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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



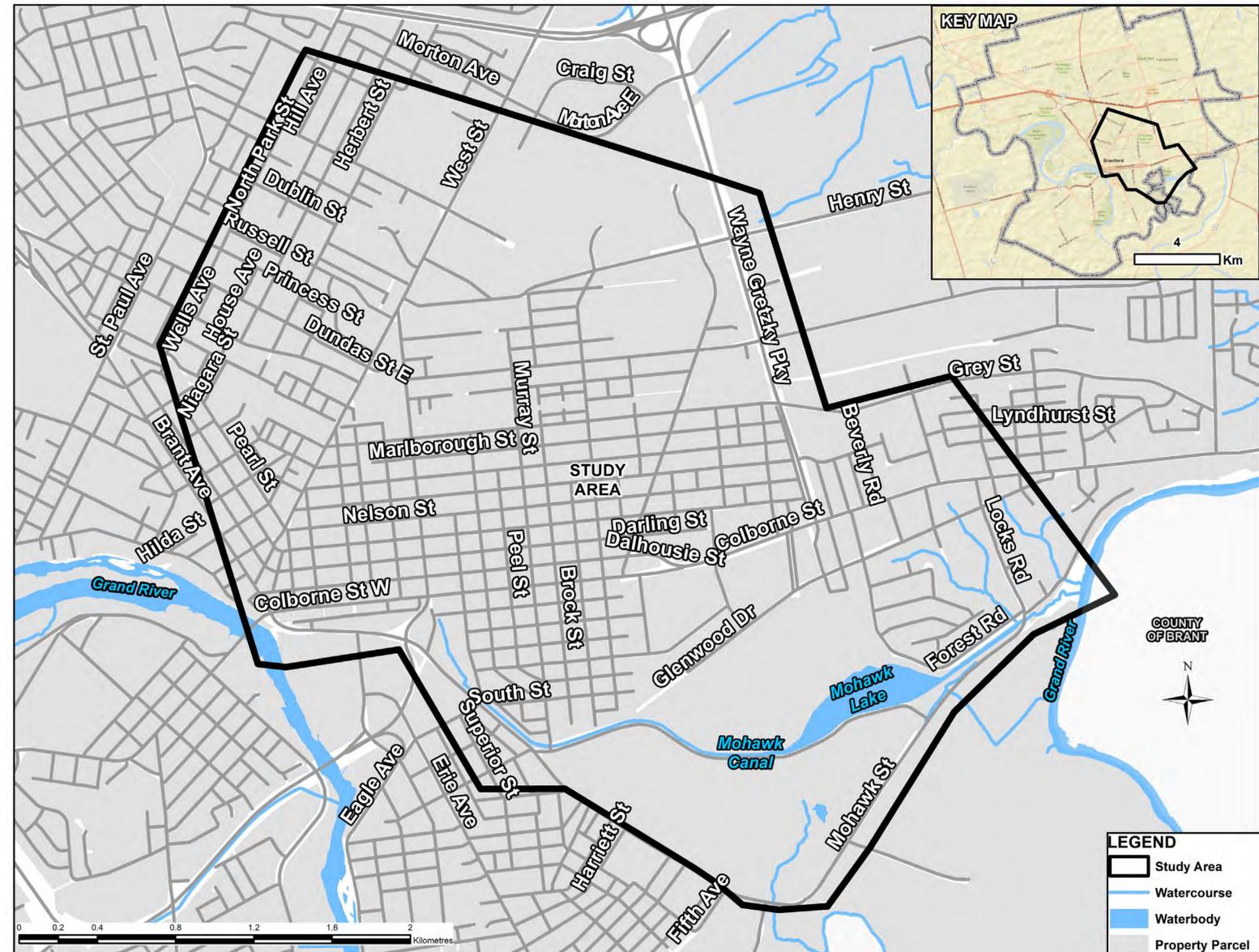
Study Area and Purpose

The purpose of the Study is to consider ways to improve the environmental quality of Mohawk Lake and Mohawk Canal by providing:

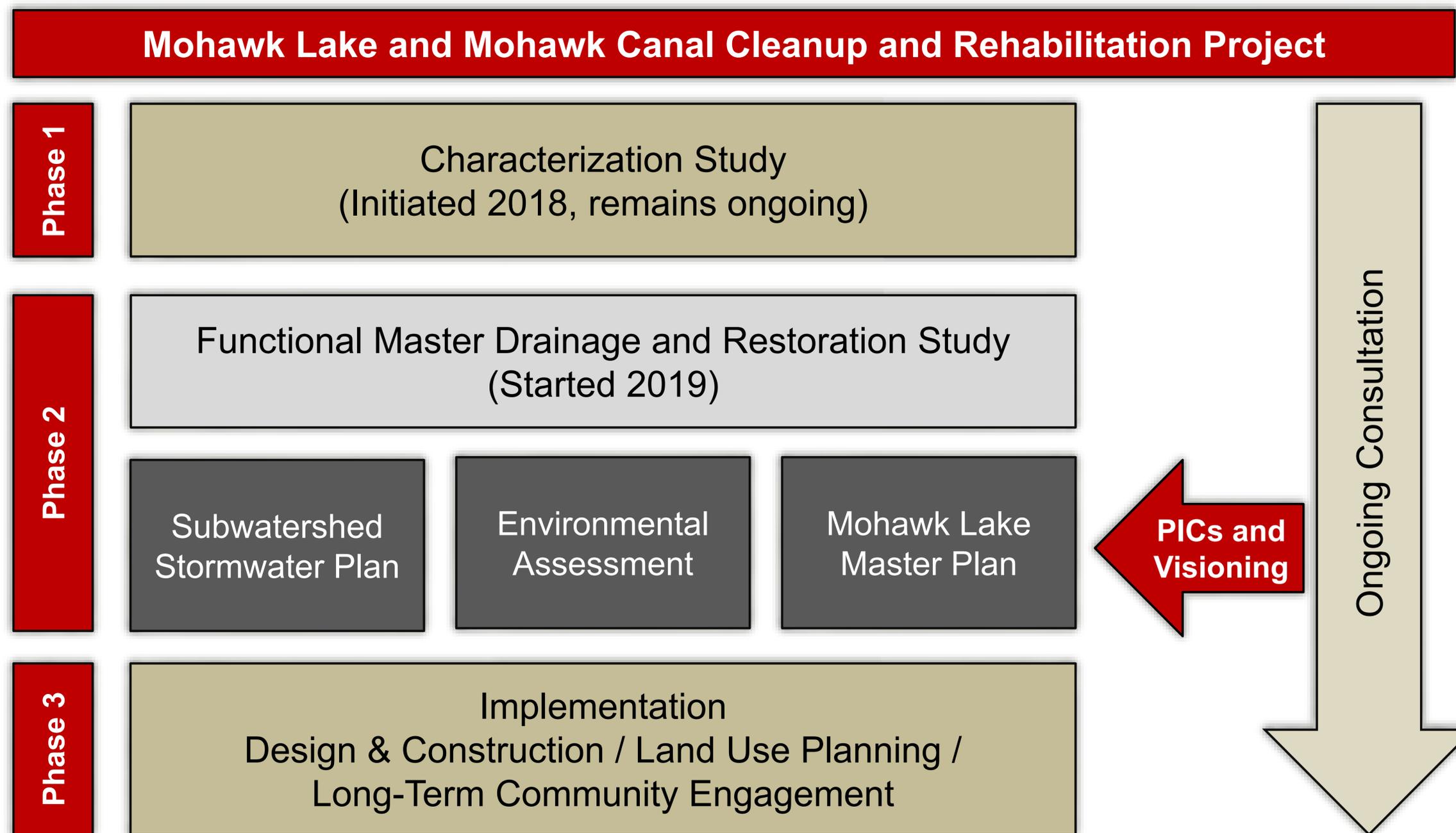
- Improved water quality conditions
- Enhanced recreational opportunities
- Enhanced fish & wildlife habitat

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

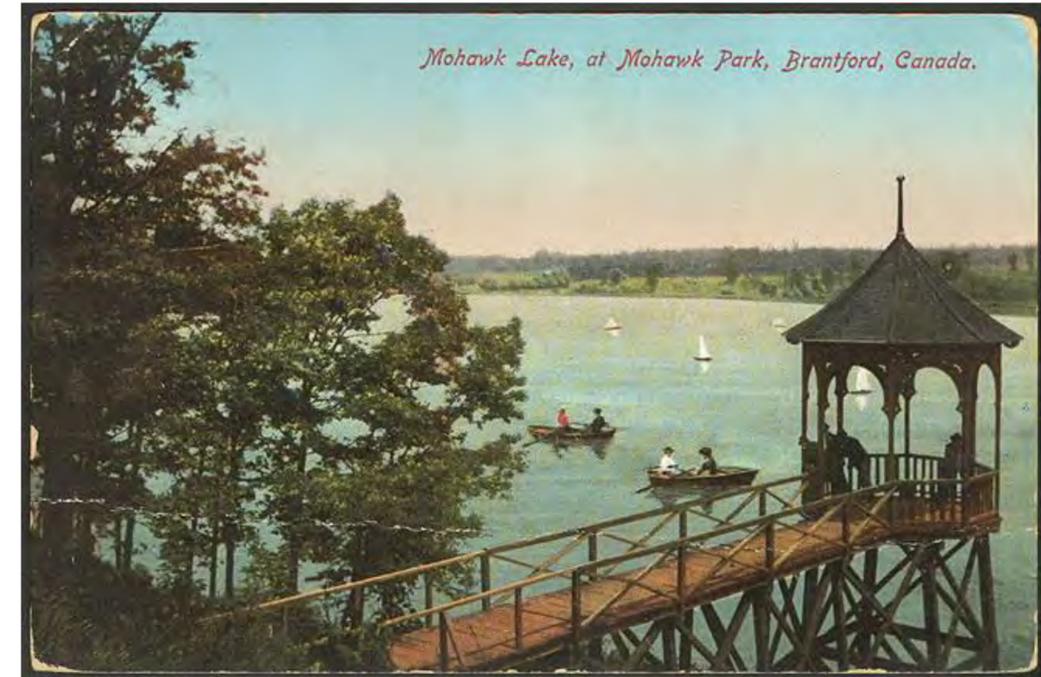


**We
are
here**



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



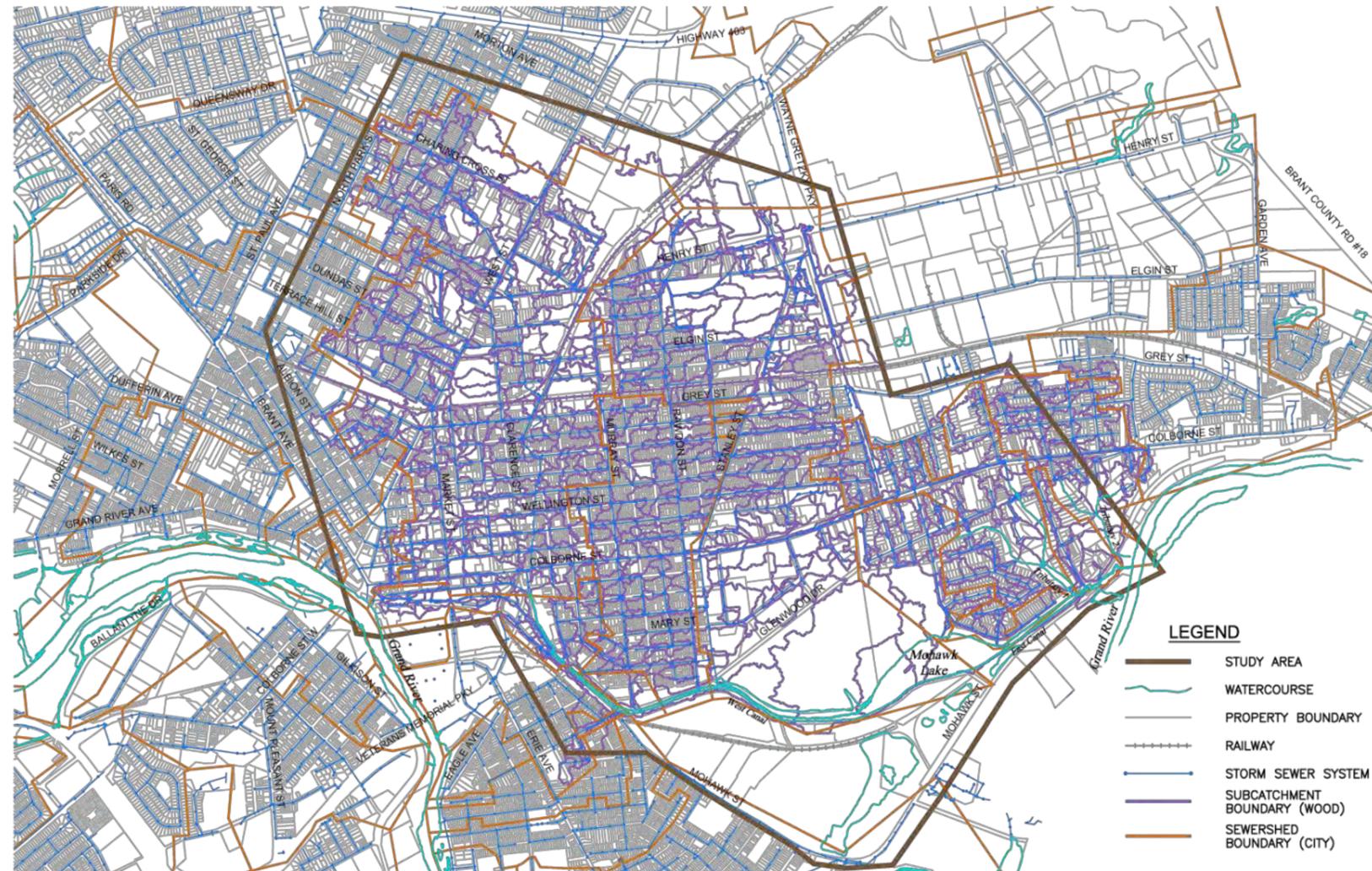
Characterization Findings

- 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



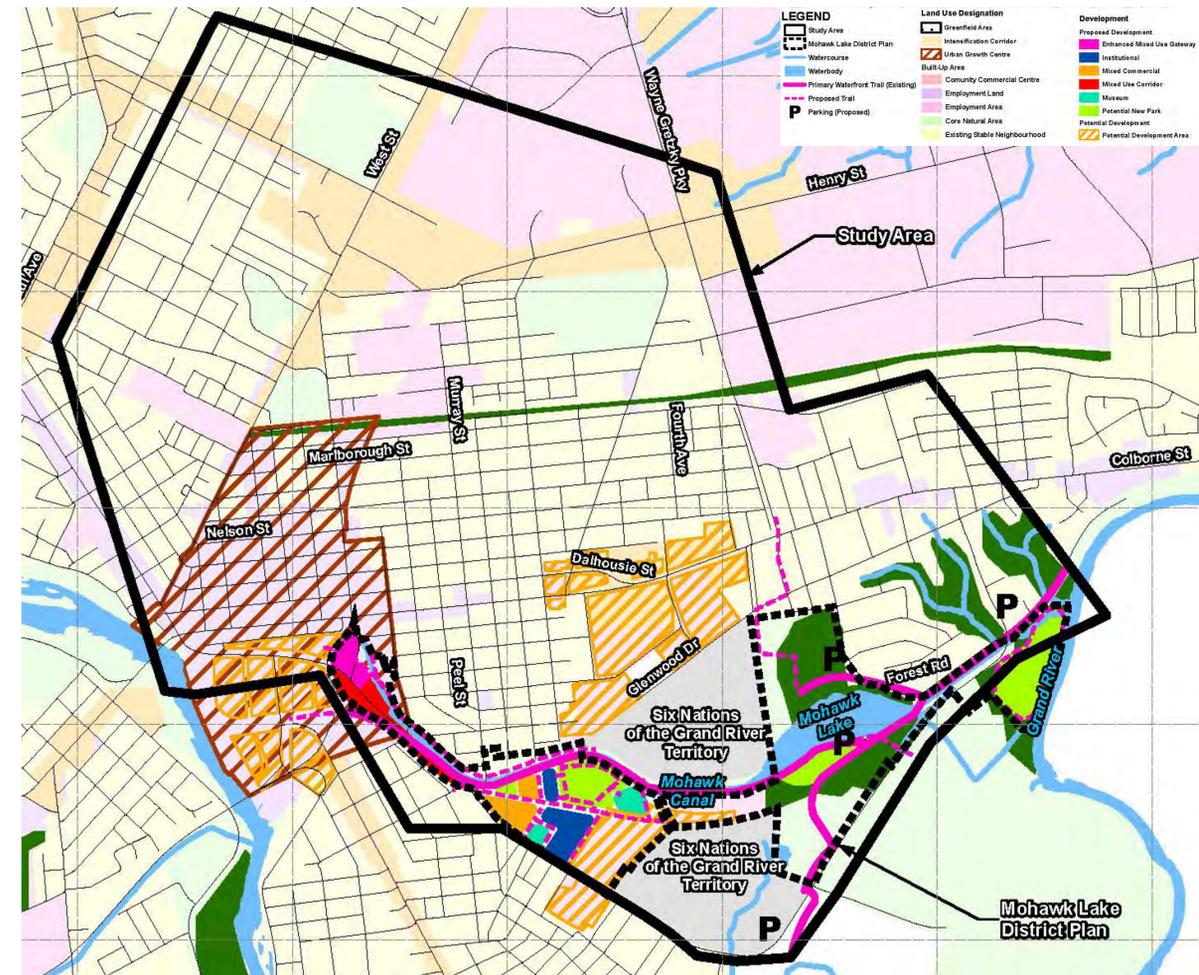
Technical Environment

- 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	Risk of contamination from sediment reduced	Risk of contamination from sediment reduced	Contaminants contained	Contaminants contained
	Hydrology & Stormwater Management	Water Quantity	Environmental flows for recreation or wildlife	Flow rate (cubic metres per second, m ³ /s)	L	Additional capacity in Lake	Additional capacity in Lake	Loss of capacity	No change
	Natural Heritage	Aquatic Habitat	Improvements or impacts to habitat viability	Area of impacted habitat (square metres, m ²)	H	Additional habitat	Additional habitat	Contaminants contained	Contaminants contained
		Wildlife Habitat	Potential effects wildlife due to changes in habitat	Area of impacted habitat (square metres, m ²)	M	No change	No change	No change	No change
	Fluvial Geomorphology	Fluvial Stability / Sediment Transport	Potential adverse effect on surface water due to drawdown or flow disruption	Extent of impact	M	Increased Lake capacity will reduce adverse sediments being transported to Grand River	Increased Lake capacity will reduce adverse sediments being transported to Grand River	Loss of capacity	No change
	Cultural Heritage & Archaeology	Archaeological & Cultural Heritage Resources	Potential adverse effects on archaeological and cultural heritage resources	Extent of impact	L	All below water works	All below water works	All below water works	All below water works
	Future Land Use & Growth Impacts	Recreation Use	Ability to support recreation, including access	E. coli concentrations	M	Contaminated sediment removed	Contaminated sediment removed	Contaminated sediment contained	Contaminated sediment contained
		Shoreline Access	Access points to lake and canal	Access points	L	No impact	No impact	No impact	No impact
		Impacts on Adjacent Properties	Changes to properties resulting from changes to water levels, construction of alternatives, etc.	Private and public properties (number of)	M	Likely odour, truck traffic and other short-term impacts	Laydown area will be disruptive in the short-term	Limited external impacts	Limited external impacts
	Hydraulics	Flooding - Lake & Canal	Impacts on flood potential in Mohawk Lake and Mohawk Canal	Floodplain extents	M	Increased Lake capacity	Increased Lake capacity	Minor loss of capacity	No change
Flooding - Streets & Sewers		Impacts on flood potential and elevation for water from streets and sewers	Flood depth	M	No change	No change	No change	No change	
Economic	Capital Cost	Design and construction costs	estimated cost (\$)	H	High	Highest	High	High	
	Contaminant Management	Sediment quantity and quality	Disposal cost (\$ / m ³)	M	High	Highest	High	High	
	Maintenance Cost	Asset management costs (Lifecycle)	estimated cost (\$)	H	Significant capacity added	Significant capacity added	Expect follow-up	Expect follow-up	
	Property Acquisition	Amount of private property required to achieve solution	Area (hectares, ha)	M	None required	None required	None required	None required	
Technical	Stormwater Management	Ability to achieve stormwater management standards	To be determined	H	Lake is an informal stormwater management system	Lake is an informal stormwater management system	Lake is an informal stormwater management system	Lake is an informal stormwater management system	
	Constructability	The ability to construct the improvements in a simple and cost effective manner	Duration / cost	M	Longer duration	Time effective	Complex	Complex	
	Community Resilience & Sustainability	Ability of the solution to mitigate climate change impacts	To be determined	M	Provides added Lake capacity	Provides added Lake capacity	No change	No change	
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

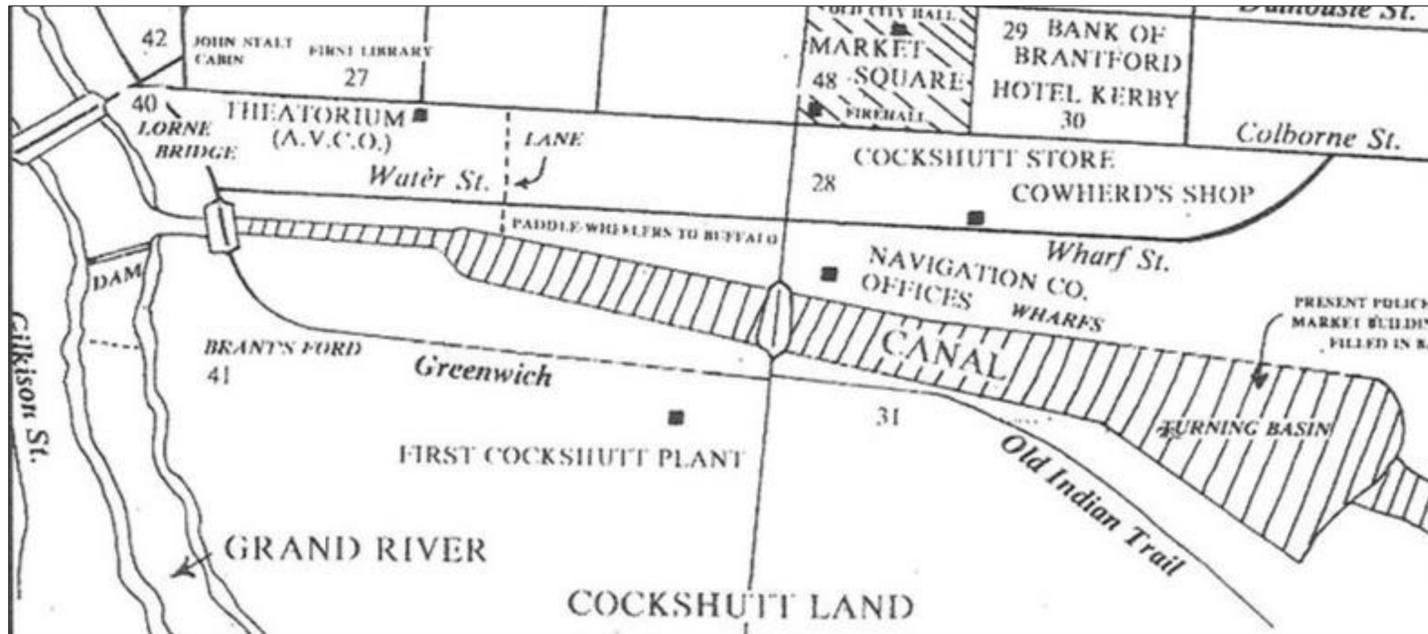
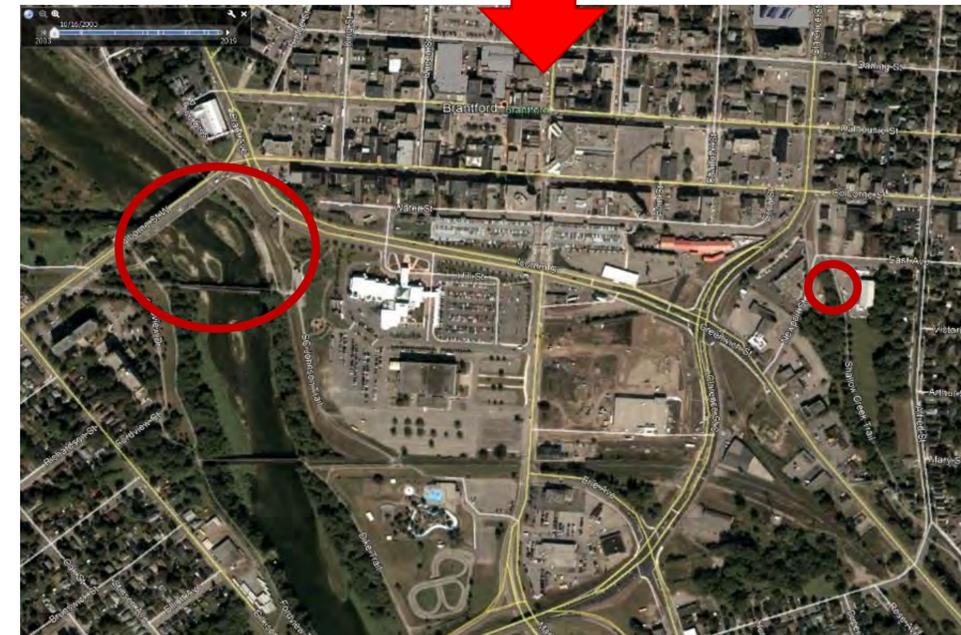


Photo Credit: The Grand River Navigational Company (Bruce Emerson. 1938)

- 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

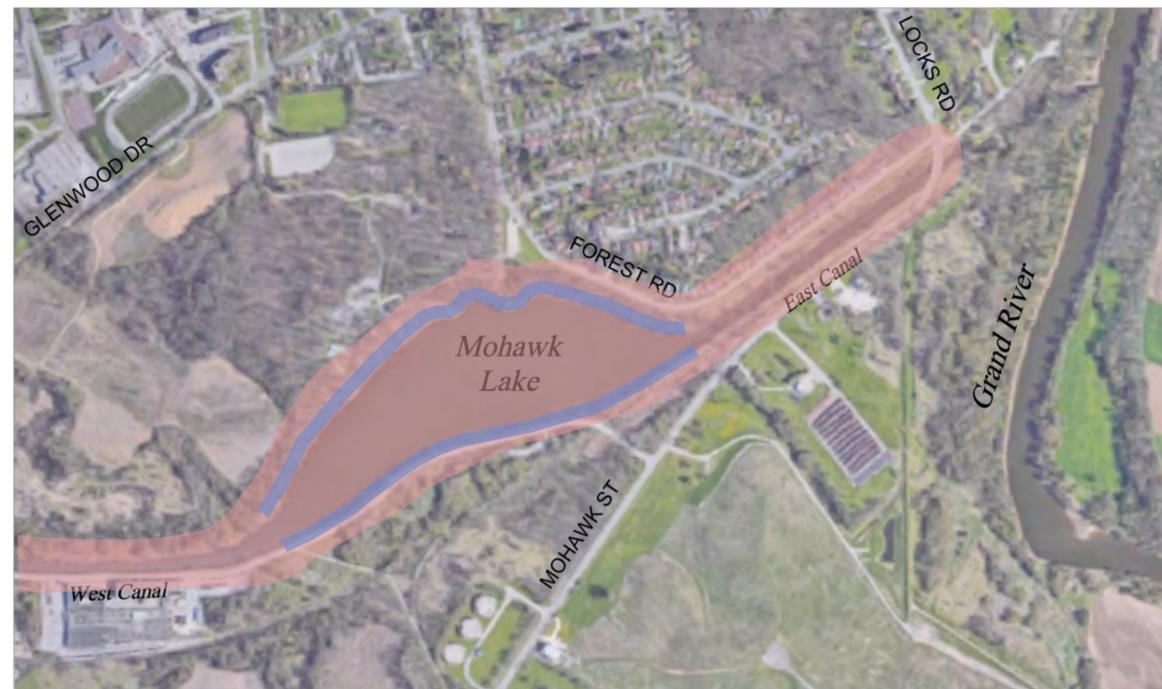


Mohawk Lake Strategic Sediment Removal / Bed Recontouring

- 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

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