Carolyn Creek Erosion Control along Barbertown Road

Schedule ‘B’ Municipal Class Environmental Assessment

Virtual Public Information Centre (March 23, 2022 – April 20, 2022)

Purpose of Virtual Public Information Centre

The purpose of this Virtual Public Information Centre is to:

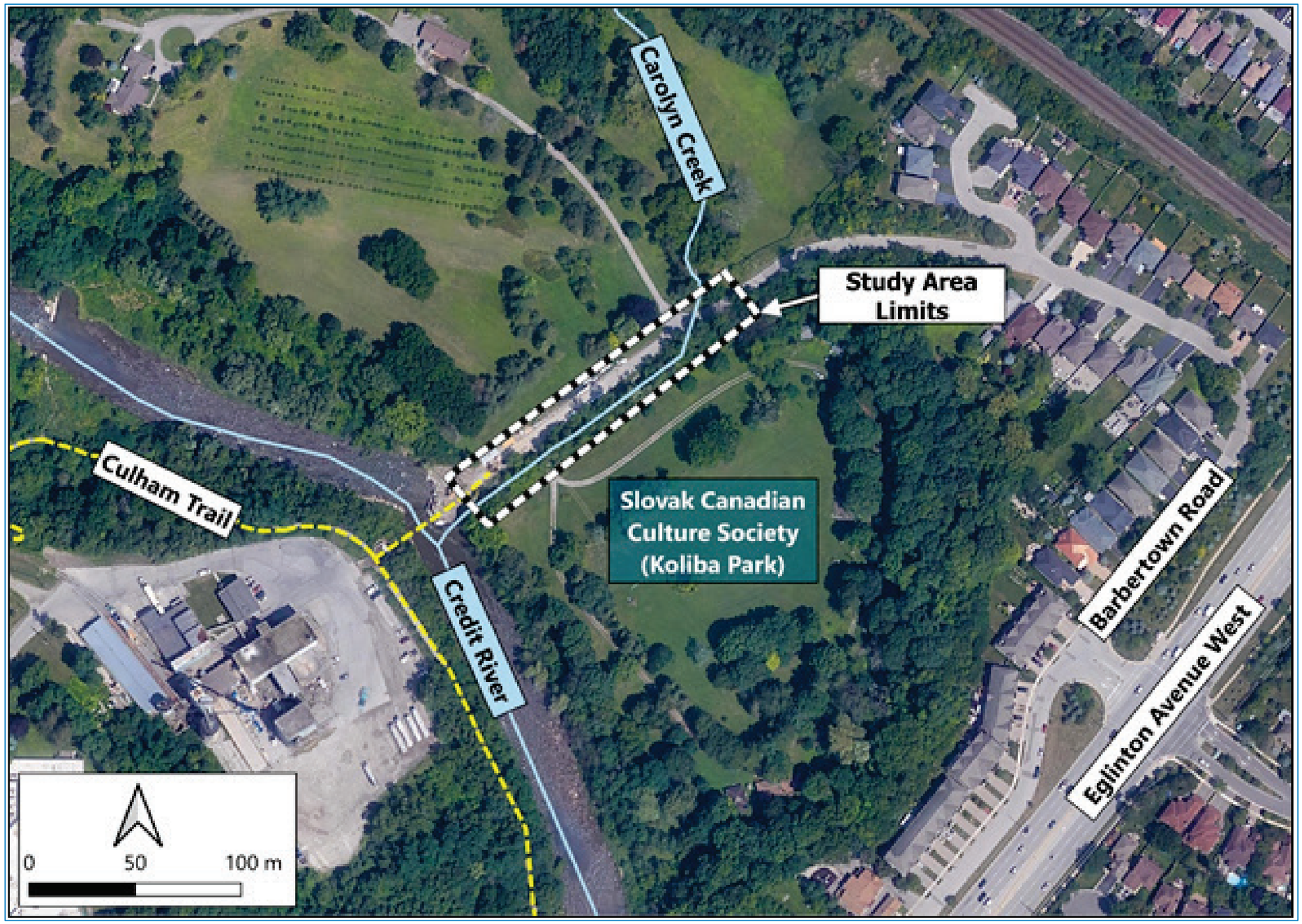
- Share information on existing erosion problem within Carolyn Creek reach along Barbertown Road,
- Share preliminary preferred solution to address the erosion, and
- Obtain feedback.

This presentation provides the following information:

- Study Overview
- Environmental Assessment Process
- Existing Conditions
- Alternative Solutions
- Preliminary Preferred Solution
- Next Steps

Study Overview

The City of Mississauga identified that a 200 metres long section of the Carolyn Creek on the south side of Barbertown Road is in need of rehabilitation. The City is carrying out an environmental assessment to identify stabilization works for the creek reach.



Environmental Assessment Process

The environmental assessment is being carried out in accordance with Municipal Class Environmental Assessment (Class EA) process. **This study will address the requirements of Phases 1 and 2 of a Schedule 'B' project under the Municipal Class EA process**.

Class EA Phase 1: Problem or Opportunity

- Identify problem and opportunities

Class EA Phase 2: Alternative Solutions

- Inventory natural, social and economic existing conditions
- Identify and evaluate alternative solutions
- Identify preferred solution
- Consult with the public, Indigenous Nations, government review agencies, and interested stakeholders to obtain feedback on the preliminary preferred solution
- Prepare and issue Project File Report and Notice of Study Completion

Existing and Future Land-use

Residential lands to the north of Carolyn Creek

The residential lands to the north of Carolyn Creek are being planned for condominium redevelopment. Stormwater drainage from the site is proposed to be directed to Carolyn Creek through a storm sewer beneath Barbertown Road. The future development will include a land dedication for City's greenbelt.

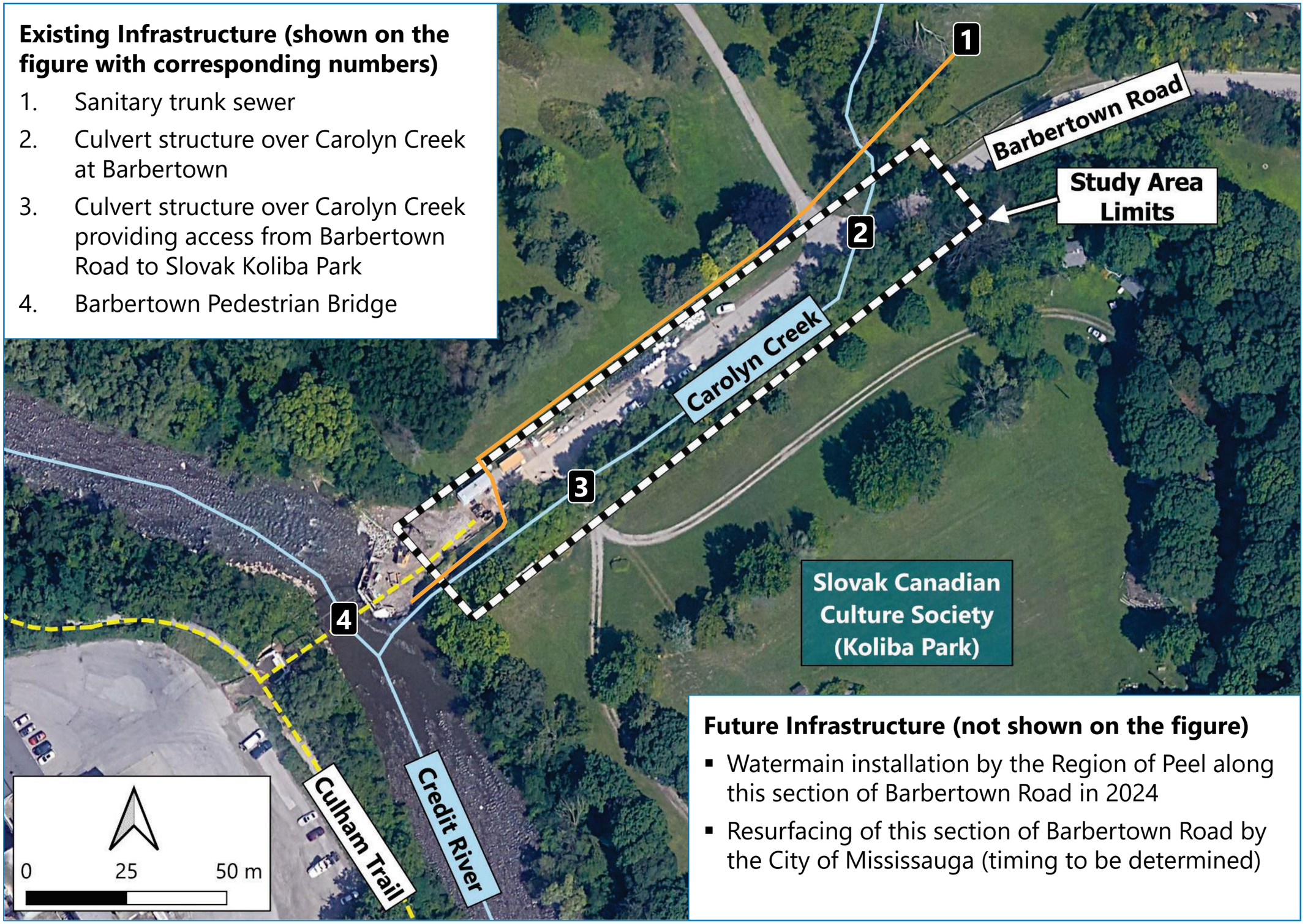
Koliba Park to the south of Carolyn Creek

The lands to the south of Barbertown Road include Slovak Canadian Culture Society's Koliba Park. The access to the park is from Barbertown Road, over Carolyn Creek.

Existing and Future Infrastructure

Existing Infrastructure (shown on the figure with corresponding numbers)

1. Sanitary trunk sewer
2. Culvert structure over Carolyn Creek at Barbertown
3. Culvert structure over Carolyn Creek providing access from Barbertown Road to Slovak Koliba Park
4. Barbertown Pedestrian Bridge

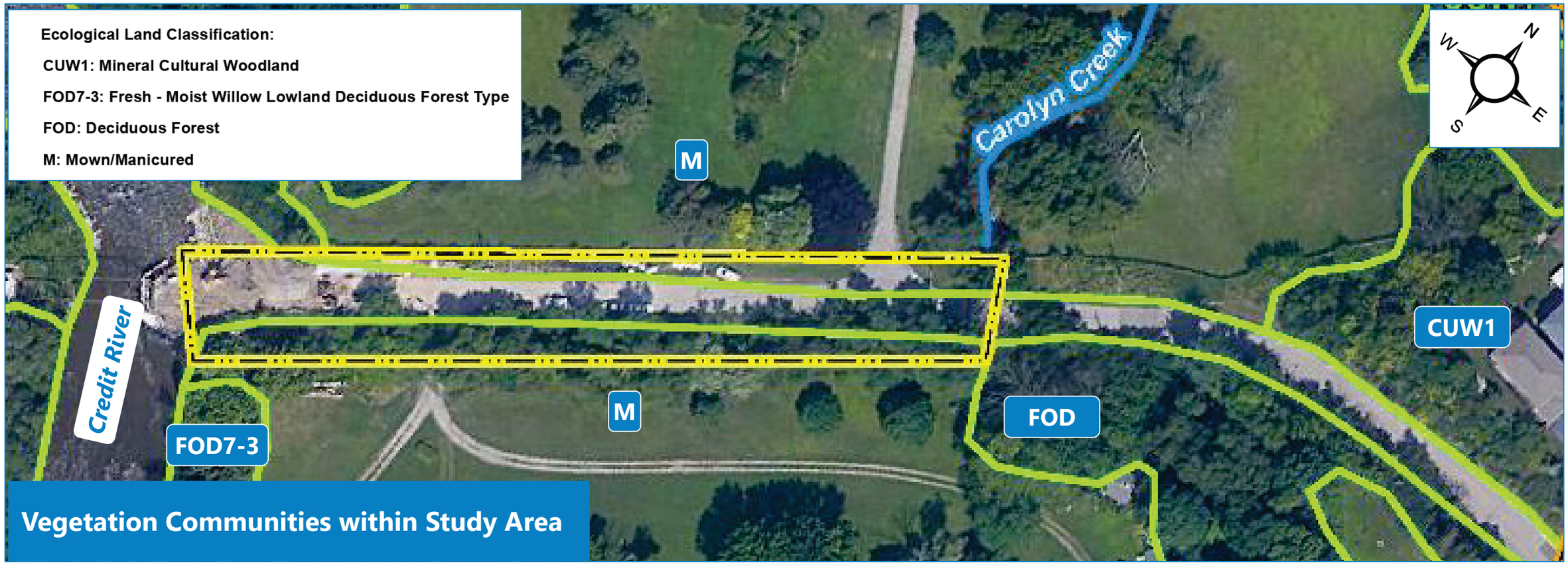


Future Infrastructure (not shown on the figure)

- Watermain installation by the Region of Peel along this section of Barbertown Road in 2024
- Resurfacing of this section of Barbertown Road by the City of Mississauga (timing to be determined)

Natural Environment - Terrestrial Resources

Vegetation: Vegetation within and adjacent to the Study Area include hedgerows, manicured lawns, disturbed roadside vegetation and isolated patches of woodland and deciduous forest. No SAR, provincially rare, or locally rare plants, or SAR trees were identified during field investigations.



Significant Wildlife Habitat: Bat Maternity Colonies (FOD7-3 and the FOD vegetation communities), Turtle Wintering Areas (Credit River) and Habitat for Special Concern Species: Eastern Wood-pewee, Red-headed Woodpecker and Snapping Turtle.

Natural Environment - Fish and Fish Habitat

The fish community survey identified six species of fish, comprised of warm and cold-water species (**Blacknose dace**, **Creek chub**, **Fathead minnow**, **Pumpkinseed**, and young of the year (YOY) salmonids **Chinook salmon** and **Coho Salmon**). No species at risk fish were recorded.

Low water levels and structures/barriers within the creek provide impediments to fish passage during certain times of the year

Opportunities for improvements to fish passage:

- Removal or reshaping of adverse accumulated cobble from gabion basket failure to improve passage
- Stabilize and replace gabion baskets
- Gradual elevation change at the upstream end of the pool
- Removal of debris (wood or litter/garbage); and
- Stabilizing banks and gabion baskets upstream of the Barbertown Road culvert.

Debris in channel that may impede fish passage

Archaeological Resources

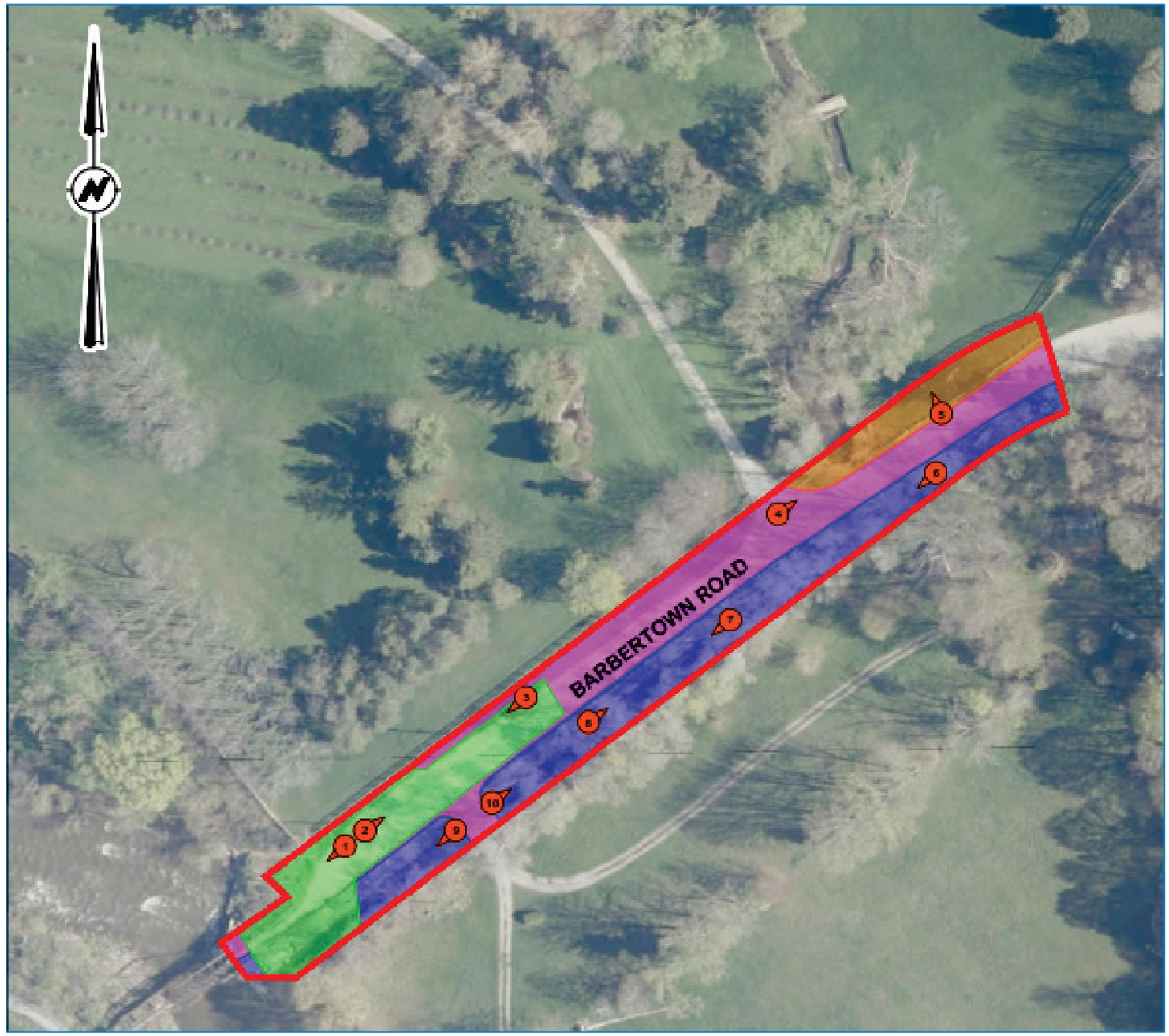
A Stage 1 Archaeological Assessment was completed, which recommended that the study area requires no further archaeological assessment.

LEGEND:

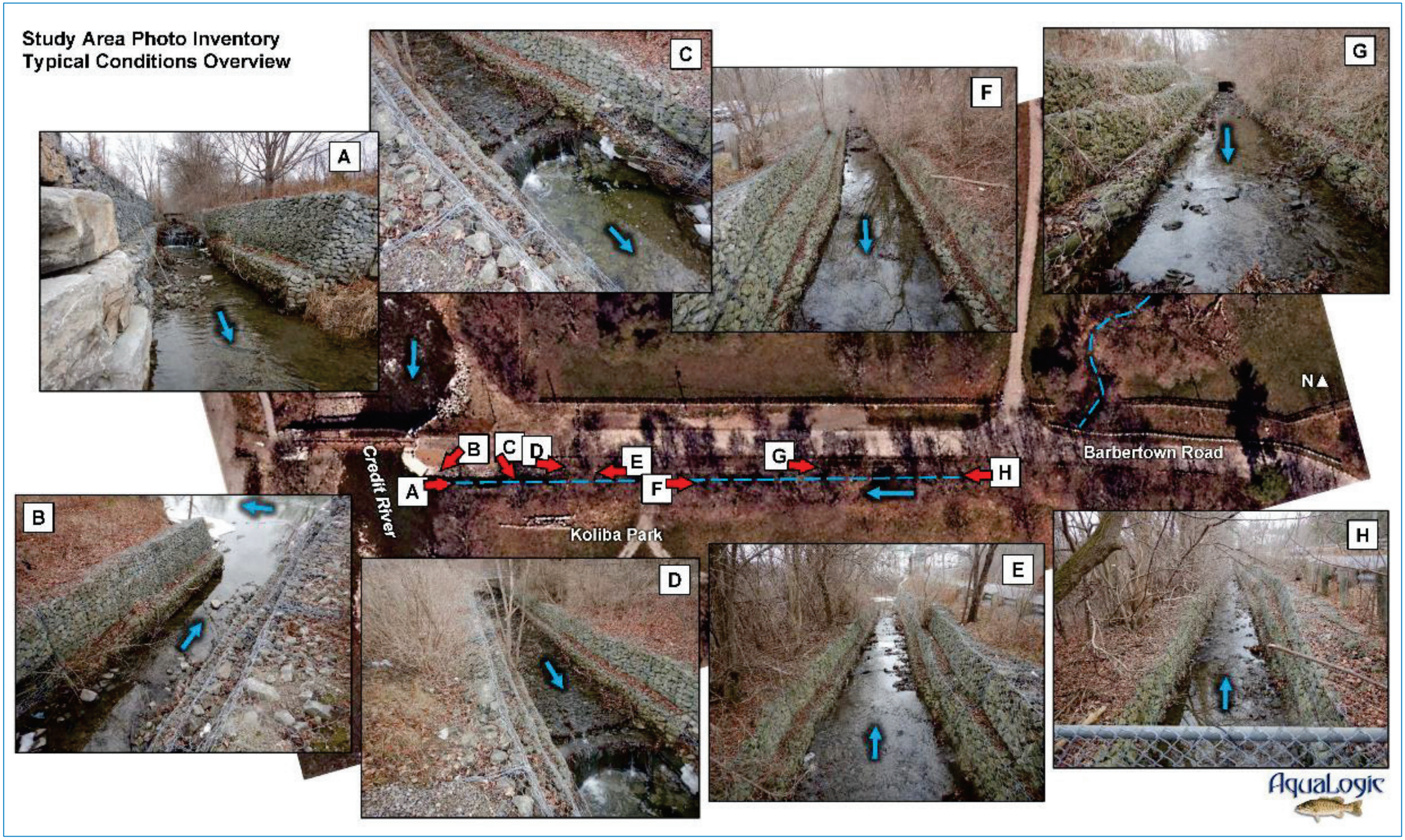
- STUDY AREA
- PHOTOGRAPH LOCATION, VIEWING DIRECTION, AND IDENTIFICATION

AREA OF NO ARCHAEOLOGICAL POTENTIAL

- DISTURBED - ROADWAYS/DRIVEWAYS/ROADSIDE GRAVEL SHOULDER: NO FURTHER ASSESSMENT REQUIRED
- NATURALLY SLOPING TOPOGRAPHY: NO FURTHER ASSESSMENT REQUIRED
- CULVERT CANAL SYSTEM WITH ROCK RETAINING WALL: NO FURTHER ASSESSMENT REQUIRED
- STAGE 1 & 2 ARCHAEOLOGICAL ASSESSMENT (PREVIOUSLY ASSESSED PIF P354-0026-2014; WOOD, 2015): NO FURTHER ASSESSMENT REQUIRED



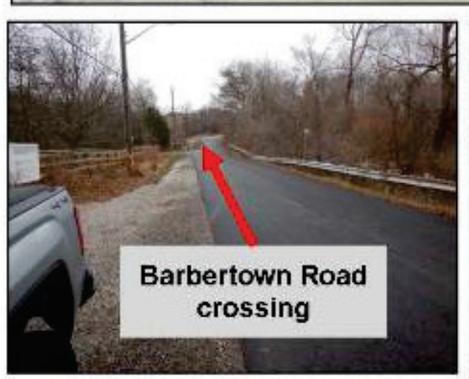
Stream Morphology – Study Area Overview

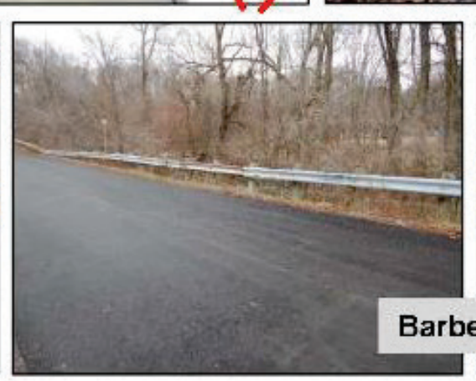


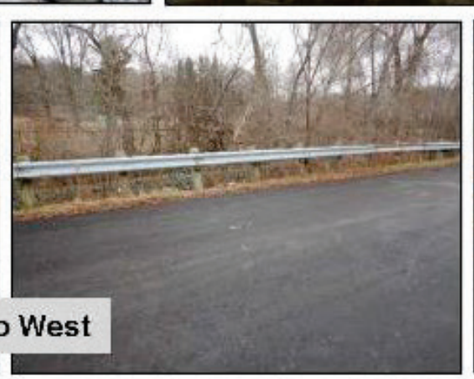
Barbertown Road and Koliba Park Entrance Crossings

Barbertown Road

Koliba Park Entrance







Barbertown Road Perspective, East to West

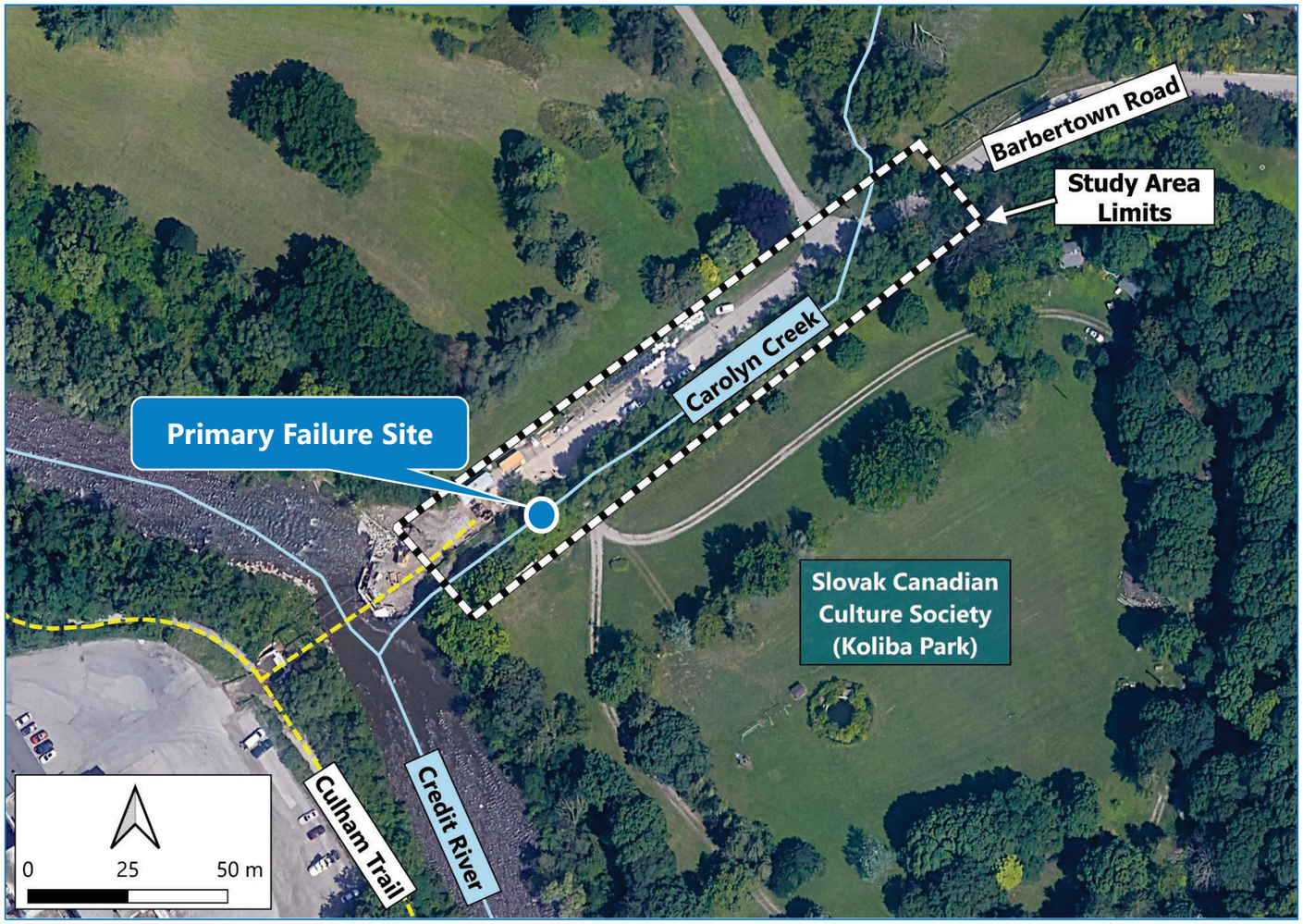
Stream Morphology - Primary Failure Site

Drop structure at Primary Failure Site

Undercut of existing gabion

Undercut of existing gabion

Original gabion weir appear to be missing



Stream Morphology - Secondary Priority Sites

Secondary Priority Details

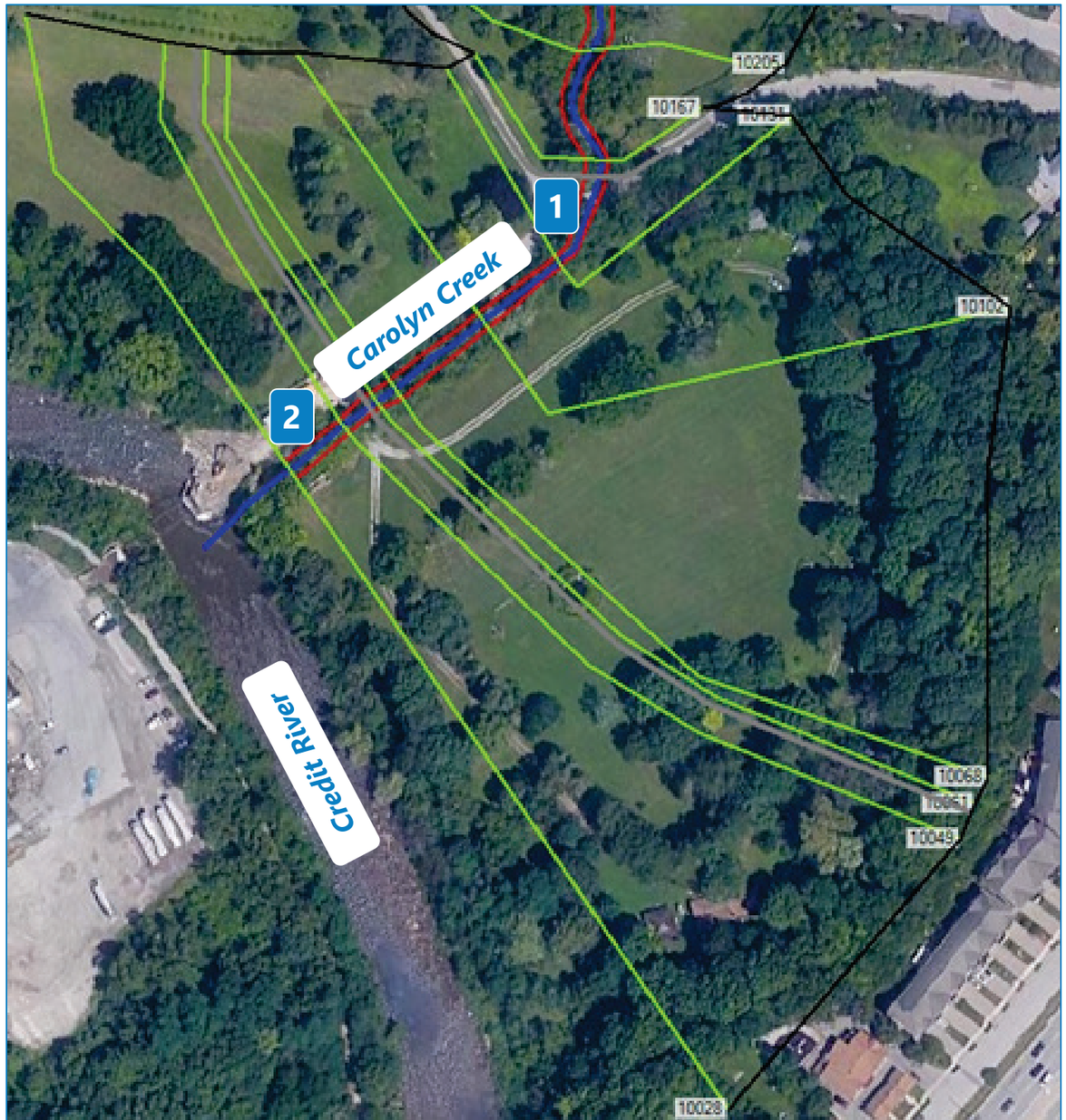
AquaLogic

Hydraulic Conditions

The Study Area is located within the storm floodplain associated with the Credit River and Carolyn Creek. Tables below present the water surface elevation, flow discharge, and the velocity for various storm events for key locations at the beginning and the end of the subject creek.

	Storm Event	Flow Discharge (m^3/s)	Velocity (m/s)	Water Surface Elevation (m)
1	2-year	4.6	1.70	135.05
	5-year	6.9	2.30	135.14
	10-year	11.3	2.20	135.52
	25-year	21.0	2.72	135.75
	50-year	31.5	3.17	135.92
	100-year	42.3	3.55	136.07
	Regional	60.6	4.07	136.27

	Storm Event	Flow Discharge (m^3/s)	Velocity (m/s)	Water Surface Elevation (m)
2	2-year	4.6	2.22	134.04
	5-year	6.9	2.46	134.21
	10-year	11.3	2.75	134.47
	25-year	21.0	2.65	134.86
	50-year	31.5	2.78	135.04
	100-year	42.3	2.72	135.22
	Regional	60.6	1.29	135.92



Green lines indicate station locations from HEC RAS model

Identification of Long List of Alternative Solutions

Alternative A: Do Nothing: The 'do nothing' alternative would leave existing conditions in place with no rehabilitation effort to mitigate damage and future risk. The do-nothing alternative is not considered viable with regard to the primary failure site.

Not being carried forward for further evaluation.

Gabion wire rust failure. Failures like this will continue to remain with do nothing option

Alternative B: Enclosure: The enclosure option would involve designing a continuous box or open-footing culvert that replaces the subject creek. Enclosure was not identified as an implementation goal of the current study, nor would it be favourably received as a site-specific solution per review agency operational approaches.

Not being carried forward for further evaluation.

Existing enclosure structure over Carolyn Creek

Long List of Alternative Solutions (Continued)

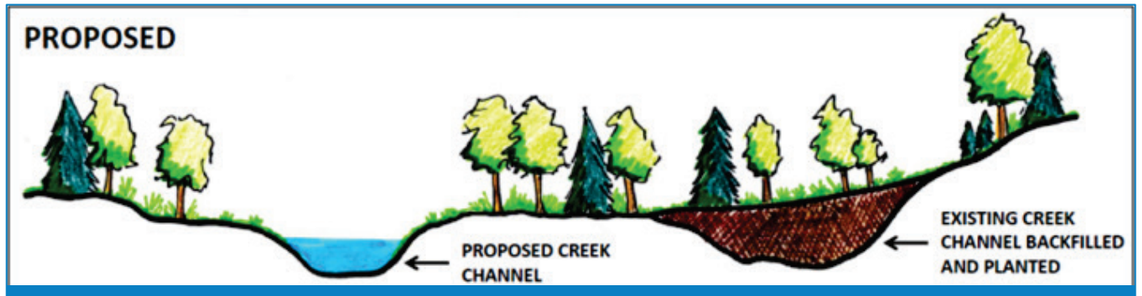
Alternative C: Protect in Place: The protect-in-place option is the traditional standard of providing erosion control stabilization to address adverse channel adjustment that impacts infrastructure and property. Replacement of the existing gabions with a boulder or armourstone solution is proposed to be an option available for more detailed analysis.

Carried forward for further evaluation.

Example of Rehabilitated Creek bank with Armourstone

Alternative D: Natural Corridor Realignment: Natural channel realignment is feasible at face value given macro-scale physical factors that drive design. The effort would be significant, and the implementation cost would be presumably very high.

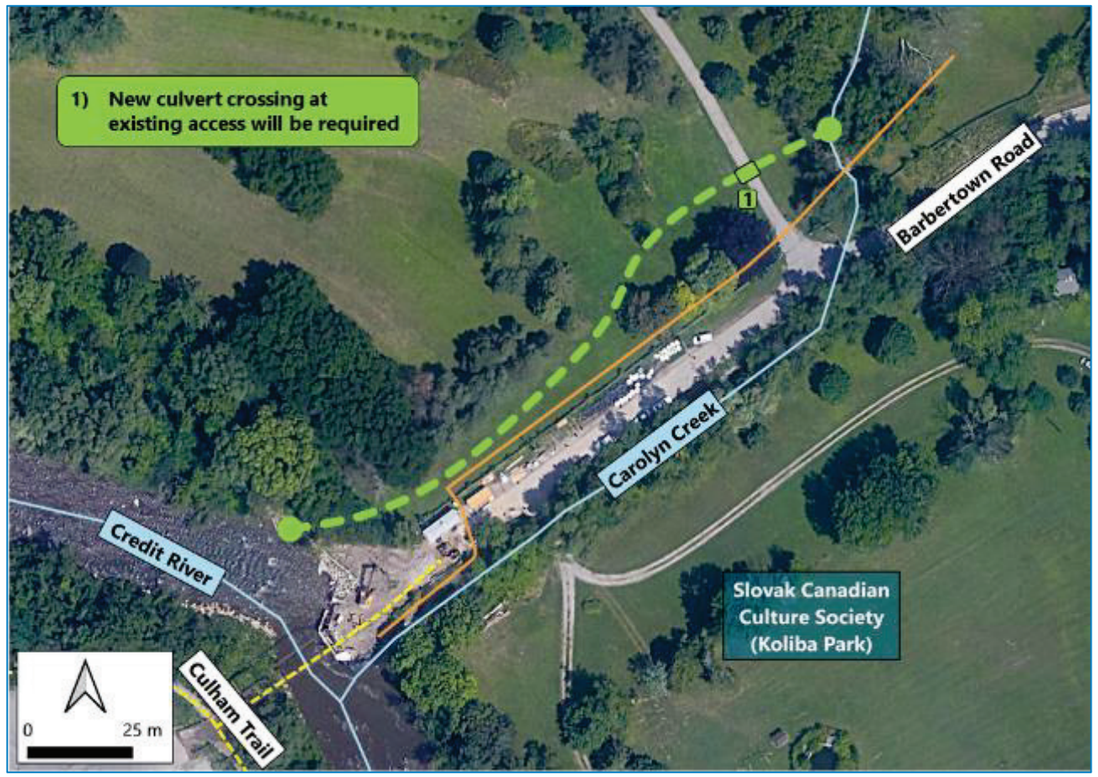
Two realignment sub-options carried forward for further evaluation.



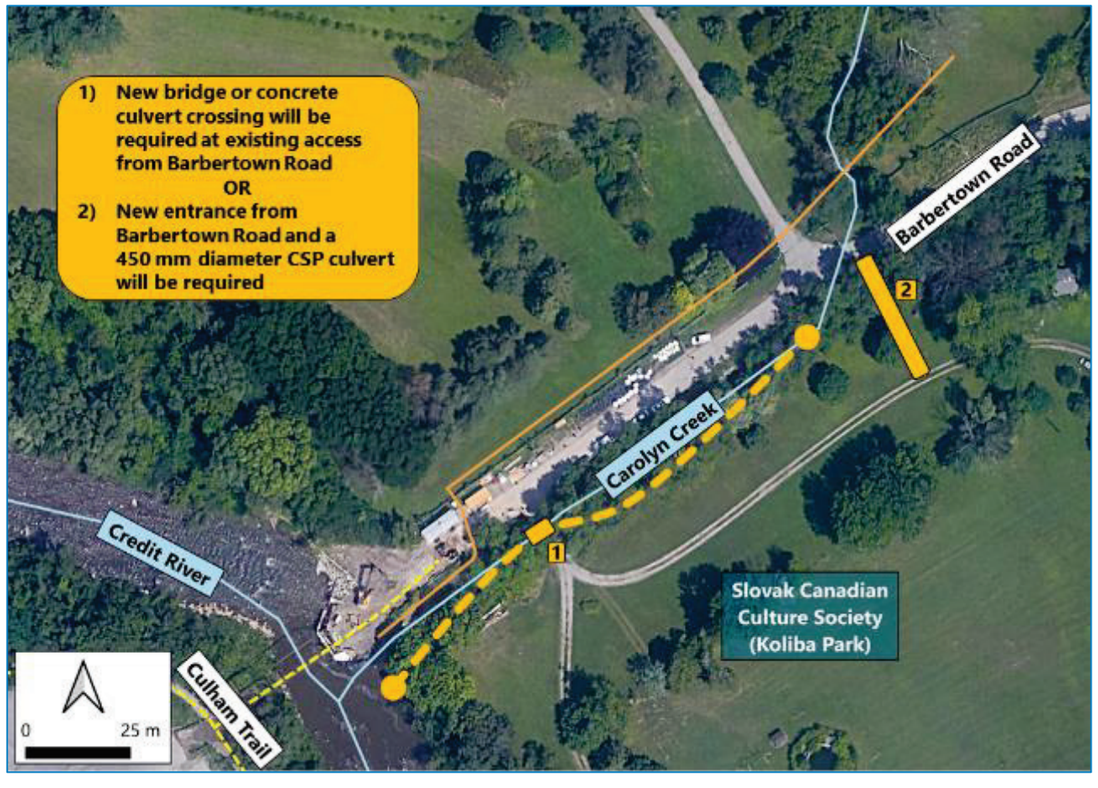
Schematic of Natural Channel Realignment

Long List of Alternative Solutions (Continued)

Concept D1: Creek Realignment to the North: This realignment alternative will involve shifting the segment of Carolyn Creek on the north side of Barbertown Road within the greenbelt dedication lands associated with future development. The creek would cross under a new structure on the future development access road.



Concept D2: Creek Realignment to the South: This realignment alternative will involve shifting the segment of Carolyn Creek on the south side within the Koliba Park property. This alternative would likely require significant land acquisition and be a costly alternative to implement.



Long List of Alternative Solutions (Continued)

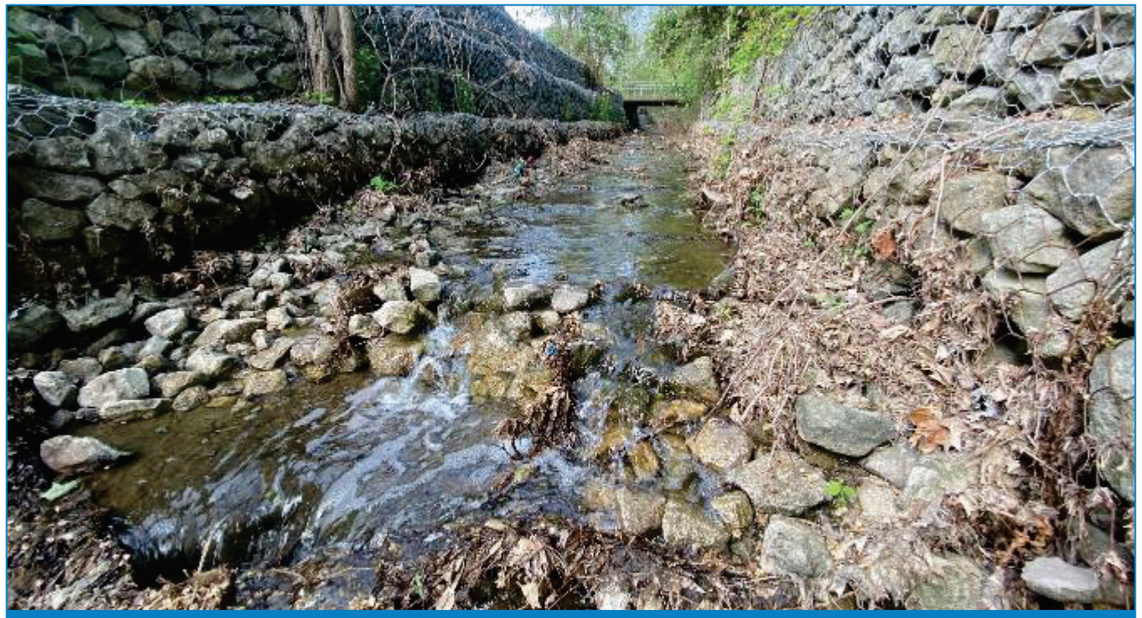
Alternative E: Replacement of Road Crossing Structures: Replacement of road crossing structures is an option premised on critical structural or flood risk factors. From a geomorphic perspective, replacement of a crossing provides the opportunity to integrate channel design with a riparian corridor. Providing an overbank setback facilitates terrestrial corridor function.

Carried forward for further evaluation.

Road Crossing (Koliba Park Entrance) over Carolyn Creek

Alternative F: Barrier Removal to Improve Fish Passage and Habitat: Fish habitat improvement can be an objective in regard to existing conditions or as an element of proposed design that largely modifies existing into new conditions. Both improvement scenarios are feasible opportunities within the current study.

Carried forward for further evaluation.



Example of Barrier to Fish Passage at Carolyn Creek

Approach for Evaluation of Alternative Solutions

The following short-listed alternative solutions were carried forward for evaluation:

- Alternative C: Protect in Place
- Alternative D: Creek Realignment
- Alternative E: Replacement of Road Crossing Structures
- Alternative F: Barrier Removal to Improve Fish Passage and Habitat

The short-listed alternatives were evaluated using the following criteria:

Evaluation Environment	Evaluation Criteria
Physical Environment	Erosion Mitigation
	Hydraulic Capacity
	Flooding
Natural Environment	Terrestrial Environment
	Aquatic Environment
Social Environment	Impact to Infrastructure / utilities
	Construction Impacts to Private Properties
	Public Safety
Economic Environment	Capital Cost
	Maintenance Cost
	Lifespan of Works

Evaluation of Alternatives – Physical Environment

Evaluation Environment	Evaluation Criteria	Factor Significance	Protect in Place / Functional Channel Design	Replacement of Road Crossing Structures	Barrier Removal to Improve Fish Passage and Habitat	Creek Realignment to the north of Barbertown Road
Physical Environment	Erosion Mitigation	High	Replacement of the gabions with boulders or armourstones will address existing erosion problem along the creek reach	Replacement of road crossing structures will generally improve creek flow, but it will not have any impact on erosion control	Fish barrier removal can be incorporated in conjunction with protect in place alternative, but does not impact erosion control	Creek realignment will result in the creation of a new creek channel in accordance with natural channel design principles. This will address the erosion problem for the long term
	Hydraulic Capacity	Low	Protect in place option will not have any impact on hydraulic capacity of the creek	Replacement of road crossing structures will potentially increase local hydraulic capacity. For full benefit, it would have to be combined with the creek realignment.	Barrier removal will not have any impact on hydraulic capacity of the creek	The creek realignment will be designed such that it will accommodate or improve hydraulic capacity
	Flooding	Low	Protect in place option will not have any impact on Regional floodplain	Replacement of road crossing option will not have any impact on Regional floodplain	Fish barrier removal will not have any impact on Regional floodplain	Creek realignment will reduce frequent floodplain.

Evaluation Scale

Positive	Neutral/Positive	Neutral	Neutral/Negative	Negative

Evaluation of Alternatives – Natural Environment

Evaluation Environment	Evaluation Criteria	Factor Significance	Protect in Place / Functional Channel Design	Replacement of Road Crossing Structures	Barrier Removal to Improve Fish Passage and Habitat	Creek Realignment to the north of Barbertown Road
Natural Environment	Terrestrial Environment	Moderate-High	There will be removal of vegetation and trees, however, there will be habitat improvement through re-vegetation	Provision of an overbank setback with crossing replacement will facilitate terrestrial corridor function. There will be some removal of vegetation and trees (less than other alternatives), however, there will be habitat improvement through re-vegetation	Physical habitat diversity such as woody debris, large rock, or additional vegetation overhangs can improve terrestrial habitat	This alternative will result in tree removals and potential loss of unevaluated/local wetlands located in the property to the north. However, with restoration measures, there will be improvement in terrestrial environment
	Aquatic Environment	High	Some opportunity for improved habitat	Nesting a low flow within the bankfull will facilitate/improve fish passage	Rehabilitation of manmade altered conditions into more natural conditions, based on geomorphic design, will recreate optimal channel geometry for aquatic habitat.	Creek realignment with natural channel design principles will allow for improved fish habitat

Evaluation Scale

Positive	Neutral/Positive	Neutral	Neutral/Negative	Negative

Evaluation of Alternatives – Socio-Economic Environment

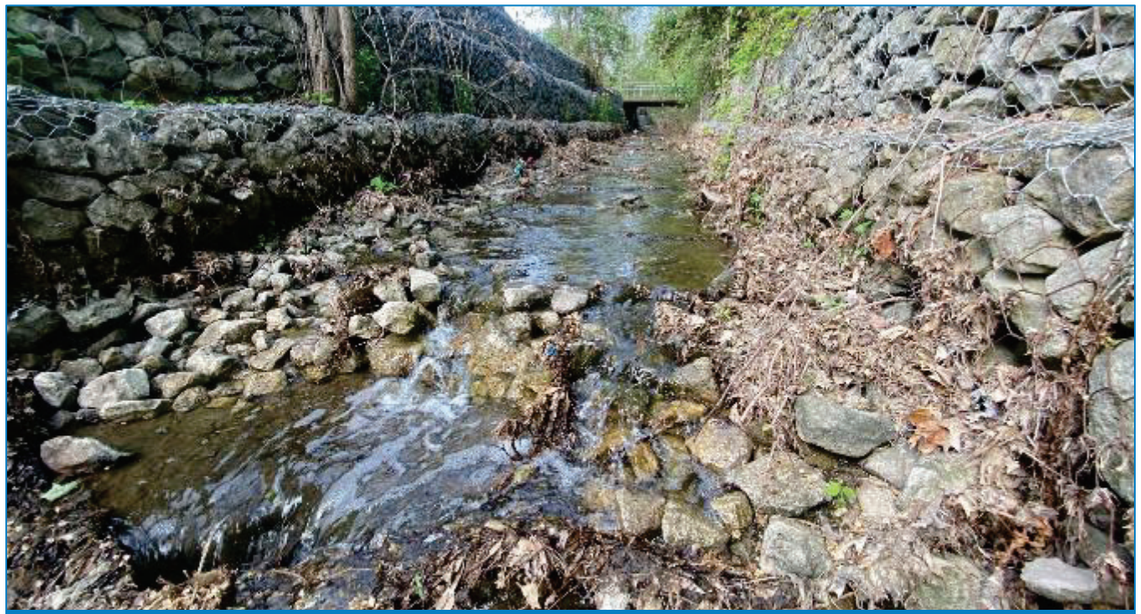
Evaluation Environment	Evaluation Criteria	Factor Significance	Protect in Place / Functional Channel Design	Replacement of Road Crossing Structures	Barrier Removal to Improve Fish Passage and Habitat	Creek Realignment to the north of Barbertown Road
Social Environment	Impact to Infrastructure/ utilities	High	Replacement of the gabions will mitigate the risk of impact to existing infrastructure	Road crossing replacement will generally maintain or improve creek conditions and not impact existing infrastructure	Fish barrier removal can be incorporated in conjunction with protect in place alternative. No additional impacts to infrastructure	This alternative will avoid impacts to the existing infrastructure and utilities
	Construction Impacts to Private Properties	Low	There will be temporary nuisance associated with construction (e.g., noise). Some land acquisition may be required.	The entrance to Koliba Park will be temporarily impacted. In addition, there will be temporary nuisance associated with construction (e.g., noise)	Fish barrier removal can be incorporated in conjunction with protect in place alternative. No additional impacts to private properties	This alternative is expected to be constructed within greenbelt lands that are to be dedicated as part of future development. Some additional land acquisition may be required.
	Public Safety	High	Replacement of gabions will improve public safety by addressing erosion	No improvements to public safety	No improvements to public safety	Creek realignment will improve public safety by addressing erosion problem
Economic Environment	Capital Cost	High	Medium-high cost	High capital cost	Low cost	High capital cost
	Maintenance Cost	Moderate	Improved creek conditions will require minimal maintenance	Replaced crossing will require minimal maintenance	Improved creek conditions will require minimal maintenance	Realigned creek will require minimum maintenance for long term
	Lifespan of Works	Moderate	Shorter lifespan	Longer lifespan	Shorter lifespan	Longer Lifespan

Evaluation Scale

Positive	Neutral/Positive	Neutral	Neutral/Negative	Negative

Overall Recommendation

Alternative:	Protect in Place / Functional Channel Design	Replacement of Road Crossing Structures	Barrier Removal to Improve Fish Passage and Habitat	Creek Realignment to the north of Barbertown Road
Recommendation:	Recommended as a short-term and a long-term solution	Not Recommended	Recommended as part of the short-term solution	Recommended for consideration as one potential long-term solution



Example of Barrier to Fish Passage at Carolyn Creek

Example of Rehabilitated Creek bank with Armourstone

Preliminary Preferred Solution for Short-term

The preliminary preferred solution for short-term is identified to be a **combination of protect in place and barrier removal measures**. The preliminary preferred solution proposes to protect the primary failure site and the gabions and bank revetment at the mouth of the creek adjacent to the Credit River and the pedestrian bridge which are two of the secondary priority sites.

The short-term solution will provide **erosion protection** and **improve fish habitat and fish passage**, while **maintaining the hydraulic capacity** of the creek. The short-term solution will also **minimize environmental impacts** during and post construction, **decrease the risk of property and infrastructure loss**, and **minimize capital and maintenance costs**.

The locations of proposed short-term works are shown on the design plan provided further below.

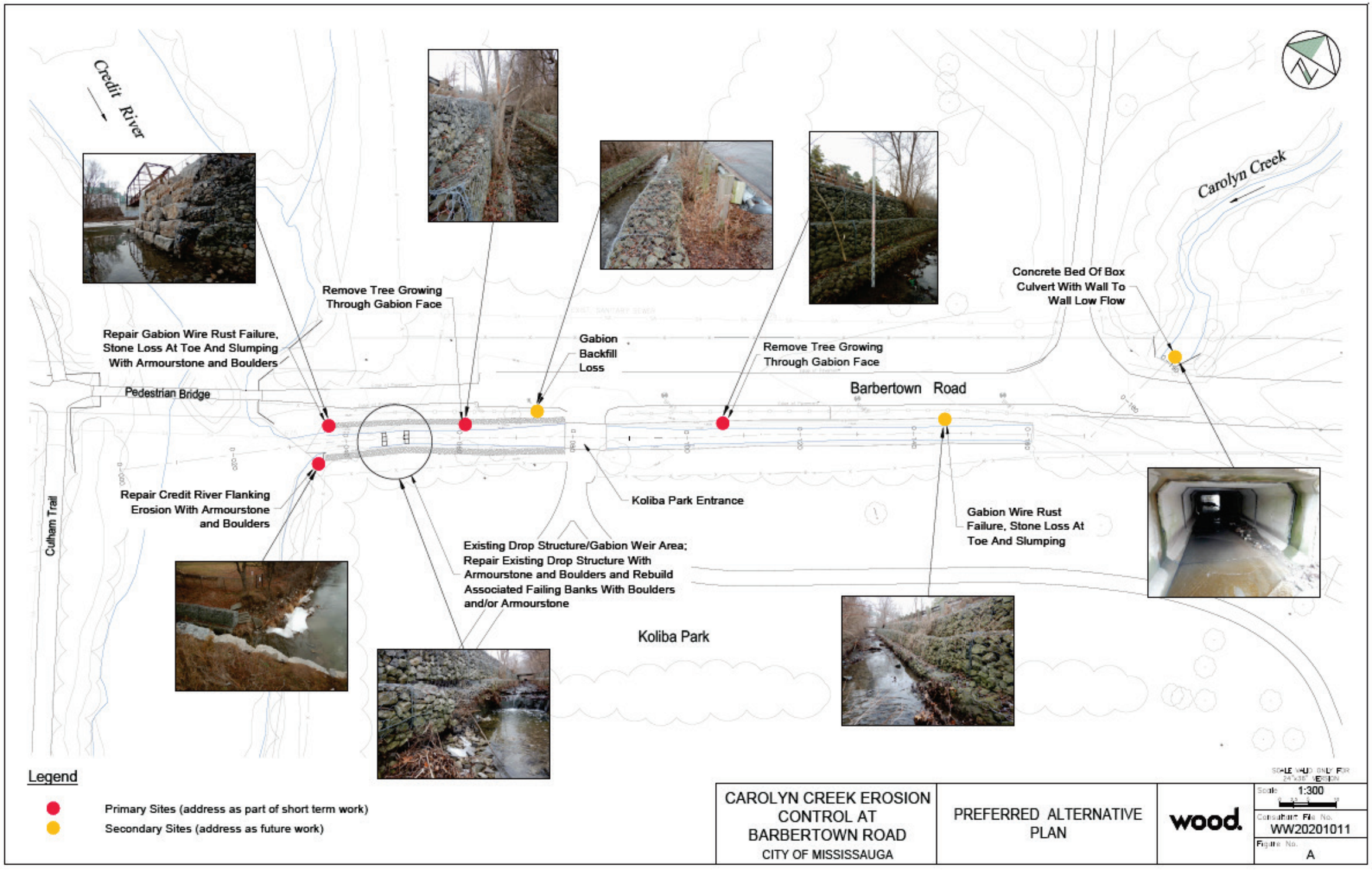
Preliminary Preferred Solution for Long-term

The preliminary preferred long-term solution is identified to be protect-in-place works, focused on addressing the remaining secondary priority sites, and continued annual monitoring of the existing gabion-lined creek.

The preliminary long-term solution also includes a recommendation for additional study to determine whether the potential alternative for a northerly creek realignment has become more favourable. This determination would be based on a re-evaluation of the alternatives, and the ongoing gabion failure conditions in the existing channel.

The locations of proposed additional protect in place works for the long-term are shown on the design plan provided further below.

Preliminary Preferred Solution



Next Steps

- Confirm **preferred solution** based on comments received
- Prepare **Project File Report** and issue for a minimum of 30-day review period
- If no Part II Order Requests are received, the project can proceed to detailed design and construction

Thank You!

Thank you for taking the time to review this information package. Your input is important to us. Please provide us your comments by **April 20, 2022**, by using the **Online Comment Form**. Comments can also be sent to the following contacts via email:

Anthony Di Giandomenico, P. Eng.
Project Manager
City of Mississauga
Anthony.DiGiandomenico@mississauga.ca

Brian Bishop, M. Eng., P. Eng.
Senior Associate, Water Resources
Wood Environment and Infrastructure Solutions
brian.bishop@woodplc.com