontario as understood by archaeologists.

The cultural history of southern Ontario began approximately 11,000 years ago when the glaciers had melted, and the land was re-exposed. The land was quickly settled by bands of hunters and gatherers who are thought to have been large game hunters. These people used large spear points that are distinctively shaped with long central grooves, called "flutes". Archaeologists have defined a number of point types that date to this time, including Gainey, Barnes, Crowfield, and Hi-Lo types. This period is referred to as the Paleo-Indian Period and it is thought to have lasted until approximately 9,000 years ago.

After 9,500 years ago, there was a long period when the climate was variable and the bare lands left by the glaciers were becoming re-forested, resulting in patchier, more diverse ecozones. During this time, which lasted until 3,000 years ago, people were adapting to diverse environmental settings. There appears to have been more reliance on local stone for making tools and more variable tool manufacturing technologies. The adoption of a spear-throwing board, known as an atlatl, was an important innovation, resulting in the ability to throw smaller darts with more force. Projectile points from this period, called the Archaic Period, are commonly side or corner-notched and are smaller than those of the preceding period. The Archaic adaptation is generally thought to have centred on localized resources, often forest resources, and groups of people are thought to have been less mobile, an adaptation that continued to develop until the arrival of Europeans.

In southern Ontario, the Archaic Period is divided into the Early, Middle and Late Archaic. Early point types include serrated Nettling and Bifurcate Base points. Middle types include Brewerton Corner Notched and Otter Creek, and Late types include Lamoka, Genesee, Crawford Knoll, and Innes. Most of these are named after sites where they were first identified.

The Archaic Period is followed by the Woodland Period. The major technological change in the Early Woodland Period is the introduction of pottery. During this time, people are thought to have developed more community organization and the manufacture of clay pottery is thought to indicate less residential mobility. Burial sites dating to this time often display evidence of ceremonial activities. Projectile points made at this time include much smaller types, probably used as arrow tips. Point types include Meadowood and Kramer and early ceramics were crudely-made vessels with conoidal (pointed) bases. The Early Woodland Period transitioned into the Middle Woodland Period approximately 2,400 years ago.



During the Middle Woodland Period in southern Ontario community and kin identity became more deeply entrenched, and more sedentary communities developed. Point types made at this time include Saugeen, Vanport, and Snyders. Ceramic vessels were conoidal in shape and decorated with stamped designs in the soft clay. The Middle Woodland Period transitioned into the Late Woodland Period A.D. 500–900 with the earliest direct evidence for agriculture.

The Late Woodland Period saw the development of recognizable Iroquoian and Algonkian cultures in southern Ontario, characterized by the intensification of agriculture and the increased utilization of corn. Greater sedentism led to increasing settlement populations and greater complexity of settlement organization. Sites dating to this time are often found on terraces overlooking the floodplains of large rivers. Iroquoian villages tended to be small, palisaded compounds with longhouses occupied by families. As the Late Woodland Period progressed, more intercommunity communication and integration became necessary to maintain the sedentary agricultural way of life. Later Iroquoian villages were larger and more heavily palisaded, and longhouses were larger also.

When European explorers and missionaries arrived in southern Ontario in the early seventeenth century, they described the local Iroquoian social organization as being under the direction of elected chiefs. Tribal confederacies and allegiances resulted in intertribal warfare, which was only made worse by the European presence. Three Ontario Iroquoian confederacies, the Huron, Petun, and Neutral, were driven from their traditional territories before the middle of the seventeenth century.

Archaeologists tend to describe a period of transition from Late Woodland to Historic times as “proto-historic”. The dating of this period is variable and may be different from site to site within a region as it describes a time when local First Nations were acquiring European trade goods indirectly through other Aboriginal middlemen rather than directly from European traders. This period was generally very short and is often difficult to differentiate archaeologically from later historic times, when trade goods were widely available, but it usually is identified by evidence of an intact traditional cultural adaptation with occasional European items used in traditional ways.

Table 2: Simplified Cultural Chronology of Southern Ontario

Period	Complexes/Cultures, Some Diagnostic Artifacts
Early Paleo-Indian (9000–8500 B.C.)	Small nomadic hunter-gatherer bands. Early Paleo-Indian (EPI) rarely found in Eastern Ontario. Gainey, Barnes, Crowfield fluted points.
Late Paleo-Indian (8500–7500 B.C.)	Small nomadic hunter-gatherer bands. Hi-Lo, Holcombe points, Lanceolate Bifaces.
Early Archaic (7500–6000/4500 B.C.)	Small nomadic hunter-gatherer bands. Nettling, Stanley/Neville points.



Table 2: Simplified Cultural Chronology of Southern Ontario

Period	Complexes/Cultures, Some Diagnostic Artifacts
Middle Archaic (6000/4500–2500 B.C.)	Transition to territorial settlements. Seasonal round of subsistence introduced. Thebes (6000–5000 B.C.), Otter Creek points (4500–3000 B.C.). Brewerton Complex (3000–2500 B.C.) . Brewerton points. Laurentian Complex (6000 B.C.–2500 B.C.) (Eastern Ontario)
Late Archaic (2500–1000 B.C.)	More numerous territorial hunter- gatherer bands, increasing use of exotic materials and artistic items for grave offerings, regional trade networks. Narrowpoint Complex (2500–1850 B.C.) . Lamoka points. Broadpoint Complex (1850–1650 B.C.) . Adder Orchard, Genesee points. Smallpoint Complex (1650–1000 B.C.) . Crawford Knoll, Innes points. Terminal Archaic (1100–1000 B.C.) Glacial Kame Complex . Hind points.
Early Woodland (1000–400 B.C.)	Pottery introduced. Meadowood Notched points, Meadowood Cache Blades, Kramer, Adena points. Meadowood Complex (1000–400 B.C.) . Middlesex Complex (650–400 B.C.) . Introduction of true cemeteries.
Middle Woodland (400 B.C.–A.D. 500/900)	Saugeen, Snyders, Vanport, Port Maitland points. Point Peninsula Complex (Southcentral and Eastern Ontario) Saugeen Complex (southeast of Lake Huron and the Bruce Peninsula, London area, and possibly as far east as the Grand River) Couture Complex (Lake St. Clair and the western end of Lake Erie). Burial ceremonialism.
Transitional Woodland (A.D. 500–900)	Agriculture introduced. Levanna, Jacks Reef points. Princess Point Complex (Eastern end of Lake Erie and the western end of Lake Ontario). Rivière au Vase Phase of the Younger / Western Basin Tradition (Lake St. Clair and western end of Lake Erie) Sandbanks Complex (Kingston area).
Late Woodland (A.D. 900–1650)	Tribal differentiation. Transition to settled village life. Dewaele, Glen Meyer Tanged, Triangular Nanticoke, Notched Nanticoke, Triangular Daniels/Madison points. Ontario Iroquoian and St. Lawrence Iroquoian Traditions (Southcentral and Eastern Ontario, respectively). Algonkian Western Basin Tradition (Lake St. Clair and the western end of Lake Erie).
Early Post-Contact (A.D. 1650–1763)	Iroquoian, Algonkian migrations and resettlement. French exploration and colonization
Late Post-Contact (A.D. 1763–1867)	Iroquoian, Algonkian migrations and resettlement. British and other European immigration increases.

Archaeologically, the years since the arrival of Europeans are referred to as the Historic Period. In southern Ontario, significant Historic sites are those that have an affiliation with an important historic event, figure, or family, but can also be anything dating to the original European settlement of a region. Often, these sites date to before A.D. 1830.



2.2.2 Review of Historical Records

Historically, the study area was located within the Geographic Township of Brantford, County of Brant. In 1626, the French Catholic Missionary, Father Joseph de la Roche Daillon visited what is now Brant County. He found a land inhabited by Neutral Iroquoians, whose chief village was named Kandoucho (Kempster & Muir 1986). This village was probably located close to the current City of Brantford.

Brant County was named after Joseph Brant, the Mohawk chief who fought for the British in the American Revolution. In 1784, Brant and his followers settled in the Grand River valley on a large tract of land they had been given in compensation for their services to the British and loss of land in New York State. They first settled along the Grand River near a shallow, easily-crossed area, which became known as Brant's ford, and later as Brantford (Mika & Mika 1977).

The first English, Scottish and Irish settlers in the township came in 1805 and found the region covered in forested hunting grounds used by the Six Nations (Warner & Beers 1883). These settlers began clearing the forests for agricultural use, first along the banks of Fairchild's Creek. The Mohawk Canal was built in 1840 which allowed Brantford access to Lake Erie, through a series of locks and dams connecting to the Welland Canal (Hill 1994: 6). Brantford grew quickly thanks both to the canal and to railway construction, making it a key distribution centre for the surrounding rich agricultural countryside (Warner & Beers 1883). Brantford Township was incorporated in 1850 (Carter 1984). Brant County was formed in 1852 out of six townships that formerly belonged to Halton, Oxford, and Wentworth Counties (Carter 1984). The county had a population of 6,410 in 1852 and 4,000 in 1875 (Carter 1984). Eventually, the Town and later City of Brantford quickly surpassed any other Euro-Canadian settlement in the township in terms of its size and economic significance (Page & Smith 1875).

The study area encompasses several locations of historical note. In particular, the Mohawk Canal was integral to the development of Brantford. First proposed in 1829, the canal was built by the Grand River Navigation Company (Appendix B: Photographs 1–2). As part of the Act which incorporated the Grand River Navigation Company, the company was given authority to expropriate any lands necessary for construction of the canal (Reville 1920: 180). The proposed 223-ha area of land required for the canal passed largely through Six Nations of the Grand River territory, who protested the loss of valuable farmland, pine forests and gypsum beds (Hill 1994: 77).

Construction of eight locks and dams along the Grand River began in 1832 near Dunnville, but construction along the area of what is now the Mohawk Canal did not begin until 1842. The Grand River Canal officially opened on 06 November 1848 (Hill 1994). The canal cut through what was originally wetland and bypassed 24 km of the Grand River (Lefler 1995: 2). Since roads in the early

years were still largely impassable, heavy cargo was shipped into Brantford via the canal. Within the canal, passenger boats provided transportation from Brantford to Buffalo. By 1850, there were more than 100 steamer boats on the Grand River. New businesses and mills were opened that could directly ship and receive goods from their own warehouses, bringing prosperity to Brantford. By the end of the nineteenth century, Brantford was the third largest exporter of goods in Canada. Mohawk Lake, a shallow body of water created within the canal, was designed to allow large barges to allow boats to turn around.

Due to financial problems and failure to maintain and repair the canal infrastructure, the Mohawk Canal was only used for five years (Hill 1994). The Grand River Navigation Company collapsed in the 1850s when the company failed to maintain their mortgage payments. In addition, in 1854, the Buffalo, Brantford and Goderich rail line opened, leading to decline in navigation on the Canal. By 1861, the City of Brantford was granted ownership over the canal, which fell into disuse shortly afterward, as the nearby train system became the more efficient method of transporting people and goods. By 1880 the canal locks were no longer in use.

Alfred Watts purchased the Mohawk Canal from the City of Brantford in 1875 for one dollar. He used the canal to build the first electrical generating station in Ontario. Mr. Watts erected a small building directly next to one of the canal locks to house a dynamo, near Locks Road and Beach Road (Reville 1920: 213; Appendix B: Photograph 3). By 1885, electrical street lighting was possible from Locks Road to the merchants in downtown Brantford, enabling Brantford's industrial boom. In 1897, the capacity of the water power station was doubled in response increasing demand. By the early 1900's Brantford was the third-largest industrial centre in Canada (Reville 1920). By 1908, the City of Brantford connected to the provincial electric power grid and Alfred Watts was unable to compete. The Watts generating station closed in 1911 (Love 2017). The building erected by Mr. Watts remained standing until 1927, when the dam and locks were destroyed by a flood (Reville 1920). Brantford. The ruins are still visible near Locks Road (Appendix B: Photograph 4).

With the construction of the Mohawk Canal, and the later completion of the railways, the City of Brantford saw an industrial boom, particularly in the late nineteenth century. The manufacturing industry contributed to population growth and commercial success. The first large-scale production facility was the P.C Van Brocklin foundry, which opened in 1844, followed by the Brantford Stoneware of Justus Morton in 1849 (Webster 1968: 7). The area surrounding the canal became the industrial centre of Brantford, with manufacturers of agricultural implements, stoves, engines, as well as flour, paper, and gypsum mills (Warner and Beers 1883). A passenger steamboat landing was constructed near Locks Road as well.

By the early twentieth century, several large industries had built factories on the canal. Factories included the Verity Plow Company (later Massey-Ferguson), Adams Wagon Company, Stemson

Chemicals, and the Cockshutt Plow Company. Cockshutt built an office and factory on the site in 1902. By the 1980s, 7,000 people were employed by Cockshutt Plow and Massey-Ferguson combined, when at the time the City of Brantford had a population of 80,000 (Active History 2011).

Currently, two buildings remain from the Cockshutt Plow Company, which was once a sprawling factory (see Appendix B: Photograph 7). Built in 1903, the remaining buildings are the office and timekeeper's building. These two buildings are representative of late nineteenth and early twentieth century industrial architecture. The office has ornamental semi-circular brickwork. In 1912 a brick façade was added to the timekeeper's building to match the office (National Trust 2019). Both buildings were designated under the Ontario Heritage Act in 2002.

Many of the factories along the canal were in full production until the 1980s, with the Cockshutt Plow Company closing in 1985, Massey-Ferguson closing in 1988, and several other industries closing in the 1990s. As a result of the industrial decline, the Greenwich-Mohawk brownfield was created. This brownfield is a polluted 21-ha area to the south of the canal, where industries were abandoned and left behind contaminated lands as a result of the dumping of waste materials (Appendix A: Figure 12).

Along with the industrial and commercial uses, the area surrounding the Mohawk Canal were used for recreation. These areas include Shallow Creek Park, Mohawk Park, and a number of recreational trails.

Mohawk Park, to the north of the canal, was originally part of the Lovejoy Estate. John Lovejoy was born in Ohio in 1800. He came to Canada and obtained a grant for what was then known as the Glebe lands on 20 December 1836. At the time, the lands were largely oak forest and wetlands. Upon construction of the Mohawk Canal, the water levels rose to form Mohawk Lake (Peterson 1987: 74). The Lovejoy estate was sold to the Brantford Street Railway Company in 1879 and it was renamed Mohawk Park (Lefler 1995: 3). On 24 May 1895, Mohawk Park had its grand opening as part of celebrations for Queen Victoria's birthday (Appendix B: Photographs 5–6). The railway company built a streetcar to take people from the city limits to a station in the middle of the park where there were amusement rides, a pavilion and a bandstand.

Shallow Creek Park, opened in the early 1950s, was created by infilling a portion of the canal. The park was once a shallow marsh that was used as the turning basin for shipping boats using the canal (Active History 2011).

Other historical locations of note within the study area are The Kanata Village and the Canadian Military Heritage Museum. Kanata Village is a learning centre that highlights Six Nations of the Grand River cultures. It is situated on a seventeenth-century Mohawk village and features a recreated longhouse. The Canadian Military Heritage Museum preserves and displays artifacts

pertaining to the military history of Canada, and Brantford in particular, from the 1700s to the 1990s.

Historical records and mapping (Appendix A: Figures 9 to 15) were examined to document past Euro-Canadian use of the study area, which was historically described as Part of Lots 1, 2, 5, 19, 25, 26, and Lovejoy Lot, Mohawk Parsonage Lot, School Lot, Grand River Navigation Co. Lot, Eagles Nest Tract, Smith Tract, Lots A and B, Concession 4, and the Town of Brantford, in the Geographic Township of Brantford, Brant County. The name Eagle's Nest has two origins. One theory maintains that an eagle's nest was found at this location, which was significant due to the eagle's sacred place in Indigenous culture. The second theory claims that the bend in the Grand River resembled an eagle's nest (Files 1993).

Appendix A: Figure 9 details the 1828 plan of settlement along the Grand River, between Dunnville and Brantford, with the portions of the newly constructed Welland Canal illustrated (Minson 2019). In this map, the Grand River is surrounded by marshland and the then town of Brantford is shown adjacent to the river.

Appendix A: Figure 10 presents an 1833 survey by Lewis Burwell showing the early town plot of Brantford (Burwell 1828). The Mohawk Parsonage Lot is shown. This land was set aside for use as a parsonage by the Anglican Church and contained a home for clergy until it was destroyed in the early 1900s. Near the study area is the Mohawk Village. This was the focal point for Six Nations and home to the Mohawk Chapel, a council house, a mill, a school and 24 log houses. The Mohawk Chapel was the first Protestant church in Ontario. The Burwell map was prepared before the Mohawk Canal was constructed, but the town plot Brantford is depicted. There is a marshy area to the north of the town plot. The western edge of the study area is shown within the William Kennedy Smith Tract, and the northern edge is shown in an area identified as "Indian Farms."

Appendix A: Figure 11 presents the 1859 *Tremaine's Map of the County of Brant* (Tremaine 1859). In this map, the Mohawk Canal is present, with a lock illustrated at the east end. A marshy area on the map is now Mohawk Lake. John Lovejoy's estate is shown in the location of the current Mohawk Park. A paper mill, Mohawk School, Mohawk Mission, and Mohawk Village are identified. A large portion of the study area is within the historic town of Brantford limits. The Grand Trunk Railway cuts through a section along the western edge of the study area that was formerly the Smith Tract.

Appendix A; Figure 12 presents the 1875 *Illustrated Historical Atlas of Brant County* (Page & Smith 1875). Again, the Mohawk Canal and Lake are present, Similarly, John Lovejoy's estate is shown in the location of the current Mohawk Park adjacent to the Mohawk School Lot. A paper mill, school, parsonage, and Mohawk Village are identified. The railway that transects the western

portion of the study area is marked as a depot. Much of the study area is within the Town Plot of Brantford.

Appendix A: Figure 13 shows an 1875 bird's eye drawing of Brantford (Brosius 1875). In this drawing, the turning basin (now Shallow Creek Park) is visible. Much of the historic town of Brantford is illustrated with housing and roads. The extreme northeastern portion of the study area, identified as being in the town plot on Figures 11 and 12, is shown as woodland on this drawing. The railroad is also illustrated with a depot building shown.

Appendix A: Figure 14 illustrates a 1928 topographic map of Brantford (OCUL 1928). This map shows the location of Mohawk Lake, Mohawk Park, the turning basin, and a number of buildings, roadways, and bridges throughout the study area. Much of the study area illustrates the same features as the earlier mapping; however, several factory buildings are now shown along the canal, particularly on the south side.

Appendix A: Figure 15 shows a 1965 fire insurance plan of Brantford (CUA 1965). The Toronto, Hamilton & Brantford Railway is identified running south of the Canal and Greenwich Street, through what are now the brownfield lands. Within the brownfield, a number of factory buildings are illustrated. A fire station is shown along the west edge of the study area, near the intersection of Greenwich and Newport streets.

In summary, a review of the historical context indicates that undisturbed portions of the subject property have archaeological potential due to the proximity of the Mohawk Canal, which was an important transportation route. In addition, Greenwich Street and Mohawk Streets are historically surveyed roads and would have been important transportation routes.

2.2.3 Historic Plaques

There are 10 historic plaques within a 1-km radius of the study area (Brown 2019). The first, located approximately 180 m southeast of the study area, documents the history of the Mohawk Institute. The plaque reads:

The Mohawk Institute was established in 1831 for children of the Six Nations Iroquois living on the Grand River. Pupils from other native communities in Ontario attended the school as well. Like all Canadian residential schools, the Mohawk Institute tried to assimilate its students into the rapidly growing Euro-Canadian society. To that end, it disregarded native cultural traditions and stressed instead Christian teachings, English-language instruction, and manual labour skills. This building was constructed in 1904 after fire destroyed the previous school. When the Institute closed in 1970 the building reverted to the Six Nations of the Grand River. It then became a centre for the renaissance of First Nations cultures.

The second plaque, located approximately 720 m southeast of the study area, documents St. Paul's 1785 Chapel of the Mohawks. The plaque reads:

This chapel, the first Protestant church in Ontario, was built by the Crown for the Mohawks of the Six Nations Iroquois who settled here in 1794. It replaced the Queen Anne Chapel (1712) at Fort Hunter, New York, which the Mohawk lost, along with their lands, as a result of their alliance with the British during the American War of Independence. The church was dedicated to St. Paul in 1788 by the Reverend John Stuart. In 1904 it was given Royal designation by Edward VII. It is the only Royal Chapel in North America.

The third plaque, located approximately 400 m north of the study area, documents the home and life of Reverend Peter Jones (1802–1856). The plaque reads:

This house, "Echo Villa", was built by the Reverend Peter Jones (Kahkewaquonaby) who lived here from 1851 until his death. Son of the noted surveyor, Augustus Jones, and Tuhbenahneequay, a Mississauga chief's daughter, Peter was born at Burlington Heights. He was converted to Methodism in 1823 and began to preach in the Grand River area. In 1826 he moved to the Mississauga settlement on the Credit River and was elected a chief of that band in 1829. An eloquent preacher, he converted many Indians throughout Upper Canada, and translated the Gospels and many hymns into the Ojibwa language. Ordained in 1833, he made several successful journeys to England to raise funds for Indian missions.

The fourth plaque, located approximately 340 m northeast of the study area, documents the paintings of St. Jude in St. Jude's Anglican Church. The plaque reads:

The paintings in this church vividly illustrate the ideas of the Arts and Crafts Movement. Popular at the turn of the 20th century, the movement reacted against increasing industrialization by promoting handwork and an integration of art and architecture. Medieval and natural imagery was typical, as seen here in the rambling vines that encircle Gothic arches and Christian symbols. Even the murals, depicting the life of Christ, have a landscape emphasis. The cohesive plan was created by members of the Browne family, whose church decorating business was one of the most prolific in Ontario.

The fifth plaque, located approximately 405 m northwest of the study area, documents the life of the Honourable Arthur Sturgis Hardy (1837–1901). The plaque reads:

Ontario's fourth prime minister was born in Mount Pleasant, called to the Bar in 1865, and practised law in Brantford for many years. In 1873 he was elected to the Ontario legislature and sat as Liberal member for South Brant until 1899. Appointed

provincial secretary and registrar in 1877, he became commissioner of crown lands in 1889. Following the resignation of Sir Oliver Mowat in 1896, Arthur Hardy assumed the portfolios of prime minister and attorney general. During his regime, an extensive revision and consolidation of the province's statutes was completed. He retired from politics in 1899 and, until his death, held the positions of clerk of process and surrogate clerk at Osgoode Hall.

The sixth plaque, located approximately 300 m northwest of the study area, documents the founding of Brantford. The plaque reads:

In the 1820's significant improvements to the Hamilton and London road attracted settlers to the Indian lands at Brant's Ford where this thoroughfare crossed the Grand River. A thriving village soon developed and in 1830 the Six Nations surrendered its site. The opening of navigation to Brantford in 1848, the completion of the Buffalo, Brantford and Goderich Railway to the town in 1854 and the development of a rich agricultural hinterland fostered significant commercial and manufacturing growth in Brantford. The firms of Cockshutt and Harris, established here during the 1870's, laid the foundation for Brantford's development as Canada's leading farm implement manufacturing centre. Brantford, which became a town in 1847, was incorporated as a city in 1877.

The seventh plaque, located approximately 450 m northwest of the study area, documents the Brant County Courthouse. The plaque reads:

In July 1852, the Six Nations Indians sold to Brant County the land upon which this court-house now stands. Designed by John Turner and William Sinon and erected by the Provisional County of Brant, the stone and brick building was largely completed in 1852. The original structure contained court rooms, county offices, a law library and a gaol. Additions were made in 1861 and 1886, but the building remains predominantly Greek Revival in style. The centre block façade has two clusters of simple Doric columns rising from the second floor and supporting a triangular pediment. Identical pediments are repeated over each of the wings. The court-house faces Victoria Square, one of Ontario's most impressive public squares.

The eighth plaque, located approximately 690 m northwest of the study area, documents the Royal Canadian College of Organists. The plaque reads:

One of Canada's oldest national associations of musicians, the Royal Canadian College of Organists was established in 1909 following an organizational meeting held here in the former Conservatory of Music. Dedicated to elevating the standards and promoting the interests of professional organists, the Canadian Guild of

Organists held its first general meeting in 1910. A decade later, when Canadian chapters of the American Guild of Organists were disbanded, the association, renamed the Canadian College of Organists, absorbed their membership. Local centres were established, and membership steadily increased from 245 in 1939 to 1300 in 1959. In recognition of its significant contribution to Canadian cultural life, the college was then granted the designation "Royal". Today it still strives to foster excellence in organ playing and church music.

The ninth plaque, located approximately 840 m northwest of the study area, documents the life of Sara Jeannette Duncan (1861–1922). The plaque reads:

*An internationally renowned author, Duncan was raised in the adjacent house and educated locally. She taught school briefly, but then determinedly turned to journalism, gaining notice for her distinctive and witty writing style. In 1890 Duncan published her first book, *A Social Departure*, based in dispatches produced during a trip around the world. Following her marriage the next year, she took up residence in India where she continued to pursue a literary career. A prolific writer, Duncan published over twenty books, only one of which, *The Imperialist* (1904), had a Canadian setting. In this penetrating study of life in Elgin (Brantford) in the late 19th century. Duncan integrated shrewd political commentary with minute social observation, thereby gaining for herself a distinctive place in Canadian literature.*

The tenth plaque, located approximately 825 m northwest of the study area, documents the life of Walter Allward (1875–1955). The plaque reads:

An outstanding sculptor of some of Canada's finest public monuments, Walter Allward is best known for his masterpiece, the Vimy war memorial in France. He emerged as a dominant figure in the transition from the sculptural conventions of the Victorian era to the more abstract forms of the 20th century. Many of his works, including the Bell Memorial, combine expressive classical figures with dramatic settings. With his original sense of spatial composition, his mastery of the classical form, and his brilliant craftsmanship, Allward created works of enduring beauty.

2.3 Stage 1 Property Inspection

2.3.1 Methodology

With advance unconditional permission-to-enter from the Client, the Stage 1 property inspection was conducted by Nicole Gavin (R353) with the assistance of Kristy O'Neal (P066) on 09 September 2019 to confirm archaeological site potential and to determine the degree to which recent

development and landscape alterations have affected that potential. The weather was sunny and warm (21°C) with good lighting and did not impede the inspection in any way.

The Stage 1 property inspection included a walk-through of the entire property, which measures approximately 232.45 ha. The property inspection was thoroughly photo-documented. Field observations were recorded on aerial maps and field forms. Landscaped sections/undeveloped sections of the study area are assumed to have retained archaeological potential, unless known to be have previously assessed or historically impacted. All land conditions were recorded as shown in Appendix A: Figure 14 and Appendix C: Photographs 1–57.

2.3.2 Record of Finds

Study Area	Map and Photos	Field Notes
Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study, formally Part of Lots 1, 2, 5, 19, 25, 26, and Lovejoy Lot, Mohawk Parsonage Lot, School Lot, Grand River Navigation Co. Lot, Eagles Nest Tract, Smith Tract, Lots A & B, Concession 4, and Town of Brantford, in the Geographic Township of Brantford, County of Brant, Now in the City of Brantford, Ontario	Photocopies of seven historical maps, one aerial photograph, six historical photographs, and 57 Stage 1 photographs	Stage 1 photo logs and field notes

Documentation related to the archaeological assessment of this project will be curated by Wood until such time that arrangements for their ultimate transfer to Her Majesty the Queen in right of Ontario, or other public institution, can be made to the satisfaction of the project owner, the MTCS and any other legitimate interest groups.

2.3.3 Results

A number of previous archaeological assessments have been completed within the study area. These are detailed above in Section 2.1.2 and are shown in Appendix A: Figure 8. Further fieldwork is recommended for certain sections of the study area that have been previously assessed, including lands within ASI’s 2011 study (PIF P057-607-2011), along with overlapping assessments conducted by ARA in 2014, 2017 and 2018, which document Site AgHa-181 (ARA 2014, 2017, 2018).

ARA’s Stage 1 & 2 study for the Greenwich Sewer (ARA 2016) found that most of the subject property was free from archaeological concern, with the exception of Site AgHb-371 and its associated buffer (ARA 2016). This site was found within lands that were previously assessed as part of ASI’s Stage 2 study that had recommended no additional fieldwork (ASI 1995).



No further fieldwork was recommended as a result of the Stage 1 to 3 assessments conducted on a parcel in the northern section of the study area (TMHC 2011a, b).

A large portion of the study area is located within a designated Cultural Heritage Landscape. In addition, sections of the study area have been designated as having archaeological potential according to the Archaeological Master Plan (City of Brantford, 2006). While these designations were noted, along with the presence of archaeological sites within the study area, the entire study area was photo-documented.

Archaeological potential has been removed from a portion of the study area in the west where railroad tracks converge (Appendix A: Figure 16 and Appendix C: Photo 57). In addition, it has been determined that a small portion along the northern bank of the canal, west of Newport Street, has been disturbed by buildings and a parking lot (Appendix A: Figure 16 and Appendix C: Photos 30–31). Although these areas were previously documented as having potential during initial survey in 2006, buildings and parking lots have since been constructed, effectively removing archaeological potential. Archaeological potential has also been removed from the area east of Murray Street on the northern bank of the canal. While the area appears to be green space, the vegetation has grown over a large concrete pad (Appendix A: Figure 16 and Appendix C: Photo 38).

The portion of the study area located south of the canal is brownfield or has been intensively developed (Appendix A: Figure 16 and Appendix C: Photos 23, 24, 26, 53, and 55). Shallow Creek Park also exhibits no archaeological potential as it was once underwater, and the land has been reclaimed (Active History 2011; Appendix A: Figure 16 and Appendix C: Photo 29).

The remainder of the study area consists of greenspace around structures and utility lines (Appendix A: Figure 16 and Appendix C: Photos 1, 3, 6, 8, 9, 11, 16, 27, 28, 32, 34, 36, 40, 41, 47, 51, 54, and 56), Mohawk Park (Appendix A: Figure 16 and Appendix C: Photos 42–46), the greenspace on either side of the paved Brock's Route trail (Appendix A: Figure 16 and Appendix C: Photos 2, 4, 13, 15, 17, and 39), woodlot (Appendix A: Figure 16 and Appendix C: Photo 5), and the Arrowdale Public Golf Course (Appendix A: Figure 16 and Appendix C: Photo 56), has archaeological potential and warrants Stage 2 assessment (Appendix A: Figure 17).

2.4 Stage 1 Analysis and Conclusions

The study area is situated within a designated Cultural Heritage Landscape and along Mohawk Lake and Mohawk Canal. Portions of the study area have already been subjected to archaeological assessments which have resulted in the documentation of numerous sites. The Stage 1 background study and property inspection indicated that undisturbed portions of the study area have archaeological potential and warrant Stage 2 property assessment based on: 1) the presence of a natural water source, Mohawk Canal, within the study area; 2) the known presence of 317

registered archaeological sites within a 1-km radius, providing direct evidence that this general area had been exploited by both pre-contact Aboriginal and historic Euro-Canadian peoples; 3) the proximity of historical transportation routes, including the Mohawk Canal, Greenwich Street and Mohawk Streets; and 4) the previous identification of archaeological potential in the western portion, eastern portion, as well as in areas south of Mohawk Lake according to the City of Brantford Archaeological Potential Map (City of Brantford 2017; Appendix A: Figure 2).

On the basis of the Stage 1 property inspection and a review of recent land use history, Wood identified that: 1) 35% (81.65 hectares) of the study area consists of structures, railroad tracks, concrete lots, brownfield area, and reclaimed land (Shallow Creek Park) where it is assumed that archaeological potential has been removed; 2) 6% (14.75 hectares) is permanently wet, or now part of Mohawk Lake and Canal, and therefore has low archaeological potential; and 3) 59% (136.06 hectares) has archaeological potential and warrants Stage 2 assessment.

Of the 136.06 hectares that retain archaeological potential, 128.91 hectares are unploughable lands that should be assessed by means of test-pit survey, and 7.15 hectares are ploughable lands that should be assessed by means of pedestrian survey.

3.0 Recommendations

In light of the results presented above, the following recommendations are made, subject to the conditions outlined below and the advice on compliance with legislation provided in Section 4.0:

1. Stage 2 archaeological assessment in the form of a test-pit survey should be conducted within landscaped areas/woodlots (128.91 hectares) that retain archaeological potential, as shown in Appendix A: Figure 17. The test pits should be excavated by hand at regular 5-m intervals in a grid-pattern and to a depth of 5 cm into the subsoil. The stratigraphy of soils excavated during test pitting should be examined in order to detect cultural soil horizons and excavated soils are to be screened through 6-mm mesh to facilitate the recovery of artifacts.

The pattern and intensity of test pit placement may be altered due to changes in archaeological potential in different parts of a study area and/or the presence of disturbed soils indicating impacts to, or removal of, archaeological potential. Any such areas of disturbance should be evaluated and photo-documented.

If archaeological resources are found, their exact distribution should be documented and any diagnostic artifacts recovered and inventoried. Upon the discovery of cultural materials, the survey grid should be continued to determine whether there are enough archaeological resources to meet the criteria for making a recommendation to carry out Stage 3 assessment. In the event that insufficient archaeological resources are recovered, eight additional test pits are to be dug in a 2–2.5-m radius around the isolated positive test pit, followed by the hand excavation of a 1-m by 1-m test unit over the positive test pit. As with the test pits, soil fills within the test unit should be screened for artifacts through 6-mm mesh. These artifacts are to be recovered and recorded by provenience.

2. Stage 2 archaeological assessment in the form of a pedestrian survey at 5-m intervals should be conducted on open agricultural lands that retain archaeological potential (7.15 ha) as shown in Appendix A: Figure 17). These fields must first be freshly ploughed by means of mouldboard ploughing (and may require disk harrowing in heavy clay) to provide for at least 80% ground surface visibility. Prior to the pedestrian survey, the newly ploughed fields should also be allowed to weather through one heavy rainfall or several light rainfalls.

If archaeological resources are encountered, the 5-m transects should be decreased to 1-m over a minimum radius of 20 around the archaeological find(s) until the full extent of the scatter has been identified or the find is determined to be isolated. In the case of a discrete scatter of artifacts, all formal artifact types and diagnostic categories are to be collected, but enough undiagnostic artifacts should be left *in-situ* to allow them to be

relocated in the event that further assessment is required. The exact location of archaeological resources should be documented using one or more of a combination of: the Global Positioning System, topographic survey or other precision measurements. As with test-pit finds, surface finds should be recovered and recorded by provenience.

3. Stage 4 mitigation is warranted for Site AgHb-371, located within the study area. The following was recommended as the result of ARA's Stage 3 investigations:

The Stage 3 archaeological assessment of the proposed corridor at Findspot 1 yielded data which was clearly sufficient to trigger further Stage 4 work. Given that the existing sewer is in need of replacement, site impacts may be unavoidable. A Ministry of Culture-sanctioned strategy involving a mixture of both targeted Stage 4 excavations, within the corridor, and site avoidance and protection, for the remainder of Findspot 1, is strongly recommended. In the future, should any portion of these lands be threatened by construction activities a full Stage 4 excavation should be undertaken. (ARA 2014: 17).

4. Stage 4 mitigation is also warranted for Site AgHa-181, located within the study area. As a result of ARA's Stage 3 investigations, Findspots 1a, 1b, 1c, 1d, 1f, 1g, 2, 3, 4a, 5, 7, 9, 11 and 15 were recommended for Stage 4 mitigation of development impacts as follows: Block excavation, undisturbed midden documentation and mechanical topsoil removal for Findspots 1a, 1b, 1c, 1d, 1f and 1g; Block excavation and mechanical topsoil removal for Findspot 2; Feature excavation and mechanical topsoil removal for Findspots 3, 4a, 5, 11 and 15; and Block/feature excavation and mechanical topsoil removal for Findspot 9.
5. No further assessment is required at Site AgHb-217, located within the study area (MTCS 2019).
6. The remainder of the study area does not require further archaeological assessment as these lands have either been fully assessed or exhibit low archaeological potential due to permanently wet conditions or the prior removal of archaeological potential.

The above recommendations are subject to Ministry of Tourism, Culture and Sport approval, and it is an offence to alter any of the Study Area without Ministry of Tourism, Culture, and Sport concurrence.

No grading or other activities that may result in the destruction or disturbance of the Study Area is permitted until notice of Ministry of Tourism, Culture, and Sport approval has been received.

4.0 Advice on Compliance with Legislation

- a) This report is submitted to the Minister of Tourism, Culture and Sport as a condition of licensing in accordance with Part IV of the *Ontario Heritage Act, R.S.O. 1990, c 0.18*. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Tourism, Culture and Sport, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.
- b) It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such a time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeological Reports referred to in Section 65.1 of the *Ontario Heritage Act*.
- c) Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*.
- d) The *Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33* requires that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.
- e) Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the *Ontario Heritage Act* and may not be altered, or have artifacts removed from them, except by a person holding an archaeological license.

5.0 Assessor Qualifications

This report was prepared and reviewed by the undersigned, employees of Wood. Wood is one of North America's leading engineering firms, with more than 50 years of experience in the earth and environmental consulting industry. The qualifications of the assessors involved in the preparation of this report are provided in Appendix D.



6.0 Closure

This report was prepared for the exclusive use of the City of Brantford and is intended to provide a Stage 1 archaeological assessment of the Study Area. The property is located along the Mohawk Canal in the City of Brantford, Ontario. The study area was historically described as Part of Lots 1, 2, 5, 19, 25, 26, and Lovejoy Lot, Mohawk Parsonage Lot, School Lot, Grand River Navigation Co. Lot, Eagles Nest Tract, Smith Tract, Lots A and B, Concession 4, and the Town of Brantford, in the Geographic Township of Brantford, County of Brant.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third party. Should additional parties require reliance on this report, written authorization from Wood will be required. With respect to third parties, Wood has no liability or responsibility for losses of any kind whatsoever, including direct or consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

The report is based on data and information collected during the Stage 1 background study and property inspection conducted by Wood. It is based solely a review of historical information, a property reconnaissance conducted on 09 September 2019 and data obtained by Wood as described in this report. Except as otherwise maybe specified, Wood disclaims any obligation to update this report for events taking place, or with respect to information that becomes available to Wood after the time during which Wood conducted the archaeological assessment. In evaluating the property, Wood has relied in good faith on information provided by other individuals noted in this report. Wood has assumed that the information provided is factual and accurate. In addition, the findings in this report are based, to a large degree, upon information provided by the current owner/occupant. Wood accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

Wood makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.

This report is also subject to the further Standard Limitations contained in Appendix E.



We trust that the information presented in this report meets your current requirements. Should you have any questions, or concerns, please do not hesitate to contact the undersigned.

Respectfully Submitted,

**Wood Environment & Infrastructure,
a Division of Wood Canada Limited**

Prepared by,



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Senior Archaeologist

Reviewed by,



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Associate Archaeologist

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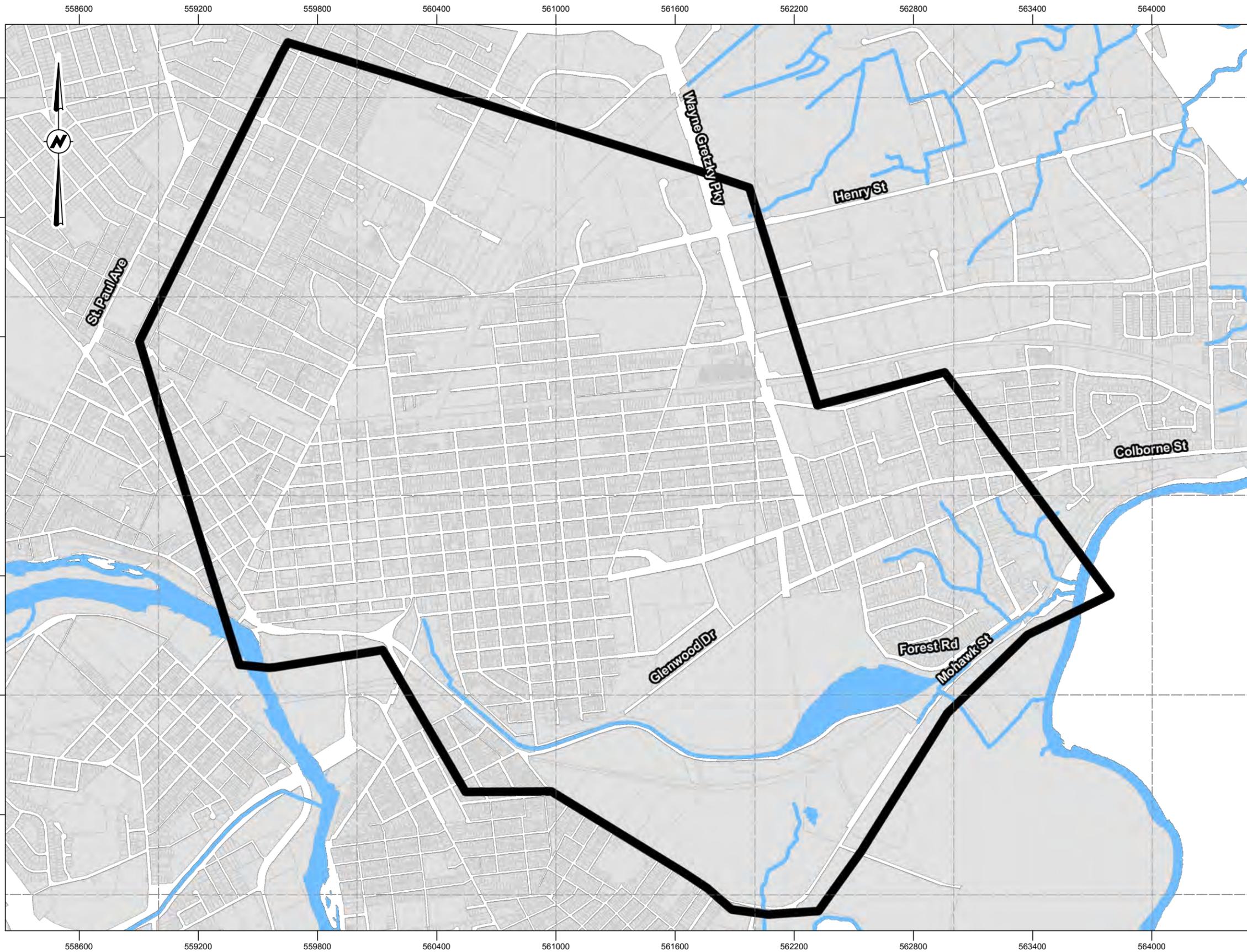
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Appendix A

Figures

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 MOHAWK LAKE AND MOHAWK CANAL FUNCTIONAL MASTER
 DRAINAGE AND RESTORATION STUDY
 GEOGRAPHIC TOWNSHIP OF BRANTFORD
 COUNTY OF BRANT
 NOW IN THE CITY OF BRANTFORD, ONTARIO

TITLE:
 MOHAWK LAKE AND CANAL
 SUBWATERSHED STUDY AREA

LEGEND:
 [Thick black line symbol] SUBWATERSHED STUDY AREA

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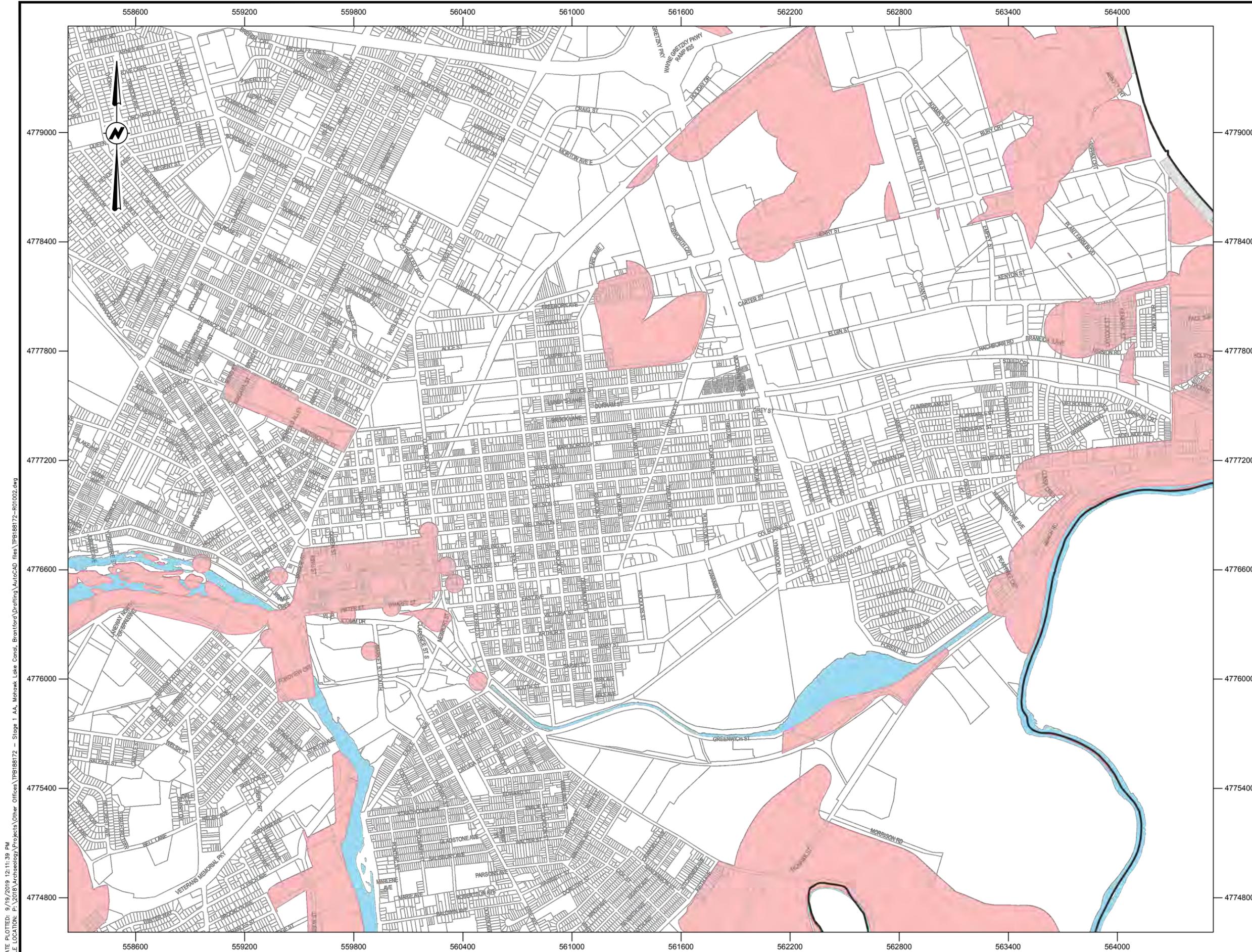
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 COUNTY OF BRANT
 NOW IN THE CITY OF BRANTFORD, ONTARIO

TITLE:
 CITY OF BRANTFORD
 ARCHAEOLOGICAL POTENTIAL MAP

LEGEND:
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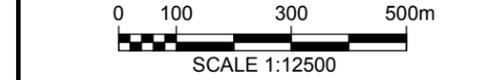
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 COUNTY OF BRANT
 NOW IN THE CITY OF BRANTFORD, ONTARIO

TITLE:
 MOHAWK LAKE DISTRICT STUDY AREA

LEGEND:
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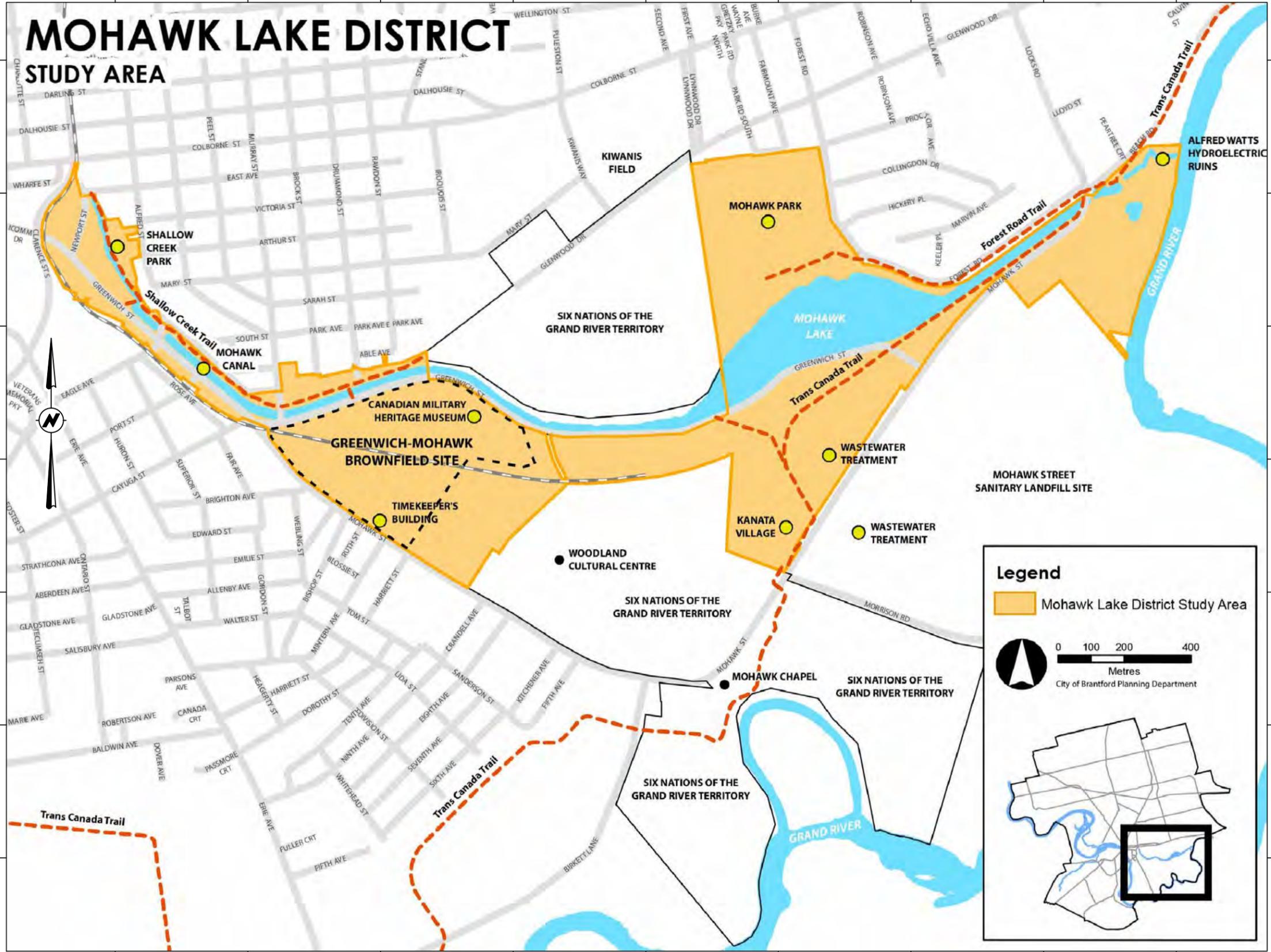
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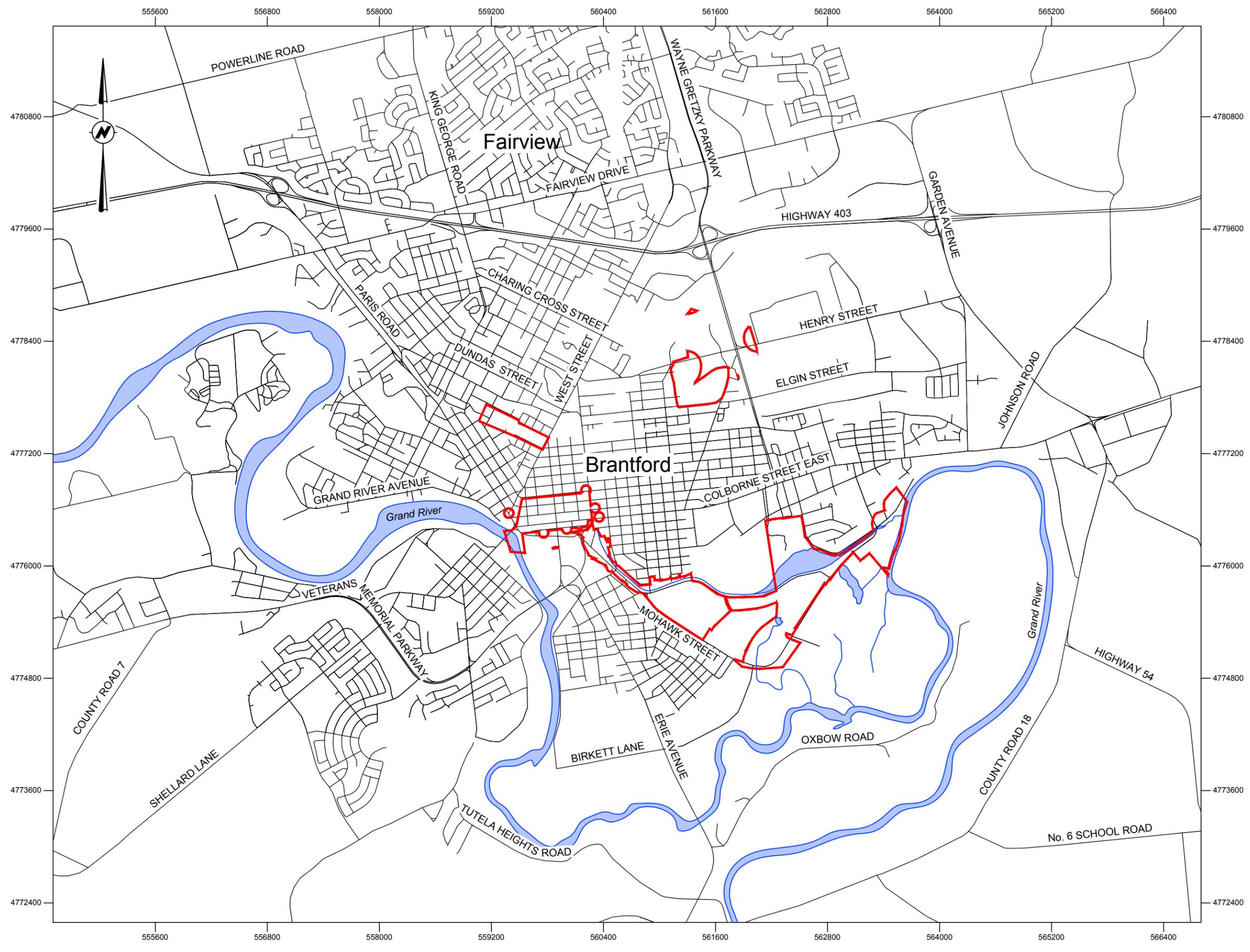
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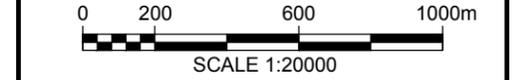
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 COUNTY OF BRANT
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TITLE:
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 LOCATION OF STUDY AREA

LEGEND:
 STUDY AREA

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TITLE:
 DEVELOPMENT PLAN

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- STUDY AREA
 - SUBWATERSHED STUDY AREA
 - MOHAWK LAKE DISTRICT STUDY AREA
 - ARCHAEOLOGICAL POTENTIAL (CITY OF BRANTFORD, ARCHAEOLOGICAL MASTER PLAN, 2006)

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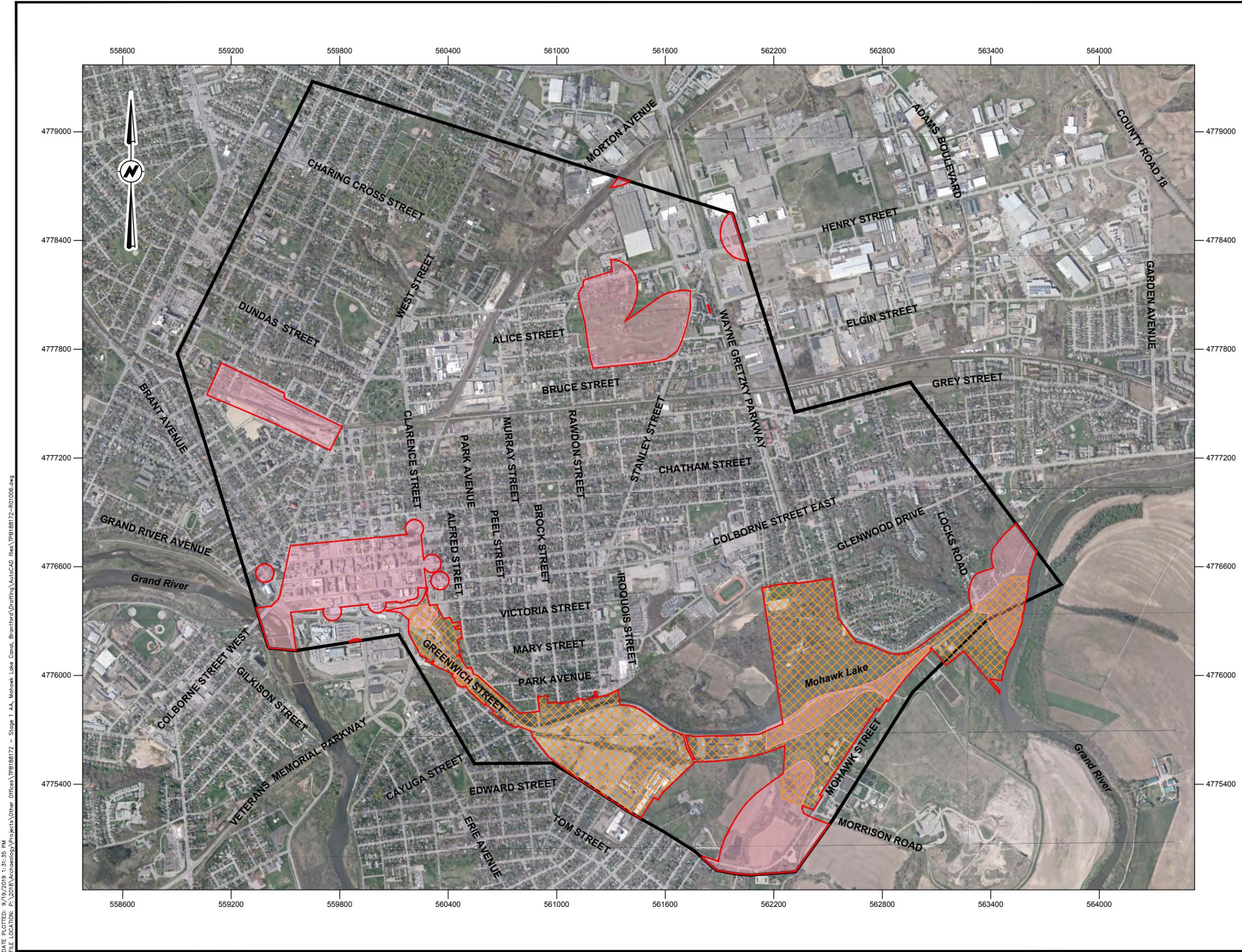
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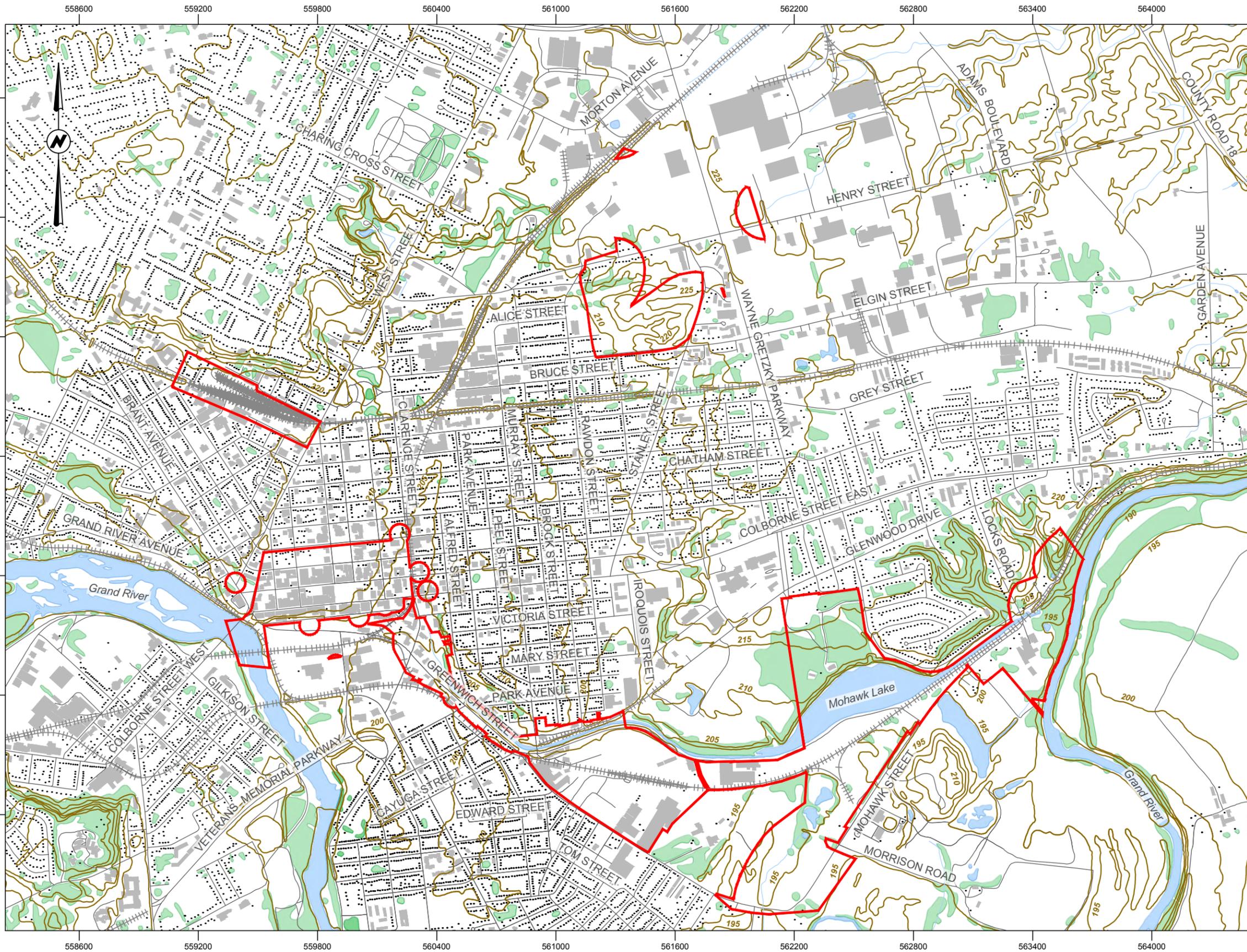


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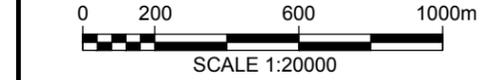


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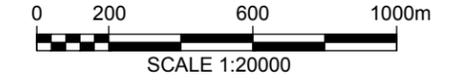
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NAD83	UTM Zone 17	TPB188172.6002
REV No:		FIGURE No:
0		7

PROJECT: STAGE 1 ARCHAEOLOGICAL ASSESSMENT
 MOHAWK LAKE AND MOHAWK CANAL FUNCTIONAL MASTER
 DRAINAGE AND RESTORATION STUDY
 GEOGRAPHIC TOWNSHIP OF BRANTFORD
 COUNTY OF BRANT
 NOW IN THE CITY OF BRANTFORD, ONTARIO

TITLE:
 PREVIOUS ARCHAEOLOGICAL ASSESSMENTS
 WITHIN AND NEAR STUDY AREA

- LEGEND:
- STUDY AREA (CURRENT INVESTIGATION)
 - STAGE 2 ARCHAEOLOGICAL ASSESSMENT (95GO-10; ASI 1995) - NO FURTHER FIELDWORK RECOMMENDED
 - STAGE 1-3 ARCHAEOLOGICAL ASSESSMENT (PIFs P007-096-2006, P007-101-2006; ARA 2007) - FURTHER STAGE 4 WORK RECOMMENDED FOR PORTIONS OF STUDY AREA
 - STAGE 1 ARCHAEOLOGICAL ASSESSMENT (PIF P057-607-2010; ASI 2010) - FURTHER FIELDWORK RECOMMENDED FOR PORTIONS OF STUDY AREA
 - STAGE 1-3 ARCHAEOLOGICAL ASSESSMENT (PIFs P083-122-2011, P083-169-2011; TMHC 2011a,b) - NO FURTHER FIELDWORK RECOMMENDED
 - STAGE 1 ARCHAEOLOGICAL ASSESSMENT (PIF P007-0596-2014; ARA 2014) - FURTHER STAGE 2 WORK RECOMMENDED
 - STAGE 1 ARCHAEOLOGICAL ASSESSMENT (PIF P219-0034-2017; WOOD 2017) - NO FURTHER FIELDWORK RECOMMENDED
 - STAGE 1-3 ARCHAEOLOGICAL ASSESSMENT (PIFs P027-0308-2017, P027-0314-2017; SJAI 2017a,b) - NO FURTHER FIELDWORK RECOMMENDED
 - STAGE 1-4 ARCHAEOLOGICAL ASSESSMENT (PIFs P089-0062-2014, P089-0075-2015, P089-0082-2015; ARA 2017, 2018) - FURTHER FIELDWORK RECOMMENDED
 - STAGE 1-2 ARCHAEOLOGICAL ASSESSMENT (PIFs P390-0234-2016, P029-0929-2017; ARCHEOWORKS 2017, 2018) - NO FURTHER FIELDWORK RECOMMENDED

NOTES:
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 ORIGINAL PAPER SIZE: 11 x 17.
 REFERENCES:
 2017 AERIAL PHOTOGRAPHS BY THE COUNTY OF BRANT;
 CANMAP STREETFILES V2008.4.



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PROJECT: STAGE 1 ARCHAEOLOGICAL ASSESSMENT
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 COUNTY OF BRANT
 NOW IN THE CITY OF BRANTFORD, ONTARIO

TITLE: 1828 PLAN OF SETTLEMENT
 ALONG THE GRAND RIVER SHOWING
 APPROXIMATE LOCATION OF STUDY AREA

LEGEND:
 [Red Box] STUDY AREA

NOTES:
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 REPORT No. TPB188172.6002.
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 REFERENCES:
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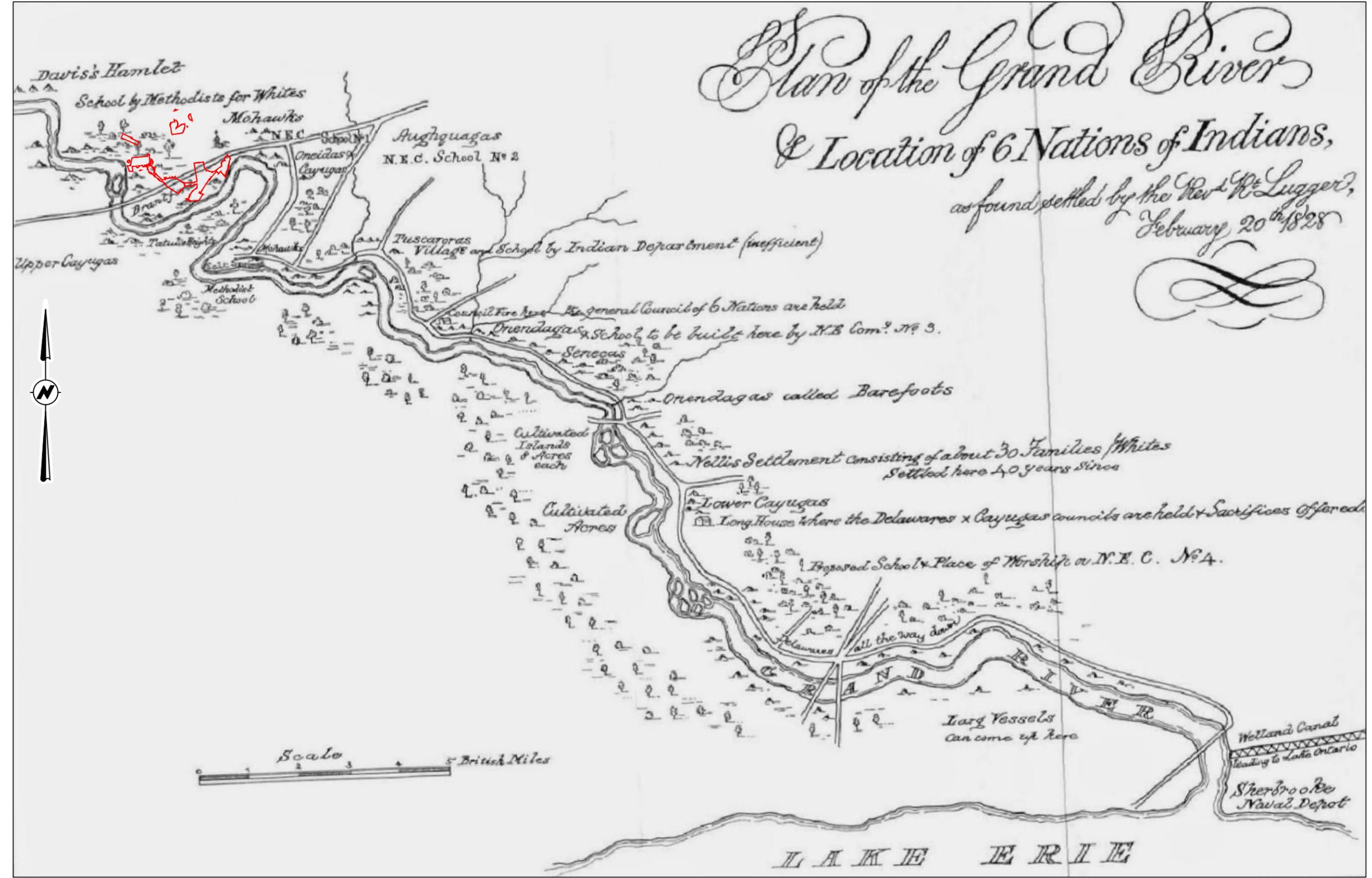


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Plan of the Grand River & Location of 6 Nations of Indians, as found settled by the Rev. W. Lugg, Feb. 20th 1828



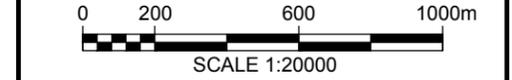
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 COUNTY OF BRANT
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TITLE: BURWELL'S 1833 MAP OF THE TOWN
 PLOT OF BRANTFORD AND SURROUNDING AREA
 SHOWING LOCATION OF STUDY AREA

LEGEND:
 STUDY AREA

NOTES:
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 REPORT No. TPB188172.6002.
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 L. BURWELL, 1833; CANMAP STREETFILES V2008.4.



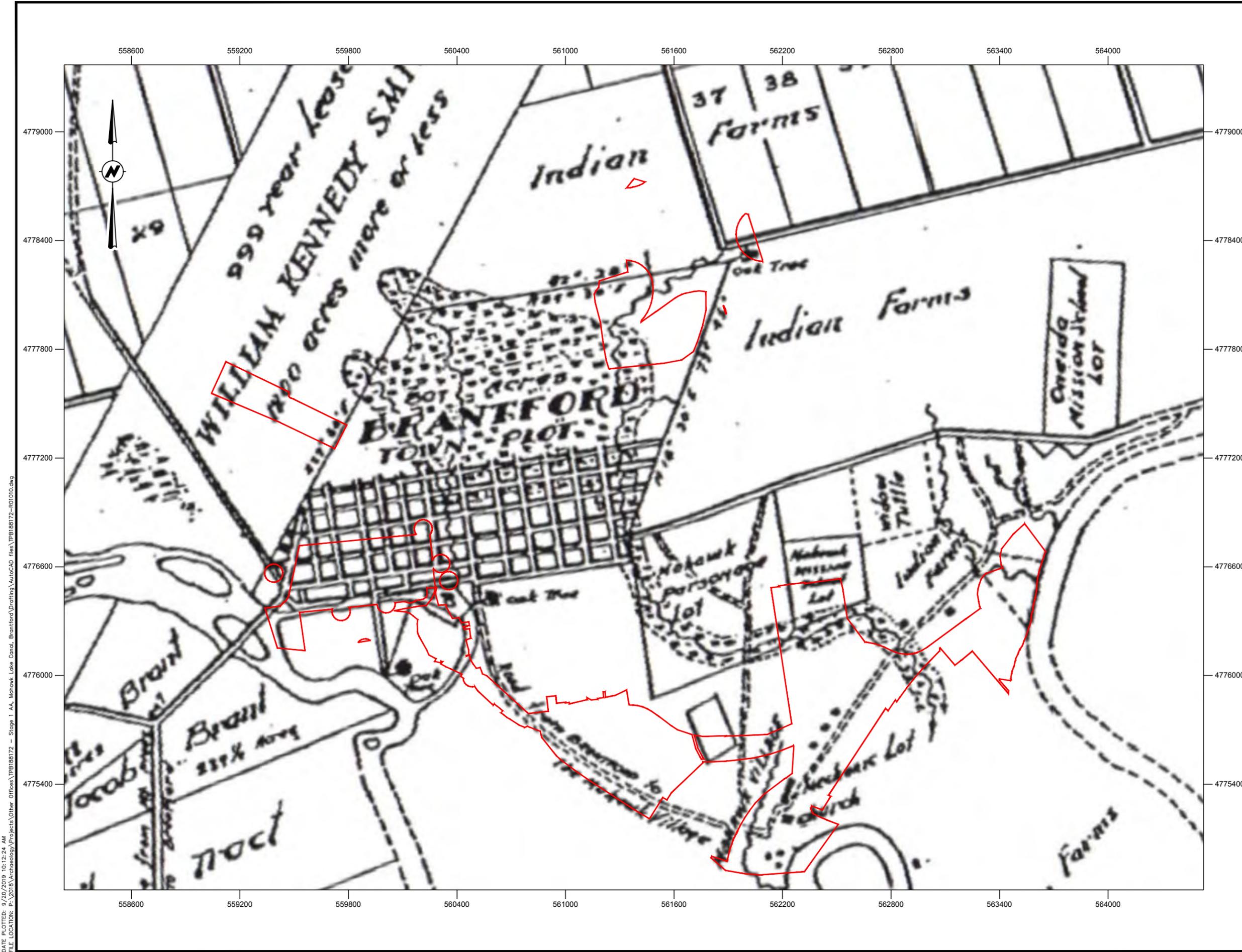
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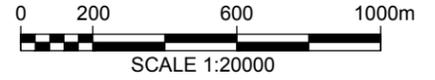
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 GEOGRAPHIC TOWNSHIP OF BRANTFORD
 COUNTY OF BRANT
 NOW IN THE CITY OF BRANTFORD, ONTARIO

TITLE:
 TREMAINE'S 1859 MAP OF THE COUNTY OF BRANT
 SHOWING LOCATION OF STUDY AREA

LEGEND:
 STUDY AREA

NOTES:
 THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE
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 REPORT No. TPB188172.6002.
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 ORIGINAL PAPER SIZE: 11 x 17.
 REFERENCES:
 G. TREMAINE, 1859; CANMAP STREETFILES V2008.4.



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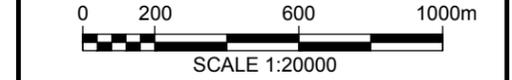
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PROJECT: STAGE 1 ARCHAEOLOGICAL ASSESSMENT
 MOHAWK LAKE AND MOHAWK CANAL FUNCTIONAL MASTER
 DRAINAGE AND RESTORATION STUDY
 GEOGRAPHIC TOWNSHIP OF BRANTFORD
 COUNTY OF BRANT
 NOW IN THE CITY OF BRANTFORD, ONTARIO

TITLE: PAGE & SMITH'S 1875 ILLUSTRATED
 HISTORICAL ATLAS OF THE COUNTY OF BRANT
 SHOWING LOCATION OF STUDY AREA

LEGEND:
 STUDY AREA

NOTES:
 THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE
 WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS
 REPORT No. TPB188172.6002.
 ALL LOCATIONS ARE APPROXIMATE.
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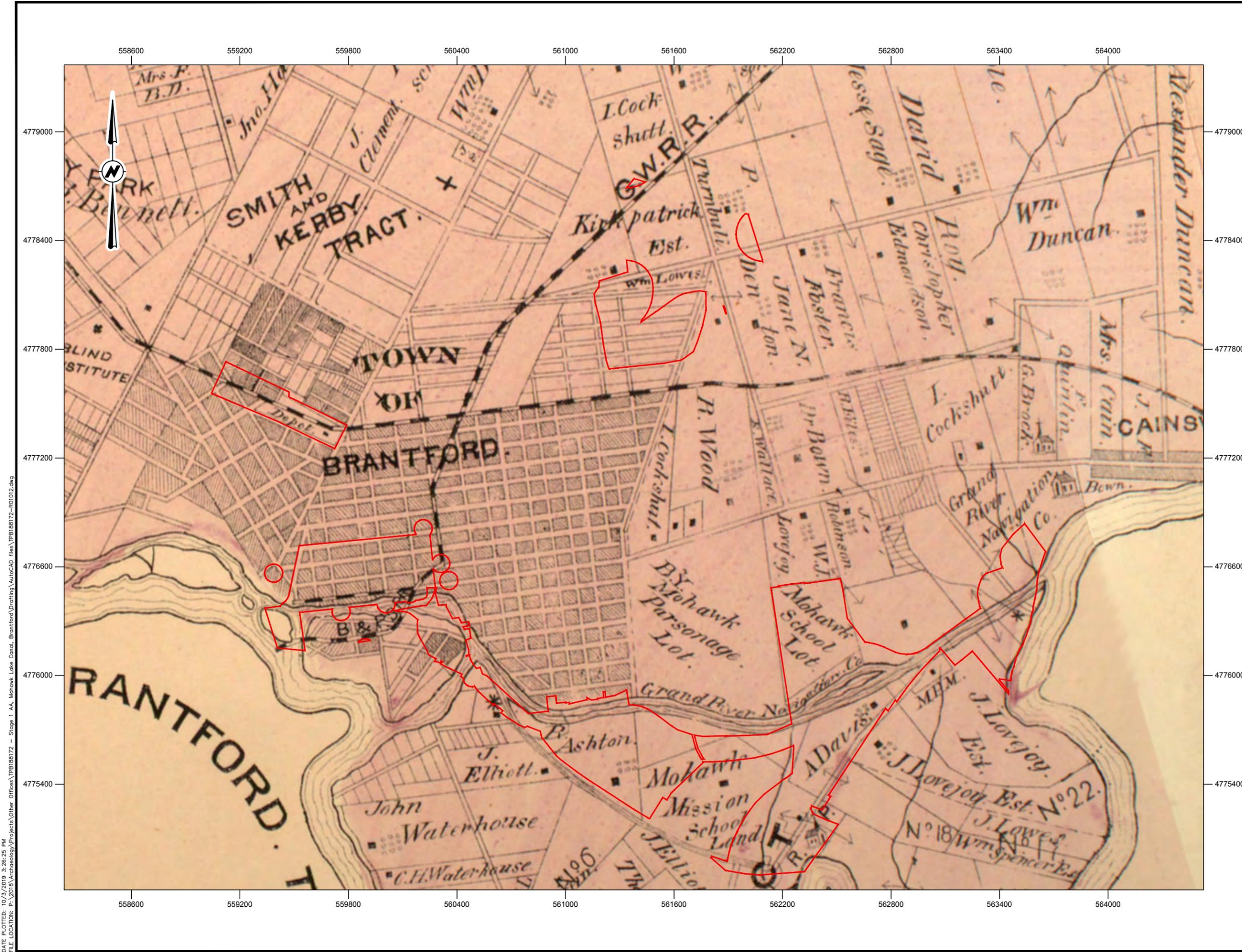
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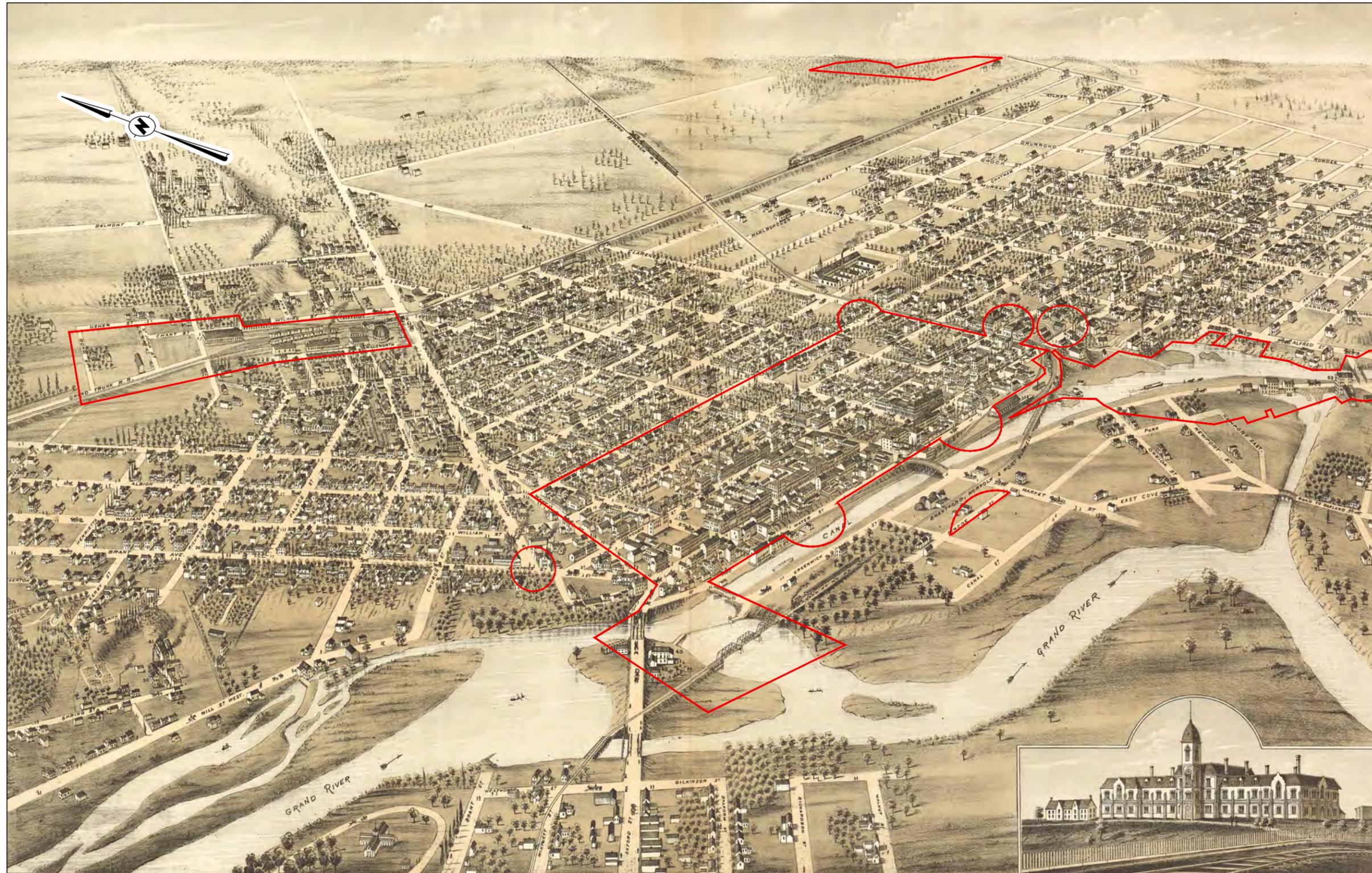


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PROJECT: STAGE 1 ARCHAEOLOGICAL ASSESSMENT
 MOHAWK LAKE AND MOHAWK CANAL FUNCTIONAL MASTER
 DRAINAGE AND RESTORATION STUDY
 GEOGRAPHIC TOWNSHIP OF BRANTFORD
 COUNTY OF BRANT
 NOW IN THE CITY OF BRANTFORD, ONTARIO

TITLE:
 1875 BIRD'S EYE DRAWING OF BRANTFORD
 SHOWING APPROX. LOCATION OF STUDY AREA

LEGEND:
 [Red outline] STUDY AREA



NOTES:
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 REPORT No. TPB188172.6002.
 ALL LOCATIONS ARE APPROXIMATE.
 ORIGINAL PAPER SIZE: 11 x 17.
 REFERENCES:
 H. BROSIUS, 1875; CANMAP STREETFILES V2008.4.

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- REFERENCES.**
- No. 1. Court House and Jail.
 - 2. Town Hall and Market.
 - 3. Post Office.
 - 4. Water Works.
 - 5. Gas Works.
 - 6. Grand Trunk R. R. Depot.
 - 7. Great Western R. R. Depot.
 - 8. Brantford, Norfolk and Port Burwell R. R. Depot.
 - 9. Bank of British North America.
 - 10. Bank of Montreal.
 - 11. Canadian Bank of Commerce.
 - A. Young Men's Christian Association Buildings.
 - 14. Grammar School.
 - 15. Ward Schools.
 - 16. Catholic School.
 - 17. Baptist Church.
 - 18. Tabernacle Baptist Church.
 - 19. Second Advent Church.
 - 20. Catholic Church.
 - 21. Grace, Church of England.
 - 22. St. Jude's, Church of England.
 - 23. Presbyterian Church.
 - 24. Zion Presbyterian Church.
 - 25. Wesleyan Methodist Church.
 - 26. 2d Wesleyan Methodist Church.
 - 27. Congregational Church.
 - 28. Primitive Church.
 - 29. African Church.
 - 30. Kerby House, J. C. Palmer, Prop.
 - 31. Commercial Hotel, Wm. E. Palmer, Prop.
 - 32. American Hotel, P. J. Pilkey, Prop.
 - 33. Farmers' Exchange, H. T. Westbrook, Prop.
 - 34. Bingham House, W. Earley, Prop.
 - 35. H. Batson's Hotel.
 - 36. E. Brockington's Hotel.
 - 37. Waterous Engine Works Co.
 - 38. W. E. Welding's Stoneware Works.
 - 39. B. C. Tisdale & Son's Stove Works.
 - 40. A. Harris, Son & Co's Kirby Mower & Reaper Works.
 - 41. Watts & Co's Soap Works.
 - 42. C. Jarvis' Putash Works.
 - 43. Alex. Howell's Agricultural Works.
 - 44. Yates & Stratford's Oil Works.
 - 45. Buck's Foundry.
 - 46. Wm. Pierce's Cabinet and Furniture Factory.
 - 47. W. Peterson's Cabinet and Furniture Factory.
 - 48. Leeming & Paterson's Confectionery & Cigar Factory.
 - 49. F. Ott's Sheepskin Factory.
 - 50. A. Morton's Dominion Starch Factory.
 - 51. M. Burns & Son's Planing Mill.
 - 52. Jas. Tut's Planing Mill.
 - 53. A. Watt's Flour Mills.
 - 54. D. Piewer's Kerby Flour Mills.
 - 55. Thos. Draper's Flour Mills.
 - 56. T. & J. Hex's Carriage Factory.
 - 57. A. Spence's Carriage Factory.
 - 58. W.P. Watt's Planing Mill.
 - 59. H. F. Witham's Soda Factory.
 - 60. Brantford Engine Works.
 - 61. Dominion Carriage Works.

BIRD'S EYE VIEW OF
BRANTFORD
 PROVINCE ONTARIO.
 CANADA.
 1875.

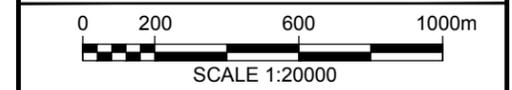
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PROJECT: STAGE 1 ARCHAEOLOGICAL ASSESSMENT
 MOHAWK LAKE AND MOHAWK CANAL FUNCTIONAL MASTER
 DRAINAGE AND RESTORATION STUDY
 GEOGRAPHIC TOWNSHIP OF BRANTFORD
 COUNTY OF BRANT
 NOW IN THE CITY OF BRANTFORD, ONTARIO

TITLE:
 1928 TOPOGRAPHIC MAP OF BRANTFORD
 SHOWING LOCATION OF STUDY AREA

LEGEND:
 STUDY AREA

NOTES:
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 REPORT No. TPB188172.6002.
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 REFERENCES:
 DEPARTMENT OF NATIONAL DEFENCE - GEOGRAPHICAL
 SECTION, 1908 (REPRINTED 1928); CANMAP STREETFILES
 V2008.4.



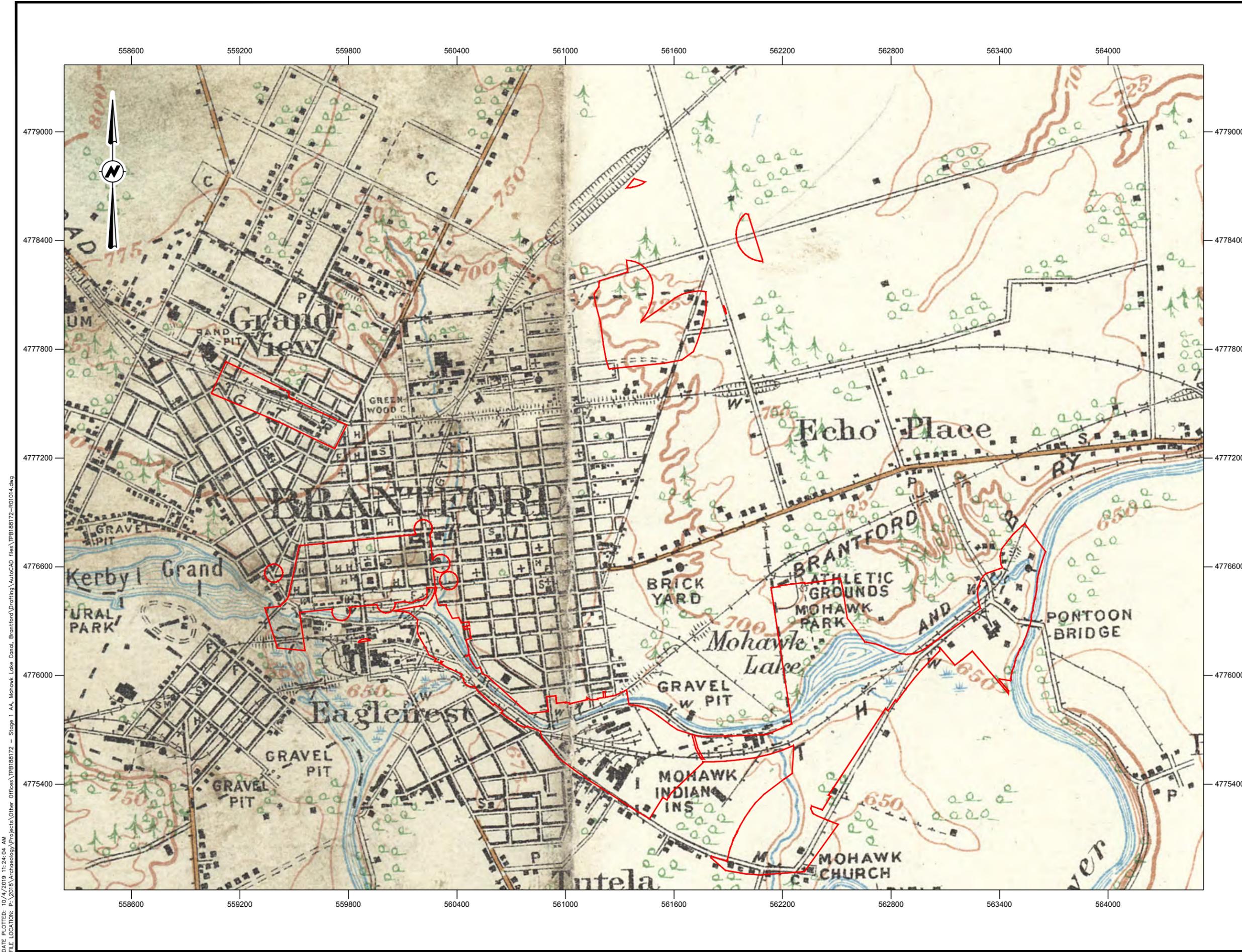
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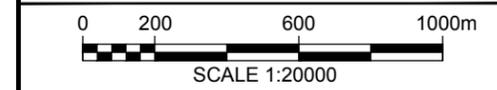
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PROJECT: STAGE 1 ARCHAEOLOGICAL ASSESSMENT
 MOHAWK LAKE AND MOHAWK CANAL FUNCTIONAL MASTER
 DRAINAGE AND RESTORATION STUDY
 GEOGRAPHIC TOWNSHIP OF BRANTFORD
 COUNTY OF BRANT
 NOW IN THE CITY OF BRANTFORD, ONTARIO

TITLE:
 1965 BRANTFORD FIRE INSURANCE PLAN
 SHOWING LOCATION OF STUDY AREA

LEGEND:
 STUDY AREA

NOTES:
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 REPORT No. TPB188172.6002.
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 CANADIAN UNDERWRITERS' BUREAU, 1965; CANMAP
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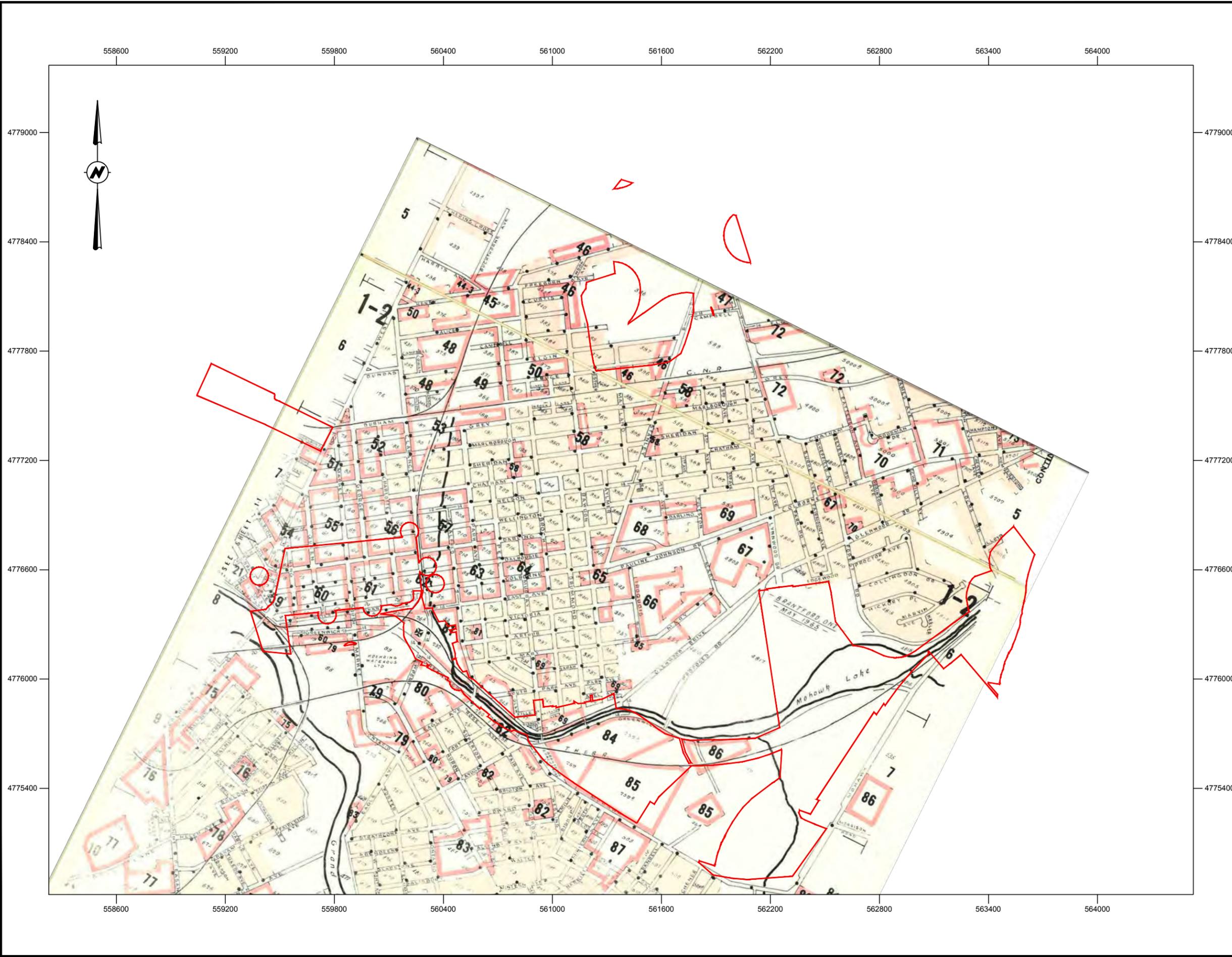
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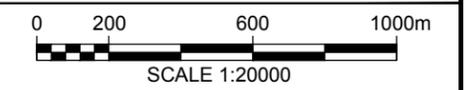


PROJECT: STAGE 1 ARCHAEOLOGICAL ASSESSMENT
 MOHAWK LAKE AND MOHAWK CANAL FUNCTIONAL MASTER
 DRAINAGE AND RESTORATION STUDY
 GEOGRAPHIC TOWNSHIP OF BRANTFORD
 COUNTY OF BRANT
 NOW IN THE CITY OF BRANTFORD, ONTARIO

TITLE:
 STAGE 1 RESULTS WITH PHOTOGRAPH LOCATIONS
 AND DIRECTIONS

- LEGEND:
- STUDY AREA
 - 📍 PHOTOGRAPH IDENTIFICATION, LOCATION, AND DIRECTION
 - LOW ARCHAEOLOGICAL POTENTIAL**
 - DISTURBED/PREVIOUSLY SUBJECT TO STAGE 2 ASSESSMENT - NO FURTHER WORK RECOMMENDED
 - PERMANENTLY WET - NO FURTHER WORK RECOMMENDED
 - ARCHAEOLOGICAL POTENTIAL**
 - UNPLOUGHABLE LAND - STAGE 2 AA RECOMMENDED (TO BE TEST PITTED AT 5m INTERVALS)
 - PLOUGHABLE LAND - STAGE 2 AA RECOMMENDED (TO BE PEDESTRIAN SURVEYED AT 5m INTERVALS)

NOTES:
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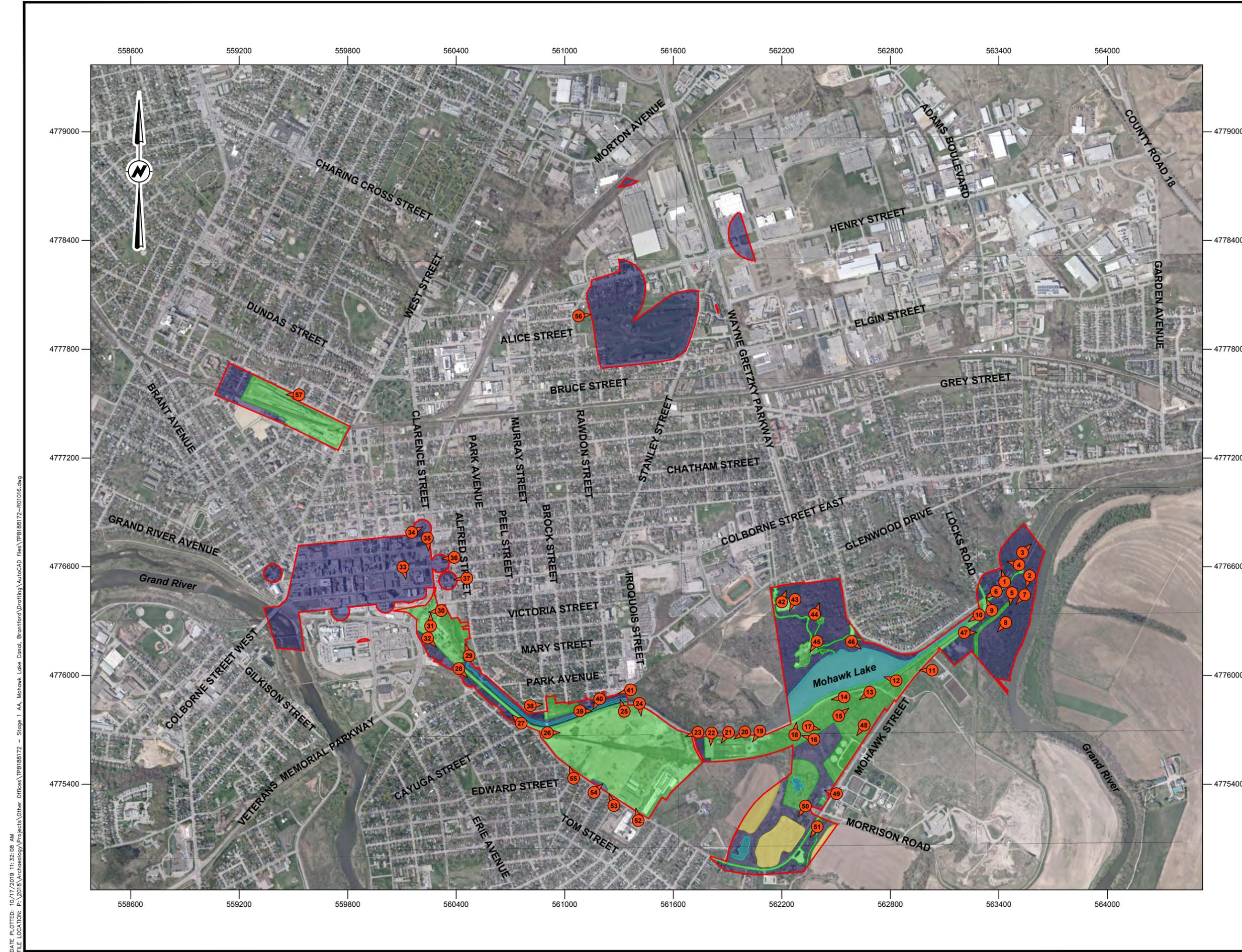
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PROJECT: STAGE 1 ARCHAEOLOGICAL ASSESSMENT
 MOHAWK LAKE AND MOHAWK CANAL FUNCTIONAL MASTER
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 GEOGRAPHIC TOWNSHIP OF BRANTFORD
 COUNTY OF BRANT
 NOW IN THE CITY OF BRANTFORD, ONTARIO

TITLE:
 SUGGESTED STAGE 2 STRATEGY

- LEGEND:
- STUDY AREA
 - LOW ARCHAEOLOGICAL POTENTIAL
 DISTURBED/PREVIOUSLY SUBJECT TO STAGE 2
 ASSESSMENT - NO FURTHER WORK RECOMMENDED
 - PERMANENTLY WET - NO FURTHER WORK
 RECOMMENDED
 - ARCHAEOLOGICAL POTENTIAL
 - UNPLOUGHABLE LAND - STAGE 2 AA RECOMMENDED
 (TEST PITTED AT 5m INTERVALS)
 - PLOUGHABLE LAND - STAGE 2 AA RECOMMENDED
 (PEDESTRIAN SURVEYED AT 5m INTERVALS)

NOTES:
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 ORIGINAL PAPER SIZE: 11 x 17.
 REFERENCES:
 2017 AERIAL PHOTOGRAPHS BY THE COUNTY OF BRANT;
 CANMAP STREETFILES V2008.4.



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NAD83	UTM Zone 17	TPB188172.6002
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Appendix B

Historic Photographs

APPENDIX B -HISTORIC PHOTOGRAPHIC RECORD

PROJECT NO. TPB188172

PROJECT Stage 1 Archaeological Assessment

LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario

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PHOTOGRAPH	1						
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Description							
Photograph of the Grand River Navigation Company Boathouse, date unknown.							

	<table border="1"><tr><td data-bbox="1088 1218 1347 1312">PHOTOGRAPH</td><td data-bbox="1347 1218 1459 1312">2</td></tr><tr><td colspan="2" data-bbox="1088 1312 1459 1919"><table border="1"><thead><tr><th data-bbox="1088 1312 1459 1386">Description</th></tr></thead><tbody><tr><td data-bbox="1088 1386 1459 1919">Photograph of the Mohawk Canal and tow path, circa 1914.</td></tr></tbody></table></td></tr></table>	PHOTOGRAPH	2	<table border="1"><thead><tr><th data-bbox="1088 1312 1459 1386">Description</th></tr></thead><tbody><tr><td data-bbox="1088 1386 1459 1919">Photograph of the Mohawk Canal and tow path, circa 1914.</td></tr></tbody></table>		Description	Photograph of the Mohawk Canal and tow path, circa 1914.
PHOTOGRAPH	2						
<table border="1"><thead><tr><th data-bbox="1088 1312 1459 1386">Description</th></tr></thead><tbody><tr><td data-bbox="1088 1386 1459 1919">Photograph of the Mohawk Canal and tow path, circa 1914.</td></tr></tbody></table>		Description	Photograph of the Mohawk Canal and tow path, circa 1914.				
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APPENDIX B - HISTORIC PHOTOGRAPHIC RECORD

PROJECT NO. TPB188172

PROJECT Stage 1 Archaeological Assessment

LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario

	PHOTOGRAPH	3
	Description Photograph of the Alfred Watts Power Building, dated 1919.	

	PHOTOGRAPH	4
	Description The Mohawk Canal dam washout after flooding, dated 1927.	

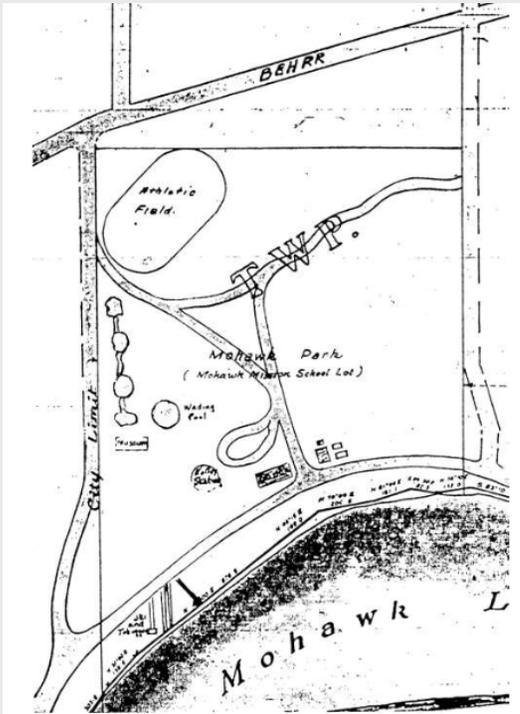
APPENDIX B -HISTORIC PHOTOGRAPHIC RECORD

PROJECT NO. TPB188172

PROJECT Stage 1 Archaeological Assessment

LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario

	<table border="1"> <tr> <td>PHOTOGRAPH</td> <td>5</td> </tr> </table>	PHOTOGRAPH	5
PHOTOGRAPH	5		
<table border="1"> <tr> <td style="text-align: center;">Description</td> </tr> <tr> <td> <p>Photograph of streetcar running through Mohawk Park, date unknown.</p> </td> </tr> </table>		Description	<p>Photograph of streetcar running through Mohawk Park, date unknown.</p>
Description			
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	<table border="1"> <tr> <td>PHOTOGRAPH</td> <td>6</td> </tr> </table>	PHOTOGRAPH	6
PHOTOGRAPH	6		
<table border="1"> <tr> <td style="text-align: center;">Description</td> </tr> <tr> <td> <p>1937 Survey of Mohawk Park</p> </td> </tr> </table>		Description	<p>1937 Survey of Mohawk Park</p>
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APPENDIX B -HISTORIC PHOTOGRAPHIC RECORD

PROJECT NO. TPB188172

PROJECT Stage 1 Archaeological Assessment

LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario



PHOTOGRAPH

7

Description

Photograph of the Cockshutt Plow Company factory prior to demolition, note the office and timekeeper's building, date unknown (Active History 2019)



PHOTOGRAPH

8

Description

Photograph of the Cockshutt Plow Company factory prior to demolition, note the office and timekeeper's building, date unknown (National Trust 2019)

Appendix C

Photographs

APPENDIX C - PHOTOGRAPHIC RECORD

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PROJECT Stage 1 Archaeological Assessment
LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario

	PHOTOGRAPH	1
	Description View of study area, south end of Peartree Court, facing northwest	

	PHOTOGRAPH	2
	Description View of study area, from the path located south of Beach Road, facing southwest.	

APPENDIX C - PHOTOGRAPHIC RECORD

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PROJECT Stage 1 Archaeological Assessment
LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario



PHOTOGRAPH

3

Description

View of study area, from the creek by Beach Road, facing northeast.



PHOTOGRAPH

4

Description

View of study area, located along Beach Road at the Brock Trail, facing northwest.

APPENDIX C - PHOTOGRAPHIC RECORD

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City of Brantford, Brant County, Ontario

	PHOTOGRAPH	5
	Description	
<p>View of wooded area, from Beach Road and Peartree Court, facing southwest.</p>		

	PHOTOGRAPH	6
	Description	
<p>View of study area, from the intersection of Beach Road and Peartree Court, facing southwest.</p>		

APPENDIX C - PHOTOGRAPHIC RECORD

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LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario

	PHOTOGRAPH	7
	Description	
<p>View of remains of Alfred Watts hydroelectric building, facing southwest.</p>		

	PHOTOGRAPH	8
	Description	
<p>Disturbed raised path, near Canal Lock at Alfred Watts building, facing southwest.</p>		

APPENDIX C - PHOTOGRAPHIC RECORD

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LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario

	PHOTOGRAPH	9
	Description	
<p>View of study area from the intersection of Locks Road, Forest Road and Beach Road, facing northwest.</p>		

	PHOTOGRAPH	10
	Description	
<p>View of Grand River, from Mohawk Street, facing southwest.</p>		

APPENDIX C - PHOTOGRAPHIC RECORD

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LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario

	PHOTOGRAPH	11
	Description View of power lines within study area, situated on Mohawk Street, east of Greenwich Street, facing northwest.	

	PHOTOGRAPH	12
	Description View of Mohawk Lake at the eastern end where it meets the Grand River, facing northwest.	

APPENDIX C - PHOTOGRAPHIC RECORD

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	PHOTOGRAPH	13
	Description View of trail by Greenwich Street, facing southwest.	

	PHOTOGRAPH	14
	Description View of parking lot within study area, facing southwest.	

APPENDIX C - PHOTOGRAPHIC RECORD

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City of Brantford, Brant County, Ontario

	PHOTOGRAPH 15
Description View of study area, with trail and forested area, facing northeast.	

	PHOTOGRAPH 16
Description View of the hydro corridor located within study area, facing northwest.	

APPENDIX C - PHOTOGRAPHIC RECORD

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	PHOTOGRAPH	17
	Description View from Greenwich path, facing southeast.	

	PHOTOGRAPH	18
	Description View from west end of Mohawk Lake, facing northeast.	

APPENDIX C - PHOTOGRAPHIC RECORD

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LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario

	PHOTOGRAPH	19
	Description View of disturbed parking lot, Brant Instore building, facing southwest.	

	PHOTOGRAPH	20
	Description View of disturbed parking lot and building south of Greenwich Street, facing southwest.	

APPENDIX C - PHOTOGRAPHIC RECORD

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City of Brantford, Brant County, Ontario

	PHOTOGRAPH	21
	Description View of brick building located east of the Canadian Military Heritage Museum, facing southwest.	

	PHOTOGRAPH	22
	Description View of the Canadian Military Heritage Museum building, facing southwest.	

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City of Brantford, Brant County, Ontario

	PHOTOGRAPH	23
	Description View of the brownfield area, facing southwest on Greenwich Street.	

	PHOTOGRAPH	24
	Description View of brownfield area, facing southeast on Greenwich Street.	

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PROJECT Stage 1 Archaeological Assessment

LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario

	<table border="1"> <tr> <td data-bbox="959 499 1203 556">PHOTOGRAPH</td> <td data-bbox="1203 499 1273 556">25</td> </tr> </table>	PHOTOGRAPH	25
	PHOTOGRAPH	25	
<table border="1"> <tr> <td data-bbox="959 579 1273 632">Description</td> </tr> <tr> <td data-bbox="959 632 1273 1066">View of Drummond Street Bridge and surrounding disturbance on Greenwich Street, facing northeast.</td> </tr> </table>	Description	View of Drummond Street Bridge and surrounding disturbance on Greenwich Street, facing northeast.	
Description			
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	<table border="1"> <tr> <td data-bbox="959 1245 1203 1302">PHOTOGRAPH</td> <td data-bbox="1203 1245 1273 1302">26</td> </tr> </table>	PHOTOGRAPH	26
	PHOTOGRAPH	26	
<table border="1"> <tr> <td data-bbox="959 1325 1273 1806">View of disturbance and brownfield at the intersection of Murray Street and Greenwich Street, facing southeast.</td> </tr> </table>	View of disturbance and brownfield at the intersection of Murray Street and Greenwich Street, facing southeast.		
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APPENDIX C - PHOTOGRAPHIC RECORD

PROJECT NO. TPB188172

PROJECT Stage 1 Archaeological Assessment

LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
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	PHOTOGRAPH	27
	Description View of Hip Cottage, facing northwest.	

	PHOTOGRAPH	28
	Description View of greenspace area that was designated as having high potential in the City of Brantford archaeological potential mapping, facing southeast.	

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LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario

	PHOTOGRAPH	29
	Description View of Shallow Creek Park from the south end, facing northwest.	

	PHOTOGRAPH	30
	Description View of office building along Newport Street, facing west.	

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	PHOTOGRAPH	31
	Description View of parking lot at Newport Street and Greenwich Street, facing north.	

	PHOTOGRAPH	32
	Description View of study area, facing southeast at open greenspace.	

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LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
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	<table border="1"><tr><td>PHOTOGRAPH</td><td>33</td></tr></table>	PHOTOGRAPH	33
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<table border="1"><tr><td>Description</td></tr><tr><td>View of study area situated at Charlotte Street and Dalhousie Street, facing southeast.</td></tr></table>		Description	View of study area situated at Charlotte Street and Dalhousie Street, facing southeast.
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	<table border="1"><tr><td>PHOTOGRAPH</td><td>34</td></tr></table>	PHOTOGRAPH	34
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<table border="1"><tr><td>Description</td></tr><tr><td>View of area designated as high potential, situated west of Nelson Street and Clarence Street, facing northeast.</td></tr></table>		Description	View of area designated as high potential, situated west of Nelson Street and Clarence Street, facing northeast.
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APPENDIX C - PHOTOGRAPHIC RECORD

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LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
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	<table border="1"><tr><td>PHOTOGRAPH</td><td>35</td></tr></table>	PHOTOGRAPH	35
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<table border="1"><tr><td>Description</td></tr><tr><td>View of study area, situated at Wellington Street and Clarence Street, facing southeast at railroad tracks.</td></tr></table>		Description	View of study area, situated at Wellington Street and Clarence Street, facing southeast at railroad tracks.
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	<table border="1"><tr><td>PHOTOGRAPH</td><td>36</td></tr></table>	PHOTOGRAPH	36
PHOTOGRAPH	36		
<table border="1"><tr><td>Description</td></tr><tr><td>View of area designated as high potential at Darling Street and Alfred Street, facing southwest.</td></tr></table>		Description	View of area designated as high potential at Darling Street and Alfred Street, facing southwest.
Description			
View of area designated as high potential at Darling Street and Alfred Street, facing southwest.			

APPENDIX C - PHOTOGRAPHIC RECORD

PROJECT NO. TPB188172

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LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario

	<table border="1"><tr><td>PHOTOGRAPH</td><td>37</td></tr></table>	PHOTOGRAPH	37
PHOTOGRAPH	37		
<table border="1"><tr><td>Description</td></tr><tr><td>View of study area on Dalhousie Street, east of Clarence Street, facing southwest.</td></tr></table>		Description	View of study area on Dalhousie Street, east of Clarence Street, facing southwest.
Description			
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	<table border="1"><tr><td>PHOTOGRAPH</td><td>38</td></tr></table>	PHOTOGRAPH	38
PHOTOGRAPH	38		
<table border="1"><tr><td>Description</td></tr><tr><td>View of brownfield lot, facing northeast.</td></tr></table>		Description	View of brownfield lot, facing northeast.
Description			
View of brownfield lot, facing northeast.			

APPENDIX C - PHOTOGRAPHIC RECORD

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PROJECT Stage 1 Archaeological Assessment

LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario

	PHOTOGRAPH	39
	Description View of walking trail on the north side of the canal, facing southeast.	

	PHOTOGRAPH	40
	Description View of greenspace located north of the canal, facing southwest.	

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City of Brantford, Brant County, Ontario

	PHOTOGRAPH	41
	Description View of study area along north side of canal, facing west.	

	PHOTOGRAPH	42
	Description View of study area within Mohawk Park, facing northeast toward soccer field.	

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City of Brantford, Brant County, Ontario

	PHOTOGRAPH	43
	Description View of Mohawk Park, facing southwest toward parking lot.	

	PHOTOGRAPH	44
	Description View of Mohawk Park, facing northeast toward wooded area.	

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PROJECT Stage 1 Archaeological Assessment

LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario

	<table border="1"><tr><td>PHOTOGRAPH</td><td>45</td></tr></table>	PHOTOGRAPH	45
PHOTOGRAPH	45		
<table border="1"><tr><td>Description</td></tr><tr><td>View of splashpad in Mohawk Park, facing southwest.</td></tr></table>		Description	View of splashpad in Mohawk Park, facing southwest.
Description			
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	<table border="1"><tr><td>PHOTOGRAPH</td><td>46</td></tr></table>	PHOTOGRAPH	46
PHOTOGRAPH	46		
<table border="1"><tr><td>Description</td></tr><tr><td>View of wooded area in Mohawk Park, facing southeast to Mohawk Lake</td></tr></table>		Description	View of wooded area in Mohawk Park, facing southeast to Mohawk Lake
Description			
View of wooded area in Mohawk Park, facing southeast to Mohawk Lake			

APPENDIX C - PHOTOGRAPHIC RECORD

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LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario

	PHOTOGRAPH	47
	Description View of greenspace on Mohawk Road, east of SPCA, facing east.	

	PHOTOGRAPH	48
	Description View of wastewater treatment tanks, facing southwest.	

APPENDIX C - PHOTOGRAPHIC RECORD

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LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
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	PHOTOGRAPH	49
	Description View of Kanata Village, facing northwest toward the reconstructed palisaded village.	

	PHOTOGRAPH	50
	Description View of agricultural field to west of Kanata Village, facing southwest.	

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	PHOTOGRAPH	51
	Description View of study area on Mohawk Street, facing southwest. Note raised berms.	

	PHOTOGRAPH	52
	Description View of buildings on Mohawk Street, facing northwest.	

APPENDIX C - PHOTOGRAPHIC RECORD

PROJECT NO. TPB188172

PROJECT Stage 1 Archaeological Assessment

LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario

PHOTOGRAPH	53		
	<table border="1"><tr><td data-bbox="961 579 1273 632">Description</td></tr><tr><td data-bbox="961 632 1273 1068">View of brownfield area, facing northwest from Mohawk Street.</td></tr></table>	Description	View of brownfield area, facing northwest from Mohawk Street.
Description			
View of brownfield area, facing northwest from Mohawk Street.			

PHOTOGRAPH	54		
	<table border="1"><tr><td data-bbox="961 1325 1273 1377">Description</td></tr><tr><td data-bbox="961 1377 1273 1814">View of the Cockshutt Plow Timekeeper's Building, facing northwest.</td></tr></table>	Description	View of the Cockshutt Plow Timekeeper's Building, facing northwest.
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View of the Cockshutt Plow Timekeeper's Building, facing northwest.			

APPENDIX C - PHOTOGRAPHIC RECORD

PROJECT NO. TPB188172

PROJECT Stage 1 Archaeological Assessment

LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
City of Brantford, Brant County, Ontario

PHOTOGRAPH	55		
	<table border="1"><tr><td data-bbox="961 579 1271 632">Description</td></tr><tr><td data-bbox="961 632 1271 1068">View of brownfield area, west of Cockshutt Plough Timekeeper's Building, facing northwest.</td></tr></table>	Description	View of brownfield area, west of Cockshutt Plough Timekeeper's Building, facing northwest.
Description			
View of brownfield area, west of Cockshutt Plough Timekeeper's Building, facing northwest.			

PHOTOGRAPH	56		
	<table border="1"><tr><td data-bbox="961 1318 1271 1371">Description</td></tr><tr><td data-bbox="961 1371 1271 1808">View of golf course, facing east.</td></tr></table>	Description	View of golf course, facing east.
Description			
View of golf course, facing east.			

APPENDIX C - PHOTOGRAPHIC RECORD

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LOCATION Mohawk Lake and Mohawk Canal Functional Master Drainage & Restoration Study
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	<table border="1"><tr><td>PHOTOGRAPH</td><td>57</td></tr></table>	PHOTOGRAPH	57
PHOTOGRAPH	57		
<table border="1"><thead><tr><th data-bbox="963 583 1273 636">Description</th></tr></thead><tbody><tr><td data-bbox="963 636 1273 1068">View of railroad tracks and train depot, facing west.</td></tr></tbody></table>		Description	View of railroad tracks and train depot, facing west.
Description			
View of railroad tracks and train depot, facing west.			

Appendix D

Assessor Qualifications

Assessor Qualifications

Dr. Shaun Austin, Ph.D., Associate Archaeologist – Dr. Austin is the Senior Advisor to Wood's cultural heritage resources group and is based in the Burlington Office. He has been working in Canadian archaeology and heritage since 1976 and as an archaeological and heritage consultant in Ontario since 1987. He is a dedicated cultural heritage consultant with repeated success guiding projects through to completion to the satisfaction of the development proponent, the cultural heritage community and all other stakeholder groups. His areas of interest and expertise include pre-contact Aboriginal lithics and ceramics. Dr. Austin holds a Professional Archaeology License (P141) issued by the Ontario Ministry of Tourism, Culture and Sport, is MTO RAQs certified in Archaeology/Heritage and is a member of the Ontario Association of Professional Archaeologists.

Barbara Slim, M.A., Senior Archaeologist – Ms. Slim is a Senior Archaeologist with more than 13 years of experience in the archaeological field and has participated in and directed numerous Stage 1 to 4 archaeological assessments in Ontario. As a founding member of the Wood's archaeology team, Ms. Slim has performed every aspect of project execution, from client relations, project design and First Nation's engagement to MTCS clearance. The majority of the above-mentioned projects have included First Nations involvement. In addition to her archaeological experience, Ms. Slim has several years of experience in conducting environmental investigations and occupational hygiene assessments. Furthermore, she currently serves as Health & Safety Coordinator for her office. Her diverse background with multidisciplinary projects has highlighted her abilities as an effective team member and innovator. Ms. Slim holds a Professional Archaeology License (P348) issued by the Ontario MTCS, is a member of the Ontario Association of Professional Archaeologists and Ontario Archaeological Association.

Kristy O'Neal, M.A., Senior Archaeologist – Ms. O'Neal is a Senior Archaeologist at Wood with over 20 years of archaeology consulting experience in Ontario. Ms. O'Neal has supervised a wide variety of Stage 1 through 4 archaeological assessments throughout Ontario, with a focus on both pre-contact and Euro-Canadian settlements. Pre-Contact projects have involved First Nations consultation. Ms. O'Neal has a strong background in cultural material analysis and has extensive experience with large complex stratified Aboriginal sites situated within often compromised urban context. She holds a Master's Degree in Bioarchaeology and a Bachelor of Arts Degree in Anthropology from the University of Western Ontario, where she received a Gold Medal Award. Ms. O'Neal's areas of interest and expertise include the archaeological prehistory and history of southwestern Ontario, with focus on the Middle Woodland period and changes in Aboriginal weapon technology. Ms. O'Neal holds a Professional Archaeology Licence (P066) issued by the Ontario Ministry of Tourism, Culture and Sport, and is a member of the Ontario Archaeology Society.

Nicole Gavin, M.A., Staff Archaeologist – Ms. Gavin has worked as a consulting archaeologist since 2006. She has helped to supervise archaeological fieldwork throughout southern Ontario, has overseen laboratory artifact processing for numerous pre-contact Indigenous and historic Euro-Canadian sites, and has prepared Stage 1 through 4 archaeological assessment reports for many of these projects. Her current research interests include Ontario pre-contact Indigenous archaeological sites, ancient Greek and Latin languages, and underwater archaeology. Ms. Gavin received a Bachelor's Degree in Classics from York University and a Master's Degree in Classics, with a specialization in Art and Archaeology from Brock University. She holds an Applied Research License (R353) issued by the Ontario Ministry of Tourism, Culture and Sport.

Appendix E

Limitations

Limitations

1. The work performed in the preparation of this report and the conclusions presented are subject to the following:
 - (a) The Standard Terms and Conditions which form a part of our Professional Services Contract;
 - (b) The Scope of Services;
 - (c) Time and Budgetary limitations as described in our Contract; and,
 - (d) The Limitations stated herein.
2. No other warranties or representations, either expressed or implied, are made as to the professional services provided under the terms of our Contract, or the conclusions presented.
3. The conclusions presented in this report were based, in part, on visual observations of the Study Area. Our conclusions cannot and are not extended to include those portions of the Study Area which were not reasonably available, in Wood Environment & Infrastructure's opinion, for direct observation.
4. The potential for archaeological resources, and any actual archaeological resources encountered, at the Study Area were assessed, within the limitations set out above, having due regard for applicable heritage regulations as of the date of the inspection.
5. Services including a background study and fieldwork were performed. Wood Environment & Infrastructure's work, including archival studies and fieldwork, were completed in a professional manner and in accordance with the Ministry of Tourism, Culture and Sport's guidelines. It is possible that unforeseen and undiscovered archaeological resources may be present at the Study Area.
6. The utilization of Wood Environment & Infrastructure's services during the implementation of any further archaeological work recommended will allow Wood Environment & Infrastructure to observe compliance with the conclusions and recommendations contained in the report. Wood Environment & Infrastructure's involvement will also allow for changes to be made as necessary to suit field conditions as they are encountered.
7. This report is for the sole use of the parties to whom it is addressed unless expressly stated otherwise in the report or contract. Any use which any third party makes of the report, in whole or in part, or any reliance thereon, or decisions made based on any information or conclusions in the report, is the sole responsibility of such third party. Wood Environment & Infrastructure accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a result of actions taken or not taken or decisions made in reliance on the report or anything set out therein.
8. This report is not to be given over to any third-party other than a governmental entity, for any purpose whatsoever without the written permission of Wood Environment & Infrastructure, which shall not be unreasonably withheld.

Original Report: Stage 1 Archaeological Assessment Supplementary Documentation

Mohawk Lake and Mohawk Canal Functional Master Drainage and Restoration Study, formally Part of Lots 1, 2, 5, 19, 25, 26, and Lovejoy Lot, Mohawk Parsonage Lot, School Lot, Grand River Navigation Co. Lot, Eagles Nest Tract, Smith Tract, Lots A and B, Concession 4, and the Town of Brantford, in the Geographic Township of Brantford, County of Brant, Now in the City of Brantford, Ontario
Project # TPB188172

Archaeological Consulting License # P348 (Slim)
P.I.F. # P348-0068-2019 (Stage 1)

{Associated with PIFs: 95GO-10 (Stage 2), P057-607-2010 (Stage 1), P083-122-2011 (Stages 1 & 2), P083-169-2011 (Stage 3), P007-0596-2014 (Stage 1), P089-0062-2014 (Stage 4), P089-0075-2015 (Stages 1 & 2), P809-0082-2015 (Stage 3), P007-096-2016 (Stages 1 & 2), P007-101-2016 (Stage 3), P027-0308-2017 (Stages 1 & 2), P027-314-2017 (Stage 3)}

Prepared for:

City of Brantford and The Ontario Ministry of Tourism, Culture and Sport
100 Wellington Square, Brantford, Ontario N3T 2M2

24-Oct-19

SUPPLEMENTARY DOCUMENTATION

SECTION 1: FIGURES

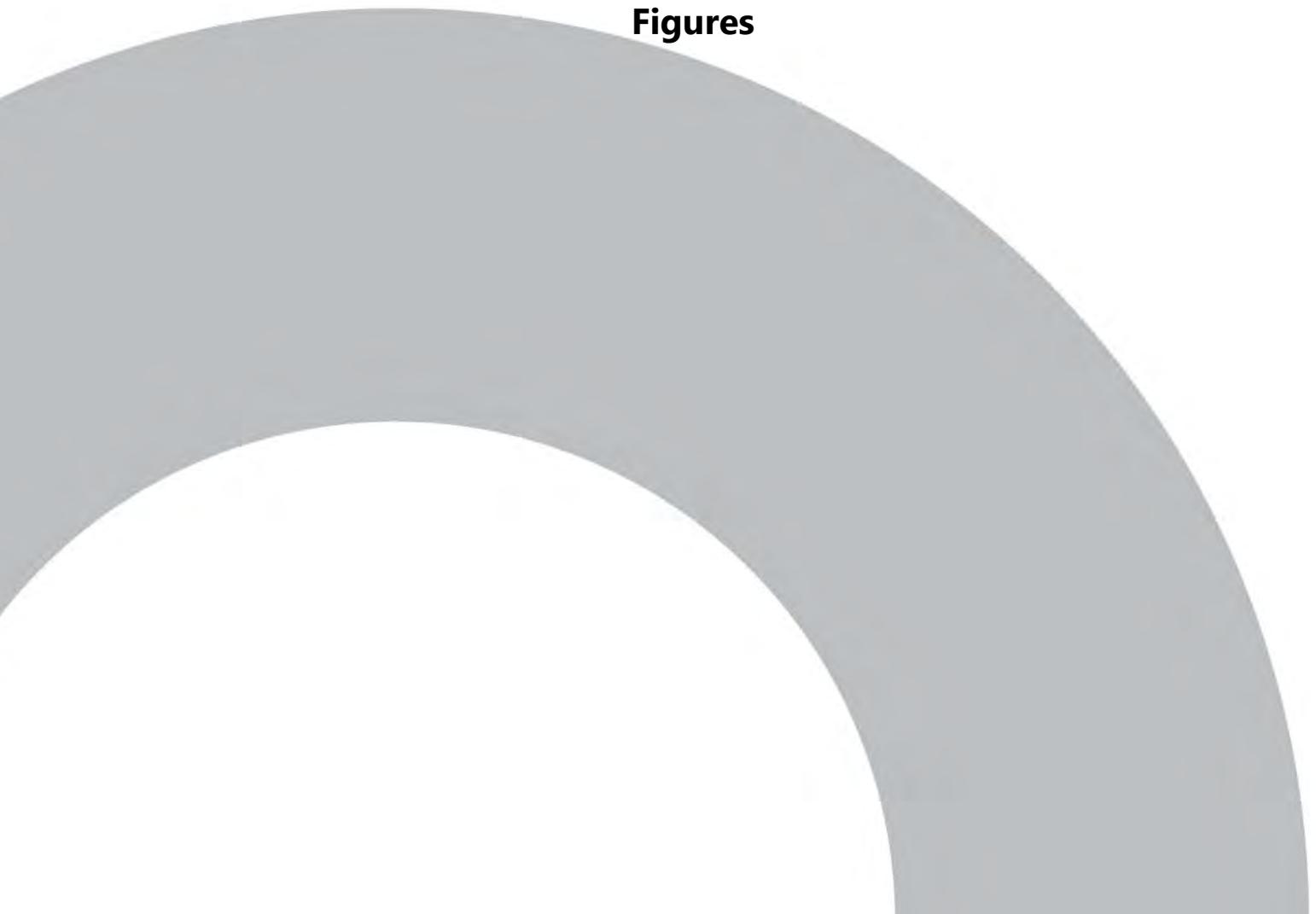
Figure 18 Map Showing Registered Archaeological Sites and Historical Features of Interest within 250 m of the Study Area



wood.

Section 1

Figures

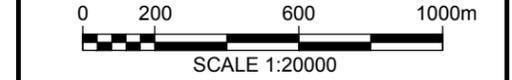


PROJECT: STAGE 1 ARCHAEOLOGICAL ASSESSMENT
 MOHAWK LAKE AND MOHAWK CANAL FUNCTIONAL MASTER
 DRAINAGE AND RESTORATION STUDY
 GEOGRAPHIC TOWNSHIP OF BRANTFORD
 COUNTY OF BRANT
 NOW IN THE CITY OF BRANTFORD, ONTARIO

TITLE:
 MAP SHOWING REGISTERED ARCHAEOLOGICAL
 SITES WITHIN 250m OF STUDY AREA

LEGEND:
 [Red outline] STUDY AREA
 [Black dot] FEATURE OF HISTORICAL INTEREST
 [Yellow dot] NO FURTHER AA RECOMMENDED
 [Green dot] STAGE 4 AA REQUIRED
 [Cyan dot] UNKNOWN ARCHAEOLOGICAL STATUS

NOTES:
 THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE
 WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS
 REPORT No. TPB188172.6002.
 ALL LOCATIONS ARE APPROXIMATE.
 ORIGINAL PAPER SIZE: 11 x 17.
 REFERENCES:
 2017 AERIAL PHOTOGRAPHS BY THE COUNTY OF BRANT;
 CANMAP STREETFILES V2008.4.



The Corporation of the City of Brantford
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Wood
 Environment & Infrastructure Solutions
 201 KING STREET, 4TH FLOOR
 LONDON, ONTARIO, N6A 1C9
 519-681-2400



DWN BY:	CHK'D BY:	DATE:
SJL	KO	SEP. 17, 2019
DATUM:	PROJECTION:	PROJECT No:
NAD83	UTM Zone 17	TPB188172.6002
REV No:		FIGURE No:
0		18



DATE PLOTTED: 10/11/2019 7:20:24 PM
 FILE LOCATION: P:\2018 Archaeology\Projects\Stage 1_AA_Mohawk Lake Canal_Brantford\Drafting\AutoCAD_files\TPB188172-R01018.dwg