City of Mississauga

Schedule ‘B’ Municipal Class Environmental Assessment Carolyn Creek Erosion Control along Barbertown Road, Mississauga, Ontario

Project File Report

NOVEMBER 04, 2022



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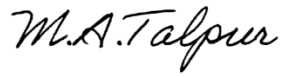
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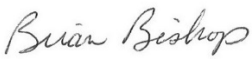
SIGNATURES

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1 Introduction and Background

1.1 Introduction

The City of Mississauga has completed a Schedule 'B' Municipal Class Environmental Assessment (Class EA) to identify a preferred solution to address erosion problems along a section of Carolyn Creek along Barbertown Road. The Study Area extends along the south side of Barbertown Road bordering the Slovak Canadian Culture Society (Koliba Park) and ends by flowing into the Credit River. The total length of the Study Area is approximately 200m. A map illustrating the location of the Study Area is provided in Figure 1.1.

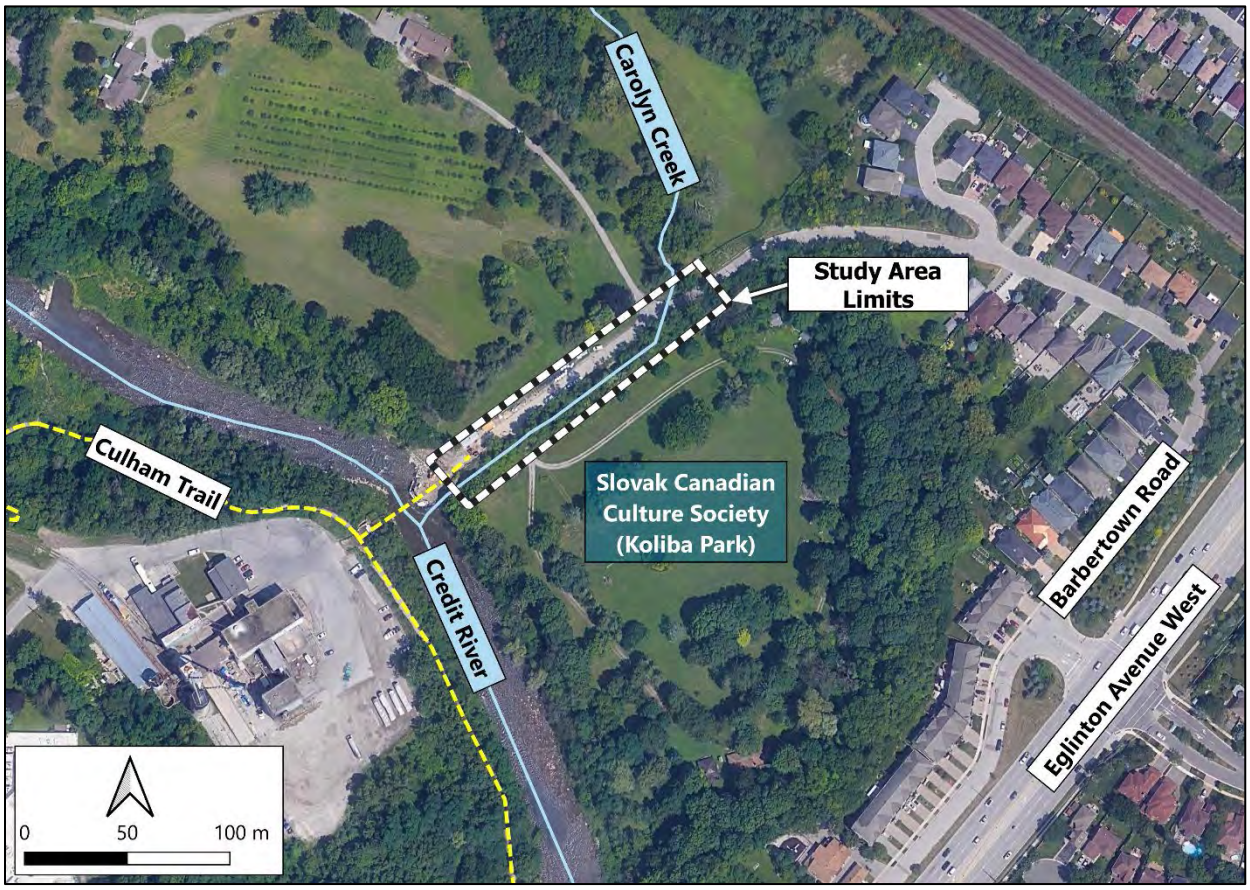


Figure 1.1: Carolyn Creek Study Area

1.2 Background

The lower reach of Carolyn Creek originates from a trunk sewer at Terry Fox Way, north of Blueheron Boulelvard. The creek flows southwest, under the CP railway, to Barbertown Road, ultimately discharging to the Credit River north of Eglinton Avenue West. The section of Carolyn Creek along Barbertown Road consists of an engineered channel constructed in 1999, replacing previous works constructed in 1985. The channel bed and banks are lined with gabion baskets and the sides alternate between 3 to 4-tiered gabion basket walls. Upstream of the Credit River, within the engineered channel there is a gabion basket drop structure.

Through its ongoing erosion monitoring program, the City of Mississauga identified the creek reach on the south side of Barbertown Road as a high priority site in need of rehabilitation. Based on the continued erosion and risk to property and infrastructure, the City initiated this Class EA Study to identify stabilization works for the creek reach.

Primary issues within the Study Area include but are not limited to the following:

- Undermined and emptying gabion basket walls at risk of failure, specifically at the drop structure;
- Partial gabion basket channel bank and bed failures throughout the remainder of the reach.

1.3 Project Goals and Objectives

The main goal of the study was to develop a restoration design for Carolyn Creek which mitigates existing erosion problems and provides long-term stability to the channel corridor. Related objectives to consider include the following:

- Provide long term erosion protection that is compatible with the natural tendencies of the creek;
- Maintain or improve the hydraulic capacity of the creek;
- Replacement of the existing hardened creek bed and banks with more ‘natural’ forms of erosion and grade control, where feasible;
- Provide environmental enhancements wherever possible;
- Improve fish habitat and fish passage;
- Minimize environmental impacts during and post construction;
- Decrease property and infrastructure loss;
- Minimize capital and maintenance costs;
- Provide design consideration for a potential storm sewer connection from a proposed townhouse development north of Barbertown Road.

1.4 Class Environmental Assessment Process

This study was completed in accordance with the Municipal Class Environmental Assessment process (October, 2000, as amended in 2007, 2011, and 2015) (Municipal Engineers Association, October 2000, as amended in 2007, 2011 & 2015). The Municipal Class EA process outlines mandatory principles, details of project consultation and technical requirements. A Municipal Class EA is considered a legal document which outlines project recommendations and next steps, based on a technical assessment, to the public and to technical practisioners and agencies, who have to review and implement the findings of the study.

Municipal Class EA undertakings are classified using 'Schedules' which depend on the potential scope of the solutions and the environmental impact (ref. Municipal Engineers Association, Municipal Class Environmental Assessment, October, 2000, as amended in 2007, 2011 and 2015). Where the various potential solutions for a given study require different project Schedules, the most rigorous Schedule is applied. This study is being conducted as a 'Schedule B' undertaking.

2 Existing Conditions

2.1 Socio-Economic Environment

2.1.1 Land Use

City of Mississauga's Existing Land Use Dashboard (City of Mississauga, 2020) was reviewed to identify land-uses within and immediately adjacent to the Study Area. Lands located immediately to the north of Barbertown Road are residential, and lands located to the south of Barbertown Road are Community / Cultural.

The residential lands to the north are municipally known as 1725 Barbertown Road, Mississauga. A portion of the residential lands is being planned for redevelopment by Barbertown Ventures Inc. Official Plan Amendment, Zoning By-law Amendment, and Draft Plan of Subdivision applications are required to permit the proposed development. Planning Justification Report prepared in support of the development applications indicate that the proposed development will include 75 townhouse units along common element condominium roads with one main vehicular access driveway to the site provided from Barbertown Road (Glen Schnarr & Associates Inc., 2019). The site is proposed to be serviced by an existing 675 mm sanitary sewer and 1500 mm diameter watermain servicing along Barbertown Road. Stormwater drainage is proposed to be directed to a designated drainage block (10m x 90m) west of the site access with stormwater quantity and quality provided. Drainage will then be conveyed through a storm sewer beneath Barbertown Road with discharge directed to the existing gabion basket lined portion of Carolyn Creek, prior to its confluence with the Credit River (C.F. Crozier & Associates Inc., 2019). An assessment completed by GEO Morphix Ltd. in 2017 determined that Carolyn Creek will not be affected by the proposed flows (GEO Morphix Ltd., 2017).

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

2.1.2 Infrastructure

Known infrastructure within the Study Area includes the following:

- Culvert structure at Barbertown Road to convey Carolyn Creek;
- Additional culvert structure providing vehicular/pedestrian access from Barbertown Road to adjacent Slovak Canadian Culture Society;
- Sanitary trunk sewer at Carolyn Creek and the Credit River;
- Barbertown Road and pedestrian bridge;

— A development proposal for townhouses on the north side of Barbertown Road is in the rezoning planning stage and is proposing a storm sewer connection into the Carolyn Creek reach;
— The Region of Peel has a watermain project along Barbertown Road planned for 2024;
— The City has plans to resurface this segment of Barbertown Road in the future with timing to be determined;

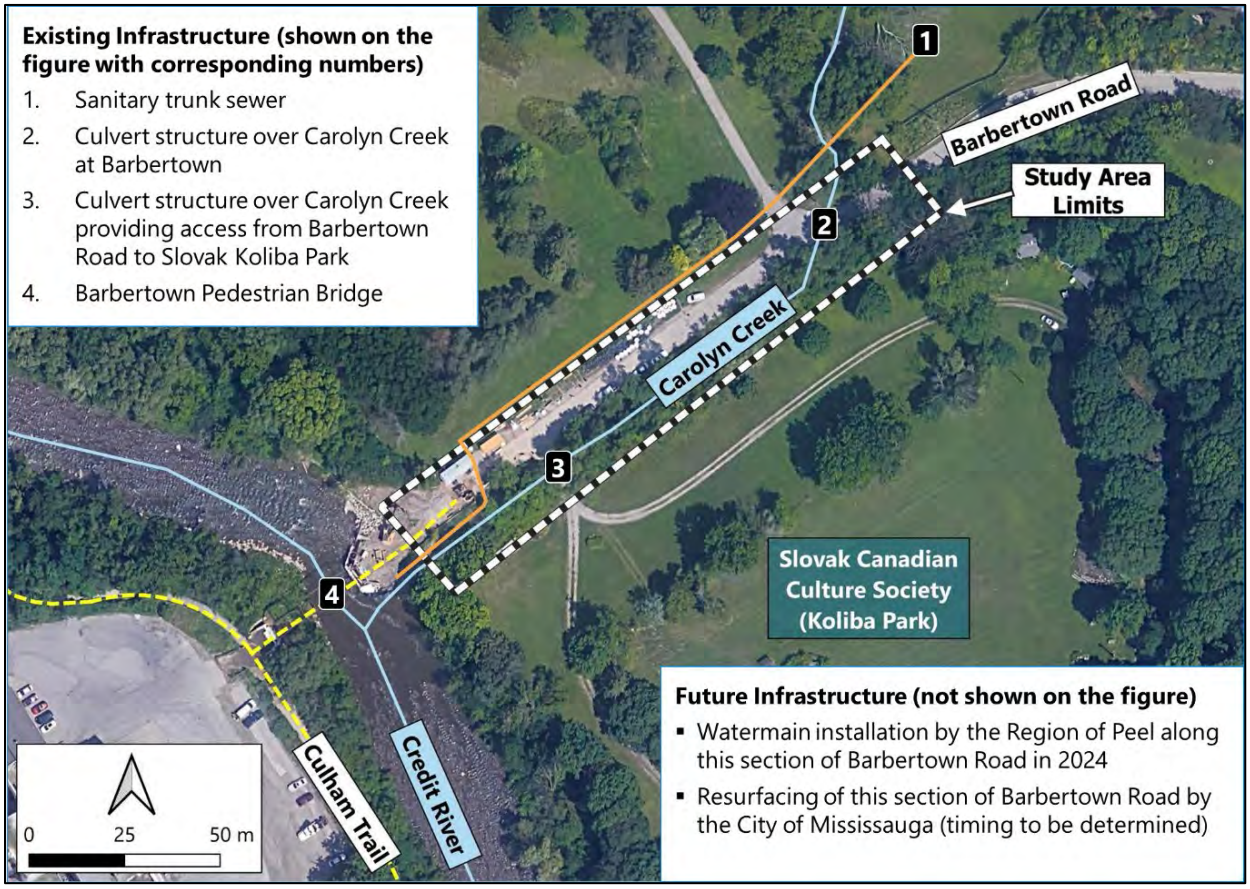


Figure 2.1: Existing Infrastructure

2.2 Physical Environment

2.2.1 Stream Morphology

Fluvial geomorphology, or stream morphology, involves the detailed study and understanding of natural watercourses as well as altered systems such as urban creeks. Development and man-made alterations to the watersheds may have negative effects to the watercourse systems, as a result of changing the hydrologic and hydraulic regime of the runoff. Changes to the flow regime, typically increases in flow and

velocity, may lead to changes include bank erosion, flooding, and valley wall failure. The purpose of the assessment is to determine the impacts on the watercourse, and to guide the selection of a preferred alternative for stream restoration, balancing the objectives of cost associated with watercourse management, and objectives of protecting public safety and property.

2.2.1.1 Watershed and Watercourse Characterization

Carolyn Creek is a 1st order feature with a topographic drainage area of approximately 5.7km^2. The Study Area is located entirely within the Credit Valley Conservation's Regulated Area and any works will require a permit from the Authority under Ontario Regulation 160/06 (Government of Ontario, 2006). The Study Area is also located entirely within the valley associated with the Credit River and the regulatory storm floodplain associated with the Credit River and Carolyn Creek. CVC's primary concern is the protection of life and property from the flood hazard. The Authority has specific criteria and requirements for construction in the floodplain.

The Study Area falls within the South Slope physiographic region, between the Peel Plain to the north and the Iroquois Plain just to the south. The 130m long study site traverses the valley floor of the larger Credit River valley. Upstream of the site, the creek cuts through the Credit slope from urbanized tableland that forms the upper catchment. The dominant catchment land use is low density residential, with valley parkland and slopes of the manmade BraeBen golf course, at the former Britannia landfill, being the key secondary land uses. Commercial, school, and medium density residential land uses, also occur in the watershed. Enclosure of some drainage area may have occurred in the past thus reducing drainage density. An online stormwater management pond discharges at Creditview Road, approximately 1.5km upstream, with channelization of the creek upstream of the pond to the point of enclosure at Terry Fox Way. Based on the online pond influence, flows are well regulated, compensating for the amount of urbanization.

The valley floor of the confluent Credit River and Carolyn Creek systems is cut into sedimentary shale with interbedded limestone. Alluvium over the bedrock is relatively thin except in deeper terrace forms, such as the sloping grade north of the creek. The study reach appears to have been straightened as a roadside feature along the south side of Barbertown Road in at least the 1940s, but probably older than this, based on historic air photos. The study reach is currently highly entrenched between gabion walls with a gabion bed. The current gabion walls were installed in 1999, replacing gabion mattress revetments previously constructed in 1985. The current Barbertown Road crossing and Koliba Park entrance crossing are replacement structures also built in 1985. The gabion channel has therefore essentially produced no sediment load in recent decades, but rather acts as a conveyance system for bedload and suspended load from upstream. The low flow visible sediment seen on the bed is generally a heterogenous fine sand to large cobble shale and limestone mix, with much material embedded in the gabion stone voids. Some failure of the gabion structures has exposed native material, specifically at the drop structure ~15m upstream of the Credit River (more detailed description further below). Sediment deposition on top of the variable

condition gabion bed does result in some minor pooling and riffle-like variability but there is no explicit sorting pattern or natural meandering low flow sequence.

The gabion channel geometry varies moderately with a 3.5-4m wide low flow base on average. The low flow is defined between the 0.5m high exposure of 1m square partially-embedded gabions. Upstream of the drop structure location, on top of the embedded row a 1m square row lines the south side and two rows line the north side of the channel, with approximately 0.4-0.5m horizontal step backs. The channel is thus approximately 4.5-5m wide along the top of the first full row and 1.5m deep +/- from the bed on the south and 2.5m deep +/- on the north. The drop structure itself is a full 1m row high and the channel walls thus gain an extra 1m high row downstream of the drop. Original plans suggest a ½ m high gabion mattress was added to the bed 5m downstream of the drop. The intent was presumably to be a weir that would create a backwater pool effect, and in turn a second drop of 0.5, but this feature is not seen in current conditions. The downstream end of the gabion channel on the north side butts to an armourstone wall which was recently constructed in 2019 as a component of the Credit River pedestrian bridge rehabilitation. The south side end terminates at the coincident and perpendicular bank of the Credit River. The south side of the gabion channel has significant tree growth along its top edge, very dense east of the Koliba Park entrance and less dense and smaller diameter on average to the west. Root balls for many trees appear to have penetrated into the adjacent gabion wall. Root fan structures are seen intercepting the base of the wall into the bed of the channel, specifically willow trees, which mimics what can typically be seen in natural channels. Filter cloth was originally installed with gabions therefore root growth along the system has penetrated significantly through the cloth.

The north edge of the gabion channel has moderate density of small diameter trees and shrubs in a narrow 1-1.5m strip abutting the asphalt edge of Barbertown Road. A continuous guardrail also lines this strip.

The Barbertown Road crossing is a series of 3m wide closed bottom concrete boxes, angled under the road with a modest turn near the downstream side to discharge parallel to the road alignment. The downstream face butts to the start of the gabion channel and the upstream face has concrete wingwalls to contain adjacent road and natural grade blends. Gabions installed on the upstream banks and bed in 1985 have substantially failed and a mix of gabion stone and natural weathered bedrock, plus a range of smaller material, is discontinuously deposited in bar forms within the culvert. The bankfull or active channel width upstream of the crossing varies in the 5-6m range. An 18-inch diameter storm sewer is connected within the crossing to the easterly wall.

The Koliba Park entrance crossing is a three section 4.2m wide closed bottom concrete box butted to gabion walls on both upstream and downstream sides. The low flow bed is fully covered with a mix of sediment sizes and blended to daylight areas upstream and downstream.

Photo inventory of typical conditions within the Study Area is shown in Figure 2.2, and conditions at Barbertown Road Crossing and Koliba Park Entrance Crossing are shown in Figure 2.3.

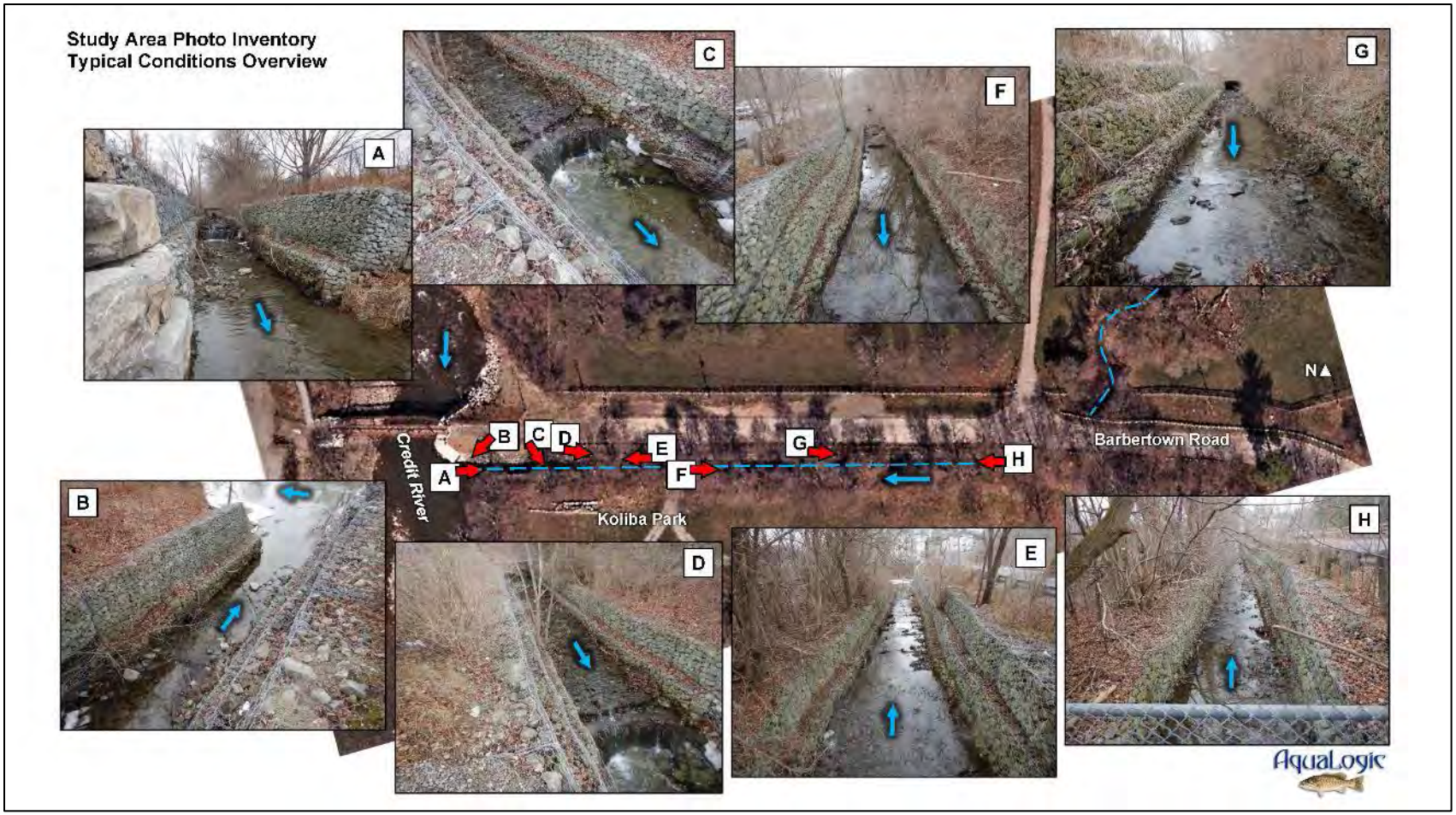


Figure 2.2: Study Area Photo Inventory Typical Conditions Overview



Figure 2.3: Barbertown Road Crossing and Koliba Park Entrance Crossing

2.2.1.2 Primary Failure Site

The primary problem location is the drop structure downstream of the Koliba Park entrance and upstream of the Credit River confluence. As already described, the drop was designed and constructed as a 1m high vertical drop with an intended 0.5m deep plunge pool. The physical waterfall at low flow was therefore intended to be 0.5m, with the gabion weir of the plunge pool intended to create a subsequent 0.5m low flow drop. The gabion weir is not currently in place and presumed to have failed with both wire and rock fill removed by peak flows. Alternatively, the weir may have never been built. Historic air photos reviewed for any indication of the weir are either too low of resolution or have too much tree canopy to determine if the weir was ever in place, or if it was, for how long.

Existing conditions below the drop are observed as an incised bed with lateral undermining of the adjacent gabion walls. This is compounded by rusted wire failure of the lower gabion mesh, and rock loss and partial slumping failure up the gabion wall. The original gabion mattress bed immediately below the drop and partially at the top of the drop has been lost. The gabion mattress loss on the bed appears to be 5m long and at the top of the drop appears to be 1m long. The physical curvilinear crest of the current drop is ~0.5-0.75 offset from the edge of the existing upstream bed mattress, implying a short distance of head cutting from original. As a result, there is a small initial low flow drop from the bed mattress to native bed, as covered by old filter cloth, followed by the main drop to the incised pool below. Original plan sketches imply the bed mattress as 0.5m deep but the installed mattress appears to have been 0.3m deep. The full vertical drop from the top edge of the existing mattress to pool invert is ~1.7m, with a maximum low flow pool depth of ~0.75m. Pool incision is therefore ~0.95m below the assumed as-constructed original bed. The incision depth tapers upward in the downstream direction to meet the intact bed mattress ~5m downstream. The plunge pool has laterally widened essentially the full 1m width of adjacent bottom row gabions, with original filter cloth exposed under the cantilevered and sagging bottom of what remains of the gabion toe on each side. Rusted out and broken wire in the toe row gabions has resulted in most of the installed stone dropping out locally, with some likely removed by peak flows but some still in-situ or shifted just downstream. The bed incision has also occurred into existing bedrock therefore gravel to large cobble and small boulder-sized pieces of shale are also observed locally and downstream of the drop. The pool invert is thus currently in a highly weathered bedrock condition and was observed to also be partially covered by bedload deposits. The undermining failure has resulted in gabions sagging between intact connections upstream and downstream and thus partial gravity collapse of the full height on each channel side has also occurred.



Figure 2.4: Primary Failure Site Feature Details

2.2.1.3 Secondary Priority Sites

Secondary issues through the Study Area exist as several smaller concerns related to constructed and natural conditions within and influencing the channel. The secondary issues are characterized as follows:

Downstream North End Gabion Damage: On the downstream right end of the gabion wall, the toe of the bottom row has rusted out wire failure. Stone loss within the lower basket and some slumping and bulging adjustment above has occurred. Distinct undermining of the wall has not however occurred therefore, despite the specific damage to some gabions, the adjacent connected elements are not significantly affected. This location is nonetheless the most significant of the secondary priority sites based on the following considerations: firstly, recently constructed armourstone abuts directly on the west so future gabion failure would potentially expose the armourstone to flanking; secondly, the gabions are providing both erosion protection and retaining wall/abutment function to the Credit River pedestrian bridge and trail connection on the tableland above. Given that the primary failure site is relatively close upstream it would be appropriate to consider integrating the ultimate solution for the primary site with this location, regardless of the observation that they are not yet undermining

Credit River Flanking Erosion: The downstream left end of gabion works meet the Credit River bank at a roughly perpendicular angle, with the river bank being the trailing edge of a large pool under the adjacent Barbertown Road pedestrian bridge. Carolyn Creek thus discharges essentially into the Credit River pool with an eddy surface flow condition in the river likely happening at higher combined flows. River bank erosion is occurring slowly and some ad-hoc placement of old concrete debris occurs on the bank at the end of the gabions. The erosion scar has slightly flanked behind the height of the gabions by 1-2m. Gabion wire rust failure at the toe of the end of the gabions is also occurring at this location with slight undermining of the existing bed. Given the close proximity to the primary failure site and the gabion damage described above on the opposite bank, it would be appropriate to consider integrating this secondary site as part of the preferred solution, along with the primary site and adjacent secondary site.

Trees Growing Through Gabion Faces: At two distinct locations within the Study Area there are small diameter trees growing through the face of the gabion walls. To a lesser degree there are smaller shrub elements also growing within the face. At present, the trees and respective root systems do not appear to be problematic in terms of bulging and stress breakage. The structural integrity of the gabions is possibly preventing the rooting systems from actually getting too expansive. The available void spacing, in other words, limits the diameter of tap or lateral roots while also limiting the relative root density, as compared to native soil horizons. The actual available soil within the void spaces may also be limited because this would only be what has naturally washed in or developed from decomposing organic matter. In turn, soil is subject to washing out due to the inherent porosity of void drainage.

Backfill Losses: Just downstream of the Koliba Park entrance on the north bank there is evidence of a small area of backfill loss behind existing gabions. This backfill loss is also apparent in available street view imagery back to 2009, thus suggesting that it is

not explicitly recent and not explicitly getting worse. Adjacent impact to the asphalt surface of Barbertown Road was not currently observed. Minor adjustment in backfill is also typical of a couple of other small locations along the north side but with no apparent adverse impact.

Gabion Toe Damage and Slumping: Wire rusting failure and breakage of the gabion wall toe interface with the gabion mattress bed is discontinuously occurring along the entire Study Area. Rusting related breakage is also apparent on the top of the bed mattress across the full low flow width. At one location on the north side downstream of the Barbertown Road crossing, the rusting damage has resulted in some stone loss and adjustment in the overriding wall. The loss and adjustment are significant enough that the wall above has slumped and rolled slightly forward. Similar but less obvious adjustment is also apparent in other locations. The location closest to the Barbertown Road crossing appears to have translated in the past to moderate road edge impact based on a tension crack pattern observable in street view imagery between 2009 and 2018. The roadside guardrail is also shifted and slightly curved out of alignment in this location. The road surface has more recently been paved over as of 2019 per work at the pedestrian bridge over the Credit River, and the tension cracks have been covered over.

Low Flow Fish Barrier at Barbertown Road: Under observed conditions at the time of field work, the existing concrete bed of the upper part of the Barbertown Road crossing was fully exposed at low flow. The wide ultra shallow flow would be untypical of natural channel conditions of a nested low flow with much narrower width to depth ratio, thus increased relative water column depth. The smooth concrete also provides no habitat benefits and no surface flow diversity or velocity shelter. Conditions as observed would be passable by only the smallest of fish with body contact to the concrete boundary.

Tree Roots into Gabions: Mature tree canopy and variable density of shrub thicket and younger trees occurs almost continuously along the south top of bank zone of the channel. The root ball extent of this zone appears to have fully spread along the backfill of installed gabions and is inferred to have penetrated through filter cloth and into the gabions. Root expansion through voids will be limited by the void sizes and the actual presence or lack thereof of soil. Based on large and dominant willow trees, the observance of willow roots into the gabion mattress channel bed suggests that rooting penetration is reasonably significant.

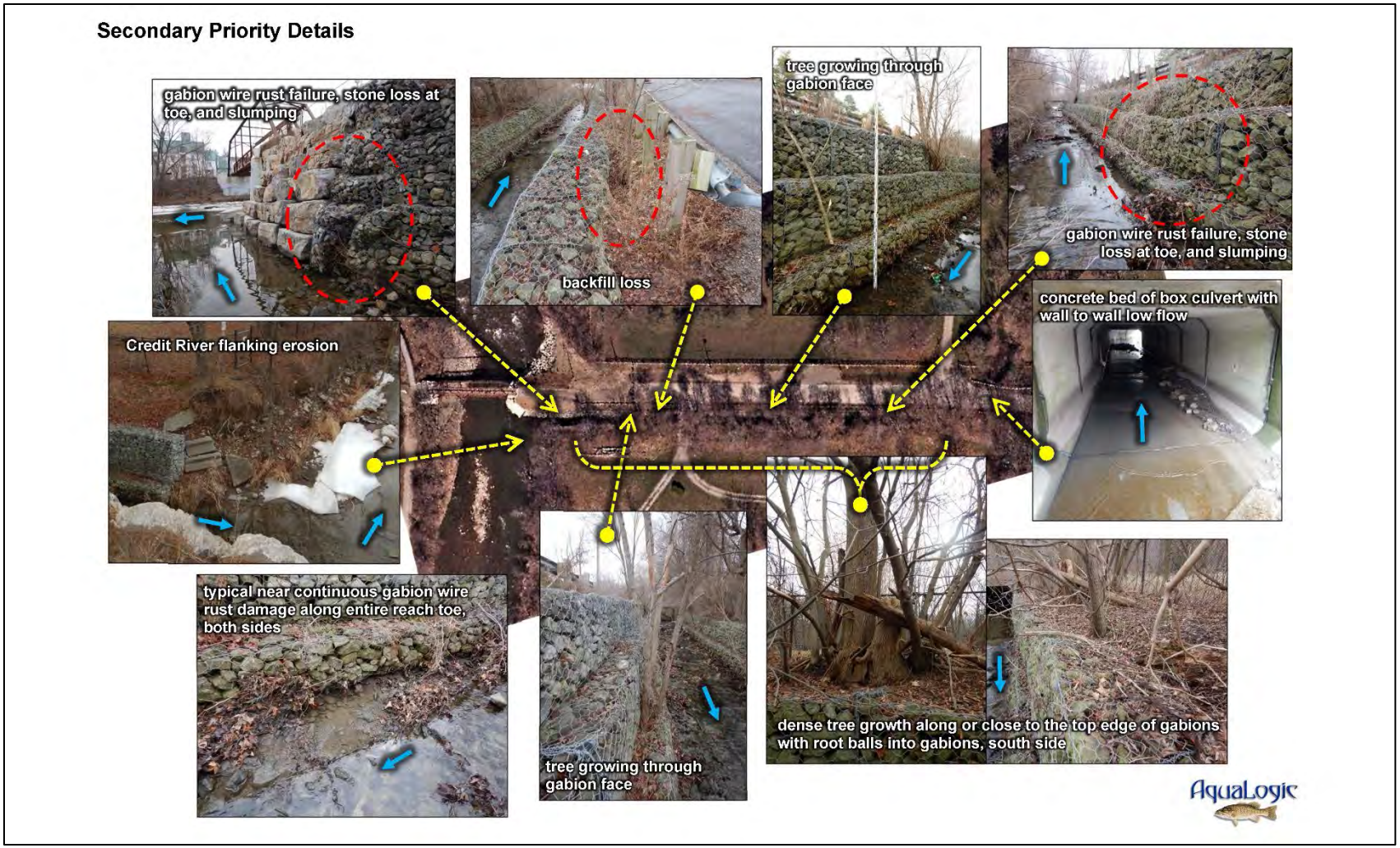


Figure 2.5. Secondary Priority Site Feature Details

2.2.2 Hydraulic Conditions

A hydraulic assessment was completed to determine exisiting hydraulic flow conditions for Carolyn Creek within the Study Area. The approved existing condition HEC-RAS model of the Carolyn Creek provided by the Credit Valley Conservation was used as a basis for Hydraulic Assessment. The existing condition model was executed for mixed profile conditions (i.e. subcritical and supercritical flow conditions), and the simulated flow discharge and velocities were extracted to characterize the flow conditions and erosion potential under the suite of storm events (i.e. 2-year through Regional Storm event). Based on the HEC-RAS model of the Carolyn Creek, the subject section of creek is located between Cross-Section Station 10028 and the downstream end of the culvert crossing the Barbertown Road at Cross-Section Station 10131.

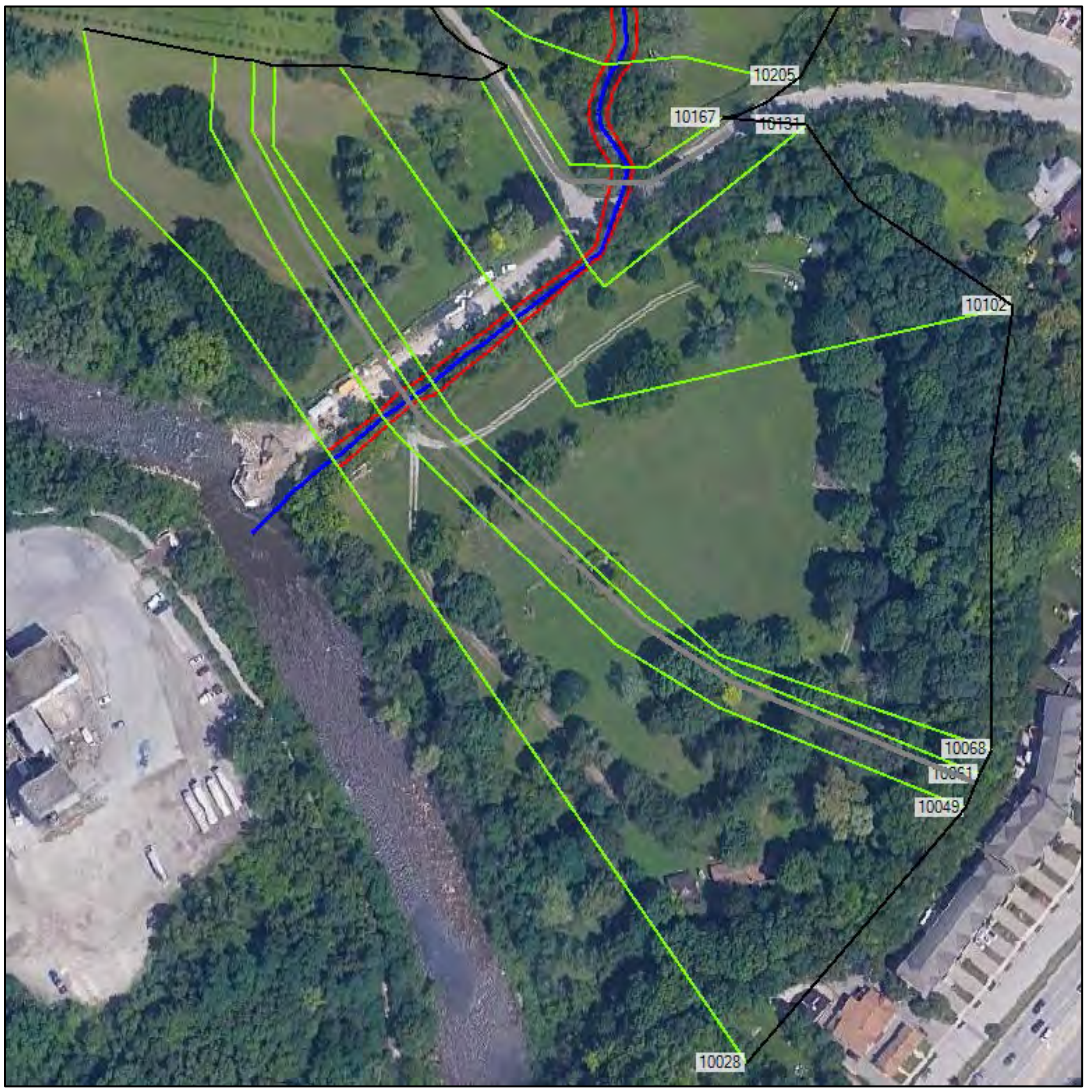


Figure 2.6: Carolyn Creek HEC-RAS Model Cross-Section Stations

The existing condition model has a ground surface elevation of 133.95 m downstream of the culvert crossing the Barbertown Road and 133.40 m at the end of the channel where it drains to the Credit River. The slope of the existing channel is about 0.45%. Table 2.1 and Table 2. 2 present the water surface elevation, flow discharge, and the velocity for the return periods of 2 to 100 years for the key locations at the beginning and the end of the engineered channel. The Cross-sections and profiles for the key locations (Station 10131 and 10028) for the 100-year storm were extracted from the HEC-RAS model and are presented in Figure 2.7 and Figure 2.8.

Table 2.1: Existing Hydraulic Conditions for various Storm Events at Station 10131

Storm Event	Flow Discharge (m^3/s)	Velocity (m/s)	Water Surface Elevation (m)
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

Table 2. 2: Existing Hydraulic Conditions for various Flood Events at Station 10028

Storm Event	Flow Discharge (m^3/s)	Velocity (m/s)	Water Surface Elevation (m)
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

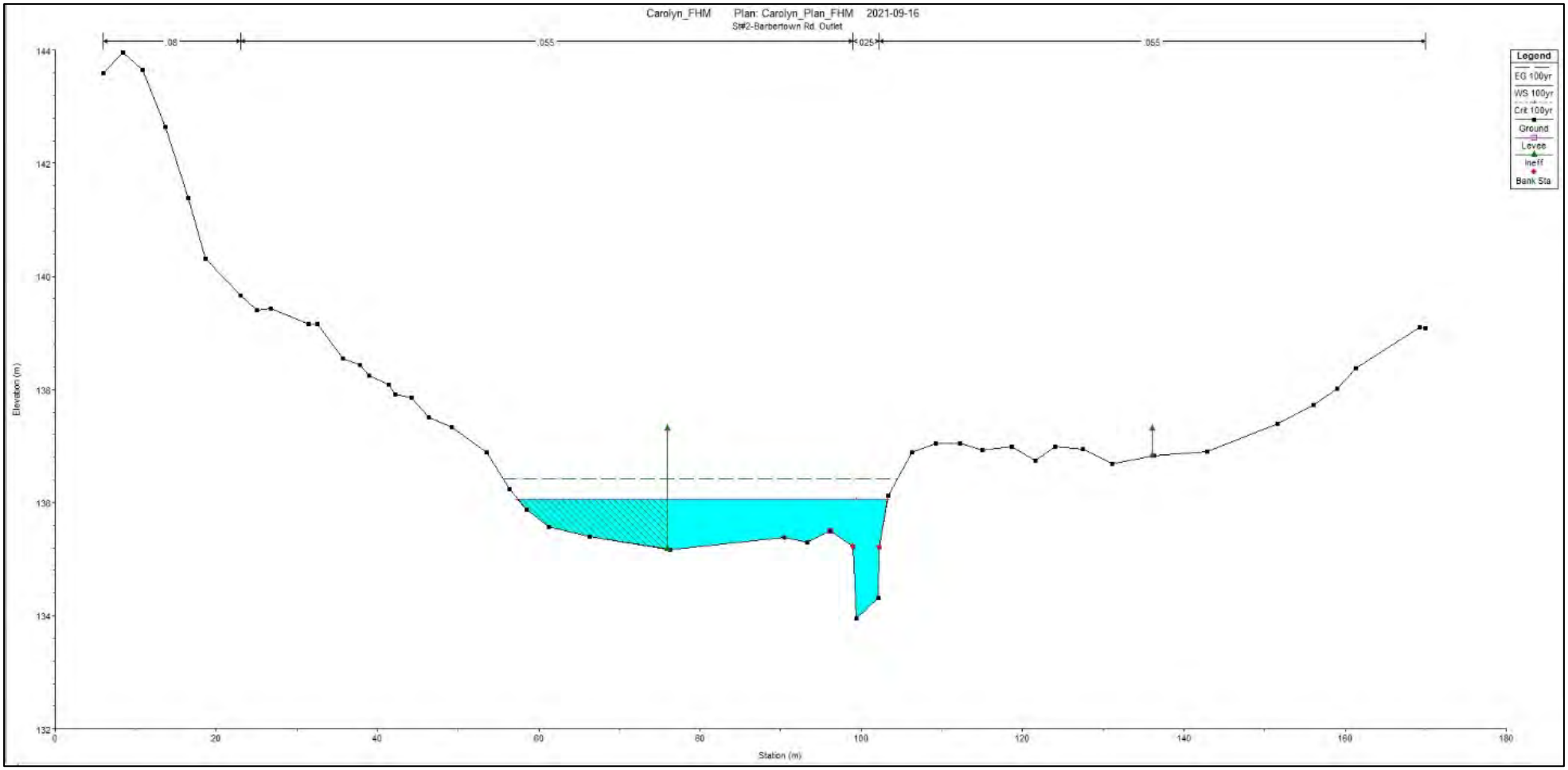


Figure 2.7: Existing Condition 100-year Flow Cross-Section of the Station 10131

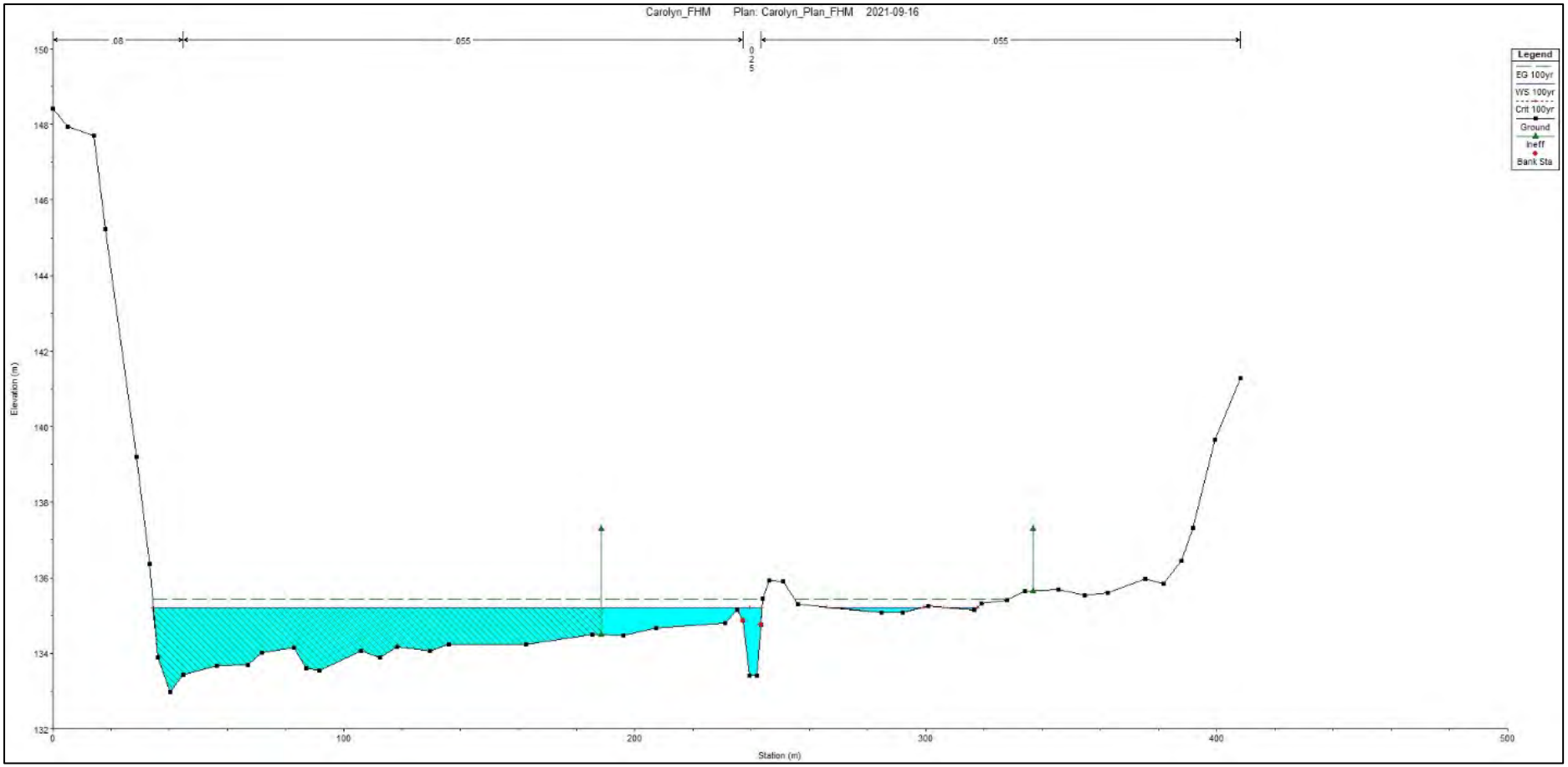


Figure 2.8: Existing Condition 100-year Flow Cross-Section of the Station 10028

2.2.3 Soil and Groundwater

A borehole geotechnical investigation was completed as part of this Class EA Study. This document provides a high-level summary of geotechnical investigation. Detailed results of geotechnical investigation, including borehole locations and borehole plans will be included in this Class EA's Project File Report.

The subsurface investigation consisted of four (4) boreholes advanced along Barbertown Road to depths of 5.2 to 6.7 metres (m). A groundwater monitoring well was installed in the borehole located close to the Barbertown bridge.

The subsurface conditions encountered in the boreholes generally consisted of the existing pavement structure overlaying fill materials over native granular and cohesive soils followed by bedrock. The native soils consisted of silts, sands, gravel, peat, and silty clay.

Following completion of drilling, the boreholes were the inspected for groundwater. The groundwater encountered at a depth of 4.6 metres and 4.9 metres in two of the four boreholes.

2.2.4 Drinking Water Source

The Study Area is located in Credit Valley Source Protection Area. A review of Ministry of the Environment, Conservation and Parks' Source Protection Information Atlas identified that the Study Area includes Highly Vulnerable Aquifers and Significant Groundwater Recharge Areas (Figure 2.9) (Ministry of the Environment, Conservation and Parks, 2022). Municipal drinking water supply in this area is taken from Lake Ontario.

Highly Vulnerable Aquifers are the aquifers that are susceptible to contamination because of their location near the ground's surface or where the types of materials in the ground around them are highly permeable. Significant Groundwater Recharge Areas are areas that are characterized by porous soils, which allow water to seep easily into the ground and flow to an aquifer.

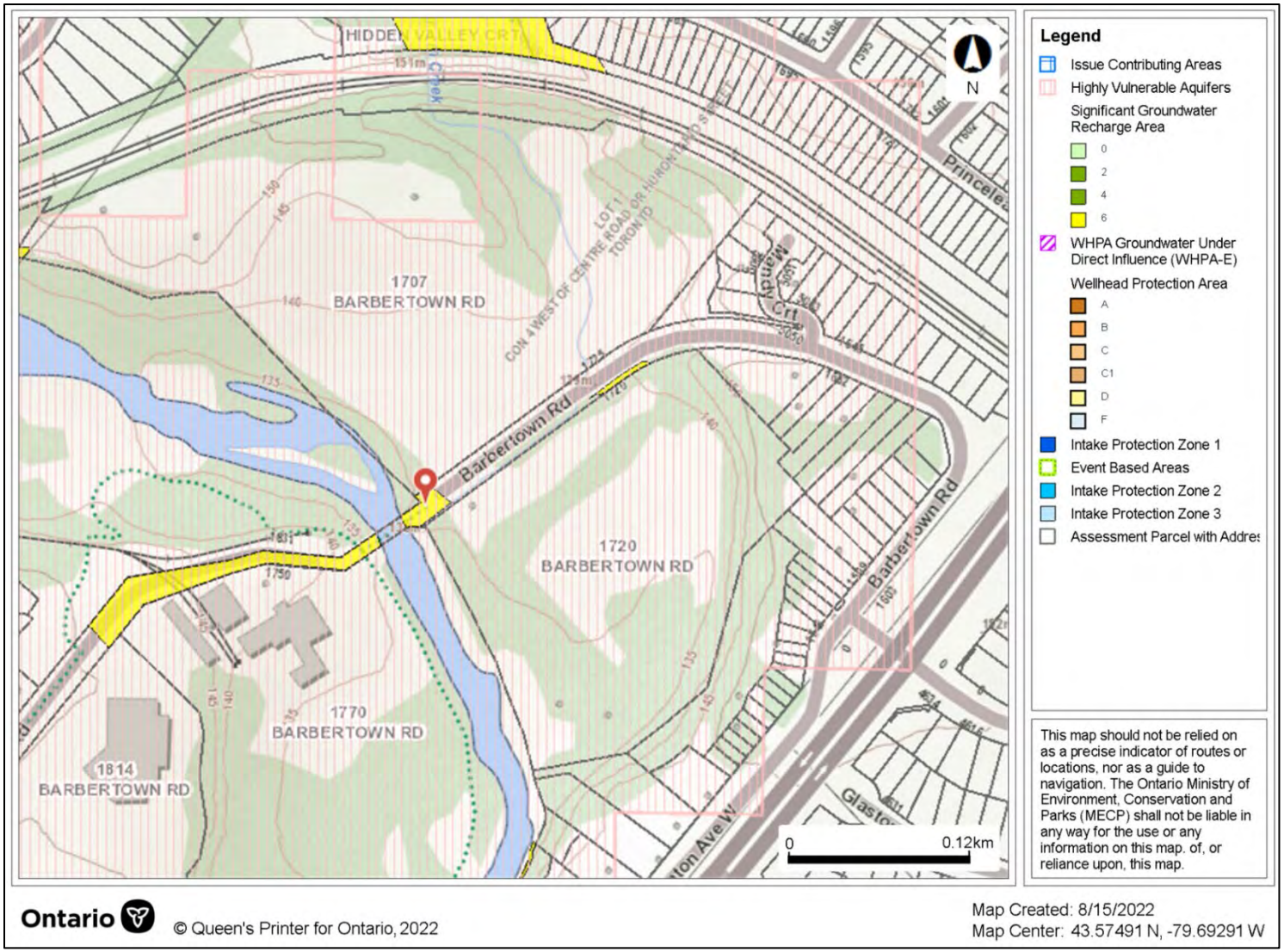


Figure 2.9. Source Water Protection

2.3 Natural Environment

Aquatic and Terrestrial Resource Assessments were completed to identify fish and fish habitat, and terrestrial resources within the Study Area. This document provides a high-level summary of Aquatic and Terrestrial Resource Assessments. Detailed information is provided in the Natural Environment Resource Assessment and Species at Risk Screening (Appendix A).

2.3.1 Fish and Fish Habitat

2.3.1.1 Methodology of Fish Habitat Assessment

An aquatic habitat assessment and fish community survey was executed on 27 May 2021 by two qualified aquatic biologists.

The aquatic habitat assessment and fish community survey involved walking the creek channel from the outflow at the Credit River, upstream approximately 200 metres (m), to the upstream end of the Barbertown Road culvert. The survey was completed in accordance with the Environmental Guide for Fisheries (Ministry of Transportation, 2020) and included an assessment of the channel 50 m upstream of the culvert. The purpose of the aquatic habitat assessment was to document existing conditions within the Carolyn Creek channel. The fish community survey was conducted using a backpack electrofisher (1,772 seconds of fishing) and one person dip netting. Additionally, a review of background information, including online databases, was completed to identify potential fish species and species at risk (SAR) within the Study Area.

2.3.1.2 Fish Habitat

The 50 m assessed area upstream of the Barbertown Road culvert was a combination of riffle, run and pool habitat with predominantly gravel substrate, accompanied by cobble, silt and sand. Water depth generally ranged from 0.05 to 0.40 m, though depths as low as 0.01 m were recorded. Exposed roots and undercut banks are present on both sides of the channel, with some slumping observed. Gabion baskets along the west bank close to the culvert are failing and an accumulation of wood and concrete was observed across the channel which may impede fish passage. A narrow treed riparian area is present on both sides of the channel, with mowed grass outside of this.

Water depth within the approximately 1.6 m high, 3.0 m wide and 25 m long concrete box culvert ranged from 0.01 to 0.28 m, with a mean wetted width of 2 m. Sand, silt, gravel and cobble were present within the culvert.

The creek is channelized in an east/west direction along the south side of Barbertown Road, downstream of the box culvert, for an approximate length of 125 m. Gabion baskets form both sides of the channel, ranging from 1.3 to 1.9 m high. The channel is approximately 2.8 m wide, with a combination of riffle, run and flow morphology and water depth generally ranging from 0.08 to 0.10 m. One pool,

approximately 3.3 m wide and 4 m long was present with a maximum depth of 0.70 m recorded. At the time of assessment, a vertical increase in elevation greater than 0.50 m was present from the pool water level to immediately upstream. The most downstream 40 m of the channel slopes downward toward its outlet at the Credit River. Substrate was predominantly gravel and cobble, with sand and silt present. An access road to the Slovak Canadian Culture Society property which is located south of the creek, crosses the channel. A narrow, densely treed riparian area is present on both sides of the gabion basket channel banks, providing riparian cover to the creek. Barbertown Road is north of the narrow tree line while predominantly mowed grass is present to the south in the Slovak Canadian Culture Society property.

The following is a summary of potential aquatic habitat issues identified during the field investigation:

- Areas where water level was 0.1 m or less, specifically on the exposed concrete bed of the Barbertown Road closed bottom crossing.
- Potential impediment to fish passage upstream of the culvert due to debris/wood in the channel upstream of Barbertown Road.
- Areas where bank failure may occur due to erosion and block the watercourse and/or input sediment into the watercourse.
- Failing gabion baskets in the vicinity of the pool near the d/s end of the channel near the Credit River, and a vertical elevation change >0.5 m at the upstream end of the pool.

2.3.1.3 Fish Community

The fish community survey captured six species of fish, comprised of warm and cold-water species, including young of the year (YOY) salmonids. No Species at Risk (SAR) were recorded.

The background information review (i.e., online databases) identified eight fish species within Carolyn Creek and an additional 14 species in the Credit River, within 500 m of the Study Area. Additionally, one SAR fish was identified within 1 kilometre (km) of the Study Area. Background information included the identification of two potential fish SAR (Lake Sturgeon, American Eel).

A SAR Habitat Assessment based on the field survey, background information regarding habitat preferences and species range, determined the potential for American Eel (Anguilla rostrata) to occur within the Study Area due to their ability to inhabit diverse freshwater habitats. Consultation with the Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF) and the Credit Valley Conservation (CVC) will occur regarding fish species records within the Study Area, to clarify the potential for American Eel to occur. Consultation with the Ministry of the Environment, Conservation and Parks will occur, as required, to address the potential for American Eel within the Study Area.

Ministry of Natural Resources and Forestry was contacted on September 15 and September 17, 2021, to request natural heritage information. On September 17, 2021,

the Ministry advised that September 15 – May 31 in-water works restriction window apply to the project.

Opportunities and Enhancements

Opportunities to improve or enhance fish passage and channel stability would include:

- 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.

2.3.2 Terrestrial Resources

2.3.2.1 Methodology of Terrestrial Resource Assessment

Terrestrial field investigations were conducted on 29 June 2021 by a qualified terrestrial biologist. Field investigations involved documenting existing conditions through a tree inventory, ecological land classification (ELC) survey, botanical inventory, assessment of potential for significant wildlife habitat (SWH) and SAR Habitat.

2.3.2.2 Vegetation

The Study Area including the Carolyn Creek within the Barbertown Road right-of-way, and the surrounding area, has been disturbed by on-going anthropogenic land uses such as the presence of residential and park areas with manicured lawns, road, trails and industrial properties. The Barbertown Road right-of-way consisted of mainly low-quality non-native species typical of roadside edges.

Naturalized vegetation within the Study Area was generally limited to a narrow band of forest along the edges of the Credit River and some small, isolated patches of woodland and deciduous forest. The following vegetation communities were delineated within the Study Area (Refer to Figure 2.10):

- Fresh – Moist Willow Lowland Deciduous Forest (FOD7-3);
- Deciduous Forest (FOD); and
- Mineral Cultural Woodland (CUW1).

Hedgerows, manicured lawns and disturbed roadside vegetation were also present.

A total of 71 plant species were identified during the field investigations. Of these, 27 (38%) were native and the remaining 44 species (62%) were non-native, representing a high percentage of non-native species which attests to the disturbed condition of the vegetation communities. No SAR, provincially rare, or locally rare plants were identified during the field investigations. The tree inventory documented a total of 101 trees within the Project Location. No SAR trees were identified during the tree inventory.



Figure 2.10. Vegetation Communities within the Study Area

2.3.2.3 wildlife and species at risk

The background information review (i.e., secondary sources, wildlife atlases and databases) identified the following records and/or ranges for wildlife and SAR within the vicinity of the Study Area:

- A total of 200 species of birds. This included five species designated as endangered, seven species designated as threatened and 11 species designated as special concern.
- A total of 14 species of amphibians and 11 species of reptiles. This included one species designated as endangered, one species designated as threatened, and three species designated as special concern.
- A total of 43 species of mammals. This includes four bat SAR whose ranges encompass the Study Area; however, it should be noted that the exact locations of species occurrences were not available for these bat SAR.
- A total of 60 species of butterflies. This includes one species designated as special concern.

The SAR Habitat Assessment identified the following potentially suitable habitat for SAR identified thought the background review:

- Low potential: Barn Swallow (Hirundo rustica), Tri-colored Bat (Perimyotis subflavus), Little Brown Myotis (Myotis lucifugus), Northern Myotis (Myotis septentrionalis), Eastern Small-footed Myotis (Myotis leibii) and Monarch (Danaus plexippus)
- Moderate Potential: Eastern Wood-Pewee (*Contopus virens*), Snapping Turtle (*Chelydra serpentina*)

The SWH Assessment identified the following candidate SWH features within the Study Area:

- Bat Maternity Colonies: The FOD7-3 and the FOD within the Project Study Area are considered candidate bat maternity roost habitat; however, suitable woodlands are not present within the Project Location.
- Turtle Wintering Areas: The Credit River, which is located within the Project Study Area is considered candidate Turtle Wintering Habitat. Carolyn Creek, located within the Project Location is not considered suitable habitat as the feature does not provide sufficiently deep water or soft mud substrates.
- Habitat for Special Concern Species: Eastern Wood-pewee, Red-headed Woodpecker and Snapping Turtle.

2.3.2.4 natural heritage features

There are no Provincially Significant Wetlands (PSWs), Locally Significant Wetlands (LSWs) or Areas of Natural and Scientific Interest (ANSI) within the Project Study Area. However, the following features identified in the City of Mississauga Official Plan (2021) (City of Mississauga, 2021) are present within the Project Study Area:

- Significant Natural Area and Natural Green Spaces

— Natural Hazard
— Public and Private Open Spaces

Through the application of the Significant Woodland Criteria, as described in the City of Mississauga Official Plan (2021) the FOD7-4 and FOD forest communities present within the Study Area are considered significant woodlands. As well, considering the definition provided in City of Mississauga Official Plan (2021), Significant Valley Lands are also present within the Study Area.

In addition to above, Credit Valley Conservation (CVC) was contacted on September 24, 2021 to request input, that should be considered in the Class EA Study. On September 28, 2021, CVC staff provided a responses, identifying following site characteristics:

— Valley System - The Study Area is located within the valley associated with the Credit River.
— Credit River Watershed Natural Heritage System - The Study Area is located within the Credit River Watershed Natural Heritage System (CRWNHS). The CRWNHS consists of High Functioning and Supporting terrestrial and aquatic natural heritage features, buffers, and complementary natural heritage areas (Centers for Biodiversity). Based on a watershed scale, the CRWNHS is intended to support Provincial, Regional and local municipal natural heritage systems as identified in their respective Strategies or Plans. As a watershed based management agency and landowner, CVC intends to implement the CRWNHS by using it as a strategic program guidance tool; to inform further development of CVC projects and policies; to assist CVC staff in providing technical advice to landowners and stakeholders at a watershed scale; and to promote a more consistent approach to natural heritage system planning across CVC's jurisdiction.
— Municipal Greenlands - The Study Area is located entirely within an area designated as Core Greenlands by the Region of Peel. It is the policy of the Region of Peel to protect the form and function of these natural areas. CVC provides technical support to the Region with respect to delineation of natural features and reviewing potential impacts from subsequent development within and adjacent to these lands.
— Mississauga Natural Areas Survey - The Study Area is located partially within the City of Mississauga's Natural Areas Survey and designated as Significant Natural Site (CRR5). CVC provides technical support to the City of Mississauga with respect to the identification and delineation of natural heritage features or areas as well as reviewing proposals for potential negative impacts to the natural features or areas.

2.4 Cultural Environment

2.4.1 Archaeological Resources

A Stage 1 Archaeological Assessment was completed as part of this Class EA Study. The Stage 1 Archaeological Assessment was carried out in accordance with the Ontario Ministry of Tourism, Culture and Sport's 2011 Standards and Guidelines for Consultant Archaeologists (Ministry of Tourism and Culture, 2011). The project information was acknowledged by the Ministry on 09 April 2021 with the issuance of PIF number P354-0066-2021.

The Stage 1 Archaeological Assessment determined that 0.27 ha (67.5%) of the Study Area is disturbed (roadways, driveways, roadside shoulder [0.13 ha], and a recently constructed culvert canal system [0.14 ha]) and does not require Stage 2 archaeological assessment. In addition, approximately 0.09 ha (22.5%) has been previously assessed (Stage 1&2 P354-0028-2014) and requires no further assessment. The remaining 0.04 ha (10%) consists of natural steeply sloping topography and does not require further testing. Results of the Stage 1 Archaeological Assessment are shown in Figure 2.11.

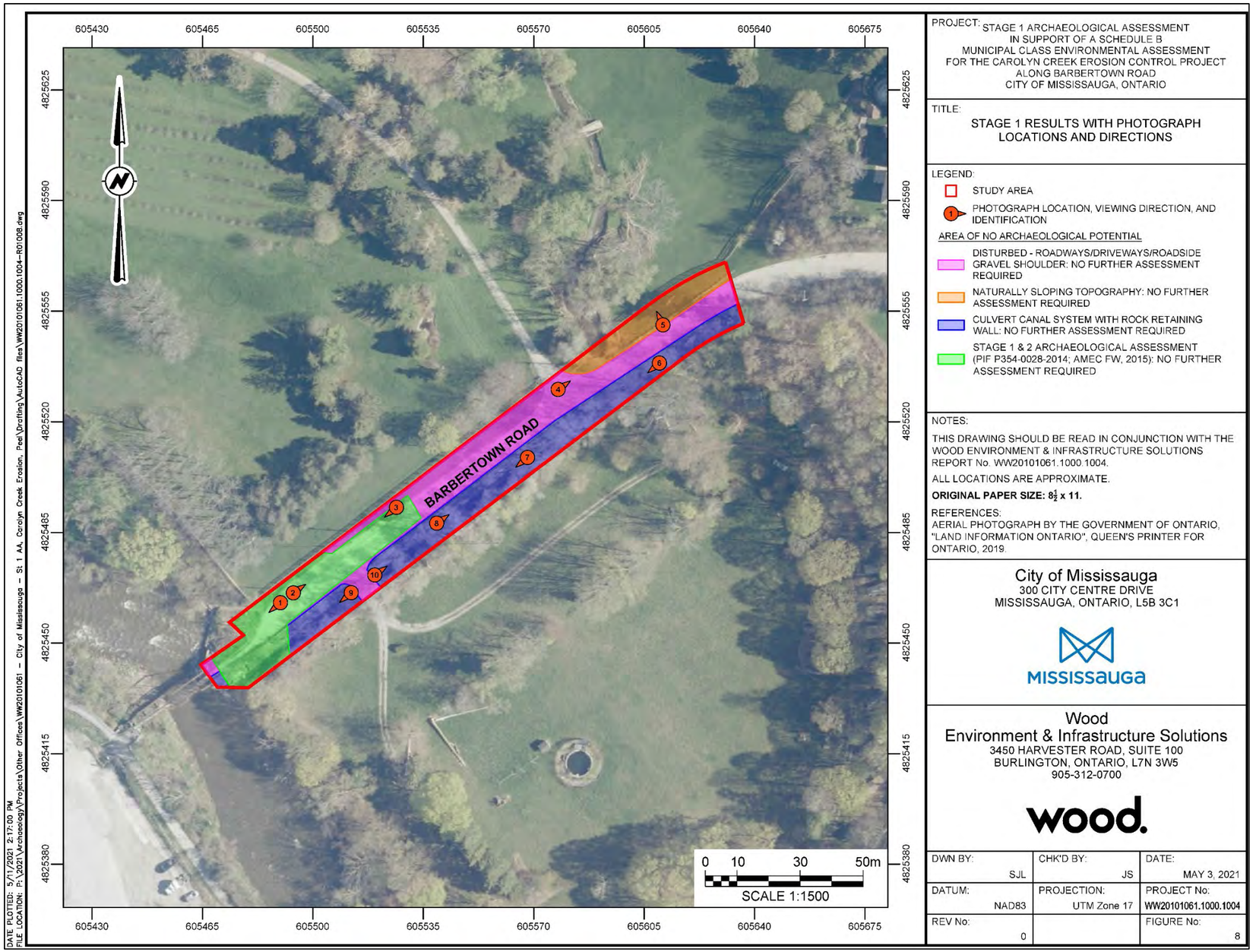
The Stage 1 Archaeological Assessment recommended that the Study Area requires no further archaeological assessment. This report was shared with the Indigenous Nations for their review and comment, prior to submitting to the Ministry of Tourism, Culture and Sport. Stage 1 Archaeological Assessment is provided in Appendix B.

2.4.2 Built Heritage Resources and Cultural Heritage Landscapes

The Study Area is located in Credit River Corridor Cultural Heritage Landscape (Figure 2.12). The Credit River Corridor was identified in the 2005 Cultural Landscape Inventory for its landscape environment, historical associations, historical or archaeological interest, outstanding features or interest, and significant ecological interest (The Landplan Collaborative Ltd., et. al, 2005). The river corridor was evaluated as a Cultural Heritage Landscape as part of City's Conserving Heritage Landscapes: Cultural Heritage Landscape Project (2022).

The Credit River is named "Mis.sin.ni.he" or "Mazinigae-zeebi" by the Mississaugas. It is approximately 90 km long, originating in the Tows of Orangeville, Mono, and Erin. It flows through nine municipalities southerly and drains into Lake Ontario in the City of Mississauga at Port Credit. (Credit Valley Conservation, 2018). Within the City of Mississauga, the Credit River runs for approximately 24 km (Figure 2.12).

The Credit River is the most significant natural landscape and wildlife habitat in the city, and it has had a significant impact on the history and development of the City. The Credit River Corridor has cultural heritage value as a cultural heritage landscape due to its physical value, historical and associative value, and contextual value (Archaeological Services Inc. (A.S.I.) et. al., 2022).



DATE PLOTTED: 5/11/2021 2:17:00 PM
FILE LOCATION: P:\2021\Archaeology\Projects\Other Offices\WW20101061 - City of Mississauga - St 1 AA, Carolyn Creek Erosion, Peel\Drafting\AutoCAD files\WW20101061.1000.1004-R01008.dwg

PROJECT: STAGE 1 ARCHAEOLOGICAL ASSESSMENT
IN SUPPORT OF A SCHEDULE B
MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT
FOR THE CAROLYN CREEK EROSION CONTROL PROJECT
ALONG BARBERTOWN ROAD
CITY OF MISSISSAUGA, ONTARIO

TITLE:
STAGE 1 RESULTS WITH PHOTOGRAPH LOCATIONS AND DIRECTIONS

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 (PIF P354-0028-2014; AMEC FW, 2015): NO FURTHER ASSESSMENT REQUIRED

NOTES:

THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS REPORT No. WW20101061.1000.1004.

ALL LOCATIONS ARE APPROXIMATE.

ORIGINAL PAPER SIZE: 8½ x 11.

REFERENCES:
AERIAL PHOTOGRAPH BY THE GOVERNMENT OF ONTARIO, "LAND INFORMATION ONTARIO", QUEEN'S PRINTER FOR ONTARIO, 2019.

City of Mississauga
300 CITY CENTRE DRIVE
MISSISSAUGA, ONTARIO, L5B 3C1

MISSISSAUGA

Wood
Environment & Infrastructure Solutions
3450 HARVESTER ROAD, SUITE 100
BURLINGTON, ONTARIO, L7N 3W5
905-312-0700

wood.

DWN BY:	CHK'D BY:	DATE:
SJL	JS	MAY 3, 2021
DATUM:	PROJECTION:	PROJECT No:
NAD83	UTM Zone 17	WW20101061.1000.1004
REV No:		FIGURE No:
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Figure 2.11. Results of Stage 1 Archaeological Assessment

Note: *Photos referenced on this figure can be found in the Stage 1 Archaeological Assessment Report provided in Appendix B.*

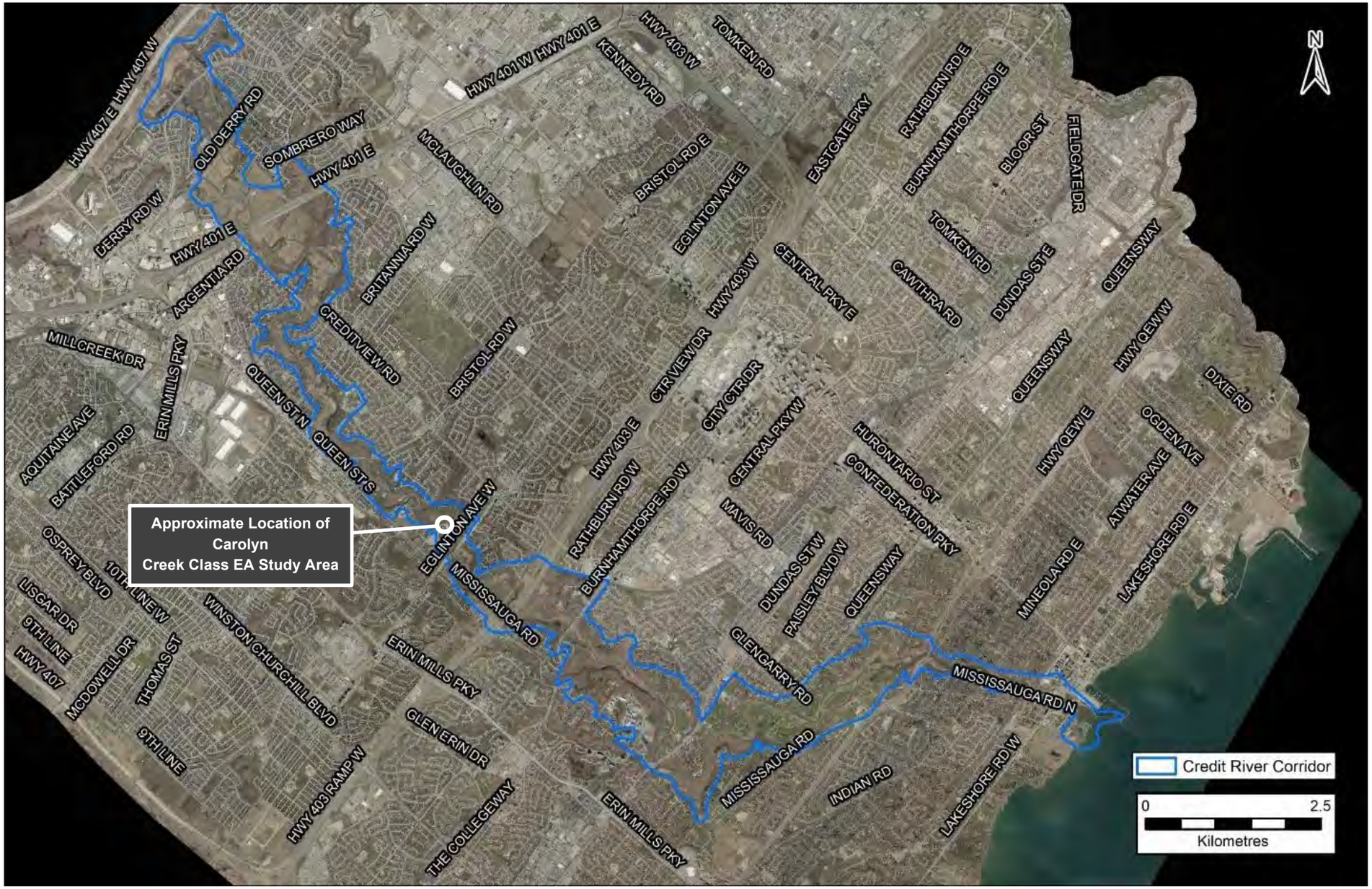


Figure 2.12: Boundary for the Credit River Corridor Significant Cultural Heritage Landscape

Source: *Conserving Heritage Landscapes: Cultural Heritage Landscape Project - Volume 3 (January 2022).*

3 Class EA Phase 1: Problem and Opportunity Statement

The Municipal Class EA document notes that the municipalities generally undertake projects in response to certain identified problems or deficiencies. In other cases, there may be opportunities which need to be addressed. Previous studies/reports undertaken by a proponent may be available to assist in defining the problem. Therefore, as part of the Class EA Phase 1, a clear problem and opportunity statement should be identified for the proposed project.

Further to intial meetings with the City, and considering the review of background information and results of various baseline inventory investigations, the following problem and opportunity statement was develoiped:

The City of Mississauga, through its ongoing erosion monitoring program, identified a 200 metres long section of Carolyn Creek on the south side of Barbertown Road as a high priority site in need of rehabilitation due to the risk to property and infrastructure. The creek section borders to the north of Slovak Canadian Culture Society (Koliba Park) and ends by flowing into the Credit River. Through this Class EA Study, the City of Mississauga is taking the opportunity to address the areas with significant erosion, through design of erosion control works and appropriate mitigation.

4 Class EA Phase 2: Alternative Solutions

In order to assess and select the Preferred Alternative(s) to address the existing erosion problems in Carolyn Creek, a systematic and transparent approach must be developed to evaluate all identified alternatives. For the current study, this evaluation has been divided into a Long-List and Short-List Screening exercise.

4.1 Identification of Long-List of Alternative Solutions

The following provides an outline of a long-list of potential alternatives to address the Problem Statement.

4.1.1 Alternative A: Do Nothing

The 'do nothing' alternative would leave existing conditions in place with no rehabilitation effort to mitigate damage and future risk. It would be expected that additional erosion and gabion failure would occur at the primary failure site in the near to mid-term. Secondary issue sites are less of an immediate priority, and potentially not near or mid-term problems. The do-nothing alternative is not considered viable with regard to the primary failure site, as such it was **not carried forward for further evaluation.**

4.1.2 Alternative B: Enclosure

The enclosure option would be to design a continuous box or open-footing culvert that replaces the existing daylighted gabion-lined components of the channel. An example of enclosure structure is shown in Figure 4.1. The enclosure could conceivably also replace each of the crossing structures. Design capacity would be based on a feasible level of discharge capacity with a target of reducing or eliminating overland and surface flooding at an infrequent peak flood event. Based on existing hydraulic modelling, the existing capacity of the gabion channel is limited to just the 5-year storm event at the downstream face of Barbertown Road, but is less than the 2-year storm event over the entire remaining length. Enclosure would have detrimental impact from an aquatic habitat perspective and would thus typically require some form of mitigation or compensation at another location as a benefit trade-off exercise. 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. Accordingly, enclosure was **not carried forward for further evaluation.**



Figure 4.1: Barbertown Road Enclosure Structure over Carolyn Creek

4.1.3 Alternative C: Protect In Place / Functional Channel Design

The protect-in-place option is the traditional standard of providing erosion control stabilization to address adverse channel adjustment that impacts infrastructure and property. The existing channel is an end-to-end protect in place approach designed to functionally maintain the creek from impacting the parallel road and private property interests. Typically, the 100-year storm event is the maximum standard for long term design life of functional erosion control works.

Installation of gabion works was common in the relative period of the 1970s to 1990s. Many of these installations had initial resistance to large storm events based on the structural mass of individual baskets and multiple baskets linked together. The design life of gabions is however impacted by rusting problems, debris and ice impact breakage, and inability to self-adjust which thus sometimes manifests as chain reaction failure. Gabions are not currently seen as a long-term solution due to these structural issues.

Replacement of the existing gabions with a target of 100-year storm event resistance would require use of appropriately sized stone in natural boulder or armour stone sizes, to geometrically replicate the same steep wall/bank channel configuration. An example of rehabilitated creek bank with multiple rows of armour stone is shown in Figure 4.2. Alternatively, having lower angle banks in a revetment style design may also be feasible but may potentially require a larger top width, dependent on the exact flow conveyance objective. Larger top width would be impactful to the parallel road, the existing mature

tree line, possibly to buried infrastructure, and may potentially be an encroachment to private property requiring more land. Large stone-based solutions can be enhanced with use of vegetation to provide habitat improvement, natural aesthetics, and integrated soil stabilization. Replacement of the existing end-to-end gabion treatment with a boulder or armour stone solution is proposed to be an option available for more detailed analysis and discussion. Accordingly, Protect in Place / Functional Channel Design was carried forward for further evaluation.



Figure 4.2: Example of Rehabilitated Creek bank with Armour stone

4.1.4 Alternative D: Natural Channel Corridor Realignment

Natural channel realignment is feasible at face value given macro-scale physical factors that drive design. Specifically, end-to-end gradient is steep but manageable and hypothetically there is available flood plain land to the south. An integrated corridor that mimics a meandering channel planform, designed for amplitude or meander belt metrics, could be built across the flood plain in this scenario. This scenario also assumes that Barbertown Road would not be relocated and as a result would be the northerly border of the corridor. An example schematic of natural channel realignment is shown in Figure 4.3.

To fully analyze this scenario, the entire flow regime would need to be considered up to and including the Regional event, and a confirmed program to acquire private land

would be needed. The engineering requirements of a cut-fill balance or lack thereof and additional infrastructure relocation would need to be incorporated. The environmental requirements of landscaping design and terrestrial corridor inclusion would also need to be incorporated. Geomorphic channel design and aquatic habitat integration would need be done with all engineering and other environmental factors integrated. The effort would be significant, and the implementation cost would be presumably very high. The perceived value of the results does not subjectively appear to be balanced by the effort and cost.

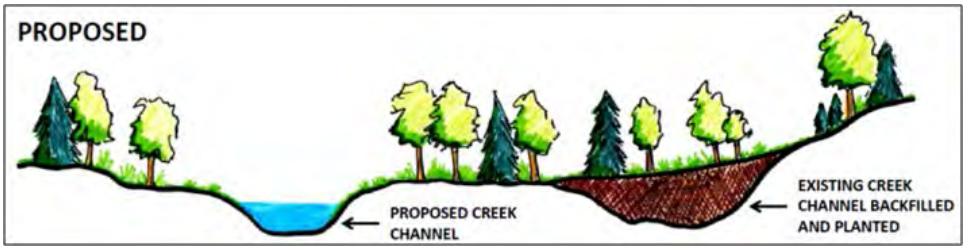


Figure 4.3: Schematic of Natural Channel Realignment

For this project, two creek realignment alternatives were identified as discussed below:

Alternative D1: Creek Realignment to the North: This realignment alternative will involve shifting the segment of Carolyn Creek from Barbertown Road culvert to Credit River 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. A high level sketch of this realignment alternative is shown in Figure 4.4. This alternative was **carried forward for further evaluation**.

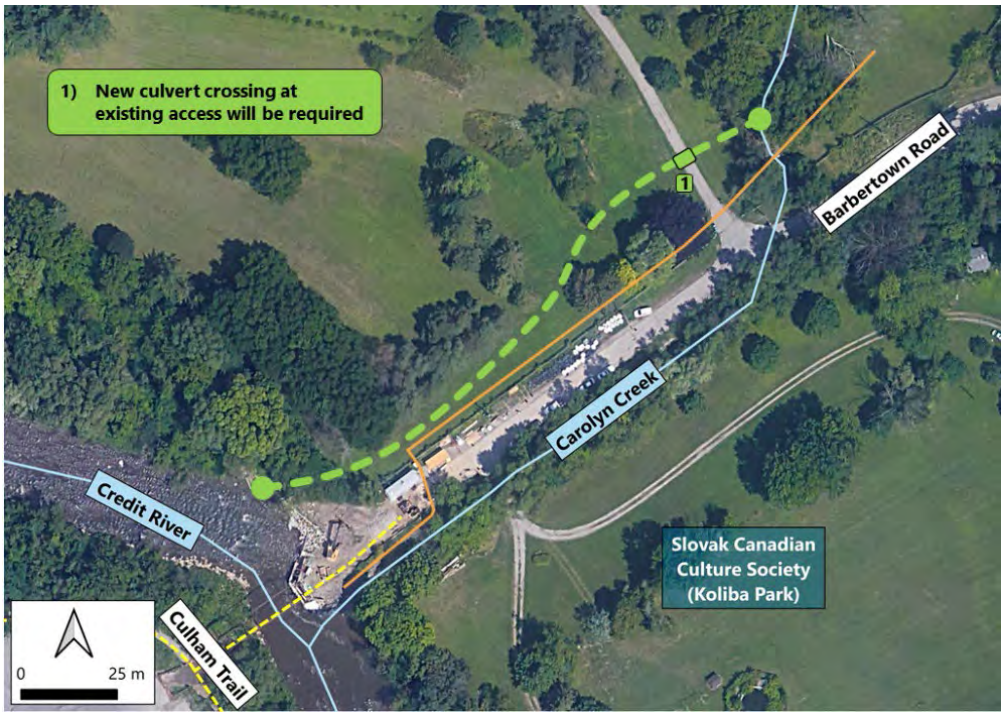


Figure 4.4: Creek Realignment to the north of Barbertown Road

Alternative D2: Carolyn Creek Realignment to the South: This realignment alternative will involve shifting the segment of Carolyn Creek from Barbertown Road culvert to Credit River on the south within the Koliba Park property. The creek would cross under a new structure that would provide access to Koliba Park. A high level sketch of this realignment alternative is shown in Figure 4.5. This alternative would likely require significant land acquisition and be a costly alternative to implement. For these reasons, this alternative **was not carried forward for further evaluation**.

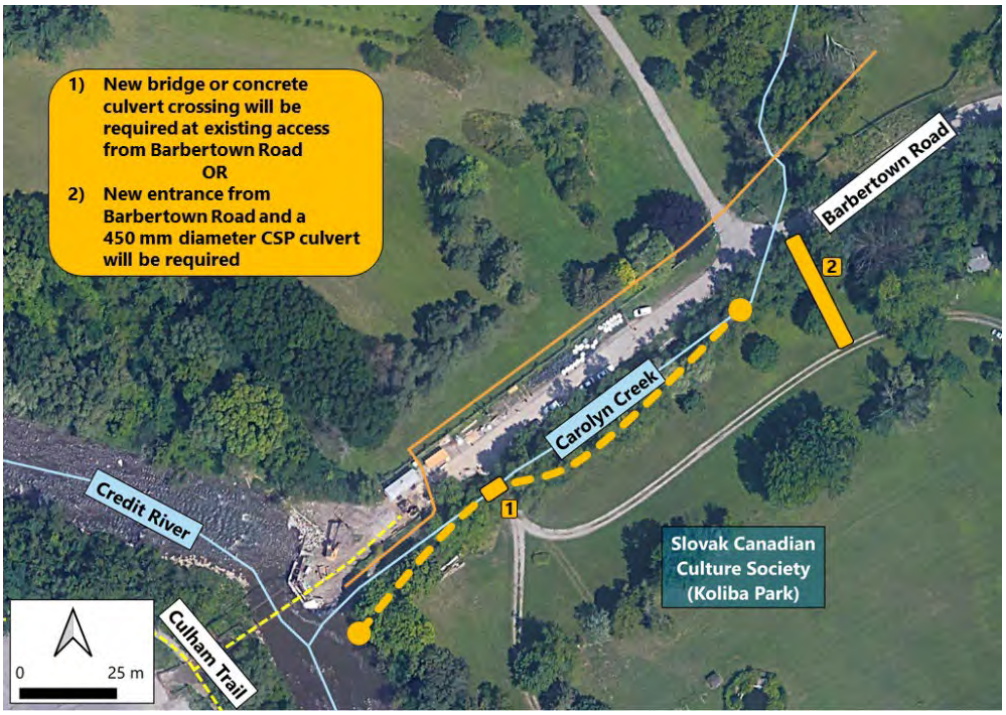


Figure 4.5: Creek Realignment to the south of Barbertown Road

4.1.5 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. The objectives and guidelines for crossing design have varied and evolved over time. The contemporary geomorphic standards typically used are opening width based on bankfull geometry width plus overbank erosion setback contingency, with scour treatment protection to the 100-year storm event. Providing a bankfull channel at appropriate gradient facilitates channel forming flow and sediment transport. Nesting a low flow within the bankfull facilitates fish passage. Providing an overbank setback facilitates terrestrial corridor function. This option was **carried forward for further evaluation.**



Figure 4.6: Road Crossing (Koliba Park Entrance) over Carolyn Creek

4.1.6 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. Improvement of existing conditions through barrier removal is a typical high value benefit because of the potential scale of opened up habitat access. Adding physical habitat diversity in terms of channel profile grading or site feature construction such as woody debris, large rock, or additional vegetation overhangs, are also potential improvements over existing conditions. Rehabilitation of manmade altered conditions into more natural conditions, based on geomorphic design, will typically recreate optimal channel geometry for aquatic habitat. Added habitat diversity features, as noted above, can also be incorporated with new functional or natural channel construction. Both improvement scenarios, either modification of existing conditions or enhancement added to construction of new conditions, are feasible opportunities within the current study. Barrier Removal was **carried forward for further evaluation.**



Figure 4.7: Barrier Removal at Carolyn Creek

4.2 Functional Assessment of Short-List of Alternative Solutions

4.2.1 Analysis of Erosion Potential

The existing conditions HEC-RAS model supplied by Credit Valley Conservation was summarized for erosion potential indicators and hydraulic geometry over all events up to and including the 100-year. The primary erosion indicators of velocity and shear stress were categorized based on stability potential under naturalized conditions of vegetation-based bank protection thresholds. The detailed results are shown in Figure 4.8 and Figure 4.9 with three categories highlighted. The ranges used for the primary indicators are velocity less than 1.2m s^{-1} = stable by average density vegetative protection, 1.2-1.8m s^{-1} = stable by high density vegetative protection, >1.8m s^{-1} = unstable by vegetation alone, and shear stress less than 40N m^{-2}, 40-80N m^{-2}, and >80N m^{-2} reflecting the same respective categories. These ranges apply specifically to vegetation control levels, exclusive of material sizing, and would not be applicable to adversely deep and wide channels without rooting depth and lateral drip lines that do not cover total bank height or that do not span laterally under the toe of bank to interlock under the bed. The results show velocity supersedes shear stress with regard to erosion potential. Specifically, velocities at and above the 10-year event over more than half of

all sections show an unstable channel scenario, if the channel was purely natural or naturalized.

If the channel corridor was in natural materials, resultant velocities would be potentially modified by different roughness but higher roughness would also lead to higher flow stages and thus greater degrees of flooding. The existing condition hydraulic results show that a naturalized replacement channel would need to modify cross-section geometry and profile to result in wetted perimeter, hydraulic radius, and gradient adjustments that reduce the salient indicator of velocity. Essentially this means a wider, shallower, and less steep scenario, that might include lateral terracing and grade control components with bioengineering treatments to enhance vegetation density.

A corridor alternative that includes stone treatment to achieve protect in place stability, while also incorporating natural elements of vegetative softening and fish habitat functions, would be premised by engineering analysis of the geometry needed for hydraulic improvement. In this regard and assuming high velocity potential, large boulder treatment in a revetment design can be achieved at a maximum bank angle of 1:1 up to approximately 3.5m high, by experience in other projects. Using existing conditions as a starting analysis point, maximum corridor velocities at the 100-year event range from 1.94-3.55m s^{-1}. The highest velocity was used as input for a treatment sizing model. Detailed results are shown in Figure 4.8 and Figure 4.9, which show a target treatment gradation of approximately 250-900mm diameter stone. The modelling assumes granite or dolomitic limestone boulders. Typically, the 900mm diameter size is a readily available stone of this type. The maximum 100-year velocity will be near the surface of stage depth and under existing conditions this is just over 2m maximum. To provide limited chance for adjustment, the face of the revetment should be made consistently with the D_{100} or 900mm size, with smaller stone as filter and bedding. Void-filling topsoil and seeding on the face would be incorporated, with additional shrub whip or live staking in voids added for density and diversity. Overhanging vegetation would also be incorporated above and along the top of stone.

The primary failure site is not coded in the existing HEC-RAS model with drop structure sections, therefore the precision to confirm potential repair or replacement will need to be done with detailed design. Nonetheless, characterization supplied for the relatively high corridor velocity range confirms that a new structure, or structures, will need to be made from suitably large boulder or armourstone material.

HEC-RAS Erosion Potential Indicators

AquaLogic

stable with average density vegetation control
stable with high density vegetation control
unstable with vegetative reinforcement only

River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Top Width (m)	Vel Left (m/s)	Vel Chnl (m/s)	Vel Right (m/s)	Shear LOB (N/m2)	Shear Chan (N/m2)	Shear ROB (N/m2)	Power Chan (N/m s)	Froude # Chl
10234	2yr	4.6	135.5	136.24	6.5		1.39			29.49		40.88	0.62
10234	5yr	6.9	135.5	136.37	7.18		1.64			39.53		64.92	0.69
10234	10yr	11.3	135.5	136.48	7.79		2.25			74.59		167.66	0.89
10234	25yr	21	135.5	137.48	62.35	0.3	0.73	0.22	2.96	5.92	1.82	4.33	0.18
10234	50yr	31.5	135.5	138.1	74.08	0.28	0.6	0.21	2.15	3.62	1.39	2.19	0.13
10234	100yr	42.3	135.5	137.88	71.37	0.44	0.98	0.32	5.54	9.93	3.49	9.77	0.22
10205	2yr	4.6	135.41	135.87	7.92		1.78			56		99.94	1
10205	5yr	6.9	135.41	135.97	8.74		1.99	0.03		64.95		129.26	1
10205	10yr	11.3	135.41	136.22	17.56	0.22	1.93	0.5	4.08	52.36	13.6	101.12	0.77
10205	25yr	21	135.41	137.47	53.01	0.25	0.61	0.25	1.91	3.61	1.91	2.19	0.14
10205	50yr	31.5	135.41	138.09	59.14	0.26	0.58	0.25	1.81	2.99	1.64	1.74	0.12
10205	100yr	42.3	135.41	137.86	56.75	0.4	0.9	0.38	4.38	7.51	4.11	6.78	0.19
10167	2yr	4.6	134.56	135.3	7.43	0.1	1.22	0.26	1.08	22.22	4.37	27.16	0.53
10167	5yr	6.9	134.56	135.65	8.77	0.22	1.1	0.25	2.67	15.36	3.25	16.96	0.38
10167	10yr	11.3	134.56	136.21	12.56	0.27	1.05	0.31	3.11	11.88	3.67	12.52	0.28
10167	25yr	21	134.56	137.44	41.07	0.25	0.86	0.21	1.95	6.47	1.53	5.57	0.17
10167	50yr	31.5	134.56	138.06	55.6	0.21	0.85	0.25	1.44	5.88	1.85	5.01	0.15
10167	100yr	42.3	134.56	137.78	48.58	0.38	1.36	0.38	4.44	15.51	4.45	21.12	0.25
10149	2-Barbertown Road												
10131	2yr	4.6	133.95	135.05	3.19		1.7			21.26		36.23	0.59
10131	5yr	6.9	133.95	135.14	3.24		2.3			37.98		87.43	0.76
10131	10yr	11.3	133.95	135.52	39.93	0.4	2.2	0.27	7.76	31.19	4.26	68.6	0.62
10131	25yr	21	133.95	135.75	43.33	0.71	2.72	0.43	19.86	45.25	9.15	123.19	0.7
10131	50yr	31.5	133.95	135.92	44.92	0.96	3.17	0.56	32.47	59.37	14.21	188.46	0.78
10131	100yr	42.3	133.95	136.07	45.91	1.18	3.55	0.67	44.98	72.31	19.18	256.79	0.84
10102	2yr	4.6	134.06	134.93	139.98	0.29	1.6		4.85	19.72		31.57	0.68
10102	5yr	6.9	134.06	135.08	142.12	0.39	1.46		7.09	15.82		23.16	0.58
10102	10yr	11.3	134.06	135.27	145.02	0.49	1.43		9.33	14.48		20.77	0.53
10102	25yr	21	134.06	135.49	148.5	0.67	1.77	0.13	15.29	20.63	1.41	36.51	0.59
10102	50yr	31.5	134.06	135.66	193.51	0.79	2.05	0.19	20.25	26.17	2.48	53.77	0.63
10102	100yr	42.3	134.06	135.78	201.32	0.91	2.3	0.33	25.66	31.75	5.64	73.07	0.67
10068	2yr	4.6	133.74	134.39	111.01		2.6			55.24		143.78	1.21
10068	5yr	6.9	133.74	134.75	169.31	0.23	2		3.59	28.97		58.07	0.77
10068	10yr	11.3	133.74	134.95	185.15	0.4	2.04		7.98	28.74		58.76	0.73
10068	25yr	21	133.74	135.25	199.8	0.58	1.83	0.11	12.73	22.09	1.07	40.48	0.61
10068	50yr	31.5	133.74	135.42	256.66	0.69	1.99	0.2	16.62	25.21	2.52	50.22	0.63
10068	100yr	42.3	133.74	135.54	273.75	0.78	2.15	0.31	20.08	28.41	5.15	61.14	0.65
10061	2yr	4.6	133.45	134.36	113.8		1.49			16.22		24.24	0.53
10061	5yr	6.9	133.45	134.57	142.32		1.77			21.62		38.28	0.57
10061	10yr	11.3	133.45	134.76	171.89	0.21	2.35		3.02	36.59		85.89	0.7
10061	25yr	21	133.45	135.24	201.06	0.47	1.67	0.04	8.35	17.57	0.18	29.41	0.47
10061	50yr	31.5	133.45	135.42	257.11	0.59	1.78	0.16	11.48	19.21	1.76	34.26	0.48
10061	100yr	42.3	133.45	135.53	285.64	0.68	1.94	0.28	14.42	22.06	3.87	42.69	0.5
10055	1-Koliba Park Entrance												
10049	2yr	4.6	133.46	134.32	84.72		1.42			14.68		20.89	0.53
10049	5yr	6.9	133.46	134.52	122.99		1.67			19.27		32.25	0.57
10049	10yr	11.3	133.46	134.82	181.05	0.15	1.98		1.78	25.25		49.98	0.6
10049	25yr	21	133.46	135.1	197.34	0.44	2.34		8.6	33.15		77.5	0.64
10049	50yr	31.5	133.46	135.25	234.23	0.62	2.67	0.17	13.7	41.82	2.15	111.45	0.69
10049	100yr	42.3	133.46	135.44	285.21	0.67	2.51	0.31	15.4	35.77	4.81	89.9	0.62

Figure 4.8: HEC-RAS Erosion Potential Indicators

10028	2yr	4.6	133.4	134.04	72.76		2.22			39.34		87.37	1
10028	5yr	6.9	133.4	134.21	103.98		2.46			45.21		111.05	1
10028	10yr	11.3	133.4	134.47	152.6		2.75			52.72		145.08	1
10028	25yr	21	133.4	134.86	203.24	0.46	2.65	0.12	10.46	44.69	1.49	118.32	0.84
10028	50yr	31.5	133.4	135.04	206.91	0.63	2.78	0.23	16.34	46.8	3.69	130.14	0.81
10028	100yr	42.3	133.4	135.22	253.84	0.71	2.72	0.21	18.75	42.68	2.68	116.02	0.74

River Sta	Profile	Q Total (m3/s)	W.S. US. (m)	W.S. DS (m)	Min El Weir Flow (m)	Q Culv Group (m3/s)	Q Weir (m3/s)	Weir Max Depth (m)	Culv Vel US (m/s)	Culv Vel DS (m/s)	Power Chan (N/m s)
2-Barbertown Road											
10149	2yr	4.6	135.3	135.05	137.25	4.6			2.47	1.26	
10149	5yr	6.9	135.65	135.14	137.25	6.9			2.83	1.69	
10149	10yr	11.3	136.21	135.52	137.25	11.3			3.33	2.32	
10149	25yr	21	137.44	135.75	137.25	18.69	2.31	0.21	3.46	5.96	881.64
10149	50yr	31.5	138.06	135.92	137.25	21.92	9.6	0.42	4.06	6.49	836.6
10149	100yr	42.3	137.78	136.07	137.25	23.18	19.12	0.6	4.29	4.29	804.2
1-Koliba Park Entrance											
10055	2yr	4.6	134.36	134.32	134.72	4.6			1.27	1.26	
10055	5yr	6.9	134.57	134.52	134.72	6.86	0.04	0.05	1.55	1.53	461.51
10055	10yr	11.3	134.76	134.82	134.72	5.39	5.91	0.36	0.86	0.86	448.73
10055	25yr	21	135.24	135.1	134.72	4.09	16.91	0.65	0.54	0.54	448.73
10055	50yr	31.5	135.42	135.25	134.72	4.07	27.43	0.82	0.53	0.53	448.73
10055	100yr	42.3	135.53	135.44	134.72	4.39	37.91	0.94	0.57	0.57	448.73

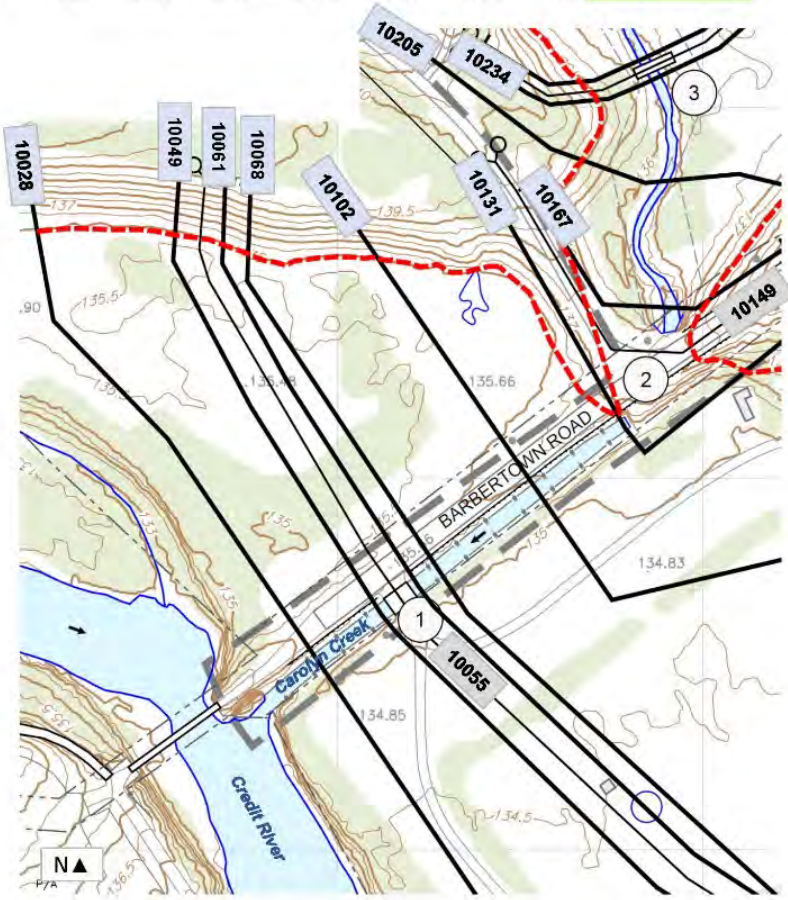


Figure 4.9: HEC-RAS Erosion Potential Indicators (Continued)

4.2.2 Analysis of Existing Road Crossings

Analysis of existing road crossing conditions, with context towards potential replacement, was completed using available hydraulic modelling. A summary of optimal opening sizing for replacement structures was also developed.

The existing conditions HEC-RAS model includes culvert modelling routines for each of the two crossings. The erosion potential indicator results are shown in Figure 4.8 and Figure 4.9. Upstream and downstream velocities are the specific available results from modelling. The same vegetation-based thresholds described above are highlighted only for context, recognizing that only the face ends of a crossing may potentially have some vegetative cover. Typically, the 100-year event design standard is used for scour analysis, subject to site specific conditions. A lower standard is used when constraints are identified and understood, or when an indicator at a lesser event is actually the highest in the regime, thus suggesting higher risk. Using 'local road' criteria, a 1.0 factor of safety is applied to scour treatment analysis to meet the intent of Ministry of Transportation Highway Drainage Design Standards (2008). The maximum velocity through Barbertown Road is 6.49m s^{-1} at the 50-year event in the downstream end, and through the Koliba Park entrance is 1.55m s^{-1} at the 5-year event. Velocities just upstream and just downstream of the Koliba Park entrance are however over 2m s^{-1} and would conservatively be more appropriate to consider.

The Barbertown Road velocity is excessively high and limiting with regard to stone sizing for treatment. Typically, the maximum reasonable velocity for armourstone protection using $1m^3$ or 2.7 tonne +/- stone is 4m s^{-1}. If deemed necessary from a structural or hydraulic perspective, replacement of the Barbertown Road crossing will require detailed design analysis to determine if anything other than a concrete box scenario is possible.

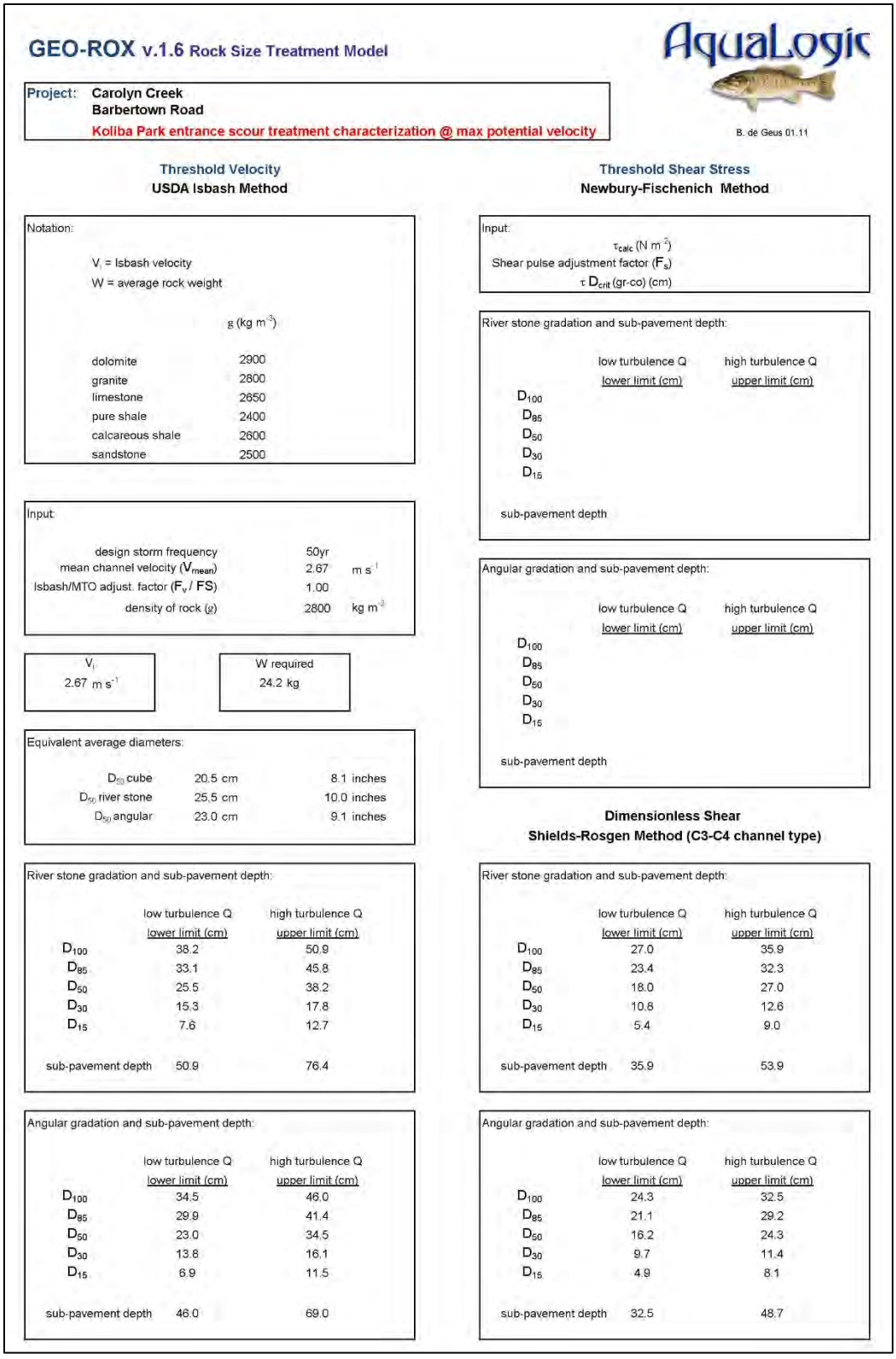
The maximum existing conditions Koliba Park entrance velocity of 1.55m s^{-1} is arguably superseded by the max velocity just downstream of 2.67m s^{-1} at the 50-year event (sec. 10049). The higher velocity was used as input for a treatment sizing model and the FS=1.0 applied. Detailed results are shown in Figure 4.10 and Figure 4.11, which show a target treatment gradation of approximately 150-500mm diameter stone. Based on the presented existing conditions analysis of the higher open channel velocity of 3.55m s^{-1}, the higher level of treatment would be conservative for a crossing but the relative stone sizing may be problematic to install in constrained potential replacement conditions. Detailed design will be needed to confirm a final target.

Installation of stone treatment in a new open bottom crossing would attempt to recreate a bankfull channel shaped by scour treatment that also provides overbanks for terrestrial corridor linkage. Corridor linkage is constrained however by entrenchment. Any potential design along the open channel component of the corridor may functionally need to be entrenched, therefore providing a continuous overbank terrace may not be realistic. If an overbank can be done, the design should have cohesive soil packed to a balance line 10cm above the installed stone depth to mimic bare native soil that would exist under shaded crossing conditions. The fill cap should be compacted in place to a

level natural surface that allows movement of small fauna along the created terrace. Grades should in theory blend and match upstream and downstream daylight grades, recognizing however that a continuous corridor beyond the crossing is a design challenge as well. Within the bankfull channel limits, re-used native creek bed substrate material should be added as void fill of the scour treatment. In lieu of available native material, a suitable aggregate alternative such as Granular B (Type 2) is deemed acceptable. The void fill will thus define the constructed bankfull and low flow wetted perimeter geometry. Physical stream bed conditions for fish habitat and barrier free passage will be mimicked per the intent of Ministry of Transportation WC-12 guidelines (Ministry of Transportation, 2008), Ministry of Transportation Fish Habitat Mitigation (Ministry of Transportation, 2020), and Conservation Authority requirements.

An extension zone of treatment that helps create defined channel entry and exit, and a buffer around the ends of the crossing walls, is also typically recommended. Vegetated stone treatments of the bankfull channel can be sized similarly to scour protection stone. A fully-integrated solution can be achieved in the daylight area transitions, while again recognizing the entrenchment constraints and the actual preferred solution is subject to detailed design analysis.

The existing gabion channel bottom width has been noted to vary in the approximate range of 3.5-4m. The natural channel upstream of Barbertown Road has been noted to have a bankfull width that varies approximately between 5-6m. Ideally, a replacement crossing would be targeted to have an opening width of bankfull plus Ministry of Transportation guideline-based setback contingency for stable channels. For a channel with 5m or less bankfull, the suggested minimum setback is 1m for cohesive materials (Ministry of Transportation, 2008), and over 5m wide is a 2m setback. Installation of long-term scour protection would be deemed to meet or exceed the intent of the guidelines for stable channels in cohesive soil. The potential opening width target could therefore range from 7m to 10m total. The minimum of the range would respect that constraints exist, limiting the opportunity to build a larger structure.



GEO-ROX v.1.6 Rock Size Treatment Model

AquaLogic

B. de Geus 01.11

Project: Carolyn Creek
Barbertown Road
Koliba Park entrance scour treatment characterization @ max potential velocity

Threshold Velocity
USDA Isbash Method

Notation:

V_i = Isbash velocity
W = average rock weight

	g (kg m^{-3})
dolomite	2900
granite	2800
limestone	2650
pure shale	2400
calcareous shale	2600
sandstone	2500

Input:

design storm frequency	50yr	
mean channel velocity (V_{mean})	2.67	m s^{-1}
Isbash/MTO adjust. factor (F_v / FS)	1.00	
density of rock (g)	2800	kg m^{-3}

V_i: 2.67 m s^{-1}

W required: 24.2 kg

Equivalent average diameters:

D_{50} cube	20.5 cm	8.1 inches
D_{50} river stone	25.5 cm	10.0 inches
D_{50} angular	23.0 cm	9.1 inches

River stone gradation and sub-pavement depth:

	low turbulence Q lower limit (cm)	high turbulence Q upper limit (cm)
D_{100}	38.2	50.9
D_{85}	33.1	45.8
D_{50}	25.5	38.2
D_{30}	15.3	17.8
D_{15}	7.6	12.7
sub-pavement depth	50.9	76.4

Angular gradation and sub-pavement depth:

	low turbulence Q lower limit (cm)	high turbulence Q upper limit (cm)
D_{100}	34.5	46.0
D_{85}	29.9	41.4
D_{50}	23.0	34.5
D_{30}	13.8	16.1
D_{15}	6.9	11.5
sub-pavement depth	46.0	69.0

Threshold Shear Stress
Newbury-Fischenich Method

Input:

τ_{calc} (N m^{-2})
Shear pulse adjustment factor (F_s)
τ D_{crit} (gr-co) (cm)

River stone gradation and sub-pavement depth:

	low turbulence Q lower limit (cm)	high turbulence Q upper limit (cm)
D_{100}		
D_{85}		
D_{50}		
D_{30}		
D_{15}		
sub-pavement depth		

Angular gradation and sub-pavement depth:

	low turbulence Q lower limit (cm)	high turbulence Q upper limit (cm)
D_{100}		
D_{85}		
D_{50}		
D_{30}		
D_{15}		
sub-pavement depth		

Dimensionless Shear
Shields-Rosgen Method (C3-C4 channel type)

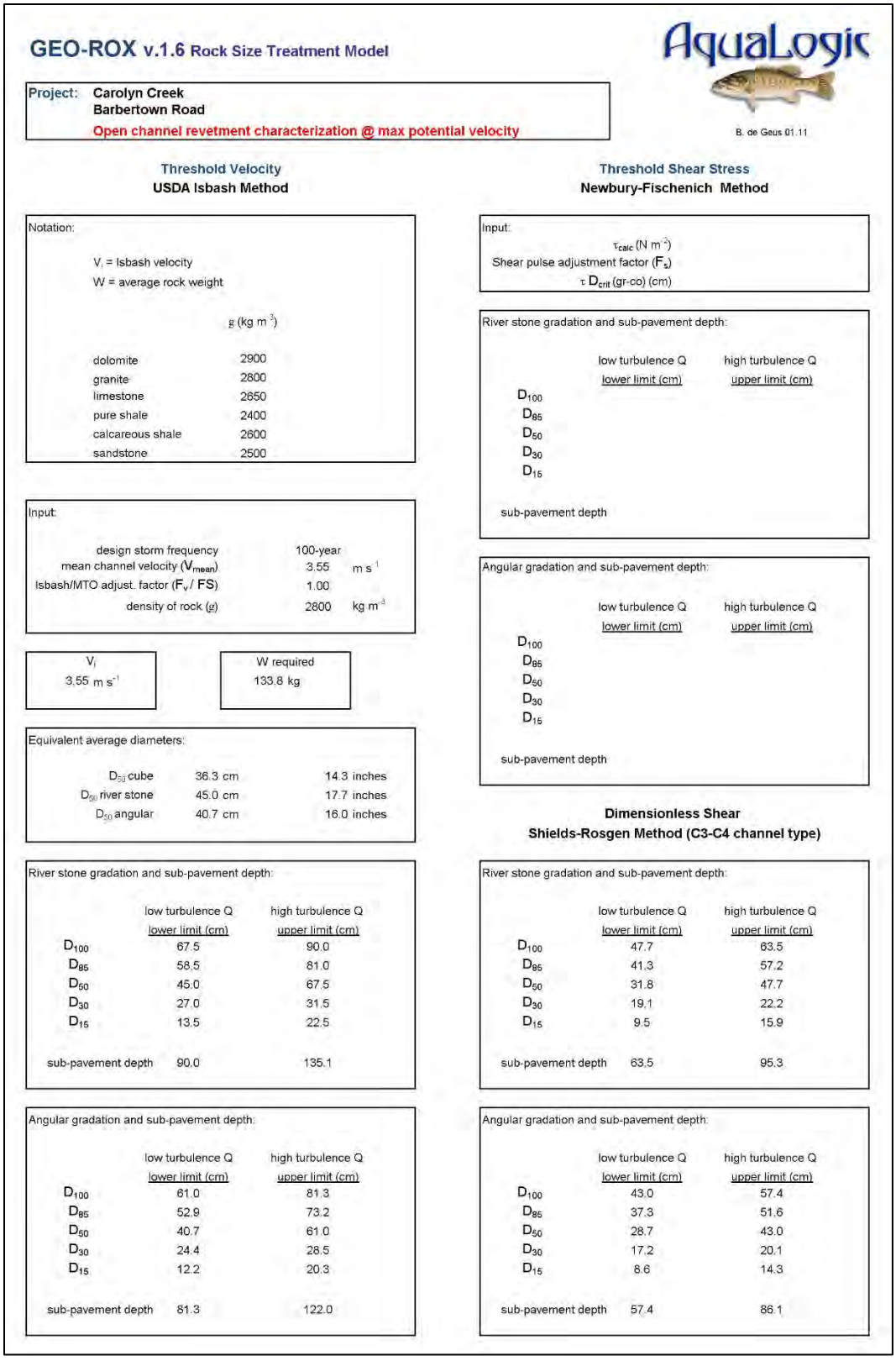
River stone gradation and sub-pavement depth:

	low turbulence Q lower limit (cm)	high turbulence Q upper limit (cm)
D_{100}	27.0	35.9
D_{85}	23.4	32.3
D_{50}	18.0	27.0
D_{30}	10.8	12.6
D_{15}	5.4	9.0
sub-pavement depth	35.9	53.9

Angular gradation and sub-pavement depth:

	low turbulence Q lower limit (cm)	high turbulence Q upper limit (cm)
D_{100}	24.3	32.5
D_{85}	21.1	29.2
D_{50}	16.2	24.3
D_{30}	9.7	11.4
D_{15}	4.9	8.1
sub-pavement depth	32.5	48.7

Figure 4.10: Koliba Park Entrance Scour Treatment Characterization



GEO-ROX v.1.6 Rock Size Treatment Model

AquaLogic

B. de Geus 01.11

Project: Carolyn Creek
Barbertown Road
Open channel revetment characterization @ max potential velocity

Threshold Velocity
USDA Isbash Method

Notation:

V_i = Isbash velocity
W = average rock weight

	g (kg m^{-3})
dolomite	2900
granite	2800
limestone	2650
pure shale	2400
calcareous shale	2600
sandstone	2500

Input:

design storm frequency	100-year	
mean channel velocity (V_{mean})	3.55	m s^{-1}
Isbash/MTO adjust. factor (F_v / FS)	1.00	
density of rock (g)	2800	kg m^{-3}

V_i	W required
3.55 m s^{-1}	133.8 kg

Equivalent average diameters:

D_{50} cube	36.3 cm	14.3 inches
D_{50} river stone	45.0 cm	17.7 inches
D_{50} angular	40.7 cm	16.0 inches

River stone gradation and sub-pavement depth:

	low turbulence Q lower limit (cm)	high turbulence Q upper limit (cm)
D_{100}	67.5	90.0
D_{85}	58.5	81.0
D_{50}	45.0	67.5
D_{30}	27.0	31.5
D_{15}	13.5	22.5
sub-pavement depth	90.0	135.1

Angular gradation and sub-pavement depth:

	low turbulence Q lower limit (cm)	high turbulence Q upper limit (cm)
D_{100}	61.0	81.3
D_{85}	52.9	73.2
D_{50}	40.7	61.0
D_{30}	24.4	28.5
D_{15}	12.2	20.3
sub-pavement depth	81.3	122.0

Threshold Shear Stress
Newbury-Fischenich Method

Input:

τ_{calc} (N m^{-2})
Shear pulse adjustment factor (F_s)
τ D_{crit} (gr-co) (cm)

River stone gradation and sub-pavement depth:

	low turbulence Q lower limit (cm)	high turbulence Q upper limit (cm)
D_{100}		
D_{85}		
D_{50}		
D_{30}		
D_{15}		
sub-pavement depth		

Angular gradation and sub-pavement depth:

	low turbulence Q lower limit (cm)	high turbulence Q upper limit (cm)
D_{100}		
D_{85}		
D_{50}		
D_{30}		
D_{15}		
sub-pavement depth		

Dimensionless Shear
Shields-Rosgen Method (C3-C4 channel type)

River stone gradation and sub-pavement depth:

	low turbulence Q lower limit (cm)	high turbulence Q upper limit (cm)
D_{100}	47.7	63.5
D_{85}	41.3	57.2
D_{50}	31.8	47.7
D_{30}	19.1	22.2
D_{15}	9.5	15.9
sub-pavement depth	63.5	95.3

Angular gradation and sub-pavement depth:

	low turbulence Q lower limit (cm)	high turbulence Q upper limit (cm)
D_{100}	43.0	57.4
D_{85}	37.3	51.6
D_{50}	28.7	43.0
D_{30}	17.2	20.1
D_{15}	8.6	14.3
sub-pavement depth	57.4	86.1

Figure 4.11: Open Channel Revetment Characterization

4.3 Evaluation of Short-List Alternative Solutions

4.3.1 Evaluation Criteria

As required by the Municipal Environmental Assessment process, the evaluation must consider relevant criteria beyond the functional efficacy of each alternative (i.e., ability to address the existing erosion problem). The various alternatives that were carried forward were assessed to determine their impact and opportunity related to four environments:

Physical Environment: This environment considers the ability of the alternative to address the problem and how it may impact existing physical systems

Natural Environment: Impacts or opportunities that an alternative may have related to the natural environment (i.e., terrestrial and aquatic habitat, water quality, etc.)

Socio-Economic Environment: Impacts/benefits related to infrastructure, private properties and public safety

Cost Considerations: Capital and maintenance costs associated with an alternative, both in the short term and long term

Within each environment, relevant and representative criteria must be selected for the evaluation. Each evaluation criterion needs to be assigned a significance weighting and based on the assessment, each alternative will then be screened or short-listed. Evaluation criteria are summarized by environment as follows:

Physical Environment

Erosion Mitigation: The ability of each alternative to address the existing erosion condition within the Study Area. Mitigation of erosion is considered positive. Erosion is the main problem in the Study Area and as such this criterion was assigned a high significance.

Hydraulic Capacity: Ability of each alternative to maintain or improve bankfull hydraulic capacity of the creek (i.e., no alterations proposed to the floodplain).

Flooding: Ability of each alternative to either reduce frequent flooding (greater than bankfull e.g., 2 and 5 year) or have any impact on the local Regional floodplain elevation. Negative impacts on Regional floodplain elevations would not be allowed.

Natural Environment

Terrestrial Environment: The terrestrial environment (wildlife, habitat, and vegetation) would be affected in the short-term through construction and in the long-term associated with the proposed restoration plan. Unavoidable habitat degradation is considered negative, whereas an increase in habitat quality is considered positive. The vegetation along the north side of the Carolyn Creek is primarily low-quality non-native species typical of roadside edges. On the south side of the creek, vegetation is primarily

hedgerows. No SAR, provincially rare, or locally rare plants were identified along the creek during the field investigations.

Aquatic Environment: Aquatic habitat would be affected in the short-term through construction and in the long-term associated with any measures taken to stabilize the creek. Unavoidable habitat degradation is considered negative, whereas an increase in habitat quality is considered positive. Potential impediment to fish passage (debris/wood) was identified upstream of the culvert at Koliba Park entrance. Potential rehabilitation works involve identifying erosion and barrier issues along the channel, and potentially addressing barriers, which may improve fish passage. Accordingly, this criterion was assigned a high significance.

Socio-Economic Environment

Impact to Infrastructure/Utilities: The ability of each alternative to be implemented and simultaneously mitigate any impact to existing infrastructure /utilities along the creek, specifically Barbertown Road and the existing culvert.

Construction Impacts to Private Properties: Koliba Park is located along the south side of subject section of Carolyn Creek. The access to the park is from Barbertown Road, over Carolyn Creek. Land uses to the north of Barbertown Road include residences. Construction may result in temporary nuisances such as increased traffic, dust, noise, impacts to ingress and egress, etc. Any impact to private property is considered negative. Given that impacts would be temporary, this criterion was assigned a low significance.

Public Safety: The ongoing erosion can compromise the stability of creek gabion walls, which are along the Barbertown Road to the north and private properties to the south. Improved public safety would be considered positive. Public safety is considered paramount on any municipal lands and as such this criterion was thus assigned a high significance.

Cost Considerations

Capital Cost: Capital costs include all costs associated with the design, permitting and construction of the alternative, including any land costs. High costs are considered negative, low costs are considered positive. A high significance was assigned to this criterion due to the need for the City of Mississauga to be able to balance economic cost with functional benefit.

Maintenance Cost: Maintenance costs are associated with work required to maintain the design condition or function of the alternative. High costs are considered negative, low costs are considered positive. This criterion was assigned a moderate significance.

Lifespan of Works: Timing for need for replacement following stabilization works. Lower life span is considered negative, and higher lifespan is considered positive impact.

4.3.2 Evaluation of Short-Listed Alternative Solutions

In order to evaluate the short-list of alternatives, the ‘impact’ or ‘benefit’ of each alternative on a given criterion was determined. Impact was determined to be either Positive, Positive/Neutral, Neutral, Negative/Neutral or Negative relative to the existing (baseline) condition. For example, Protect in Place would have a positive impact on the Erosion Mitigation criterion, while it would have a neutral impact on the Terrestrial Environment criterion. The impact is deemed to be neutral where the alternative does not change the existing condition.

Table 4.1 outlines the evaluation of each short-listed alternative relative to the criteria discussed above and provides the impact score and associated justification.

Table 4.1: Evaluation of Alternative Solutions

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.
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 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
Socio-Economic 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
Cost Considerations	*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
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

Positive	Neutral/Positive	Neutral	Neutral/Negative	Negative

4.4 Preferred Solution

4.4.1 Short-Term Solution

Based on the discussion and evaluation presented above, the preferred solution for short-term is identified to be a combination of protect in place and barrier removal measures. This solution will collectively mitigate erosion within the creek reach and improve fish passage and habitat.

The preferred solution proposes to protect the primary failure site (Section 2.2.1.2) 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 discussed in Section 2.2.1.3.

It considers the existing constraints, such as Barbertown Road located to the north and Koliba Park located to the south. Compared to the other alternatives, the preliminary preferred solution minimizes impacts to the form and function of the Credit River and Carolyn Creek valley and provides opportunities for enhancement, which was identified as a key requirement by the CVC. Overall, the short-term solution addresses the objectives of this study, which included:

- Providing long term erosion protection that is compatible with the natural tendencies of the creek;
- Maintaining or improving the hydraulic capacity of the creek;
- Replacing of the existing hardened creek bed and banks with more ‘natural’ forms of erosion and grade control, where feasible;
- Providing environmental enhancements wherever possible;
- Improving fish habitat and fish passage;
- Minimizing environmental impacts during and post construction;
- Decreasing property and infrastructure loss;
- Minimizing capital and maintenance costs;
- Providing design consideration for a potential storm sewer connection from a proposed townhouse development north of Barbertown Road.

This study addressed the Class EA process requirements, including consultation, identification and evaluation of alternatives, and identification of impacts and mitigation measures for the short-term protect-in-place works outlined above. Please refer to the Preferred Solution Plan for the location of Primary and Secondary Sites at the end of this section.

4.4.2 Long-Term Solution

Based on the discussion and evaluation presented above, the preferred long-term solution is identified to be additional protect-in place works and continued annual monitoring of the existing gabion-lined creek, plus additional study to determine whether the potential alternative for a northerly creek realignment has become more

favourable based on a re-evaluation of the alternatives, and the ongoing gabion failure conditions in the existing channel.

Additional protect-in place works will focus on addressing the remaining secondary priority sites, identified in the Preferred Solution Plan, plus any additional repair sites that develop in the intervening years.

As noted above, a separate component of the long-term solution will be a future study, whether a Class EA addendum (if initiated within 10 years) or a separate Class EA if carried out beyond the 10-year addendum window. The focus of this future study would be a reassessment of alternatives, including the north realignment, which was determined in this current study to be a technically feasible alternative.

The City investigated the potential for realignment of the creek to the north of Barbertown Road and consulted with the landowners of the future development to the north side. Based on the discussion with the landowner, the development application's first engineering design submission will be made in early 2022. Introducing a new creek realignment in that area will require further investigations, which is not compatible with the timing of the proposed development.

To fully analyze this alternative, the entire flow regime would need to be considered up to and including the Regional event, and consultation with the private landowner would be required to incorporate realignment into the greenbelt land dedication in the future development lands. The engineering requirements of a cut-fill balance or lack thereof and additional infrastructure relocation would need to be incorporated. The environmental requirements of landscaping design and terrestrial corridor inclusion would also need to be incorporated. Geomorphic channel design and aquatic habitat integration would need be done with all engineering and other environmental factors integrated. Given the timing of the proposed development, and lack of comprehensive baseline inventory to inform impact assessment for related to the creek realignment alternative, this alternative will not be carried forward to implementation as part of this Class EA.

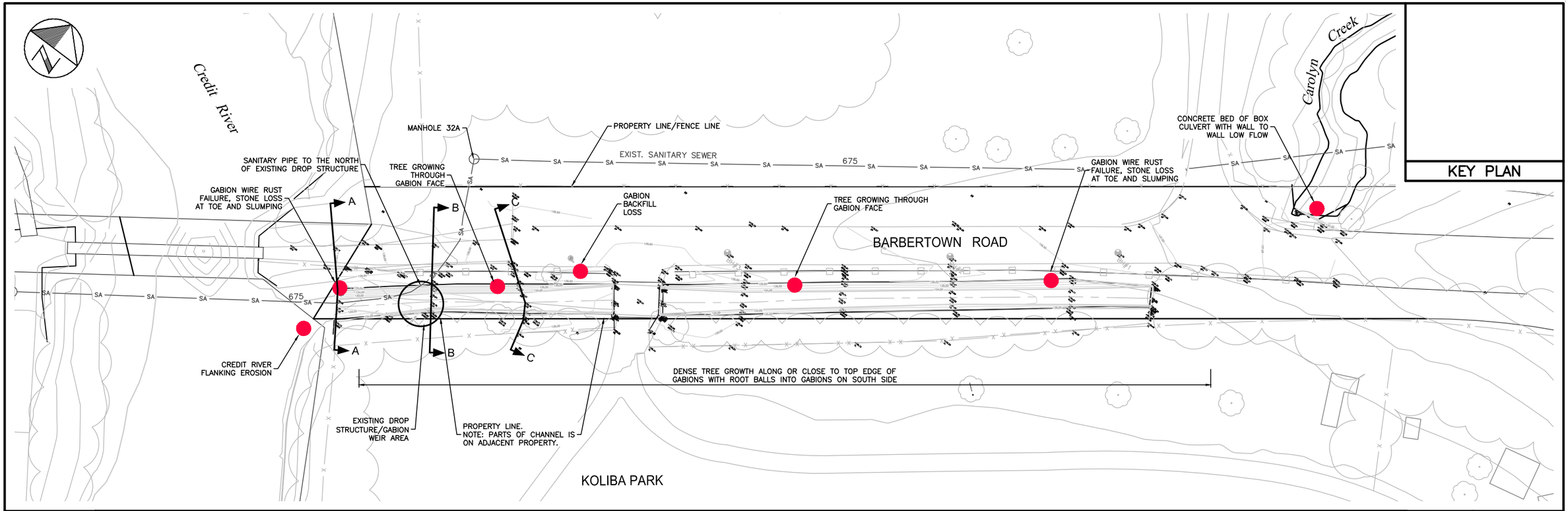
This current study will address the Class EA process requirements, including consultation, identification and evaluation of alternatives, and identification of impacts and mitigation measures for the long-term protect-in-place works outlined above.

Should the City wish to revisit the potential long-term creek realignment, a separate Class EA Study or an addendum to this Study will be required to review the creek realignment alternative in detail, including its impacts and required mitigation measures.

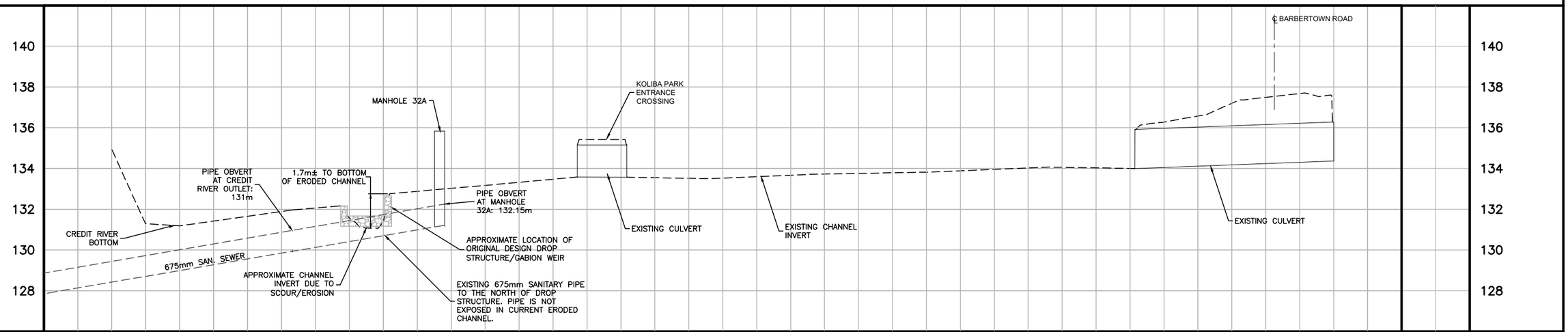
4.4.3 Preliminary Cost Estimate for Preferred Solution

The preferred solution will consist of removing and replacing the 3-4 rows of gabion basket banks with armour stone, including bed works to tie the two banks together, and removal of the barrier to fish passage, by recreating the grade control feature that has eroded/scoured and is failing. The limit of works would be from the river, where the new banks would be transitioned to the existing downstream bank, and to the pedestrian bridge embankment, upstream approximately 20 m, at which point the

new banks would tie in to the existing gabions. The works would extend approximately 10 m upstream and downstream of the confluence. There would therefore be a net total of approximately 60 m of bank works. A bank consisting of a triple row of 1.0 m high armour stones would be estimated to cost $2,500/m, or $150,000 for the 60 m. There would be additional costs for the grade control structure, tree removal, gabion basket removal, environmental controls and restoration. The works will also require special equipment and care for the proximity of the Region sanitary sewer. **The total cost estimate for the short-term solution would be in the range of $250,000 to $300,000.**



KEY PLAN



CHAINAGE/ PROPOSED ℄ ELEVATION	0+000 000.00	0+020 000.00	0+036.6 131.96	0+040 132.15	0+060 133.02	0+080 135.24	0+100 133.53	0+120 133.76	0+140 133.96	0+160 134.00	0+180 137.49	0+190 134.36

No	Date	Drawn	Appr'd	Revisions

APPROVALS

Design	BEB	Checked	RBS
Drawn	MBK	Checked	BEB

Scale
Horiz. 1:300 (0, 2.5, 5, 10)
Vert. 1:100 (0, 2, 4)

Date OCTOBER 2021

CAROLYN CREEK EROSION CONTROL AT BARBERTOWN ROAD
CITY OF MISSISSAUGA

PLAN AND PROFILE

wood.

Contract No.

Consultant File No. WW20101061

Drawing No. SHEET 1 OF ?

5 Potential Effects and Mitigation Measures

5.1 Socio-Economic Environment

5.1.1 Land Use

5.1.1.1 Potential Effects

Private property will be required from Koliba Park (on the south side) and ADM Milling (on the west side) for a permanent easement for construction and future maintenance purposes.

5.1.1.2 Mitigation Measures

City of Mississauga's Realty Team will contact the private property owners during detailed design phase to obtain the easement. The following measures are being proposed for the detailed design and construction phases to avoid/minimize impacts on land use:

- Land needs have been carefully considered to ensure areas are minimized to extent possible for construction and future maintenance purposes.
- Where possible, the road right-of-way should be used for temporary laydown areas and construction access.
- The road users and Culham Trail users should be notified of proposed construction well in advance. Attempts should be made to inform residents, not just in the immediate vicinity of the construction area, but in a larger area. Construction notifications could be issued via means to be determined by the City of Mississauga and may include direct mailout of letters to the area residents and businesses, installation of signage, newspaper ads, notification posting on the City of Mississauga's website, and social media platforms (e.g., Facebook and Twitter).

5.1.2 Noise

5.1.2.1 Potential Effects

The properties in the close vicinity of the construction area will experience higher noise levels during construction. Noise effects during construction will be associated with excavation, drilling, truck traffic and operation of heavy machinery. These impacts will be temporary in nature and are largely unavoidable.

5.1.2.2 Mitigation Measures

To minimize the potential for noise effects during construction, it is recommended that provisions be written into the contract documentation for the contractor to implement during construction, as outlined below:

- All equipment should be properly maintained to limit noise emissions. As such, all construction equipment should be operated with effective muffling devices that are in good working order
- There should be explicit indication in contract documents that Contractor is expected to comply with all applicable requirements of the contract and City of Mississauga Noise By-law
- The Contract documents should contain a provision that any initial noise complaint will trigger verification that the general noise control measures agreed to above are in effect

5.1.3 Air Quality

5.1.3.1 Potential Effects

The construction activities are anticipated to affect the local air quality. These effects include dust from various material handling operations and combustion emissions from construction equipment. Such emissions will be of a temporary nature and the effects are not predicted to move far from the immediate vicinity of the construction activities.

No effects on air quality are anticipated during operation and maintenance phases. Once the creek enhancement work is complete, the air quality conditions are anticipated to return to existing conditions. Therefore, no measures are proposed to avoid or minimize the effects on air quality during project operation and maintenance phases.

5.1.3.2 Mitigation Measures

Recommendations for mitigation measures for reducing construction related air quality impacts are discussed in the “Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities” (Cheminfo Services Inc., 2005). Standard mitigation measures and non-chloride dust suppressants identified in this document should be incorporated into Contract documents and implemented during construction to mitigate impacts on air quality. Typical mitigation measures include the following:

- Construction activities and the site should be monitored for wind direction and weather conditions to ensure that high-impact activities be reduced when the wind is blowing consistently towards nearby critical and sensitive receptors. Visible fugitive dust should also be monitored and immediate action should be taken to determine the root cause in order to counteract this
- Each area of the construction site should be graded separately (i.e., not all at once), timed to coincide with the actual construction in that area. This allows vegetation and cover to remain intact within the construction zone, until just prior to construction occurring on that segment of the construction site
- Construction activities should be scheduled and planned to limit areas of exposed soil at any given time (i.e., clear vegetation, but strategically grub)
- Site layout should be planned to maximize separation from machinery and dust-causing activities

- Ensure that equipment (and adequate water supply and chemical dust suppressants, such as calcium chloride, if applicable) required for dust control and trained workers are available at the work site prior to commencing construction activities with potential for dust generation
- Exposed ground surfaces should be stabilized with non-erodible material as soon as practicably possible after construction in the affected area where soil surfaces will remain exposed for extended periods
- Construction vehicles / machinery and equipment should be in good repair, equipped with emission controls, as applicable, properly maintained and operated within regulatory requirements
- A minimal number of machines operating in any one area should be carefully considered during construction activities
- Minimize idling of equipment and trucks located in queuing areas in proximity of residences and other establishments.

5.1.4 Infrastructure

5.1.4.1 Potential Effects

As discussed in Section 2.1.2, the existing and proposed infrastructure within the Study Area includes the following:

- Culvert structure at Barbertown Road to convey Carolyn Creek;
- Additional culvert structure providing vehicular/pedestrian access from Barbertown Road to adjacent Slovak Canadian Culture Society;
- Region of Peel's sanitary trunk sewer at Carolyn Creek and the Credit River;
- Barbertown Road and pedestrian bridge;
- A development proposal for townhouses on the north side of Barbertown Road is in the rezoning planning stage and is proposing a storm sewer connection into the Carolyn Creek reach;
- The Region of Peel has a watermain project along Barbertown Road planned for 2024;
- The City has plans to resurface this segment of Barbertown Road in the future with timing to be determined.

The proposed works are not anticipated to impact existing culverts and pedestrian bridge within the Study Area. Pedestrian, cyclist, and vehicular access along this section of Barbertown Road will be temporarily blocked throughout the duration of construction and is unavoidable. Mitigation measures to avoid impacts on Regional sanitary trunk sewer are outlined below.

5.1.4.2 Mitigation Measures

The following mitigation measures are proposed to avoid impacts on Regional sanitary trunk sewer located at Carolyn Creek and the Credit River. These measures were identified based on the requirements identified by the Region of Peel staff to protect the Regional sanitary trunk sewer.

- The City will daylight and verify the location of the existing sanitary sewers, and will show the edge of sewer on the design drawings.

- Travelling over the existing sewer is proposed to be avoided, and the City proposes to use long-reach equipment, to enable as much work as possible to be done with the equipment on the road. However, there may need to be travel parallel/adjacent to the sewer, where it crosses under the creek in the concrete-encased section shown on the Region drawings 13204-D. Avoiding of all equipment near the sewer is not possible. A review of the details of the proposed proximity of the creek works to the sewer, will be undertaken as part of detailed design.
- Armour stone is proposed to replace existing gabion stone-filled baskets, in select locations along Carolyn Creek, near the Credit River. This location is currently shown to be over a Region sewer. With the exchange between gabion baskets and armour stone, there is not anticipated to be a significant change in loading.
- The detailed design will indicate the standard clearances.
- The City acknowledges that an encroachment agreement will be required.
- Landscape restoration vegetation will not plant any trees within the sewer easements or on top of existing sanitary sewers.

5.2 Physical Environment

5.2.1 Excess Soil and Materials

5.2.1.1 Potential Effects

During construction, there may be excavated soil/materials that could not be used on site and may require removal. There may also be a need for importing additional soil on site.

5.2.1.2 Mitigation Measures

Management of excess soil (including excavation, transportation, temporary storage, and disposal) should be completed in accordance with O. Reg. 406/19 and the Ministry of the Environment, Conservation and Parks' current guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014). While the solution of replacing the banks in the same location is not expected to generate very much excess soil, the amount of excavated soil and/or imported soil will be determined during detailed design phase.

5.2.2 Groundwater

5.2.2.1 Potential Effects

As noted in Section 2.2.3, the groundwater was encountered at a depth of 4.6 metres and 4.9 metres in two of the four boreholes installed within the Study Area. Proposed works will not involve deep excavation during construction, as such, groundwater is not anticipated to be encountered during construction. No impacts on groundwater quantity and quality are anticipated.

5.2.2.2 Mitigation Measures

Due to the shallow nature of proposed works, no mitigation measures are proposed.

5.2.3 Drinking Water Source

5.2.3.1 Potential Effects

As noted in Section 2.2.4, the Study Area is located in an area of Highly Vulnerable Aquifers and Significant Groundwater Recharge Areas. Potential effects on drinking water source during construction may be associated with accidental spills/leakage of fluids from construction machinery, which could transport deleterious substances to the drinking water source (Lake Ontario) through Credit River.

5.2.3.2 Mitigation Measures

Best management practices should be implemented during construction to prevent any fuel lubricants and fluid spills resulting from construction activities and manage any unanticipated occurrences that could result in impacts to groundwater or potentially result in transport to Lake Ontario through Credit River (although this is very unlikely). All spills that could potentially cause damage to the environment shall be reported to the Spills Action Centre of the Ministry of the Environment, Conservation, and Parks (800-268-6060). Further details on these mitigation measures are provided in the Natural Environment section below.

5.3 Natural Environment

5.3.1 Fish and Fish Habitat

5.3.1.1 Potential Effects

Potential effects of construction activities may include the following:

- Introduction of sediments, concrete and other deleterious substances into Carolyn Creek and Credit River;
- Disruption of critical fish life stages;
- Erosion and sedimentation due to the operation of machinery; and
- Loss of vegetative cover over the creek.

5.3.1.2 Mitigation Measures

The proposed works which will be undertaken will improve the function of Carolyn Creek and provide increased channel stability. The following mitigation measures are proposed:

- In-water works shall be avoided from September 15 to May 31 to protect critical life stages of the resident fish species as identified by the Ministry of Natural Resources and Forestry. This timing window represents the cold-water environment and will allow for resident fish communities to complete their spawning without construction disturbance;

- Project activities shall be scheduled to avoid wet and rainy periods and in-water works shall be conducted during low flow conditions;
- All dewatering discharge, if required, shall be directed to a filter bag to remove sediments. The filter bag shall be located in an area that is sufficiently vegetated, stable and does not display any evidence of erosion or instability;
- The disturbance or removal of riparian vegetation should be minimized;
- Construction staging shall occur in a manner to prevent spills and/or leaks into Carolyn Creek and Credit River;
- During detailed design, an Erosion and Sediment Control Plan should be developed to contain/isolate the work area, manage site drainage/runoff and prevent excess sediment from entering into Carolyn Creek and Credit River throughout the construction of the proposed works. This plan should be developed consistent with Erosion and Sediment Control Guide for Urban Construction (Toronto and Region Conservation Authority, 2019), and Ontario Provincial Standards Specifications. The Erosion and Sediment Control Plan should include Standard Notes for Drawings Submitted for CVC Review.
- The erosion and sediment control measures should be implemented prior to commencement of construction works, and maintained through all phases of the construction, until vegetation is re-established, and all disturbed ground is permanently stabilized with a vegetative cover. The Erosion and Sediment Control Plan should illustrate the layout of the proposed erosion and sediment control measures to be implemented during construction; and should include:
  - Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering natural areas. Sediment control barriers (e.g., silt fence) should be installed around the perimeter of the work area, including any areas designated as staging/storage areas. The silt fence will also prohibit wildlife from entering the work areas.
  - The contractor should implement a debris containment system to avoid debris falling into Carolyn Creek and Credit River during construction activities.
  - Regular inspection and maintenance of erosion and sediment control measures during construction, and
  - Removal of non-biodegradable erosion and sediment control materials once the site is stabilized.
- Any stockpiled materials shall be stored and stabilized away from Carolyn Creek and Credit River;
- All construction materials shall be removed from site upon construction completion;
- An application for License to Collect Fish for Scientific Purposes, under the *Fish and Wildlife Coordination Act, 1997* should be submitted to the Ministry of Natural Resources and Forestry and authorization should be obtained in order to relocate any fish within the in-water works area.

5.3.2 Terrestrial Ecosystem

5.3.2.1 Potential Effects

5.3.2.1.1 Potential Effects on Vegetation and Trees

Project's potential effects on vegetation and trees may include the following:

- Tree damage, and tree removal;
- Vegetation clearing and grubbing;
- Staging of equipment may encroach into adjacent natural areas beyond the proposed Project construction area which may result in additional vegetation damage or loss;
- Contamination of vegetation communities due to the unplanned release or discharge of deleterious substances to the environment, including fuels (diesel and propane), lubricants (engine oil, transmission oil, etc.), and coolants (ethylene glycol);
- Erosion and Sediment Control Measures should be developed and implemented as described in the section above.
- Potential increased dust generation and deposition on vegetation resulting in effects on photosynthesis, respiration, and transpiration;
- Introduction of invasive and/or non-localized plant material from previous construction sites and disturbance activities;
- Soil compaction from laydown and staging areas.

5.3.2.1.2 Potential Effects on Wildlife

Project's potential effects on wildlife may include the following:

- Potential disturbance, damage, or harm to wildlife;
- Impacts to nesting birds;
- Construction activities may cause localized, short-term increases in noise and vibrations, which could disturb wildlife and deter animals from the area. Wildlife could also be disturbed by artificial lighting if construction occurs outside of daylight hours;
- Most species of birds in Canada are protected under the Migratory Birds Convention Act, 1994, through the Migratory Birds Regulations and the Migratory Birds Sanctuary Guidelines. These policies and regulations ensure the protection of listed migratory bird species, their nests, eggs and offspring. The Migratory Birds Convention Act prohibits harm or destruction of migratory birds and their nests. Removal of vegetation to accommodate the construction of the project could directly harm nesting birds;
- The trees along the south side of Carolyn Creek are considered as candidate bat maternity roost habitat. During construction, removal of potential bat maternity trees may result in potential harm to Species at Risk and non-Species at Risk bats;
- During site preparation and construction wildlife may enter the work area and be at risk for mortality through conflicts with construction equipment.

5.3.2.2 Mitigation Measures

In order to avoid and/or minimize construction impacts on terrestrial ecosystem, the following mitigation measures are recommended:

5.3.2.2.1 Mitigation Measures for Vegetation and Trees

- All work zones shall be clearly marked on detailed design drawings.
- Disturbance and removal of existing trees and vegetation should be minimized where possible and confined to the footprint of the construction activities.
- During detailed design, a Tree Protection and Replacement Plan should be prepared to identify trees that may require removal and to protect the remaining trees. Mitigation for the loss of trees should occur in the form of replacement trees and shrubs.
- During detailed design, a Vegetation Restoration Plan should be developed to propose vegetation to restore the disturbed areas. Replacement vegetation must be native species and suited to the local hydrology and soils of the area. The Vegetation Restoration Plan should be developed taking into consideration CVC's Ecosystem Offsetting Guidelines and any City guidelines for natural heritage systems.
- Tree protection fencing shall be installed in accordance with the Tree Protection and Replacement Plan. The tree protection fencing shall be installed prior to construction activities.
- All tree removals shall be completed by a qualified tree care professional under the supervision of a certified arborist using best arboricultural practice.
- All construction equipment, vehicles, and associated materials should be operated, stored, and maintained in a manner that prevents the entry of any deleterious substance from entering into the natural environment as indicated in OPSS 182, OPSS 517 and OPSS 805.
- All materials used or generated (e.g., organics, soils, construction waste and debris, etc.) during site preparation, construction, and clean-up should be temporarily stored, handled, and disposed of in a manner that prevents their entry to Carolyn Creek and Credit River. To the extent possible, the temporary on-site storage of sediment should be restricted.
- Drip pans should be implemented under equipment (i.e., generators, pumps, etc.) in operation within the work areas. If refueling and staging occurs on tree roots, a root zone protection should apply.
- Any refueling is to be undertaken at least 30 m from Carolyn Creek and Credit River. If this is not possible, any refueling should occur away from Carolyn Creek and Credit River to the greatest extent possible.
- Ensure a Spill Management Plan (including spill kit materials, instructions regarding their use, education of staff, and emergency contact numbers) is developed by the Contractor and is present on-site at all times for implementation in the event of an accidental spill. All spills are to be reported to the MECP Spills Action Centre (SAC) at 1 800-268-6060.
- Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species and noxious weeds.

- Identify local regulatory authorities (Credit Valley Conservation, Ministry of the Environment, Conservation and Parks) and have contact information available on site.
- Conditions of all permits and approvals should be followed (as required).
- All disturbed areas of the work site shall be stabilized and re-vegetated promptly, and/or treated with appropriate erosion protection materials.
- Access to any natural areas outside of the construction area should be prohibited to the extent possible to ensure the protection of these areas; this includes temporary access.
- Dust production should be minimized to the extent practical by implementing dust suppression methods and thereby minimizing the zone of influence. Primary dust suppression methods can include watering in cases where watering will not promote entry of chemicals into the creek.
- Introduction of new invasive species should be prevented by washing down equipment prior to transporting to site and limiting travel of equipment and vehicles to and from the Project area.
- All heavy equipment and tools used on-site should be maintained in good working condition.
- Construction personnel should avoid idling of vehicles when not necessary for construction activities.

5.3.2.2.2 Mitigation Measures for Wildlife

- All vegetation and tree removal must occur outside of the bat maternity roosting window (March 31st to September 30th) to avoid impacts to Species at Risk bats.
- To prevent harm to nesting birds, removal of woody vegetation (i.e., trees and shrubs) should be conducted outside of the typical bird nesting period in this area (April 1st to August 31st). These timing constraints should not be perceived as absolutes. This period represents the core breeding period, although some species may nest in March and September. Ultimately, the objective from a compliance perspective is to not circumvent the Migratory Birds Convention Act and its regulations. Due diligence measures should be implemented and documented for any nest searching efforts, including record control, to ensure compliance with the Migratory Birds Convention Act.
- For activities (including vegetation removal) that must occur during bird nesting season, surveys to identify nesting activity should be completed by an experienced Avian Biologist within 24 hours of scheduled work activities. The Avian Biologist conducting the nest sweeps must be able to identify birds by species and be knowledgeable of nesting seasons and activities for appropriate species. Due to the uncertainty that lies with nest sweeps during construction, especially during leaf-on conditions, it is, as noted, recommended that all vegetation clearing activities occur outside the above-noted bird nesting window. In the event that bird nests protected under the Migratory Birds Convention Act, Fish and Wildlife Conservation Act or Endangered Species Act are encountered during construction, work must stop in the vicinity of the sighting until further direction is provided. These species and their nests must not be disturbed, tormented, injured in any way, destroyed, and/or separated from young. A protective buffer area should be established around the nest and should be

determined in consultation with a qualified avian biologist, as well as the Ministry of Natural Resources and Forestry, Ministry of the Environment, Conservation and Parks, and/or Canadian Wildlife Service, as necessary. Nest surveys should only be completed in simple habitats such as singular trees or a small and well-defined area. Complex habitats such as vegetation communities with layers and dense foliage reduce the certainty of capturing all potential breeding.

- Vertical facings suitable for nesting by bird species (i.e., soil piles, excavation areas) should be covered using tarps, or plastic sheets, or any other means of preventing nesting within the construction zone. Such barriers should be installed prior to April 1 and shall remain in place until August 30, or until the completion of construction works. Alternatively, vertical facings should be maintained daily at a 45° angle to deter nesting.
- Sediment fence that is intended to have the dual function of wildlife exclusion should be installed by March 1st and remain in place, intact, until the completion of the works.
- In order to prevent impacts to wildlife as a result of noise and vibrations, equipment idling should be kept to a minimum during construction. Minimizing equipment idling will also reduce carbon emissions and reduce the overall carbon footprint of construction. Construction outside of daylight hours should be avoided.
- Where feasible, works should be conducted during daylight hours, unless otherwise necessary, to avoid potential effects of artificial night lighting on crepuscular and nocturnal species.
- Sources of unnecessary noise or encroachment of worker activities into nearby habitats should be minimized to limit the extent of the project zone of influence when possible.
- The brush piles and other moveable habitat features in the area should be relocated before construction. As feasible, the work area should be surrounded by a silt (exclusion) fence within 48 hours of the commencement of construction activities to keep wildlife out of the site. The exclusion fencing should be examined daily and repaired as needed to ensure it functions as intended.
- Construction personnel should watch for wildlife attempting to enter the work area. In the event wildlife are encountered, work shall stop, and the appropriate personnel shall be notified accordingly (e.g., site engineer, and government agency).
- Immediately prior to the initiation of construction activities, the Project Area should be searched by a qualified biologist for the presence of wildlife, including SAR, and/or habitat features.
- Where appropriate, authorized, and legal, wildlife found within the work area shall be allowed to disperse and/or relocated to suitable habitat outside of the construction area.
- In the unlikely event that construction activities result in any injured or orphaned wildlife, the injured or orphaned wildlife will be immediately transferred to a local wildlife rehabilitation facility.
- An Application for a Wildlife Scientific Collector's Authorization, under the Fish and Wildlife Conservation Act, 1997, should be submitted to the Ministry of Natural Resources and Forestry and the permit should be obtained. This permit is

required to relocate any wildlife (i.e., turtles, snakes, or amphibians) found in the vicinity of the subject bridge during the work activities. The contractor is responsible for the permitting and completion of the wildlife rescue and relocation work. All work must be completed by a qualified biologist.

— Local regulatory authorities should be identified and their contact information should be made available on site during construction. Local regulatory authorities include Credit Valley Conservation; Peel Region; Ministry of the Environment, Conservation and Parks; Ministry of Natural Resources and Forestry; Fisheries and Oceans Canada; and local emergency service providers.

5.4 Cultural Environment

5.4.1 Archaeological Resources

5.4.1.1 Potential Effects

The Stage 1 Archaeological Assessment completed in support of this Class EA Study, recommended that the Study Area requires no further archaeological assessment. During construction, there may be a potential of uncovering archaeological resources.

5.4.1.2 Mitigation Measures

The following standard measures will apply during construction:

— Should previously undocumented archaeological resources be discovered, they may indicate 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 assessment, in compliance with Section 48 (1) of the Ontario Heritage Act.

— The Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33 requires that any person discovering human remains must cease all activities immediately and notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with Ontario Regulation 30/11, the coroner shall notify the Registrar, Ontario Ministry of Public and Business Service Delivery, which administers provisions of that Act related to burial sites. In situations where human remains are associated with archaeological resources, the Ministry of Citizenship and Multiculturalism (MCM) should also be notified (at archaeology@ontario.ca) to ensure that the archaeological site is not subject to unlicensed alterations which would be a contravention of the Ontario Heritage Act.

— 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.

5.4.2 Built Heritage Resources and Cultural Heritage Landscapes

The proposed works will address erosion problem in Carolyn Creek along Barbertown Road segment and are not anticipated to negatively affect the Credit River Corridor Cultural Heritage Landscape.

6 Commitments for Future Work

6.1 Commitments for Technical Work

Table 6.1 summarizes the commitments for additional work that will need to be addressed prior to construction.

Table 6.1: Commitments for Additional Work

Category	Project Phase	Commitment
Social Environment	Detailed Design	Property owners should be consulted and land acquisitions should be completed.
	Detailed Design	The Project Team should include note in the contract documents that Contractor is expected to comply with all applicable requirements of the contract and City of Mississauga Noise By-law.
	Detailed Design	The Project Team should ensure that the Contract documents contain a provision that any initial noise complaint will trigger verification that the general noise control measures agreed to above are in effect.
	Construction	The road users and Culham Trail users should be notified of proposed construction well in advance. Attempts should be made to inform residents, not just in the immediate vicinity of the construction area, but in a larger area. Construction notifications could be issued via means to be determined by the City of Mississauga and may include direct mailout of letters to the area residents and businesses, installation of signage, newspaper ads, notification posting on the City of Mississauga's website, and social media platforms (e.g., Facebook and Twitter).
Natural Environment	Detailed Design	The following timing restrictions should be incorporated into the project schedule: — In-water works should be avoided from September 15 to May 31 to protect critical life stages of the resident fish species. This timing window will allow for

Category	Project Phase	Commitment
		resident fish communities to complete their spawning without construction disturbance. The timing window is in accordance with Ministry of Natural Resources and Forestry's In-water Work Timing Window Guidelines (March 11, 2013). — To prevent harm to nesting birds, removal of woody vegetation (i.e., trees and shrubs) should be conducted outside of the typical bird nesting period in this area (April 1 to August 31). These timing constraints should not be perceived as absolutes. This period represents the core breeding period, although some species may nest in March and September. Ultimately, the objective from a compliance perspective is to not circumvent the *Migratory Birds Convention Act* and its regulations. Due diligence measures should be implemented and documented for any nest searching efforts, including record control, to ensure compliance with the *Migratory Birds Convention Act*. — All vegetation and tree removal must occur outside of the bat maternity roosting window (March 31 to September 30) to avoid impacts to Species at Risk bats. This activity should be incorporated into project's construction schedule during detailed design.
	Detailed Design	Staging, and access areas should be minimized as feasible to avoid disturbing the natural environment beyond the proposed disturbance limit.
	Detailed Design	An Erosion and Sediment Control Plan should be developed to contain/isolate the work area, manage site drainage/runoff and prevent excess sediment from entering into Carolyn Creek and Credit River throughout the construction of the proposed works. This plan should be developed consistent with Erosion and Sediment Control Guide for Urban Construction (Toronto and Region Conservation Authority, 2019), and Ontario Provincial Standards Specifications. The Erosion and Sediment Control Plan should include Standard Notes for Drawings Submitted for CVC Review.

Category	Project Phase	Commitment
	Detailed Design	A Tree Protection and Replacement Plan should be prepared to identify trees that may require removal and to protect the remaining trees. Mitigation for the loss of trees should occur in the form of replacement trees and shrubs.
	Detailed Design	A Vegetation Restoration Plan should be developed to propose vegetation to restore the disturbed areas. Replacement vegetation must be native species and suited to the local hydrology and soils of the area. The Vegetation Restoration Plan should be developed taking into consideration CVC's Ecosystem Offsetting Guidelines and any City guidelines for natural heritage systems.
	Detailed Design	The Project Team shall ensure that the mitigation measure discussed in Section 5.0 of this report, should be reviewed, refined (if required) and incorporated into Tender Documents to ensure that they are implemented by the Contractor during construction.
Fluvial Geomorphological Design	Detailed Design	The detailed design for creek works should be completed by a fluvial geomorphologist in consultation with Credit Valley Conservation.
Excess Soil / Fill Import	Detailed Design	The amount of excavated soil and/or imported soil should be determined during detailed design phase .
Technical Environment – Infrastructure	Detailed Design	Consultation should continue with the Region of Peel due to proposed works in close proximity to the Regional sanitary sewer.

6.2 Commitments for Permits and Approvals

Table 6.2 outlines the permits and approvals that will be required to facilitate construction of this project.

Table 6.2: Permits and Approvals

Permit Authority	Permit / Approval
Fisheries and Oceans Canada	A request for review form should be submitted to Fisheries and Oceans Canada to receive advice on mitigation measures and to confirm that an authorization under Fisheries Act is not required.
Ministry of Natural Resources and Forestry	An application for License to Collect Fish for Scientific Purposes, under the *Fish and Wildlife Coordination Act, 1997* should be submitted to the Ministry of Natural Resources and Forestry and authorization should be obtained in order to relocate any fish within the in-water works area. The contractor is responsible for the permitting and completion of the fish rescue and relocation work (if required). All work must be completed by a qualified biologist.
	An Application for a Wildlife Scientific Collector's Authorization, under the *Fish and Wildlife Conservation Act, 1997*, should be submitted to the Ministry of Natural Resources and Forestry and the permit should be obtained. This permit is required to relocate any wildlife (i.e., turtles, snakes, or amphibians) found in the vicinity of the subject bridge during the work activities. The contractor is responsible for the permitting and completion of the wildlife rescue and relocation work (if required). All work must be completed by a qualified biologist.
Credit Valley Conservation	A permit should be obtained from the Credit Valley Conservation for works within Floodplain Hazard and Regulated Areas.
City of Mississauga	The contractor may be required to obtain a Road Occupancy Permit from the City of Mississauga.

6.3 Monitoring Plan

The project construction should be subject to daily on-site inspection to ensure that mitigation measures and commitments identified in this report are adhered to by the Contractor. Monitoring should include following elements:

- A regular environmental monitoring/inspection program during the course of the Project construction to confirm environmental protection measures and commitments identified in Section 5.0 and Section 6.0 of this report are being applied.
- Monitoring and maintenance of erosion and sediment control measures and addressing any failures.
- Maintenance of records of monitoring, maintenance and construction incidents.

7 Consultation

7.1 Consultation Approach

7.1.1 Project Webpage

A project webpage was developed for this project on the City of Mississauga's website (Figure 7.1). Information related to the Class EA study was posted on this webpage, including study notices, Public Information Centre materials, study reports and links to other relevant studies. The project webpage can be accessed by clicking on this link: www.mississauga.ca/carolyncreekstudy.

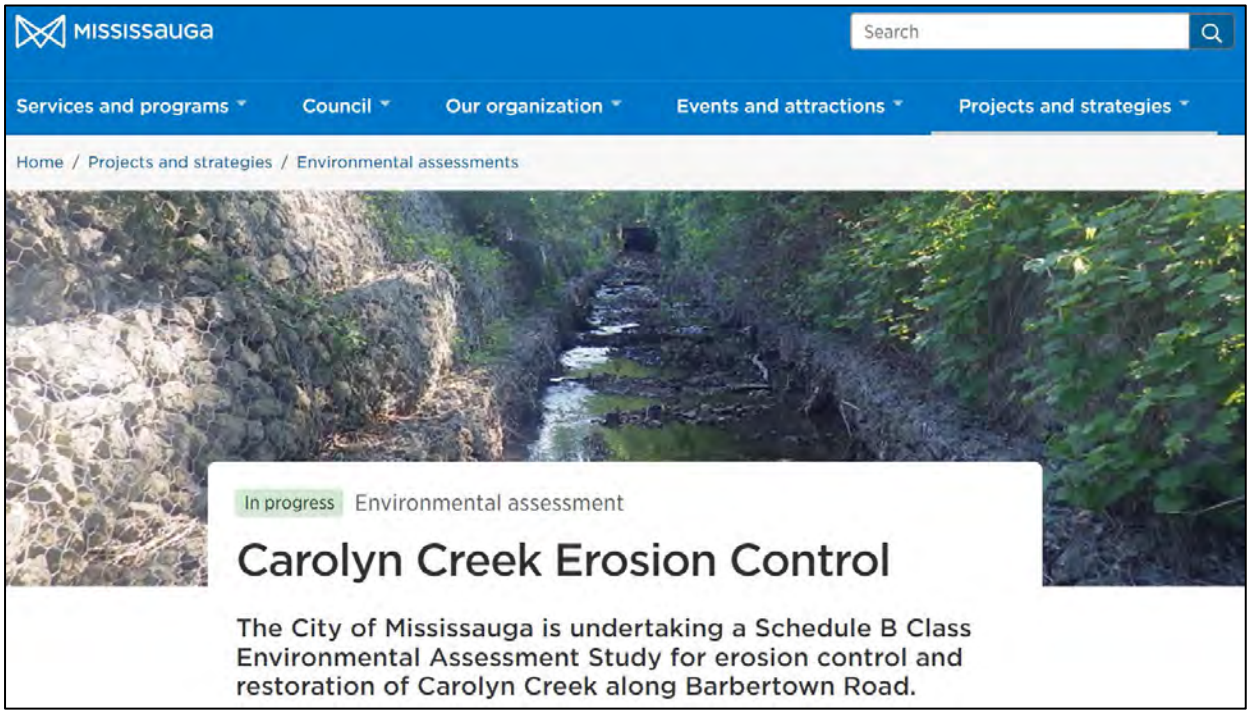


Figure 7.1: Screenshot of Project Webpage

7.1.2 Study Contact List

A Study Contact List was developed at the commencement of this Class EA study. This list included contacts from the Indigenous Nations, federal and provincial government agencies, Credit Valley Conservation, Peel Region, City of Mississauga, utility companies, potentially impacted property owners and key stakeholders. The Contact List was updated during the study to add and/or remove comments based on the requests received. Contact groups from the Study Contact List are listed in the (Table 7.1). In addition to these groups, the City provided a list of addresses of properties adjacent to the Study Area. This list included 61 property addresses. Due to privacy reasons, this list has not been included in this report.

Table 7.1. Contact Groups on the Study Contact List

Contact Group	Name
Indigenous Nations	Mississaugas of the Credit First Nation Six Nations of the Grand River Haudenosaunee Confederacy Chiefs Council as represented by Haudenosaunee Development Institute
Provincial Government Agencies	Ministry of the Environment, Conservation and Parks Ministry of Natural Resources and Forestry - Aurora District Ministry of Tourism, Culture and Sport Ministry of Municipal Affairs and Housing Infrastructure Ontario
Conservation Authority	Credit Valley Conservation
Region of Peel	Public Works Peel Regional Paramedic Services
City of Mississauga	Various Departments
Elected Officials	Ron Starr (Ward 6 – Councillor)
Utilities	Alectra Utilities Enbridge Pipelines Inc. TransCanada Hydro One Bell Canada Rogers Communications Telus Zayo Cogeco
Potentially Impacted Property Owners	ADM Milling Slovak-Canadian Cultural Society
Stakeholders / Interest Groups	Barbertown Ventures Inc.

The final Study Contact List is provided in Appendix C.

7.2 Study Notices

7.2.1 Notice of Study Commencement and Public Information Centre

Notice of Study Commencement was shared with the Indigenous Nations on 7 April 2021. This notice was shared early in the study process to identify the interests of the Indigenous Nations in the Study (e.g., interest to participate in the monitoring of field investigations, report reviews, etc.).

A combined Notice of Study Commencement and Online Public Information Centre was issued to introduce the Class EA Study and invite the public, regulatory agencies, potentially impacted property owners and key stakeholders to participate in the Study process. Table 7.2 lists the methods of distribution of the Notice of Study Commencement and Online Public Information Centre.

Table 7.2: Distribution Method for the Notice of Study Commencement and Online Public information Centre

Notice Distribution Method	Date
Issued to Canada Post for mailout to 61 addresses adjacent to the Study Area	21 March 2022
Posting on City's website	22 March 2022
Email circulation to the contacts on the Study Contact List (including Indigenous Nations, Government Agencies, Utility Companies, and Stakeholders)	23 March 2022

The Notice of Commencement and Online Public Information Centre is provided in Appendix D.

7.3 Public Consultation

An Online Public Information Centre was hosted from 23 March 2022 to 20 April 2022. As part of this event, a pdf presentation was posted on the Project webpage and comments were invited during a four-week period (23 March 2022 to 20 April 2022). Email address of the City staff and an online Comment Form were posted on the project webpage for anyone that wanted to submit comments during the comment period.

One comment was received from a member of public related to this Class EA Study. Another comment was received from a property owner for a property outside of the Study Area. A summary of comments and Study Team's responses is provided in Table 7.3. Public Information Centre presentation is provided in Appendix D, and proof of public correspondence is provided in Appendix D.

Table 7.3: Summary of Public Comment and Study Team's Response

Summary of Comment	Summary of Study Team's Response
Slovak Canadian Cultural Society requested printed copies of the PIC slides.	Study Team mailout printed copies of the PIC slides on 28 March 2022; however, did not receive any comments from Slovak Canadian Cultural Society.
The comment from the member of public expressed concern about an erosion problem at the rear of their property along the Credit River.	Clarification was provided that the Carolyn Creek erosion control study is focused on addressing erosion risks specifically along Carolyn Creek adjacent to Barbertown Road. In relation to the property in question, the City completed river stabilization works around 2011 that stretched upstream of Eglinton Avenue and included the river-bank behind the subject property. The latest monitoring indicates the stabilization works are in good condition and are continuing to function as originally intended. Future creek works are not currently proposed for this area but will be regularly re-evaluated based on City's monitoring.
Acomment from amember of the public expressed concern about the proposed land development on 1725 Barbertown Road. The comment also noted that the City administration finds that the simplest and most cost-effective solution to fix the erosion problems would just be to cut down the remaining trees that surround Carolyn creek, dry the waterway and sell the land for development to the highest bidder.	As presented in the Public Information Centre, there are preferred solutions being advanced for Carolyn Creek along Barbertown Road for the short-term and long-term. The proposed preferred solution will collectively mitigate erosion within the creek reach and improve fish passage and habitat. Further, the preferred solution will minimize impacts to the form and function of the Credit River and Carolyn Creek valley and will provide opportunities for enhancement, which was identified as a key requirement by Credit Valley Conservation. There will be some tree removal required to undertake proposed works, however, tree removal will be minimized to the extent possible, and replacement trees will be planted.

A summary of correspondence received from government agencies and utility companies as a result of the Online Public Information Centre are discussed in their corresponding sections below.

7.4 Indigenous Consultation

Indigenous engagement is a key component of the Class EA process. On April 1, 2021, the Ministry of the Environment, Conservation and Parks identified the following Indigenous Nations that may be interested in the project:

- Mississaugas of the Credit First Nation
- Six Nations of the Grand River (Both Six Nations Elected Council and Haudenosaunee Confederacy Chiefs Council); and
- Huron-Wendat Nation (HWN should only be engaged if there are potential archeological impacts).

Following understood consultation protocols with these Indigenous Nations, Study Team contacted the Indigenous Nations about this Class EA Study. A summary of outreach to the Indigenous Nations is provided in Table 7.4. Proof of correspondence with the Indigenous Nations is provided in Appendix E.

7.5 Agency Consultation

A summary of correspondence with government agencies is provided in Table 7.5. Proof of correspondence with government agencies is provided in Appendix F.

7.6 Utility Consultation

A summary of correspondence with utilities is provided in Table 7.6. Proof of correspondence with utility companies is provided in Appendix G.

Table 7.4: Summary of Correspondence with the Indigenous Nations

Date	Method of Communication	Communication Summary
Mississaugas of the Credit First Nation (MCFN)		
7 April 2021	Email	Study Team provided a letter from the City of Mississauga and a project summary to MCFN and indicated that the Stage 1 Archaeological Assessment and Natural Environment is anticipated for spring and summer 2021.
30 April 2021	Phone	Study Team spoke to MCFN about the project.
31 May 2021	Email	Study Team provided MCFN with a draft participation agreement between MCFN and City of Mississauga for upcoming Natural Environment fieldwork.
01 June 2021	Email	Study Team followed up to identify that the project team is looking into confirming field work and Indigenous participation in the field work.
22 June 2021	Email	Study Team shared the draft Stage 1 Archeological Assessment Report for review and comment.
23 July 2021	Email	Study Team followed-up regarding the draft Stage 1 Archeological Assessment Report to see if there are any comments or concerns.
30 July 2021	Email	MCFN identified no comments or questions with the draft Stage 1 Archeological Assessment Report.
23 March 2022	Email	Study Team provided the Notice of Public Information Centre.
Six Nations of the Grand River (SNGR)		

Date	Method of Communication	Communication Summary
7 April 2021	Email	Study Team provided a letter and a project summary on behalf of the City of Mississauga.
26 June 2021	Email	SNGR forwarded the draft Stage 1 Archeological Assessment Report to the SNGR Archaeology contact.
22 June 2021	Email	Study Team provided the draft Stage 1 Archeological Assessment Report.
23 June 2021	Email	Study Team followed-up regarding comments or concerns and inquired as to whether SNGR required more time to review the draft Stage 1 Archeological Assessment Report.
23 March 2022	Email	Study Team provided the Notice of Public Information Centre.
Haudenosaunee Development Institute (HDI)		
7 April 2021	Email	Study Team provided HDI with a letter and a project summary on behalf of the City of Mississauga.
22 April 2021	Email and phone	Study Team followed up with HDI to see if there were any questions or concerns about the project.
4 May 2021	Email	HDI indicated to Study Team that a field monitor and a contractual agreement is required.
3 June 2021	Email and phone	HDI spoke to Study Team about requiring an Archeology and Environmental agreement.

Date	Method of Communication	Communication Summary
		HDI requested an Archeology and Environmental agreement internally for Study Team.
8 June 2021	Email	HDI provided Study Team with a standard Archeology and Environmental monitoring agreement and requested it returned signed if agreed to.
11 June 2021	Email	Study Team requested a Microsoft Word version of the agreement from HDI.
15 June 2021	Email	HDI provided the City of Mississauga with a monitoring agreement for Archaeology and for Environmental studies and CC'd Study Team.
17 June 2021	Email	HDI informed Study Team that one Environmental Monitor would attend field work and requested aid coordinating with the ecologist.
22 June 2021	Email	Study Team provided HDI with the draft Stage 1 Archeological Assessment Report for Carolyn Creek for review and comment by 2021-07-22.
22 June 2021	Email	Study Team provided HDI with details regarding the Natural Environment Field Work and COVID-19 forms.
23 July 2021	Email	Study Team followed-up with HDI regarding the draft Stage 1 Archeological Assessment Report to find out if there are any comments, concerns or more time required for the review.
23 March 2022	Email	Study Team provided the Notice of Public Information Centre.
Huron-Wendat Nation (HWN)		

Date	Method of Communication	Communication Summary
7 April 2021	Email	Study Team provided HWN with a letter and project summary from the City of Mississauga and anticipated timelines for the Stage 1 Archeological Assessment Report.
22 April 2021	Email	Study Team followed-up with HWN regarding any comments or concerns about the Project.
22 June 2021	Email	Study Team provided HWN with the draft Stage 1 Archeological Assessment Report.
23 March 2022	Email	Study Team provided the Notice of Public Information Centre

Table 7.5: Summary of Correspondence with the Government Agencies

Date	Method of Communication	Communication Summary
Ministry of the Environment, Conservation and Parks (MECP)		
23 March 2021	Email	Study Team sent an email introductory email to the Ministry introducing the project, noting that a combined Notice of Study Commencement and Public Information Centre #1 will be issued for this Class EA Study, and all the notices will be shared with the Ministry as they become available. Also attached the Project Information Form and requested information on which Indigenous Nations should be consulted as part of this Class EA Study.
1 April 2021	Email	The Ministry identified the following Indigenous Nations that may have an interest in the project: — Mississaugas of the Credit First Nation — Six Nations of the Grand River (Both Six Nations Elected Council and Haudenosaunee Confederacy Chiefs Council); and — Huron-Wendat Nation (HWN should only be engaged if there are potential archeological impacts).
Credit Valley Conservation (CVC)		
24 September 2021	Email	Study Team sent an email introductory email to the CVC introducing the project, noting that a combined Notice of Study Commencement and Public Information Centre #1 will be issued for this Class EA Study, and all the notices will be shared with the CVC as they become available. Study Team requested input from the CVC on matters that should be considered in this Class EA, including identification and evaluation of alternative solutions. Study

Date	Method of Communication	Communication Summary
		Team also expressed interest in a meeting with the CVC staff to share preliminary results of various technical investigations and to discuss potential alternative options for the creek. Study Team inquired about CVC's preference on the format of this meeting (i.e., site visit or a virtual meeting).
28 September 2021	Email	CVC staff shared high level input for consideration into the Class EA Study and noted that additional information can be provided upon submission of the Notice of Study Commencement and PIC materials when they are available. CVC staff suggested a virtual meeting to discuss the preliminary results of the investigations and potential solutions.
09 November 2021	Email	Study Team thanked CVC staff for the high-level comments, and shared Study Team's availability for a meeting. A virtual meeting was scheduled for 09 December 2022.
09 December 2021	Meeting	The purpose of this meeting was to present information to CVC and obtain input on the high-level results of field investigations and potential alternative solutions for addressing erosion problem at Carolyn Creek along Barbertown Road. No concerns were expressed by CVC staff at the meeting. CVC requested copies of draft technical reports for review. CVC staff noted that they were planning to complete a site visit in the next 1-2 months and will provide detailed comments once draft documents are provided and reviewed by CVC staff. CVC also requested draft copy of the evaluation criteria and matrix when available. CVC thanked the City for the presentation and photographs in particular, and noted that the staff can see opportunities for improvement of the creek.
10 December 2021	Email	Study Team shared minutes of the meeting of 09 December 2022.

Date	Method of Communication	Communication Summary
		CVC staff provided a response on 13 December 2022, noting that there were no comments on meeting minutes.
1 April 2022	Email	CVC staff provided a response to the Notice of Study Commencement and Public Information Centre, noting that the CVC will require technical studies/reports/analysis completed in support of the preliminary preferred solution for their review before PIC or before selection of the preferred solution.
12 April 2022	Email	Study Team shared a document outlining the draft evaluation of alternatives and preliminary preferred solution for Carolyn Creek, along Barbertown Road.
29 April 2022	Email	CVC staff shared comments on the evaluation of alternatives. The comments outlined the following: Requirement for preparing the Erosion and Sediment Control (ESC) plans to identify measures and controls to prevent excess sediment from entering either Carolyn Creek or the Credit River throughout the construction of the proposed works. CVC shared links to Erosion and Sediment Control Guide for Urban Construction (2019) and Standard Notes for Drawings Submitted for CVC Review. It was unclear to CVC staff if any fill or grading would be required as part of the preferred solution. CVC staff added that a hydraulic assessment would be required to show the impact of alterations to channel profile and roughness of the channel to the existing flood hazard. CVC staff suggested consider using CVC's Ecosystem Offsetting Guidelines and associated replacement ratios for all proposed vegetation removals within the regulated area.

Date	Method of Communication	Communication Summary
24 May 2022	Email	Study Team provided following responses to CVC's comments: ESC Plans and Tree Protection and Replacement Plans will be developed during detailed design phase and will be provided to CVC for review at that time. Tree Protection and Replacement Plans will be developed taking into consideration CVC's Ecosystem Offsetting Guidelines and any City guidelines for natural heritage systems. With regards to hydraulic assessment, Study Team provided clarification that the hydraulic assessment for the baseline/existing conditions was completed using CVC's model and included in the evaluation document that was shared with the CVC. A second assessment will be developed during the detailed design phase for the preferred alternative and will also be based on the CVC model.
Region of Peel		
24 March 2022	Email	Region of Peel staff provided a response to the Notice of Study Commencement and Public Information Centre, outlining requirements to avoid any impacts to the existing sanitary sewer located in the project area. These requirements included: Daylighting and verifying the location of the existing sanitary sewers within the construction limits. Providing details and calculations demonstrating that the construction equipment/vehicles/materials will have no negative impact on the sewer. Ensuring no equipment movement over existing sanitary manholes. Requirement for standard Region of Peel clearances between existing sanitary sewers and proposed works.

Date	Method of Communication	Communication Summary
		Advising that any proposed works within a Regional Easement may require an Encroachment Agreement. Advising that planting of any trees should avoid the sewer easements or on the top of existing sanitary sewers. Advising that coordination with Region of Peel may be required during the construction in case there are any regional projects in this area.
24 May 2022	Email	Study Team provided responses to Region of Peel comments, noting the following: The City will daylight and verify the location of the existing sanitary sewers, and will show the edge of sewer on the design drawings. Travelling over the existing sewer is proposed to be avoided, and the City proposes to use long-reach equipment, to enable as much work as possible to be done with the equipment on the road. However there may need to be travel parallel/adjacent to the sewer, where it crosses under the creek in the concrete-encased section shown on the Region drawings 13204-D. Avoiding of all equipment near the sewer is not possible. A review of the details of the proposed proximity of the creek works to the sewer, will be undertaken as part of detailed design. Armour stone is proposed to replace existing gabion stone-filled baskets, in select locations along Carolyn Creek, near the Credit River. This location is currently shown to be over a Region sewer. With the exchange between gabion baskets and armour stone, there is not anticipated to be a significant change in loading. The detailed design will indicate the standard clearances. The City acknowledges that an encroachment agreement will be required.

Date	Method of Communication	Communication Summary
		Landscape restoration vegetation will not plant any trees within the sewer easements or on top of existing sanitary sewers.

Table 7.6: Summary of Correspondence with the Utility Companies

Date	Method of Communication	Communication Summary
Hydro One Networks Inc.		
30 March 2022	Email	Hydro One staff provided a response to the Notice of Study Commencement and Public Information Centre, confirming that Hydro One does not own nor operates underground high voltage transmission facilities within the Study Area.
Zayo		
31 March 2022	Email	Zayo staff provided a response to the Notice of Study Commencement and Public Information Centre, confirming that Zayo has no existing plant in the Study Area.
Telecon on behalf of Rogers Communications		
12 May 2022	Email	Telecon on behalf of Rogers Communications, provided a response to the Notice of Study Commencement and Public Information Centre, confirming that Rogers currently does not possess existing plant in the Study Area/there are no conflicts.

8 Next Steps

8.1 Section 16 Order Request Process

This report has documented the planning, decision making and consultation process for Carolyn Creek Erosion Control project in accordance with the Municipal Class Environmental Assessment process for a 'Schedule B' project. This report will be made available for a formal review period for review by the public, Indigenous Nations, government review agencies, and key stakeholders. Interested persons may provide written comments to the following contact in accordance with the timeline identified in the Notice of Study Completion:

Anthony DiGiandomenico P.Eng.
Storm Drainage Engineer, Environmental Services
City of Mississauga
201 City Centre Drive, Suite 800
Mississauga, ON L5B 2T4
anthony.digiandomenico@mississauga.ca

In addition, a request may be made to the Ministry of the Environment, Conservation and Parks for an order requiring a higher level of study (i.e., requiring an individual/comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g., require further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered. Requests should include the requester contact information and full name. Requests should specify what kind of order is being requested (request for conditions or a request for an individual/comprehensive environmental assessment), how an order may prevent, mitigate or remedy potential adverse impacts on Aboriginal and treaty rights, and any information in support of the statements in the request. This will ensure that the ministry is able to efficiently begin reviewing the request. The request should be sent in writing or by email to:

Minister of the Environment, Conservation and Parks
Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto ON M7A 2J3
minister.mecp@ontario.ca

Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. W, 1st Floor
Toronto ON, M4V 1P5
EABDirector@ontario.ca

Requests should also be copied to the City of Mississauga contact identified above. All personal information included in your request – such as name, address, telephone number and property location – is collected, under the authority of section 30 of the Environmental Assessment Act and is collected and maintained for the purpose of creating a record that is available to the general public. As this

information is collected for the purpose of a public record, the protection of personal information provided in the Freedom of Information and Protection of Privacy Act (FIPPA) does not apply (s.37). Personal information you submit will become part of a public record that is available to the general public unless you request that your personal information remain confidential.

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APPENDIX

A

Natural Environment Resource Assessment and Species at Risk Screening

Natural Environment Resource Assessment and Species at Risk Screening

Carolyn Creek Erosion Control Project Along Barbertown Road
City of Mississauga
Project # WW20101061

Rev0A

Prepared for:

City of Mississauga

300 City Centre Dr., Mississauga, Ontario, L5B 3C1

October 2021

Natural Environment Resource Assessment and Species at Risk Screening

Carolyn Creek Erosion Control Project Along Barbertown Road
Project Location
Project # WW20101061

Rev0A

Prepared for:

City of Mississauga

300 City Centre Dr., Mississauga, Ontario, L5B 3C1

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October 2021

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List of Acronyms and Abbreviations

Term	Definition
AMO	Atlas of the Mammals of Ontario
ANSI	Area of Natural and Scientific Interest
ARA	Aquatic Resource Area
BCI	Bat Conservation International
CAA	*Conservation Authorities Act, 1990*
COSSARO	Committee on the Status of Species at Risk in Ontario
CVC	Credit Valley Conservation
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
EIS	Environmental Impact Study
ELC	Ecological Land Classification
ESA	*Endangered Species Act, 2007*

Term	Definition
FWCA	Fish and Wildlife Conservation Act
GGH	Greater Golden Horseshoe
ha	Hectare
HADD	Harmful Alteration, Disruption or Destruction of fish habitat
LIO	Land Information Ontario
km	kilometre
m	metre
MBCA	*Migratory Birds Convention Act, 1994*
MECP	Ministry of Environment Conservation and Parks
MMAH	Ministry of Municipal Affairs and Housing
MNRF	Ministry of Natural Resources and Forestry (formerly Ministry of Northern Development, Mines, and Natural Resources and Forestry)
MTO	Ministry of Transportation
NAS	Natural Area Survey
NHIC	Natural Heritage Information Centre
OBBA	Ontario Breeding Birds Second Atlas
OBA	Ontario Butterfly Atlas
ORAA	Ontario Reptile and Amphibian Atlas
O.Reg.	Ontario Regulation
PPS	Provincial Policy Statement
PSW	Provincially Significant Wetland
ROP	Region of Peel Official Plan
ROW	Right-of-way
SAR	Species at Risk
SARA	*Species at Risk Act, 2002*
SARO	Species at Risk in Ontario
SWH	Significant Wildlife Habitat
SWHCS	Significant Wildlife Habitat Criteria Schedules

1.0 Introduction

Wood Environment & Infrastructure Solutions, a Division of Wood Canada Limited (Wood), has been retained by the City of Mississauga to undertake a Municipal Class Environmental Assessment (Class EA), prepare detailed engineering design and construction drawings for the Carolyn Creek Erosion Control Project along Barbertown Road (the Project), located in the City of Mississauga, Ontario. The purpose of the Project is to restore approximately 200 m of Carolyn Creek which currently exhibits hardened creek bed and banks.

This Natural Environment Resource Assessment and Species at Risk (SAR) Screening has been prepared to document the exisiting conditions with the Project Study Area, present results of the field investigations and determine overall significance and sensitivity of natural features.

Work completed in support of the Natural Environment Resource Assessment and SAR Screening included a review of secondary source information and field investigations including botanical surveys, Ecological Land Classification (ELC), fish habitat assessment, fish communty surveys, Significant Wildlife Habitat (SWH) assessment and SAR habitat assessment. The findings presented in this report are based on Wood's professional experience and expertise relative to natural environment inventories.

1.1 Study Area

For the purposes of this Report, two Project-specific terms are defined below, and spatial boundaries for each term are depicted in Figure 1-1:

- "Project Location" refers to the physical footprint of the proposed structure where direct disturbance is expected during the proposed works. The Project Location extends along the south side of Barbertown Road bordering the Slovak Canadian Culture Society (Koliba Park) and ends by flowing into the Credit River. The total length of the creek through the Project Location is approximately 200 m. The Project Location is primarily comprised of a narrow band of trees growing on the banks of the watercourse, the vegetation is largely represented by non-native species such as Siberian Elm.
- "Project Study Area" refers to the Project Location plus the 120 m surrounding landscape. The Project Study Area is generally comprised of manicured/mown areas, the Credit River, deciduous forests, cultural woodlands, a pedestrian bridge, road infrastructure, industrial and residential areas.

605100 605200 605300 605400 605500 605600 605700 605800 605900 606000

4825700 4825600 4825500 4825400 4825300

DURIE ROAD

PRINCELEA PLACE

EGLINTON AVENUE WEST

BARBERTOWN ROAD

CREDIT RIVER

Upstream Aquatic Study Area

CAROLYN CREEK

MELODY DRIVE

AMANA PLACE

BARBERTOWN ROAD

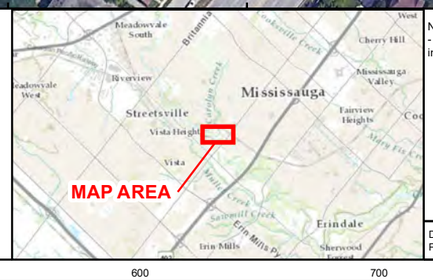
Downstream Aquatic Study Area

INVERNESS BOULEVARD

P:\2020\Projects_Other\WW20101061_CarolynCreek\11_GIS\MXD\Project_Study_Area_1-1_1.mxd

LEGEND

- Project Location
- Terrestrial Study Area
- Aquatic Study Area
- Watercourse (LIO)
- Flow Direction



NOTES:
- Imagery extracted from Google imagery, 2018

Datum: NAD83
Projection: UTM Zone 17N

0 50 100 200 300 400 500 600 700 Metres

MISSISSAUGA wood.

CAROLYN CREEK EROSION CONTROL

Project Study Area

PROJECT N°: WW20101061 | **FIGURE: 1-1**

SCALE: 1:2,500 | DATE: September 2021

1.2 Proposed Development

Carolyn Creek originates from a trunk sewer at Terry Fox Road, north of Blueheron Blvd. The creek flows southwest to Barbertown Road, ultimately discharging to the Credit River north of Eglinton Avenue West. The Project Location consists of an engineering channel constructed approximately 30 to 40 years ago. The banks are lined with gabion baskets and alternate from 3 to 4-tiered gabion basket walls. Upstream of the Credit River within the engineered channel there is a gabion basked drop structure. Through its ongoing erosion monitoring program, the City of Mississauga (the City) identified the creek reach on the south side of Barbertown Road as a high priority site in need of rehabilitation. Based upon the continued erosion and risk to property and infrastructure the City is now proceeding with the Project. This work will contribute to future projects in the area including: the development of townhouses on the northside of Barbertown Road, proposed storm sewer connections to Carolyn Creek, Region of Peel watermain project planned for 2021 and the City of Mississauga Barbertown Road resurfacing project planned for 2022.

The goal of the Project is to develop a restoration design for Carolyn Creek which mitigates existing erosion problems and provides long term stability to the channel corridor. Related objectives include:

- Provide long term erosion protection that is compatible with the natural tendencies of the creek
- Maintain or improve the hydraulic capacity of the creek;
- Replacement of the existing hardened creek bed and banks with more 'natural' forms of erosion and grade control, where feasible;
- Provide environmental enhancements wherever possible;
- Improve fish habitat and fish passage;
- Minimize environmental impacts during and post construction;
- Decrease property and infrastructure loss;
- Minimize capital and maintenance costs; and,
- Provide design consideration for a potential storm sewer connection from the proposed townhouse development.

2.0 Policy Context

2.1 Federal Legislation Requirements

2.1.1 Species at Risk Act, 2002 (as amended)

The Canadian SARA was passed into law in 2002 and was last amended on October 6, 2020. The purpose of the Species at Risk Act (SARA) is to prevent wildlife species in Canada from disappearing, to provide for the recovery of wildlife species, and to manage species to prevent further risk to their status. Only species listed as Threatened, Endangered, or Extirpated under Schedule 1 are afforded both individual and habitat protection under SARA. Outside of federal lands, SARA legislation only applies to the following:

- Migratory birds (i.e., those species listed under Article I of the Migratory Birds Convention Act, 1994) that also fall under Schedule 1 of SARA. This does not include the species' critical habitat, and
- Aquatic species that fall under Schedule 1 of SARA.

Notably, SARA prohibitions can be applied if provincial legislation or voluntary measures do not adequately protect federally listed species and their residence. Generally, compliance with provincial legislation will satisfy the requirements under the SARA.

Applicability to the Project

The Project Location is not located within federal lands; however, SARA applies to this Project concerning federally listed migratory birds that may occur, that are not otherwise protected under the Provincial Endangered Species Act (ESA). A well, Carolyn Creek and the Credit River are present; therefore, SARA applies to this Project concerning federally listed aquatic SAR that may occur.

2.1.2 Migratory Birds Convention Act, 1994 (as amended)

The Migratory Birds Convention Act (MBCA) was passed in 1917, updated in 1994, and the last amendment was December 12, 2017. The Migratory Birds Convention Act (MBCA) prohibits harming and/or killing most species of birds and/or destroying or collecting their eggs or nests. The MBCA does not permit the incidental take of a migratory bird or its nest, with some exceptions. Protected species are listed under Article I of the MBCA. These species are native or naturally occurring in Canada and are species that are known to occur regularly in Canada. Most birds found in the Project Location receive protection under the MBCA, and nearly all of the remaining species receive similar protection under the provincial Fish and Wildlife Conservation Act (FWCA).

The MBCA together with the Migratory Birds Regulations (C.R.C., c. 1035), last amended on June 18, 2020, are federal legislative requirements that are binding on members of the public and all levels of government, including federal and provincial. The "incidental take" of migratory birds and the disturbance, destruction or taking of the nest of a migratory bird is prohibited. No permit can be issued for the incidental take of migratory birds.

Bird species not regulated under the MBCA include Rock Dove, American Crow, Brown-headed Cowbird, Common Grackle, House Sparrow, Red-winged Blackbird, and European Starling. Conversely, if the species identified is protected under Ontario's Endangered Species Act (Section 2.2.1) or SARA, additional restrictions may apply.

Environment and Climate Change Canada (ECCC) and the Canadian Wildlife Service have compiled nesting calendars that show the variation in nesting intensity by habitat type and nesting zone within broad geographical areas distributed across Canada (ECCC 2018). While this does not mean nesting birds will not nest outside of these periods, the calendars can be used to reduce the risk of encountering a nest.

Applicability to the Project

The MBCA applies to all of Canada. As such, the MBCA applies to the entire Project Location and Project Study Area. Therefore, if a protected species or their nest is encountered during Project activities, the Project must comply with the prohibitions of the MBCA. Vegetation removals should follow appropriate timing windows or Best Management Practices

2.1.3 Fisheries Act, 1985 (as amended)

The federal Fisheries Act was established in 1985 with amendments that came into effect on November 25, 2013, and August 28, 2019. The Fisheries Act provides protection to fish and fish habitat such that:

"No person shall carry on any work, undertaking or activity that results in the harmful alteration, disruption or destruction of fish habitat" (Section 35 (1))."

The Fisheries Act defines fish habitat as:

"water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas" (Section 2 (1))."

The Fisheries Act requires that any development project avoid harmful alteration, disruption or destruction of fish habitat (HADD) unless authorized by Fisheries and Oceans Canada (DFO). If mitigation measures cannot be applied, and residual effects will cause HADD, then provisions under the Act may apply (i.e., approval).

Applicability to the Project

Any waterbody or watercourse that contains fish or is any other area on which fish depend directly or indirectly to carry out their life processes as described in the Fisheries Act is provided protection under the Act. As such, the Fisheries Act would apply to this Project if any of the proposed Project works can potentially impact fish or fish habitat.

2.2 Provincial Legislative Requirements

2.2.1 Endangered Species Act, 2007 (as amended)

The Ontario Endangered Species Act (ESA) was passed into law in 2007 and came into effect on June 30, 2008 and was last amended July 21, 2020. In Ontario, SAR are determined by the Committee on the Status of Species at Risk in Ontario (COSSARO). If a species is listed under the ESA as Extirpated, Endangered, or Threatened, Section 9 of the ESA prohibits killing, harming, harassing, capturing, taking, possessing, collecting, buying, selling, leasing, trading or offering to buy, sell, lease or trade a member of the species. Similarly, Section 10 of the ESA prohibits the damage or destruction of the habitat of all Endangered and Threatened species. Habitat is broadly characterized within the ESA as the area prescribed by regulation as the habitat of the species or an area on which the species depends directly or indirectly, to carry on its

life processes, including reproduction, rearing of young, hibernation, migration or feeding. Habitat is specifically defined for some species.

Species listed as Special Concern are not afforded protection under Section 9 and 10 of the ESA; however, they are protected as Significant Wildlife Habitat, as described in the Provincial Policy Statement (PPS).

Applicability to the Project

Any SAR ranked as Threatened or Endangered that may be impacted by any Project work requires consideration. If impacts to SAR or their habitat cannot be fully avoided, a permit or approval may be required under the ESA.

2.2.2 Fish and Wildlife Conservation Act, 1997 (as amended)

The Fish and Wildlife Conservation Act (FWCA) was established in 1997 and last amended December 10, 2019. The FWCA applies to 'wildlife', which is defined as:

"an animal that belongs to a species that is wild by nature, and includes game wildlife and specially protected wildlife" (Section 1 (1))."

Those species considered "specially protected wildlife" include those specially protected amphibians, birds, invertebrates, mammals, and reptiles, as identified within Schedules 6 to 11 under the FWCA. The FWCA is managed by the Ministry of Natural Resources and Forestry (MNRF) and applies to all wildlife as defined under the FWCA. In instances where wildlife will require collection or relocation at any point in the project (i.e., through trapping/collection and relocation), permits and approvals under the FWCA may be required.

Applicability to the Project

The FWCA is managed by the MNDMNRF and is applicable to all fish and wildlife as defined under the FWCA. In instances where wildlife and/or fish will require collection or relocation at any point in the Project, (i.e., through trapping / collection and relocation), permits and/or approvals under the FWCA may be required. These permits are contractor specific, whereby, the individual undertaking the work to rescue and relocate or collect wildlife and/or fish will be the responsible party required to obtain the necessary permit and approvals.

A License to Collect Fish for Scientific Purposes is required to complete fish community surveys within the Project Location, as such. permits/approval under the FWCA will be required to complete this task.

2.2.3 Conservation Authorities Act, 1990 (as amended)

The Conservation Authorities Act (CAA) was established in 1990 and was last amended on June 6, 2019. The CAA authorizes the formation of conservation authorities in Ontario and addresses their roles, responsibilities, and governance in resource management and environmental protection. The purpose of the CAA is:

"to provide for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources in watersheds in Ontario."

Section 28 of the CAA sets out prohibited activities that include development in areas that could be unsafe for development because of natural processes associated with flooding or erosion, and interference with, or alterations to, watercourses, wetlands, or shorelines.

Each of Ontario's 36 conservation authorities has its own Section 28 Ontario Regulation (O. Reg.). The core mandate of conservation authorities is to undertake watershed-based programs to protect people and property from flooding and other natural hazards and conserve natural resources for economic, social, and environmental benefits (Conservation Ontario 2019). In the Project area, the CAA is applied via CVC: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses O. Reg. 160/06.

Applicability to the Project

The Project Location falls within the CVC regulated area (Refer to Figure 2-2). CVC regulates the watercourse and valleylands, and Project works within the regulated area will require consultation with HCA. As part of its permitting process, the CVC typically requires the proponent to prepare an EIS, or similar report, which must demonstrate that the development can proceed without resulting in any alteration to a watercourse or interference to the hydrologic function of a wetland.

2.2.4 Planning Act, 1990 (as amended)

The Planning Act is provincial legislation that sets out the ground rules for land use planning in Ontario. Established in 1990, the Planning Act was last amended on July 21, 2020. The Act describes how land use may be controlled and who may control them. The Planning Act also provides the basis for developing regional and municipal official plan documents to guide development. Regional plans such as the Greenbelt Plan and Niagara Escarpment Plan regulate the Study Area. Municipally, the Project falls under the jurisdiction of the Urban Hamilton Official Plan (City of Hamilton, 2013) – discussed further in Section 2.3 below. The PPS is issued under Section 3 of the Planning Act by the Ministry of Municipal Affairs and Housing (MMAH). Under the Planning Act, the PPS is applicable province-wide and provides overall policy directions on matters of provincial interest related to land use planning and development. Regional plans, municipal official plans, and the PPS work together to establish and protect natural features.

2.2.4.1 Provincial Policy Statement, 2020

The PPS is the complimentary policy document to the Planning Act. The PPS was issued under Section 3 of the Planning Act and came into effect May 1, 2020, replacing the previous PPS issued on April 30, 2014. The PPS provides direction on matters of provincial interest related to land use planning and development and promotes the provincial "policy-led" planning system that recognizes and addresses the complex interrelationship among environmental, economic and social factors in land use planning (Ministry of Municipal Affairs and Housing, 2020).

The PPS provides policies specific to natural heritage and states that natural features must be protected for the long term. Section 2 of the PPS provides direction for the wise use and management of resources, including the protection of natural areas and features. Relevant natural heritage policies are in Section 2.1 of the PPS and generally states that the diversity and connectivity of natural heritage (including surface and groundwater features) should be maintained, restored or, where possible, improved. Section 2.2 of the PPS relates more specifically to water resources and supports planning authorities to protect, improve, and restore the quality and quantity of water. Those natural heritage features identified within the PPS where development and site alteration is not permitted, unless it has been demonstrated that there will be no negative impact on features and functions, in Ecoregion 7E include:

- Significant wetlands;
- Significant coastal wetlands and non-significant coastal wetlands;
- Significant habitat of endangered and threatened species (i.e., SAR);
- Fish habitat;
- Significant woodlands;
- Significant valleylands;
- Significant Areas of Natural and Scientific Interest (ANSIs); and
- Significant wildlife habitat (SWH) (the Significant Wildlife Habitat Technical Guide (MNRF, 2000) and Ecoregion schedules (MNRF, 2015) to assist planning authorities and other participants in the land use planning system).

Each of these features is afforded varying levels of protection subject to guidelines, and in some cases, regulations. Significant woodlands, valleylands and wetlands can be designated by municipalities and/or the MNDMNRF (e.g., under the Ontario Wetland Evaluation System). Fish habitat information can be identified by conservation authorities, the MNDMNRF, and DFO. However, the management of fish habitat is governed by DFO. Those areas identified as SWH and ANSIs are designated by MNDMNRF. The MECP designates those areas identified as the habitats of endangered and threatened species. The Natural Heritage Reference Manual (MNRF, 2010) is a technical document used to help assess natural heritage features.

The PPS provides overall policy direction and should be read in conjunction with other provincial plans such as the Greenbelt Plan and Niagara Escarpment Plan. The more stringent of policies apply unless otherwise explicitly stated. It is understood that features identified as part of provincial policy plans (e.g., PPS, the Greenbelt Plan, A Place to Grow: Growth Plan for the Greater Golden Horseshoe, etc.) have been incorporated into the Municipal and Regional Official Plans.

Applicability to the Project

The PPS provides policies on land use planning that are integrated into municipal and regional plans. A review of the Project Study Area for this Project identified several NHS features.

The Project Location falls within Significant Woodlands and Valleylands in Ecoregions 7E, SWH, and ANSI. The Project must not have a negative impact on the feature and function of the natural features.

2.2.4.2 Greenbelt Act, 2005 (as amended) and the Greenbelt Plan, 2017

Ontario's Greenbelt protects farmland, communities, forests, wetlands and watersheds. It also preserves cultural heritage and supports recreation and tourism in Ontario's Greater Golden Horseshoe. The Greenbelt Plan derives its authority from the Greenbelt Act, 2005 (last amended May 14, 2009). The Greenbelt Plan was first released in 2005 and last updated in May 2017. The Greenbelt was introduced in 2005 as the cornerstone of the Greater Golden Horseshoe (GGH). The GGH is the heart of the Great Lakes region and contains Ontario's most ecologically and hydrological significant natural environments. The GGH also contains the Oak Ridges Moraine and the Niagara Escarpment. The Greenbelt Plan identifies where urbanization should not occur in order to provide permanent protection to the agricultural land base and functions of the landscape.

Like other provincial plans, the Greenbelt Plan builds upon the policy foundation provided by the PPS. It provides additional and more specific land use planning policies to address issues facing the specific

geographic area. The policies of The Greenbelt Plan usually satisfy the policies of the PPS. Where there is conflict, the Greenbelt Plan will take precedence, except where the relevant legislation provides otherwise. Where matters addressed in the PPS do not overlap with policies in the Greenbelt Plan, those PPS policies must be independently satisfied. The Greenbelt Plan must also be read in conjunction with other Provincial Plans, such as the Growth Plan for the Greater Golden Horseshoe and the Niagara Escarpment Plan. Where the plans, regulations or standards are more restrictive than the Greenbelt Plan, the more restrictive provision shall prevail.

Applicability to the Project

The Project Study Area is located within a Settlement Area outside of the Greenbelt Area. Further to this, the Credit River which is located within the Project Study Area is also considered a River Valley Connection (Outside Greenbelt). This is illustrated on Figure 2-2. As such, this legislation does not apply to the Project.

2.3 Regional and Municipal Legislative Requirements

2.3.1 Region of Peel Official Plan

The Regional Municipality of Peel came into existence in January 1974 under Provincial legislation. That legislation also established the lower-tier area municipalities of the City of Brampton, the City of Mississauga, and the Town of Caledon. The Region of Peel Official Plan (ROP), office consolidation December 2018, outlines strategies to guide growth and development in Peel Region. The ROP allows municipalities to cover more detailed matters in their specific Official Plans.

Chapter 2 of the ROP (2018) focuses on the natural environment. The Chapter emphasizes joint efforts with area municipalities, conservation authorities, and provincial plans to protect and restore natural systems. The natural heritage system is called the Greenlands System and is composed of Core Areas, Natural Areas and Corridors, and Potential Natural Areas and Corridors.

Chapter 5 of the ROP (2018) focuses on the Regional Structure. Chapter 5 describes the Region's role within the Greater Toronto and Hamilton Area and its relationship to the surrounding municipalities.

Applicability to the Project

The Project Study Area is within the City of Mississauga, an area municipality within the Region of Peel. A small fragment of the Region's Core Areas of the Greenlands System is located within the Project Study Area (Refer to Figure 2-2). As well, the ROP (2018) also indicates that the Project Study Area is not located within any protected areas associated with the Oak Ridges Moraine Conservation Plan.

2.3.2 City of Mississauga Official Plan

The City of Mississauga Official Plan, consolidation April 8, 2021 (City of Mississauga, April 8, 2021), guides how the City will grow and develop and provides a basis for the City's land use and urban design, in line with the City's Strategic Plan. The planning regime within the City is directed by provincial legislation plans and policies, including the PPS, the Greenbelt Plan, the Parkway Belt West Plan, the Growth Plan for the Greater Golden Horseshoe, and the Regional Transportation Plan.

Land-use policies, as they pertain to natural heritage, are provided in Chapter 6, Section 6.3 of the Official Plan. The City applies the Green System which is a response to the challenge of achieving a high level of ecological function and connectivity of natural heritage features within an urban environment. The Green

system include the Natural Heritage Systems, Urban Forests, Natural Hazard Lands as well as Parks and Open spaces. The Natural Heritage System includes Significant Natural Areas, Natural Green Spaces, Special Management Areas, Residential Woodlands and Linkages.

Applicability to the Project

The Project Study Area is with the City of Mississauga, as such, the City's official plan applies to the Project. In accordance with the Official Plan mapping, the Project Study Area is located within the Green System, Significant Natural Area and Natural Green Spaces and Natural Hazard Area.

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605100 605200 605300 605400 605500 605600 605700 605800 605900 606000

4825700 4825600 4825500 4825400 4825300

DURIE ROAD

PRINCELEA PLACE

CREDIT RIVER

EGLINTON AVENUE WEST

BARBERTOWN ROAD

CAROLYN CREEK

MELODY DRIVE

BARBERTOWN ROAD

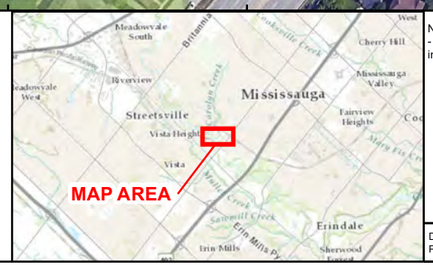
AMANA PLACE

INVERNESS BOULEVARD

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LEGEND

- Project Location
- Terrestrial Study Area
- Credit Valley Conservation (CVC) Regulated Area
- Core Areas of the Greenlands System
- Significant Natural Areas and Natural Green Spaces
- Watercourse (LIO)
- Flow Direction
- Direct Fish Habitat



NOTES:
- Imagery extracted from Google imagery, 2018

Datum: NAD83
Projection: UTM Zone 17N

0 50 100 200 300 400 500 600 700 Metres

MISSISSAUGA wood.

CAROLYN CREEK EROSION CONTROL

Natural Heritage Features and Policy Areas

PROJECT N°: WW20101061 **FIGURE: 2-1**

SCALE: 1:2,500 DATE: September 2021

605100 605200 605300 605400 605500 605600 605700 605800 605900 606000

4825700 4825600 4825500 4825400 4825300

DURIE ROAD

PRINCELEA PLACE

CREDIT RIVER

EGLINTON AVENUE WEST

BARBERTOWN ROAD

CAROLYN CREEK

MELODY DRIVE

BARBERTOWN ROAD

AMANA PLACE

INVERNESS BOULEVARD

P:\2020\Projects_Other\WW20101061_CarolynCreek\11_GIS\MXD\NH_Features_Policy_Areas_2-2_1.mxd

LEGEND

- Project Location
- Terrestrial Study Area
- Green System
- Special Management Areas
- Natural Hazard Area
- Watercourse (LIO)
- River Valley Connection (Outside Greenbelt)
- Flow Direction
- Direct Fish Habitat



NOTES:
- Imagery extracted from Google imagery, 2018

MISSISSAUGA wood.

CAROLYN CREEK EROSION CONTROL

Natural Heritage Features and Policy Areas

Datum: NAD83
Projection: UTM Zone 17N

N W E S

PROJECT N°: WW20101061 **FIGURE: 2-2**

SCALE: 1:2,500 DATE: September 2021

0 50 100 200 300 400 500 600 700 Metres

3.0 Agency Consultation

An information request was sent to the Ministry of Natural Resources and Forestry (MNRF) on September 15, 2021. A response was received from the MNRF on the same day with their response directing the recipient to the *Natural Heritage Information Resource Guide* (2019). A follow up email to MNRF was submitted on September 17, 2021, requesting clarification on the in-water timing window restriction due to warm, cool and coldwater species being present within Carolyn Creek. MNRF responded directing the proponent to follow the coldwater timing window (September 15 – May 31 restricted period) for any works. A copy of the agency consultation is documented in Appendix A of this Report.

4.0 Methods

4.1 Background Information Review

Information relevant to the Project Study Area included the locations of natural heritage features (e.g., Provincially Significant Wetlands (PSWs), ANSIs, and Environmentally Significant Areas) and the probability of SAR occurrences. Sources reviewed included:

- Policies and plans covered in Section 2.0;
- Ministry of Natural Resources and Forestry (MNRF) Natural Heritage Information Centre (NHIC) database (2019) grid square [17PJ0525];
- MNRF Land Information Ontario (LIO) and GeoHub (2018);
- (Ontario Breeding Birds Atlas, 2006) (OBBA), grid square 17PJ02;
- Ontario Reptile and Amphibian Atlas (ORAA; (Ontario Nature, 2018)), grid square 17PJ02;
- Ontario Butterfly Atlas (OBA) (Toronto Entomologists' Association (TEA), 2018), grid square 17PJ02;
- Atlas of the Mammals of Ontario (AMO; (Dobbyn J. S., 1994));
- Bat Conservation International Inc. (Bat Conservation International (BCI), 2021);
- Aquatic Species at Risk Map (Fisheries and Oceans Canada (DFO), 2021);
- Credit River Watershed and Region of Peel Natural Areas Inventory – Volume 1 (Peel, 2011); and
- The Natural Area Survey (NAS) dataset for site CRR5 (City of Mississauga, 2020).

The MNRF NHIC database utilizes a one km x one km system. The OBBA, ORAA, and OBA, utilize a 10 km x 10 km system whereby a list of species documented within a specific square can be generated. The list of mammals that may be found in the Project Study Area was similarly generated; however, the AMO is not available in a database and as such, the potential presence of these species within the 10 km x 10 km squares was extrapolated based on the AMO documentation (Dobbyn J. S., 1994). Habitat assessment and mapping was undertaken via desktop review and field investigations.

For the purposes of this report, only common names for species have been provided; the full nomenclature of each reported species is provided within Appendix B.

4.2 Field Investigations

Field investigations were performed for the Project Location and Study Area. The Project Location was publicly accessiable but property access was not available for all areas within the broader Project Study Area. Where access was not availality, surveys were conducted from the roadside or fenceline. All field investigations were undertaken by qualified biologists. A description of field survey methodologies is provided in the subsections below. Survey dates, times, weather conditions, and field personnel are summarized in Table 4-1.

Table 4-1: Summary of Field Investigations

Survey Type	Date	Time (Hours)	Weather	Surveyor
Tree Inventory, ELC, Botanical Inventory, SAR Habitat Assessment and SWH Assessment	June 29, 2021	09:00 – 13:30	30°C, 100% cloud, light wind, rain	Julie Ellis
Aquatic Habitat Survey and Fish Community Survey	May 27, 2021	09:00 – 16:00	18°C, 60% cloud, light wind, no rain	Roxanne Dibbley, Amanda Wittmann

4.2.1 Aquatic Surveys

Field habitat assessments were completed by qualified Aquatic Wood staff on 27 May 2021. Field conditions were assessed in accordance with the MTO Environmental Guide for Fish and Fish Habitat (the Guide) (2020), focusing on visual observations of various habitat features to identify factors that may influence fish community composition and determine presence of specialized habitat within assessed reaches such as spawning, feeding and migratory habitat. These features included but not necessarily limited to the following:

- Instream cover
- Flow characteristics
- Bank characteristics and stability
- Substrate composition
- Stream morphology
- Barriers to fish movement
- Disturbances and past habitat alterations (e.g., channelization, pollutant point sources)
- Canopy cover
- Aquatic vegetation
- Riparian vegetation
- Groundwater indicators (e.g., iron staining)
- Habitat enhancement opportunities

The aquatic habitat assessment involved walking the creek channel from the outflow at the Credit River, upstream approximately 200 metres (m), to the upstream end of the Barbertown Road culvert (Figure 1-1).

Fish Community Surveys

Following fish habitat assessments, fish community surveys via backpack electrofishing under Licence No. 1097571 from MNRF were completed on 27 May 2021. Electrofishing was conducted using a Halltech backpack electrofisher with one netter, for a total effort of 1772 seconds. A mandatory fish collection report will be submitted to MNRF prior to 31 January 2022.

4.2.2 Vegetation Communities and Botanical Inventories

Vegetation communities within the Project Study Area were classified and delineated through a combination of aerial photograph interpretation and field examination, in accordance with the protocol

for the *Ecological Land Classification for Southern Ontario*: *The First Approximation of ELC* (Lee, et al., 1998). Ecological Land Classification (ELC) is the provincially accepted standard for classifying vegetation communities in Ontario. This protocol uses a series of six nested levels (Site Region, System, Community Class, Community Series, Ecosite and Vegetation Type) to describe the ecological form and function of a vegetation community in a spatial context, from largest to smallest scale. Vegetation communities were classified to the lowest level possible (i.e., Vegetation Type or Ecosite), based on the stand structure and species composition, which includes noting species dominance within each vegetation layer. Vegetation community boundaries were delineated on maps in the field, which were then digitized by GIS analyst. The occurrence of ELC communities was cross-referenced with provincially significant vegetation communities as identified in the Significant Wildlife Habitat Ecoregion Criterion Schedule 7E (MNRF, 2015) to determine whether these communities may provide Significant Wildlife Habitat (SWH). SWH are further described in Section 4.2.5 below.

A botanical inventory was also undertaken within the Project Study Area; these inventories provide a record of all vascular plants observed onsite. Plant species occurrences were cross-referenced with the NHIC database and the *Plants of the Credit River Watershed* (CVC, 2002) to identify provincial and local rarity, respectively, of the species present. Common and scientific names of plant species are based on the current nomenclature as listed in the NHIC database. All plant species included in Appendix B were recorded during Wood's botanical field investigations.

4.2.3 Species at Risk Habitat Assessment

Potentially suitable SAR habitat within the Project Study Area was determined by reviewing aerial photography, examining existing conditions on site, and comparing those to habitat descriptions of each SAR species. Using the results of the background information, as well as the results of the field investigations (i.e., ELC, SWH and Vascular Plant List), a SAR habitat assessment was conducted for SAR deemed to be potentially present within the Study Area.

4.2.4 Significant Wildlife Habitat Assessment

Candidate SWH was identified in accordance with the SWH guidelines for Ecoregion 7E (MNRF, 2015) through a combination of desktop review of aerial photography coupled with the results of field investigations. A number of candidate SWH were ruled-out due to one or a combination of the following characteristics of the Study Area:

- limited size of features within overall Study Area;
- fragmentation from other natural areas;
- low quality of habitat within the Study Area (i.e., presence of disturbed vegetation communities, invasive/non-native species, etc.); and/or,
- some suitable supporting habitat present but did not meet minimum size or other described feature requirements.

4.2.5 Incidental Observations

All incidental wildlife observed or heard during the other surveys were recorded. For example, if during Anuran call surveys a bird species was heard or observed, the species was recorded as incidental.

5.0 Biophysical Conditions

Biophysical condition is presented here as a result of background information and secondary sources, and field investigations. The following subsections describe the natural environment within the Project Study Area, and more specifically, within the Project Location. These descriptions are intended to provide context and establish the setting of the Project.

5.1 Landform and Physiography

The Project Study Area is located in the Lake Erie-Lake Ontario Ecoregion (7E). This Ecoregion is located within the Deciduous Forest Region, Niagara Forest Section (Rowe, 1972). This Ecoregion 7E is underlain by Silurian and Devonian limestone bedrock, the topography is flat and overlain by deep undulating deposits of ground moraine (Crins et al., 2009). Most substrates in the ecoregion are comprised of calcareous mineral material and there are glaciolacustrine deposits left over from historical lakes while (Crins et al, 2009). The predominant substrates in the ecoregion include Gray Brown Luvisols (60%) and Gleysols (37%) (Crins et al, 2009).

At the local scale, the Project Study Area is located within the South Slope physiographic region (Peel, 2011). This region is characterized by low-lying, fine-grained, undulating ground moraine and knolls (Peel, 2011). This region has been greatly altered by agricultural and urban land use practices (Peel, 2011). The soils have low permeability and groundwater infiltration is limited (Peel, 2011).

5.2 Aquatic Habitat

Carolyn Creek originates in the residential area at Terry Fox Way and Blueheron Boulevard before being conveyed through a concrete box culvert under the CP rail line approximately 400 m upstream of the Credit River. This concrete structure creates an impediment to fish passage due to the weir within the culvert itself. The watercourse surveyed flows southwest into the Credit River and fish community records provided by LIO ARA (Table 5-1) identify warm, cool and coldwater fish records.

Table 5-1: Background Fish Records for Carolyn Creek

Common Name	Scientific Name
Blacknose Dace	*Rhinichthys atratulus*
Chinook Salmon	*Oncorhynchus tshawytscha*
Coho Salmon	*Oncorhynchus kisutch*
Creek Chub	*Semotilus atromaculatus*
Fathead Minnow	*Pimephales promelas*
Goldfish	*Carassius auratus*
Northern Pearl Dace	*Margariscus nachtriebi*
Rainbow Trout	*Oncorhynchus mykiss*

5.2.1 Fish Habitat Characteristics

The 50 m assessed area upstream of the Barbertown Road culvert was a combination of riffle, run and pool habitat with predominantly gravel substrate, accompanied by cobble, silt and sand. Water depth generally ranged from 0.05 to 0.40 m, though depths as low as 0.01 m were recorded. Exposed roots and undercut banks are present on both sides of the channel, with some slumping observed. Gabion baskets along the west bank close to the culvert are failing and an accumulation of wood and concrete was observed across the channel which may impede fish passage. A narrow treed riparian area is present on both sides of the channel, with mowed grass outside of this area. Water depth within the approximately 1.6 m high, 3.0 m wide and 25 m long concrete box culvert ranged from 0.01 to 0.28 m, with a mean wetted width of 2 m. Sand, silt, gravel and cobble were present within the culvert.

The creek is channelized in an east/west direction along the south/downstream side of Barbertown Road, downstream of the box culvert, for an approximate length of 125 metres (m). Gabion baskets form both sides of the channel, ranging from 1.3 to 1.9 m high. The channel is approximately 2.8 m wide, with a combination of riffle, run and flow morphology and water depth generally ranging from 0.08 to 0.10 m. One pool, approximately 3.3 m wide and 4 m long was present with a maximum depth of 0.70 m recorded. At the time of assessment, a vertical increase in elevation greater than 0.50 m was present from the pool water level to immediately upstream. The most downstream 40 m of the channel slopes downward toward its outlet at the Credit River. Substrate was predominantly gravel and cobble, with sand and silt present. An access road to the Slovak Canadian Culture Society property, which is located, south of the creek, crosses the channel. A narrow, densely treed riparian area is present on both sides of the gabion basket channel banks, providing riparian cover to the creek. Barbertown Road is north of the narrow tree line while predominantly mowed grass is present to the south in the Slovak Canadian Culture Society property.

Fish Community Surveys

A total of five species of fish were recorded within the Study Area during the Wood 2021 fish community surveys, none of which are federal or provincial SAR (Table 5-2)

Table 5-2: 2021 Fish Records for Carolyn Creek

Common Name	Scientific Name
Blacknose Dace	*Rhinichthys atratulus*
Chinook Salmon	*Oncorhynchus tshawytscha*
Coho Salmon	*Oncorhynchus kisutch*
Creek Chub	*Semotilus atromaculatus*
Fathead Minnow	*Pimephales promelas*

5.3 Vegetation Communities and Botanical Inventory

The Project Study Area has been disturbed by on-going anthropogenic land uses such as the presence of residential and park areas with manicured lawns, road, trails and industrial properties. The majority of the Project Study Area is represented by manicured lawn (Refer to Figure 5-1). The Barbertown Road right-of-way (ROW) consisted mainly of low-quality non-native species typical of roadside edges. Where possible roadside vegetation was delineated into larger adjacent vegetation communities for the purpose of mapping; as these features are below the typical size limit for vegetation communities when applying ELC

(Lee, et al., 1998). Naturalized vegetation within the Project Study Area is generally limited to a narrow band of forest remains along the edges of the Credit River and some isolated patches of woodland and deciduous forest. Vegetation community descriptions for the Study Area are provided below and are illustrated on Figure 5-1.

Fresh – Moist Willow Lowland Deciduous Forest (FOD7-3): The canopy of this community was dominated by hybrid crack willow with Manitoba maple and black walnut also present. The community lacked a well-defined subcanopy. The shrub layer consisted of European buckthorn, Tartarian honeysuckle and red ash. The herbaceous layer consisted of a higher and lower levels. The higher level consisted of Canada goldenrod, wild parsnip, riverbank grape and stinging nettle. The lower level was dominated by garlic mustard and small forget-me-not.

Deciduous Forest (FOD): Access to this community was not granted for field investigations. The community was delineated and classified through aerial photographic interpretation. However, one of the edges of this communities was observable from Barbertown Road. The following species were common along the forest edge: Manitoba maple, red ash, American basswood, Siberian elm, black walnut, eastern white pine, European buckthorn, Canada thistle, large-leaved aster, wild chicory, spotted Lady's-thumb, oxeye daisy, creeping bellflower and common dandelion. Many of these plants are non-native and typical of disturbed roadside edges.

Mineral Cultural Woodland (CUW1): Access to this community was not granted for field investigations. The community was delineated and classified through aerial photographic interpretation. However, the edge of one of these communities was observable from Barbertown Road. The following species were common along the forest edge: Manitoba maple, red ash, American basswood, European buckthorn, white mulberry, staghorn sumac, Tatarian honeysuckle, Canada thistle, wild carrot, quackgrass, wild chicory and bittersweet nightshade. The majority of these plants are non-native and typical of disturbed roadside edges.

Hedgerows, Manicured Lawns and Roadside Vegetation:
The manicured area north of the Project Location consisted largely of mown grass, though small patches of trees and shrubs did remain. The following species were noted from Barbertown Road: black walnut, white elm, Manitoba maple, Norway maple, Canada goldenrod, wild carrot, quackgrass, wild chicory and bittersweet nightshade.

The manicured area within and immediately south of Project Location consisted of a narrow band of trees and large portion of mown grass and planted trees. The following species were noted: American basswood, black walnut, crack willow, green ash, Manitoba maple, Norway maple, Siberian elm, white elm, white oak, white poplar, white spruce, European buckthorn, white mulberry, Tatarian honeysuckle, Canada thistle, wild carrot, quackgrass, large-leaved aster, wild chicory and bittersweet nightshade. The Project Location was largely dominated by Siberian elm, Norway Maple, crack willow and European honeysuckle which are non-native species typical of disturbed roadside edges.

The background information review identified a total of 223 plant species identified through previous Natural Areas Surveys (City of Mississauga, 2020) within the vicinity of the Project Study Area. Of these, one plant, Butternut is a SAR. As well 14 plants are considered locally rare in accordance with the *Plants of the Credit River Watershed* (CVC, 2002) (Refer to Table 5-3). A complete list of these plant species identified thought the background information review is provided in Appendix B.

Table 5-3: Rare Plants identified through the background Information Review

Common Name	Scientific Name	CVC Status	Source
American Cow Parsnip	*Heracleum maximum*	rare	NAS Data
American Groundnut	*Apios americana*	rare	NAS Data
Arrow-leaved Aster	*Symphyotrichum urophyllum*	rare	NAS Data
Black Oak	*Quercus velutina*	rare	NAS Data
Common Bedstraw	*Galium aparine*	rare	NAS Data
Eastern Ninebark	*Physocarpus opulifolius*	rare	NAS Data
Greater Water Dock	*Rumex britannica*	rare	NAS Data
Old Field Aster	*Symphyotrichum pilosum*	rare	NAS Data
Purple-stemmed Angelica	*Angelica atropurpurea*	rare	NAS Data
Red Pine	*Pinus resinosa*	rare	NAS Data
Sandbar Willow	*Salix interior*	rare	NAS Data
Spotted St. John's-wort	*Hypericum punctatum*	rare	NAS Data
Sycamore	*Platanus occidentalis*	rare	NAS Data
Wild Blue Phlox	*Phlox divaricata*	rare	NAS Data

A total of 71 plant species were identified during the field investigations. Of these, 27 (38%) were native and the remaining 44 species (62%) were non-native, representing a high percentage of non-native species which attests to the disturbed condition of the vegetation communities. No SAR, provincially rare, or locally rare plants were identified during the field investigations. A complete list of the plants recorded within the Study Area are provided in Appendix B.



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LEGEND

- Project Location
- Project Study Area
- ELC Boundary

Ecological Land Classification:

- CUW1: Mineral Cultural Woodland
- FOD7-3: Fresh - Moist Willow Lowland Deciduous Forest Type
- FOD: Deciduous Forest
- M: Mown/Manicured

NOTES:
- Imagery extracted from Google imagery, 2018

Datum: NAD83
Projection: UTM Zone 17N

0 50 100 200 300 Metres

MISSISSAUGA wood.

CAROLYN CREEK EROSION CONTROL

Ecological Land Classification

PROJECT N°: WW20101061 | **FIGURE: 5-1**

SCALE: 1:1,300 | DATE: August 2021

5.4 Birds

Combining the NHIC, OBBA, NAS and eBird list identified 200 species of birds, including, five endangered, seven threatened and 11 special concern SAR were identified for the Project Location. A summary of those SAR is provided in Table 5-4. SAR and the SAR Habitat Assessment are futher discussed in Section 6.1.

Table 5-4: SAR Birds with Occurrence Records within the Project Study Area

Common Name	Scientific Name	S Rank (Provincial)[1]	G Rank (Global)[1]	SARO[2]	Source
Alder Flycatcher	*Empidonax virescens*	S2S3B	G5	END	OBBA, ebird
Golden Eagle	*Aquila chrysaetos*	S2B	G5	END	ebird
Henslow's Sparrow	*Centronyx henslowii*	SHB	G4	END	NHIC
Prothonotary Warbler	*Protonotaria citrea*	S1B	G5	END	ebird
Yellow-breasted Chat	*Icteria virens*	S1B	G5	END	ebird
Bank Swallow	*Riparia*	S4B	G5	THR	OBBA, ebird, NAS
Barn Swallow	*Hirundo rustica*	S5B	G5	THR	OBBA, ebird, NAS,
Bobolink	*Dolichonyx oryzivorus*	S4B	G5	THR	OBBA, ebird
Cerulean Warbler	*Setophaga cerulea*	S3B	G4	THR	ebird
Chimney Swift	*Chaetura pelagica*	S4B,S4N	G4G5	THR	OBBA, ebird, NAS
Eastern Meadowlark	*Sturnella magna*	S4B	G5	THR	OBBA
Louisiana Waterthrush	*Parkesia motacilla*	S3B	G5	THR	Ebird
Bald Eagle	*Haliaeetus leucocephalus*	S2N,S4B	G5	SC	ebird
Canada Warbler	*Cardellina canadensis*	S4B	G5	SC	ebird
Common Nighthawk	*Chordeiles minor*	S4B	G5	SC	OBBA, ebird
Eastern Wood-Pewee	*Contopus virens*	S4B	G5	SC	OBBA, ebird
Evening Grosbeak	*Coccothraustes vespertinus*	S4B	G5	SC	ebird
Golden-winged Warbler	*Vermivora chrysoptera*	S4B	G4	SC	ebird

Olive-sided Flycatcher	*Contopus cooperi*	S4B	G4	SC	ebird
Peregrine Falcon	*Falco peregrinus*	S3B	G4	SC	OBBA, ebird
Red-headed Woodpecker	*Melanerpes erythrocephalus*	S4B	G5	SC	ebird
Rusty Blackbird	*Euphagus carolinus*	S4B	G5	SC	ebird
Wood Thrush	*Hylocichla mustelina*	S4B	G4	SC	OBBA, eBird

Note(s)

1. **S-rank and G-rank:** The natural heritage provincial ranking system (provincial S-rank, global G-rank) is used by the Natural Heritage Information Centre (NHIC). The statuses were taken from NatureServe Explorer (2021): X - Presumed Extirpated, H- Possibly Extirpated (Historical), 1 - Critically Imperiled, 2-Imperiled, 3 - Vulnerable, 4 - Apparently Secure, 5 – Secure, NR – Unranked, U – Unrankable, NA - Not Applicable, S#S#/G#G# - Range Rank. Breeding Status Qualifiers: B – Breeding, N – Nonbreeding, M - Migrant —Conservation status refers to the breeding population of the species in the province. ? -Inexact or Uncertain
2. **SARO**: The Endangered Species Act 2007 (ESA): END - Endangered, THR – Threatened, SC - Special Concern, NAR - Not at Risk

In addition to the aforemention SAR, the background information reivew also idenfitied a total of 10 species that are ranked as provincially rare (S1-S3). These include: Black-crowned Night-Heron, Caspian Tern, Fish Crow, Great Black-backed Gull, Great Egret, Prairie Warbler, Purple Martin, Rough-legged Hawk, Whimbrel and White-eyed Vireo. Likewise, 71 species are considered indicator species for various SWH criteria and will be considered when evaluating SWH in Section 6.2.7.

5.5 Amphibians and Reptiles

Within the vicinity of the Project Study Area, a total of 14 species of amphibians and 12 species of reptiles were reported in the ORAA (Ontario Nature, 2019) and NAS (City of Mississauga, 2020). This includes one endangered amphibian, one threatened reptile, and three special concern reptiles (Refer to Table 5-5. SAR and the SAR Habitat Assessment are futher discussed in Section 6.1.

Table 5-5: SAR Amphibians and Reptiles with Occurrence Records within the Project Study Area

Taxa	Common Name	Scientific Name	S Rank (Provincial)[1]	G Rank (Global)[1]	SARO[2]	Source
Amphibian	Jefferson Salamander	*Ambystoma jeffersonianum*	S2	G4	END	ORRA
Reptiles	Blanding's Turtle	*Emydoidea blandingii*	S3	G4	THR	ORRA
	Eastern Ribbonsnake	*Thamnophis sauritus*	S4	G5	SC	ORRA
	Northern Map Turtle	*Graptemys geographica*	S3	G5	SC	ORRA
	Snapping Turtle	Chelydra serpentina	S4	G5	SC	ORRA, NAS

Note(s)

1. **S-rank and G-rank**: The natural heritage provincial ranking system (provincial S-rank, global G-rank) is used by the Natural Heritage Information Centre (NHIC). The statuses were taken from NatureServe Explorer (2021): X - Presumed Extirpated, H- Possibly Extirpated (Historical), 1 - Critically Imperiled, 2-Imperiled, 3 - Vulnerable, 4 - Apparently Secure, 5 – Secure, NR – Unranked, U – Unrankable, NA - Not Applicable, S#S#/G#G# - Range Rank. Breeding Status Qualifiers: B – Breeding, N – Nonbreeding, M - Migrant —Conservation status refers to the breeding population of the species in the province. ? -Inexact or Uncertain

2. **SARO**: The Endangered Species Act 2007 (ESA): END - Endangered, THR – Threatened, SC - Special Concern, NAR - Not at Risk

The background information reivew did not identify any reptile or amphibian species that are ranked as provincially rare (S1-S3). However, 9 species are considered indicator species for various SWH criteria and will be considered when evaluating SWH in Section 6.2.7.

5.6 Mammals

Within the vicinity of the Project Study Area, a total of 43 species of mammals have ranges that overlap the Project Location as reported in the AMO (Dobbyn J. , 1994), NAS (City of Mississauga, 2020) and the Bat Conservation International (BCI) range maps. This includes four bat SAR whose ranges encompass the Project Location; however, its should be noted that that the exact locations of species occurrences are not available from the atlas or BCI (Refer to Table 5-6). SAR and the SAR Habitat Assessment are futher discussed in Section 6.1.

Table 5-6: SAR Mammals with Ranges that overlap the Project Study Area

Common Name	Scientific Name	S Rank (Provincial)[1]	G Rank (Global)[1]	SARO[2]	Source
Eastern small-footed myotis	*Myotis leibii*	S2S3	G4	END	BCI, AMO
Little Brown Myotis	*Myotis lucifugus*	S3	G3	END	BCI, AMO
Northern Myotis	*Myotis septentrionalis*	S3	G1G2	END	BCI
Tricolored Bat	*Perimyotis subflavus*	S3?	G2G3	END	BCI, AMO

Note(s)

1. **S-rank and G-rank**: The natural heritage provincial ranking system (provincial S-rank, global G-rank) is used by the Natural Heritage Information Centre (NHIC). The statuses were taken from NatureServe Explorer (2021): X - Presumed Extirpated, H- Possibly Extirpated (Historical), 1 - Critically Imperiled, 2-Imperiled, 3 - Vulnerable, 4 - Apparently Secure, 5 – Secure, NR – Unranked, U – Unrankable, NA - Not Applicable, S#S#/G#G# - Range Rank. Breeding Status Qualifiers: B – Breeding, N – Nonbreeding, M - Migrant —Conservation status refers to the breeding population of the species in the province. ? -Inexact or Uncertain
2. **SARO**: The Endangered Species Act 2007 (ESA): END - Endangered, THR – Threatened, SC - Special Concern, NAR - Not at Risk

Given the vegetative characteristics and habitat suitability, there is a probability for SAR bats, as well as non-SAR bats, to occur within the larger study area, however, unlikely within the immediate Project Location.

The background information reivew did not identify any mammals species that are ranked as provincially rare (S1-S3). However, four (4) species are considered indicator species for various SWH criteria and will be considered when evaluating SWH in Section 6.2.7.

5.7 Invertebrates

Within the vicinity of the Project Study Area, a total of 60 species of butterflies with occurrence records within the Project Study Area (Ontario Butterfly Atlas (Toronto Entomologists' Association (TEA), 2018) and NAS (City of Mississauga, 2020). This includes one special concern species, Monarch. SAR and the SAR

Habitat Assessment are futher discussed in Section 6.1. The background information reivew did not identify any invertebrate species that are ranked as provincially rare (S1-S3).

6.0 Evaluation of Significance

6.1 Species at Risk

In Ontario, SAR are those species whose individuals or populations are considered Extirpated, Endangered, Threatened, or Special Concern, as determined by the provincial Committee on the Status of Species at Risk in Ontario (COSSARO), and are regulated by the provincial Endangered Species Act, 2007 (ESA).

A summary of SAR with species occurrence records or ranges which overlap the Project Study Area are provided in Table 6-1 below. The probabilities provided in Table 6-1 are based on an assessment of each species' habitat preferences/needs in conjunction with background information. Additionally, SAR may come into the area or species already occurring in the area may be up-listed at any time. The probabilities of occurrence are defined as 'High', 'Moderate', 'Low', and 'None' and are based on the following definitions:

- **High**: Those species recorded in the vicinity of the Project Location (typically within 10 km and recorded in the past 20 years) and whose preferred habitat is abundant within the Project Location. Species with high probability of occurrence would be expected to breed within or frequently use the habitats available within the Project Location and would be known to have a high relative abundance within the region (i.e., compared to other regions in Ontario).

- **Moderate**: Those species in the vicinity of the Project Location but have limited suitable habitat within the Project Location. Species with moderate probabilities of occurrence may not occur within the Project Location frequently, but may intermittently use it for foraging, migration or movement to other parts of their home-range.

- **Low**: Those species recorded in the vicinity of the Project Location, but whose preferred habitat does not occur or is extremely limited within the Project Location. These species may intermittently move through the Project Location but are unlikely to become permanent residents.

- **None**: Those species whose preferred habitat is completely absent from the Project Location and may only migrate intermittently through the Project Location.

As noted herein, species identified as endangered and threated are provided protection under the ESA. Those species, identified as special concern, are not afforded protection under Sections 9 and 10 of the ESA: however, may be afforded protection as part of SWH. As such, due diligence should be enforced if a special concern species or their habitat is determined present.

Table 6-1: Species at Risk Habitat Assessment and Potential Occurrence

Species Name, Status (SARA, ESA, S-Rank)[1,2,3,4], and Data Source	Preferred Habitat	Potential for SAR Habitat/ Occurrence within the Project Location
Birds		
Bald Eagle (*Haliaeetus leucocephalus*) SARA: No Status COSEWIC: Not at Risk ESA: Special Concern S-Rank: S4 Source: eBird	Eagles require large, stout-limbed, open-crowned trees to support their large bulky nests of sticks and provide perch and roost sites. Supercanopy trees are typically used because they are easily accessed. Nests are typically located in mature or old forest with a discontinuous canopy and numerous supercanopy trees (Naylor and Watt 2004).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. Further to this, stick nests were not observed during the field investigations.
Bank Swallow (*Riparia riparia*) SARA: Threatened ESA: Threatened S-Rank: S4B Source: OBBA, eBird	Bank Swallows nest in burrows in natural and human-made settings where there are vertical faces in silt and sand deposits. Many nests are on banks of rivers and lakes, but they are also found in active sand and gravel pits or former ones where the banks remain suitable (COSEWIC , 2013).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. Further to this, nests of this species were not observed during the field investigations. However, the species may forage along the Credit River in the Project Study Area.
Barn Swallow (*Hirundo rustica*) SARA: Threatened ESA: Threatened S-Rank: S4B Source: OBBA, eBird	Barn Swallows have shifted largely to nesting in and on artificial structures, including buildings, bridges and road culverts, and prefer various open habitats for foraging including grassy fields, pastures, agricultural crops and over open water (Heagy, et al., 2014).	**Low –** Habitat suitable for the species (pedestrian bridge and culverts) are present; however, nests of this species were not observed during the field investigations. However, the species may forage along the Credit River in the Project Study Area.
Bobolink (*Dolichonyx oryzivorus*) SARA: Threatened ESA: Threatened S-Rank: S4B Source: OBBA, eBird	Bobolink nest primarily in forage crops, hayfields and associated pastures. Bobolink also occur in wet prairie, graminoid peatlands and abandoned fields dominated by tall grasses, no-till cropland, small-grain fields, reed beds and irrigated fields in arid regions. The species does not generally occupy fields of row crops such as corn, soybean and wheat, pastures in valleys with high shrub density or intensively grazed pastures (McCracken, et al., 2013).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may migrate intermittently through the Project Location.
Canada Warbler (*Cardellina canadensis*) SARA: Threatened ESA: Special Concern S-Rank: S4 Source: eBird	Found in a variety of upland and wetland forest types, but it is most abundant in wet, mixed deciduous-coniferous forests with a well-developed shrub layer. Nests are typically located on or near the ground on mossy logs or roots, along stream banks or on hummocks (COSEWIC 2008a).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may migrate intermittently through the Project Location.
Cerulean Warbler (*Setophaga cerulea*) SARA: Endangered ESA: Threatened S-Rank: S3B Source: eBird	Cerulean Warblers nest in mature deciduous upland or swamp forests having a tall canopy and uneven structure (Cadman et al. 2007). Territories are often centered around large oak or hickory trees (Barg et al. 2005) and generally occur in large forest tracts with interior forest (Cadman et al. 2007)	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may migrate intermittently through the Project Location.

Species Name, Status (SARA, ESA, S-Rank)[1,2,3,4], and Data Source	Preferred Habitat	Potential for SAR Habitat/ Occurrence within the Project Location
Chimney Swift (*Chaetura pelagica*) SARA: Threatened ESA: Threatened S-Rank: S4B, S4N Source: OBBA, eBird	Chimney swifts forage aerially over virtually any habitat. Nesting and roosting take place in a dark sheltered spot with vertical surfaces to cling to. This may include large hollow trees, chimneys, and other structures (COSEWIC, 2007).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may migrate intermittently through the Project Location.
Common Nighthawk (*Chordeiles minor*) SARA: Threatened ESA: Special Concern S-Rank: S4B Source: OBBA, eBird	Breeds in a wide range of open habitats, such as beaches, recently logged or burned-over areas, forest clearings, short-grass prairies, pastures, open forests, marshes, lakeshores, gravel roads, riverbanks, rocky outcrops or barrens, railways and urban parks (COSEWIC 2007a). Breeding habitat of Common Nighthawk includes a huge variety of open habitats such as clearings, grasslands, open forests, cropfields and urban areas. In urban areas, gravel rooftops are used. Foraging is aerial over virtually any habitat. (COSEWIC 2007)	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may migrate intermittently through the Project Location.
Eastern Meadowlark (*Sturnella magna*) SARA: Threatened ESA: Threatened S-Rank: S4B Source: OBBA	Eastern Meadowlarks nest in a variety of open grassy habitats, preferring native grasslands, pastures, and savannahs. Larger tracts of grassland are preferred (McCracken, et al., 2013).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may migrate intermittently through the Project Location.
Eastern Wood-pewee (*Contopus virens*) SARA: Special Concern ESA: Special Concern S-Rank: S4B Source: OBBA, eBird	Eastern Wood-pewee breeding in mature to intermediate-aged forests with an open understory, often being associated with clearings and edges. Migrants may occur in a wide variety of habitats (COSEWIC, 2012).	**Moderate –** Suitable habitat of deciduous forest with an open understory is present within the Project Study Aare but not within the Project location.
Evening Grosbeak (*Coccothraustes vespertinus*) SARA: Special Concern ESA: Special Concern S-Rank: S4B Source: eBird	Optimal Evening Grosbeak breeding habitat generally includes open, mature mixedwood forests, where fir species and/or White Spruce are dominant, and Spruce Budworm is abundant. Outside the breeding season, the species seems to depend largely on seed crops from various trees such as firs and spruces in the boreal forest but is also attracted to ornamental trees that produce seeds or fruit, and bird feeders stocked with sunflower seeds. Evening Grosbeaks are found in a variety of forested areas, most typically mature mixed forests with an open canopy and high proportions of Balsam Fir, White Spruce and/or Trembling Aspen (COSEWIC 2016).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may migrate intermittently through the Project Location.
Golden Eagle (*Aquila chrysaetos*) SARA: No Status COSEWIC: Not at Risk ESA: Endangered S-Rank: S4B Source: eBird	Golden Eagles live in open and semiopen country featuring native vegetation across most of the Northern Hemisphere. They avoid developed areas and uninterrupted stretches of forest. They are found primarily in mountains up to 12,000 feet, canyonlands, rimrock terrain, and riverside cliffs and bluffs. Golden Eagles nest on cliffs and steep escarpments in grassland, chapparal, shrubland, forest, and other vegetated areas (Cornell University 2017).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may migrate intermittently through the Project Location.
Golden-winged Warbler (*Vermivora chrysoptera*) SARA: Threatened ESA: Special Concern	Golden-winged Warblers are found in areas of early successional scrub surrounded by mature forests. They are found in dry uplands, swamp forests and marshes. Preferred habitat areas include utility right-of-ways, field edges, recently logged areas, beaver marshes, and areas which have been burned or intermittently farmed (COSEWIC 2006).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may migrate intermittently through the Project Location.

Species Name, Status (SARA, ESA, S-Rank)[1,2,3,4], and Data Source	Preferred Habitat	Potential for SAR Habitat/ Occurrence within the Project Location
S-Rank: S4B Source: eBird		
Henslow's Sparrow (*Ammodramus henslowii*) SARA: Endangered ESA: Endangered S-Rank: SHB Source: NHIC	Henslow's Sparrows require grassland habitat and occur in greater frequency and at higher densities in large patches of suitable habitat. The species has adapted to breed in agricultural grasslands and grasslands on reclaimed surface mines (COSEWIC 2011b). Henslow's Sparrow requires grassland habitat, and is area-sensitive, being found at higher densities in larger areas of habitat. Nesting may occur in abandoned fields, lightly grazed pasture and wet meadows. The species is now very rare and sporadic as a nesting bird in Ontario (COSEWIC 2011)	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may migrate intermittently through the Project Location.
Louisiana Waterthrush (*Seiurus motacilla*) SARA: Threatened ESA: Special Concern S-Rank: S3B Source: eBird	The Louisiana Waterthrush occupies specialized habitat, showing a strong preference for nesting and wintering along pristine, headwater streams and associated wetlands that occur in large tracts of mature forest. Although it prefers running water (especially clear, coldwater streams), it also less frequently inhabits heavily wooded, deciduous swamps having large pools of open water. It is considered to be an area-sensitive forest species and exhibits a preference for older growth woodland (COSEWIC 2006b).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may migrate intermittently through the Project Location.
Olive-sided Flycatcher (*Contopus cooperi*) SARA: Threatened ESA: Special Concern S-Rank: S4B Source: eBird	Olive-sided Flycatchers are most often found in open areas containing tall trees or snags for perching. Open areas include forest openings, forest edges, burned forest or open to semi-open mature forest stands. Generally, forest habitat is either coniferous or mixed coniferous (COSEWIC 2007c).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may migrate intermittently through the Project Location.
Peregrine Falcon (*Falco peregrinus anatum / tundrius*) SARA: Special Concern ESA: Special Concern S-Rank: S3B Source: OBBA, eBird	Most Peregrine Falcons nest on cliff ledges or crevices, but some will also use tall buildings and bridges near good foraging areas (COSEWIC 2007d). Habitat for Peregrine Falcons has three scales: a nest site with associated perching sites, a nesting territory, and a home range (Ontario Peregrine Falcon Recovery Team 2010). Characteristics of urban nests are often similar to those of natural cliff nests in that chosen nest sites are usually on one of the taller buildings in an area and within one block of other tall buildings and a reliable food source. They mostly feed on medium-sized birds such as Rock Pigeon and Ring-billed Gull. Other common prey are the European Starling (Sturnus vulgaris), Blue Jay (Cyanocitta cristata), Baltimore Oriole (Icterus galbula), House Sparrow (Passer domesticus) and Kinglet species (Regulus spp.) (Ontario Peregrine Falcon Recovery Team 2010).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may migrate intermittently through the Project Location.
Prothonotary Warbler (*Protonotaria citrea*) SARA: Endangered ESA: Endangered S-Rank: S1B Source: eBird	During the breeding season in Canada, Prothonotary Warblers occupy mature and semi-mature, deciduous swamp forest and riparian floodplains. Permanent and semi-permanent pools of open water are characteristic, and nests are typically situated over standing or slow-moving water. The Prothonotary Warbler is a secondary-cavity nester, often using naturally formed tree cavities in dead or dying trees, but more commonly occupying cavities that have been excavated by chickadees and Downy Woodpeckers (COSEWIC 2007b). Uses a variety of habitats including roadsides, pastures, forest edges, and grasslands. (COSEWIC 2007e).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may migrate intermittently through the Project Location.
Rusty Blackbird (*Euphagus carolinus*) SARA: Special Concern ESA: No Status S-Rank: S4B Source: eBird	The breeding habitat of the Rusty Blackbird corresponds closely to the boreal forest. Within this biome, its habitat is characterized by forest wetlands, such as slow-moving streams, peat bogs, sedge meadows, marshes, swamps, beaver ponds and pasture edges. In winter, it occurs primarily in damp woodlands and cultivated fields in the southeastern portion of North America (COSEWIC 2006).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may migrate intermittently through the Project Location.
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	Uses a variety of habitats including roadsides, pastures, forest edges, and grasslands (COSEWIC, 2007).	**Moderate –** Suitable habitat of deciduous forest edges are present within the Project Study Area but not within the Project location.

Species Name, Status (SARA, ESA, S-Rank)[1,2,3,4], and Data Source	Preferred Habitat	Potential for SAR Habitat/ Occurrence within the Project Location
SARA: Threatened ESA: Special Concern S-Rank: S4B Source: eBird		
Wood Thrush (*Hylocichla mustelina)* SARA: Threatened ESA: Special Concern S-Rank: S4B Source: OBBA, eBird	Wood Thrush breed in mature or second growth deciduous and mixed wood forests. They prefer forests with dense understory and large continuous areas of forest but are not reliant on this. Habitat fragmentation due to human development and over-grazing by White-tailed Deer are the main threats to this species (COSEWIC, 2012).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may migrate intermittently through the Project Location.
Yellow-breasted Chat *virens* subspecies (*Icteria virens virens*) SARA: Special Concern ESA: Endangered. S-Rank: Source: eBird	Early successional shrub habitats in the Carolinian zone (COSEWIC 2011).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may migrate intermittently through the Project Location.
Amphibians and Reptiles		
Jefferson Salamander (*Ambystoma jeffersonianum*) SARA: Endangered ESA: Endangered S-Rank: S2 Source: ORRA	Adult Jefferson Salamanders, throughout their range, are found within deciduous or mixed upland forests containing, or adjacent to, suitable breeding ponds. Breeding ponds are normally ephemeral, or vernal, woodland pools that dry in late summer. Terrestrial habitat is in mature woodlands that have small mammal burrows or rock fissures that enable adults to over-winter underground below the frost line (COSEWIC 2010c). Jefferson Salamanders spend most of their time underground in mixed or deciduous upland forests. In spring, breeding ponds are required for reproduction, which are typically vernal woodland pools that dry by late summer (COSEWIC 2010)	**None** – Suitable habitat and vernal pools are not present within the Project Location or the Project Study Area.
Blanding's Turtle (*Emyonidea blandingii*) SARA: Threatened ESA: Threatened S-Rank: S3 Source: ORRA	Blanding's Turtles are found in a variety of productive wetlands, occurring primarily in shallow-water habitats- shallow lakes, ponds and wetlands with mucky bottoms. This species hibernates in the soft bottoms of water bodies. Other habitat features include rocks, logs or substrates in sunny locations that provide basking opportunities (COSEWIC 2005). Females nest on various substrates on land, while overwintering occurs underwater in permanent pools (COSEWIC 2016).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may move intermittently through the Project Location.
Eastern Ribbonsnake (*Thamnophis sauritus*) SARA: Special Concern ESA: Special Concern S-Rank: S3 Source: ORRA	The Eastern Ribbonsnake is semi-aquatic and most frequently found along wetland edges. Quiet, shallow water with low surrounding cover is preferred, although areas with good exposure to sunlight are also required (EC 2014). Found near aquatic environments that are generally quiet, shallow, and have surrounding vegetation to act as cover (COSEWIC 2002)	**None** – Suitable habitat is not present within the Project Location or the Project Study Area.
Northern Map Turtle (*Graptemys geographica*) SARA: Special Concern ESA: Special Concern	Inhabits both lakes and rivers, showing a preference for slow moving currents, muddy bottoms, and abundant aquatic vegetation. These turtles need suitable basking sites (such as emergent rocks and logs) and exposure to the sun for at least part of the day (COSEWIC 2002). Shallow, soft-bottomed habitats are preferred, with wintering occurring in deeper sections (COSEWIC 2012).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area.

Species Name, Status (SARA, ESA, S-Rank)[1,2,3,4], and Data Source	Preferred Habitat	Potential for SAR Habitat/ Occurrence within the Project Location
S-Rank: S3 Source: ORRA		
Snapping Turtle (*Chelydra serpentina*) SARA: Special Concern ESA: Special Concern S-Rank: S4 Source: ORRA	Snapping Turtles prefer slow-moving waters with a soft mud bottom and dense aquatic vegetation. Established populations are most often located in ponds, sloughs, shallow bays or river edges and slow streams and wetlands. Individuals can also exist in developed areas (e.g., golf course ponds, irrigation canals); however, it is unlikely that populations persist in such habitats. Snapping Turtles can occur in highly polluted waterways, but environmental contamination is known to limit reproductive success (COSEWIC, 2008).	**Moderate –** Suitable habitat can be found within the study area and Project Location.
Mammals		
Tri-colored Bat (*Perimyotis subflavus*) SARA: Endangered ESA: Endangered S-Rank: S3 Source: AMO, BCI	Within treed habitats, Tri-colored Bat primarily roosts in tree foliage (mainly within oak leaves). Leaf roosts are shaped like umbrellas with a "roof" and a hollow core where bats rest. Studies have shown that oak leaves are a preferred roost site. Maple leaves are also selected, although less commonly. It is thought that Tri-colored Bat may prefer roost trees in more open woodlands, as opposed to deep woods. Roosts in tree cavity are used less frequently than Myotis species (Ministry of Northern Development, Mines, Natural Resources and Forestry , 2011).	**Low –** Deciduous Forest communities are present within the Project Study Area but not with the Project Location. This species may move intermittently through the Project Location.
Little Brown Myotis (*Myotis lucifugus*) SARA: Endangered ESA: Endangered S-Rank: S3 Source: AMO, BCI	The Little Brown Myotis is widespread throughout the southern half of Canada and is especially associated with humans, often forming nursery colonies in buildings, attics, and other man-made structures. Little Brown Myotis forage over water where their diet consists of aquatic insects, mainly midges, mosquitoes, mayflies, and caddisflies. They also feed over forest trails, cliff faces, meadows, and farmland where they consume a wide variety of insects, from moths and beetles to crane flies (Ministry of Northern Development, Mines, Natural Resources and Forestry , 2011).	**Low –** Deciduous Forest communities are present within the Project Study Area but not with the Project Location. This species may move intermittently through the Project Location.
Northern Myotis (*Myotis septentrionalis*) SARA: Endangered ESA: Endangered S-Rank: S3 Source: BCI	The Northern Myotis is one of the less common species found to hibernate in Ontario. This species is closely associated with woodlands and uses trees as maternity sites (Ministry of Northern Development, Mines, Natural Resources and Forestry , 2011).	**Low –** Deciduous Forest communities are present within the Project Study Area but not with the Project Location. This species may move intermittently through the Project Location.
Eastern Small-footed Myotis (*Myotis leibii*) SARA: No status ESA: Endangered S-Rank: S2S3 Source: AMO, BCI	The Eastern Small-footed Bat is one of the less common species found to hibernate in Ontario. Caves and mines serve as significant hibernacula while streams and ponds serve as foraging areas (Ministry of Northern Development, Mines, Natural Resources and Forestry , 2011).	**None** – Suitable habitat is not present within the Project Location or the Project Study Area. This species may move intermittently through the Project Location.
Invertebrates		
Monarch (*Danaus plexippus*) SARA: Special Concern ESA: Special Concern S-Rank: S2N, S4B Source: OBA	Monarch is very widely distributed across North America and found in a wide variety of habitats. Populations fluctuate dramatically but have been generally declining likely due to habitat destruction on the hibernation grounds in Mexico, as well as pesticide use and other factors on the vast breeding grounds. Monarchs require Milkweeds (*Asclepias*) to lay their eggs and will use a variety of other flowers for adult food (COSEWIC, 2016).	**Low –** No meadow habitats suitable for the species are present within the Project Study Area or Project Location. No milkweed were recorded during the field investigations. This species may migrate through the Project Location intermittently.

[1] *Species At Risk Act, 2002* (SARA). Schedule 1 status. [2] *Endangered Species Act, 2007* (ESA).

[3] S1 - Extremely rare throughout its range in the province; S2 - Rare throughout its range in the province; S3 - Uncommon or vulnerable species; S4 - Apparently Secure Species; S5 - Secure Species; SX - Extirpated; B - Breeding; N - Non-breeding; ? - Uncertainty

[4] NHIC = Natural Heritage Information Centre, ABBO = Atlas of the Breeding Birds of Ontario, AMO = Atlas of Mammals of Ontario, ORAA = Ontario Reptile and Amphibian Atlas; TEA = Toronto Entomologists Association: Ontario Butterfly Atlas.

6.2 Natural Heritage Features

Provincial, Regional and Municipal plans work together to establish, define, and protect natural heritage features. A summary of natural heritage features present, or potentially present, is considered below.

6.2.1 Areas of Natural and Scientific Interest

There are no ANSIs within the Project Study Area or Project Location.

6.2.2 Wetlands

There are PSWs or Locally Significant (LSWs) within the Project Study Area or Project Location.

6.2.3 Features Identified in the Official Plan

The Project Study Area and Project Location are located within following features identified in the City of Mississauga Official Plan (Refer to Table 6-2):

Table 6-2: Features Identified in the Official Plan

Feature or Designated Area Type	Source	Located within the Project Study Area	Located within the Project Location
Green System	City of Mississauga Official Plan – Schedule 1a	Y	Y
Significant Natural Area and Natural Green Spaces	City of Mississauga Official Plan Schedule 3	Y	N
Natural Hazard	City of Mississauga Official Plan Schedule 3	Y	Y
Public and Private Open Spaces	City of Mississauga Official Plan Schedule 4	Y	Y

6.2.4 Significant Woodlands

In accordance with Section 6.3.12 of the City of Mississauga Official Plan woodlands meeting the following conditions are treated as significant woodlands:

- woodlands, excluding cultural savannahs, greater than or equal to four hectares;
- woodlands, excluding cultural woodlands and cultural savannahs, greater than or equal to two hectares and less than four hectares;
- any woodland greater than 0.5 hectares that:

- supports old growth trees (greater than or equal to 100 years old);
- supports a significant linkage function as determined through an Environmental Impact Study approved by the City in consultation with the appropriate conservation authority;
- is located within 100 metres of another Significant Natural Area supporting a significant ecological relationship between the two features;
- is located within 30 metres of a watercourse or significant wetland; or
- supports significant species or communities

Through the application of these criteria, the FOD7-4 and FOD forest communities present within the Project Study Area are considered significant woodlands, given their size and proximity to the Credit River.

6.2.5 Significant Valleylands

The City of Mississauga Official Plan (City of Mississauga, April 8, 2021) addresses significant valleylands through both the Natural Hazard Lands and the Significant Natural Areas and form part of the city's Natural Heritage System. In accordance with Section 6.3.12.h of the City of Mississauga Official Plan"

"*Significant valleylands are associated with the main branches, major tributaries and other tributaries and watercourse corridors draining directly to Lake Ontario including the Credit River, Etobicoke Creek, Mimico Creek and Sixteen Mile Creek*."

The Project Study Area is located within a Significant Natural Area and associated with the Credit River. As such the Significant Valley lands are present within the Project Study Area.

6.2.6 Streams and Fish Habitat

Carolyn Creek and the Credit River are located with the Project Study Area and provide habitat for warm, cool and cold-water habitat for fish.

6.2.7 Significant Wildlife Habitat

Wildlife habitat is defined as areas where plants, animals, and other organisms live and can find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific wildlife habitat of concern may include areas where species concentrate at a point in their annual life cycle and those areas which are important to migratory and non-migratory species.

Wildlife habitat is considered "significant" if it is deemed ecologically important in terms of feature, function, representation or amount, and contributes to the quality and diversity of an identifiable geographic area or Natural Heritage System (Ministry of Municipal Affairs and Housing, 2020). According to the Significant Wildlife Habitat Criteria Schedule for Ecoregion 7E (MNRF, 2015), SWH may consist of:

- Seasonal Concentration Areas for Animals;
- Rare Vegetation Communities;
- Specialized Habitat for Wildlife;

- Habitat for Species of Conservation Concern; and
- Animal Movement Corridors.

The Significant Wildlife Habitat Screening is provided in Appendix E. Based on the conditions documented through field investigations, the following candidate SWH have been identified within the Project Study Area:

Seasonal Concentration Areas for Animals

- **Bat Maternity Colonies:** The FOD7-3 and the FOD within the Project Study Area are considered candidate bat maternity roost habitat; however, suitable woodlands are not present within the Project Location.

- **Turtle Wintering Areas**: The Credit River, which is located within the Project Study Area is considered candidate Turtle Wintering Habitat. Carolyn Creek, located within the Project Location is not considered suitable habitat as the feature does not provide sufficiently deep water or soft mud substrates.

Habitat for Species of Conservation Concern

- **Habitat for Special Concern Species**: Eastern Wood-pewee, Red-headed Woodpecker and Snapping Turtle.

7.0 Summary and Conclusion

A summary of the findings documented within this report are as follows:

- Carolyn Creek is a channelized watercourse, with a mix of warm, cool and cold-water fish species as identified by fish community surveys and background review.
- MNRF provided the timing window of no in-water work between September 15 – May 31 of any given year.
- A total of 71 plant species were identified during the field investigations. Of these, 27 (38%) were native and the remaining 44 species (62%) were non-native
- A total of four ELC communities are present in the Study Area.
- There are no ANSIs, PSWs or Locally Significant (LSWs) within the Project Study Area or Project Location.
- A total of 200 species of birds, 43 species of mammals, 14 species of amphibians, 12 species of reptiles, and 60 species of butterflies and moths were identified within the study area from background review and incidental observations.
- A search of the NHIC database and other atlases and resources produced records of 32 SAR within the vicinity of the Study Area. Secondary source information indicates low potential for other known SAR with habitat ranges encompassing the Study Area to occur based on existing habitat conditions and criteria

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Appendix A

Agency Correspondence

Project # WW20101061

From:	Scientific Collection Permits Aurora (NDMNRF)
To:	Godard, Michael
Subject:	RE: Request for Information: Carolyn Creek Erosion Control Project
Date:	Friday, September 17, 2021 9:27:36 AM
Attachments:	image001.png TimingWindows.pdf

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Thank you for your email.

In this case the Ministry's recommendation is to follow the cold water window.

Thank you.

From: Godard, Michael <michael.godard@woodplc.com>
Sent: September 17, 2021 8:16 AM
To: Scientific Collection Permits Aurora (NDMNRF) <scp.aurora@ontario.ca>
Subject: RE: Request for Information: Carolyn Creek Erosion Control Project

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Good morning,

Thank you for your response.

We have reviewed all of the documents suggested within the guide and was mostly inquiring about the in-water timing window restriction due to warm, cool and coldwater species being present. Ie. Should we be following both the warm water window – March 15 – July 15 as well as the September 15 – may 31 restriction as YOY Salmonidae were captured within this section?

Thanks
Michael

Michael Godard, B.Sc (Hon)
Senior Fisheries Biologist
Mobile: 519-589-2645
Michael.godard@woodplc.com
www.woodplc.com

From: Scientific Collection Permits Aurora (NDMNRF) <scp.aurora@ontario.ca>

Sent: Wednesday, September 15, 2021 3:13 PM
To: Godard, Michael <michael.godard@woodplc.com>
Subject: RE: Request for Information: Carolyn Creek Erosion Control Project

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Hi Michael,

Thank you for your request for information on natural heritage information. In order to provide the most efficient service possible, the attached *Natural Heritage Information Request Guide* has been developed to assist you with accessing natural heritage data and values from convenient online sources.

It remains the proponent's responsibility to complete a preliminary screening for each project, to obtain available information from multiple sources, to conduct any necessary field studies, and to consider any potential environmental impacts that may result from an activity. We wish to emphasize the need for the proponents to complete screenings prior to contacting the Ministry or other agencies for more detailed technical information and advice.

The Ministry continues to work on updating data housed by Lands Information Ontario and the Natural Heritage Information Centre, and ensuring this information is accessible through online resources. Species at risk data is regularly being updated. To ensure access to reliable and up to date information, please contact SAROntario@ontario.ca.

This information will assist in scoping the necessary field assessments for an area if development or site alteration is proposed. This information is not meant to replace the responsibility of the proponent to undertake species and / or habitat surveys. Surveys or additional site level assessment are often required to confirm presence or absence of natural heritage features and values. Environmental consulting firms have the professional and technical expertise to assess sites for natural heritage features and can gauge the potential for such features to exist.

Absence or lack of information for a given geographic area does not necessarily mean the absence of natural heritage features. Many areas in Ontario have never been surveyed and new plant and animal species records are still being discovered for many localities. In addition, new species may be listed and new natural heritage features may be defined over time. For these reasons, the Ministry cannot provide a definitive statement on the presence, absence or condition of natural heritage features in all parts of Ontario.

Thank you for your inquiry,

MNDMNRF Aurora District Office
50 Bloomington Road, Aurora, ON, L4G 0L8
Tel: (905) 713-7400
Email: scp.aurora@ontario.ca

Please consider the environment before printing this e-mail.

As part of providing accessible customer service, please let us know if you have any accommodation needs or require communication supports or alternate formats.

From: Godard, Michael <michael.godard@woodplc.com>
Sent: September 15, 2021 11:42 AM
To: Scientific Collection Permits Aurora (NDMNRF) <scp.aurora@ontario.ca>; Golby, Karen (NDMNRF) <karen.golby@ontario.ca>
Cc: Talpur, Mir <mir.talpur@woodplc.com>
Subject: Request for Information: Carolyn Creek Erosion Control Project

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Good Morning,

Wood Environment & Infrastructure Solutions, a Division of Wood Canada Ltd. (Wood) has been retained by the City of Mississauga to provide professional engineering services for the Class Environmental Assessment and detailed design for the erosion control works and watercourse improvements for Carolyn Creek, from the Credit River 200 m upstream, along Barbertown Road, to the downstream end of the Barbertown Road culvert, which is currently a gabion-lined channel reach. The study area is provided in the attached RFI.

Wood has undertaken a preliminary review of available background data within the detail design limits, using several available online resources.

During this preliminary review, Wood has identified data gaps for which we require additional information. Please consider this a formal request for the information provided within the attached RFI.

We understand that not all the information requested from the list above may be available; however, it would be greatly beneficial if you could please provide a response indicating which information can or will be provided.

Many thanks,
Michael

Michael Godard, B.Sc (Hon)
Senior Fisheries Biologist
Mobile: 519-589-2645
Michael.godard@woodplc.com
www.woodplc.com

Appendix B

Compiled Species

Project # WW20101061

Table 1: Compiled Species Lists: Plants

Scientific Name	Common Name	S Rank (Provincial)	G Rank (Global)	Exotic Status	SARO	Coefficient of Conservatism	CVC Status	FOD7-3	Manicured Area
Acer negundo	Manitoba Maple	S5	G5			0		x	x
Acer platanoides	Norway Maple	SNA	GNR	SE5					x
Achillea millefolium	Common Yarrow	SNA	G5	SE5?					x
Aegopodium podagraria	Goutweed	SNA	GNR	SE5				x	
Alliaria petiolata	Garlic Mustard	SNA	GNR	SE5				x	x
Amphicarpaea bracteata	American Hog-peanut	S5	G5			4		x	
Anemonastrum canadense	Canada Anemone	S5	G5			3		x	
arctium minus	Common Burdock	SNA	GNR	SE5				x	x
Campanula rapunculoides	Creeping Bellflower	SNA	GNR	SE5					x
chenopodium album	Common Lamb's-quarters	SNA	G5	SE5					x
Cichorium intybus	Wild Chicory	SNA	GNR	SE5					x
Cirsium arvense	Canada Thistle	SNA	G5	SE5					x
Clematis virginiana	Virginia Clematis	S5	G5			3		x	
Convolvulus arvensis	Field Bindweed	SNA	GNR	SE5				x	
Cornus rugosa	Round-leaved Dogwood	S5	G5			6		x	
daucus carota	Wild Carrot	SNA	GNR	SE5					x
Elymus repens	Quackgrass	SNA	GNR	SE5					x
Eurybia macrophylla	Large-leaved Aster	S5	G5			5			x
Eutrochium maculatum	Spotted Joe Pye Weed	S5	G5			3		x	
Fraxinus pennsylvanica	Red Ash	S4	G5			3		x	x
Hemerocallis fulva	Orange Daylily	SNA	GNA	SE5					x
Heracleum mantegazzianum	Giant Hogweed	SNA	GNR	SE2				x	
Hypericum perforatum	Common St. John's-wort	SNA	GNR	SE5				x	
impatiens capensis	Spotted Jewelweed	S5	G5			4		x	
Juglans nigra	Black Walnut	S4?	G5			5		x	x
Juncus tenuis	Path Rush	S5	G5			0			x
Leucanthemum vulgare	Oxeye Daisy	SNA	GNR	SE5				x	x
Lonicera tatarica	Tatarian Honeysuckle	SNA	GNR	SE5				x	x
Lotus corniculatus	Garden Bird's-foot Trefoil	SNA	GNR	SE5					x
Lysimachia arvensis	Scarlet Pimpernel	SNA	GNR	SE4					x
Lysimachia ciliata	Fringed Yellow Loosestrife	S5	G5			4		x	
Lythrum salicaria	Purple Loosestrife	SNA	G5	SE5				x	
Morus alba	White Mulberry	SNA	GNR	SE5					x
Myosotis arvensis	Field Forget-me-not	SNA	GNR	SE4				x	
Nabalus altissimus	Tall Rattlesnakeroot	S5	G5			5		x	
Myosotis laxa	Small Forget-me-not	S5	G5			6		X	
Pastinaca sativa	Wild Parsnip	SNA	GNR	SE5				x	
Parthenocissus quinquefolia	Virginia Creeper	S4?	G5			6		x	x
Phalaris arundinacea	Reed Canarygrass	S5	G5			0		x	
Pastinaca sativa	Wild Parsnip	SNA	GNR	SE5				x	
Persicaria maculosa	Spotted Lady's-thumb	SNA	G3G5	SE5					x
Plantago major	Common Plantain	SNA	G5	SE5				x	
Picea glauca	White Spruce	S5	G5			6			x
Pinus strobus	Eastern White Pine	S5	G5			4			x
Poa pratensis	Kentucky Bluegrass	S5	G5			0			x
Populus alba	White Poplar	SNA	G5	SE5					x
Prunus sp.	Cherry species	-	-	-					x
Prunus virginiana	Chokecherry	S5	G5			2			x
Quercus alba	White Oak	S5	G5			6			x
Rudbeckia hirta	Black-eyed Susan	S5	G5			0		x	
Rhamnus cathartica	European Buckthorn	SNA	GNR	SE5				x	x
Rumex obtusifolius	Bitter Dock	SNA	GNR	SE5				x	
Salix x fragilis	(Salix alba X Salix euxina)	SNA	GNA					x	
Securigera varia	Purple Crown-vetch	SNA	GNR	SE5				x	
rhus typhina	Staghorn Sumac	S5	G5			1			x

Solidago altissima	Tall Goldenrod	S5	G5			1		x	
Rumex crispus	Curled Dock	SNA	GNR	SE5				x	x
Solanum dulcamara	Bittersweet Nightshade	SNA	GNR	SE5					x
Solidago canadensis	Canada Goldenrod	S5	G5			1		x	x
Sonchus arvensis	Field Sow-thistle	SNA	GNR	SE5				x	x
Symphyotrichum puniceum	Purple-stemmed Aster	S5	G5			6			x
Symphyotrichum spp.	Aster Species	-	-	-				x	x
Taraxacum officinale	Common Dandelion	SNA	G5	SE5					x
Tilia americana	Basswood	S5	G5			4			x
Typha angustifolia	Narrow-leaved Cattail	SNA	G5	SE5				x	x
Urtica dioica	Stinging Nettle	S5	G5			2		x	
Vicia cracca	Tufted Vetch	SNA	GNR	SE5				x	
Ulmus americana	White Elm	S5	G4			3			x
Ulmus pumila	Siberian Elm	SNA	GNR	SE3					x
Urtica dioica	Stinging Nettle	S5	G5			2		X	
Vitis riparia	Riverbank Grape	S5	G5			0		x	x

Number of Endangered Speices	0
Number of Threatened Speices	0
Number of Special Concern Speices	0
Number of S1	0
Number of S2	0
Number of S3	0

Total Number of Plants	71
Native:	27
Non-native	44

Table 2: Background Plant List

Taxa	Common Name	Scientific Name	S Rank (Provincial)	G Rank (Global)	Exotic Status	SARO	CVC Status	Source
Plant	(Acer rubrum X Acer saccharinum)	*Acer x freemanii*	SNA	GNA				NAS Data
Plant	(Lonicera morrowii X Lonicera tatarica)	*Lonicera x bella*	SNA	GNA				NAS Data
Plant	Alternate-leaved Dogwood	*Cornus alternifolia*	S5	G5				NAS Data
Plant	American Beech	*Fagus grandifolia*	S4	G5				NAS Data
Plant	American Black Currant	*Ribes americanum*	S5	G5				NAS Data
Plant	American Cow Parsnip	*Heracleum maximum*	S5	G5			rare	NAS Data
Plant	American Groundnut	*Apios americana*	S5	G5			rare	NAS Data
Plant	American Hog-peanut	*Amphicarpaea bracteata*	S5	G5				NAS Data
Plant	American Witch-hazel	*Hamamelis virginiana*	S4S5	G5				NAS Data
Plant	Annual Fleabane	*Erigeron annuus*	S5	G5				NAS Data
Plant	Arrow-leaved Aster	*Symphyotrichum urophyllum*	S4	G4G5			rare	NAS Data
Plant	Austrian Pine	*Pinus nigra*	SNA	GNR	SE3			NAS Data
Plant	Bachelor's Button	*Centaurea cyanus*	SNA	GNR	SE1			NAS Data
Plant	Basswood	*Tilia americana*	S5	G5				NAS Data
Plant	Bitternut Hickory	*Carya cordiformis*	S5	G5				NAS Data
Plant	Bittersweet Nightshade	*Solanum dulcamara*	SNA	GNR	SE5			NAS Data
Plant	Black Ash	*Fraxinus nigra*	S3	G5				NAS Data
Plant	Black Cherry	*Prunus serotina*	S5	G5				NAS Data
Plant	Black Knapweed	*Centaurea nigra*	SNA	GNR	SE5?			NAS Data
Plant	Black Locust	*Robinia pseudoacacia*	SNA	G5	SE5			NAS Data
Plant	Black Medick	*Medicago lupulina*	SNA	GNR	SE5			NAS Data
Plant	Black Oak	*Quercus velutina*	S4	G5			rare	NAS Data
Plant	Black Raspberry	*Rubus occidentalis*	S5	G5				NAS Data
Plant	Black Walnut	*Juglans nigra*	S4?	G5				NAS Data
Plant	Bloodroot	*Sanguinaria canadensis*	S5	G5				NAS Data
Plant	Blue Spruce	*Picea pungens*	SNA	G5	SE1			NAS Data
Plant	Blue Vervain	*Verbena hastata*	S5	G5				NAS Data
Plant	Broad-leaved Cattail	*Typha latifolia*	S5	G5				NAS Data
Plant	Broad-leaved Enchanter's Nightshade	*Circaea canadensis*	S5	G5				NAS Data
Plant	Broad-leaved Helleborine	*Epipactis helleborine*	SNA	GNR	SE5			NAS Data
Plant	Bull Thistle	*Cirsium vulgare*	SNA	GNR	SE5			NAS Data
Plant	Bur Oak	*Quercus macrocarpa*	S5	G5				NAS Data
Plant	Butter-and-eggs	*Linaria vulgaris*	SNA	GNR	SE5			NAS Data
Plant	Butternut	*Juglans cinerea*	S2?	G3		END		NAS Data
Plant	Calico Aster	*Symphyotrichum lateriflorum*	S5	G5				NAS Data
Plant	Canada Anemone	*Anemonastrum canadense*	S5	G5				NAS Data
Plant	Canada Avens	*Geum canadense*	S5	G5				NAS Data
Plant	Canada Goldenrod	*Solidago canadensis*	S5	G5				NAS Data
Plant	Canada Honewort	*Cryptotaenia canadensis*	S5	G5				NAS Data
Plant	Canada Thistle	*Cirsium arvense*	SNA	G5	SE5			NAS Data
Plant	Catnip	*Nepeta cataria*	SNA	GNR	SE5			NAS Data
Plant	Chokecherry	*Prunus virginiana*	S5	G5				NAS Data
Plant	Coltsfoot	*Tussilago farfara*	SNA	GNR	SE5			NAS Data
Plant	Common Apple	*Malus pumila*	SNA	G5	SE4			NAS Data
Plant	Common Bedstraw	*Galium aparine*	S5	G5			rare	NAS Data
Plant	Common Burdock	*Arctium minus*	SNA	GNR	SE5			NAS Data
Plant	Common Buttercup	*Ranunculus acris*	SNA	G5	SE5			NAS Data
Plant	Common Dandelion	*Taraxacum officinale*	SNA	G5	SE5			NAS Data
Plant	Common Evening-primrose	*Oenothera biennis*	S5	G5				NAS Data
Plant	Common Goatsbeard	*Aruncus dioicus*	SNA	G5	SE1			NAS Data
Plant	Common Hound's-tongue	*Cynoglossum officinale*	SNA	GNR	SE5			NAS Data
Plant	Common Lamb's-quarters	*Chenopodium album*	SNA	G5	SE5			NAS Data
Plant	Common Lilac	*Syringa vulgaris*	SNA	GNR	SE5			NAS Data
Plant	Common Milkweed	*Asclepias syriaca*	S5	G5				NAS Data
Plant	Common Motherwort	*Leonurus cardiaca*	SNA	GNR	SE5			NAS Data
Plant	Common Plantain	*Plantago major*	SNA	G5	SE5			NAS Data
Plant	Common Ragweed	*Ambrosia artemisiifolia*	S5	G5				NAS Data
Plant	Common Reed	*Phragmites australis*	S4?	G5				NAS Data
Plant	Common Self-heal	*Prunella vulgaris*	S5	G5				NAS Data
Plant	Common Sow-thistle	*Sonchus oleraceus*	SNA	GNR	SE5			NAS Data
Plant	Common St. John's-wort	*Hypericum perforatum*	SNA	GNR	SE5			NAS Data
Plant	Common Teasel	*Dipsacus fullonum*	SNA	GNR	SE5			NAS Data
Plant	Common Timothy	*Phleum pratense*	SNA	GNR	SE5			NAS Data
Plant	Cottony Willow	*Salix eriocephala*	S5	G5				NAS Data
Plant	Creeping Bellflower	*Campanula rapunculoides*	SNA	GNR	SE5			NAS Data
Plant	Creeping Bentgrass	*Agrostis stolonifera*	SNA	G5	SE5			NAS Data
Plant	Creeping Buttercup	*Ranunculus repens*	SNA	GNR	SE5			NAS Data
Plant	Creeping Yellow Loosestrife	*Lysimachia nummularia*	SNA	GNR	SE5			NAS Data
Plant	Curled Dock	*Rumex crispus*	SNA	GNR	SE5			NAS Data
Plant	Currant Species	*Ribes sp.*						NAS Data
Plant	Cursed Buttercup	*Ranunculus sceleratus*	S5	G5				NAS Data
Plant	Dame's Rocket	*Hesperis matronalis*	SNA	G4G5	SE5			NAS Data
Plant	Deptford Pink	*Dianthus armeria*	SNA	GNR	SE5			NAS Data
Plant	Devil's Beggarticks	*Bidens frondosa*	S5	G5				NAS Data
Plant	Eastern Cottonwood	*Populus deltoides*	S5	G5				NAS Data
Plant	Eastern Hemlock	*Tsuga canadensis*	S5	G5				NAS Data
Plant	Eastern Hop-hornbeam	*Ostrya virginiana*	S5	G5				NAS Data
Plant	Eastern Ninebark	*Physocarpus opulifolius*	S5	G5			rare	NAS Data
Plant	Eastern Prickly Gooseberry	*Ribes cynosbati*	S5	G5				NAS Data
Plant	Eastern White Cedar	*Thuja occidentalis*	S5	G5				NAS Data
Plant	Eastern White Pine	*Pinus strobus*	S5	G5				NAS Data
Plant	English Hawthorn	*Crataegus monogyna*	SNA	G5	SE4			NAS Data
Plant	English Ivy	*Hedera helix*	SNA	GNR	SE1			NAS Data
Plant	English Plantain	*Plantago lanceolata*	SNA	G5	SE5			NAS Data
Plant	Eurasian Woodland Bluegrass	*Poa nemoralis*	SNA	GU	SE4			NAS Data

Plant	European Ash	*Fraxinus excelsior*	SNA	GNR	SE2			NAS Data
Plant	European Buckthorn	*Rhamnus cathartica*	SNA	GNR	SE5			NAS Data
Plant	European Gromwell	*Lithospermum officinale*	SNA	GNR	SE5			NAS Data
Plant	European Mountain-ash	*Sorbus aucuparia*	SNA	G5	SE4			NAS Data
Plant	European Privet	*Ligustrum vulgare*	SNA	GNR	SE5			NAS Data
Plant	European Red Currant	*Ribes rubrum*	SNA	G4G5	SE5			NAS Data
Plant	European Swallowwort	*Vincetoxicum rossicum*	SNA	GNR	SE5			NAS Data
Plant	Field Bindweed	*Convolvulus arvensis*	SNA	GNR	SE5			NAS Data
Plant	Field Horsetail	*Equisetum arvense*	S5	G5				NAS Data
Plant	Field Peppergrass	*Lepidium campestre*	SNA	GNR	SE5			NAS Data
Plant	Field Sow-thistle	*Sonchus arvensis*	SNA	GNR	SE5			NAS Data
Plant	Fowl Bluegrass	*Poa palustris*	S5	G5				NAS Data
Plant	Fox Sedge	*Carex vulpinoidea*	S5	G5				NAS Data
Plant	Fragrant Sumac	*Rhus aromatica*	S4	G5				NAS Data
Plant	Fringed Yellow Loosestrife	*Lysimachia ciliata*	S5	G5				NAS Data
Plant	Garden Bird's-foot Trefoil	*Lotus corniculatus*	SNA	GNR	SE5			NAS Data
Plant	Garlic Mustard	*Alliaria petiolata*	SNA	GNR	SE5			NAS Data
Plant	Giant Goldenrod	*Solidago gigantea*	S5	G5				NAS Data
Plant	Grass-leaved Starwort	*Stellaria graminea*	SNA	GNR	SE5			NAS Data
Plant	Great Burdock	*Arctium lappa*	SNA	GNR	SE5			NAS Data
Plant	Great Ragweed	*Ambrosia trifida*	S5	G5				NAS Data
Plant	Greater Water Dock	*Rumex britannica*	S5	G5			rare	NAS Data
Plant	Green Foxtail	*Setaria viridis*	SNA	GNR	SE5			NAS Data
Plant	Grey Dogwood	*Cornus racemosa*	S5	G5				NAS Data
Plant	Ground-ivy	*Glechoma hederacea*	SNA	GNR	SE5			NAS Data
Plant	Hawthorn Speccies	*Crataegus sp.*						NAS Data
Plant	Heart-leaved Aster	*Symphyotrichum cordifolium*	S5	G5				NAS Data
Plant	Hedge False Bindweed	*Calystegia sepium*	S5	G5				NAS Data
Plant	Herb-Robert	*Geranium robertianum*	S5	G5				NAS Data
Plant	Honey Locust	*Gleditsia triacanthos*	S2?	G5				NAS Data
Plant	Hooked Agrimony	*Agrimonia gryposepala*	S5	G5				NAS Data
Plant	Horse Chestnut	*Aesculus hippocastanum*	SNA	GNR	SE2			NAS Data
Plant	Hybrid CrackWillow	*Salix fragilis*						NAS Data
Plant	Japanese Tree Lilac	*Syringa reticulata*	SNA	GNR	SE1			NAS Data
Plant	Jerusalem Artichoke	*Helianthus tuberosus*	SU	G5				NAS Data
Plant	Kentucky Bluegrass	*Poa pratensis*	S5	G5				NAS Data
Plant	Large False Solomon's Seal	*Maianthemum racemosum*	S5	G5				NAS Data
Plant	Large-toothed Aspen	*Populus grandidentata*	S5	G5				NAS Data
Plant	Lesser Periwinkle	*Vinca minor*	SNA	GNR	SE5			NAS Data
Plant	Manitoba Maple	*Acer negundo*	S5	G5				NAS Data
Plant	Meadow Hawkweed	*Pilosella caespitosa*	SNA	GNR	SE5			NAS Data
Plant	Meadow Willow	*Salix petiolaris*	S5	G5				NAS Data
Plant	Moth Mullein	*Verbascum blattaria*	SNA	GNR	SE5			NAS Data
Plant	Multiflora Rose	*Rosa multiflora*	SNA	GNR	SE5			NAS Data
Plant	Nannyberry	*Viburnum lentago*	S5	G5				NAS Data
Plant	Narrow-leaved Cattail	*Typha angustifolia*	SNA	G5	SE5			NAS Data
Plant	New England Aster	*Symphyotrichum novae-angliae*	S5	G5				NAS Data
Plant	Northern Red Oak	*Quercus rubra*	S5	G5				NAS Data
Plant	Norway Maple	*Acer platanoides*	SNA	GNR	SE5			NAS Data
Plant	Norway Spruce	*Picea abies*	SNA	G5	SE3			NAS Data
Plant	Old Field Aster	*Symphyotrichum pilosum*	S5	G5			rare	NAS Data
Plant	Orange Daylily	*Hemerocallis fulva*	SNA	GNA	SE5			NAS Data
Plant	Orchard Grass	*Dactylis glomerata*	SNA	GNR	SE5			NAS Data
Plant	Ostrich Fern	*Matteuccia struthiopteris*	S5	G5				NAS Data
Plant	Oxeye Daisy	*Leucanthemum vulgare*	SNA	GNR	SE5			NAS Data
Plant	Panicled Aster	*Symphyotrichum lanceolatum*	S5	G5				NAS Data
Plant	Paper Birch	*Betula papyrifera*	S5	G5				NAS Data
Plant	Path Rush	*Juncus tenuis*	S5	G5				NAS Data
Plant	Pennsylvania Sedge	*Carex pensylvanica*	S5	G5				NAS Data
Plant	Perennial Flax	*Linum perenne*	SNA	GNR	SE3			NAS Data
Plant	Poison Ivy	*Toxicodendron radicans*	S5	G5				NAS Data
Plant	Prickly Lettuce	*Lactuca serriola*	SNA	GNR	SE5			NAS Data
Plant	Purple Crown-vetch	*Securigera varia*	SNA	GNR	SE5			NAS Data
Plant	Purple Loosestrife	*Lythrum salicaria*	SNA	G5	SE5			NAS Data
Plant	Purple-stemmed Angelica	*Angelica atropurpurea*	S5	G5			rare	NAS Data
Plant	Purple-stemmed Aster	*Symphyotrichum puniceum*	S5	G5				NAS Data
Plant	Pussy Willow	*Salix discolor*	S5	G5				NAS Data
Plant	Quackgrass	*Elymus repens*	SNA	GNR	SE5			NAS Data
Plant	Red Ash	*Fraxinus pennsylvanica*	S4	G5				NAS Data
Plant	Red Clover	*Trifolium pratense*	SNA	GNR	SE5			NAS Data
Plant	Red Maple	*Acer rubrum*	S5	G5				NAS Data
Plant	Red Pine	*Pinus resinosa*	S5	G5			rare	NAS Data
Plant	Red Raspberry	*Rubus idaeus*	S5	G5				NAS Data
Plant	Red-osier Dogwood	*Cornus sericea*	S5	G5				NAS Data
Plant	Reed Canarygrass	*Phalaris arundinacea*	S5	G5				NAS Data
Plant	Riverbank Grape	*Vitis riparia*	S5	G5				NAS Data
Plant	Rose Species	*Rosa sp.*						NAS Data
Plant	Rough Cockleburr	*Xanthium strumarium*	S5	G5				NAS Data
Plant	Rough Mannagrass	*Glyceria maxima*	SNA	GNR	SE4			NAS Data
Plant	Russian Olive	*Elaeagnus angustifolia*	SNA	GNR	SE3			NAS Data
Plant	Salix x rubens	*Salix x rubens*						NAS Data
Plant	Sandbar Willow	*Salix interior*	S5	G5			rare	NAS Data
Plant	Scarlet pimpernel	*Anagallis arvensis*		#N/A	#N/A	#N/A		NAS Data
Plant	Scots Pine	*Pinus sylvestris*	SNA	GNR	SE5			NAS Data
Plant	Sedge Species	*Carex sp.*						NAS Data
Plant	Shagbark Hickory	*Carya ovata*	S5	G5				NAS Data
Plant	Siberian Elm	*Ulmus pumila*	SNA	GNR	SE3			NAS Data

Plant	Silver Maple	*Acer saccharinum*	S5	G5				NAS Data
Plant	Slippery Elm	*Ulmus rubra*	S5	G5				NAS Data
Plant	Small-flowered Evening-primrose	*Oenothera parviflora*	S5	G5				NAS Data
Plant	Smooth Brome	*Bromus inermis*	SNA	G5	SE5			NAS Data
Plant	Spiked Sedge	*Carex spicata*	SNA	GNR	SE5			NAS Data
Plant	Spotted Geranium	*Geranium maculatum*	S5	G5				NAS Data
Plant	Spotted Jewelweed	*Impatiens capensis*	S5	G5				NAS Data
Plant	Spotted Joe Pye Weed	*Eutrochium maculatum*	S5	G5				NAS Data
Plant	Spotted St. John's-wort	*Hypericum punctatum*	S5	G5			rare	NAS Data
Plant	Spotted Water-hemlock	*Cicuta maculata*	S5	G5				NAS Data
Plant	Staghorn Sumac	*Rhus typhina*	S5	G5				NAS Data
Plant	Stinging Nettle	*Urtica dioica*	S5	G5				NAS Data
Plant	Sugar Maple	*Acer saccharum*	S5	G5				NAS Data
Plant	Sulphur Cinquefoil	*Potentilla recta*	SNA	GNR	SE5			NAS Data
Plant	Swamp Milkweed	*Asclepias incarnata*	S5	G5				NAS Data
Plant	Sycamore	*Platanus occidentalis*	S4	G5			rare	NAS Data
Plant	Tall Anemone	*Anemone virginiana*	S5	G5				NAS Data
Plant	Tall Goldenrod	*Solidago altissima*	S5	G5				NAS Data
Plant	Tall Meadow-rue	*Thalictrum pubescens*	S5	G5				NAS Data
Plant	Tatarian Honeysuckle	*Lonicera tatarica*	SNA	GNR	SE5			NAS Data
Plant	Thicket Creeper	*Parthenocissus vitacea*	S5	G5				NAS Data
Plant	Trembling Aspen	*Populus tremuloides*	S5	G5				NAS Data
Plant	True Forget-me-not	*Myosotis scorpioides*	SNA	G5	SE5			NAS Data
Plant	Tufted Vetch	*Vicia cracca*	SNA	GNR	SE5			NAS Data
Plant	Upright Yellow Wood-sorrel	*Oxalis stricta*	S5	G5				NAS Data
Plant	Virginia Clematis	*Clematis virginiana*	S5	G5				NAS Data
Plant	Virginia Waterleaf	*Hydrophyllum virginianum*	S5	G5				NAS Data
Plant	Wayfaring Viburnum	*Viburnum lantana*	SNA	GNR	SE2			NAS Data
Plant	White Ash	*Fraxinus americana*	S4	G5				NAS Data
Plant	White Campion	*Silene latifolia*	SNA	GNR	SE5			NAS Data
Plant	White Clover	*Trifolium repens*	SNA	GNR	SE5			NAS Data
Plant	White Elm	*Ulmus americana*	S5	G4				NAS Data
Plant	White Mulberry	*Morus alba*	SNA	GNR	SE5			NAS Data
Plant	White Oak	*Quercus alba*	S5	G5				NAS Data
Plant	White Sweet-clover	*Melilotus albus*	SNA	G5	SE5			NAS Data
Plant	White Vervain	*Verbena urticifolia*	S5	G5				NAS Data
Plant	White Willow	*Salix alba*	SNA	G5	SE4			NAS Data
Plant	Wild Blue Phlox	*Phlox divaricata*	S4	G5			rare	NAS Data
Plant	Wild Carrot	*Daucus carota*	SNA	GNR	SE5			NAS Data
Plant	Wild Chervil	*Anthriscus sylvestris*	SNA	GNR	SE4?			NAS Data
Plant	Wild Chicory	*Cichorium intybus*	SNA	GNR	SE5			NAS Data
Plant	Wild Cucumber	*Echinocystis lobata*	S5	G5				NAS Data
Plant	Wild Parsnip	*Pastinaca sativa*	SNA	GNR	SE5			NAS Data
Plant	Wild Strawberry	*Fragaria virginiana*	S5	G5				NAS Data
Plant	Willow Species	*Salix sp.*						NAS Data
Plant	Wood Avens	*Geum urbanum*	SNA	G5	SE3			NAS Data
Plant	Woodland Sedge	*Carex blanda*	S5	G5				NAS Data
Plant	Woolly Blue Violet	*Viola sororia*	S5	G5				NAS Data
Plant	Yellow Avens	*Geum aleppicum*	S5	G5				NAS Data
Plant	Yellow Birch	*Betula alleghaniensis*	S5	G5				NAS Data
Plant	Yellow Iris	*Iris pseudacorus*	SNA	GNR	SE4			NAS Data

Number of Amphibians	14
Number of Birds	200
Number of Butterflies	60
Number of Mammals	43
Number of Reptiles	12
Number of Plants	223

Table 3:Compiled Species List: Amphibians

Taxa	Common Name	Scientific Name	S Rank (Provincial)	G Rank (Global)	Exotic Status	SARO	CVC Status	Source
Amphibian	American Bullfrog	*Lithobates catesbeianus*	S4	G5			-	ORRA
Amphibian	American Toad	*Anaxyrus americanus*	S5	G5			-	ORRA, NAS Data
Amphibian	Blue-spotted Salamander	*Anchomenus picticornis*	SNR	GNR			-	ORRA
Amphibian	Eastern Red-backed Salamander	*Plethodon cinereus*	S5	G5			-	ORRA
Amphibian	Gray Treefrog	*Hyla versicolor*	S5	G5			-	ORRA
Amphibian	Green Frog	*Lithobates clamitans*	S5	G5			-	ORRA
Amphibian	Jefferson Salamander	*Ambystoma jeffersonianum*	S2	G4		END	-	ORRA
Amphibian	Mudpuppy	*Necturus maculosus*	S4	G5		NAR	-	ORRA
Amphibian	Northern Leopard Frog	*Lithobates pipiens*	S5	G5		NAR	-	ORRA, NAS Data
Amphibian	Red-spotted Newt	*Notophthalmus viridescens viridescens*	S5	G5T5			-	ORRA
Amphibian	Spotted Salamander	*Ambystoma maculatum*	S4	G5			-	ORRA
Amphibian	Spring Peeper	*Pseudacris crucifer*	S5	G5			-	ORRA
Amphibian	Western Chorus Frog	*Pseudacris maculata pop. 1*	S4	G5TNR		NAR	-	ORRA
Amphibian	Wood Frog	*Lithobates sylvaticus*	S5	G5			-	ORRA

Number of Amphibians	14
Number of Birds	200
Number of Butterflies	60
Number of Mammals	43
Number of Reptiles	12
Number of Plants	223

Table 4:Compiled Species List: Reptiles

Taxa	Common Name	Scientific Name	S Rank (Provincial)	G Rank (Global)	Exotic Status	SARO	CVC Status	Source
Reptile	Blanding's Turtle	*Emydoidea blandingii*	S3	G4		THR		ORRA
Reptile	Dekay's Brownsnake	*Storeria dekayi*	S5	G5		NAR		ORRA, NAS Data
Reptile	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	S5	G5T5				ORRA, NAS Data
Reptile	Eastern Milksnake	*Lampropeltis triangulum*	S4	G5		NAR		NAS Data
Reptile	Eastern Ribbonsnake	*Thamnophis sauritus*	S4	G5		SC		ORRA
Reptile	Midland Painted Turtle	*Chrysemys picta marginata*	S4	G5T5				ORRA
Reptile	Milksnake	*Lampropeltis triangulum*	S4	G5		NAR		ORRA
Reptile	Northern Map Turtle	*Graptemys geographica*	S3	G5		SC		ORRA
Reptile	Northern Watersnake	*Nerodia sipedon sipedon*	S5	G5T5		NAR		ORRA,NAS Data
Reptile	Red-bellied Snake	*Storeria occipitomaculata*	S5	G5				ORRA
Reptile	Red-eared Slider	*Trachemys scripta*	SNA	G5	SE2			ORRA
Reptile	Snapping Turtle	*Chelydra serpentina*	S4	G5		SC		ORRA, NAS Data

Number of Amphibians	14
Number of Birds	200
Number of Butterflies	60
Number of Mammals	43
Number of Reptiles	12
Number of Plants	223

Table 5:Compiled Species List: Birds

Taxa	Common Name	Scientific Name	S Rank (Provincial)	G Rank (Global)	Exotic Status	SARO	CVC Status	Source
Bird	Alder Flycatcher	*Empidonax alnorum*	S5B	G5			-	OBBA, ebird
Bird	American Crow	*Corvus brachyrhynchos*	S5B	G5			-	OBBA, ebird, NAS data
Bird	American Goldfinch	*Spinus tristis*	S5B	G5			-	OBBA, ebird, NAS data
Bird	American Kestrel	*Falco sparverius*	S4	G5			-	OBBA, ebird
Bird	American Pipit	*Anthus rubescens*	S4	G5			-	ebird
Bird	American Redstart	*Setophaga ruticilla*	S5B	G5			Rare	OBBA, ebird, NAS data
Bird	American Robin	*Turdus migratorius*	S5B	G5			-	OBBA, ebird
Bird	American Tree Sparrow	*Spizella arborea*	S4B	G5			-	ebird
Bird	American Wigeon	*Anas americana*	S4	G5			-	ebird
Bird	American Woodcock	*Scolopax minor*	S4B	G5			-	OBBA, ebird
Bird	Bald Eagle	*Haliaeetus leucocephalus*	S2N,S4B	G5		SC	Rare	ebird
Bird	Baltimore Oriole	*Icterus northropi*	S4B	G5			-	OBBA, ebird, NAS data
Bird	Bank Swallow	*Riparia riparia*	S4B	G5		THR	Rare	OBBA, ebird, NAS data
Bird	Barn Swallow	*Hirundo rustica*	S5B	G5		THR	Rare	OBBA, ebird, NAS data
Bird	Barred Owl	*Strix varia*	S5	G5			Rare	ebird
Bird	Bay-breasted Warbler	*Setophaga castanea*	S5B	G5			-	ebird
Bird	Belted Kingfisher	*Megaceryle alcyon*	S4B	G5			Rare	OBBA, ebird
Bird	Black-and-white Warbler	*Mniotilta varia*	S5B	G5			Rare	ebird
Bird	Black-billed Cuckoo	*Coccyzus erythropthalmus*	S5B	G5			-	OBBA, ebird
Bird	Blackburnian Warbler	*Setophaga fusca*	S5B	G5			Rare	ebird
Bird	Black-capped Chickadee	*Poecile atricapillus*	S5	G5			-	OBBA, ebird, NAS data
Bird	Black-crowned Night-Heron	*Nycticorax nycticorax*	S3B,S3N	G5			Rare	ebird
Bird	Blackpoll Warbler	*Setophaga striata*	S4B	G5			-	ebird
Bird	Black-throated Blue Warbler	*Setophaga caerulescens*	S5B	G5			Rare	ebird
Bird	Black-throated Green Warbler	*Setophaga virens*	S5B	G5			Rare	ebird
Bird	Blue Jay	*Cyanocitta cristata*	S5	G5			-	OBBA, ebird, NAS data
Bird	Blue-gray Gnatcatcher	*Polioptila caerulea*	S4B	G5			Rare	ebird, NAS Data
Bird	Blue-headed Vireo	*Vireo solitarius*	S5B	G5			Rare	ebird
Bird	Blue-winged Warbler	*Vermivora cyanoptera*	S4B	G5			Rare	ebird
Bird	Bobolink	*Dolichonyx oryzivorus*	S4B	G5		THR	Rare	OBBA, ebird
Bird	Bohemian Waxwing	*Bombycilla garrulus*	SNA	G5			-	ebird
Bird	Broad-winged Hawk	*Buteo platypterus*	S5B	G5			Rare	ebird
Bird	Brown Creeper	*Certhia americana*	S5B	G5			Rare	OBBA, ebird, NAS data
Bird	Brown Thrasher	*Toxostoma rufum*	S4B	G5			Rare	OBBA, ebird
Bird	Brown-headed Cowbird	*Molothrus ater*	S4B	G5			-	OBBA, ebird, NAS data
Bird	Bufflehead	*Bucephala albeola*	S4	G5			-	ebird
Bird	Canada Goose	*Branta canadensis*	S5	G5			-	OBBA, ebird, NAS data
Bird	Canada Warbler	*Cardellina canadensis*	S4B	G5		SC	Rare	ebird
Bird	Cape May Warbler	*Setophaga tigrina*	S5B	G5			-	ebird
Bird	Carolina Wren	*Thryothorus ludovicianus*	S4	G5			Rare	OBBA, ebird
Bird	Caspian Tern	*Hydroprogne caspia*	S3B	G5		NAR	Rare	ebird
Bird	Cedar Waxwing	*Bombycilla cedrorum*	S5B	G5			-	OBBA, ebird, NAS data
Bird	Cerulean Warbler	*Setophaga cerulea*	S3B	G4		THR	Rare	ebird
Bird	Chestnut-sided Warbler	*Setophaga pensylvanica*	S5B	G5			Rare	ebird
Bird	Chimney Swift	*Chaetura pelagica*	S4B,S4N	G4G5		THR	Rare	OBBA, ebird, NAS data
Bird	Chipping Sparrow	*Spizella passerina*	S5B	G5			-	OBBA
Bird	Chipping Sparrow	*Spizella passerina*	S5B	G5			-	ebird, NAS Data
Bird	Clay-colored Sparrow	*Spizella pallida*	S4B	G5			Rare	ebird
Bird	Cliff Swallow	*Petrochelidon pyrrhonota*	S4B	G5			Rare	OBBA, ebird, NAS data
Bird	Common Goldeneye	*Bucephala clangula*	S5	G5			-	ebird
Bird	Common Grackle	*Quiscalus quiscula*	S5B	G5			Rare	OBBA, ebird, NAS data
Bird	Common Loon	*Gavia immer*	S5B,S5N	G5		NAR	-	ebird
Bird	Common Merganser	*Mergus merganser*	S5B,S5N	G5			Rare	ebird
Bird	Common Nighthawk	*Chordeiles minor*	S4B	G5		SC	Rare	OBBA, ebird
Bird	Common Raven	*Corvus corax*	S5	G5			-	ebird
Bird	Common Redpoll	*Acanthis flammea*	S4B	G5			-	ebird
Bird	Common Snipe	*Gallinago gallinago*	S5B	G5			Rare	OBBA
Bird	Common Tern	*Sterna hirundo*	S4B	G5		NAR	Rare	ebird
Bird	Common Yellowthroat	*Geothlypis trichas*	S5B	G5			-	OBBA, ebird
Bird	Common/Red-breasted Merganser	*Mergus merganser*	S5B,S5N	G5			Rare	ebird, NAS Data
Bird	Cooper's Hawk	*Accipiter cooperii*	S4	G5		NAR	Rare	ebird, NAS Data
Bird	Dark-eyed Junco	*Junco hyemalis*	S5B	G5			Rare	ebird
Bird	Double-crested Cormorant	*Phalacrocorax auritus*	S5B	G5		NAR	-	ebird
Bird	Downy Woodpecker	*Dryobates pubescens*	S5	G5			-	OBBA, ebird, NAS data
Bird	Eastern Bluebird	*Sialia sialis*	S5B	G5		NAR	Rare	ebird
Bird	Eastern Kingbird	*Tyrannus tyrannus*	S4B	G5			Rare	OBBA, ebird, NAS data
Bird	Eastern Meadowlark	*Sturnella magna*	S4B	G5		THR	Rare	OBBA
Bird	Eastern Phoebe	*Sayornis phoebe*	S5B	G5			-	OBBA, ebird
Bird	Eastern Screech-Owl	*Megascops asio*	S4	G5		NAR	-	OBBA, ebird
Bird	Eastern Towhee	*Pipilo erythrophthalmus*	S4B	G5			Rare	OBBA, ebird
Bird	Eastern Wood-Pewee	*Contopus virens*	S4B	G5		SC	Rare	OBBA, ebird
Bird	Eurasian/African Collared-Dove	*Streptopelia decaocto*	SNA	G5	SE		-	ebird
Bird	European Starling	*Sturnus vulgaris*	SNA	G5	SE		-	OBBA, ebird, NAS data
Bird	Evening Grosbeak	*Coccothraustes vespertinus*	S4B	G5		SC	Rare	ebird
Bird	Field Sparrow	*Spizella pusilla*	S4B	G5			-	OBBA, ebird
Bird	Fish Crow	*Corvus ossifragus*	S1S2	G5			-	ebird
Bird	Fox Sparrow	*Passerella iliaca*	S4B	G5			-	ebird
Bird	Golden Eagle	*Aquila chrysaetos*	S2B	G5		END	-	ebird
Bird	Golden-crowned Kinglet	*Regulus satrapa*	S5B	G5			Rare	ebird
Bird	Golden-winged Warbler	*Vermivora chrysoptera*	S4B	G4		SC	Rare	ebird
Bird	Gray Catbird	*Dumetella carolinensis*	S4B	G5			Rare	OBBA, ebird, NAS data
Bird	Gray-cheeked Thrush	*Catharus minimus*	S4B	G5			-	ebird
Bird	Great Black-backed Gull	*Larus marinus*	S2B	G5			-	ebird
Bird	Great Blue Heron	*Ardea herodias*	S4	G5			Rare	ebird
Bird	Great Crested Flycatcher	*Myiarchus crinitus*	S4B	G5			-	OBBA, ebird

Bird	Great Egret	*Ardea alba*	S2B	G5			-	ebird, NAS Data
Bird	Great Horned Owl	*Bubo virginianus*	S4	G5			-	OBBA, ebird
Bird	Greater Yellowlegs	*Tringa melanoleuca*	S4B,S4N	G5			-	ebird
Bird	Green Heron	*Butorides virescen*	S4B	G5			-	OBBA, ebird
Bird	Hairy Woodpecker	*Dryobates villosus*	S5	G5			Rare	OBBA, ebird, NAS data
Bird	Harris's Sparrow	*Zonotrichia querula*	SNA	G5			-	ebird
Bird	Henslow's Sparrow	*Centronyx henslowii*	SHB	G4		END	Rare	NHIC
Bird	Hermit Thrush	*Catharus guttatus*	S5B	G5			-	ebird
Bird	Herring Gull	*Larus argentatus*	S5B,S5N	G5			Rare	ebird
Bird	Hoary Redpoll	*Acanthis hornemanni*	SNA	G5			-	ebird
Bird	Hooded Merganser	*Lophodytes cucullatus*	S5B,S5N	G5			Rare	ebird
Bird	Horned Lark	*Eremophila alpestris*	S5B	G5			Rare	OBBA, ebird
Bird	House Finch	*Haemorhous mexicanus*	SNA	G5	SE		-	OBBA, ebird
Bird	House Sparrow	*Passer domesticus*	SNA	G5	SE		-	OBBA, ebird, NAS data
Bird	House Wren	*Troglodytes aedon*	S5B	G5			-	OBBA, ebird, NAS data
Bird	House/Purple Finch	*Haemorhous mexicanus*	SNA	G5	SE		-	ebird, NAS Data
Bird	Iceland Gull	*Larus glaucoides*	S4N	G5			-	ebird
Bird	Indigo Bunting	*Passerina cyanea*	S4B	G5			-	OBBA, ebird, NAS data
Bird	Killdeer	*Charadrius vociferus*	S5B,S5N	G5			Rare	OBBA, ebird, NAS data
Bird	Least Flycatcher	*Empidonax minimus*	S4B	G5			Rare	OBBA, ebird
Bird	Lincoln's Sparrow	*Melospiza lincolnii*	S5B	G5			-	ebird
Bird	Long-eared Owl	*Asio otus*	S4	G5			Rare	ebird
Bird	Louisiana Waterthrush	*Parkesia motacilla*	S3B	G5		THR	Rare	ebird
Bird	Magnolia Warbler	*Setophaga magnolia*	S5B	G5			Rare	ebird
Bird	Mallard	*Anas platyrhynchos*	S5	G5			-	OBBA, ebird, NAS data
Bird	Marsh Wren	*Cistothorus palustris*	S4B	G5			Rare	ebird
Bird	Merlin	*Falco columbarius*	S5B	G5		NAR	-	ebird
Bird	Mourning Dove	*Zenaida macroura*	S5	G5			-	OBBA
Bird	Mourning Dove	*Zenaida macroura*	S5	G5			-	ebird, NAS Data
Bird	Mourning Warbler	*Geothlypis philadelphia*	S4B	G5			Rare	OBBA, ebird, NAS data
Bird	Mute Swan	*Cygnus olor*	SNA	G5	SE		-	ebird
Bird	Nashville Warbler	*Leiothlypis ruficapilla*	S5B	G5			Rare	ebird
Bird	Northern Cardinal	*Cardinalis cardinalis*	S5	G5			-	OBBA, ebird, NAS data
Bird	Northern Flicker	*Colaptes auratus*	S4B	G5			-	OBBA, ebird, NAS data
Bird	Northern Goshawk	*Accipiter gentilis*	S4	G5		NAR	Rare	ebird
Bird	Northern Harrier	*Circus hudsonius*	S4B	G5		NAR	Rare	ebird
Bird	Northern Mockingbird	*Mimus polyglottos*	S4	G5			Rare	OBBA, ebird
Bird	Northern Parula	*Setophaga americana*	S4B	G5			-	ebird
Bird	Northern Pintail	*Anas acuta*	S5	G5			-	ebird
Bird	Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	S4B	G5			-	OBBA, ebird
Bird	Northern Shrike	*Lanius borealis*	S4	G5			-	ebird
Bird	Northern Waterthrush	*Parkesia noveboracensis*	S5B	G5			Rare	OBBA, ebird
Bird	Olive-sided Flycatcher	*Contopus cooperi*	S4B	G4		SC	-	ebird
Bird	Orange-crowned Warbler	*Leiothlypis celata*	S4B	G5			-	ebird
Bird	Orchard Oriole	*Icterus spurius*	S4B	G5			Rare	OBBA, ebird
Bird	Osprey	*Pandion haliaetus*	S5B	G5			Rare	ebird
Bird	Ovenbird	*Seiurus aurocapilla*	S4B	G5			Rare	OBBA, ebird
Bird	Peregrine Falcon	*Falco peregrinus*	S3B	G4		SC	Rare	OBBA, ebird
Bird	Philadelphia Vireo	*Vireo philadelphicus*	S5B	G5			-	ebird
Bird	Pied-billed Grebe	*Podilymbus podiceps*	S4B,S4N	G5			Rare	ebird
Bird	Pileated Woodpecker	*Dryocopus pileatus*	S5	G5			Rare	OBBA
Bird	Pine Grosbeak	*Pinicola enucleator*	S4B	G5			-	ebird
Bird	Pine Siskin	*Spinus pinus*	S4B	G5			Rare	ebird
Bird	Pine Warbler	*Setophaga pinus*	S5B	G5			Rare	OBBA, ebird
Bird	Prairie Warbler	*Setophaga discolor*	S3B	G5		NAR	-	ebird
Bird	Prothonotary Warbler	*Protonotaria citrea*	S1B	G5		END	-	ebird
Bird	Purple Finch	*Haemorhous purpureus*	S4B	G5			Rare	ebird
Bird	Purple Martin	*Progne subis*	S3S4B	G5			Rare	OBBA, ebird
Bird	Red Crossbill	*Loxia curvirostra*	S4B	G5			Rare	ebird
Bird	Red-bellied Woodpecker	*Melanerpes carolinus*	S4	G5			-	ebird
Bird	Red-breasted Merganser	*Mergus serrator*	S4B,S5N	G5			-	ebird
Bird	Red-breasted Nuthatch	*Sitta canadensis*	S5	G5			Rare	ebird
Bird	Red-eyed Vireo	*Vireo olivaceus*	S5B	G5			-	OBBA, ebird, NAS data
Bird	Red-headed Woodpecker	*Melanerpes erythrocephalus*	S4B	G5		SC	Rare	ebird
Bird	Red-shouldered Hawk	*Buteo lineatus*	S4B	G5		NAR	Rare	ebird
Bird	Red-tailed Hawk	*Buteo jamaicensis*	S5	G5		NAR	-	OBBA, ebird, NAS data
Bird	Red-winged Blackbird	*Agelaius phoeniceus*	S4	G5			-	OBBA, NAS data
Bird	Ring-billed Gull	*Larus delawarensis*	S5B,S4N	G5			-	ebird, NAS Data
Bird	Ring-necked Duck	*Aythya collaris*	S5	G5			-	ebird
Bird	Rock Pigeon	*Columba livia*	SNA	G5	SE		-	OBBA, ebird, NAS data
Bird	Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S4B	G5			-	OBBA, ebird, NAS data
Bird	Rough-legged Hawk	*Buteo lagopus*	S1B,S4N	G5		NAR	-	ebird
Bird	Ruby-crowned Kinglet	*Regulus calendula*	S4B	G5			-	ebird
Bird	Ruby-throated Hummingbird	*Archilochus colubris*	S5B	G5			-	ebird
Bird	Rusty Blackbird	*Euphagus carolinus*	S4B	G4	SC	NAR	-	ebird
Bird	Sandhill Crane	*Grus canadensis*	S5B	G5			-	ebird
Bird	Savannah Sparrow	*Passerculus sandwichensis*	S4B	G5			Rare	OBBA, ebird
Bird	Scarlet Tanager	*Piranga olivacea*	S4B	G5			Rare	OBBA, ebird
Bird	Sedge Wren	*Cistothorus platensis*	S4B	G5		NAR	Rare	ebird
Bird	Sharp-shinned Hawk	*Accipiter striatus*	S5	G5		NAR	Rare	OBBA, ebird
Bird	Snow Bunting	*Plectrophenax nivalis*	SNA	G5			-	ebird
Bird	Solitary Sandpiper	*Tringa solitaria*	S4B	G5			-	ebird
Bird	Song Sparrow	*Melospiza melodia*	S5B	G5			-	OBBA, ebird, NAS data
Bird	Sora	*Porzana carolina*	S4B	G5			-	ebird
Bird	Spotted Sandpiper	*Actitis macularius*	S5	G5			-	OBBA, ebird, NAS data
Bird	Swainson's Thrush	*Catharus ustulatus*	S4B	G5			-	ebird
Bird	Swamp Sparrow	*Melospiza georgiana*	S5B	G5			-	OBBA, ebird

Bird	Tennessee Warbler	*Leiothlypis peregrina*	S5B	G5			-	ebird
Bird	Tree Swallow	*Tachycineta bicolor*	S4B	G5			-	OBBA, ebird
Bird	Trumpeter Swan	*Cygnus buccinator*	S4	G4		NAR	-	ebird
Bird	Tundra Swan	*Cygnus columbianus*	S4	G5			-	ebird
Bird	Turkey Vulture	*Cathartes aura*	S5B	G5			Rare	OBBA, ebird
Bird	Veery	*Catharus fuscescens*	S4B	G5			Rare	OBBA, ebird
Bird	Vesper Sparrow	*Pooecetes gramineus*	S4B	G5			Rare	ebird
Bird	Virginia Rail	*Rallus limicola*	S5B	G5			-	ebird
Bird	Warbling Vireo	*Vireo gilvus*	S5B	G5			-	OBBA, ebird, NAS data
Bird	Whimbrel	*Numenius phaeopus*	S3B,S4N	G5			-	ebird
Bird	White-breasted Nuthatch	*Sitta carolinensis*	S5	G5			-	OBBA, ebird, NAS data
Bird	White-crowned Sparrow	*Zonotrichia leucophrys*	S4B	G5			-	ebird
Bird	White-eyed Vireo	*Vireo griseus*	S2B	G5			-	ebird
Bird	White-throated Sparrow	*Zonotrichia albicollis*	S5B	G5			Rare	ebird
Bird	White-winged Crossbill	*Loxia leucoptera*	S5B	G5			-	ebird
Bird	Wild Turkey	*Meleagris gallopavo*	S5	G5			Rare	ebird, NAS Data
Bird	Willow Flycatcher	*Empidonax traillii*	S5B	G5			-	OBBA, ebird
Bird	Wilson's Warbler	*Cardellina pusilla*	S4B	G5			-	ebird
Bird	Winter Wren	*Troglodytes hiemalis*	S5B	G5			Rare	ebird
Bird	Wood Duck	*Aix sponsa*	S5	G5			-	OBBA, ebird
Bird	Wood Thrush	*Hylocichla mustelin*	S4B	G4		SC	Rare	OBBA, ebird
Bird	Yellow Warbler	*Setophaga petechia*	S5B	G5			-	OBBA, ebird, NAS data
Bird	Yellow-bellied Flycatcher	*Empidonax flaviventris*	S5B	G5			-	ebird
Bird	Yellow-bellied Sapsucker	*Sphyrapicus varius*	S5B	G5			-	ebird
Bird	Yellow-billed Cuckoo	*Coccyzus americanus*	S4B	G5			Rare	OBBA, ebird
Bird	Yellow-breasted Chat	*Icteria virens*	S1B	G5		END	-	ebird
Bird	Yellow-rumped Warbler	*Setophaga coronata*	S5B	G5			Rare	ebird
Bird	Yellow-throated Vireo	*Vireo flavifrons*	S4B	G5			Rare	ebird

Number of Amphibians	14
Number of Birds	200
Number of Butterflies	60
Number of Mammals	43
Number of Reptiles	12
Number of Plants	223

Table 6:Compiled Species List: Mammals

Taxa	Common Name	Scientific Name	S Rank (Provincial)	G Rank (Global)	Exotic Status	SARO	CVC Status	Source
Mammal	Beaver	*Castor canadensis*	S5	G5			-	AMO, NAS Data
Mammal	Big Brown Bat	*Eptesicus fuscus*	S4	G5			-	AMO
Mammal	Black Bear	*Ursus americanus*	S5	G5		NAR	-	AMO
Mammal	Coyote	*Canis latrans*	S5	G5			-	AMO, NAS Data
Mammal	Deer Mouse	*Peromyscus maniculatus*	S5	G5			-	AMO, NAS Data
Mammal	Eastern Chipmunk	*Tamias striatus*	S5	G5			-	AMO
Mammal	Eastern Cottontail	*Sylvilagus floridanus*	S5	G5			-	AMO, NAS Data
Mammal	Eastern Red Bat	*Lasiurus borealis*	S4	G4		-	-	AMO
Mammal	Eastern small-footed myotis	*Myotis leibii*	S2S3	G4		END	-	BCI, AMO
Mammal	Ermine	*Mustela erminea*	S5	G5			-	AMO
Mammal	European Hare	*Lepus europaeus*	SNA	G5	SE		-	AMO
Mammal	Gray Squirrel	*Sciurus carolinensis*	S5	G5			-	AMO, NAS Data
Mammal	Groundhog	*Marmota monax*	S5	G5			-	AMO
Mammal	Hairy-tailed Mole	*Parascalops breweri*	S4	G5			-	AMO
Mammal	Hoary Bat	*Lasiurus cinereus*	S4	G3G4			-	AMO
Mammal	House Mouse	*Mus musculus*	SNA	G5	SE		-	AMO
Mammal	Little Brown Myotis	*Myotis lucifugus*	S3	G3		END	-	BCI, AMO
Mammal	Long-tailed Weasel	*Mustela frenata*	S4	G5			-	AMO
Mammal	Meadow Jumping Mouse	*Zapus hudsonius*	S5	G5			-	AMO
Mammal	Meadow Vole	*Microtus pennsylvanicus*	S5	G5			-	AMO
Mammal	Mink	*Neovison vison*	S4	G5			-	AMO
Mammal	Muskrat	*Ondatra zibethicus*	S5	G5			-	AMO
Mammal	Northern Flying Squirrel	*Glaucomys sabrinus*	S5	G5			-	AMO
Mammal	Northern Myotis	*Myotis septentrionalis*	S3	G1G2		END	-	BCI
Mammal	Norway Rat	*Rattus rattus*	SNA	G5	SE		-	AMO
Mammal	Opossum	*Didelphis virginiana*	S4	G5			-	AMO
Mammal	Porcupine	*Erethizon dorsatum*	S5	G5			-	AMO
Mammal	Raccoon	*Procyon lotor*	S5	G5			-	AMO
Mammal	Red Fox	*Vulpes vulpes*	S5	G5			-	AMO
Mammal	Red Squirrel	*Tamiasciurus hudsonicus*	S5	G5			-	AMO, NAS Data
Mammal	River Otter	*Lontra canadensis*	S5	G5			-	AMO
Mammal	Short-tailed Shrew	*Blarina brevicauda*	S5	G5			-	AMO
Mammal	Silver-haired Bat	*Lasionycteris noctivagans*	S4	G3G4			-	AMO
Mammal	Smoky Shrew	*Sorex fumeus*	S5	G5			-	AMO
Mammal	Snowshoe Hare	*Lepus americanus*	S5	G5			-	AMO
Mammal	Southern Flying Squirrel	*Glaucomys volans*	S4	G5		NAR	-	AMO
Mammal	Star-nosed Mole	*Condylura cristata*	S5	G5			-	AMO
Mammal	Striped Skunk	*Mephitis mephitis*	S5	G5			-	AMO
Mammal	Tricolored Bat	*Perimyotis subflavus*	S3?	G2G3		END	-	BCI, AMO
Mammal	Water Shrew	*Sorex palustris*	S5	G5			-	AMO
Mammal	White-footed Mouse	*Peromyscus leucopus*	S5	G5			-	AMO
Mammal	White-tailed Deer	*Odocoileus virginianus*	S5	G5			-	AMO, NAS Data
Mammal	Woodland Jumping Mouse	*Napaeozapus insignis*	S5	G5			-	AMO

Number of Amphibians	14
Number of Birds	200
Number of Butterflies	60
Number of Mammals	43
Number of Reptiles	12
Number of Plants	223

Table 7:Compiled Species List: Butterfly

Taxa	Common Name	Scientific Name	S Rank (Provincial)	G Rank (Global)	Exotic Status	SARO	CVC Status	Source
Butterfly	Acadian Hairstreak	*Satyrium acadica*	S4	G5			-	OBA
Butterfly	American Copper	*Lycaena phlaeas*	S5	G5			-	OBA
Butterfly	American Lady	*Vanessa virginiensis*	S5	G5			-	OBA
Butterfly	Appalachian Brown	*Lethe appalachia*	S4	G4			-	OBA
Butterfly	Baltimore Checkerspot	*Euphydryas phaeton*	S4	G5			-	OBA
Butterfly	Banded Hairstreak	*Satyrium calanus*	S4	G5			-	OBA
Butterfly	Black Swallowtail	*Papilio polyxenes*	S5	G5			-	OBA
Butterfly	Bronze Copper	*Lycaena hyllus*	S5	G5			-	OBA
Butterfly	Cabbage White	*Pieris rapae*	SNA	G5	SE		-	OBA, NAS Data
Butterfly	Clouded Sulphur	*Phoebis sennae*	SNA	G5			-	OBA
Butterfly	Common Buckeye	*Junonia coenia*	SNA	G5			-	OBA
Butterfly	Common Ringlet	*Coenonympha tullia*	S5	G5			-	OBA
Butterfly	Common Wood-Nymph	*Cercyonis pegala*	S5	G5			-	OBA
Butterfly	Compton Tortoiseshell	*Nymphalis l-album*	S5	G5			-	OBA
Butterfly	Delaware Skipper	*Anatrytone logan*	S4	G5			-	OBA
Butterfly	Dreamy Duskywing	*Erynnis icelus*	S5	G5			-	OBA
Butterfly	Dun Skipper	*Euphyes vestris*	S5	G5			-	OBA
Butterfly	Eastern Comma	*Polygonia comma*	S5	G5			-	OBA
Butterfly	Eastern Giant Swallowtail	*Papilio cresphontes*	S4	G5			-	OBA
Butterfly	Eastern Pine Elfin	*Callophrys niphon*	S5	G5			-	OBA
Butterfly	Eastern Tailed Blue	*Cupido comyntas*	S5	G5			-	OBA
Butterfly	Eastern Tiger Swallowtail	*Papilio glaucus*	S5	G5			-	OBA
Butterfly	Edwards' Hairstreak	*Satyrium edwardsii*	S4	G5			-	OBA
Butterfly	European Skipper	*Thymelicus lineola*	SNA	G5	SE		-	OBA
Butterfly	Eyed Brown	*Lethe eurydice*	S5	G5			-	OBA
Butterfly	Fiery Skipper	*Hylephila phyleus*	SNA	G5			-	OBA
Butterfly	Gray Comma	*Polygonia progne*	S5	G5			-	OBA
Butterfly	Great Spangled Fritillary	*Speyeria cybele*	S5	G5			-	OBA
Butterfly	Hickory Hairstreak	*Satyrium caryaevorus*	S4	G4			-	OBA
Butterfly	Hobomok Skipper	*Poanes hobomok*	S5	G5			-	OBA
Butterfly	Juvenal's Duskywing	*Erynnis juvenalis*	S5	G5			-	OBA
Butterfly	Least Skipper	*Ancyloxypha numitor*	S5	G5			-	OBA
Butterfly	Lintner's Mourning Cloak	*Nymphalis antiopa*	S5	G5			-	OBA
Butterfly	Little Glassywing	*Pompeius verna*	S4	G5			-	OBA
Butterfly	Little Wood-Satyr	*Megisto cymela*	S5	G5			-	OBA
Butterfly	Long Dash Skipper	*Polites mystic*	S5	G5			-	OBA
Butterfly	Meadow Fritillary	*Boloria bellona*	S5	G5			-	OBA
Butterfly	Milbert's Tortoiseshell	*Aglais milberti*	S5	G5			-	OBA
Butterfly	Monarch	*Danaus plexippus*	S2N,S4B	G4		SC	-	OBA, NAS Data
Butterfly	Northern Azure	*Celastrina lucia*	S5	G5			-	OBA
Butterfly	Northern Broken-Dash	*Wallengrenia egeremet*	S5	G5			-	OBA
Butterfly	Northern Cloudywing	*Thorybes pylades*	S5	G5			-	OBA
Butterfly	Northern Crescent	*Phyciodes cocyta*	S5	G5			-	OBA
Butterfly	Northern Pearly-Eye	*Lethe anthedon*	S5	G5			-	OBA
Butterfly	Orange Sulphur	*Colias eurytheme*	S5	G5			-	OBA
Butterfly	Painted Lady	*Vanessa cardui*	S5	G5			-	OBA
Butterfly	Pearl Crescent	*Phyciodes tharos*	S4	G5			-	OBA
Butterfly	Peck's Skipper	*Polites peckius*	S5	G5			-	OBA
Butterfly	Question Mark	*Polygonia interrogationis*	S5	G5			-	OBA
Butterfly	Red Admiral	*Vanessa atalanta*	S5	G5			-	OBA
Butterfly	Red-spotted Purple	*Limenitis arthemis astyanax*	S5	G5T5			-	OBA
Butterfly	Silver-spotted Skipper	*Epargyreus clarus*	S4	G5			-	OBA
Butterfly	Silvery Blue	*Glaucopsyche lygdamus*	S5	G5			-	OBA, NAS Data
Butterfly	Silvery Checkerspot	*Chlosyne nycteis*	S5	G5			-	OBA
Butterfly	Striped Hairstreak	*Satyrium liparops*	S5	G5			-	OBA
Butterfly	Tawny-edged Skipper	*Polites themistocles*	S5	G5			-	OBA
Butterfly	Viceroy	*Limenitis archippus*	S5	G5			-	OBA
Butterfly	White Admiral	*Limenitis arthemis arthemis*	S5	G5T5			-	OBA
Butterfly	Wild Indigo Duskywing	*Erynnis baptisiae*	S4	G5			-	OBA
Butterfly	Zebra Swallowtail	*Eurytides marcellus*	SNA	G5			-	OBA

Number of Amphibians	14
Number of Birds	200
Number of Butterflies	60
Number of Mammals	43
Number of Reptiles	12
Number of Plants	223

Appendix C

Aquatic Field Investigation Sheets

Project # WW20101061

Ontario

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WATERCOURSE FIELD COLLECTION FORM

GENERAL INFORMATION			
Project # WW20101061	Project Description: Barbertown Road Erosion Control		Date: 27 May 2021
Is Stream Realignment required for this section: ○ Yes ◉ No ○ Unknown			
Collectors: R Dibbley A. Wittmann		Time Started:	Time Finished:
Weather Conditions: Sun/cloud mix			
Air Temp (°C):	Water Temp (°C):	Conductivity (µS/cm):	Velocity (m/s):
Photos Numbers And Descriptions:			

LOCATION			
Name of Waterbody: Carolyn Creek	Drainage System: Credit River	Crossing #:	Station #:
Location Of Crossing: Creek along south side of Barbertown road from Credit River to creek crossing road ~200m upstream			
GPS Coordinates: 605588 4825531 ↑ upstream 17T 605483 4825441 creek outlet ↗		MTO Chainage:	

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Township: Milton	MNRF District: Aurora

LAND USE AND POLLUTION

Surrounding Land Use:	Sources of Pollution:
Road immediately north Slovak Society Park to the South (mowed lawn) Property with mowed lawn north of road	Road

EXISTING STRUCTURE TYPE N/A

Bridge	Box Culvert	Open Foot Culvert	CSP	N/A
O	⊘	O	O	O

Other O (Describe)	Size: (w x h) m^2
Upstream end crossing Barbertown road	N/A

SECTION TYPE AND MORPHOLOGY

Section (Reach) Identifier:	Section Location: (Include On Habitat Map)
Study area	
Associated Wetland: N/A	

Stream / River	Channelized	Permanent	Intermittent	Ephemeral
⊘	⊘ ~~in culvert~~	O	O	O

Total Section (Reach) Length (m): Downstream side of Barbertown Rd

Sub-Sections:	Run ⊘	Pool ⊘	Riffle ⊘	Flats ⊘	Culvert ⊘	Other O
Percentage of Area:	~~30~~ 35	<5	~~13~~ 10	~~20~~ 30	23m long 100	
Mean wetted depth (m)	0.1	0.5 (0.7 max)	0.08	0.1	0.1 (0.28m max)	
Mean wetted width (m)	2	3.3		2.8	2.0	
Mean bankfull depth (m)		gabion baskets ~~3m~~ high on both sides	gabion baskets along both sides as channel walls			
Mean bankfull width (m)						

M. Corrugated

Concrete box culvert under road

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Substrate (type & %)								
Bedrock (Br)	***Boulder (Bo)***	***Cobble (Co)***	***Gravel (Gr)***	***Sand (Sa)***	***Silt (Si)***	***Clay (Cl)***	***Muck (Mu)***	***Detritus (D)***
/	/	40	45	5	10	/	/	

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Bank	○	● gabion baskets failing near pool	○	○
Right Bank	○	●	○	○
	Deposition Zone	**Protected Bank**	**Vulnerable Bank**	**Eroding Bank**
Left Bank	○	● gabion baskets	○	○
Right Bank	○	● " "	○	○

facing upstream

HABITAT

In-Stream Cover (% surface area):

Undercut banks:	Boulders:	Cobbles:	Organic Debris:	None
—	—	20	—	○

Vascular Macrophytes:	Woody Debris:
Instream: 0	Instream: <5
Overhanging: 0	Overhanging: 0

Shore Cover (% stream shaded):

100-90%	89-60%	59-30%	29-1%	None
● NO	●	○	○	○

WN20100G1

May 2021

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Vegetation Type:				
Vegetation Type (%)	Submergent:	Floating:	Emergent:	None O
Predominant Species:	some algae no vascular plants			

MIGRATORY OBSTRUCTIONS		
Permanent elevation change at pool - 0.5m vertical change during survey	Seasonal water level possibly	None

POTENTIAL CRITICAL HABITAT		
Spawning	Groundwater None observed	Other

POTENTIAL ENHANCEMENT OPPORTUNITIES

fix gabion baskets & gabion wire on channel bed. Provide movement upstream of pool from pool. Remove garbage.

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ADDITIONAL COMMENTS

channelized along south side of road with gabion baskets along both sides. Channel ~~height~~ width ~2.8m wide between gabion baskets. Gabion baskets 1.9m high on left (north) side and 1.3m high on right (south) side. Channel bed slopes down ~40m length before going into credit River. Large drop (>1m) at upstream end of pool (~3.3m wide, 4m long). Gabion baskets broke at pool

Additional Notes Appended? O No ◉ Yes Number of Pages 1

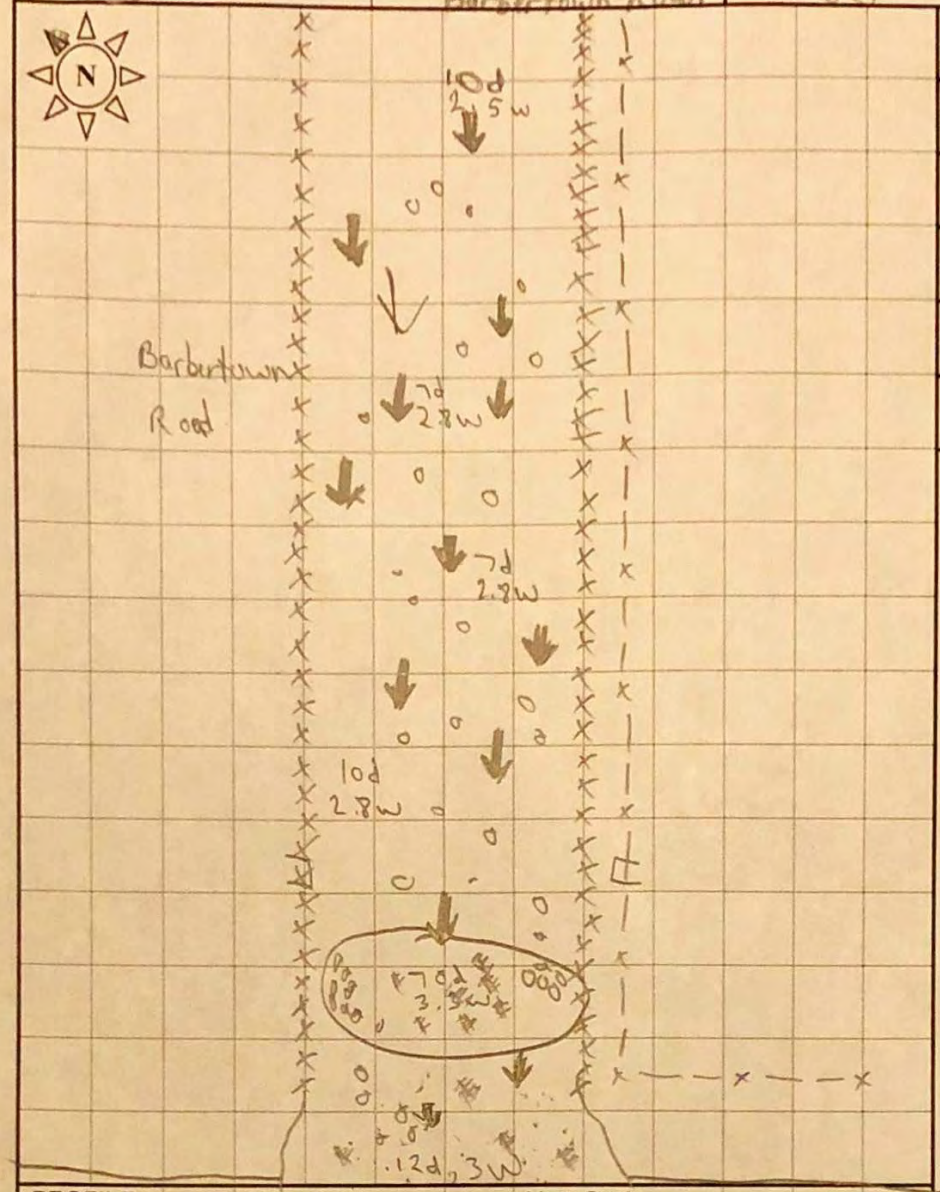
upstream section

WW20101061

May 2021

WW20101061

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
—	Downstream (SE) of Barbertown Road	~200	—



PROFILE: Horz. Scale — Vert. Scale

credit river

gabion basket

← 1.8m →

PROJECT #: WW20101061

MAPPER: R. Dibbley

NAME OF WATERBODY: Carolyn Creek

CROSSING #:

STATION #:

DATE: YY-MMM-DD 27-MAY-2021

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
Culvert

Page 6 of 6

ELECTROFISHING FORM

Project Name / Number:

wood.

Waterbody:	Date: (DD/MMM/YYYY)	Water Temp:	Shocking Method:	Pg: 1 of 1 Run: ___ of ___
Carolyn Creek	07MAY2021		Backpack	
UTM Start:	**Start Time / Stop Time (24 hrs):**		**Netters:**	**Site Area (Length X Width):**
UTM End:	15:30		RD / AW	
Zone / Acc.: 17T				
Sample ID:	**Elapsed Time: (hours)**	**Effort (seconds):**	**Voltage:**	**Frequency:** / **Pulse:**
CC-EF1	/	1472+	150	80 /

Sample ID	Fish #	Species	Species Code	Length (mm)		Round Weight	Aging Structures	Retained	Comments (Hg / Released / etc.)
				Fork	Total	(g / kg)	(Sc, Pr, Dr, Oto)	(Y/N)	
	1			N	N	N	N	N	
	5								

Species Box Tally Area / Site Comments:

Chinook Salmon: ☒

Coho / Chinook: ☒ ☒ :

Coho Salmon: ☒ ☐

Salmonid sp. = 1 :

Fathead Minnow = ☐

Creek Chub = ☒ ☒ ☒ : :

Blacknose Dace ☒ ☒ ☒ ☒ ☒ ☒ ☒ ☒ ☒ ☒ :

Pumpkinseed = *

Spawning male = *
(counted in above tally)

Not 100% sure about individ. Coho + Chinook ID.

Aging Structures Legend:

Sc - Scales
Pr - Pectoral Ray
Oto - Otoliths
Dr - Dorsal Ray
yoy - Young Of the Year
1+ - Older than "yoy"

QA/QC By:

Date:

Appendix D

Significant Wildlife Habitat Screening

Project # WW20101061

SWH Screening 7 E

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
Seasonal Concentration Areas					
Waterfowl Stopover and Staging Areas: Terrestrial (Rationale – Habitat important to migrating waterfowl)	American Black Duck Wood Duck Green-winged Teal Blue-winged Teal Mallard Northern Pintail Northern Shoveler American Wigeon Gadwall	CUM1 CUT1 Plus evidence of annual spring flooding from meltwater or run-off within these Ecosites.	•Fields with sheet water during Spring (mid-March to May) •Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl •Agricultural fields with waste grains are commonly used by waterfowl, these are not considered SWH unless they have spring sheet water available •Anecdotal information from the landowner, adjacent landowners or local naturalist clubs may be good information in determining occurrence. •Reports and other information available from Conservation Authorities •Sites documented through waterfowl planning processes (*e.g.,* EHJV implementation plan) •Field Naturalist Clubs •Ducks Unlimited Canada •Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • Any mixed species aggregations of 100 or more individuals required • The flooded field ecosite habitat plus a 100-300m radius, dependent on local site conditions and adjacent land use is the significant wildlife habitat • Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates) • SWH MIST Index #7 provides development effects and mitigation measures.	**Not Present** No ponds, marshes, lakes, bays, coastal inlets, watercourses (aquatic), or fields (terrestrial) with evidence of standing water in spring and concentrations of waterfowl are present within the Project Study Area.
Waterfowl Stopover and Staging Areas: Aquatic (Rationale – Important for local and migrant waterfowl populations during the spring or fall migration or both periods combined. Sites identified are usually only one of a few in the eco-district)	Canada Goose Cackling Goose Snow Goose American Black Duck Northern Pintail Northern Shoveler American Wigeon Gadwall Green-winged Teal Blue-winged Teal Hooded Merganser Common Merganser Lesser Scaup Greater Scaup Long-tailed Duck Surf Scoter	MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7	•Ponds, marshes, lakes, bays, coastal inlets and watercourses used during migration. Sewage treatment ponds and storm water ponds do not qualify as a SWH, however a reservoir managed as a large wetland or pond/lake does qualify •These habitats have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water). •Environment Canada •Naturalist clubs often are aware of staging/stopover areas. •OMNRF Wetland Evaluations indicate presence of locally and regionally significant waterfowl staging.	Studies carried out and verified presence of: • Aggregations of 100 or more of listed species for 7 days, results in >700 waterfowl use days • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH • The combined area of the ELC ecosites and a 100m radius area is the SWH • Wetland area and shorelines associated with sites identified within the SWHTG Appendix K are significant wildlife habitat.	

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
	White-winged Scoter Black Scoter Ring-necked duck Common Goldeneye Bufflehead Redhead Ruddy Duck Red-breasted Merganser Brant Canvasback Ruddy Duck		•Sites documented through waterfowl planning processes (*e.g.,* EHJV implementation plan) •Ducks Unlimited projects •Element occurrence specification by Nature Serve: http://www.natureserve.org •Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	• Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • Annual Use of Habitat is Documented from Information Sources or Field Studies (Annual can be based on completed studies or determined from past surveys with species numbers and dates recorded). • SWH MIST Index #7 provides development effects and mitigation measures.	
Shorebird Migratory Stopover Area (Rationale: High quality shorebird stopover habitat is extremely rare and typically has a long history of use.)	Greater Yellowlegs Lesser Yellowlegs Marbled Godwit Hudsonian Godwit Black-bellied Plover American Golden-Plover Semipalmated Plover Solitary Sandpiper Spotted Sandpiper Semipalmated Sandpiper Pectoral Sandpiper White-rumped Sandpiper Baird's Sandpiper Least Sandpiper Purple Sandpiper Stilt Sandpiper Short-billed Dowitcher Red-necked Phalarope Whimbrel Ruddy Turnstone Sanderling Dunlin	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2 MAM3 MAM4 MAM5	• Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. • Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. • Sewage treatment ponds and storm water ponds do not qualify as a SWH. <u>Information Sources</u> • Western hemisphere shorebird reserve network. • Canadian Wildlife Service (CWS) Ontario Shorebird Survey. • Bird Studies Canada • Ontario Nature • Local birders and naturalist clubs • Natural Heritage Information Center (NHIC) Shorebird Migratory Concentration Area	Studies confirming: • Presence of 3 or more of listed species and > 1000 shorebird use days during spring or fall migration period. (shorebird use days are the accumulated number of shorebirds counted per day over the course of the fall or spring migration period) • Whimbrel stop briefly (<24hrs) during spring migration, any site with >100 Whimbrel used for 3 years or more is significant. • The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100m radius area cxlviii • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects' • SWHMiST Index #8 provides development effects and mitigation measures.	**Not Present** No shorelines of lakes, rivers, wetlands, beach areas, bars, seasonally flooded muddy and un-vegetated habitats are present within the Project Study Area.
Raptor Wintering (Rationale: Sites used by multiple species, a	Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel	HAWKS/OWLS: Combination of ELC Community Series; need to have present one	• The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors	Studies confirm the use of these habitats by: • One or more Short-eared Owls or; one of more Bald	**Not Present** Suitable combinations of habitat types are not present within the Project Study Area. As well,

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
high number of individuals and used annually are most significant)	Snowy Owl **Special Concern:** Short-eared Owl Bald Eagle	Community Series from each land class; Forest: FOD, FOM, FOC. Upland: CUM, CUT, CUS, CUW. BALD EAGLE Forest Community Series: FOD, FOM, FOC, SWD, SWM or SWC on shoreline areas adjacent to large rivers or adjacent to lakes with open water (hunting area).	• Raptor wintering (hawk/owl) sites need to be >20 ha with a combination of forest and upland • Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands • Field area of the habitat is to be wind swept with limited snow depth or accumulation. • Eagle sites have open water and large trees and snags available for roosting INFORMATION SOURCES • OMNRF Ecologist or Biologist • Naturalist clubs • Natural Heritage Information Centre (NHIC) Raptor Winter Concentration Area • Data from Bird Studies Canada • Results of Christmas Bird Counts • Reports and other information available from Conservation Authorities	Eagles or; at least 10 individuals and two of the listed hawk/owl species • To be significant a site must be used regularly (3 in 5 years) for a minimum of 20 days by the above number of birds. • The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #10 and #11 provides development effects and mitigation measures.	woodlands within the Project Study Area do not meet the minimum size requirements.
Bat Hibernacula (Rationale; Bat hibernacula are rare habitats in all Ontario landscapes.)	Big Brown Bat Tri-coloured Bat	Bat Hibernacula may be found in these ecosites: CCR1 CCR3 CCA1 CCA2 (Note: buildings are not considered SWH)	•Hibernacula may be found in caves, mine shafts, underground foundations and Karsts •Active mine sites should not be considered as SWH •The locations of Bat Hibernacula are relatively poorly known. INFORMATION SOURCES •OMNRF for possible locations and contact for local experts •Natural Heritage Information Centre (NHIC) Bat Hibernaculum •Ministry of Northern Development and Mines for location of mine shafts. •Clubs that explore caves (*e.g.,* Sierra Club) •University Biology Departments with bat experts.	•All sites with confirmed hibernating bats are SWH •The area includes 200 m radius around the entrance of the hibernaculum for most development types and 1000 m for wind farms •Studies are to be conducted during the peak swarming period (Aug. – Sept.). Surveys should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects" •SWH MIST Index #1 provides development effects and mitigation measures.	**Not Present** No caves, mine shafts, underground formations/foundations, crevices, or Karst present within the Project Study Area.
Bat Maternity Colonies (Rationale: Known locations of forested bat maternity colonies are extremely rare	Big Brown Bat Silver-haired Bat	Maternity colonies considered SWH are found in forested Ecosites. All ELC Ecosites in ELC Community Series: FOD, FOM, SWD, SWM	•Maternity colonies can be found in tree cavities, vegetation and often in buildings (buildings are not considered to be SWH). •Maternity roosts are not found in caves and mines in Ontario •Maternity colonies located in Mature deciduous or mixed forest stands with >10/ha large diameter (>25cm dbh) wildlife	•Maternity colonies with confirmed use by: o>10 Big Brown Bats (EPFU) o>5 adult female Silver-haired (LANO) Bats •The area of habitat includes the entire woodland or a forest stand ELC Ecosite or an Eco	**Candidate Habitat Present** The FOD7-3 and the FOD within the Project Study Area are considered candidate bat maternity roost habitat; however, suitable woodlands are not

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
in all Ontario landscapes.)			trees •Female bats prefer wildlife trees (snags) in early stages if decay, class 1-3 or class 1 or 2 •Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred INFORMATION SOURCES •OMNRF for possible locations and contact for local experts •University Biology Departments with bat experts.	element containing the maternity colonies •Evaluation methods for maternity colonies should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects" •SWH MIST Index #12 provides the development effects and mitigation measures.	present within the Project Location.
Turtle Wintering Areas (Rationale: Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.)	Midland Painted Turtle **Special Concern:** Northern Map Turtle Snapping Turtle	Snapping and Midland Painted Turtles: SW, MA, OA and SA; FEO and BOO. Northern Map Turtle: Open water areas such as deeper rivers or streams and lakes with current can also be used as overwintering habitat.	•For most turtles, wintering areas are in the same general areas as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates. •Overwintering sites are permanent water bodies, large wetlands and bots or fens with adequate dissolved oxygen. •Manmade ponds such as sewage lagoons or storm water ponds should not be considered SWH. INFORMATION SOURCES •EIS studies carried out by conservation authorities. •Field naturalists clubs. •OMNRF ecologist or biologist •NHIC	•Presence of five overwintering Midland Painted Turtles is significant. •One or more Northern Map Turtle or Snapping Turtle overwintering within a wetland is significant. •The mapped ELC ecosite area with the overwintering turtles is the SWH. If the hibernation site is within a stream or river, the deep-water pool where the turtles are overwintering is the SWH. •Overwintering areas may be identified by searching for congregations (basking areas) of turtles on warm, sunny days during the fall (September to October) or spring (March to May). Congregation of turtles is more common where wintering areas are limited and therefore significant. •SWH MIST Index #28 provides development effects and mitigation measures for turtle wintering habitat.	**Candidate Habitat Present** The Credit River, which is located within the Project Study Area is considered candidate Turtle Wintering Habitat. Carolyn Creek, located within the Project Location is not considered suitable habitat as the feature does not provide sufficiently deep water or soft mud substrates.
Reptile Hibernaculum (Rationale: Generally, sites are the only	SNAKES Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake	For all snakes, habitat may be found in any ecosite other than very wet ones. Talus, Rock Barren, Crevice,	•For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural or naturalized locations. The existence of features that go	Studies confirming: •Presence of snake hibernacula used by a minimum of five individuals of a snake sp. or;	**Not Present** Suitable habitat of talus, rock barren, alvars, caves and/or crevices are not present within the

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
known sites in the area. Sites with the highest number of individuals are most significant.)	Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake SPECIAL CONCERN Milksnake Eastern Ribbonsnake LIZARD SPECIAL CONCERN (Southern Shield population): Five-lined Skink	Cave, and Alvar sites may be directly related to these habitats. Observations or congregations of snakes on sunny warm days in the spring or fall is a good indicator. For Five-lined Skink, ELC Community Series of FOD and FOM and Ecosites: FOC1 FOC3	below frost line; such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH. •Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line •Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. •Five-lined skink prefer mixed forests with rock outcrop openings providing cover rock overlaying granite bedrock with fissures. INFORMATION SOURCES •In spring, local residents or landowners may have observed the emergence of snakes on their property (*e.g.,* old dug wells). •Reports and other information available from Conservation Authorities. •Field Naturalist Clubs •University herpetologists •Natural Heritage Information Centre (NHIC) •OMNRF ecologist or biologist may be aware of locations of wintering skinks	individuals of two or more snake spp. •Congregations of a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. near potential hibernacula (*e.g.,* foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct) •NOTE: If there are Special Concern Species present, then site is SWH •NOTE: Sites for hibernation possess specific habitat parameters (*e.g.,* temperature, humidity, *etc.*) and consequently are used annually, often by many of the same individuals of a local population (*i.e.,* strong hibernation site fidelity). Other critical life processes (*e.g.,* mating) often take place in close proximity to hibernacula. •The feature in which the hibernacula is located plus a 30 m radius area is the SWH •SWH MIS Index #13 provides development effects and mitigation measures for snake hibernacula. •Presence of any active hibernaculum for skink is significant. •SWHMiST Index #37 provides development effects and mitigation measures for fivelined skink wintering habitat.	Study Area. Furthermore, no rockpiles, cracks below the frostline, old stone fences or old foundation were found during the field investigations.
Colonially Nesting Bird Breeding Habitat: cliff/bank (Rationale: Historical use and number of	Cliff Swallow Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies)	Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles Cliff faces, bridge abutments, silos, barns.	• Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area. • Does not include man-made structures (bridges or buildings) or recently (2 years)	Studies confirming: • Presence of 1 or more nesting sites with 8 or more cliff swallow pairs and/or rough-winged swallow pairs during	**Not Present** While suitable habitat (i.e., bridges) and banks are present within the Project Study Area; nest searches were undertaken during

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
nests in a colony make this habitat significant. An identified colony can be very important to local populations. All swallow populations are declining in Ontario.)		Habitat found in the following ecosites: CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1	disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. • Does not include a licensed/permitted Mineral Aggregate Operation. INFORMATION SOURCES • Reports and other information available from Conservation Authorities • Ontario Breeding Bird Atlas • Bird Studies Canada; http://www.birdscanada.org/birdmon • Field Naturalist Clubs.	the breeding season. • A colony identified as SWH will include a 50m radius habitat area from the peripheral nests • Field surveys to observe and count swallow nests are to be completed during the breeding season. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #4 provides development effects and mitigation measures.	field investigation which confirmed the absence of nests of this species within the Project Study Area.
Colonially Nesting Bird Breeding Habitat: tree/shrub (Rationale: Large colonies are important to local bird populations, typically sites are only known colony in area and are used annually.)	Great Blue Heron Black-crowned Night-Heron Great Egret Green Heron	SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7 FET1	• Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. • Most nests in trees are 11 to 15 m from ground, near the top of the tree. INFORMATION SOURCES • Ontario Breeding Bird Atlas colonial nest records. • Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNRF). • Natural Heritage Information Centre (NHIC) Mixed Wader Nesting Colony • Aerial photographs can help identify large heronries. • Reports and other information available from Conservation Authorities. • MNRF District Offices • Field Naturalist Clubs.	Studies confirming: • Presence of 5 or more active nests of Great Blue Heron or other listed species. • The habitat extends from the edge of the colony and a minimum 300m radius or extent of the Forest Ecosite containing the colony or any island <15 ha with a colony is the SWH • Confirmation of active heronries are to be achieved through site visits conducted during the nesting season (April to August) or by evidence such as the presence of fresh guano, dead young and/or eggshells • SWH MIST Index #5 provides development effects and mitigation measures.	**Not Present** Suitable habitat of Swamps (SW) and Fens (FE) are not present within the Study Area. Furthermore, no stick nests representative of these species were identified during field investigation.
Colonially Nesting Bird Breeding Habitat: ground (Rationale: Colonies are important to local bird populations, typically sites are only known	Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird	Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1;50,000 NTS map). Close proximity to watercourses in open fields or pastures with scattered	• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands. INFORMATION SOURCES	Studies confirming: • Presence of > 25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern • Presence of 5 or more pairs for Brewer's Blackbird • Any active nesting colony of	**Not Present** Suitable habitat is not present within the Project Study Area.

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
colony in area and are used annually.)		trees or shrubs (Brewer's Blackbird) MAM1 – 6 MAS1 – 3 CUM CUT CUS	• Ontario Breeding Bird Atlas, rare/colonial species records. • Canadian Wildlife Service • Reports and other information available from Conservation Authorities. • Natural Heritage Information Centre (NHIC) Colonial Waterbird Nesting Area • MNRF District Offices. • Field Naturalist Clubs	one or more Little Gull, and Great Black-backed Gull is significant • The edge of the colony and a minimum 150m radius area of habitat, or the extent of the ELC ecosites containing the colony or any island <3 ha with a colony is the SWH • Studies would be done during May/June when actively nesting. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #6 provides development effects and mitigation measures.	
Migratory Butterfly Stopover Areas (Rationale: Butterfly stopover areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter.)	Painted Lady Red Admiral SPECIAL CONCERN Monarch	Combination of ELC Community Series; need to have present one Community Series from each landclass: FIELD: CUM, CUT, CUS FOREST: FOC, FOD, FOM, CUP Anecdotally, a candidate site for butterfly stopover will have a history of butterflies being observed.	• A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Erie or Lake Ontario • The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south • The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat • Staging areas usually provide protection from the elements and are often spits of land or areas with the shortest distance to cross the Great Lakes INFORMATION SOURCES • MNRF District Offices • Natural Heritage Information Centre (NHIC) • Agriculture Canada in Ottawa may have list of butterfly experts. • Field Naturalist Clubs • Toronto Entomologists Association • Conservation Authorities	Studies confirm: • The presence of Monarch Use Days (MUD) during fall migration (Aug/Oct). MUD is based on the number of days the site is used by Monarchs, multiplied by the number of individuals using the site. Numbers of butterflies can range from 100-500/day, significant variation can occur between years and multiple years of sampling should occur • Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD. • MUD of >5000 or >3000 with the presence of Painted Ladies or Red Admiral's is to be considered significant. • SWH MIST Index #16 provides development effects and mitigation measures.	**Not Present** The Project Study is not within 5km of Lake Ontario. Further to this, suitable habitat types and sizes are not present within the Project Study Area.

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
Landbird Migratory Stopover Areas (Rationale: Sites with a high diversity of species as well as high numbers are most significant.)	All migratory songbirds Canadian Wildlife Service Ontario website: http://www.ec.gc.ca/nature/default.asp?lang=En&n=421B7A9D-1 All migrant raptor species: Ontario Ministry of Natural Resources: Fish and Wildlife Conservation Act, 1997. Schedule 7: Specially Protected Birds (Raptors)	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD	• Woodlots >10 ha in size and within 5 km of Lake Ontario. • If multiple woodlands are located along the shoreline those woodlands <2 km from and Lake Ontario are more significant • Sites have a variety of habitats: forest, grassland and wetland complexes • The largest sites are more significant • Woodlots and forest fragments are important habitats to migrating birds, these features located along the shore and within 5 km of and Lake Ontario are Candidate SWH. INFORMATION SOURCES • Bird Studies Canada • Ontario Nature • Local birders and field naturalist clubs • Ontario Important Bird Areas (IBA) Program	Studies confirm: • Use of the habitat by >200 birds/day and with >35 species and with at least 10 bird species recorded on at least 5 different survey dates. This abundance and diversity of migrant bird species is considered above average and significant • Studies should be completed during spring (Mar.-May) and fall (Aug.-Oct.) migration using standardized assessment techniques. Evaluation to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #9 provides development effects and mitigation measures.	**Not Present** The Project Study is not within 5km of Lake Ontario. Further to this, suitable habitat types and sizes are not present within the Project Study Area.
Deer Winter Congregation Areas (Rationale: Deer movement during winter in the southern areas of Ecoregion 7E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands to reduce or avoid the impacts of winter conditions.)	White-tailed Deer	All forested Ecosites with these ELC Community Series: FOC, FOM, FOD, SWC, SWM, SWD Conifer plantations much smaller than 50 ha may also be used.	• Woodlots >100 ha in size. Woodlots <100ha may be considered as significant based on MNRF studies or assessment • Deer movement during winter in the southern areas of Ecoregion 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands • If deer are constrained by snow death refer to the Deer Yarding Area habitat within Table 1.1 of this Schedule • Large woodlots >100 ha and up to 1,500 ha are known to be used annually by densities of deer that range from 0.1-1.5 deer/ha • Woodlots with high densities of deer due to artificial feeding are not significant. INFORMATION SOURCES • MNRF District Offices • LIO/NRVIS	Studies confirm: • Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF • Use of the woodlot by white-tailed deer will be determined by MNRF, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNRF • Studies should be completed during winter (Jan./Feb.) when >20 cm of snow is on the ground using aerial survey techniques, ground road surveys, or a pellet count deer survey If a SWH is determined for Deer Wintering Area or if a proposed development is within Stratum II yarding area then Movement Corridors are to be considered as outlined in Table 1.4.1 of this	**Not Present** There are no features delineated by MNRF present. Furthermore, forests of suitable size are not present within the Project Study Area.

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
				Schedule • SWH MIST Index #2 provides development effects and mitigation measures	
Rare Vegetation Communities or Specialized Habitat for Wildlife					
Rare Vegetation Communities					
Cliffs and Talus Slopes (Rationale: Cliffs and Talus Slopes are extremely rare habitats in Ontario.)		Any ELC Ecosite within Community Series: TAO, TAS, TAT, CLO, CLS, CLT A Cliff is vertical to near vertical bedrock >3 m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris.	• Most cliff and talus slopes occur along the Niagara Escarpment INFORMATION SOURCES • The Niagara Escarpment Commission has detailed information on location of these habitats • OMNRF Districts • Natural Heritage Information Centre (NHIC) has location information available on their website • Field Naturalist Clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes • SWH MIST Index #21 provides development effects and mitigation measures	**Not Present** There are no cliff or talus slope features present within the Project Study Area.
Sand Barren (Rationale: Sand barrens are rare in Ontario and support rare species. Most sand barrens have been lost due to cottage development and forestry.)		ELC Ecosites: SBO1, SBS1, SBT1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always <60% Sand barrens typically are exposed sand, generally sparsely vegetated and caused by a lack of moisture, periodic fires and erosion. Usually located within other types of natural habitat such as forest or savannah. Vegetation can vary from patchy and barren to tree covered but less than 60%.	• A sand barren area >0.5 ha in size INFORMATION SOURCES • The Niagara Escarpment Commission has detailed information on location of these habitats • OMNRF Districts • Natural Heritage Information Centre (NHIC) has location information available on their website • Field Naturalist Clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Sand Barrens • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic spp.) • SWH MIST Index #20 provides development effects and mitigation measures	**Not Present** There are no sand barrens present within the Project Study Area.
Alvar (Rationale: Alvars are extremely rare	FIVE ALVAR INDICATOR SPECIES *Carex crawei* *Panicum philadelphicum*	ALO1, ALS1, ALT1, FOC1, FOC2, CUM2, CUS2, CUT2-1, CUW2	• An Alvar site >0.5 ha in size • Alvar is particularly rare in Ecoregion 7E where the only known sites are found in the	• Field studies identify that four of the five ALVAR INDICATOR SPECIES at a Candidate Alvar	**Not Present** There are no Alvars present within the Project Study Area.

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
habitats in Ecoregion 6E.)	*Eleocharis compressa* *Scutellaria parvula* *Trichostema brachiatum* These indicator species are very specific to Alvars within Ecoregion 6E	An Alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plants. Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animal species. Vegetation cover varies from patchy to barren with a less than 60% tree cover	western islands of Lake Erie INFORMATION SOURCES • Alvars of Ontario (Federation of Ontario Naturalists, 2000) • Conserving Great Lakes Alvars (Ontario Nature) • OMNRF Districts • Natural Heritage Information Centre (NHIC) has location information available on their website • Field Naturalist Clubs • Conservation Authorities	Site is significant • Site must not be dominated by exotic of introduced species (<50% vegetative cover are exotic spp.) • The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses • SWH MIST Index #17 provides development effects and mitigation measures	
Old Growth Forest (Rationale: Due to historic logging practices and land clearance for agriculture, old growth forest is rare in Ecoregion 6E.)		Forest Community Series: FOD, FOC, FOM, SWD, SWC, SWM Old Growth Forests are characterized by heavy mortality or turnover of over-storey trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris.	• Woodland areas 30 ha or greater in size or with at least 10 ha interior habitat assuming 100 m buffer at edge of forest INFORMATION SOURCES • OMNRF Forest Resource Inventory mapping • OMNRF Districts • Field Naturalist Clubs • Conservation Authorities • Sustainable Forestry License (SFL) companies will possibly know locations through field operations • Municipal forestry departments	Field studies will determine: • If dominant tree species of the forest are >140 years old, then the area containing these trees is SWH • The forested area containing the old growth characteristics will have experienced no recognizable forestry activities (cut stumps will not be present) • The area of forest ecosites combined or an eco-element within an ecosite that contain the old growth characteristics is the SWH • Determine ELC vegetation types for the forest area containing the old growth characteristics • SWH MIST Index #23 provides	**Not Present** There are no Old Growth Forests present within the Project Study Area.

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
				development effects and mitigation measures	
Savannah (Rationale: Savannahs are extremely rare habitats in Ontario.)		TPS1, TPS2, TPW1, TPW2, CUS2 A Savannah is a tallgrass prairie habitat that has tree cover between 25-60%.	• No minimum size to site • Site must be restored or a natural site. Remnant sites such as railway right-of-ways are not considered SWH INFORMATION SOURCES • Natural Heritage Information Centre (NHIC) has location information available on their website • Field Naturalist Clubs • Conservation Authorities	Field studies confirm: • One or more of the Savannah indicator species listed in Appendix N should be present. Note: savannah plant spp. List from Ecoregion 6E should be used. • Area of the ELC Ecosite is the SWH • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic spp.) • SWH MIST Index #18 provides development effects and mitigation measures.	**Not Present** There are no Savannahs present within the Project Study Area.
Tallgrass Prairie (Rationale: Tallgrass Prairies are extremely rare habitats in Ontario.)		TPO1, TPO2 A tallgrass prairie has ground cover dominated by prairie grasses. An open tallgrass prairie habitat has <25% tree cover.	• No minimum size to site • Site must be restored or a natural site. Remnant sites such as railway right-of-ways are not considered SWH INFORMATION SOURCES • Natural Heritage Information Centre (NHIC) has location information available on their website • Field Naturalist Clubs • Conservation Authorities	Field studies confirm: • One or more of the Prairie indicator species listed in Appendix N should be present. Note: savannah plant spp. List from Ecoregion 6E should be used. • Area of the ELC Ecosite is the SWH • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic spp.) • SWH MIST Index #19 provides development effects and mitigation measures.	**Not Present** There are no Tallgrass Prairies present within the Project Study Area.
Other Rare Vegetation Communities (Rationale: Plant communities that often contain rare species which depend on the habitat for survival.)		Provincially rare (S1, S2, S3) vegetation communities are listed in Appendix M of the Significant Wildlife Habitat Technical Guide (MNRF, 2000). Any ELC Ecosite Code that has a possible ELC Vegetation Type that is provincially rare is candidate SWH.	• ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in Appendix M of the Significant Wildlife Habitat Technical Guide (MNRF, 2000). • OMNRF/NHIC will have up to date listing for rare vegetation communities. INFORMATION SOURCES • Natural Heritage Information Centre (NHIC) has location information available on their	• Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of the Significant Wildlife Habitat Technical Guide (MNRF, 2000). • Area of the ELC Vegetation Type polygon is the SWH. • SWH MIST Index #37 provides	**Not Present** There are no other rare vegetation communities present within the Project Study Area.

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
		Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps.	website • OMNRF Districts • Field Naturalist Clubs • Conservation Authorities	development effects and mitigation measures.	
Specialized Habitat for Wildlife					
Waterfowl Nesting Area (Rationale: Important to local waterfowl populations, sites with greatest number of species and highest number of individuals are significant)	American Black Duck Northern Pintail Northern Shoveler Gadwall Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SWT1, SWT2, SWD1, SWD2, SWD3, SWD4 NOTE Includes adjacency to Provincially Significant Wetlands	• A waterfowl nesting area extends 120 m from a wetland (>0.5 ha) or a wetland (>0.5 ha) and any small wetlands (0.5 ha) within 120 m or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur • Upland areas should be at least 120 m wide so that predators such as raccoons, skunks and foxes have difficulty finding nests • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40 cm dbh) in woodlands for cavity nest sites. INFORMATION SOURCES • Ducks Unlimited staff may know the locations of particularly productive nesting sites • MNRF Wetland Evaluations for indication of significant waterfowl nesting habitat • Reports and other information available from Conservation Authorities	Studies confirmed: • Presence of 3 or more nesting pairs for listed species excluding Mallards, or; • Presence of 10 or more nesting pairs for listed species including Mallards. • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April - June). Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • A field study confirming waterfowl nesting habitat will determine boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120 m from the wetland and will provide enough habitat for waterfowl to successfully nest • SWH MIST Index #25 provides development effects and mitigation measures.	**Not Present** Suitable habitat types of marshes (MA), shallow aquatic (SA) and/or swamps (SW) are not present within the Project Study Area.
Bald Eagle and Osprey nesting, foraging and Perching Habitat (Rationale: Nest sites are fairly uncommon in Ecoregion 7E and are used annually by these species. Many	Osprey SPECIAL CONCERN Bald Eagle	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands.	• Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. • Nests located on man-made objects are not to be included as SWH (*e.g.,* telephone poles	Studies confirm the use of these nests by: • One or more active Osprey or Bald Eagle nests in an area • Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the	**Not Present** While the Credit River may provide foraging habitat for these species, no stick nests representative of these species were identified during field investigation.

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
suitable nesting locations may be lost due to increasing shoreline development pressures and scarcity of habitat.)			and constructed nesting platforms) INFORMATION SOURCES • NHIC compiles all known nesting sites for Bald Eagles in Ontario • MNRF values information (LIO/NRVIS) will list known nesting locations. Note: data from NRVIS is provided as a point and does not represent all the habitat • Nature Counts, Ontario Nest Records Scheme data. • OMNRF District. • Check the Ontario Breeding Bird Atlas or Rare Breeding Birds in Ontario for species documented • Reports and other information available from Conservation Authorities. • Field Naturalists clubs	SWH. • For an Osprey, the active nest and a 300 m radius around the nest or the contiguous woodland stand is the SWH, maintaining undisturbed shorelines with large trees within this area is important • For a Bald Eagle the active nest and a 400-800 m radius around the nest is the SWH. Area of the habitat from 400-800 m is dependent on sight lines from the nest to the development and inclusion of perching and foraging habitat • To be significant a site must be used annually. When found inactive, the site must be known to be inactive for > 3 years or suspected of not being used for >5 years before being considered not significant. • Observational studies to determine nest site use, perching sites and foraging areas need to be done from early March to mid-August. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #26 provides development effects and mitigation measures	
Woodland Raptor Nesting Habitat (Rationale: Nest sites for these species are rarely identified; these area sensitive habitats are often used annually by these species.)	Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3.	• All natural or conifer plantation woodland/forest stands >30 ha with > 4 ha of interior habitat. Interior habitat determined with a 200 m buffer. • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests, within tops or crotches of trees. Species such as Cooper's Hawk nest along forest edges sometimes on peninsulas or small off-shore islands.	Studies confirm: • Presence of one or more active nests from species list is considered significant • Red-shouldered Hawk and Northern Goshawk – A 400 m radius around the nest or 28 ha area of habitat is the SWH. The 28 ha habitat area would be applied where optimal habitat	**Not Present** Forests of suitable size are not present within the Project Study Area. Further to this, no stick nests representative of these species were identified during field investigation.

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
			• In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest INFORMATION SOURCES • OMNRF Districts. • Check the Ontario Breeding Bird Atlas or Rare Breeding Birds in Ontario for species documented. • Check data from Bird Studies Canada. • Reports and other information available from Conservation Authorities.	is irregularly shaped around the nest. • Barred Owl – A 200m radius around the nest is the SWH • Broad-winged Hawk and Coopers Hawk, – A 100m radius around the nest is the SWH • Sharp-Shinned Hawk – A 50m radius around the nest is the SWH • Conduct field investigations from early March to end of May. The use of call broadcasts can help in locating territorial (courting/nesting) raptors and facilitate the discovery of nests by narrowing down the search area. • SWH MIST Index #27 provides development effects and mitigation measures	
Turtle Nesting Habitat (Rationale: These habitats are rare and when identified will often be the only breeding site for local populations of turtles.)	Midland Painted Turtle SPECIAL CONCERN Northern Map Turtle Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100 m) or within the following ELC Ecosites: MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, BOO1, FEO1	• Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. • For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and is located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. • Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes and rivers are most frequently used. INFORMATION SOURCES • Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (well-drained sands and fine gravels). • Check the Ontario Herpetofaunal Summary Atlas records or other similar atlases for uncommon turtles; location information may help to find potential nesting habitat for them.	Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles. • One ore more Northern Map Turtles or Snapping Turtles nesting is a SWH. • The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30 to 100 m around the nesting area dependent on slope, riparian vegetation and adjacent land use is the SWH. • Travel routes from wetland to nesting area are to be considered within the SWH as part of the 30 to 100 m area of habitat. • Field investigations should be conducted in prime nesting season typically late spring to early summer. Observational studies observing the turtles	**Not Present** Suitable wetlands habitats are not present, nor were any sand/gravel features or evidence of turtle nesting along the banks of the Credit River identified within the Project Study Area

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
			• Natural Heritage Information Centre (NHIC). • Field naturalist clubs.	nesting is a recommended method. • SWH MIST Index #28 provides development effects and mitigation measures for turtle nesting habitat.	
Seeps and Springs (Rationale: Seeps/springs are typical of headwater areas and are often at the source of Coldwater streams.)	Wild Turkey Ruffed Grouse Spruce Grouse White-tailed Deer Salamanders	Seeps/springs are areas where groundwater comes to the surface. Often they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	• Any forested area (with <25% meadow/field/ pasture) within the headwaters of a stream or river system • Seeps and springs are important feeding and drinking areas. Especially in the winter will support a variety of plant and animal species. INFORMATION SOURCES • Topographical Map. • Thermography. • Hydrological surveys conducted by Conservation Authorities and MOECC. • Field Naturalists Clubs and landowners. • Municipalities and Conservation Authorities may have drainage maps and headwater areas mapped	Field studies confirm: • Presence of a site with 2 or more seeps/springs should be considered SWH. • The area of an ELC forest ecosite or an Eco element within ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat • SWH MIST Index #30 provides development effects and mitigation measures	**Not Present** The Project Study Area is not located within a headwater area nor were any indicator or seeps or spring noted during the field investigations.
Amphibian Breeding Habitat: Woodland (Rationale: These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations.)	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Wood Frog	All Ecosites associated with these ELC Community Series: FOC, FOM, FOD, SWC, SWM, SWD Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to reduced risk to migrating amphibians.	• Presence of a wetland, pond or woodland pool (including vernal pools) >500 m2 (about 25 m diameter) within or adjacent (within 120 m) to a woodland (no minimum size). Some small wetlands may not be mapped and may be important breeding pools for amphibians. • Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat. INFORMATION SOURCES • Ontario Herpetofaunal Summary Atlas (or other similar atlases) for records • Local landowners may also provide assistance as they may hear spring-time choruses of amphibians on their property. • OMNRF Districts and wetland evaluations • Field Naturalist clubs • Canadian Wildlife Service Amphibian Road Call Survey	Studies confirm: • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog species with at least 20 individuals (adults or egg masses) or 2 or more of the listed frog species with Call Level Codes of 3. • A combination of observational study and call count surveys will be required during the spring (Mar.-Jun.) when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetlands • The habitat is the wetland area plus a 230m radius of woodland area. If a wetland area is adjacent to a woodland,	**Not Present** No wetlands or vernal pools are present within the Project Study Area.

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
			• Ontario Vernal Pool Association: http://www.ontariovernalpools.org	a travel corridor connecting the wetland to the woodland is to be included in the habitat. • SWH MIST Index #14 provides development effects and mitigation measures	
Amphibian Breeding Habitat: Wetland (Rationale: Wetlands supporting breeding for these amphibian species are extremely important and fairly rare within central Ontario landscapes.)	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	ELC Community Classes SW, MA, FE, BO, OA and SA. Typically these wetland ecosites will be isolated (>120 m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (*e.g.,* Bullfrog) may be adjacent to woodlands.	• Wetlands >500m2 (about 25m diameter), supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats • Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators • Bullfrogs require permanent water bodies with abundant emergent vegetation. INFORMATION SOURCES • Ontario Herpetofaunal Summary Atlas (or other similar atlases) • Canadian Wildlife Service Amphibian Road Surveys and Backyard Amphibian Call Count. • OMNRF Districts and wetland evaluations. • Reports and other information available from Conservation Authorities	Studies confirm: • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog/toad species with at least 20 individuals (adults or eggs masses) or 2 or more of the listed frog/toad species with Call Level Codes of 3 or; Wetland with confirmed breeding Bullfrogs are significant • The ELC ecosite wetland area and the shoreline are the SWH • A combination of observational study and call count surveys will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands. • If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWH MIST Index #15 provides development effects and mitigation measures.	**Not Present** No wetlands or vernal pools are present within the Project Study Area. While the Credit River is present, it is not anticipated to provide amphibian breeding habitat as it contains fish which would prey upon amphibian eggs. Similarly, since Carolyn Creek is directly linked to the Credit River, it is also not anticipated to provide amphibian breeding habitat.
Woodland Area-Sensitive Bird Breeding Habitat (Rationale: Large, natural blocks of mature woodland habitat within the	Yellow-bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler	All Ecosites associated with these ELC Community Series: FOC, FOM, FOD, SWC, SWM, SWD	CRITERIA • Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs. old) forest stands or woodlots >30 ha • Interior forest habitat is at least 200 m from forest edge habitat	Studies confirm: • Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. • Note: any site with breeding Cerulean Warblers or Canada Warblers is to be considered	**Not Present** Forests of suitable size are not present within the Project Study Area.

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
settled areas of Southern Ontario are important habitats for area sensitive interior forest song birds.)	Black-throated Blue Warbler Ovenbird Scarlet Tanager Winter Wren SPECIAL CONCERN Cerulean Warbler Canada Warbler		INFORMATION SOURCES • Local birder clubs. • Canadian Wildlife Service (CWS) for the location of forest bird monitoring. • Bird Studies Canada conducted a 3-year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to determine what forests were of greatest value to interior species • Reports and other information available from Conservation Authorities.	SWH • Conduct field investigations in spring and early summer when birds are singing and defending their territories • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #34 provides development effects and mitigation measures	
Habitats of Species of Conservation Concern					
Marsh Bird Breeding Habitat (Rationale: Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.)	American Bittern Virginia Rail Sora Common Moorhen American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Green Heron Trumpeter Swan SPECIAL CONCERN Black Tern Yellow Rail	MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1, SAM1, SAF1, FEO1, BOO1 For Green Heron: all SW, MA and CUM1 sites	• Nesting occurs in wetlands. • All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present • For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water INFORMATION SOURCES • OMNRF District and wetland evaluations. • Field Naturalist clubs • Natural Heritage Information Centre (NHIC) Records. • Reports and other information available from Conservation Authorities • Ontario Breeding Bird Atlas	Studies confirm: • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or breeding by any combination of 4 or more of the listed species • Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH • Area of the ELC ecosite is the SWH. • Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #35 provides development effects and mitigation measures	**Not Present** Suitable wetland habitats are not present within the Project Study Area.
Open Country Bird Breeding Habitat (Rationale: This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow SPECIAL CONCERN Short-eared Owl	CUM1, CUM2	• Large grassland areas (includes natural and cultural fields and meadows) >30 ha • Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (*i.e.,* no row cropping or intensive hay or livestock pasturing in the last 5 years) • Grassland sites considered significant should have a history of longevity, either	Field studies confirm: • Presence of nesting or breeding of 2 or more of the listed species • A field with 1 or more breeding Short-eared Owls is to be considered SWH • The area of SWH is the	**Not Present** Suitable grassland habitats are not present within the Project Study Area.

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.)			abandoned fields, mature hayfields and pasturelands that are at least 5 years or older. • The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species INFORMATION SOURCES • Agricultural land classification maps, Ministry of Agriculture. • Local bird clubs. • Ontario Breeding Bird Atlas • EIS Reports and other information available from Conservation Authorities	contiguous ELC ecosite field areas • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #32 provides development effects and mitigation measures	
Shrub / Early Successional Breeding Bird habitat (Rationale: This wildlife habitat is declining throughout Ontario and North America. The Brown Thrasher has declined significantly over the past 40 years based on CWS (2004) trend records.)	INDICATOR SPECIES Brown Thrasher Clay-coloured Sparrow COMMON SPECIES Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher SPECIAL CONCERN Yellow-breasted Chat Golden-winged Warbler	CUT1, CUT2, CUS1, CUS2, CUW1, CUW2 Patches of shrub ecosites can be complexed into a larger habitat for some bird species	• Large field areas succeeding to shrub and thicket habitats >10 ha in size • Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (*i.e.,* no row-cropping, haying or live-stock pasturing in the last 5 years) • Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species • Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands INFORMATION SOURCES • Agricultural land classification maps, Ministry of Agriculture. • Local bird clubs. • Ontario Breeding Bird Atlas • Reports and other information available from Conservation Authorities	Field studies confirm: • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species • A habitat with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat • The area of the SWH is the contiguous ELC ecosite field/thicket area. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #33 provides development effects and mitigation measures	**Not Present** While cultural woodlands (CUW) are present with the Project Study Area, none meet the minimum size requirements for this SWH type.
Terrestrial Crayfish Habitat (Rationale: Terrestrial Crayfish are only found within SW Ontario in Canada	Chimney or Digger Crayfish Devil Crayfish or Meadow Crayfish	MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, MAS1, MAS2, MAS3, SWD, SWT, SWM CUM1 with inclusions of	• Wet meadow and edges of shallow marshes (no minimum size) should be surveyed for terrestrial crayfish • Constructs burrows in marshes, mudflats, meadows, the ground can't be too moist. Can often be found far from water	Studies confirm: • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable meadow marsh, swamp or moist terrestrial sites	**Not Present** Suitable wetland and swamp types are not present within the Project Study Area. As well, no chimneys/burrows of the species

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
and their habitats are very rare.)		above meadow marsh ecosites can be used by terrestrial crayfish	• Both species are a semi-terrestrial burrower which spends most of its life within burrows consisting of a network of tunnels. Usually the soil is not too moist so that the tunnel is well-formed. INFORMATION SOURCES • Information sources from "Conservation Status of Freshwater Crayfishes" by Dr. Premek Hamr for the WWF and CNF, March, 1998	• Area of ELC ecosite or an Eco element area of meadow marsh or swamp within the larger ecosite area is the SWH • Surveys should be done April to August in temporary or permanent water. Note the presence of burrows or chimneys are often the only indicator of presence, observance or collection of individuals is very difficult • SWH MIST Index #36 provides development effects and mitigation measures	were identified during field investigations.
Special Concern and Rare Wildlife Species (Rationale: These species are quite rare or have experienced significant population declines in Ontario.)	All Special Concern and Provincially Rare (S1, S2, S3, SH) plant and animal species. Lists of these species are tracked by the NHIC	All plant and animal element occurrences (EOs) within a 1 km or 10 km grid. Older EOs were recorded prior to GPS being available, therefore location information may lack accuracy.	• When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites INFORMATION SOURCES • Natural Heritage Information Centre (NHIC) will have Special Concern and Provincially Rare (S1-S3, SH) species lists with element occurrences data. • NHIC Website "Get Information": http://nhic.mnr.gov.on.ca • Ontario Breeding Bird Atlas • Expert advice should be sought as many of the rare spp. Have little information available about their requirements	Studies confirm: • Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable. • The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs be easily mapped and cover an important life stage component for a species *e.g.,* specific nesting habitat or foraging habitat. • SWH MIST Index #37 provides development effects and mitigation measures	**Candidate Habitat Present** The following Special Concern and Provincially Rare (S1, S2, S3, SH) plant and animal species identified through the background information review: **Special Concern:** Canada Warbler, Common Nighthawk, Evening Grosbeak, Golden-winged Warbler, Olive-sided Flycatcher, Eastern Wood-Pewee, Peregrine Falcon, Bald Eagle, Wood Thrush, Red-headed Woodpecker, Rusty Blackbird, Eastern Ribbonsnake, Northern Map Turtle, Snapping Turtle and Monarch. As documented in the SAR Habitat Screening there is suitable habitat for Eastern Wood-pewee, Red-headed Woodpecker and Snapping Turtle present within the Project Study Area. **Provincially Rare:** Black-crowned Night-Heron, Caspian Tern, Fish Crow, Great Black-backed Gull, Great Egret, Prairie Warbler, Purple Martin, Rough-legged

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
					Hawk, Whimbrel and White-eyed Vireo. Of these species, suitable habitats for the Black-crowned Night-Heron, Caspian Tern, Great Black-backed Gull, Great Egret, Rough-legged Hawk and Whimbrel have been ruled out though the SWH habitat assessments for Colonially Nesting Bird Breeding Habitat (Tree, Shrub, Ground) SWH, Raptor Wintering, Shorebird Migratory Stopover Area SWH types. A brief assessment for the remaining species is present below. **Fish Crow:** This species is not a resident species, nor does it breed in Ontario. As such, the Project Study Area does not provide habitat for the Species. The source of this record was eBird, which accepts records from the general public. The species was either misidentified or was observed as a vagrant. **Prairie Warbler:** This species as an extremely limited breeding range in Ontario. The Project Study Area is not located within he known breeding range of this species. The source of this record was eBird, it is assumed the observation of this species was made while it was migrating through the Project Study Area. **Purple Martin:** This species breeds in large colonies in southern Ontario. However, they are largely limited to the breeding within nesting boxes. No nesting boxes or large colonies of the

Significant Wildlife Habitat Type (7E)	Indicator Wildlife Species	Ecosites/ Habitat Description	Criteria and Information Sources	Defining Criteria	Confirmed or Candidate SWH at Project Site
					species were identified during field investigations. **White-eye Vireo:** is species as an extremely limited breeding range in Ontario. The Project Study Area is not located within he known breeding range of this species. The source of this record was eBird, it is assumed the observation of this species was made while it was migrating through the Project Study Area. There are no candidate habitat for the following Provincially Rare species within the Project Study Area.
Animal Movement Corridors					
Amphibian Movement Corridors (Rationale: Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.)	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	Corridors may be found in all ecosites associated with water. Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1	• Movement corridors between breeding habitat and summer habitat • Movement corridors must be determined when amphibian breeding habitat is confirmed as SWH (Amphibian Breeding Habitat, Wetland) INFORMATION SOURCES • MNRF District Office. • Natural Heritage Information Centre (NHIC). • Reports and other information available from Conservation Authorities. • Field Naturalist Clubs	• Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites • Corridors should consist of native vegetation, with several layers of vegetation. Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant • Corridors should have at least 15m of vegetation on both sides of waterway or be up to 200m wide of woodland habitat and with gaps <20m • Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat • SWH MIST Index #40 provides development effects and mitigation measures	**Not Present** Given that there are no suitable breeding habitats available, no movement corridors have been identified.

APPENDIX

B

Stage 1 Archaeological Assessment

Original Report:
Stage 1 Archaeological Assessment

In Support of a Schedule 'B' Municipal Class Environmental Assessment for the Carolyn Creek Erosion Control Project along Barbertown Road, City of Mississauga, Ontario
Located within Lot 1, Concession IV (WHS), formerly in Toronto Township, County of Peel, now the City of Mississauga, Regional Municipality of Peel, Ontario
Project # WW201061

Archaeological Consulting License #P354 (Seguin)
PIF # P354-0066-2021 (Stage 1)

June 17, 2021

Prepared for:
City of Mississauga
300 City Centre Drive, Mississauga, ON Canada L5B 3C1

wood.

Original Report:
Stage 1 Archaeological Assessment

In Support of a Schedule 'B' Municipal Class Environmental Assessment for the Carolyn Creek Erosion Control Project along Barbertown Road, City of Mississauga, Ontario
Located within Lot 1, Concession IV (WHS), formerly in Toronto Township, County of Peel, now the City of Mississauga, Regional Municipality of Peel, Ontario
Project # WW201061

Prepared For:
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June 17, 2021

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wood.

Executive Summary

Wood Environment & Infrastructure (“Wood”) was retained by the City of Mississauga (“City of Mississauga” or the “Client”) to conduct a Stage 1 archaeological assessment in support of the Carolyn Creek Erosion Project along Barbertown Road, in the City of Mississauga. This archaeological assessment was completed in support of a Municipal Class Environmental Assessment and was completed as part of the background characterization stage, prior to alternative evaluation and design and project construction.

The segment of the subject creek is located within the right-of-way (“ROW”) along the south side of Barbertown Road, between the Slovak Canadian Culture Society (Koliba Park) and Barbertown Road, and the study area extends approximately 205 m from just north of the Barbertown Road box culvert to the Credit River (the “study area”). The study area was historically located in Lot 1, Concession IV (WHS), formerly in Toronto Township, County of Peel, now the City of Mississauga, Regional Municipality of Peel, Ontario. The study area is approximately 0.40 hectares (“ha”) in size (Appendix A: Figure 1-Figure 3).

The Stage 1 archaeological assessment was carried out in accordance with the Ontario Ministry of Heritage, Sport, Tourism and Culture Industries (“MHSTCI”) 2011 *Standards and Guidelines for Consultant Archaeologists* (MHSTCI 2011), under an Ontario Professional Licence to Conduct Archaeological Fieldwork (P354) held by Jason Seguin, Senior Archaeologist at Wood. The project information was acknowledged by the MHSTCI on 09 April 2021 with the issuance of PIF number P354-0066-2021 (Stage 1). Permission to enter the study area for the purposes of the Stage 1 archaeological assessment was granted to Wood by the Client for 13 April 2021. This permission extended to all required archaeological fieldwork activities.

The Stage 1 property assessment was undertaken by Cara Howell (R180) of Wood on 13 April 2021. The weather during the assessment was overcast and cool with a temperature of 12°C. The weather did not impede the property assessment in any way.

The Stage 1 background study indicated that the study area has general archaeological potential and requires Stage 2 property assessment for the following reasons: 1) the west section of the study area is adjacent to the Credit River and a portion of Carolyn Creek intersects with the east section of the study area (Appendix A:Figure 3); 2) the presence of one registered archaeological site located within 300 m of the study area and, four additional sites within a 1 km radius of the study providing direct evidence that this general area had been utilized by Indigenous and Euro-Canadian peoples; and, 3) the location of the study area within a historical transportation route (Appendix A: Figure 6 and Figure 7).

Despite the general archaeological potential of the study area, the Stage 1

archaeological assessment determined that 0.27 ha (67.5%) of the study area is disturbed (roadways, driveways, roadside shoulder [0.13 ha], and a recently constructed culvert canal system [0.14 ha]) and does not require Stage 2 archaeological assessment. In addition, approximately 0.09 ha (22.5%) has been previously assessed (Stage 1&2 P354-0028-2014) and requires no further assessment. The remaining 0.04 ha (10%) consists of natural steeply sloping topography and does not require further testing.

In light of the findings of the Stage 1 archaeological assessment of the study area, the following recommendation is made, subject to the conditions outlined below and in Section 5.0:

1. The study area (Figure 8) requires no further archaeological assessment.

The above recommendation is subject to Ministry of Heritage, Sport, Tourism and Culture Industries' approval, and it is an offence to alter any portion of the study area without Ministry of Heritage, Sport, Tourism and Culture Industries' 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 Heritage, Sport, Tourism and Culture Industries' approval has been received.

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Project Personnel

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1.0 Section 1 – Project Context

1.1 Project Context

Wood Environment & Infrastructure ("Wood") was retained by the City of Mississauga ("City of Mississauga" or the "Client") to conduct a Stage 1 archaeological assessment in support of the Carolyn Creek Erosion Project along Barbertown Road, in the City of Mississauga. This archaeological assessment was completed in support of a Municipal

Class Environmental Assessment and was completed as part of the background characterization stage, prior to alternative evaluation and design and project construction.

The segment of the subject creek is located within the right-of-way ("ROW") along the south side of Barbertown Road, between the Slovak Canadian Culture Society (Koliba Park) and Barbertown Road, and the study area extends approximately 205 m from just north of the Barbertown Road box culvert to the Credit River (the "study area"). The study area was historically located in Lot 1, Concession IV (WHS), formerly in Toronto Township, County of Peel, now the City of Mississauga, Regional Municipality of Peel, Ontario. The study area is approximately 0.40 hectares ("ha") in size (Appendix A: Figure 1-Figure 3).

The Stage 1 archaeological assessment was carried out in accordance with the Ontario Ministry of Heritage, Sport, Tourism and Culture Industries ("MHSTCI") 2011 Standards and Guidelines for Consultant Archaeologists (MHSTCI 2011), under an Ontario Professional Licence to Conduct Archaeological Fieldwork (P354) held by Jason Seguin, Senior Archaeologist at Wood. The project information was acknowledged by the MHSTCI on 09 April 2021 with the issuance of PIF number P354-0066-2021 (Stage 1). Permission to enter the study area for the purposes of the Stage 1 archaeological assessment was granted to Wood by the Client for 13 April 2021. This permission extended to all required archaeological fieldwork activities.

This report presents the results of the Stage 1 background study and makes pertinent recommendations.

1.2 Scope of Work

A Stage 1 archaeological assessment consists of an archaeological background study and property inspection. It is a systematic qualitative process executed in order to assess the archaeological potential of a study area based on its historical use and its potential for early Euro-Canadian (early settler) and pre-contact Indigenous occupation. The objectives of a Stage 1 background study are: 1) to provide information about the study area's geography, history, previous archaeological fieldwork and current land condition; 2) to evaluate in detail the study area's archaeological potential which will support recommendations for Stage 2 property assessment for all or parts of the study

area if warranted; and 3) to recommend appropriate strategies for Stage 2 property assessment if warranted.

The scope of work for the Stage 1 background study consisted of the following tasks:

- Contacting the MHSTCI to determine if recorded archaeological sites exist in the vicinity (1 kilometre [“km’”] radius) of the study area, through a search of the *Ontario Archaeological Sites Database* maintained by that Ministry.
- Contacting the MHSTCI to determine if there are any known reports of previous archaeological field work within the study area or within a radius of 50 metres (“m”) around the study area, through a search of the *Ontario Public Register of Archaeological Reports* maintained by that Ministry.
- A desktop review of the study area’s physical setting to determine its potential for both pre-contact and post-contact period human occupation, including its topography, hydrology, soils, and proximity to important resources and historical transportation routes and settlements.
- A review of the potential for post-contact period human 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 its physical setting, and to aid in delineating areas where archaeological potential may have been impacted or removed by recent land-use practices.
- Formulate appropriate field testing strategies for areas of general archaeological potential.
- Preparing a Stage 1 report of findings with recommendations regarding the need for further archaeological work if deemed necessary.

2.0 Stage 1 Background Study

As part of the Stage 1 archaeological assessment, Wood queried the *Ontario Archaeological Sites Database*, maintained by the MHSTCI to determine if archaeological sites have been registered within 1 km of the study area (Section 2.1.1) (MHSTCI 2021a). The *Ontario Public Register of Archaeological Reports* was also queried to determine whether previous archaeological assessments have been carried out within the study area, or within a 50 m radius of the study area (Section 2.1.2) (MHSTCI 2021b). Second, the principal determinants of archaeological potential, namely proximity to water, topography, drainage, soils, and proximity to important resources and historical transportation routes and settlements, were examined to evaluate the study area's general archaeological potential (Sections 2.1, 2.1.3, 2.2, and 2.2.1). Third, the specific potential for post-contact period archaeological resources was assessed through an examination of available historical maps and other archival sources (Section 2.2). And fourth, a property inspection was conducted to confirm the desktop evaluation of archaeological potential and identify areas where recent land use has impacted or removed that potential.

2.1 Archaeological Context

2.1.1 Registered Archaeological Sites

In Ontario, information concerning archaeology sites is stored in the *Ontario Archaeological Sites Database* maintained by the MHSTCI. This database contains archaeological sites registered within the Borden system (Borden 1952). 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 study area is located within the *AjGw* Borden block. On the basis of a search of the *Ontario Archaeological Sites Database* on 09 April 2021, there are 18 registered sites located within a 1 km radius of the study area. One site is located within 300 m of the study area (Table 1). Please note that a mapping review to confirm the location information provided for each of the sites indicated 14 of them are over 1 km from the study area. Only those within a 1 km radius were taken into consideration.

Table 1: Registered Archaeological Sites within 1 km Radius of the Study Area

Borden Number	Site Name	Cultural Affiliation	Site Type	Distance from Study Area	Development Review Status
AjGw-23	McConnell	-	-	+1 km	-

Borden Number	Site Name	Cultural Affiliation	Site Type	Distance from Study Area	Development Review Status
AjGw-39	Farnington	Archaic	Campsite	670 m	-
AjGw-40	Marchesse	Paleo-Indian	Campsite	+1 km	-
AjGw-67	Timothy Street Mill	Post-Contact Euro-Canadian	Distillery, Mill, Tannery	+1 km	-
AjGw-69	Flynn	Post-Contact Euro-Canadian	Homestead	+1 km	No Further Cultural Heritage Value or Interest (CHVI)
AjGw-101	Sherwood Mills	Archaic	Campsite	+1 km	-
AjGw-119	Thunderhead	Early Woodland	Findspot	740 m	No Further CHVI
AjGw-213	Park Point Estates #1	Post-Contact – Euro-Canadian and Aboriginal	Homestead Findspot	+1 km	-
AjGw-214	Staggall	Post-Contact Euro-Canadian	Homestead	+1 km	-
AjGw-358	Barbertown Site	Post-Contact Euro-Canadian	Homestead	220 m (SE)	No Further CHVI
AjGw-433	-	Post-Contact	Unknown	1 km	No Further CHVI
AjGw-434	-	Post-Contact	Homestead	+1 km	Further CHVI
AjGw-435	-	Post-Contact	Dump	+1 km	No Further CHVI
AjGw-436	-	Pre-Contact	Findspot	+1 km	No Further CHVI
AjGw-578	-	Pre-Contact	Unknown	+1 km	Further CHVI
AjGw-618	Scottish Church	Post-Contact Euro-Canadian	Chapel	+1 km	No Further CHVI
AjGw-634	Cuthbert-Asquith	Post-Contact Euro-Canadian	Homestead	+1 km	No Further CHVI
AjGw-638	-	Post-Contact	Unknown	+1 km	Further CHVI

- Archaeological Site AjGw-358 (the Barbertown site) is located approximately 220 m southeast of the study area. It is post-contact Euro-Canadian homestead that has undergone Stage 4 Mitigation and has no further cultural heritage value or interest (MHSTCI 2021a).

2.1.2 History of Archaeological Investigations

Wood completed a search for archaeological reports within 50 m of the study area within the *Ontario Public Register of Archaeological Reports* administered by the MHSTCI on 09 April 2021. Based on this search (by address, lot and concession, and above-mentioned archaeological sites), one archaeological assessment has been conducted within the study area and one archaeological assessment has been conducted within 50 m of the study area (Appendix A: Figure 4).

2.1.2.1 Reports Documenting Archaeological Assessments Within the Study Area

Table 2 lists the reports made available from MHSTCI documenting archaeological assessments conducted within the study area.

Table 2: Related Archaeological Assessment Reports Within the Study Area

Year	Title	Author	PIF
2015	Stage 1 & 2 Archaeological Assessment: Barbertown Pedestrian Bridge, City of Mississauga, Ontario	Wood (formerly Amec Foster Wheeler)	P354-0028-2014

- *Stage 1 & 2 Archaeological Assessment: Barbertown Pedestrian Bridge, City of Mississauga, Ontario*. Prepared for the City of Mississauga, July 2015, Ref. No. TP114064, (PIF #: P354-0028-2015).

In 2015, Wood (formerly Amec Foster Wheeler) conducted a Stage 1 & 2 archaeological assessment adjacent to the Credit River including portions of the Barbertown Road right-of-way (ROW) (Figure 4). 0.09 ha of the 2015 assessment overlaps with the current study area (22.5% of the current study area). Wood's Stage 2 assessment did not identify anything of cultural heritage value or interest and Wood's Stage 2 assessment recommend that "The study area does not require further archaeological assessment (Wood 2015:11) (Appendix A: Figure 4).

2.1.2.2 Reports Documenting Archaeological Assessments Within 50 m of the Study Area

Table 3 lists the report made available from MHSTCI documenting archaeological assessments conducted within 50 m of the study area.

Table 3: Related Archaeological Assessment Reports Within 50 m of the Study Area

Year	Title	Author	PIF
2016	Stage 1 – 2 Archaeological 1725 Barbertown Road, Part of Lot 1, Concession 4 (Geographic Township of Toronto, County of Peel), City of Mississauga, Regional Municipality of Peel, Ontario	AMICK	P1024-0022-2015

- *Stage 1 – 2 Archaeological Assessment 1725 Barbertown Road, Part of Lot 1, Concession 4 (Geographic Township of Toronto, County of Peel) City of Mississauga, Regional Municipality of Peel*. Prepared by AMICK, Revised Report May 2016, Reference. No. 15690, (PIF #: P1024-0022-2015).

In 2016, AMICK conducted a Stage 1 & 2 archaeological assessment on lands directly north of the study area at municipal address 1725 Barbertown Road (Appendix A: Figure 4). The assessment was undertaken as a requirement under the Planning Act, in support of a Draft Plan of Subdivision. AMICK's Stage 1 assessment resulted in the determination that portions of their study area exhibit a moderate to high potential for the identification and recovery of archaeological resources. The Stage 2 assessment consisted of a test pit survey at five-metre intervals. The Stage 2 assessment produced no archaeological resources and a recommendation of "no further archaeological assessment of the study area is warranted…The proposed undertaking is clear of any archaeological concern and development activity within the study area may now proceed" (AMICK 2016:2).

2.1.3 Environmental Context

The study area (Appendix A: Figure 1 to Figure 3) is situated in the South Slope physiographic region of Ontario (Chapman and Putnam 1984:172). The South Slope extends from the Trent River to the Niagara Escarpment covering approximately 2,434 square km. Towards the cities of York, Etobicoke and Mississauga, the terrain is characterized by irregular knolls and hollos (Chapman and Putnam 1984:172). However, west of the Credit River the Trafalgar Moraine provides subdued morainic topography while narrow belts of planed and fluted terrain are located above the Iroquois shorecliff. All rivers in this area have cut through the boulder clay into the shale. Valley walls here are often nearly perpendicular (Chapman and Putnam 1984:173). The South Slope contains fertile soils which have been used for agriculture.

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* (MHSTCI 2011) lists proximity to water as one of the prime indicators of potential for the presence of archaeological sites. Distance from water has been one of the most commonly used variables for predictive modelling of archaeological site location. Water, both potable and non-potable, also facilitated the transportation of people and goods and served to focus animal and plant resources. According to the *Standards and Guidelines for Consultant Archaeologists* (MHSTCI 2011), lands within 300 m of an extant or formerly mapped river or creek have potential for the presence of early Indigenous and Euro-Canadian archaeological sites. The western section of the study area is adjacent to the Credit River and a portion of Carolyn Creek intersects with the study area in the northeast (Appendix A: Figure 3).

2.2 Historical Context

2.2.1 A Cultural History for Southern and Eastern Ontario

The majority of interpretations of pre-contact Indigenous 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 Indigenous Nations 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 cultural history of southern and eastern Ontario as understood by archaeologists. It is based upon published syntheses of Indigenous cultural occupations (Wright 1968, Ellis and Ferris 1990, Adams 1994). For additional reference, Ellis and Ferris (1990) provide greater detail of the distinctive characteristics of each time period and cultural group.

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 centered 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 point types are named after archaeological 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 but were 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 Algonquian 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. Algonquian settlements tended to be less populous and temporary.

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 post-contact contact 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 Indigenous peoples were acquiring European trade goods indirectly through other Indigenous middlemen rather than directly from European traders. This period was generally very short and is often difficult to differentiate archaeologically from later post-contact 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 4: Simplified Cultural Chronology of Southern and Eastern 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	Small nomadic hunter-gatherer bands. Nettling, Stanley/Neville points.

Period	Complexes/Cultures, Some Diagnostic Artifacts
(7500–6000/4500 B.C.)	
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 (6000–2500 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 Younge / 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.

Period	Complexes/Cultures, Some Diagnostic Artifacts
	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.

In southern Ontario, significant post-contact archaeological 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 archaeological sites date to before A.D. 1830, but archaeologically significant Euro-Canadian sites can date into the twentieth century.

2.2.2 Review of Historical Records

During pre-contact and early contact times, the vicinity of the study area would have contained a mixture of deciduous trees, coniferous trees, and open areas. In the early nineteenth century, Euro-Canadian settlers arrived and began to clear the forests for agricultural purposes. In the nineteenth and early twentieth centuries, the study area and surrounding land were primarily used for agricultural purposes.

Toronto Township and the Historic Settlement of Streetsville

In 1818, the Toronto Township in Peel County was first surveyed and Euro-Canadian settlement in the area commenced shortly after. Several mill sites were developed by Timothy Street, along the banks of the Credit River, the first of which was operational by 1821. Settlement was established around the mills, in particular around part of Lots 2 through 6, Concession IV, New Survey, and became known as Streetsville (Unterman McPhail 2007:7).

As the community grew, adjacent lands were cleared and cultivated for agriculture, the primary crop produced being wheat. By the mid-1830s, a grist mill had been established by John Beaty at a point on the Credit River southeast of Streetsville (Smith 1846:177).

By the mid-1840s; Streetsville had a population of 550, a daily stagecoach service to Toronto, and there were two gristmills and three saw mills. By 1849 the population rose

to 1,200 and a large tannery was established. A large woolen factory, three saw mills and the tannery were owned by the Barber family (Unterman McPhail 2007:7) (Appendix A: Figure 6 and Figure 7).

Around the mid-nineteenth century, the Great Western Railway was built to the south of Port Credit, and the Grand Trunk Railway passed to the north of Streetsville. In 1857 the community was incorporated as a village. In 1877 Gooderham & Worts Mills moved to Toronto, and the Barbers changed their mill production from flour to woolen goods. In 1879, the Credit Valley Railway arrived in Streetsville providing a line to Toronto (Unterman McPhail 2007:7).

Barbertown Road

In 1843, Base Line Road ended at the east bank of the Credit River. The Barbertown Road evolved as a “given” road to the north of the surveyed concession road known as the Base Line (Eglinton Avenue). The “given” road provided a more suitable crossing of the Credit River at the Barber mill site. The road wound down into the valley on the east side of the river before crossing the river on the west side near the Toronto Woolen Mill site. The road passed through the mill site and up the hill to the Streetsville Road (Mississauga Road). The road became known as the Barbertown Road due to the mill site and provided access from the Base Line road on the east side of the river to both the mill site and to Streetsville.

Barbertown Road remained as the principal access road to Streetsville from the southeast until Eglinton Avenue was carried over the Credit River in the early 1960s. The Barbertown Road then became a secondary access road across the Credit River (McCormick Rankin Cop. 2006).

Historical records and mapping were examined for evidence of early Euro-Canadian use of the study area. The study area was located within Lot 1, Concession IV (WHS), former Township of Toronto, County of Peel, Ontario.

The 1859 *Tremaine’s Map of the County of Peel* (Tremaine and Tremaine, 1859) was examined in an effort to determine the potential for post-contact period archaeological evidence within the study area, which at that time appears to be under the ownership of the Barber Brothers (Appendix A: Figure 5). The map shows the Credit River traversing the northwest edge of the study area. Historical features are not illustrated within the study area.

In addition, the *1877 Illustrated Historical Atlas of the County of Peel* (Walker & Miles, 1877; Appendix A: Figure 6 and Figure 7) was examined. In 1887 the Credit River is illustrated traversing the west edge of the study area and Carolyn Creek is illustrated intersecting the study area further east. The study area is now within a historic transportation route (Barbertown Road). There are no structures within the boundaries of the study area. Historical structures are illustrated on the west side of the Credit

River, the closest of which is approximately 30 m northwest of the study area.

2.2.3 Historical Plaques

The MHSTCI's *Standards and Guidelines for Consultant Archaeologists* (MHSTCI 2011:18) stipulates that areas of early Euro-Canadian settlement, including places of early military pioneer settlement (pioneer homesteads, isolated cabins, farmstead complexes), early wharf or dock complexes, pioneer churches and early cemeteries, are considered to have archaeological potential. There may be commemorative markers of their history, such as local, provincial, or federal monuments or heritage parks. Early historical transportation routes (trails, passes, roads, railways, portage routes), properties listed on a municipal register or designated under the *Ontario Heritage Act* or a federal, provincial, or municipal historic landmark or site, and properties that local histories or informants have identified with possible archaeological sites, historical events, activities, or occupations are also considered to have archaeological potential.

The Credit River-Culham Trail runs along the west bank of the Credit River and in the vicinity of the Barbertown Bridge which crosses the Credit River at the west edge of the study area. Plaques are situated along trail which interpret the history of the Barber Mills, waterpower technology and Barberton community (Unterman McPhail 2007:14). There are no additional historical plaques located within a 1 km radius of the study area (Ontario Heritage Trust 2021).

2.3 Potential for Archaeological Resources

Archaeological potential is defined as the likelihood of finding archaeological sites within a study area. For planning purposes, determining archaeological potential provides a preliminary indication that archaeological sites might be found within the study area, and consequently, that it may be necessary to allocate time and resources for archaeological survey and mitigation.

The framework for determining the presence of archaeological potential within a study area is drawn from provincial standards found in the *Standards and Guidelines for Consultant Archaeologists* (MHSTCI 2011, Sections 1.3.1 and 1.3.2). The following are features or characteristics that can indicate archaeological potential:

- previously identified archaeological sites;
- water sources (it is important to distinguish types of water and shoreline, and to distinguish natural from artificial water sources, as these features affect site locations and types to varying degrees):
  - primary water sources (e.g. lakes, rivers, streams, creeks);
  - secondary water sources (e.g. intermittent streams and creeks, springs, marshes, swamps);
  - features indicating past water sources (e.g. glacial lake shorelines indicated by

the presence of raised sand or gravel beach ridges, relic river or stream channels indicated by clear dip or swale in the topography, shorelines of drained lakes or marshes, cobble beaches); and,

- accessible or inaccessible shoreline (e.g. high bluffs, swamp or marsh fields by the edge of a lake, sandbars stretching into marsh).

- elevated topography (e.g. eskers, drumlins, large knolls, plateaus);
- pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground;
- distinctive land formation that might have been special or spiritual places, such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases. There may be physical indicators of their use, such as burials, structures, offerings, rock paintings or carvings;
- resource areas, including:

- food or medicinal plants (e.g. migratory routes, spawning areas, prairie);
- scarce raw materials (e.g. quartz, copper, ochre or outcrops of chert); and,
- early Euro-Canadian industry (e.g. fur trade, logging, prospecting, mining).

- areas of early Euro-Canadian settlement. These include places of early military or pioneer settlement (e.g. pioneer homesteads, isolated cabins, farmstead complexes), early wharf or dock complexes, pioneer churches and cemeteries. There may be commemorative markers of their history, such as local provincial, or federal monuments or heritage parks;
- early transportation routes (e.g. trails, passes, roads, railways, portages); and,
- property listed on a municipal register or designated under the *Ontario Heritage Act* or that is a federal, provincial or municipal historic landmark or property that local histories or informants have identified with possible archaeological sites, historical events, activities or occupations.

Archaeological potential can be determined to not be present for either the entire study area or parts of it when the area under consideration has been subjected to extensive and deep land alterations that have severely damaged the integrity of any archaeological resources. This is commonly referred to as “disturbed” or “disturbance” and may include:

- quarrying;
- major landscaping involving grading below topsoil;
- building footprints;
- sewage and infrastructure development; and,
- activities such as agricultural cultivation, gardening, minor grading, and

landscaping do not necessarily affect archaeological potential.

The study area includes lands within the current right-of-way ("ROW"), for a length of approximately 205 m of Barbertown Road, situated immediately north of Koliba Park (the Slovak Canadian Culture Society) ending at the Credit River. This includes paved roadway, associated roadway shoulder, driveway, and a culvert and gabion basket-lined channel system as part of Carolyn Creek.

Several factors can be used to assess the potential for recovery of Indigenous archaeological resources within a study area. Natural water sources are located within 300 m of the study area, including a section of the Credit River adjacent to the west section of the study area and Carolyn Creek which intersects with the east section of the study area (Figure 3). Moreover, there is direct evidence that this general area has been utilized by Indigenous people in the past. Although no Indigenous archaeological sites have been registered within the study area, two Indigenous archaeological sites have been registered within a 1 km radius of the study area.

As per the MHSTCI's *Standards and Guidelines for Consultant Archaeologists* (MHSTCI 2011), any areas within 100 m of early transportation routes and 300 m of early Euro-Canadian settlement have archaeological potential. The study area is located within an historical roadway (Barbertown Road) as illustrated in both the 1859 (Figure 5) and 1877 (Figure 6 and Figure 7) historical maps. Although no Euro-Canadian sites have been registered within the study area, one Euro-Canadian archaeological site has been registered within 300 m of the study area.

Given the above, background archival research supports the conclusion that the study area exhibits general archaeological potential for the presence of both Indigenous and Euro-Canadian archaeological resources therefore, a Stage 2 archaeological assessment is required.

Areas that have been disturbed by modern activities, both extensive and intensive, have low potential for the recovery of archaeological resources. These areas include the paved roadway, associated roadway shoulder, driveway, and the culvert system related to Carolyn Creek.

3.0 Stage 1 Property Assessment

3.1 Methods

A Stage 1 property inspection was conducted by Cara Howell (R180) on 13 April 2021 with advance permission-to-enter obtained from the Client. The weather was overcast and warm with a maximum temperature of 12°C and did not impede the inspection in any way. As such, it is confirmed that the assessment met Section 1.2 Standard 2 of the *Standards and Guidelines for Consultant Archaeologists* (MHSTCI 2011) regarding weather and lighting.

The Stage 1 property inspection confirmed archaeological site potential and determined the degree to which development and landscape alteration have affected that potential. The Stage 1 property inspection was conducted from the public right-of-way and no private properties were entered. The property inspection was thoroughly photo-documented. Field observations were recorded on aerial maps and field forms. All land conditions were recorded as shown in Appendix A:Figure 8 and Appendix B: Photographs 1 to 10.

3.2 Results

Based on the Stage 1 property inspection and background research Wood determined that archaeological potential has been removed within 0.27 ha (67.5%) of the study area. These areas, identified as disturbed, have had the integrity of the topsoil compromised by earth moving activities to the point where archaeological potential has been removed. These areas include roadways, driveways, roadside shoulder (cumulatively 0.13 ha), and a recently constructed culvert canal system (0.14 ha) on the south side of Barbertown Road (Appendix A: Figure 8, Appendix B: Photographs 1 to 3 and 6 to 10),

The remaining 0.04 ha (10%) consists of natural steeply sloping topography (Appendix B: Photographs 4 and 5, Appendix A:Figure 8) and requires no additional work.

3.2.1 Documentary Record

The inventory of documentary records accumulated as part of this assessment is provided in Table 5.

Table 5: Inventory of Documentary Record

Study Area	Map and Photo(s)	Field Notes
Lot 1, Concession IV (WHS), formerly in Toronto Township, County of Peel, now the City of Mississauga, Ontario	Copies of 2 historical maps, 10 Stage 1 photographs and 1 aerial photograph	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 MHSTCI and any other legitimate interest groups.

3.3 Stage 1 Analysis and Conclusions

The Stage 1 background study indicated that the study area has general archaeological potential. However, despite the general archaeological potential of the study area, the Stage 1 background study and property inspection confirmed that 0.27 ha of the study area (67.5%) has been previously disturbed and does not require additional assessment, 0.09 ha of the study area (22.5%) has been subject to previous archaeological assessment (Wood 2015) and was recommended for no further archaeological assessment, and 0.04 ha of the study area (10%) is steeply sloped and does not require further archaeological assessment. In summary, no portion of the study area is recommended for further archaeological assessment.

4.0 Recommendations

In light of the findings of the Stage 1 archaeological assessment of the study area, the following recommendation is made, subject to the conditions outlined below and in Section 5.0:

1. The study area (Figure 8) requires no further archaeological assessment.

The above recommendations are subject to Ministry of Heritage, Sport, Tourism and Culture Industries' approval, and it is an offence to alter any of portion of the study area without Ministry of Heritage, Sport, Tourism and Culture Industries' concurrence.

No grading or other activities that may result in the destruction or disturbance of the study area is permitted until notice of the Ministry of Heritage, Sport, Tourism and Culture Industries' approval has been received.

5.0 Advice on Compliance with Legislation

a. This report is submitted to the Minister of Heritage, Sport, Tourism and Culture Industries as a condition of licensing in accordance with Part IV of the *Ontario Heritage Act, R.S.O. 1990, c. O.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 Heritage, Sport, Tourism and Culture Industries, 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 local police or coroner and the Registrar of Cemeteries at the Ministry of Government and Consumer Services.

6.0 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 C.

7.0 Closure

This report was prepared for the exclusive use of the City of Mississauga and is intended to provide a Stage 1 archaeological assessment of the study area. The study area includes lands within the current right-of-way ("ROW"), for a length of approximately 205 m of Barbertown Road, situated immediately north of Koliba Park (the Slovak Canadian Culture Society) ending at the Credit River in the City of Mississauga, Ontario. The property is legally described as Lot 1, Concession IV (WHS), formerly in Toronto Township, County of Peel, now the City of Mississauga, Ontario.

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 conducted by Wood. It is based solely a review of historical information, a property reconnaissance conducted on 13 April 2021 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 D.

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,

Draft

Jason Seguin, M.A. (P354)
Senior Archaeologist

Reviewed by,

Draft

Barbara Slim, M.A. (P348)
Associate Archaeologist

Draft

Peter Popkin, Ph.D. CAHP, MClfA (P362)
Associate Archaeologist

8.0 Bibliography

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AMICK
2016 *Stage 1 – 2 Archaeological Assessment 1725 Barbertown Road, Part of Lot 1, Concession 4 (Geographic Township of Toronto, County of Peel), City of Mississauga, Regional Municipality of Peel*. Revised Report May 2016, Reference No. 15690, (PIF #: P1024-0022-2015).

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2021b Archaeological Assessments Completed Within the Study Area or Within 50 Metres of the Study Area Provided from the Ontario Public Register of Archaeological Reports, 09 April 2021.

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Wright James V.
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Internet archival sources:

Ontario Heritage Trust, Plaque Database (Government of Ontario)
2021 Provincial Plaque Program - Ontario Heritage Trust
Searched 09 April 2021

Appendix A: Figures

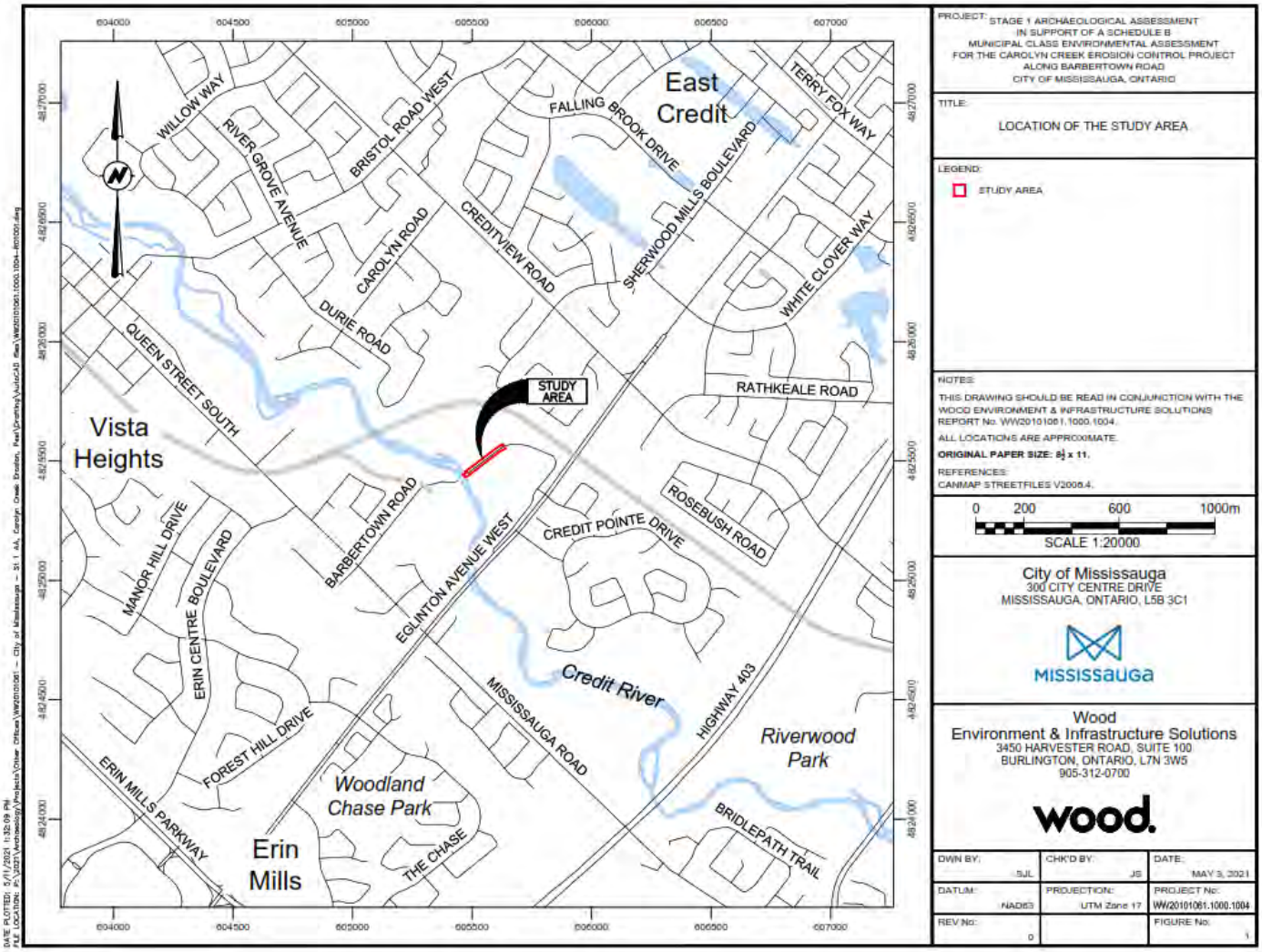


Figure 1: Location of the Study Area

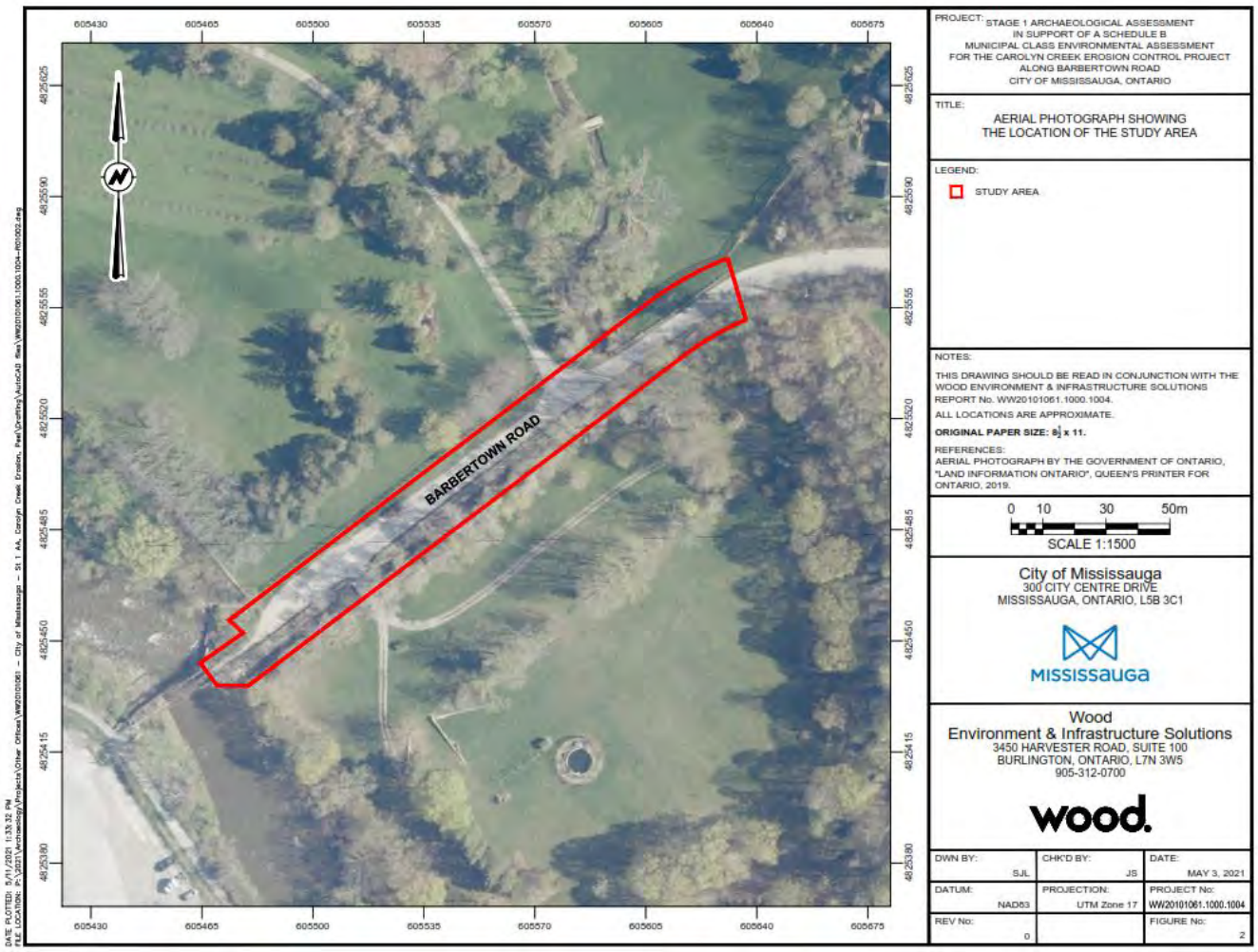


Figure 2: Aerial Photograph Showing the Location of the Study Area

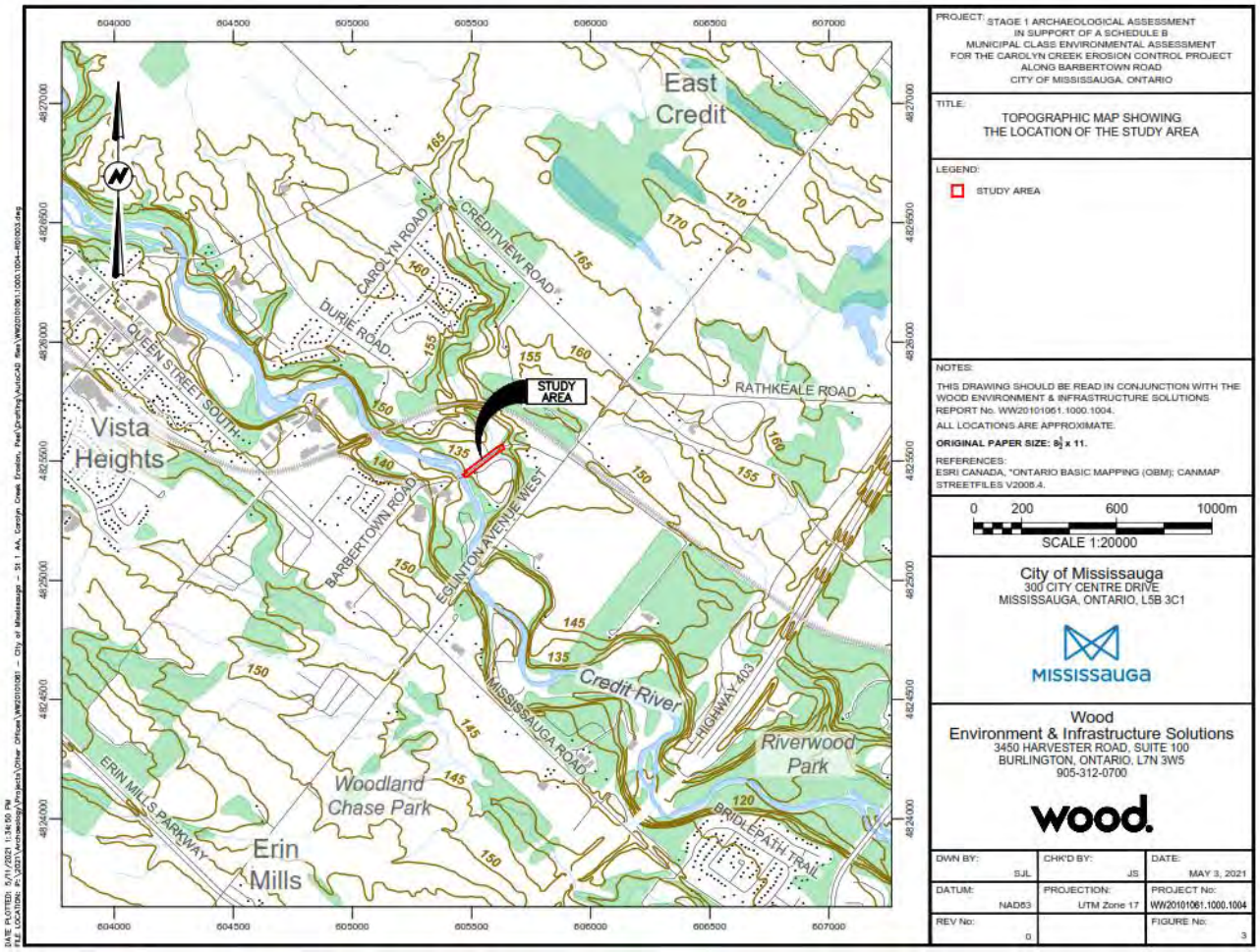


Figure 3: Topographic Map Showing the Location of the Study Area

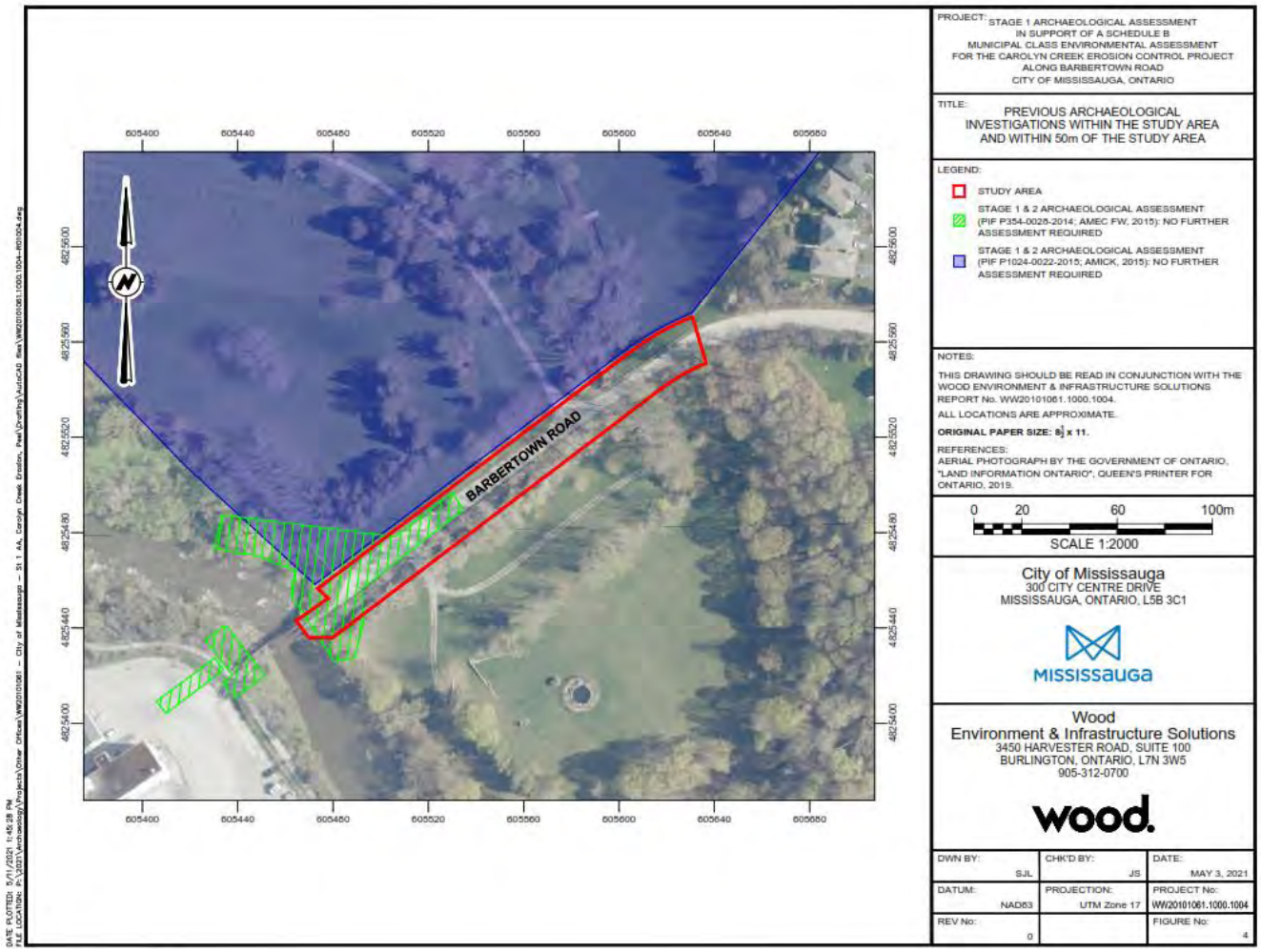


Figure 4: Previous Archaeological Investigations within the Study Area and Within 50m of the Study Area

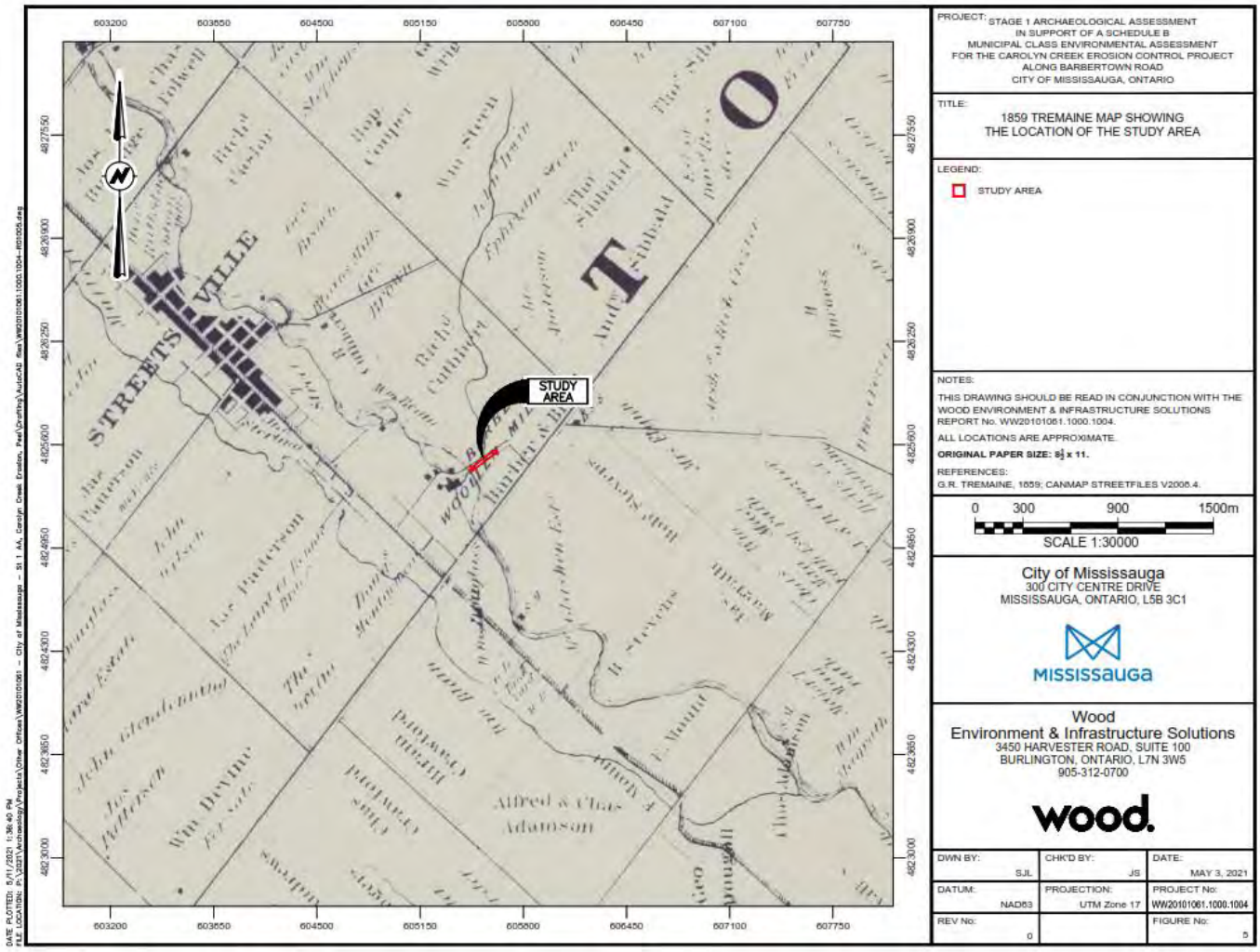


Figure 5: 1859 Tremaine Map of the County of Peel, Ontario Showing the Location of the Study Area

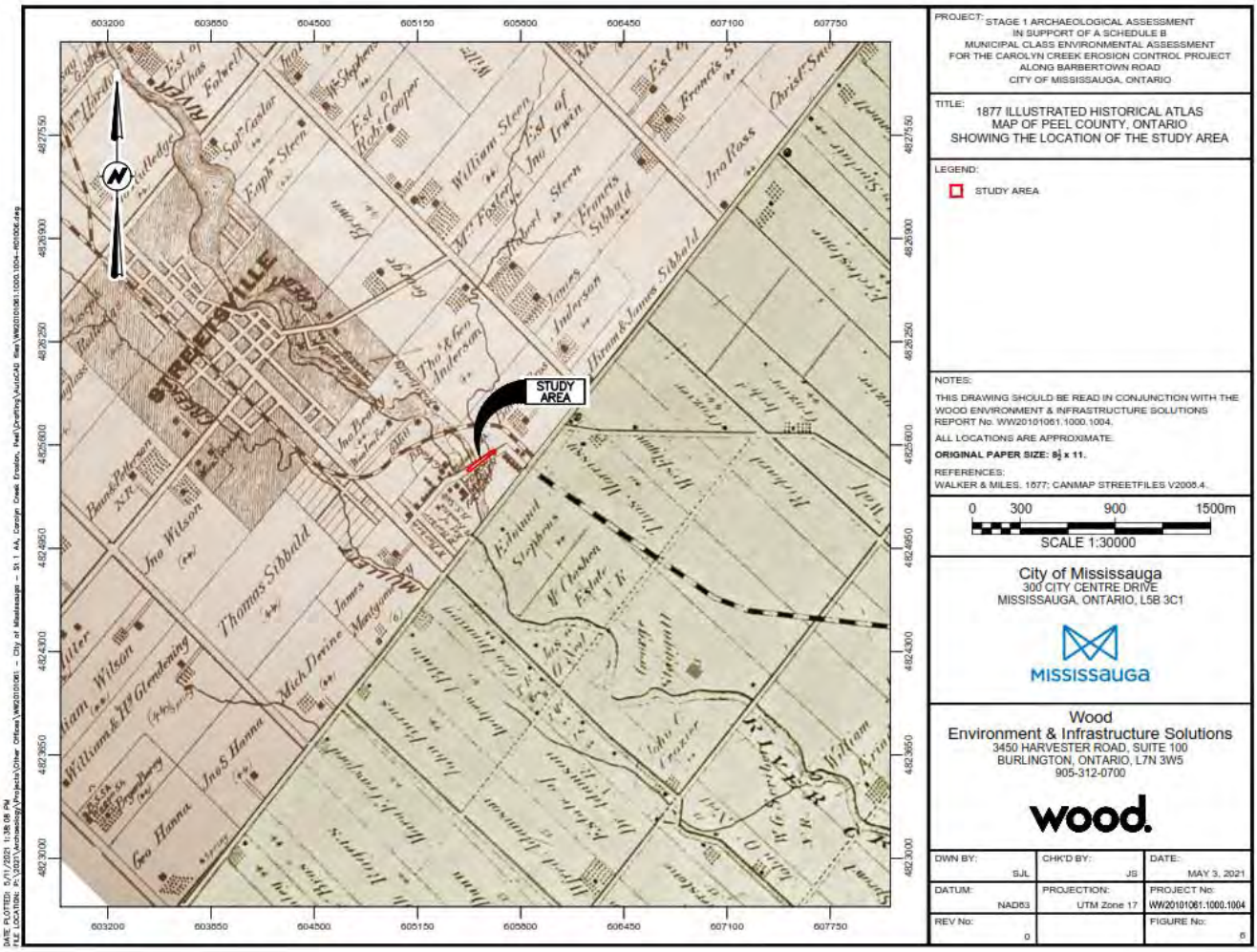


Figure 6: 1877 Illustrated Historical Atlas Map of Peel County Showing the Location of the Study Area

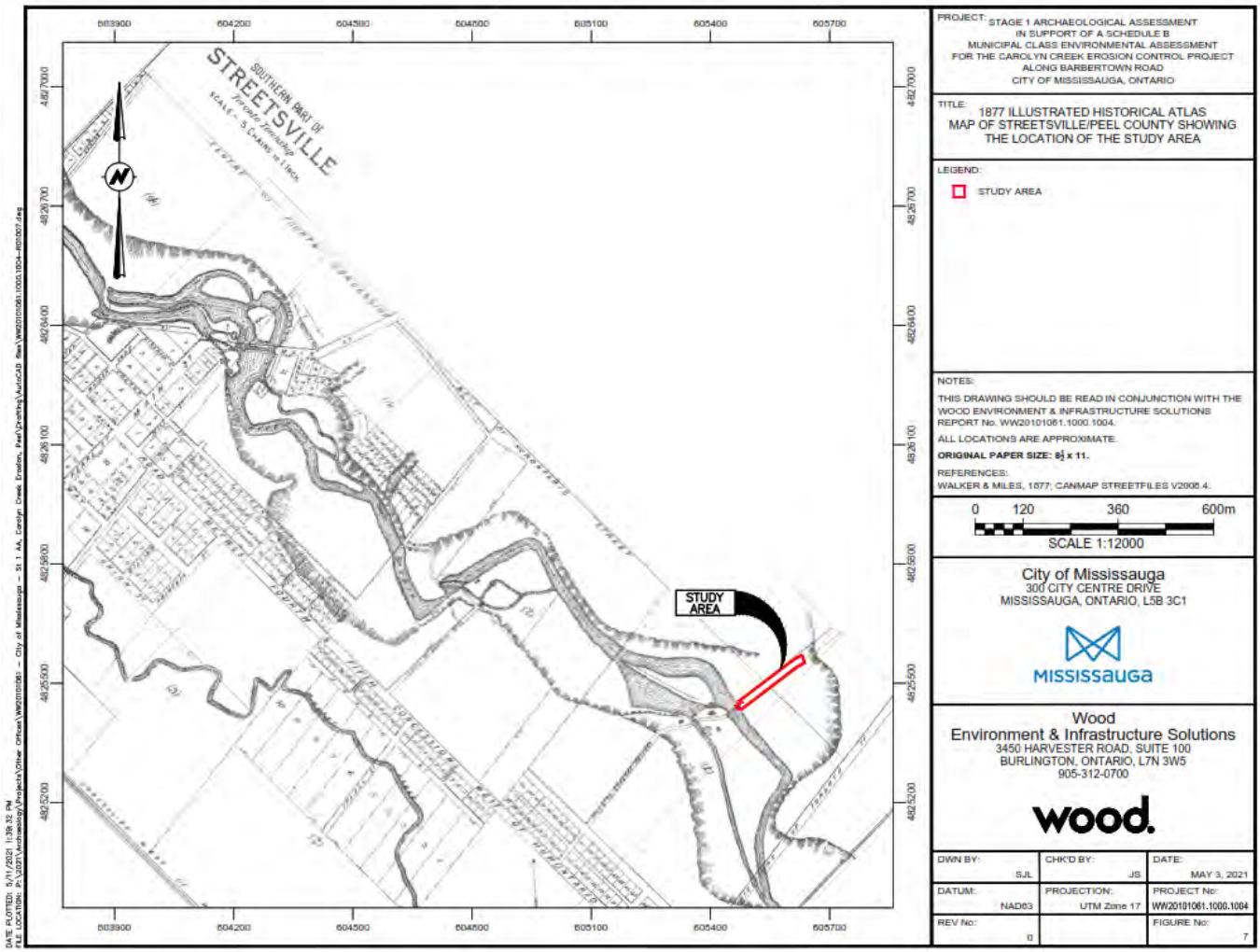


Figure 7:1877 Illustrated Historical Atlas Map of Peel, Streetsville Showing the Location of the Study Area

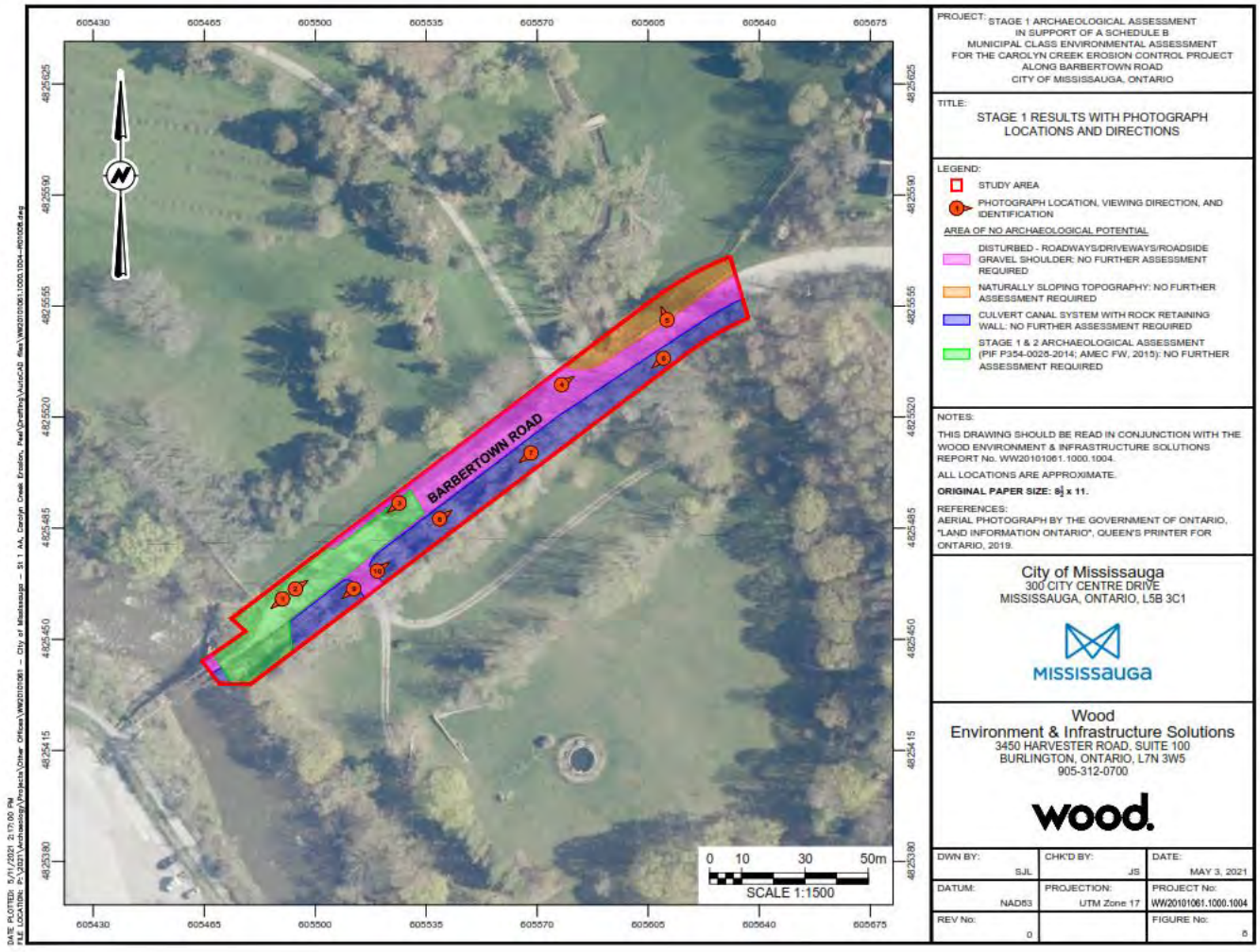


Figure 8: Stage 1 Results with Photograph Locations and Directions

Appendix B: Photographs

	PHOTOGRAPH 1 View of the study area towards the Barbertown Bridge as it crosses the Credit River. Gravel shoulder and paved roadway observed.
	PHOTOGRAPH 2 View of the west side of Barbertown Road and ROW. Gravel shoulder and paved roadway observed.

	PHOTOGRAPH 3 View of the north side of Barbertown Road towards Credit River and Barbertown Bridge. Gravel shoulder and paved roadway observed.
	PHOTOGRAPH 4 View of the north side of Barbertown Road. Gravel shoulder and paved roadway observed. Steeply sloping natural topography observed from the bridge (see Photograph 5) down towards Carolyn Creek.

	PHOTOGRAPH 5 View of Carolyn Creek on the north side of Barbertown Road from the bridge. Steeply sloping natural topography observed alongside the creek.
	PHOTOGRAPH 6 View of the south side of Barbertown road.

	PHOTOGRAPH 7 View of the south side of Barbertown Road and culvert canal system.
	PHOTOGRAPH 8 View of the south side of Barbertown Road. Culvert canal system and paved road observed



PHOTOGRAPH 9

View of the south side of Barbertown Road. Culvert canal system and paved road observed. Barbertown Bridge and Credit River are noted in the background.



PHOTOGRAPH 10

View of the south side of Barbertown Road. Culvert canal system and paved road observed.

Appendix C: Assessor Qualifications

Project No. WW201061

wood.

Assessor Qualifications

Peter Popkin, Ph.D., CAHP, MCIfA, Associate Archaeologist (P362) – Dr. Popkin is an Associate Archaeologist at Wood. Peter has over 20 years of professional experience in both consulting and academic archaeology within Canada and internationally. In Ontario he has successfully undertaken consultant archaeology projects triggered by: the Planning Act (subdivisions, site plans, re-zoning, official plan amendments, consent), the Environmental Assessment Act (individual and Class EAs, provincial and federal EAs), the Environmental Protection Act (Renewable Energy Approvals O.Reg 359/09), as well as the Aggregates Resources Act (aggregate pit extensions), and has managed projects under the National Energy Board Act (now the Canadian Energy Regulator Act). Dr. Popkin has lectured in archaeology at York University, the University of Toronto and Wilfrid Laurier University in Ontario, as well as University College London, King's College London, and Birkbeck College, in the UK. Dr. Popkin holds a Professional Archaeology Licence (P362) from the Ontario MHSTCI, is a Professional Member of the Canadian Association of Heritage Professionals (CAHP) and is a full Member of the Chartered Institute for Archaeologists (MCIfA). Dr. Popkin received his Ph.D. from the Institute of Archaeology, University College London, London, UK (2009).

Barbara Slim, M.A., Associate Archaeologist, Ontario Archaeology Discipline Lead (P348) – Ms. Slim is a professionally licensed archaeologist with over 16 years of experience in the archaeology and environmental consulting industry. Ms. Slim has conducted all aspects of Stage 1 to 4 archaeological assessments for provincial agencies, municipalities, and land developers in support of infrastructure developments, financial real estate transactions, environmental remediation and private developments. As a founding member of the Wood Ontario archaeology team, Ms. Slim has performed every aspect of project execution, from client relations, project design to MHSTCI clearance. Through her project experience, Ms. Slim has gained an in-depth understanding of the Heritage Act and legislations & standards associated with cultural heritage management. Ms. Slim holds a Master's Degree in Anthropology from Trent University and an Honours Bachelor's Degree in Environmental Studies and Anthropology from Trent University. Ms. Slim currently holds a Professional Archaeology Licence (P348) issued by the Ontario MHSTCI, is RAQs Certified in Archaeology/Heritage and is a member of the Ontario Association of Professional Archaeologists.

Cara Howell B.A., Senior Archaeologist (R180) - Ms. Howell holds a B.A. Degree in Anthropology and Classical Archaeology from McMaster University and has been working in the field of archaeological consulting since 1999. She holds an Applied Research Licence (R180) in archaeology from the Ontario MHSTCI and possesses a full range of archaeological skills. As a result of her specialized interest in the early post-contact period, she has become an authority on early Euro-Canadian artifacts and background research. As the archaeology Laboratory Director for Wood's Cultural Heritage Resources Group, she developed and implements a computerized cataloguing system for artifacts and other resources. Ms. Howell also serves as lead liaison with

Indigenous communities.

Jason Seguin, M.A., Senior Archaeologist (P354) - Mr. Seguin has worked as an archaeologist since 2004 and has conducted numerous Stage 1 to 4 archaeological assessments including background searches, field surveys, archaeological excavations, analysis of archaeological resources, laboratory work and reporting. Mr. Seguin is involved in project management and supervision as well as being an archaeological laboratory director. Mr. Seguin has developed research and communication skills through producing and editing field reports, teaching university level students in both lecture and seminar environments, as well as preparing and presenting presentations at academic conferences. Mr. Seguin's education and work experience have provided him with an extensive knowledge base, consisting of theoretical and practical experience in cultural resource management in Canada and Central America, as well as curatorial, archival and museum management experience. Mr. Seguin holds a Master's Degree in Anthropology from Trent University, and a Post-Graduate Certificate in Museum Management and Curatorship from Sir Sandford Fleming College. Mr. Seguin currently holds a Professional Archaeology License (P354) issued by the Ontario MHSTCI and is a member of the Association of Professional Archaeologists.

Stephen LaBute, CAD Draftsperson - Mr. LaBute has over 19 years of experience as a draftsperson. He has worked in the geotechnical and environmental fields for over 11 years. He has very strong technical skills and is very efficient at managing projects. He often goes above the call of duty meeting deliveries. His responsibilities have included serving as project CAD lead and quality control management. Projects include, transportation, infrastructure, environmental assessments, geotechnical investigations, and archaeological assessments.

Appendix D: 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 Heritage, Sport, Tourism and Culture Industries' 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 of 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.

APPENDIX

C

Study Contact List

Carolyn Creek Erosion Control Class Environmental Assessment
Study Contact List

Organization/Department	Contact Name	Title	Email
Indigenous Nations			
Mississaugas of the Credit First Nation	Various Contacts		
Six Nations of the Grand River	Various Contacts		
Haudenosaunee Development Institute	Various Contacts		
Federal Ministries			
Fisheries and Oceans Canada	Ashley Bedford	Fisheries Protection Biologist	Ashley.Bedford@dfo-mpo.gc.ca
Fisheries and Oceans Canada	Fish and Fish Habitat Protection Program		FisheriesProtection@dfo-mpo.gc.ca
Provincial Ministries & Agencies			
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Ministry of the Environment Conservation and Parks - Central Region			eanotification.cregion@ontario.ca
Ministry of the Environment Conservation and Parks			MEA.NOTICES.EAAB@ontario.ca
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Ministry of Natural Resources and Forestry - Aurora District	Aurora McAllister	Mangement Biologist	aurora.mcallister@ontario.ca
Ministry of Natural Resources and Forestry - Aurora District	Maria Jawaid	District Planner	maria.jawaid@ontario.ca
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Ministry of Tourism, Culture and Sport	Dan Minkin	Heritage Planner	dan.minkin@ontario.ca
Ministry of Municipal Affairs and Housing	Heather Watt	Manager	heather.watt@ontario.ca
Infrastructure Ontario	Lisa Myslicki	Environmental Coordinator	lisa.myslicki@infrastructureontario.ca
Conservation Authority			
Credit Valley Conservation	Iftekhar Ahmad	Planner, Environmental Assessment (acting)	iftekhar.ahmad@cvc.ca
Credit Valley Conservation	Jakub Kilis	Manager, Infrastructure and Regulations	jakub.kilis@cvc.ca
Region of Peel			
Region of Peel	Asha Saddi	Technical Analyst, Infrastructure Programming and Studies	asha.saddi@peelregion.ca
Region of Peel	Nimarta Gill	Project Manager, Infrastructure Planning and Asset Management	nimarta.gill@peelregion.ca
Region of Peel	Sally Rook	Manager of Infrastructure Programming and Studies	sally.rook@peelregion.ca
~~Region of Peel - Public Works~~	~~Andrew Farr~~	~~Acting Commissioner, Public Works~~	~~andrew.farr@peelregion.ca~~
Region of Peel	Joanna Pietkiewicz	Project Manager, Wastewater Treatment Capital	joanna.pietkiewicz@peelregion.ca
Region of Peel - Water & Wastewater Division	Maad Abid Al Hadi	Technical Analyst, Capital Works	Maad.AbidAlHadi@peelregion.ca
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Region of Peel - Water & Wastewater Division	Frank Pugliese	Wastewater Capital	frank.pugliese@peelregion.ca
Region of Peel - Water & Wastewater Division	Italia Ponce	Project Manager	pwi@peelregion.ca
Region of Peel	Rose Hercia		rose.hercia@peelregion.ca
Peel Regional Paramedic Services	Brian Gibson	Deputy Chief at Peel Regional Paramedic Services	brian.gibson@peelregion.ca
~~Peel Regional Paramedic Services~~	~~Dana Ralph Banke~~	~~Supervisor, Risk and Audit~~	~~dana.banke@peelregion.ca~~
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City of Mississauga	Anthony Di Giandomenico	Project Manager	anthony.digiandomenico@mississauga.ca
City of Mississauga	Jim Greenfield	Planner, Parks Planning	jim.greenfield@mississauga.ca
City of Mississauga	Katie Henley	Landscape Architect, Parks Planning	katie.henley@mississauga.ca
Mississauga Fire and Emergency Services	Deryn Rizzi	Fire Chief	deryn.rizzi@mississauga.ca
Mississauga Fire and Emergency Services	Fire Prevention and Life Safety Division		fire.prevention@mississauga.ca
Elected Officials			
City of Mississauga - Ward 6 – Councillor	Ron Starr	Ward 6 – Councillor	ron.starr@mississauga.ca

Carolyn Creek Erosion Control Class Environmental Assessment
Study Contact List

Organization/Department	Contact Name	Title	Email
Utilities			
Alectra Utilities	Chris Kafel	Manager, Distribution Design, Customer Capital	chris.kafel@alectrautilities.com
Alectra Utilities	Jimmy Truong	Design Technician, Central Division	Jimmy.Truong@alectrautilities.com
Enbridge Pipelines Inc.			mark-ups@enbridge.com
Enbridge Pipelines Inc.			utilitycirculations@enbridge.com
Enbridge Pipelines Inc.	Enzo Greco	Advisor Construction Project Management	Enzo.Greco@enbridge.com
TransCanada	Darlene Quilty		dquilty@mhbcplan.com
Hydro One	Jim Oriotis		jim.oriotis@hydroone.com
Hydro One			tpumarkup@hydroone.com
Bell Canada	Kevin Lee		Kevin.li@netricom.com
Bell Canada Municipal Operations Centre	Diana Velez (c/o Netricom)		bell.moc@netricom.com
~~Rogers Communications~~	~~Lily Apa~~		~~Lily.Apa@rci.rogers.com~~
Rogers Communications			GTA.Markups@rci.rogers.com
Rogers Communications			MOB.Permits@rci.rogers.com
Rogers Communications			Rogers.MOC@telecon.ca
Telus	Indira Sharma		telusutilitymarkups@netricom.com
Zayo			utility.circulations@zayo.com
Cogeco			utility.circulations@cogecodata.com
Stakeholders / Interest Groups			
ADM Milling	Barnet Garcia		Barnet.Garcia@adm.com
ADM Milling	Adrian Gardo		Adrian.Gardo@adm.com
Crozier	Matt Britton	Project Manager-Land Development	mbritton@cfcrozier.ca
Michael Gedz Realty Inc., Brokerage	Michael Gedz	Development Coordinator	mg@michaelgedz.com
Sterling Group	Paul Federico	Developer	pfederico@sterlinggroupcorp.com
Slovak-Canadian Cultural Society	Anna Zapletal	President	mail@slovakcanadianculture.com

APPENDIX

D

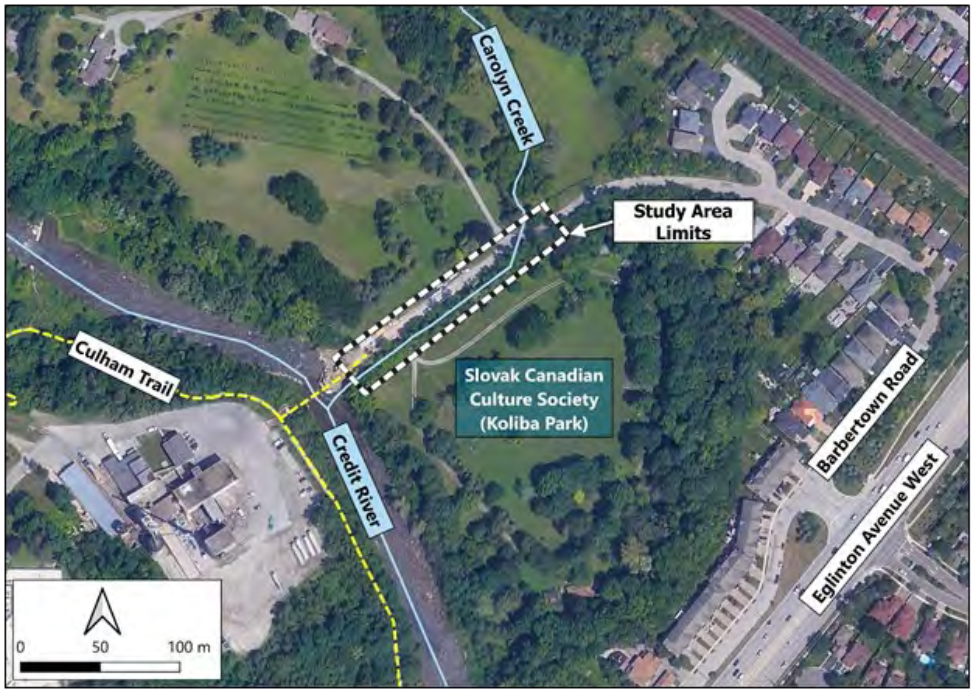
Public Consultation

APPENDIX

D-1 *Notice of Study Commencement and Public Information Centre*

Notice of Study Commencement and Online Public Information Centre
Municipal Class Environmental Assessment Study for Carolyn Creek Erosion Control along Barbertown Road

WHAT?
The City of Mississauga is undertaking a Schedule 'B' Municipal Class Environmental Assessment (Class EA) to identify a preferred solution to address erosion problems along a section of Carolyn Creek along Barbertown Road (please refer to the key plan for Study Area limits).



WHY?
Through its ongoing erosion monitoring program, the City of Mississauga has identified the creek reach on the south side of Barbertown Road as a high priority site in need of rehabilitation, based on the continued erosion and risk to property and infrastructure.

HOW?
- The study has examined the creek and associated natural environment to identify existing erosion problems, potential future risks, and opportunities for restoration and environmental enhancement.
- Through the Municipal Class EA process, multiple alternative solutions have been developed and evaluated by the Study Team and will be considered for refinement through consultation process (see below). The Study Team will then confirm a Preferred Solution and proceed with the detailed design of the recommended works.
- At the end of the Class EA Study, a Project File Report, documenting the study process will be available for review by the public, Indigenous Nations, Government Agencies, and stakeholders.

GET INVOLVED!
- Consultation is an essential part of the Municipal Class EA process. We want to ensure that anyone with an interest in this study has the opportunity to provide input. The Study Team has developed an information package to allow local residents, interested members of the public, Indigenous Nations, Government Agencies and interested stakeholders an opportunity to review and comment on the alternative solutions, the evaluation process, the preliminary preferred solution and the next steps in the study. The information package will be made available on a dedicated Project webpage for this project on City's website from **March 23** to **April 20, 2022**: www.mississauga.ca/carolyncreekstudy
- Please provide us your comments by **April 20, 2022**, by using the Online Comment Form available on project webpage. Comments can also be sent to the following contacts via email:

Anthony Di Giandomenico P.Eng.
Storm Drainage Engineer
City of Mississauga
anthony.digiandomenico@mississauga.ca

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

Personal information is collected under the authority of the Environmental Assessment Act and will be used in the assessment process. With exception of personal information, all comments shall become part of the public records. Questions about this collection should be directed to the Project Manager listed above.
This notice was issued in March 2022.

APPENDIX

D-2 *Public Information Centre Slides*

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.

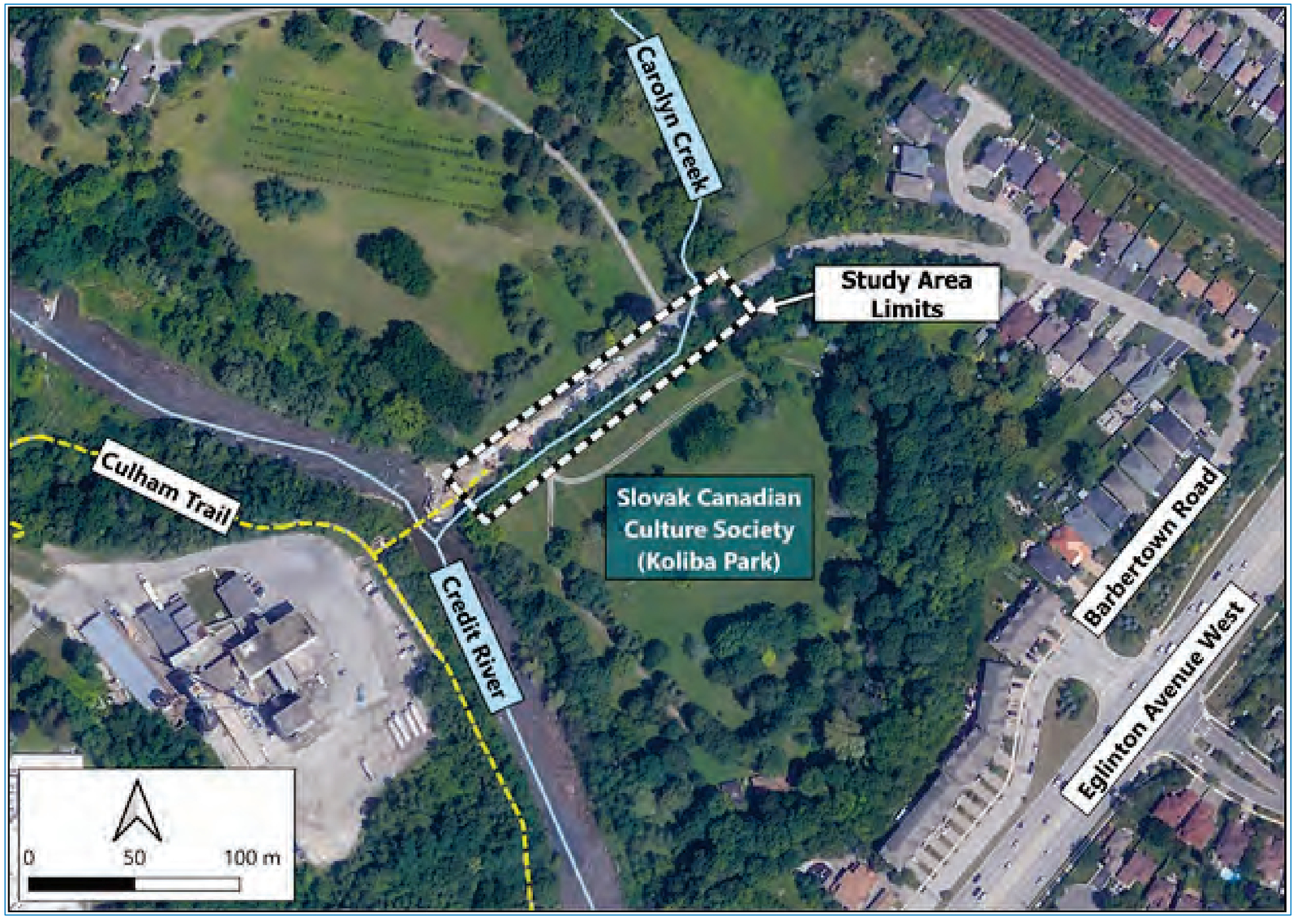


This presentation provides the following information:

- 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.



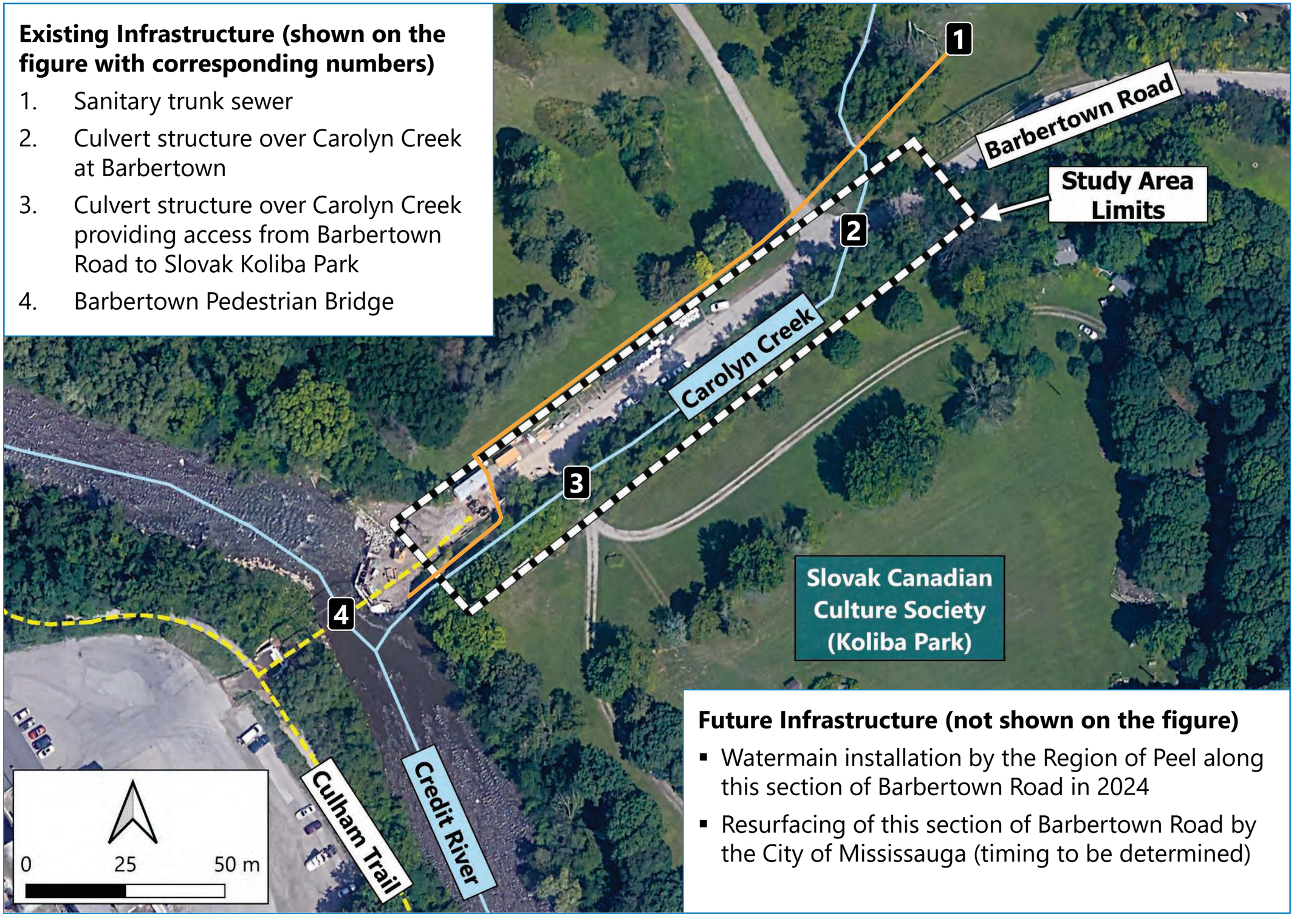
Koliba Park to the south of Carolyn Creek

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.



Vegetation Communities within Study Area

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:

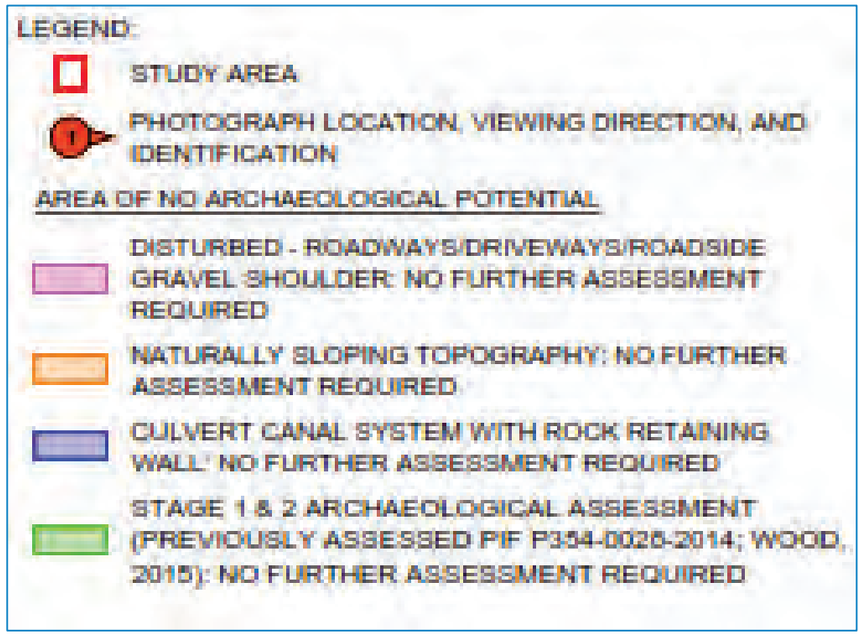
- Removal or reshaping of adverse accumulated cobble from gabion basket failure to improve passage
- Stabilize and replace gabion baskets
- Gradual elevation change at the upstream end of the pool
- Removal of debris (wood or litter/garbage); and
- Stabilizing banks and gabion baskets upstream of the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



Debris in channel that may impede fish passage

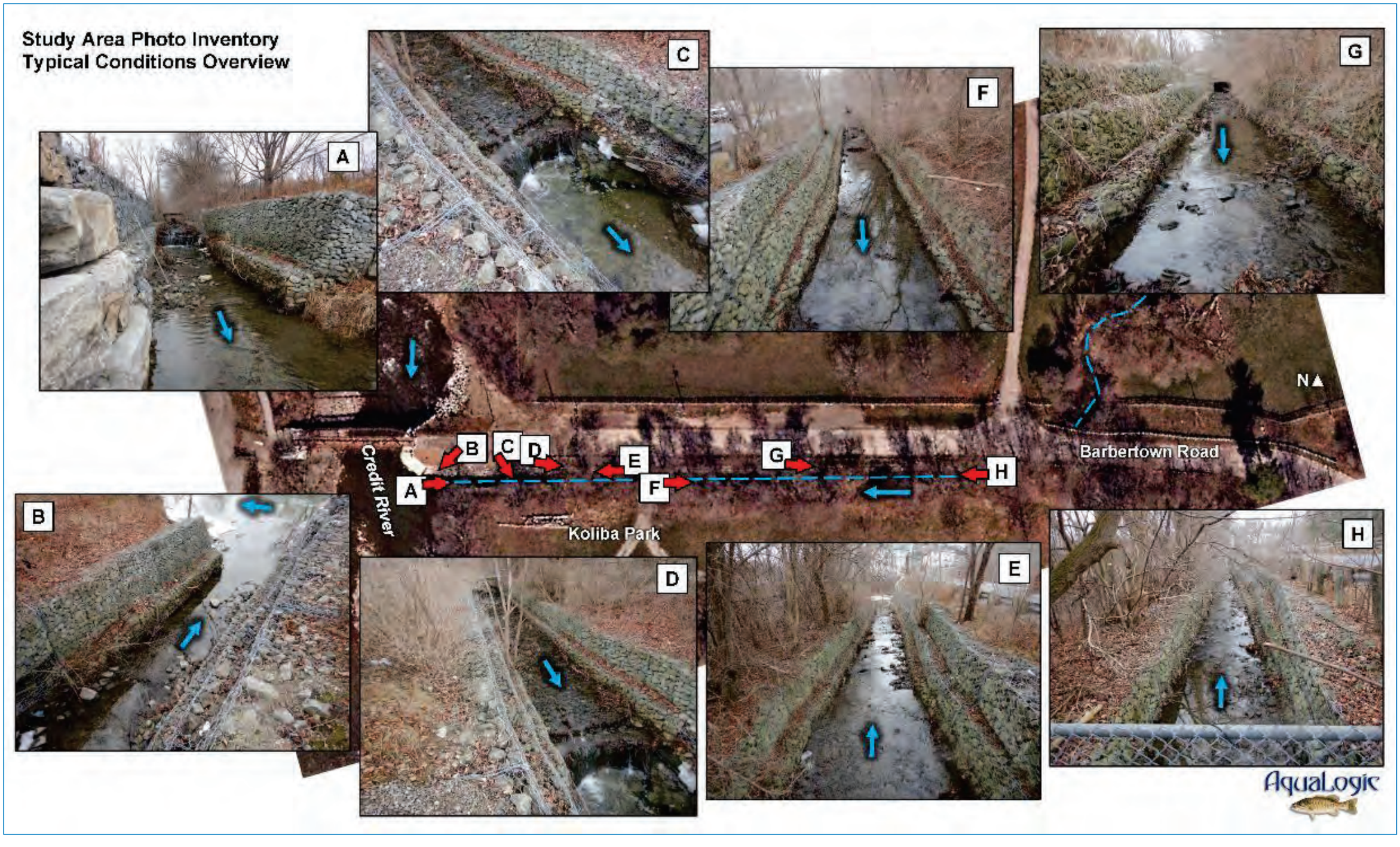
Archaeological Resources

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





Stream Morphology – Study Area Overview



Barbertown Road and Koliba Park Entrance Crossings

Barbertown Road

staff gauge

Koliba Park Entrance

Barbertown Road crossing

Barbertown Road Perspective, East to West

Koliba Park entrance crossing

Stream Morphology - Primary Failure Site



Drop structure at Primary Failure Site



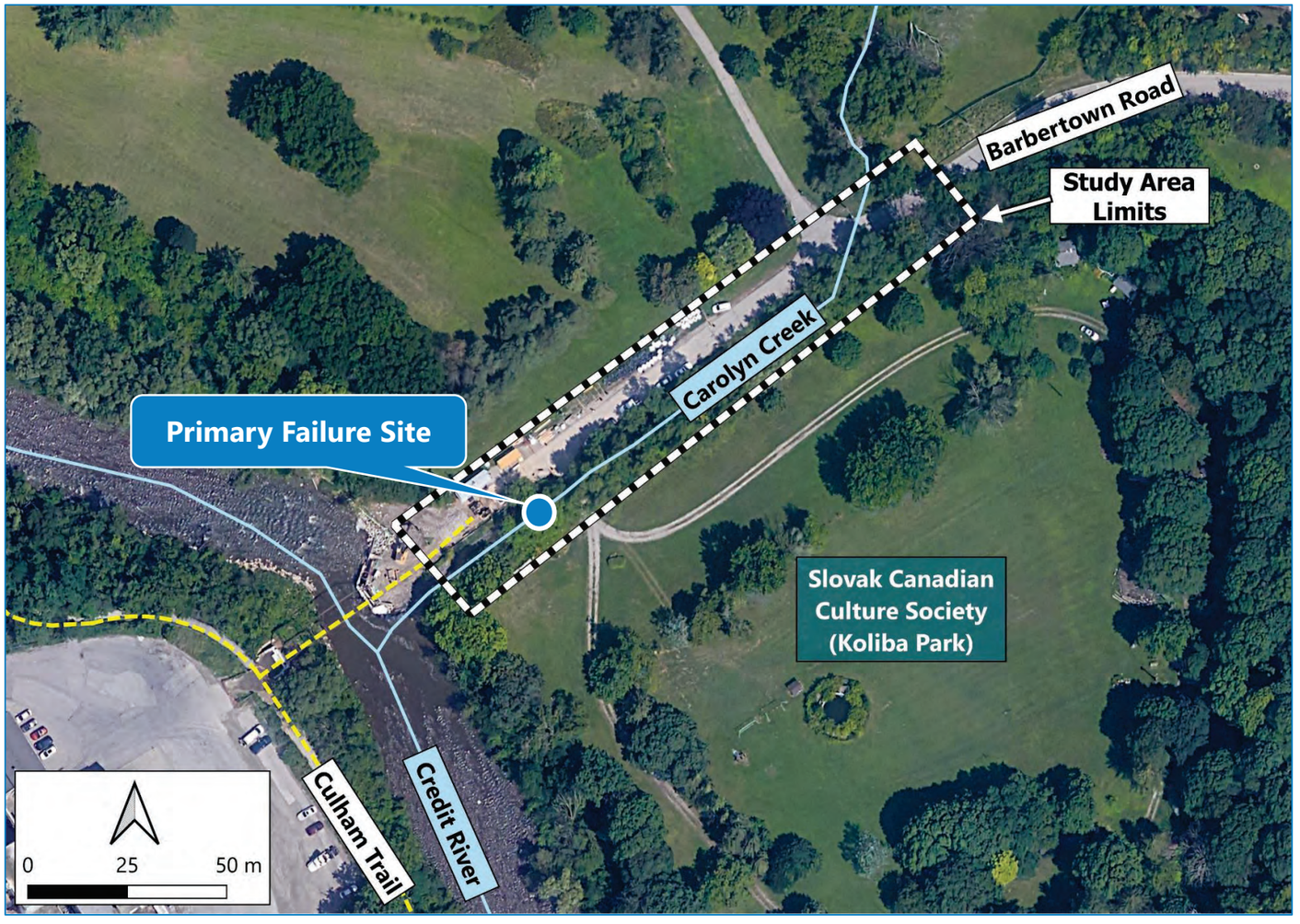
Undercut of existing gabion



Undercut of existing gabion



Original gabion weir appear to be missing



Stream Morphology - Secondary Priority Sites

Secondary Priority Details





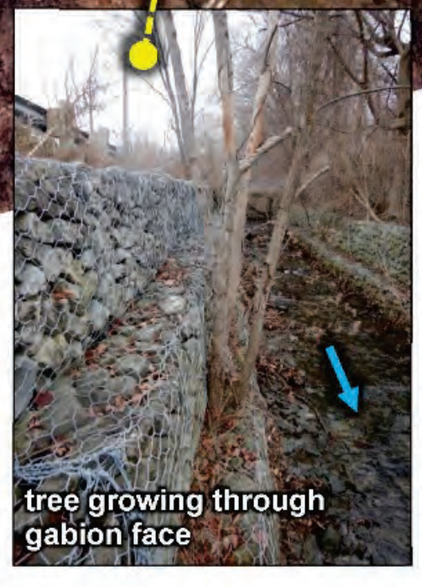
















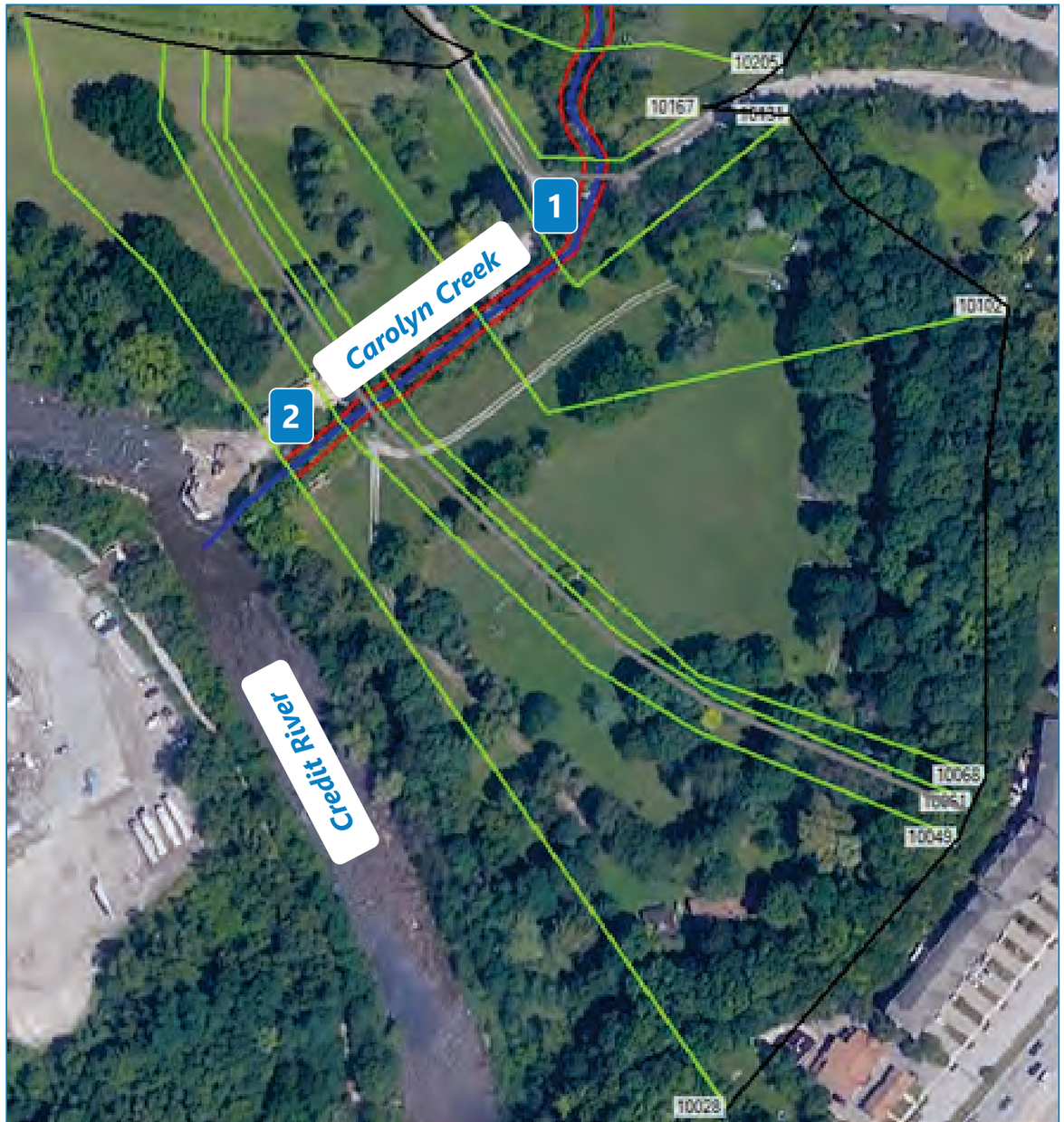
AquaLogic

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.

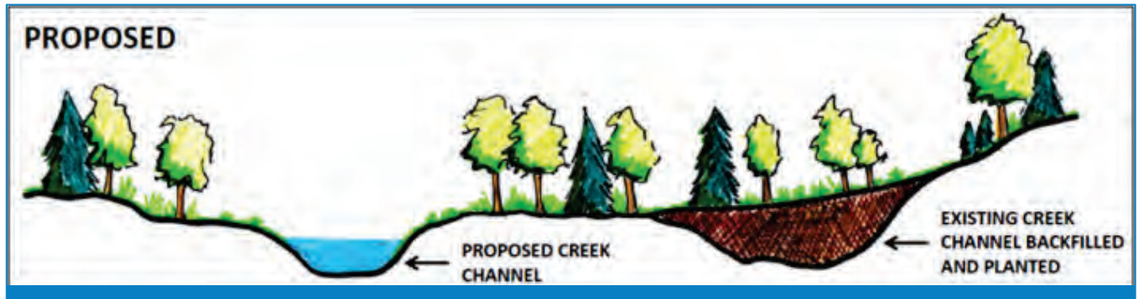
Carried forward for further evaluation.



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.

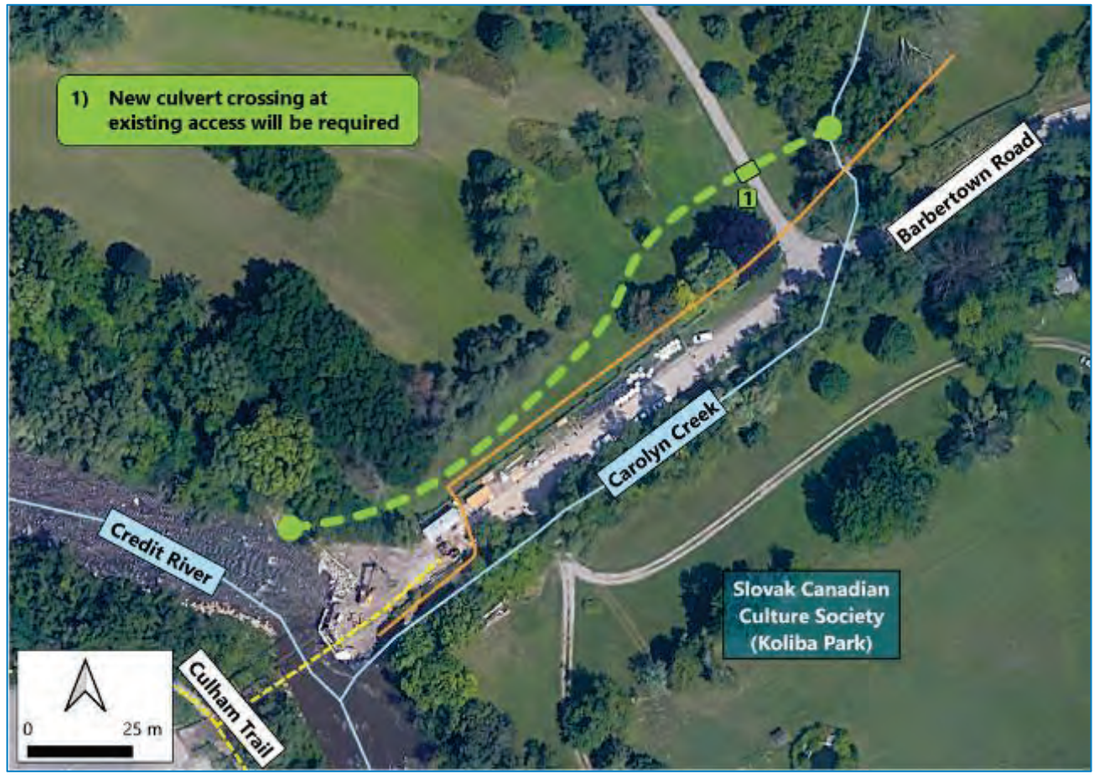
Two realignment sub-options carried forward for further evaluation.



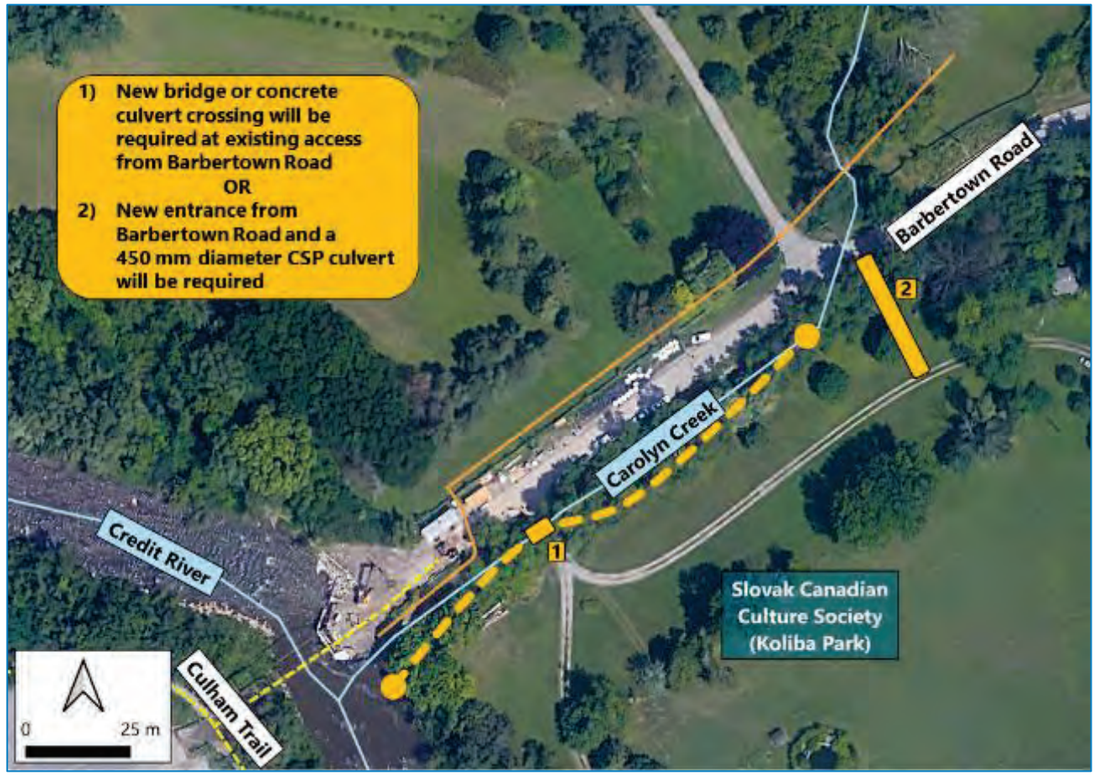
Schematic of Natural Channel Realignment

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.

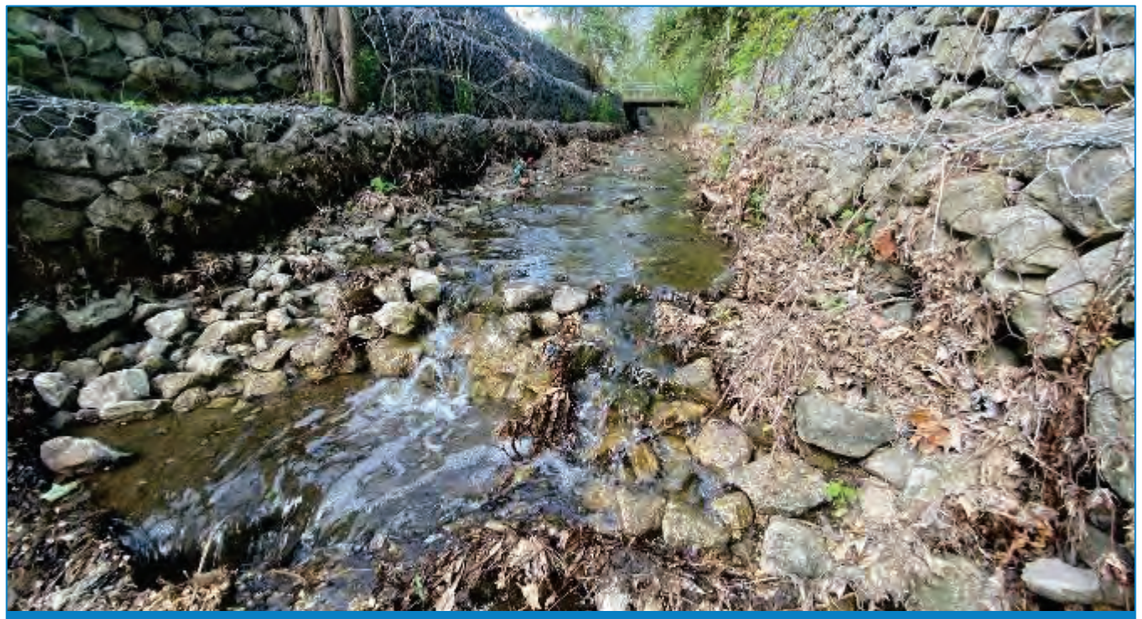
Carried forward for further evaluation.



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

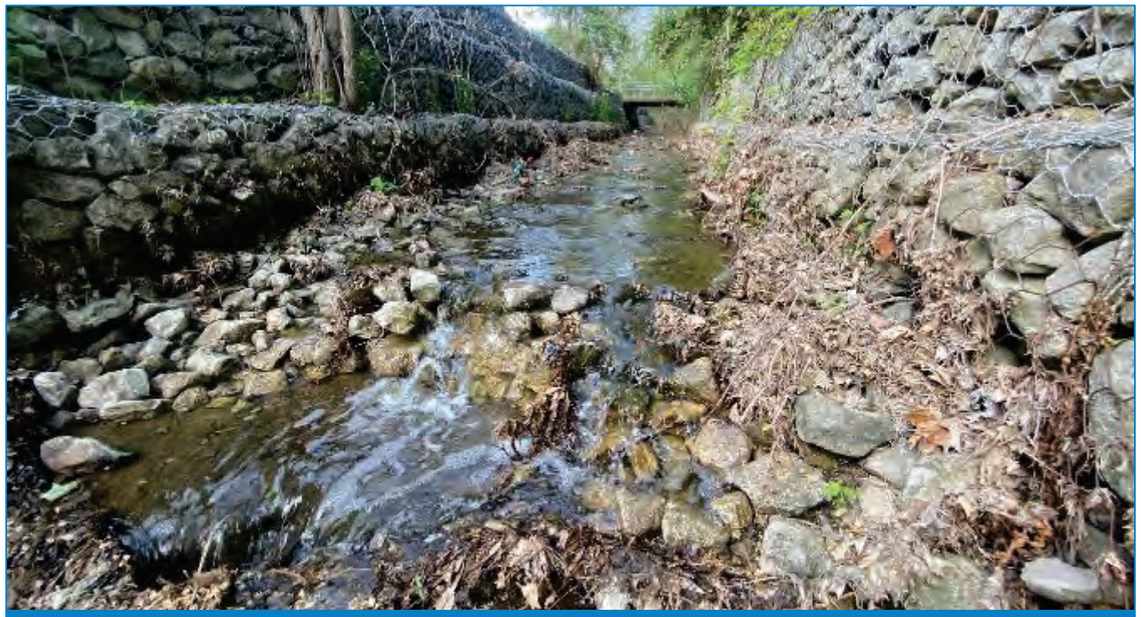
Evaluation Environment	Evaluation Criteria	Factor Significance	Protect in Place / Functional Channel Design	Replacement of Road Crossing Structures	Barrier Removal to Improve Fish Passage and Habitat	Creek Realignment to the north of Barbertown Road
Social Environment	Impact to Infrastructure/ utilities	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.

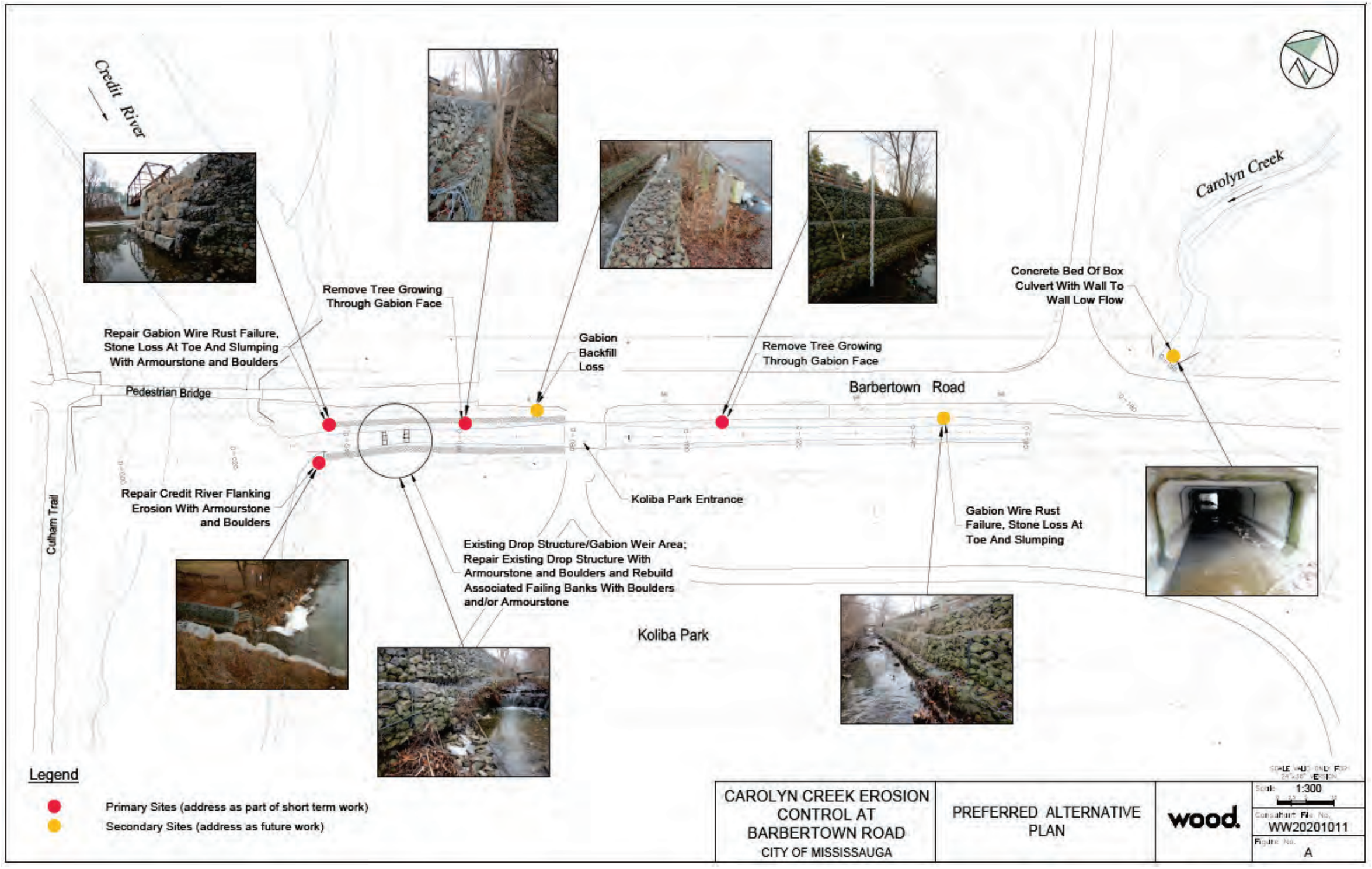
Preliminary Preferred Solution for Long-term

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

APPENDIX

D-3 *Public Comments*

Talpur, Mir

From: [redacted]
Sent: Monday, March 28, 2022 2:24 PM
To: Talpur, Mir
Subject: Re: Slovak Canadian Cultural Society

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Mir
Thank you for your response. We look forward to receiving the information.
[redacted]

From: Talpur, Mir <mir.talpur@woodplc.com>
Sent: Monday, March 28, 2022 5:17 AM
To: [redacted]
Cc: Anthony DiGiandomenico <anthony.digiandomenico@mississauga.ca>; Bishop, Brian <brian.bishop@woodplc.com>
Subject: RE: Slovak Canadian Cultural Society

Hi [redacted],

Thank you for your email. We will arrange to have a Public Information Centre package sent to you.

Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
www.woodplc.com

From: [redacted]
Sent: Friday, March 25, 2022 6:40 PM
To: Talpur, Mir <mir.talpur@woodplc.com>
Subject: Slovak Canadian Cultural Society

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Sent from Mail for Windows
Please mail us all the info re erosion study of Carolyn Creek
Our mailing address is [redacted]
We do not have access to a printer and can not
Retrieve it from your web site.
Thank you
[redacted] President

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Talpur, Mir

From: Anthony DiGiandomenico <Anthony.DiGiandomenico@mississauga.ca>
Sent: Thursday, March 31, 2022 4:52 PM
To: Bishop, Brian
Subject: FW: Carolyn Creek study

Hi Brian,

Response below to the resident south of our study area. Just FYI.

Thanks,
Anthony

From: Anthony DiGiandomenico
Sent: 2022/03/31 4:47 PM
To: [redacted]
Cc: Mayor Bonnie Crombie <mayor@mississauga.ca>; Ron Starr <ron.starr@mississauga.ca>; Muneef Ahmad <muneef.ahmad@mississauga.ca>
Subject: RE: Carolyn Creek study

Good Afternoon Sandeep,

Thank you for reaching out with your erosion concerns and I'm sorry to hear you haven't received clear direction to-date.

The Carolyn Creek erosion control study is focused on addressing erosion risks specifically along Carolyn Creek adjacent to Barbertown Road within a relatively small study area. The purpose of this study is mainly to provide erosion protection for the existing primary failure site located adjacent to the Barbertown Road bridge.

A previous engineering study of the Credit River was undertaken by the City and it identified the section of river behind your property as a high-priority site for erosion protection. Based on these findings, the City completed river stabilization works around 2011 that stretched upstream of Eglinton Avenue and included the river bank behind your property. This project included the placement of large rock and vegetation to protect the toe of the slope (at river level) and reduce the rate of erosion of the river valley wall and the top of slope.

The City continues to regularly monitor this site, and all creeks and rivers across the City, as part of our creek monitoring program. The latest evaluation indicates the stabilization works are in good condition and are continuing to function as originally intended. Future creek works are not currently proposed for this area but will be regularly re-evaluated based on our monitoring.

Thank you,
Anthony

Anthony Di Giandomenico P.Eng.
Storm Drainage Engineer, Environmental Services
T 905-615-3200 ext.3491
anthony.digiandomenico@mississauga.ca

From: [redacted]
Sent: 2022/03/30 10:47 AM
To: Anthony DiGiandomenico <Anthony.DiGiandomenico@mississauga.ca>; brian.bishop@woodpic.ca
Cc: Mayor Bonnie Crombie <mayor@mississauga.ca>
Subject: Carolyn Creek study

Good Morning,

I am a resident who is directly impacted by erosion. My property at north west corner of Eglinton / credit river backs onto the river (albeit at an elevation). I have been running from piller to post to bring this to the attention of the concerned authorities but to no availl. Each organization I have approached keeps pointing me to the other. I have had meetings with the councillor as well. Additionally I have written to Credit Valley conservation, onemilliontrees.ca and other organizations as well

I would appreciate if my property is considered as part of the erosion control or any study being conducted and actioned on to ensure my property is protected. Right now as it stands there is a 100 feet drop about 3-4 feet from my backyard fence which poses extreme danger.

Looking forward to hearing from the concerned parties.

Thanks,
[redacted]

Talpur, Mir

From: Talpur, Mir
Sent: Tuesday, May 24, 2022 1:34 PM
To: [redacted]
Cc: Anthony DiGiandomenico; Bishop, Brian
Subject: Carolyn Creek Erosion Control Class Environmental Assessment Study

Hello [redacted],

Thank you for your interest in Carolyn Creek Erosion Control Class Environmental Assessment Study that is being conducted by the City of Mississauga. We received your comments submitted as part of the Public Information Centre. We would like to take an opportunity to provide a response.

As presented in the Public Information Centre, there are preferred solutions being advanced for Carolyn Creek along Barbertown Road for the short-term and long-term. The proposed preferred solution will collectively mitigate erosion within the creek reach and improve fish passage and habitat. Further, the preferred solution will minimize impacts to the form and function of the Credit River and Carolyn Creek valley and will provide opportunities for enhancement, which was identified as a key requirement by the Credit Valley Conservation. There will be some tree removal required to undertake proposed works, however, tree removal will be minimized to the extent possible, and replacement trees will be planted.

We trust that the above response provides clarification. Thank you again for your interest in this project.

Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
www.woodplc.com

APPENDIX

E-1 *Mississaugas of the Credit First Nation*

From:	Shams, Aniqa
To:	"fawn.sault@mncfn.ca"
Cc:	Talpur, Mir; Kelly, Mary K; Maher, Trina
Subject:	RE: Natural Environment Fieldwork - MCFN FLR Agreement Tuesday, June 1,
Date:	2021 7:39:00 AM
Attachments:	image002.png image003.jpg

Hi Fawn,

As for the Carolyn Creek Municipal Class EA that we spoke about via phone on April 30, I am still confirming the type of field work planned for natural environment and the potential to have Indigenous participation in the field work. As soon as I have this answer, I will let you and Megan know.

Thanks,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From:	Shams, Aniqa
To:	Fawn.Sault@newcreditfirstnation.com; megan.devries@mncfn.ca
Cc:	Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian; Kelly, Mary K; Talpur, Mir; Maher, Trina
Subject:	RE: Mississauga - Class EA - Carolyn Creek Erosion Control
Date:	Friday, July 23, 2021 3:28:00 PM
Attachments:	image001.png image002.png

Hi Fawn,

We wanted to follow-up with you regarding the draft Stage 1 Archeological Assessment Report for Carolyn Creek. Please let us know if you have any comments or concerns or require more time for review. We look forward to hearing back from you.

Best regards,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Pronouns – She/Her/Hers
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From: Shams, Aniqa
Sent: Tuesday, June 22, 2021 12:34 PM
To: 'Fawn.Sault@newcreditfirstnation.com' <Fawn.Sault@newcreditfirstnation.com>; 'megan.devries@mncfn.ca' <megan.devries@mncfn.ca>
Cc: 'Anthony.DiGiandomenico@mississauga.ca' <Anthony.DiGiandomenico@mississauga.ca>; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>; Maher, Trina <trina.maher@woodplc.com>
Subject: RE: Mississauga - Class EA - Carolyn Creek Erosion Control

Good afternoon Fawn and Megan,

As another follow-up on this project, we are pleased to share the draft Stage 1 Archeological Assessment Report for Carolyn Creek with Mississaugas of the Credit First Nation for review and comment. If you could please provide us any comments you may have by July 22, that would be greatly appreciated. Once we receive your review and comments, we will submit this report to the MHSTCI for their review and approval. Please note that the recommendation of this report is that the study area does not require further archaeological assessment.

If you have any questions or comments, please do not hesitate to contact me!

Best regards,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From: Shams, Aniqa
Sent: Wednesday, April 7, 2021 12:54 PM
To: Fawn.Sault@newcreditfirstnation.com
Cc: megan.devries@mncfn.ca; Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>
Subject: Mississauga - Class EA - Carolyn Creek Erosion Control

Good afternoon Fawn,

The City of Mississauga is undertaking a Schedule B Class Environmental Assessment (Class EA) Study for erosion control and watercourse improvements to Carolyn Creek.

Please find attached a letter from the City as well as a summary of the Project. The field work for the Stage 1 Archaeological Assessment and Natural Environment is currently planned for the spring and summer of 2021. However, we will keep you informed once we have confirmed the schedule.

We will follow-up with Mississaugas of the Credit First Nation in the near future to discuss. Please do not hesitate to contact us should you have any questions or comments.

Thank you,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

Fawn Sault
Consultation Manager
Mississaugas of the Credit First Nation
Fawn.Sault@newcreditfirstnation.com

April 7, 2021

Re: City of Mississauga - Carolyn Creek Erosion Control
Schedule 'B' Municipal Class Environmental Assessment
Notice of Study Commencement

Dear Ms. Sault,

The City of Mississauga (City) has started a Schedule 'B' Municipal Class Environmental Assessment (Class EA or the Study) for erosion control and watercourse improvements to Carolyn Creek.

The City has received direction from the Provincial Crown that the Mississaugas of the Credit First Nation may have an interest in the Project. The City is committed to involving Indigenous Nations and public stakeholders in this Study. For more details on this Class EA, please find attached the Project Information Sheet. Please feel free to share this information within your community as you feel appropriate.

We are interested in understanding any interests or questions that the Mississaugas of the Credit First Nation may have about this Project and if there is a potential for the Project to affect Indigenous and Treaty Rights. We would also be interested to know if there are any sites of cultural significance to your Nation within, or adjacent to, the Study area. If you would like to meet and discuss this Project, please feel free to contact the undersigned. We will contact you by telephone, in the near future, to assure that this correspondence has been received and to determine your interest in a meeting.

Sincerely,

Anthony Di Giandomenico, P. Eng.
Project Manager
The Corporation of the City of Mississauga
Transportation & Works Department
Anthony.DiGiandomenico@mississauga.ca

Brian Bishop, M. Eng., P. Eng.
Consultant Project Manager
Wood Environment & Infrastructure Solutions
Brian.Bishop@woodplc.com

Cc: Megan DeVries, MCFN (megan.devries@mncfn.ca)
Mary Kelly, Wood (mary.k.kelly@woodplc.com)

Mir Ahsan Talpur, Wood (mir.talpur@woodplc.com)

Encl: Carolyn Creek Erosion Control - Project Summary

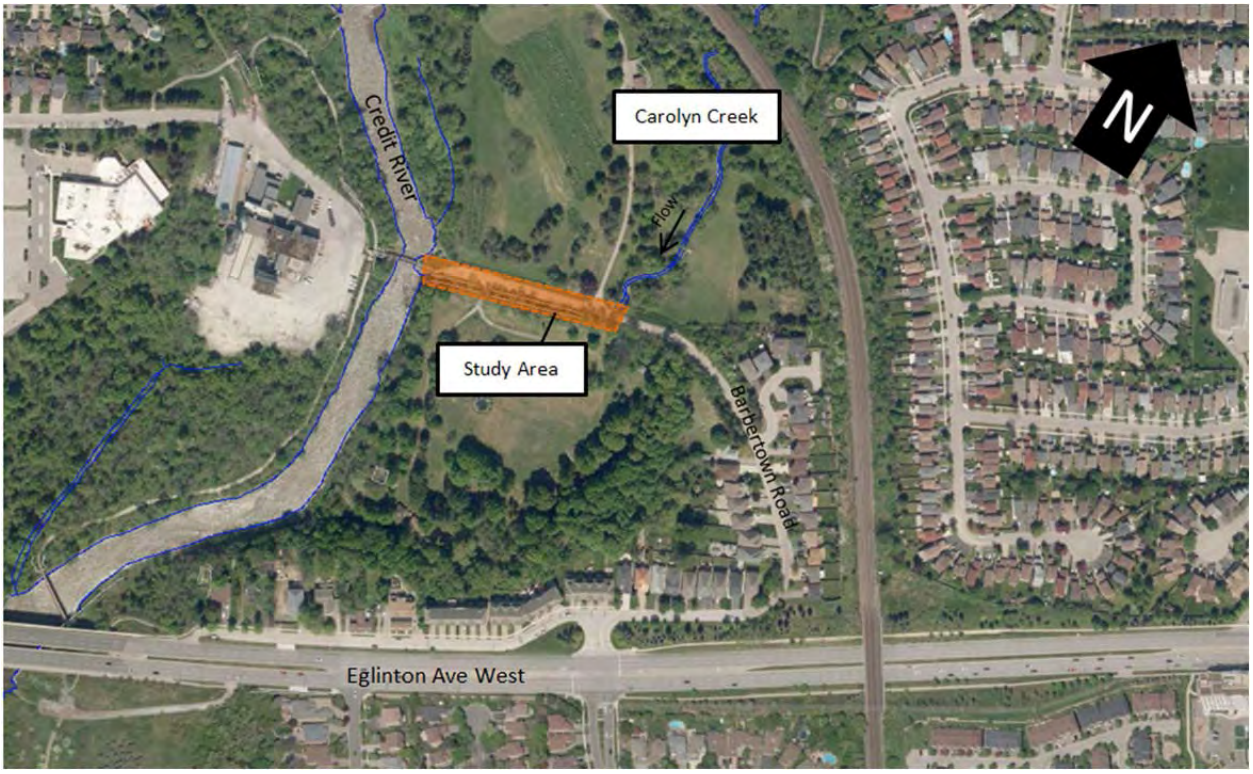
Carolyn Creek Erosion Control
Schedule 'B' Municipal Class Environmental Assessment

A Municipal Class Environmental Assessment is a decision-making and planning process which identifies the potential environmental effects of a project within a local area, so these risks can be managed prior to a project's implementation.

Project Description

The City of Mississauga (City) has initiated a Schedule 'B' Municipal Class Environmental Assessment (Class EA) for erosion control and watercourse improvements to Carolyn Creek, located just north of Eglinton Avenue West, as shown in the figure below. The Study aims to develop a plan to create better waterflow for Carolyn Creek which will address the current erosion problems and provide long-term stability for the waterflow of the creek.

Figure 1: Study Area for Carolyn Creek



The City has been undertaking an on-going erosion monitoring program for its creeks. A portion of Carolyn Creek, located on the south side of Barbertown Road, has been identified as a high priority site in need of rehabilitation because of continued erosion and risk to property and infrastructure. The City's goal is to provide long-term erosion protection which takes into consideration the natural waterflow of the Creek while also

designing a solution that will maintain or possibly improve the waterflow capacity of the Carolyn Creek. The Class EA will also include a review of options, such as replacing the current hardened creek bed and stone banks and replace these with more natural forms of creek erosion solutions used today. These elements can improve fish habitat and passage, offer a visual enhancement to the area, which is more reflective of a natural space, and minimize environmental impacts during and after construction.

The City has retained Wood Environment & Infrastructure Solutions (Wood) to undertake this Class EA Study and to prepare a detailed design and associated construction drawings.

Municipal Class 'B' Environmental Assessment

Municipal erosion control projects are required to follow the process for a Schedule 'B' project as described in the Municipal Class Environmental Assessment document. Accordingly, the purpose of this Class EA is to:

- Identify the areas along Carolyn Creek which are most affected by erosion and what solutions are possible to address this issue, evaluate those potential solutions to identify a preferred solution to address erosion problem
- Identify the potential effects associated with the recommended solution and identify practical measures to avoid or mitigate potential negative effects

The first step in the study process is to develop an understanding of the existing erosion problems with the Carolyn Creek. This will be done by reviewing background studies (where available) and collect supplemental information related to the natural, socio-economic and technical environments. These steps will help the City to define the problem and opportunity statement for the Class EA. Once existing issues have been identified, the City will develop potential alternatives for improvements to the creek.

The Class EA planning process helps identify the potential effects of proposed projects. Each proposed alternative is assessed against baseline conditions to determine the potential effects, and where necessary, identify mitigation measures to minimize or avoid those impacts. From these alternatives, the most feasible alternative is identified.

A key component of this study is to consult with the regulatory agencies, the public, interested stakeholders and the Indigenous groups whose Traditional Territory the project is located in.

Baseline Studies

Baseline studies are prepared to describe the current biological, human and physical environment conditions. The following investigations will be completed as part of this study:

- Archaeological Assessments
- Fish Habitat Assessment

- Terrestrial Environment Assessment
- Geomorphic Assessment (assessment of creek form)
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Potential Project Related Effects

Potential project effects will be identified through an evaluation of the alternatives, and for the preferred solution, mitigation measures to address these potential effects will be developed. This may include effects on:

- Environmental features including land-based and water-based environments
- Archaeological resources

Schedule and Next Steps

- Field Surveys: tentatively planned for Spring-Summer 2021
- Public Information Sessions: tentatively planned for Summer 2021
- Project File Report: submission tentatively planned for Fall 2021 / Winter 2022

Contact Information

Anthony Di Giandomenico, P. Eng.
Project Manager
The Corporation of the City of Mississauga
Transportation & Works Department
300 City Centre Drive
Mississauga, ON L5B 3C1
Phone: (905) 615-3200 (Ext. 3491)
Anthony.DiGiandomenico@mississauga.ca

Brian Bishop, M. Eng., P. Eng.
Consultant Project Manager
Wood Environnent & Infrastructure Solutions
3450 Harvester Road, Suite 100,
Burlington, ON L7N 3W5
Telephone: (905) 335-2353
Brian.Bishop@woodplc.com

From:	Megan DeVries
To:	Shams, Aniqa
Cc:	Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian; Kelly, Mary K; Talpur, Mir; Maher, Trina; Fawn Sault
Subject:	RE: Mississauga - Class EA - Carolyn Creek Erosion Control
Date:	Friday, July 30, 2021 10:50:36 AM
Attachments:	image002.jpg image003.png image004.png image006.png

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Hi Aniqa,

Thank you for following up on this. I have now completed the review of the Stage 1 AA of Carolyn Creek Erosion Control and have no further comments or questions.

Sincerely,
Megan.

Megan DeVries (she/her)
Archaeological Operations Supervisor

Department of Consultation and Accommodation (DOCA)
Mississaugas of the Credit First Nation (MCFN)
4065 Highway 6 North, Hagersville, ON N0A 1H0
Mobile: 289-527-2763
http://www.mncfn.ca

This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed. If you are not the intended recipient you are notified that disclosing, copying, distributing or taking any action in reliance on the contents of this information is strictly prohibited. Please note that any views or opinions presented in this email are solely those of the author and do not necessarily represent those of the Mississaugas of the Credit First Nation.

From: Shams, Aniqa <aniqa.shams@woodplc.com>
Sent: Friday, July 23, 2021 3:29 PM
To: Fawn Sault <Fawn.Sault@mncfn.ca>; Megan DeVries <Megan.DeVries@mncfn.ca>
Cc: Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>; Maher, Trina <trina.maher@woodplc.com>
Subject: RE: Mississauga - Class EA - Carolyn Creek Erosion Control

Hi Fawn,

We wanted to follow-up with you regarding the draft Stage 1 Archeological Assessment Report for Carolyn Creek. Please let us know if you have any comments or concerns or require more time for review. We look forward to hearing back from you.

Best regards,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Pronouns – She/Her/Hers

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Mobile: + (416) 357-2093
www.woodplc.com

From: Shams, Aniqa
Sent: Tuesday, June 22, 2021 12:34 PM
To: 'Fawn.Sault@newcreditfirstnation.com' <Fawn.Sault@newcreditfirstnation.com>; 'megan.devries@mncfn.ca' <megan.devries@mncfn.ca>
Cc: 'Anthony.DiGiandomenico@mississauga.ca' <Anthony.DiGiandomenico@mississauga.ca>; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>; Maher, Trina <trina.maher@woodplc.com>
Subject: RE: Mississauga - Class EA - Carolyn Creek Erosion Control

Good afternoon Fawn and Megan,

As another follow-up on this project, we are pleased to share the draft Stage 1 Archeological Assessment Report for Carolyn Creek with Mississaugas of the Credit First Nation for review and comment. If you could please provide us any comments you may have by July 22, that would be greatly appreciated. Once we receive your review and comments, we will submit this report to the MHSTCI for their review and approval. Please note that the recommendation of this report is that the study area does not require further archaeological assessment.

If you have any questions or comments, please do not hesitate to contact me!

Best regards,
Aniqa

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Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From: Shams, Aniqa
Sent: Wednesday, April 7, 2021 12:54 PM
To: Fawn.Sault@newcreditfirstnation.com
Cc: megan.devries@mncfn.ca; Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>
Subject: Mississauga - Class EA - Carolyn Creek Erosion Control

Good afternoon Fawn,

The City of Mississauga is undertaking a Schedule B Class Environmental Assessment (Class EA) Study for erosion control and watercourse improvements to Carolyn Creek.

Please find attached a letter from the City as well as a summary of the Project. The field work for the Stage 1 Archaeological Assessment and Natural Environment is currently planned for the spring and summer of 2021. However, we will keep you informed once we have confirmed the schedule.

We will follow-up with Mississaugas of the Credit First Nation in the near future to discuss. Please do not hesitate to contact us should

you have any questions or comments.

Thank you,
Aniqa

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Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From:	Ramlogan, Vijanti
To:	DOCA.Admin@mncfn.ca
Cc:	Mark.Laforme@mncfn.ca; Talpur, Mir; Bishop, Brian; anthony.digiandomenico@mississauga.ca; Maher, Trina; Kelly, Mary K; Shams, Aniqa
Subject:	Carolyn Creek Erosion Control - Notice of Public Information Centre
Date:	Wednesday, March 23, 2022 9:36:00 AM
Attachments:	image001.png WW20101061_CarolynCreekEC-Notice-PIC_2022-03-23.pdf

Good morning, Abby and Mark,

A Public Information Centre is being hosted to allow local residents, interested members of the public, Indigenous Nations, Government Agencies and interested stakeholders an opportunity to review and comment on the alternative solutions, the evaluation process, the preliminary preferred solution and the next steps in the Carolyn Creek Erosion Control study. Please visit the Project webpage to review information materials, and provide any comments by **April 20, 2022**: www.mississauga.ca/carolyncreekstudy

The City of Mississauga is undertaking a Schedule 'B' Municipal Class Environmental Assessment (Class EA) to identify a preferred solution to address erosion problems along a section of Carolyn Creek along Barbertown Road. The study has examined the creek and associated natural environment to identify existing erosion problems, potential future risks, and opportunities for restoration and environmental enhancement.

Please refer to the attached Notice of Study Commencement and Public Information Centre for more information.

If you have any questions or concerns, please let me know.

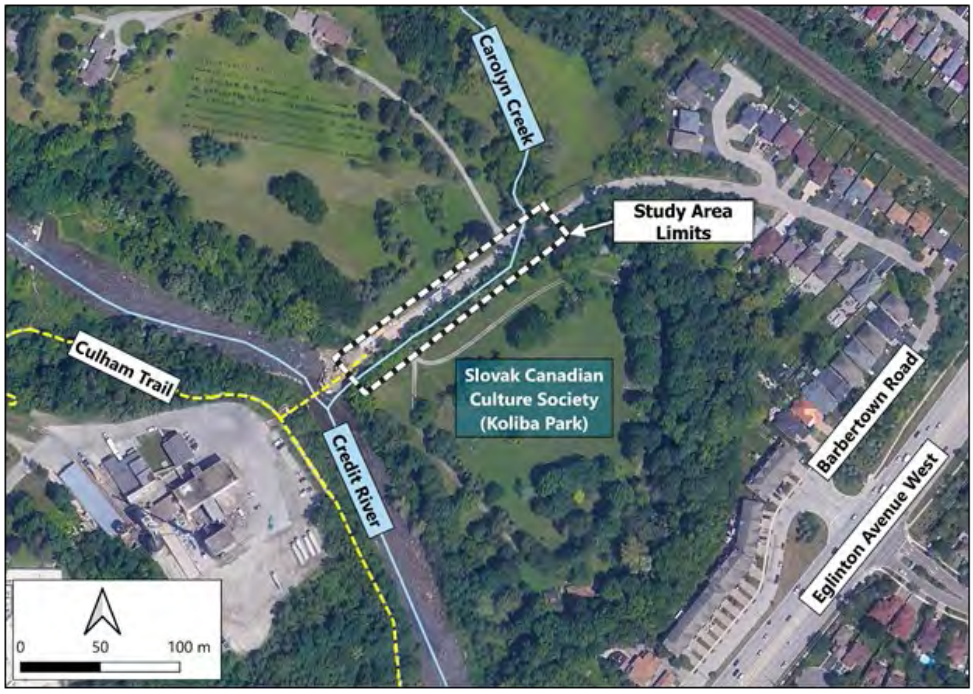
Thanks for your time.

Truly,
Vi

Vijanti Ramlogan, MESc
Intermediate Human Environment Consultant
Pronouns (she/her/hers)
Mobile: +705-690-6435
www.woodplc.com

Notice of Online Public Information Centre
Municipal Class Environmental Assessment Study for Carolyn Creek Erosion Control along Barbertown Road

WHAT?
The City of Mississauga is undertaking a Schedule 'B' Municipal Class Environmental Assessment (Class EA) to identify a preferred solution to address erosion problems along a section of Carolyn Creek along Barbertown Road (please refer to the key plan for Study Area limits).



WHY?
Through its ongoing erosion monitoring program, the City of Mississauga has identified the creek reach on the south side of Barbertown Road as a high priority site in need of rehabilitation, based on the continued erosion and risk to property and infrastructure.

HOW?
- The study has examined the creek and associated natural environment to identify existing erosion problems, potential future risks, and opportunities for restoration and environmental enhancement.
- Through the Municipal Class EA process, multiple alternative solutions have been developed and evaluated by the Study Team and will be considered for refinement through consultation process (see below). The Study Team will then confirm a Preferred Solution and proceed with the detailed design of the recommended works.
- At the end of the Class EA Study, a Project File Report, documenting the study process will be available for review by the public, Indigenous Nations, Government Agencies, and stakeholders.

GET INVOLVED!
- Consultation is an essential part of the Municipal Class EA process. We want to ensure that anyone with an interest in this study has the opportunity to provide input. The Study Team has developed an information package to allow local residents, interested members of the public, Indigenous Nations, Government Agencies and interested stakeholders an opportunity to review and comment on the alternative solutions, the evaluation process, the preliminary preferred solution and the next steps in the study. The information package will be made available on a dedicated Project webpage for this project on City's website from **March 23** to **April 20, 2022**: www.mississauga.ca/carolyncreekstudy
- Please provide us your comments by **April 20, 2022**, by using the Online Comment Form available on project webpage. Comments can also be sent to the following contacts via email:

Anthony Di Giandomenico P.Eng.
Storm Drainage Engineer
City of Mississauga
anthony.digiandomenico@mississauga.ca

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

Personal information is collected under the authority of the Environmental Assessment Act and will be used in the assessment process. With exception of personal information, all comments shall become part of the public records. Questions about this collection should be directed to the Project Manager listed above.
This notice was issued in March 2022.

APPENDIX

E-2 *Six Nations of the Grand River*

Robbin Vanstone
Consultation Supervisor
Six Nations of the Grand River
rvanstone@sixnations.ca

April 7, 2021

Re: City of Mississauga - Carolyn Creek Erosion Control
Schedule 'B' Municipal Class Environmental Assessment
Notice of Study Commencement

Dear Ms. Vanstone,

The City of Mississauga (City) has started a Schedule 'B' Municipal Class Environmental Assessment (Class EA or the Study) for erosion control and watercourse improvements to Carolyn Creek.

The City has received direction from the Provincial Crown that the Six Nations of the Grand River may have an interest in the Project. The City is committed to involving Indigenous Nations and public stakeholders in this Study. For more details on this Class EA, please find attached the Project Information Sheet. Please feel free to share this information within your community as you feel appropriate.

We are interested in understanding any interests or questions that the Six Nations of the Grand River may have about this Project and if there is a potential for the Project to affect Indigenous and Treaty Rights. We would also be interested to know if there are any sites of cultural significance to your Nation within, or adjacent to, the Study area. If you would like to meet and discuss this Project, please feel free to contact the undersigned. We will contact you by telephone, in the near future, to assure that this correspondence has been received and to determine your interest in a meeting.

Sincerely,

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Project Manager
The Corporation of the City of Mississauga
Transportation & Works Department
Anthony.DiGiandomenico@mississauga.ca

Brian Bishop, M. Eng., P. Eng.
Consultant Project Manager
Wood Environment & Infrastructure Solutions
Brian.Bishop@woodplc.com

Cc: Lonny Bomberry, SNGR (lonnybomberry@sixnations.ca)
Tanya j. Hill-Montour, SNGR (tanyahill-montour@sixnations.ca)
Mary Kelly, Wood (mary.k.kelly@woodplc.com)
Mir Ahsan Talpur, Wood (mir.talpur@woodplc.com)
Encl: Carolyn Creek Erosion Control - Project Summary

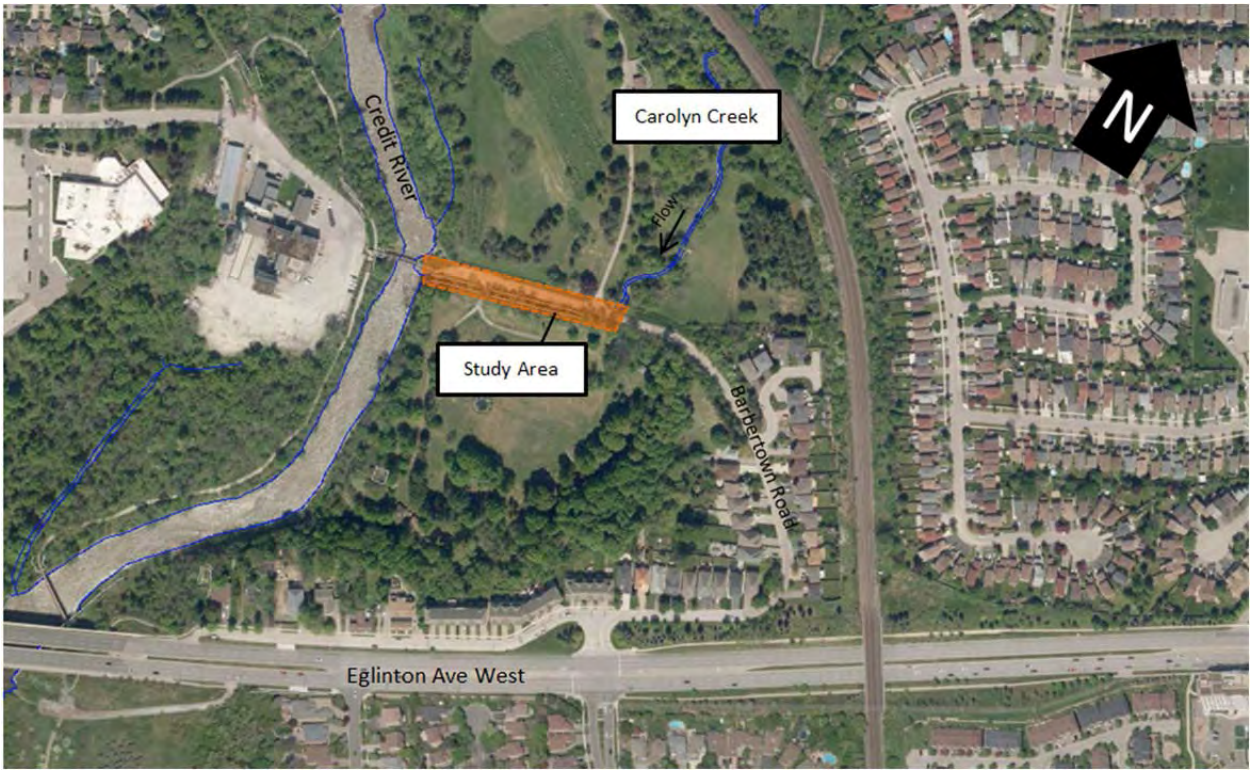
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Contact Information

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Project Manager
The Corporation of the City of Mississauga
Transportation & Works Department
300 City Centre Drive
Mississauga, ON L5B 3C1
Phone: (905) 615-3200 (Ext. 3491)
Anthony.DiGiandomenico@mississauga.ca

Brian Bishop, M. Eng., P. Eng.
Consultant Project Manager
Wood Environnent & Infrastructure Solutions
3450 Harvester Road, Suite 100,
Burlington, ON L7N 3W5
Telephone: (905) 335-2353
Brian.Bishop@woodplc.com

From:	Shams, Aniqa
To:	rvanstone@sixnations.ca
Cc:	lonnybomberry@sixnations.ca; tanyahill-montour@sixnations.ca; Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian; Kelly, Mary K; Talpur, Mir; Maher, Trina
Subject:	RE: Mississauga - Class EA - Carolyn Creek Erosion Control
Date:	Friday, July 23, 2021 3:29:00 PM
Attachments:	image002.png image003.png

Hi Robbin,

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Best regards,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Pronouns – She/Her/Hers
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From: Shams, Aniqa
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To: 'rvanstone@sixnations.ca' <rvanstone@sixnations.ca>
Cc: 'lonnybomberry@sixnations.ca' <lonnybomberry@sixnations.ca>; 'tanyahill-montour@sixnations.ca' <tanyahill-montour@sixnations.ca>; 'Anthony.DiGiandomenico@mississauga.ca' <Anthony.DiGiandomenico@mississauga.ca>; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>; Maher, Trina <trina.maher@woodplc.com>
Subject: RE: Mississauga - Class EA - Carolyn Creek Erosion Control

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If you have any questions or comments, please do not hesitate to contact me!

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Aniqa

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Human Environment Consultant
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Mobile: + (416) 357-2093
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From:	Robin Vanstone
To:	Shams, Aniqa
Cc:	Tanya Hill-Montour
Subject:	RE: Mississauga - Class EA - Carolyn Creek Erosion Control
Date:	Monday, July 26, 2021 8:24:05 AM
Attachments:	image004.png image002.png image003.png image008.png image009.png

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Good Morning Aniqa,

It is Tanya Hill-Montour that is in charge of Archaeology. I have cc'd her for your convenience.

Kind Regards,

Robbin Vanstone

Consultation Supervisor
Lands and Resources
Six Nations of the Grand River
w. 519-753-0665 ext. 5433
c. 226-388-0284
rvanstone@sixnations.ca

From: Shams, Aniqa <aniqa.shams@woodplc.com>
Sent: July 23, 2021 3:29 PM
To: Robin Vanstone <rvanstone@sixnations.ca>
Cc: Lonny Bomberry <lonnybomberry@sixnations.ca>; Tanya Hill-Montour <tanyahill-montour@sixnations.ca>; Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>; Maher, Trina <trina.maher@woodplc.com>
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Aniqa

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We will follow-up with Six Nations of the Grand River in the near future to discuss. Please do not hesitate to contact us should you have any questions or comments.

Thank you,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

APPENDIX

E-3

Haudenosaunee Confederacy Chiefs Council c/o Haudenosaunee Development Institute

From:	Ramlogan, Vijanti
To:	Raechelle Williams
Cc:	Todd Williams; Talpur, Mir; Kelly, Mary K; Maher, Trina; Shams, Aniqa; Bishop, Brian; anthony.digiandomenico@mississauga.ca; hdi2@bellnet.ca
Subject:	Carolyn Creek Erosion Control - Notice of Public Information Centre
Date:	Wednesday, March 23, 2022 10:18:00 AM
Attachments:	WW20101061_CarolynCreekEC-Notice-PIC_2022-03-23.pdf image001.png

---

Good morning Raechelle and Todd,

The City of Mississauga is undertaking a Schedule 'B' Municipal Class Environmental Assessment (Class EA) to identify a preferred solution to address erosion problems along a section of Carolyn Creek along Barbertown Road. The study has examined the creek and associated natural environment to identify existing erosion problems, potential future risks, and opportunities for restoration and environmental enhancement.

A Public Information Centre is being hosted to allow local residents, interested members of the public, Indigenous Nations, Government Agencies and interested stakeholders an opportunity to review and comment on the alternative solutions, the evaluation process, the preliminary preferred solution and the next steps in the study. Please visit the Project webpage to review information materials, and provide any comments by **April 20, 2022**: www.mississauga.ca/carolyncreekstudy

Please refer to the attached Notice of Public Information Centre for more information.

If you have any questions or concerns, please let me know.

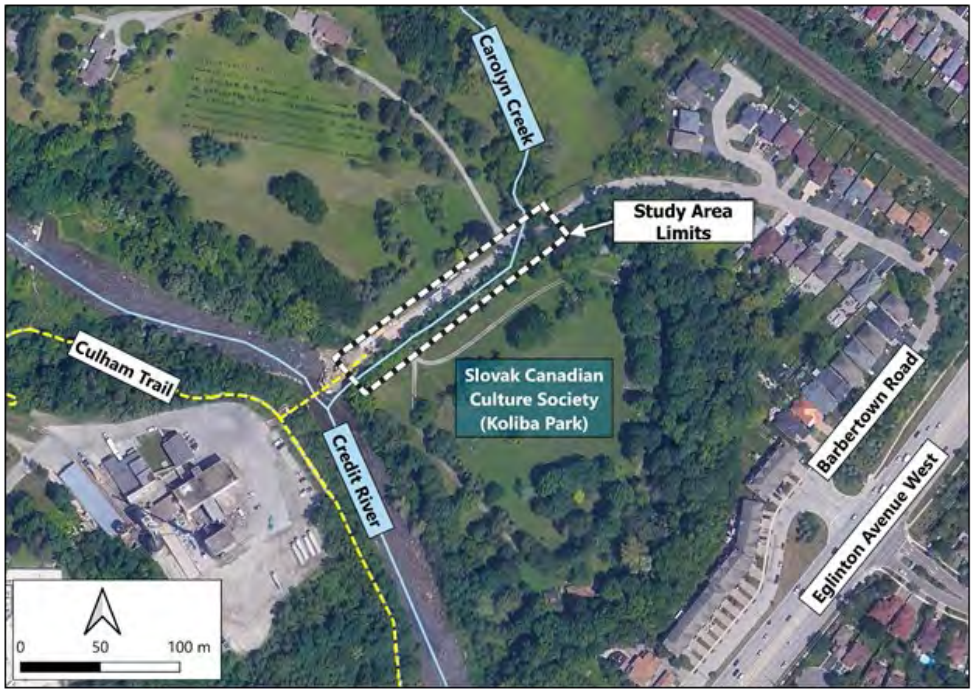
Thanks for your time.

Truly,
Vi

Vijanti Ramlogan, MESc
Intermediate Human Environment Consultant
Pronouns (she/her/hers)
Mobile: +705-690-6435
www.woodplc.com

Notice of Online Public Information Centre
Municipal Class Environmental Assessment Study for Carolyn Creek Erosion Control along Barbertown Road

WHAT?
The City of Mississauga is undertaking a Schedule 'B' Municipal Class Environmental Assessment (Class EA) to identify a preferred solution to address erosion problems along a section of Carolyn Creek along Barbertown Road (please refer to the key plan for Study Area limits).



WHY?
Through its ongoing erosion monitoring program, the City of Mississauga has identified the creek reach on the south side of Barbertown Road as a high priority site in need of rehabilitation, based on the continued erosion and risk to property and infrastructure.

HOW?
- The study has examined the creek and associated natural environment to identify existing erosion problems, potential future risks, and opportunities for restoration and environmental enhancement.
- Through the Municipal Class EA process, multiple alternative solutions have been developed and evaluated by the Study Team and will be considered for refinement through consultation process (see below). The Study Team will then confirm a Preferred Solution and proceed with the detailed design of the recommended works.
- At the end of the Class EA Study, a Project File Report, documenting the study process will be available for review by the public, Indigenous Nations, Government Agencies, and stakeholders.

GET INVOLVED!
- Consultation is an essential part of the Municipal Class EA process. We want to ensure that anyone with an interest in this study has the opportunity to provide input. The Study Team has developed an information package to allow local residents, interested members of the public, Indigenous Nations, Government Agencies and interested stakeholders an opportunity to review and comment on the alternative solutions, the evaluation process, the preliminary preferred solution and the next steps in the study. The information package will be made available on a dedicated Project webpage for this project on City's website from **March 23** to **April 20, 2022**: www.mississauga.ca/carolyncreekstudy
- Please provide us your comments by **April 20, 2022**, by using the Online Comment Form available on project webpage. Comments can also be sent to the following contacts via email:

Anthony Di Giandomenico P.Eng.
Storm Drainage Engineer
City of Mississauga
anthony.digiandomenico@mississauga.ca

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

Personal information is collected under the authority of the Environmental Assessment Act and will be used in the assessment process. With exception of personal information, all comments shall become part of the public records. Questions about this collection should be directed to the Project Manager listed above.
This notice was issued in March 2022.

From:	Shams, Aniqa
To:	"hdi2@bellnet.ca"
Cc:	"jocko@sixnationsns.com"; "williams.todde@gmail.com"; "Anthony.DiGiandomenico@mississauga.ca"; Bishop, Brian; Kelly, Mary K; Talpur, Mir
Subject:	RE: Mississauga - Class EA - Carolyn Creek Erosion Control
Date:	Thursday, April 22, 2021 12:14:00 PM
Attachments:	image001.png

Hi Tracey,

We are following up to see if you had any questions or concerns about the project. I left you a voicemail, but feel free to call or email me back with any feedback you may have. We will try to follow-up with you again in a few weeks.

Thank you,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From: Shams, Aniqa
Sent: Wednesday, April 7, 2021 12:54 PM
To: hdi2@bellnet.ca
Cc: jocko@sixnationsns.com; williams.todde@gmail.com; Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>
Subject: Mississauga - Class EA - Carolyn Creek Erosion Control

Good afternoon Tracey,

The City of Mississauga is undertaking a Schedule B Class Environmental Assessment (Class EA) Study for erosion control and watercourse improvements to Carolyn Creek.

Please find attached a letter from the City as well as a summary of the Project. The field work for the Stage 1 Archaeological Assessment and Natural Environment is currently planned for the spring and summer of 2021. However, we will keep you informed once we have confirmed the schedule.

We will follow-up with Haudenosaunee Confederacy Chiefs Council c/o Haudenosaunee Development Institute in the near future to discuss. Please do not hesitate to contact us should you have any questions or comments.

Thank you,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

Tracey General
Office Manager
Haudenosaunee Confederacy Chiefs Council
c/o Haudenosaunee Development Institute
hdi2@bellnet.ca

April 7, 2021

Re: City of Mississauga - Carolyn Creek Erosion Control
Schedule 'B' Municipal Class Environmental Assessment
Notice of Study Commencement

Dear Ms. General,

The City of Mississauga (City) has started a Schedule 'B' Municipal Class Environmental Assessment (Class EA or the Study) for erosion control and watercourse improvements to Carolyn Creek.

The City has received direction from the Provincial Crown that the Haudenosaunee Confederacy Chiefs Council as represented by Haudenosaunee Development Institute (HDI) may have an interest in the Project. The City is committed to involving Indigenous Nations and public stakeholders in this Study. For more details on this Class EA, please find attached the Project Information Sheet. Please feel free to share this information within your community as you feel appropriate.

We are interested in understanding any interests or questions that the HDI may have about this Project and if there is a potential for the Project to affect Indigenous and Treaty Rights. We would also be interested to know if there are any sites of cultural significance to your Nation within, or adjacent to, the Study area. If you would like to meet and discuss this Project, please feel free to contact the undersigned. We will contact you by telephone, in the near future, to assure that this correspondence has been received and to determine your interest in a meeting.

Sincerely,

Anthony Di Giandomenico, P. Eng.
Project Manager
The Corporation of the City of Mississauga
Transportation & Works Department
Anthony.DiGiandomenico@mississauga.ca

Brian Bishop, M. Eng., P. Eng.
Consultant Project Manager
Wood Environment & Infrastructure Solutions
Brian.Bishop@woodplc.com

Cc: Leroy Jocko Hill, HDI (jocko@sixnationsns.com)
Todd Williams, HDI (williams.todde@gmail.com)
Mary Kelly, Wood (mary.k.kelly@woodplc.com)
Mir Ahsan Talpur, Wood (mir.talpur@woodplc.com)
Encl: Carolyn Creek Erosion Control - Project Summary

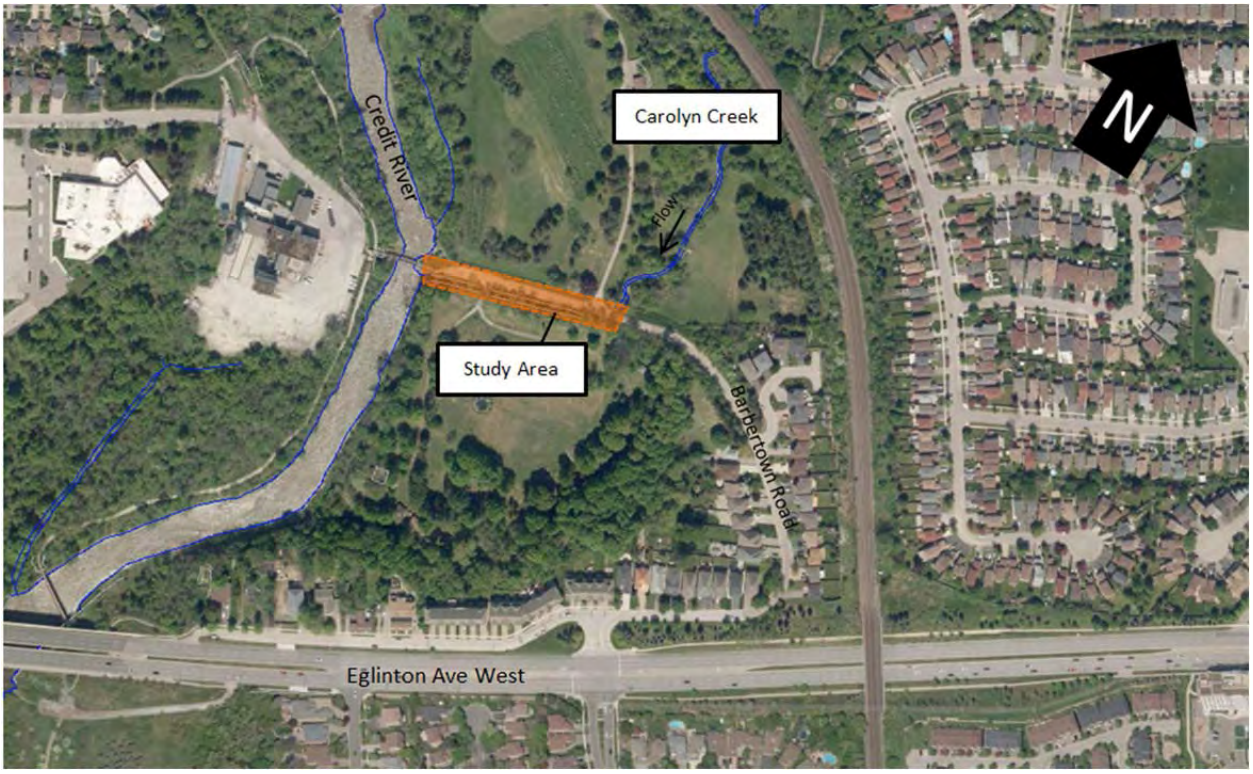
Carolyn Creek Erosion Control
Schedule 'B' Municipal Class Environmental Assessment

A Municipal Class Environmental Assessment is a decision-making and planning process which identifies the potential environmental effects of a project within a local area, so these risks can be managed prior to a project's implementation.

Project Description

The City of Mississauga (City) has initiated a Schedule 'B' Municipal Class Environmental Assessment (Class EA) for erosion control and watercourse improvements to Carolyn Creek, located just north of Eglinton Avenue West, as shown in the figure below. The Study aims to develop a plan to create better waterflow for Carolyn Creek which will address the current erosion problems and provide long-term stability for the waterflow of the creek.

Figure 1: Study Area for Carolyn Creek



The City has been undertaking an on-going erosion monitoring program for its creeks. A portion of Carolyn Creek, located on the south side of Barbertown Road, has been identified as a high priority site in need of rehabilitation because of continued erosion and risk to property and infrastructure. The City's goal is to provide long-term erosion protection which takes into consideration the natural waterflow of the Creek while also

designing a solution that will maintain or possibly improve the waterflow capacity of the Carolyn Creek. The Class EA will also include a review of options, such as replacing the current hardened creek bed and stone banks and replace these with more natural forms of creek erosion solutions used today. These elements can improve fish habitat and passage, offer a visual enhancement to the area, which is more reflective of a natural space, and minimize environmental impacts during and after construction.

The City has retained Wood Environment & Infrastructure Solutions (Wood) to undertake this Class EA Study and to prepare a detailed design and associated construction drawings.

Municipal Class 'B' Environmental Assessment

Municipal erosion control projects are required to follow the process for a Schedule 'B' project as described in the Municipal Class Environmental Assessment document. Accordingly, the purpose of this Class EA is to:

- Identify the areas along Carolyn Creek which are most affected by erosion and what solutions are possible to address this issue, evaluate those potential solutions to identify a preferred solution to address erosion problem
- Identify the potential effects associated with the recommended solution and identify practical measures to avoid or mitigate potential negative effects

The first step in the study process is to develop an understanding of the existing erosion problems with the Carolyn Creek. This will be done by reviewing background studies (where available) and collect supplemental information related to the natural, socio-economic and technical environments. These steps will help the City to define the problem and opportunity statement for the Class EA. Once existing issues have been identified, the City will develop potential alternatives for improvements to the creek.

The Class EA planning process helps identify the potential effects of proposed projects. Each proposed alternative is assessed against baseline conditions to determine the potential effects, and where necessary, identify mitigation measures to minimize or avoid those impacts. From these alternatives, the most feasible alternative is identified.

A key component of this study is to consult with the regulatory agencies, the public, interested stakeholders and the Indigenous groups whose Traditional Territory the project is located in.

Baseline Studies

Baseline studies are prepared to describe the current biological, human and physical environment conditions. The following investigations will be completed as part of this study:

- Archaeological Assessments
- Fish Habitat Assessment

- Terrestrial Environment Assessment
- Geomorphic Assessment (assessment of creek form)
- Geotechnical Investigation (investigation for subsurface soil and rock conditions)
- Hydrology/Hydraulic Assessment (assessment of surface water interactions and the assessment of infrastructure to convey stormwater).

Potential Project Related Effects

Potential project effects will be identified through an evaluation of the alternatives, and for the preferred solution, mitigation measures to address these potential effects will be developed. This may include effects on:

- Environmental features including land-based and water-based environments
- Archaeological resources

Schedule and Next Steps

- Field Surveys: tentatively planned for Spring-Summer 2021
- Public Information Sessions: tentatively planned for Summer 2021
- Project File Report: submission tentatively planned for Fall 2021 / Winter 2022

Contact Information

Anthony Di Giandomenico, P. Eng.
Project Manager
The Corporation of the City of Mississauga
Transportation & Works Department
300 City Centre Drive
Mississauga, ON L5B 3C1
Phone: (905) 615-3200 (Ext. 3491)
Anthony.DiGiandomenico@mississauga.ca

Brian Bishop, M. Eng., P. Eng.
Consultant Project Manager
Wood Environnent & Infrastructure Solutions
3450 Harvester Road, Suite 100,
Burlington, ON L7N 3W5
Telephone: (905) 335-2353
Brian.Bishop@woodplc.com

From:	Raechelle Williams
To:	Shams, Aniqa
Cc:	Todd Williams
Subject:	Fwd: Mississauga - Class EA - Carolyn Creek Erosion Control
Date:	Tuesday, May 4, 2021 1:51:10 PM
Attachments:	image003.png WW20101061_Carolyn Creek_City of Mississauga_Cover Letter_HDI_FINAL.pdf

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Sgeno/Hello

My name is Raechelle Williams, I am part of HDI's environmental team. I was forwarded your email from Todd and Tracey. Upon reviewing the email, I noticed that Field surveys are being planned this year to satisfy requirements of MCEA. As you now the Haudenosaunee have treaty rights in your project area and to protect these rights we require a field monitor and a contractual agreement to compensate our services.

Nyaweh/Thank-You

Raechelle Williams
HDI Environmental Supervisor
(519) 802 - 9402

---------- Forwarded message ---------
From: **Todd Williams** <williams.todde@gmail.com>
Date: Thu., Apr. 22, 2021, 12:44 p.m.
Subject: Fwd: Mississauga - Class EA - Carolyn Creek Erosion Control
To: Janice Williams <janice.r.n.w23@gmail.com>

From: Shams, Aniqa
To: Raechelle Williams
Cc: Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian; Kelly, Mary K; Talpur, Mir; Ellis, Julie; Maher, Trina
Subject: RE: HDI Monitoring at Carolyn Creek Erosion Control Assessment - Mississauga
Date: Tuesday, June 22, 2021 12:29:00 PM
Attachments: Declaration Form Covid-19.pdf
image001.jpg
image002.png
EI Fitness For Duty_Covid19 Medical Pre-Screening Form v2.pdf

---

Hi Raechelle,

We have some more details to provide you regarding the Natural Environment Field Work.

Carolyn Creek – Natural Environment Field Work
Date: **Tuesday 29 June 2021**
Start Time: **10:00 am**
Location:
Image

Wood Field Lead: Julie Ellis
Wood Field Lead Contact Number: 705-717-5106

Wood is aware that the COVID-19 pandemic presents a challenge to everyone as we attempt to continue to perform work while practicing physical distancing. Please ensure that any Environmental Monitor attending the site provided is aware of the following practices that we are following on our work sites:

- All employees and visitors to site must review the Fitness for Duty Medical Pre-Screening Form and provide their signature / confirmation on the Declaration Form Covid-19 (both attached);
- Wood will limit the size of their field crew;
- Distancing of workers and workers working separately with their own equipment.

If you could also please provide the contact details of the Environmental Monitor (email and phone number), so that our field lead can coordinate the day off? We would also like to note that Mississaugas of the Credit First Nation will be participating in the field work as well.

Best regards,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From: Raechelle Williams <janice.r.n.w23@gmail.com>
Sent: Thursday, June 17, 2021 1:48 PM
To: Shams, Aniqa <aniqa.shams@woodplc.com>
Subject: Re: HDI Monitoring at Carolyn Creek Erosion Control Assessment - Mississauga

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Hello Aniqa,

I had received an auto reply email back from Julie Ellis earlier. I was wondering if you are able to assist us with coordinating on behalf of the ecologist fieldwork. Again I would like one of HDI Environmental Monitors out during this work.

Nyaweh/Thank-You,

Raechelle Williams
HDI Environmental Supervisor
(519) 802 - 9402

On Thu., Jun. 17, 2021, 12:41 p.m. Shams, Aniqa, <aniqa.shams@woodplc.com> wrote:

> Hi Todd,
>
> We just wanted to let you know that the terrestrial ecology fieldwork will occur on one day between June 28 and June 30. Please let us know how you would like to proceed – if you would like to be directly in touch with the ecologist completing the field work, the contact information is provided below. Otherwise, I can also coordinate on behalf of the ecologist.
>
> **Julie Ellis**
> Senior Biologist
> Wood Environment and Infrastructure Solutions
> Mobile: +705-717-5106
> **Julie.ellis@woodplc.com**
>
> Thanks,
> Aniqa
>
> **Aniqa Shams, RPP, MCIP**
> Human Environment Consultant
> Direct: + (905) 568-2929
> Mobile: + (416) 357-2093
> **www.woodplc.com**
>
> ---
>
> **From:** Todd Williams <williams.todde@gmail.com>
> **Sent:** Tuesday, June 15, 2021 4:04 PM
> **To:** anthony.digiandomenico@mississauga.ca
> **Cc:** Wayne (HDI) Hill <tworowarchaeology@gmail.com>; Shams, Aniqa <aniqa.shams@woodplc.com>; Janice Williams <janice.r.n.w23@gmail.com>; Janice Bomberry <janicehdi@gmail.com>
> **Subject:** HDI Monitoring at Carolyn Creek Erosion Control Assessment - Mississauga
>
> **CAUTION:** External email. Please do not click on links/attachments unless you know the content is genuine and safe.
>
> Afternoon Anthony,
>
> I'm just following up on a discussion we had with Wood requesting field participation on this Class EA.
>
> I've attached a draft copy of HDI's standard monitoring agreement for Archaeology and for Environmental.

Please review. If agreed too, please sign and return a copy.

Thanks,

Todd E. Williams, P.Eng
Monitoring Program Coordinator
Haudenosaunee Development Institute (HDI)
Haudenosaunee Confederacy Chiefs Council (HCCC)
Haudenosaunee 1755 Treaty Territory
O: 519-445-4222
M: 519-761-1794
https://www.haudenosauneeconfederacy.com/
https://www.haudenosauneeconfederacy.com/departments/haudenosaunee-development-institute/

---------- Forwarded message ---------
From: **Shams, Aniqa** <aniqa.shams@woodplc.com>
Date: Fri, Jun 11, 2021 at 10:06 AM
Subject: RE: HDI Monitoring at Carolyn Creek Erosion Control Assessment - Mississauga
To: Todd Williams <williams.todde@gmail.com>
Cc: Wayne (HDI) Hill <tworowarchaeology@gmail.com>, Janice Williams <janice.r.n.w23@gmail.com>, Janice Bomberry <janicehdi@gmail.com>, Talpur, Mir <mir.talpur@woodplc.com>

Hi Todd,

Thanks so much for providing the agreements. I apologize for not clarifying earlier, but can you please address the agreement to the City of Mississauga? The City's project managers info is outlined below:

Anthony Di Giandomenico P.Eng.
Storm Drainage Engineer, Environmental Services
T 905-615-3200 ext.3491 | M 647-285-8291
anthony.digiandomenico@mississauga.ca

City of Mississauga | Transportation & Works Department
Infrastructure Planning & Engineering Division

Is it also possible to receive this agreement in a word version? This will make it easier for the City's review and to update the contact info to the City's accounting department for invoicing.

Thanks,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From: Todd Williams <williams.todde@gmail.com>
Sent: Tuesday, June 8, 2021 3:58 PM
To: Shams, Aniqa <aniqa.shams@woodplc.com>

Cc: Wayne (HDI) Hill <tworowarchaeology@gmail.com>; Janice Williams <janice.r.n.w23@gmail.com>; Janice Bomberry <janicehdi@gmail.com>
Subject: HDI Monitoring at Carolyn Creek Erosion Control Assessment - Mississauga

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Afternoon Aniqa,

I'm just following up on Raechelle's request for field participation on this assessment.

I've attached a draft copy of HDI's standard monitoring agreement for Archaeology and for Environmental.

Please review. If agreed too, please sign and return a copy.

Thanks,

Todd E. Williams, P.Eng
Monitoring Program Coordinator
Haudenosaunee Development Institute (HDI)
Haudenosaunee Confederacy Chiefs Council (HCCC)
Haudenosaunee 1755 Treaty Territory
O: 519-445-4222
M: 519-761-1794
https://www.haudenosauneeconfederacy.com/
https://www.haudenosauneeconfederacy.com/departments/haudenosaunee-development-institute/

---------- Forwarded message ---------
From: **Raechelle Williams** <janice.r.n.w23@gmail.com>
Date: Thu, Jun 3, 2021 at 10:46 AM
Subject: Fwd: Mississauga - Class EA - Carolyn Creek Erosion Control
To: Todd Williams <williams.todde@gmail.com>

Morning Todd,

Are you able to provide an agreement involving both Archeology and Environmental and send it to Aniqa Shams?

I just got off the phone with Aniqa Shams and she said the city of Mississauga has requested we send an agreement for HDI to be involved in the project. She also mentioned the Environmental work will be done this summer and plan to do Archeology stage 2 work in the fall.

Raechelle Williams

---------- Forwarded message ---------
From: **Raechelle Williams** <janice.r.n.w23@gmail.com>
Date: Tue., May 4, 2021, 1:50 p.m.
Subject: Fwd: Mississauga - Class EA - Carolyn Creek Erosion Control
To: <aniqa.shams@woodplc.com>
Cc: Todd Williams <williams.todde@gmail.com>

Sgeno/Hello

My name is Raechelle Williams, I am part of HDI's environmental team. I was forwarded your email from Todd and

Tracey. Upon reviewing the email, I noticed that Field surveys are being planned this year to satisfy requirements of MCEA. As you now the Haudenosaunee have treaty rights in your project area and to protect these rights we require a field monitor and a contractual agreement to compensate our services.

Nyaweh/Thank-You

Raechelle Williams
HDI Environmental Supervisor
(519) 802 - 9402

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Subject: Fwd: Mississauga - Class EA - Carolyn Creek Erosion Control
To: Janice Williams <janice.r.n.w23@gmail.com>

From:	Shams, Aniqa
To:	"Todd Williams"
Cc:	"Wayne (HDI) Hill"; "Janice Williams"; "Janice Bomberry"; "anthony.digiandomenico@mississauga.ca"; Bishop, Brian; Talpur, Mir; Kelly, Mary K; Maher, Trina
Subject:	RE: HDI Monitoring at Carolyn Creek Erosion Control Assessment - Mississauga
Date:	Friday, July 23, 2021 3:28:00 PM
Attachments:	image001.png image002.png

Hi Todd,

We wanted to follow-up with you regarding the draft Stage 1 Archeological Assessment Report for Carolyn Creek. Please let us know if you have any comments or concerns or require more time for review. We look forward to hearing back from you.

Best regards,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Pronouns – She/Her/Hers
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From: Shams, Aniqa
Sent: Tuesday, June 22, 2021 12:34 PM
To: Todd Williams <williams.todde@gmail.com>
Cc: Wayne (HDI) Hill <tworowarchaeology@gmail.com>; Janice Williams <janice.r.n.w23@gmail.com>; Janice Bomberry <janicehdi@gmail.com>; anthony.digiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Maher, Trina <trina.maher@woodplc.com>
Subject: RE: HDI Monitoring at Carolyn Creek Erosion Control Assessment - Mississauga

Good afternoon Todd,

As a follow-up on this project, we are pleased to share the draft Stage 1 Archeological Assessment Report for Carolyn Creek with Haudenosaunee Development Institute for review and comment. If you could please provide us any comments you may have by July 22, that would be greatly appreciated. Once we receive your review and comments, we will submit this report to the MHSTCI for their review and approval. Please note that the recommendation of this report is that the study area does not require further archaeological assessment.

Thanks so much for providing the contact details! If you have any questions or comments, please do not hesitate to contact me.

Best regards,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

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Sent: Tuesday, June 8, 2021 3:58 PM
To: Shams, Aniqa <aniqa.shams@woodplc.com>
Cc: Wayne (HDI) Hill <tworowarchaeology@gmail.com>; Janice Williams <janice.r.n.w23@gmail.com>; Janice Bomberry <janicehdi@gmail.com>
Subject: HDI Monitoring at Carolyn Creek Erosion Control Assessment - Mississauga

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Afternoon Aniqa,

I'm just following up on Raechelle's request for field participation on this assessment.

I've attached a draft copy of HDI's standard monitoring agreement for Archaeology and for Environmental.

Please review. If agreed too, please sign and return a copy.

Thanks,

Todd E. Williams, P.Eng
Monitoring Program Coordinator
Haudenosaunee Development Institute (HDI)
Haudenosaunee Confederacy Chiefs Council (HCCC)
Haudenosaunee 1755 Treaty Territory
O: 519-445-4222
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https://www.haudenosauneeconfederacy.com/
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To: Todd Williams <williams.todde@gmail.com>

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Raechelle Williams

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To: <aniqa.shams@woodplc.com>
Cc: Todd Williams <williams.todde@gmail.com>

Sgeno/Hello

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Nyaweh/Thank-You

Raechelle Williams
HDI Environmental Supervisor
(519) 802 - 9402

---------- Forwarded message ---------
From: **Todd Williams** <williams.todde@gmail.com>
Date: Thu., Apr. 22, 2021, 12:44 p.m.
Subject: Fwd: Mississauga - Class EA - Carolyn Creek Erosion Control
To: Janice Williams <janice.r.n.w23@gmail.com>

From:	Ramlogan, Vijanti
To:	Raechelle Williams
Cc:	Todd Williams; Talpur, Mir; Kelly, Mary K; Maher, Trina; Shams, Aniqa; Bishop, Brian; anthony.digiandomenico@mississauga.ca; hdi2@bellnet.ca
Subject:	Carolyn Creek Erosion Control - Notice of Public Information Centre
Date:	Wednesday, March 23, 2022 10:18:00 AM
Attachments:	WW20101061_CarolynCreekEC-Notice-PIC_2022-03-23.pdf image001.png

---

Good morning Raechelle and Todd,

The City of Mississauga is undertaking a Schedule 'B' Municipal Class Environmental Assessment (Class EA) to identify a preferred solution to address erosion problems along a section of Carolyn Creek along Barbertown Road. The study has examined the creek and associated natural environment to identify existing erosion problems, potential future risks, and opportunities for restoration and environmental enhancement.

A Public Information Centre is being hosted to allow local residents, interested members of the public, Indigenous Nations, Government Agencies and interested stakeholders an opportunity to review and comment on the alternative solutions, the evaluation process, the preliminary preferred solution and the next steps in the study. Please visit the Project webpage to review information materials, and provide any comments by **April 20, 2022**: www.mississauga.ca/carolyncreekstudy

Please refer to the attached Notice of Public Information Centre for more information.

If you have any questions or concerns, please let me know.

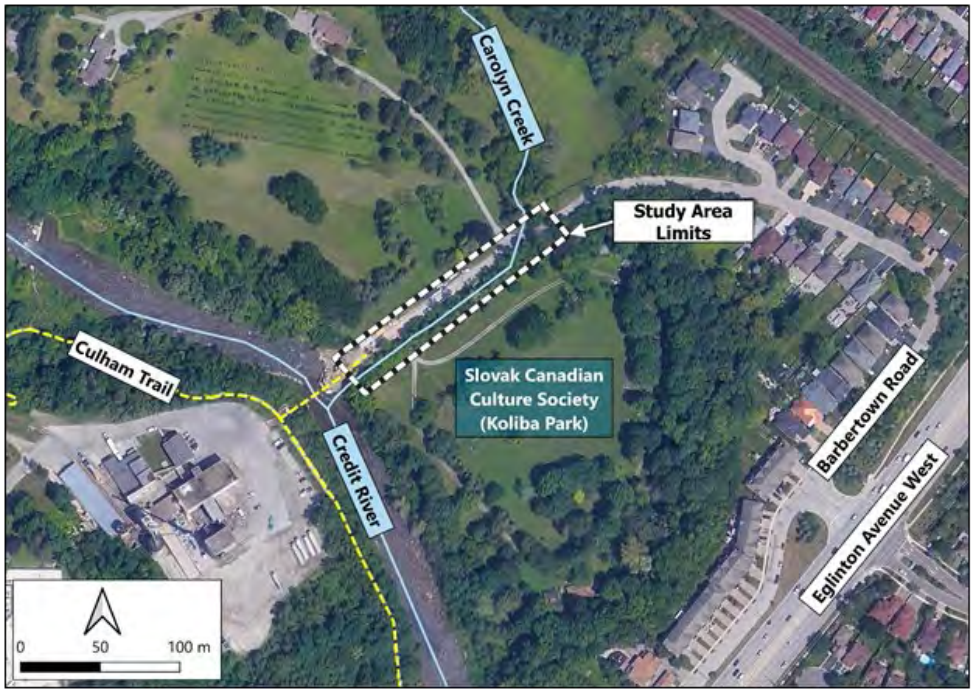
Thanks for your time.

Truly,
Vi

Vijanti Ramlogan, MESc
Intermediate Human Environment Consultant
Pronouns (she/her/hers)
Mobile: +705-690-6435
www.woodplc.com

Notice of Online Public Information Centre
Municipal Class Environmental Assessment Study for Carolyn Creek Erosion Control along Barbertown Road

WHAT?
The City of Mississauga is undertaking a Schedule 'B' Municipal Class Environmental Assessment (Class EA) to identify a preferred solution to address erosion problems along a section of Carolyn Creek along Barbertown Road (please refer to the key plan for Study Area limits).



WHY?
Through its ongoing erosion monitoring program, the City of Mississauga has identified the creek reach on the south side of Barbertown Road as a high priority site in need of rehabilitation, based on the continued erosion and risk to property and infrastructure.

HOW?
- The study has examined the creek and associated natural environment to identify existing erosion problems, potential future risks, and opportunities for restoration and environmental enhancement.
- Through the Municipal Class EA process, multiple alternative solutions have been developed and evaluated by the Study Team and will be considered for refinement through consultation process (see below). The Study Team will then confirm a Preferred Solution and proceed with the detailed design of the recommended works.
- At the end of the Class EA Study, a Project File Report, documenting the study process will be available for review by the public, Indigenous Nations, Government Agencies, and stakeholders.

GET INVOLVED!
- Consultation is an essential part of the Municipal Class EA process. We want to ensure that anyone with an interest in this study has the opportunity to provide input. The Study Team has developed an information package to allow local residents, interested members of the public, Indigenous Nations, Government Agencies and interested stakeholders an opportunity to review and comment on the alternative solutions, the evaluation process, the preliminary preferred solution and the next steps in the study. The information package will be made available on a dedicated Project webpage for this project on City's website from **March 23** to **April 20, 2022**: www.mississauga.ca/carolyncreekstudy
- Please provide us your comments by **April 20, 2022**, by using the Online Comment Form available on project webpage. Comments can also be sent to the following contacts via email:

Anthony Di Giandomenico P.Eng.
Storm Drainage Engineer
City of Mississauga
anthony.digiandomenico@mississauga.ca

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

Personal information is collected under the authority of the Environmental Assessment Act and will be used in the assessment process. With exception of personal information, all comments shall become part of the public records. Questions about this collection should be directed to the Project Manager listed above.
This notice was issued in March 2022.

APPENDIX

E-4 *Huron-Wendat First Nation*

From: Shams, Aniqa
To: maxime.picard@cnhw.qc.ca
Cc: Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian; Kelly, Mary K; Talpur, Mir
Subject: RE: Mississauga - Class EA - Carolyn Creek Erosion Control
Date: Thursday, April 22, 2021 12:15:00 PM
Attachments: image001.png

Hi Maxime,

We are following up to see if you had any questions or concerns about the project. We would be happy to talk to you about the project, feel free to call or email me back with any feedback you may have. We will try to follow-up with you again in a few weeks.

Thank you,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From: Shams, Aniqa
Sent: Wednesday, April 7, 2021 12:54 PM
To: maxime.picard@cnhw.qc.ca
Cc: Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>
Subject: Mississauga - Class EA - Carolyn Creek Erosion Control

Good afternoon Maxime,

The City of Mississauga is undertaking a Schedule B Class Environmental Assessment (Class EA) Study for erosion control and watercourse improvements to Carolyn Creek.

Please find attached a letter from the City as well as a summary of the Project. The field work for the Stage 1 Archaeological Assessment is currently planned for the spring and summer of 2021. However, we will keep you informed once we have confirmed the schedule for archaeology.

We will follow-up with Huron-Wendat First Nation in the near future to discuss. Please do not hesitate to contact us should you have any questions or comments.

Thank you,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

Maxime Picard
Huron-Wendat First Nation
maxime.picard@cnhw.qc.ca

April 7, 2021

Re: City of Mississauga - Carolyn Creek Erosion Control
Schedule 'B' Municipal Class Environmental Assessment
Notice of Study Commencement

Dear Mr. Picard,

The City of Mississauga (City) has started a Schedule 'B' Municipal Class Environmental Assessment (Class EA or the Study) for erosion control and watercourse improvements to Carolyn Creek.

The City has received direction from the Provincial Crown that the Huron-Wendat First Nation may have an interest in the Project. The City is committed to involving Indigenous Nations and public stakeholders in this Study. For more details on this Class EA, please find attached the Project Information Sheet. Please feel free to share this information within your community as you feel appropriate.

We are interested in understanding any interests or questions that the Huron-Wendat First Nation may have about this Project and if there is a potential for the Project to affect Indigenous and Treaty Rights. We would also be interested to know if there are any sites of cultural significance to your Nation within, or adjacent to, the Study area. If you would like to meet and discuss this Project, please feel free to contact the undersigned. We will contact you by telephone, in the near future, to assure that this correspondence has been received and to determine your interest in a meeting.

Sincerely,

Anthony Di Giandomenico, P. Eng.
Project Manager
The Corporation of the City of Mississauga
Transportation & Works Department
Anthony.DiGiandomenico@mississauga.ca

Brian Bishop, M. Eng., P. Eng.
Consultant Project Manager
Wood Environment & Infrastructure Solutions
Brian.Bishop@woodplc.com

Cc: Mary Kelly, Wood (mary.k.kelly@woodplc.com)
Mir Ahsan Talpur, Wood (mir.talpur@woodplc.com)
Encl: Carolyn Creek Erosion Control - Project Summary

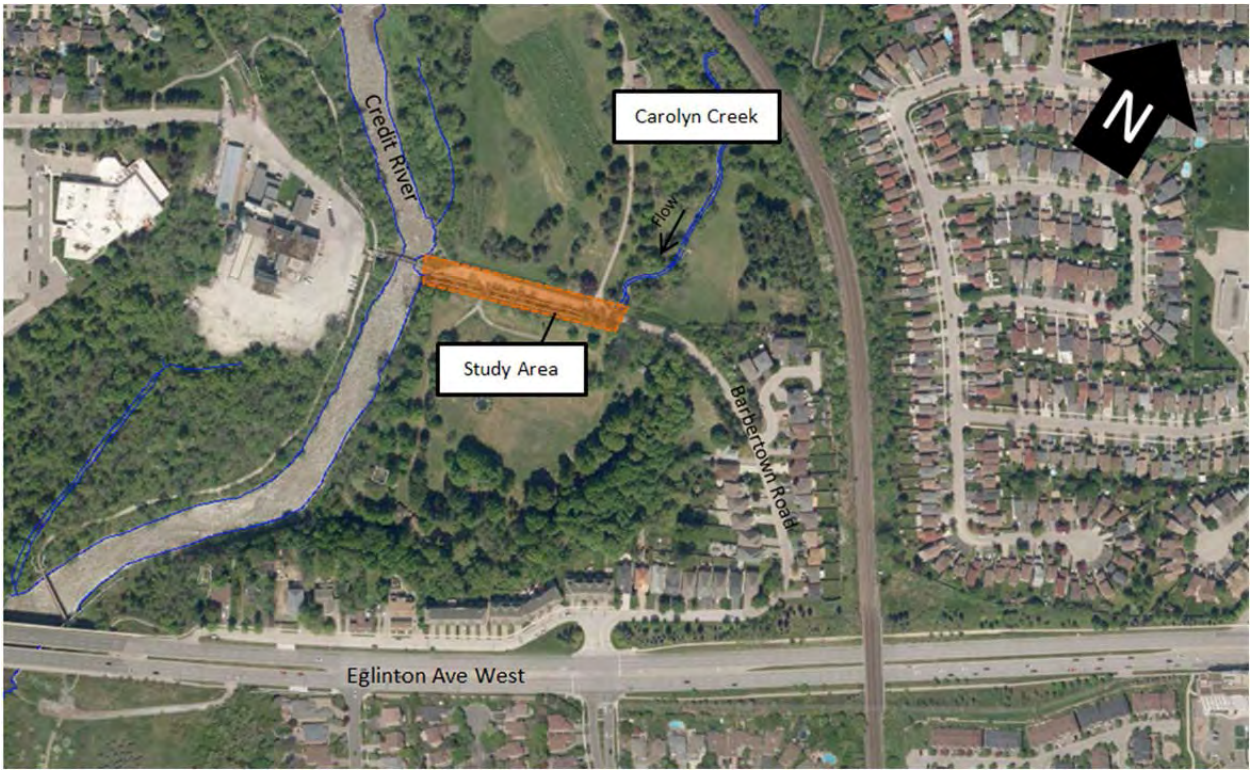
Carolyn Creek Erosion Control
Schedule 'B' Municipal Class Environmental Assessment

A Municipal Class Environmental Assessment is a decision-making and planning process which identifies the potential environmental effects of a project within a local area, so these risks can be managed prior to a project's implementation.

Project Description

The City of Mississauga (City) has initiated a Schedule 'B' Municipal Class Environmental Assessment (Class EA) for erosion control and watercourse improvements to Carolyn Creek, located just north of Eglinton Avenue West, as shown in the figure below. The Study aims to develop a plan to create better waterflow for Carolyn Creek which will address the current erosion problems and provide long-term stability for the waterflow of the creek.

Figure 1: Study Area for Carolyn Creek



The City has been undertaking an on-going erosion monitoring program for its creeks. A portion of Carolyn Creek, located on the south side of Barbertown Road, has been identified as a high priority site in need of rehabilitation because of continued erosion and risk to property and infrastructure. The City's goal is to provide long-term erosion protection which takes into consideration the natural waterflow of the Creek while also

designing a solution that will maintain or possibly improve the waterflow capacity of the Carolyn Creek. The Class EA will also include a review of options, such as replacing the current hardened creek bed and stone banks and replace these with more natural forms of creek erosion solutions used today. These elements can improve fish habitat and passage, offer a visual enhancement to the area, which is more reflective of a natural space, and minimize environmental impacts during and after construction.

The City has retained Wood Environment & Infrastructure Solutions (Wood) to undertake this Class EA Study and to prepare a detailed design and associated construction drawings.

Municipal Class 'B' Environmental Assessment

Municipal erosion control projects are required to follow the process for a Schedule 'B' project as described in the Municipal Class Environmental Assessment document. Accordingly, the purpose of this Class EA is to:

- Identify the areas along Carolyn Creek which are most affected by erosion and what solutions are possible to address this issue, evaluate those potential solutions to identify a preferred solution to address erosion problem
- Identify the potential effects associated with the recommended solution and identify practical measures to avoid or mitigate potential negative effects

The first step in the study process is to develop an understanding of the existing erosion problems with the Carolyn Creek. This will be done by reviewing background studies (where available) and collect supplemental information related to the natural, socio-economic and technical environments. These steps will help the City to define the problem and opportunity statement for the Class EA. Once existing issues have been identified, the City will develop potential alternatives for improvements to the creek.

The Class EA planning process helps identify the potential effects of proposed projects. Each proposed alternative is assessed against baseline conditions to determine the potential effects, and where necessary, identify mitigation measures to minimize or avoid those impacts. From these alternatives, the most feasible alternative is identified.

A key component of this study is to consult with the regulatory agencies, the public, interested stakeholders and the Indigenous groups whose Traditional Territory the project is located in.

Baseline Studies

Baseline studies are prepared to describe the current biological, human and physical environment conditions. The following investigations will be completed as part of this study:

- Archaeological Assessments
- Fish Habitat Assessment

- Terrestrial Environment Assessment
- Geomorphic Assessment (assessment of creek form)
- Geotechnical Investigation (investigation for subsurface soil and rock conditions)
- Hydrology/Hydraulic Assessment (assessment of surface water interactions and the assessment of infrastructure to convey stormwater).

Potential Project Related Effects

Potential project effects will be identified through an evaluation of the alternatives, and for the preferred solution, mitigation measures to address these potential effects will be developed. This may include effects on:

- Environmental features including land-based and water-based environments
- Archaeological resources

Schedule and Next Steps

- Field Surveys: tentatively planned for Spring-Summer 2021
- Public Information Sessions: tentatively planned for Summer 2021
- Project File Report: submission tentatively planned for Fall 2021 / Winter 2022

Contact Information

Anthony Di Giandomenico, P. Eng.
Project Manager
The Corporation of the City of Mississauga
Transportation & Works Department
300 City Centre Drive
Mississauga, ON L5B 3C1
Phone: (905) 615-3200 (Ext. 3491)
Anthony.DiGiandomenico@mississauga.ca

Brian Bishop, M. Eng., P. Eng.
Consultant Project Manager
Wood Environnent & Infrastructure Solutions
3450 Harvester Road, Suite 100,
Burlington, ON L7N 3W5
Telephone: (905) 335-2353
Brian.Bishop@woodplc.com

De : Shams, Aniqa [mailto:aniqa.shams@woodplc.com]
Envoyé : 22 avril 2021 13:11
À : Maxime Picard <maxime.picard@cnhw.qc.ca>
Cc : Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>; mario gros-louis <mario.groslouis@cnhw.qc.ca>; Mélanie Vincent <melanievincent21@yahoo.ca>; louis.lesage@cnhw.qc.ca
Objet : RE: Mississauga - Class EA - Carolyn Creek Erosion Control

Hi Maxime,

Thank you for letting us know. Just to clarify, does this mean you are not responsible for just this project or going forward, all of our infrastructure projects should be addressed to Mario and Mélanie?

Thanks,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From: Maxime Picard <maxime.picard@cnhw.qc.ca>
Sent: Thursday, April 22, 2021 12:59 PM
To: Shams, Aniqa <aniqa.shams@woodplc.com>
Cc: Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>; mario gros-louis <mario.groslouis@cnhw.qc.ca>; Mélanie Vincent <melanievincent21@yahoo.ca>; louis.lesage@cnhw.qc.ca
Subject: RE: Mississauga - Class EA - Carolyn Creek Erosion Control

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Good afternoon Aniqa,

You will need to follow-up with my colleagues who are cc'ed in this email.

Due to some structure changes here at the Nation I am unfortunately not in charge of those files anymore.

Best regards,

Maxime

Maxime Picard, B. Sc. A.
Directeur développement économique et projets majeurs

Conseil de la Nation huronne-wendat
255, place Chef Michel Laveau
Wendake (Québec) G0A 4V0
Téléphone : (418) 843-3767
Mobile : (418) 262-1681
Télécopieur : (418) 842-1108
Site Internet : www.wendake.ca

De : Shams, Aniqa [mailto:aniqa.shams@woodplc.com]
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Thank you,
Aniqa

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Mobile: + (416) 357-2093
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Sent: Wednesday, April 7, 2021 12:54 PM

To: maxime.picard@cnhw.qc.ca
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Please find attached a letter from the City as well as a summary of the Project. The field work for the Stage 1 Archaeological Assessment is currently planned for the spring and summer of 2021. However, we will keep you informed once we have confirmed the schedule for archaeology.

We will follow-up with Huron-Wendat First Nation in the near future to discuss. Please do not hesitate to contact us should you have any questions or comments.

Thank you,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From:	Lori-Jeanne Bolduc
To:	Shams, Aniqa
Cc:	Mario Gros Louis
Subject:	TR: Mississauga - Class EA - Carolyn Creek Erosion Control
Date:	Wednesday, May 26, 2021 3:13:09 PM
Attachments:	image007.jpg image008.png image009.png image002.jpg image003.png image001.png image004.jpg

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CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Hi Aniqa,

Thank you for your email. I understand that an archeological assessment will take place as part of this project. The Huron-Wendat Nation is interested in participating in all archaeological fieldwork for this project, as well as receiving copies of the draft reports for review and comments. When will the archeological work take place?

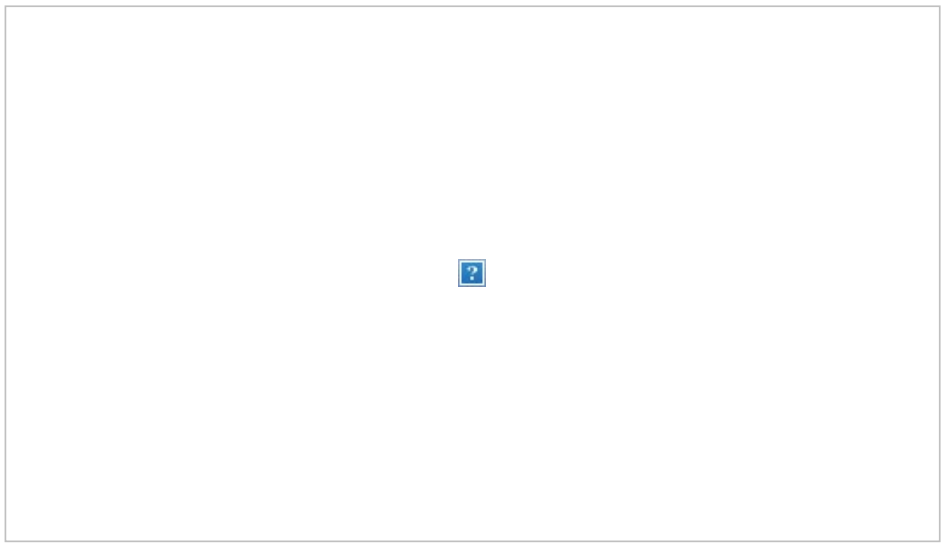
Regarding our contact info, it is listed below. You can keep me (I'm a land planning advisor) and Mario Gros-Louis (land planning analyst) on file as the main points of contact for consultations. Since we are still working from home, the easiest way to reach us is by email.

Best regards,

Lori-Jeanne

ATTENTION: Please note that Maxime Picard has a new position at the Huron-Wendat Nation Council and is no longer in charge of Ontario consultations. Any new consultation from Ontario must be sent to Mario Gros-Louis (mario.groslouis@wendake.ca) and Lori-Jeanne Bolduc (lori-jeanne.bolduc@wendake.ca).

For inquiries relating specifically to archaeology (fieldwork planning, monitoring, reports review, etc.), please contact Valérie Janssen, archaeologist (valerie.janssen@wendake.ca), Jean-François Richard (jean-francois.richard@wendake.ca) and Isabelle Lechasseur (isabelle.lechasseur@wendake.ca).



De : Shams, Aniqa <aniqa.shams@woodplc.com>
Envoyé : 20 mai 2021 09:48
À : mario gros-louis <mario.groslouis@cnhw.qc.ca>; Mélanie Vincent <melanievincent21@yahoo.ca>;

louis.lesage@cnhw.qc.ca
Cc : Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>; Maher, Trina <trina.maher@woodplc.com>
Objet : FW: Mississauga - Class EA - Carolyn Creek Erosion Control

Hi Mario, Mélanie and Louis,

I apologize for the delayed follow-up. I have attached the cover letter from the City as well as a summary of the Study. This was originally provided to Maxime for background on the Study. Please let us know if you have any comments or questions about this Study.

On a side note, can you please provide your contact information (phone number, mailing address and job title) for our records? We would like to have the most up to date information for this Study, as well as our other projects. If you could also identify what your preferred method is of contacting you (i.e., email, phone or both?), that would be great.

We look forward to hearing from you.

Best regards,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From: Maxime Picard <maxime.picard@cnhw.qc.ca>
Sent: Thursday, April 22, 2021 1:28 PM
To: Shams, Aniqa <aniqa.shams@woodplc.com>
Cc: Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>; mario gros-louis <mario.groslouis@cnhw.qc.ca>; Mélanie Vincent <melanievincent21@yahoo.ca>; louis.lesage@cnhw.qc.ca
Subject: RE: Mississauga - Class EA - Carolyn Creek Erosion Control

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All of your projects should be addressed to Mario and Mélanie.

Maxime Picard, B. Sc. A.
Directeur développement économique et projets majeurs

Conseil de la Nation huronne-wendat
255, place Chef Michel Laveau
Wendake (Québec) G0A 4V0
Téléphone : (418) 843-3767
Mobile : (418) 262-1681

Télécopieur : (418) 842-1108
Site Internet : www.wendake.ca

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Maxime

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Directeur développement économique et projets majeurs

Conseil de la Nation huronne-wendat
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Thank you,
Aniqa

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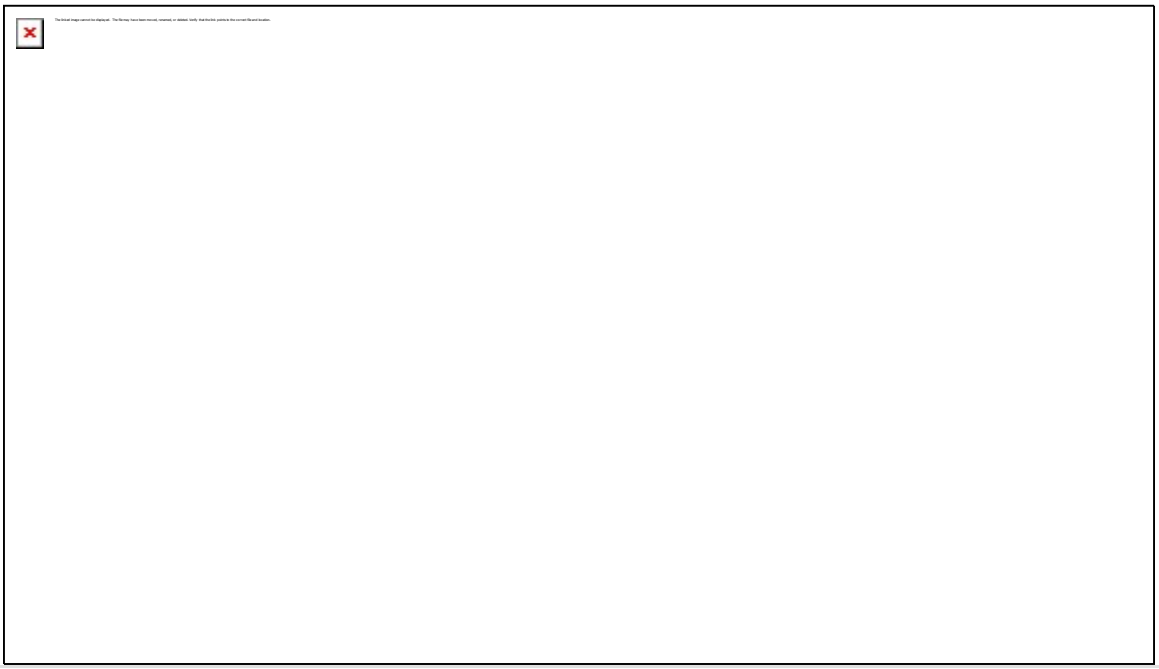
From: Mario Gros Louis <Mario.GrosLouis@wendake.ca>
Sent: Monday, July 26, 2021 8:47 PM
To: Shams, Aniqa; Lori-Jeanne Bolduc
Cc: anthony.digiandomenico@mississauga.ca; Bishop, Brian; Talpur, Mir; Kelly, Mary K; Maher, Trina
Subject: RE: Mississauga - Class EA - Carolyn Creek Erosion Control

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Hi Aniqa,

Thank you for your email. We have no comments at this point. Please keep us updated about any new project or archaeological studies and fieldwork.

Best regards,



De : Shams, Aniqa <aniqa.shams@woodplc.com>
Envoyé : 23 juillet 2021 15:29
À : Lori-Jeanne Bolduc <Lori-Jeanne.Bolduc@wendake.ca>
Cc : Mario Gros Louis <Mario.GrosLouis@wendake.ca>; anthony.digiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Maher, Trina <trina.maher@woodplc.com>
Objet : RE: Mississauga - Class EA - Carolyn Creek Erosion Control

Hi Lori-Jeanne,

We wanted to follow-up with you regarding the draft Stage 1 Archeological Assessment Report for Carolyn Creek. Please let us know if you have any comments or concerns or require more time for review. We look forward to hearing back from you.

Best regards,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Pronouns – She/Her/Hers
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From: Shams, Aniqa
Sent: Tuesday, June 22, 2021 12:34 PM
To: 'Lori-Jeanne Bolduc' <Lori-Jeanne.Bolduc@wendake.ca>
Cc: Mario Gros Louis <Mario.GrosLouis@wendake.ca>; anthony.digiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Maher, Trina <trina.maher@woodplc.com>
Subject: RE: Mississauga - Class EA - Carolyn Creek Erosion Control

Good afternoon Lori-Jeanne,

As a follow-up on this project, we are pleased to share the draft Stage 1 Archeological Assessment Report for Carolyn Creek with Huron Wendat Nation for review and comment. If you could please provide us any comments you may have by July 22, that would be greatly appreciated. Once we receive your review and comments, we will submit this report to the MHSTCI for their review and approval. Please note that the recommendation of this report is that the study area does not require further archaeological assessment.

Thanks so much for providing the contact details! If you have any questions or comments, please do not hesitate to contact me!

Best regards,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From: Lori-Jeanne Bolduc <Lori-Jeanne.Bolduc@wendake.ca>
Sent: Wednesday, May 26, 2021 3:13 PM
To: Shams, Aniqa <aniqa.shams@woodplc.com>
Cc: Mario Gros Louis <Mario.GrosLouis@wendake.ca>
Subject: TR: Mississauga - Class EA - Carolyn Creek Erosion Control

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Hi Aniqa,

Thank you for your email. I understand that an archeological assessment will take place as part of this project. The Huron-Wendat Nation is interested in participating in all archaeological fieldwork for this project, as well as receiving copies of the draft reports for review and comments. When will the archeological work take place?

Regarding our contact info, it is listed below. You can keep me (I'm a land planning advisor) and Mario Gros-Louis (land planning analyst) on file as the main points of contact for consultations. Since we are still working from home, the easiest way to reach us is by email.

Best regards,

Lori-Jeanne

ATTENTION: Please note that Maxime Picard has a new position at the Huron-Wendat Nation Council and is no longer in charge of Ontario consultations. Any new consultation from Ontario must be sent to Mario Gros-Louis (mario.groslouis@wendake.ca) and Lori-Jeanne Bolduc (lori-jeanne.bolduc@wendake.ca).

For inquiries relating specifically to archaeology (fieldwork planning, monitoring, reports review, etc.), please contact Valérie Janssen, archaeologist (valerie.janssen@wendake.ca), Jean-François Richard (jean-francois.richard@wendake.ca) and Isabelle Lechasseur (isabelle.lechasseur@wendake.ca).

NATION HURONNE-WENDAT
Bureau du Nionwentsïo

Lori-Jeanne Bolduc, M. ATDR
Conseillère en aménagement du territoire
255, Place Chef Michel-Laveau
Wendake (Qc) G0A 4V0
Téléphone : 418-843-3767 # 2211
Courriel : lori-jeanne.bolduc@wendake.ca

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De : Shams, Aniqa <aniqa.shams@woodplc.com>
Envoyé : 20 mai 2021 09:48
À : mario gros-louis <mario.groslouis@cnhw.qc.ca>; Mélanie Vincent <melanievincent21@yahoo.ca>;

louis.lesage@cnhw.qc.ca
Cc : Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>; Maher, Trina <trina.maher@woodplc.com>
Objet : FW: Mississauga - Class EA - Carolyn Creek Erosion Control

Hi Mario, Mélanie and Louis,

I apologize for the delayed follow-up. I have attached the cover letter from the City as well as a summary of the Study. This was originally provided to Maxime for background on the Study. Please let us know if you have any comments or questions about this Study.

On a side note, can you please provide your contact information (phone number, mailing address and job title) for our records? We would like to have the most up to date information for this Study, as well as our other projects. If you could also identify what your preferred method is of contacting you (i.e., email, phone or both?), that would be great.

We look forward to hearing from you.

Best regards,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From: Maxime Picard <maxime.picard@cnhw.qc.ca>
Sent: Thursday, April 22, 2021 1:28 PM
To: Shams, Aniqa <aniqa.shams@woodplc.com>
Cc: Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>; mario gros-louis <mario.groslouis@cnhw.qc.ca>; Mélanie Vincent <melanievincent21@yahoo.ca>; louis.lesage@cnhw.qc.ca
Subject: RE: Mississauga - Class EA - Carolyn Creek Erosion Control

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

All of your projects should be addressed to Mario and Mélanie.

Maxime Picard, B. Sc. A.
Directeur développement économique et projets majeurs



Conseil de la Nation huronne-wendat
255, place Chef Michel Laveau
Wendake (Québec) G0A 4V0
Téléphone : (418) 843-3767
Mobile : (418) 262-1681
Télécopieur : (418) 842-1108
Site Internet : www.wendake.ca

De : Shams, Aniqa [mailto:aniqa.shams@woodplc.com]
Envoyé : 22 avril 2021 13:11
À : Maxime Picard <maxime.picard@cnhw.qc.ca>
Cc : Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>; mario gros-louis <mario.groslouis@cnhw.qc.ca>; Mélanie Vincent <melanievincent21@yahoo.ca>; louis.lesage@cnhw.qc.ca
Objet : RE: Mississauga - Class EA - Carolyn Creek Erosion Control

Hi Maxime,

Thank you for letting us know. Just to clarify, does this mean you are not responsible for just this project or going forward, all of our infrastructure projects should be addressed to Mario and Mélanie?

Thanks,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
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Mobile: + (416) 357-2093
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wood.

From: Maxime Picard <maxime.picard@cnhw.qc.ca>
Sent: Thursday, April 22, 2021 12:59 PM
To: Shams, Aniqa <aniqa.shams@woodplc.com>

Cc: Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>; mario gros-louis <mario.groslouis@cnhw.qc.ca>; Mélanie Vincent <melanievincent21@yahoo.ca>; louis.lesage@cnhw.qc.ca
Subject: RE: Mississauga - Class EA - Carolyn Creek Erosion Control

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Good afternoon Aniqa,

You will need to follow-up with my colleagues who are cc'ed in this email.

Due to some structure changes here at the Nation I am unfortunately not in charge of those files anymore.

Best regards,

Maxime

Maxime Picard, B. Sc. A.
Directeur développement économique et projets majeurs

Conseil de la Nation huronne-wendat
255, place Chef Michel Laveau
Wendake (Québec) G0A 4V0
Téléphone : (418) 843-3767
Mobile : (418) 262-1681
Télécopieur : (418) 842-1108
Site Internet : www.wendake.ca

De : Shams, Aniqa [mailto:aniqa.shams@woodplc.com]
Envoyé : 22 avril 2021 12:15
À : maxime.picard@cnhw.qc.ca
Cc : Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>
Objet : RE: Mississauga - Class EA - Carolyn Creek Erosion Control

Hi Maxime,

We are following up to see if you had any questions or concerns about the project. We would be happy to talk to you about the project, feel free to call or email me back with any feedback you may have. We will try to follow-up with you again in a few weeks.

Thank you,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From: Shams, Aniqa
Sent: Wednesday, April 7, 2021 12:54 PM
To: maxime.picard@cnhw.qc.ca
Cc: Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Talpur, Mir <mir.talpur@woodplc.com>
Subject: Mississauga - Class EA - Carolyn Creek Erosion Control

Good afternoon Maxime,

The City of Mississauga is undertaking a Schedule B Class Environmental Assessment (Class EA) Study for erosion control and watercourse improvements to Carolyn Creek.

Please find attached a letter from the City as well as a summary of the Project. The field work for the Stage 1 Archaeological Assessment is currently planned for the spring and summer of 2021. However, we will keep you informed once we have confirmed the schedule for archaeology.

We will follow-up with Huron-Wendat First Nation in the near future to discuss. Please do not hesitate to contact us should you have any questions or comments.

Thank you,
Aniqa

Aniqa Shams, RPP, MCIP
Human Environment Consultant
Direct: + (905) 568-2929
Mobile: + (416) 357-2093
www.woodplc.com

From:	Ramlogan, Vijanti
To:	lori-jeanne.bolduc@wendake.ca
Cc:	mario.groslouis@cnhw.qc.ca; anthony.digiandomenico@mississauga.ca; Bishop, Brian; Talpur, Mir; Kelly, Mary K; Maher, Trina
Subject:	Carolyn Creek Erosion Control - Notice of Public Information Centre
Date:	Wednesday, March 23, 2022 10:01:00 AM
Attachments:	WW20101061_CarolynCreekEC-Notice-PIC_2022-03-23.pdf image001.png

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Good morning, Lori-Jeanne

The City of Mississauga is undertaking a Schedule 'B' Municipal Class Environmental Assessment (Class EA) to identify a preferred solution to address erosion problems along a section of Carolyn Creek along Barbertown Road. The study has examined the creek and associated natural environment to identify existing erosion problems, potential future risks, and opportunities for restoration and environmental enhancement.

A Public Information Centre is being hosted to allow local residents, interested members of the public, Indigenous Nations, Government Agencies and interested stakeholders an opportunity to review and comment on the alternative solutions, the evaluation process, the preliminary preferred solution and the next steps in the study. Please visit the Project webpage to review information materials, and provide any comments by **April 20, 2022**: www.mississauga.ca/carolyncreekstudy

Please refer to the attached Notice of Public Information Centre for more information.

If you have any questions or concerns, please let me know.

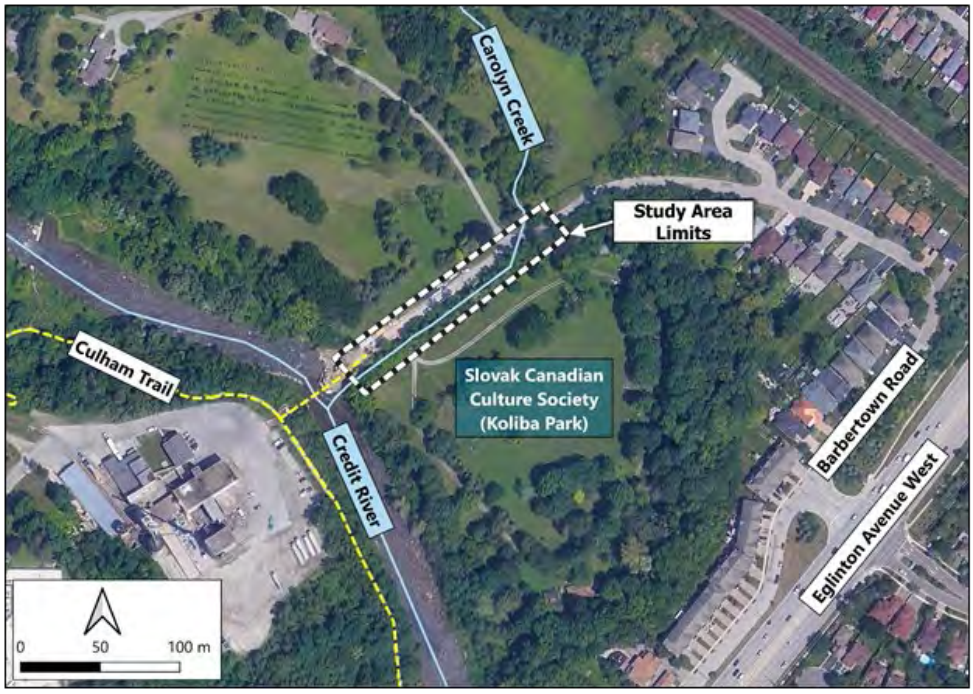
Thanks for your time.

Truly,
Vi

Vijanti Ramlogan, MESc
Intermediate Human Environment Consultant
Pronouns (she/her/hers)
Mobile: +705-690-6435
www.woodplc.com

Notice of Online Public Information Centre
Municipal Class Environmental Assessment Study for Carolyn Creek Erosion Control along Barbertown Road

WHAT?
The City of Mississauga is undertaking a Schedule 'B' Municipal Class Environmental Assessment (Class EA) to identify a preferred solution to address erosion problems along a section of Carolyn Creek along Barbertown Road (please refer to the key plan for Study Area limits).



WHY?
Through its ongoing erosion monitoring program, the City of Mississauga has identified the creek reach on the south side of Barbertown Road as a high priority site in need of rehabilitation, based on the continued erosion and risk to property and infrastructure.

HOW?
- The study has examined the creek and associated natural environment to identify existing erosion problems, potential future risks, and opportunities for restoration and environmental enhancement.
- Through the Municipal Class EA process, multiple alternative solutions have been developed and evaluated by the Study Team and will be considered for refinement through consultation process (see below). The Study Team will then confirm a Preferred Solution and proceed with the detailed design of the recommended works.
- At the end of the Class EA Study, a Project File Report, documenting the study process will be available for review by the public, Indigenous Nations, Government Agencies, and stakeholders.

GET INVOLVED!
- Consultation is an essential part of the Municipal Class EA process. We want to ensure that anyone with an interest in this study has the opportunity to provide input. The Study Team has developed an information package to allow local residents, interested members of the public, Indigenous Nations, Government Agencies and interested stakeholders an opportunity to review and comment on the alternative solutions, the evaluation process, the preliminary preferred solution and the next steps in the study. The information package will be made available on a dedicated Project webpage for this project on City's website from **March 23** to **April 20, 2022**: www.mississauga.ca/carolyncreekstudy
- Please provide us your comments by **April 20, 2022**, by using the Online Comment Form available on project webpage. Comments can also be sent to the following contacts via email:

Anthony Di Giandomenico P.Eng.
Storm Drainage Engineer
City of Mississauga
anthony.digiandomenico@mississauga.ca

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

Personal information is collected under the authority of the Environmental Assessment Act and will be used in the assessment process. With exception of personal information, all comments shall become part of the public records. Questions about this collection should be directed to the Project Manager listed above.
This notice was issued in March 2022.

APPENDIX

F

Agency Consultation

APPENDIX

F-1 *Ministry of the Environment, Conservation and Parks*

Talpur, Mir

From: Bell, Trevor (MECP) <Trevor.Bell@ontario.ca>
Sent: Thursday, April 1, 2021 3:23 PM
To: Talpur, Mir; EA Notices to CRegion (MECP)
Cc: Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian; Kelly, Mary K; Shakeel, Meera
Subject: RE: Schedule B - Municipal Class EA - Carolyn Creek Erosion Control along Barbertown Road

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Hello Mir,

Thanks for your email. Based on the information you have provided, the following Indigenous communities should be engaged as they may have an interest in your project:

- Mississaugas of the Credit First Nation;
- Six Nations of the Grand River (Both Six Nations Elected Council and Haudenosaunee Confederacy Chiefs Council); and
- Huron-Wendat Nation (HWN should only be engaged if there are potential archeological impacts).

Please let me know if you have any questions.

Thanks,
Trevor

Trevor Bell | Environmental Planner/Environmental Assessment Coordinator
Project Review Unit, Environmental Assessment and Permissions Branch
Ministry of the Environment, Conservation and Parks
5775 Yonge Street, 8th floor, Toronto ON, M2M 4J1
New Phone: 437-770-3731 | trevor.bell@ontario.ca

From: Talpur, Mir <mir.talpur@woodplc.com>
Sent: March 23, 2021 9:08 AM
To: Bell, Trevor (MECP) <Trevor.Bell@ontario.ca>; EA Notices to CRegion (MECP) <eanotification.cregion@ontario.ca>
Cc: Anthony.DiGiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Kelly, Mary K <mary.k.kelly@woodplc.com>; Shakeel, Meera <meera.shakeel@woodplc.com>
Subject: Schedule B - Municipal Class EA - Carolyn Creek Erosion Control along Barbertown Road

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Good Morning Trevor,

The City of Mississauga has retained Wood Environment & Infrastructure Solutions to undertake a Schedule B Municipal Class Environmental Assessment and to prepare detailed design and associated construction drawings for Carolyn Creek Erosion Control Project along Barbertown Road. The study area extends along the south side of Barbertown Road bordering the Slovak Canadian Culture Society (Koliba Park), and ends by

flowing into the Credit River. The total length of the creek through the study area is approximately 200m. A map illustrating the location of the study area is provided at the end of this email.

We will be issuing a combined Notice of Study Commencement and Public Information Centre #1 for this Class EA Study. We will share the notices for this Class EA Study with you as they become available.

At this time, we have completed the attached Project Information Form for this project. We would like to initiate early engagement with the potentially affected Indigenous Nations, and would like to confirm with you the Indigenous Nations that should be consulted as part of this Class EA Study. We would appreciate if you could please advise on this at your earliest convenience. Thank you.



Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
3450 Harvester Road, Suite 100
Burlington ON L7N 3W5
www.woodplc.com

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APPENDIX

F-2 *Credit Valley Conservation*

Minutes

Date:	09 December 2021
File #:	WW20101061 - Carolyn Creek Erosion Control along Barbertown Road - Schedule 'B' Municipal Class Environmental Assessment
Meeting Date & Time:	09 December 2021 1:00 – 2:00 PM
Meeting at:	City of Mississauga (CoM) Webex Meeting
Subject:	Review of Existing Inventory and Long List of Alternatives with Credit Valley Conservation

Attendees:

Anthony DiGiandomenico, CoM	Iftekhar Ahmad, CVC
Greg Frew, CoM	Jakub Kilis, CVC
Brian Bishop, Wood	Lori Cook, CVC
Mir Ahsan Talpur, Wood	Matteo De Stefano, CVC
Michael Godard, Wood	
Bill de Geus, AquaLogic	

Matters Discussed	Action By:
1. Purpose of Meeting Anthony introduced the meeting. The purpose of this meeting was to present information to Credit Valley Conservation (CVC) and obtain input on the high-level results of field investigations and potential alternative solutions for addressing erosion problem at Carolyn Creek along Barbertown Road. The presentation was provided in turns by Brian, Mir and Bill. It was noted that the presentation shared at this meeting would be used for the virtual Public Information Centre that is being planned for January 2022.	

PLEASE NOTE: If there is any comment or amendment to be made to these meeting notes, they should be brought to the notice of Wood within five (5) business days of issue and confirmed in writing.

3450 Harvester Road
Burlington, ON L7N 3W5
+1 905 335 2353
www.woodplc.com

Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited
Registered office: 2020 Winston Park Drive, Suite 700, Oakville, Ontario L6H 6X7
Registered in Canada No. 773289-9; GST: 899879050 RT0008; DUNS: 25-362-6642

Matters Discussed	Action By:
2. Items of Discussion Following the presentation, the Study Team invited CVC staff to provide comments or ask any questions. CVC's questions/comments and Study Team's responses are summarized below: • Comments: CVC requested copies of draft technical reports for review. CVC staff is planning to complete a site visit in the next 1-2 months and will provide detailed comments once draft documents are provided and reviewed. CVC also asked for a draft copy of the evaluation criteria and matrix when available. CVC thanked the City for the presentation and photographs in particular, and can see opportunities for improvement of the creek. • Question: Will there be any property taking required for realignment alternatives? • Response: Yes, additional property will be required in order to implement the realignment alternatives. • Question: Would the City consider removing/redesigning or relocating the access to Koliba Park if the Protect in Place is identified as the preferred option? • Response: It would potentially be considered as a secondary priority repair site for channel remediation, and is noted to involve an amount of bank/wall replacement if the bridge/culvert is removed, plus potential design of a longer bridge or design of a new entrance farther up the road • Question: What is the status of the future development to the north? • Response: The future development is currently at Draft Plan of Subdivision stage, however, it will be registering soon. The City is anticipating the greenbelt land dedication in 2022. • Question: What is the condition of creek at the CPR railway crossing? Are there any constraints to fish passage? • Response: The railway crossing (limestone masonry culvert) has wingwalls and a concrete spillway at the downstream end, with a vertical drop of approximately 1.0 m, constituting a fish barrier. (Note: post-meeting City creek inventory photos also reveal a debris jam at the safety grate at the upstream end of	

Matters Discussed	Action By:
the culvert.) • Comment: The CVC staff suggested that the barriers at the railway crossing should be documented in the EA report, as it relates to overall fish passage and objectives. • Comment: The CVC staff noted that the alternatives considered are comprehensive. The CVC staff indicated that improvement of passage for non-jumping fish species would be an objective that should be documented in the EA. Chinook and coho salmon may continue to choose to navigate the creek if they so prefer.	

Meeting Minutes prepared by:

Wood Environment & Infrastructure Solutions
a Division of Wood Canada Limited

Per: **Mir Ahsan Talpur, M.Env.Sc., EP**
Environmental Planner
mir.talpur@woodplc.com

MAT

Carolyn Creek Erosion Control along Barbertown Road

Schedule ‘B’ Municipal Class Environmental Assessment

Meeting with Credit Valley Conservation (December 9, 2021)





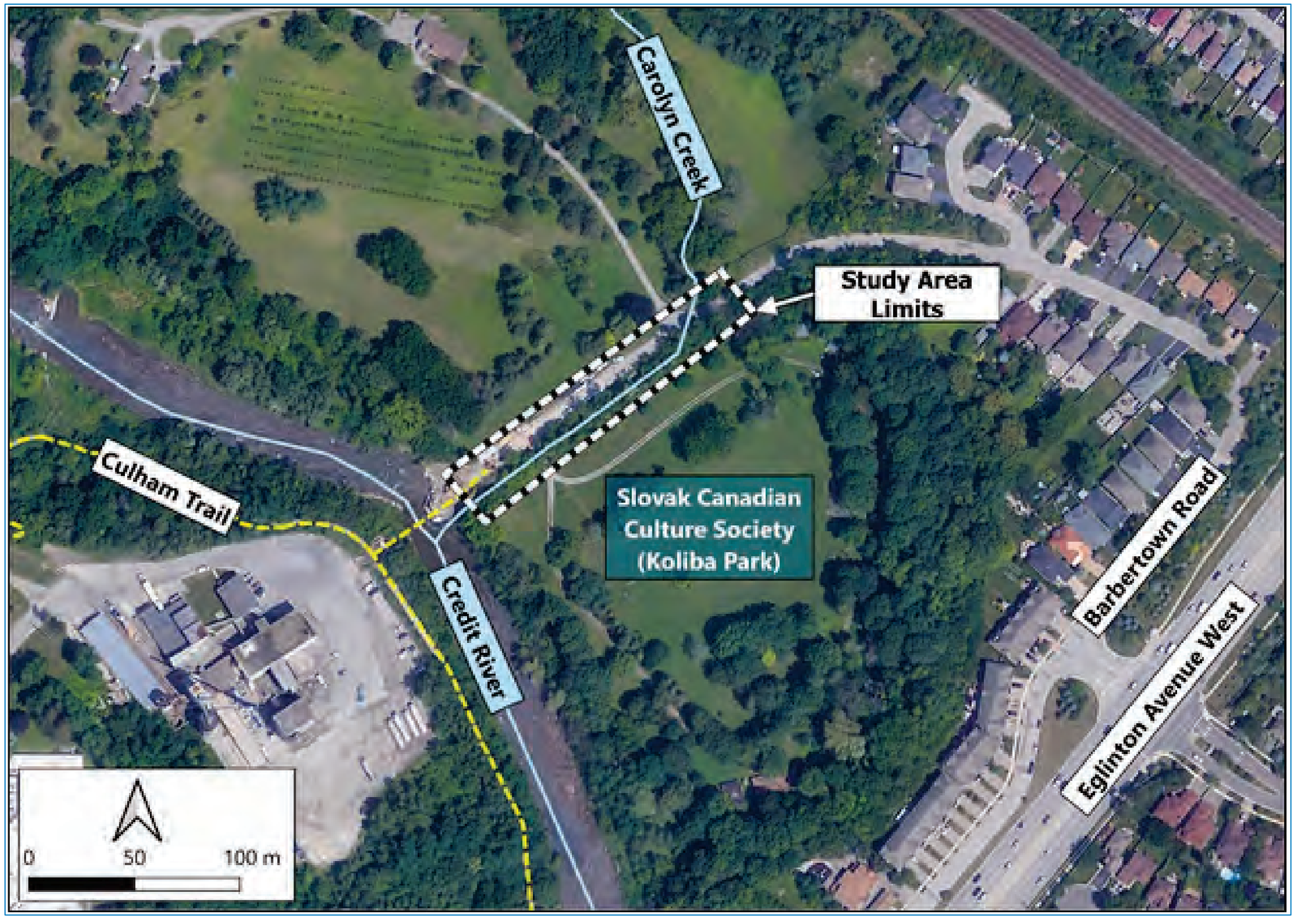
Presentation Outline

- Study Overview
- Environmental Assessment Process
- Existing Conditions
- Alternative Solutions
- 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 exiting conditions
- Identify and evaluate alternative solutions
- Identify preferred solution
- Consult with the public, Indigenous Nations, government review agencies, and interested stakeholders regard the 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.



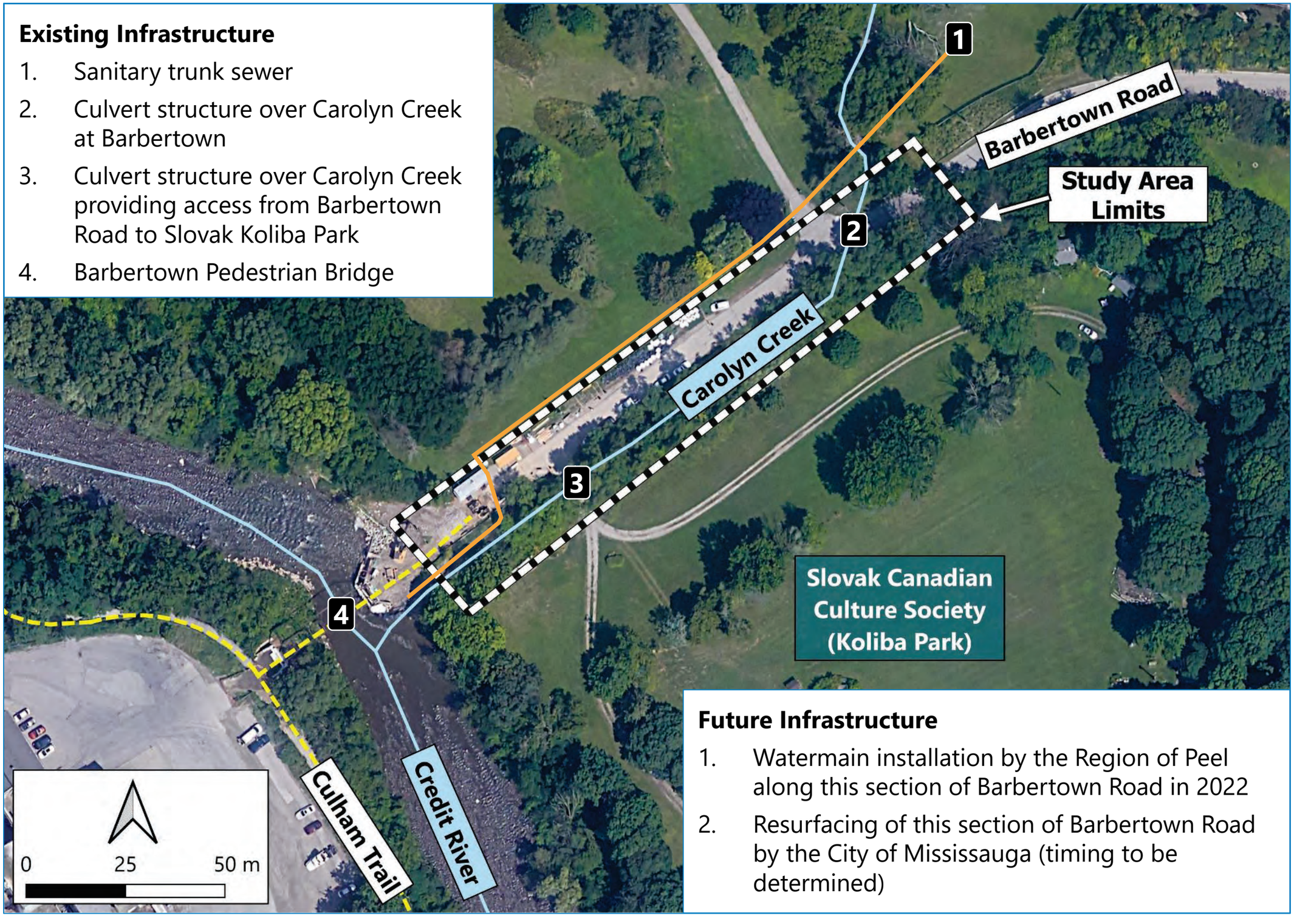
Koliba Park to the south of Carolyn Creek

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

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

1. Watermain installation by the Region of Peel along this section of Barbertown Road in 2022
2. 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.



Vegetation Communities within Study Area

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:

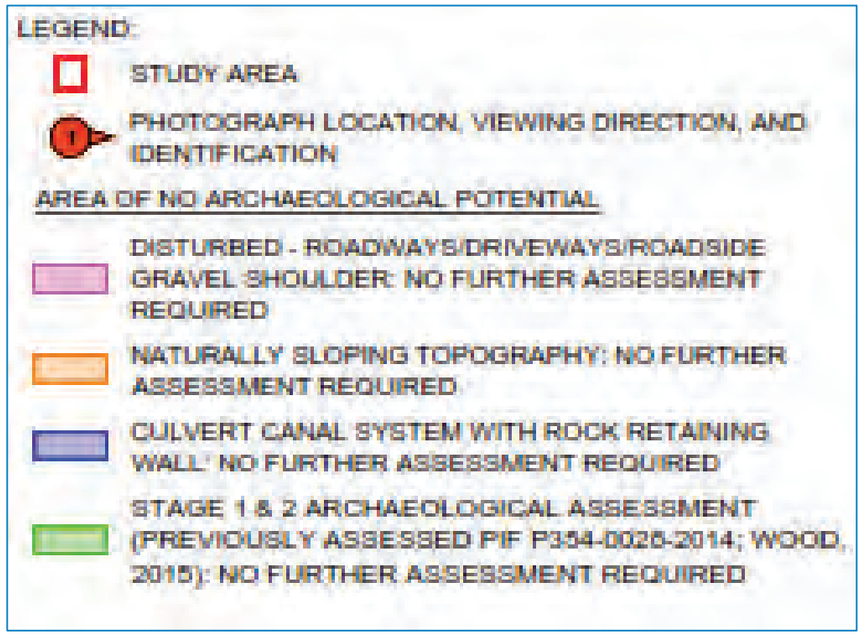
- Removal or reshaping of adverse accumulated cobble from gabion basket failure to improve passage
- Stabilize and replace gabion baskets
- Gradual elevation change at the upstream end of the pool
- Removal of debris (wood or litter/garbage); and
- Stabilizing banks and gabion baskets upstream of the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



Debris in channel that may impede fish passage

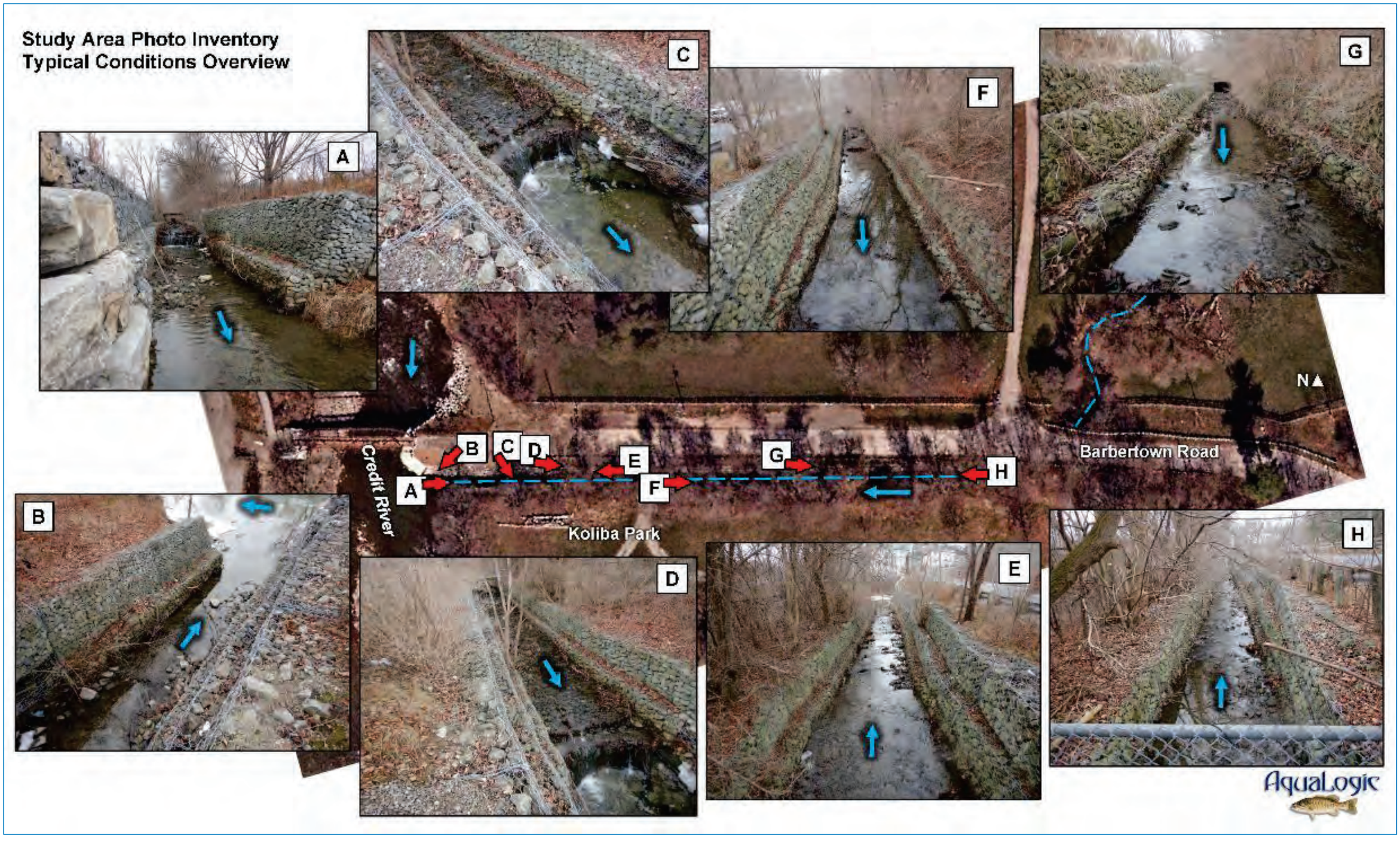
Archaeological Resources

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





Stream Morphology – Study Area Overview



Barbertown Road and Koliba Park Entrance Crossings

Barbertown Road

staff gauge

Koliba Park Entrance

Barbertown Road crossing

Barbertown Road Perspective, East to West

Koliba Park entrance crossing

Stream Morphology - Primary Failure Site



Drop structure at Primary Failure Site



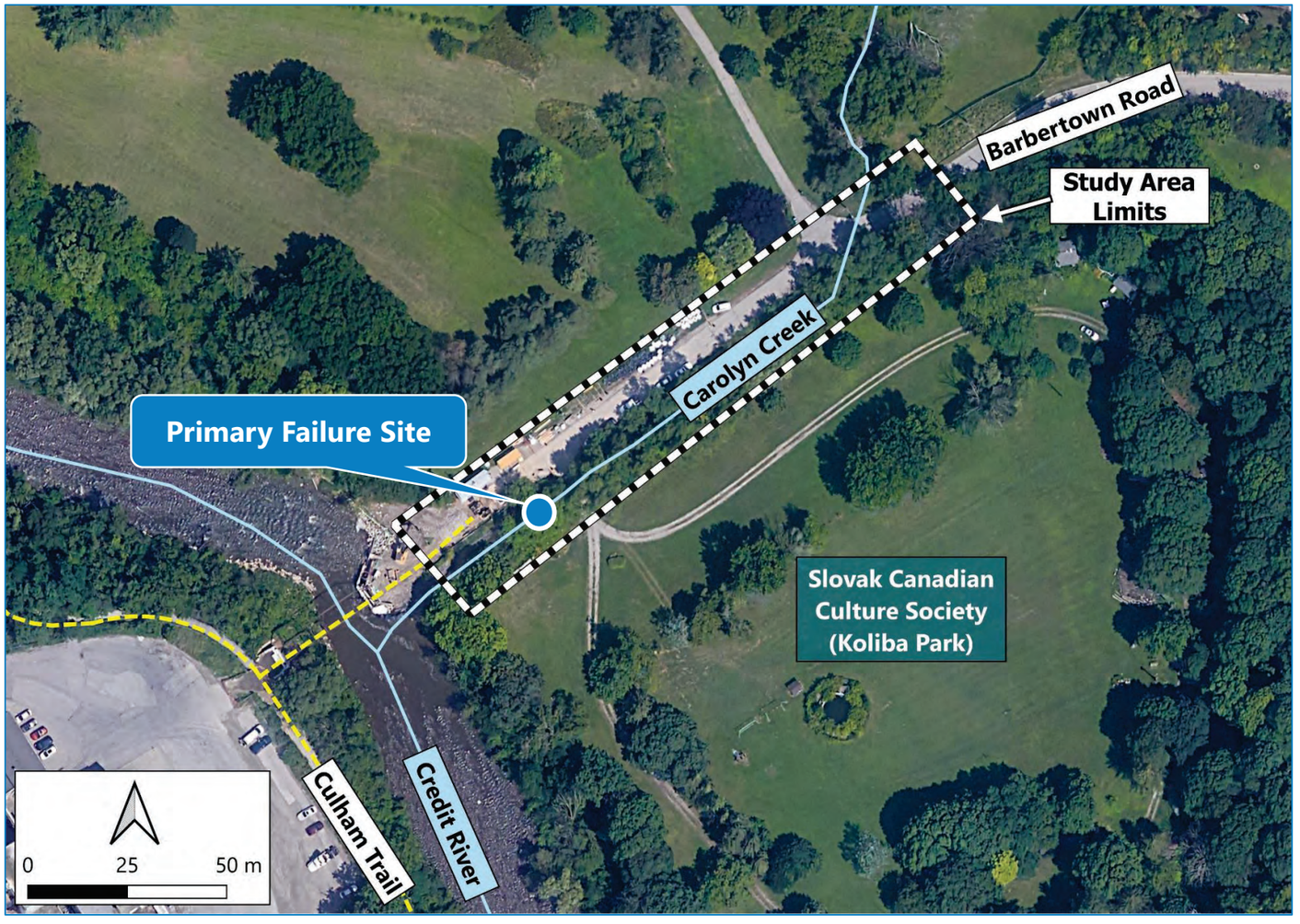
Undercut of existing gabion



Undercut of existing gabion



Original gabion weir appear to be missing



Stream Morphology - Secondary Priority Sites

Secondary Priority Details





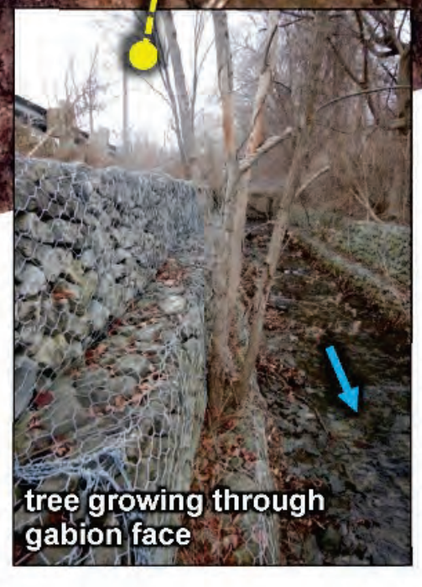
















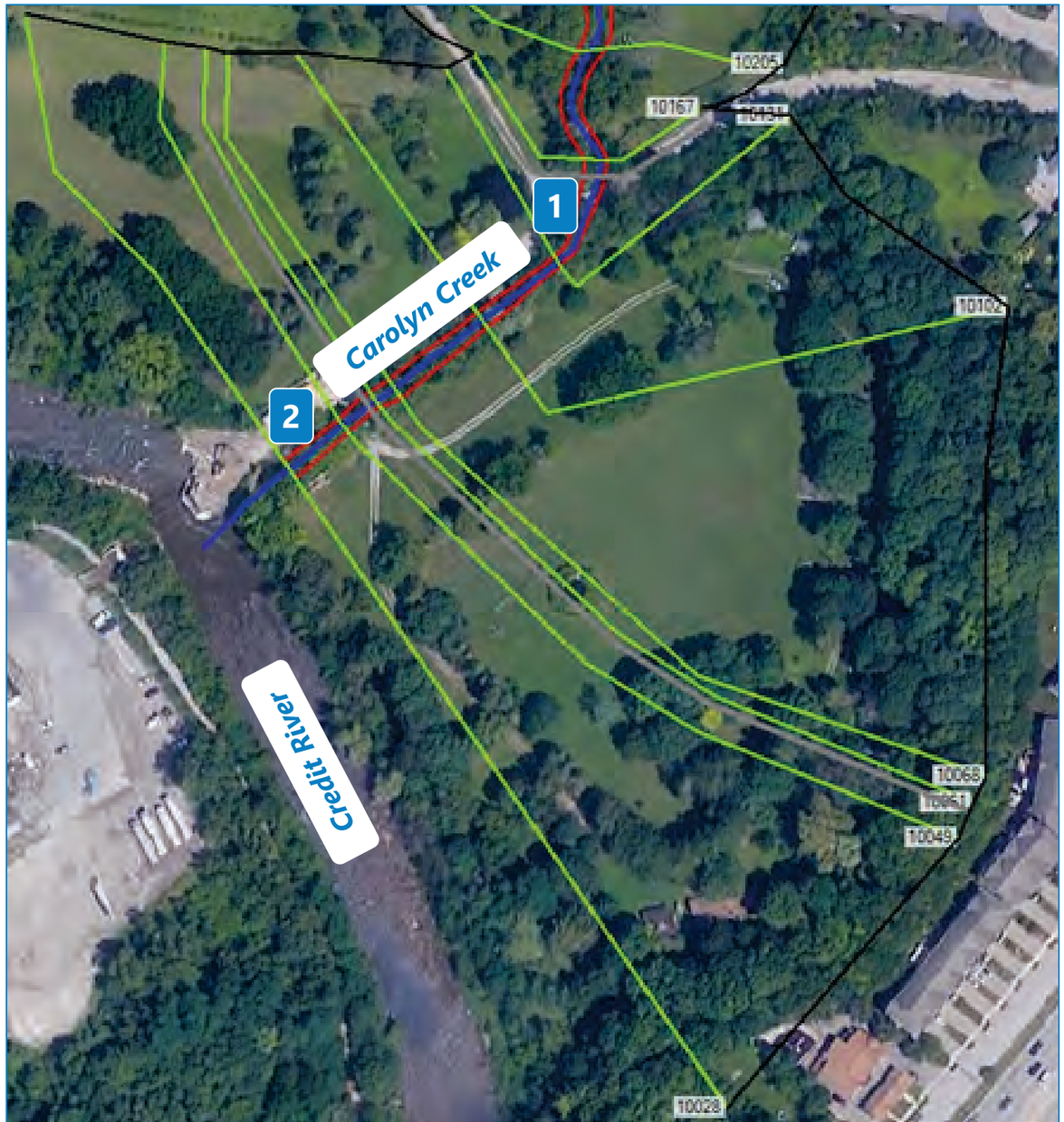
AquaLogic

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.

Proposed to not be 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.

Proposed to not be 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.

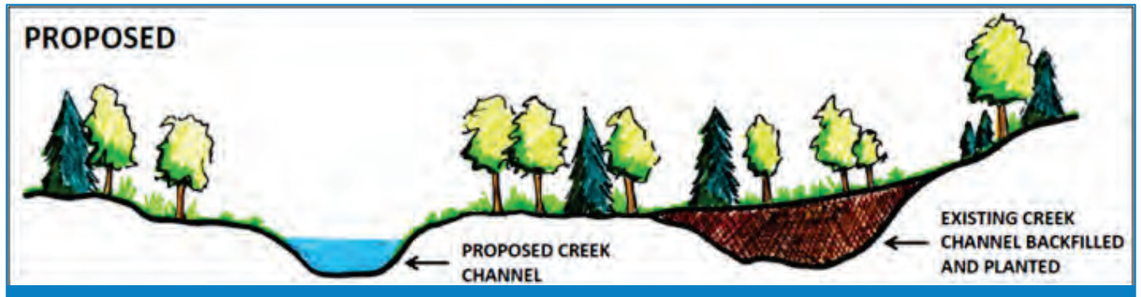
Proposed to be carried forward for further evaluation.



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.

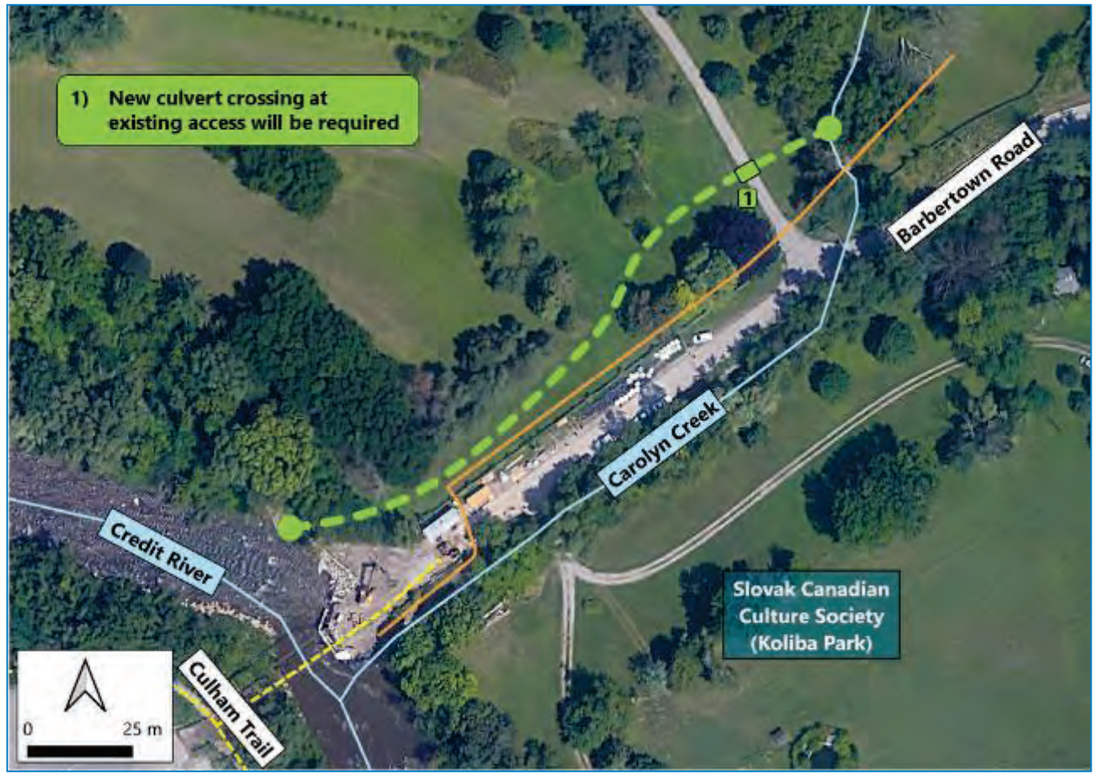
Proposed to be carried forward for further evaluation.



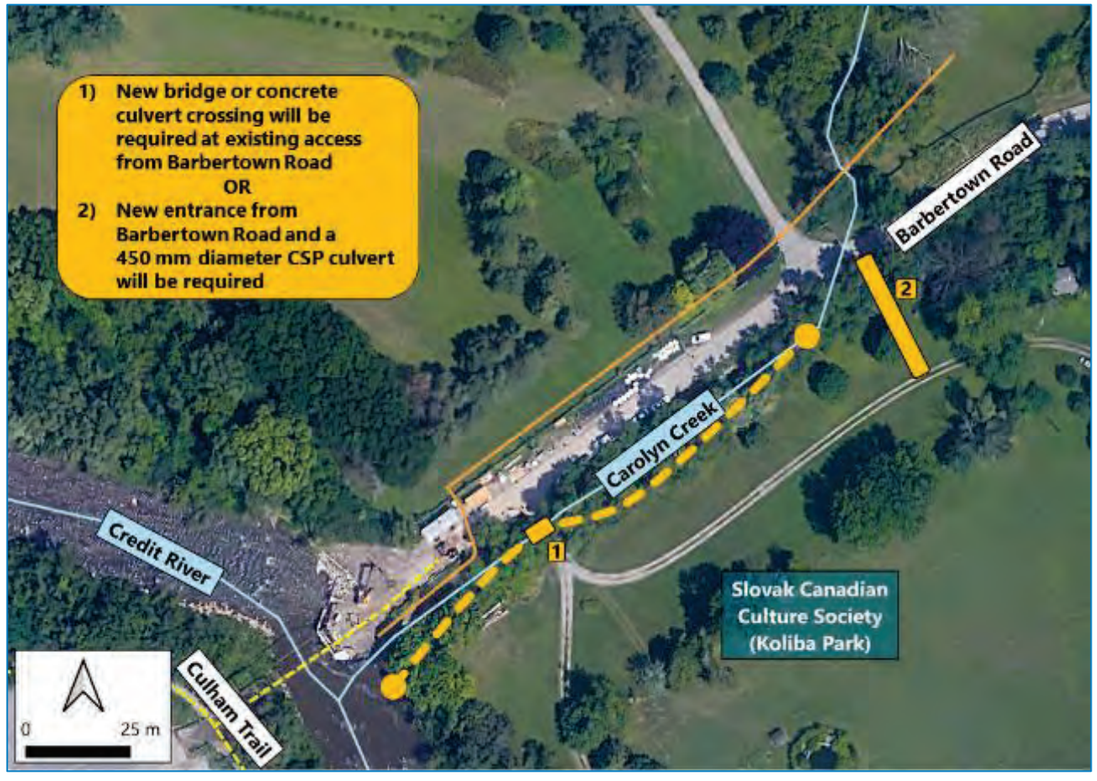
Schematic of Natural Channel Realignment

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. This alternative would involve lengthy discussions with the private landowner, and an agreement on land or an easement.



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 involve lengthy discussions with the private landowner, and an agreement on land or an easement.



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.

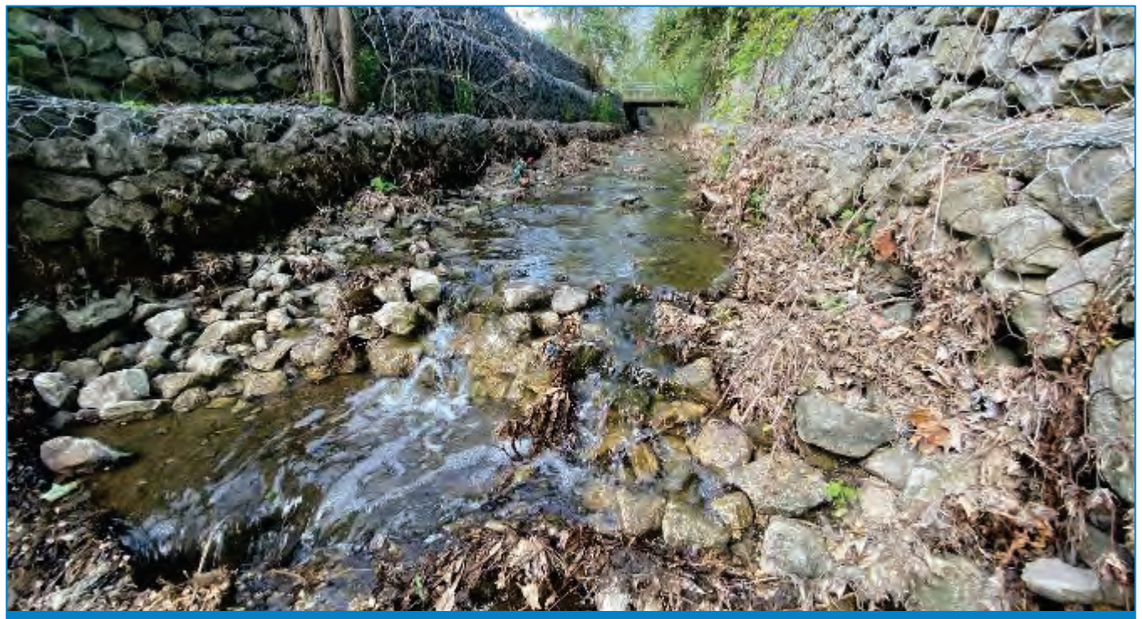
Proposed to be carried forward for further evaluation.



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.

Proposed to be carried forward for further evaluation.



Example of Barrier to Fish Passage at Carolyn Creek

Approach for Evaluation of Alternative Solutions

Short list of alternative solutions:

- 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 will be evaluated using the following criteria:

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

Next Steps

- Complete **evaluation of alternative solutions**
- Complete **Public Information Centre**
- Finalize **preferred design**
- 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 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

Talpur, Mir

From: Talpur, Mir
Sent: Friday, December 10, 2021 9:45 AM
To: Ahmad, Iftekhar
Cc: Kilis, Jakub; anthony.digiandomenico@mississauga.ca; Bishop, Brian; Godard, Michael; bill.degeus@sympatico.ca
Subject: Carolyn Creek Erosion Control - CVC Meeting Minutes
Attachments: WW20101061_CarolynCreekEC-CVCMeeting_09-12-2021.pdf

Hi Iftekhar,

Please find attached the minutes of yesterday's meeting regarding Carolyn Creek Erosion Control project. If you could share these minutes with Lori and Matteo, that would be appreciated.

Let me know if there are any changes to the minutes. Thanks!

Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
www.woodplc.com

wood.

From: Ahmad, Iftekhar <Iftekhar.Ahmad@cvc.ca>
Sent: Friday, November 12, 2021 7:57 AM
To: Talpur, Mir <mir.talpur@woodplc.com>
Cc: Kilis, Jakub <Jakub.Kilis@cvc.ca>; anthony.digiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Godard, Michael <michael.godard@woodplc.com>; bill.degeus@sympatico.ca
Subject: RE: [External] CVC's high level comments - Carolyn Creek Erosion Control Project along Barbertown Road - Schedule 'B' Municipal Class EA

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Good Morning Mir,

No problem. We are fine with discussing the project in the City's next monthly meeting. Can you please contact Greg Frew (Stormwater Drainage Engineer) at the City to add this item to the agenda of the meeting on December 9th.

Thanks, have a nice Friday and weekend.

Best regards,
Iftekhar

I'm working remotely. The best way to reach me is by email or Microsoft Teams.

Iftekhar Ahmad | he/him/his
Planner, Environmental Assessment (acting) | Credit Valley Conservation
905-670-1615 ext 296
iftekhar.ahmad@cvc.ca | cvc.ca

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2021 CANADA'S GREENEST EMPLOYERS

GREATER TORONTO'S TOP 2021 EMPLOYERS

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From: Talpur, Mir <mir.talpur@woodplc.com>
Sent: Thursday, November 11, 2021 2:00 PM
To: Ahmad, Iftekhar <Iftekhar.Ahmad@cvc.ca>
Cc: Kilis, Jakub <Jakub.Kilis@cvc.ca>; anthony.digiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Godard, Michael <michael.godard@woodplc.com>; bill.degeus@sympatico.ca
Subject: [External] CVC's high level comments - Carolyn Creek Erosion Control Project along Barbertown Road - Schedule 'B' Municipal Class EA

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Hi Iftekhar,

Our PM, Brian Bishop has to attend a Council Meeting on December 2nd. He has been informed that there has been a slight change in the agenda, and that meeting could stretch into the afternoon of December 2nd.

We apologize for this, but December 2nd would not work for us, and we are hoping we can select another day for this meeting. Anthony noted that the City has a tentative meeting with CVC set aside each month. For the next month, it is booked for December 9, from 1-4 PM. Would it be possible to combine this meeting with that monthly meeting for December? If for some reason that doesn't work, I have identified below our additional availability:

- **Monday, December 6:** 10 AM – 11 AM
- **Wednesday, December 8:** 9 AM – 12 PM & 1 PM – 3 PM
- **Friday, December 10:** All day

Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
www.woodplc.com

From: Ahmad, Iftekhar <Iftekhar.Ahmad@cvc.ca>
Sent: Thursday, November 11, 2021 10:34 AM
To: Talpur, Mir <mir.talpur@woodplc.com>
Cc: Kilis, Jakub <Jakub.Kilis@cvc.ca>; anthony.digiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Godard, Michael <michael.godard@woodplc.com>; Snow, Julie <julie.snow@woodplc.com>; bill.degeus@sympatico.ca
Subject: RE: [External] RE: CVC's high level comments - Carolyn Creek Erosion Control Project along Barbertown Road - Schedule 'B' Municipal Class EA

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Hi Mir,

CVC staff are available on Thursday, December 2 (1-3 pm). Please include me, Jakub, and the following CVC staff members in the meeting invite.

Lori Cook, lori.cook@cvc.ca
Matteo De Stefano, matteo.destefano@cvc.ca

Thanks,

Best regards,
Iftekhar

I'm working remotely. The best way to reach me is by email or Microsoft Teams.

Iftekhar Ahmad | he/him/his
Planner, Environmental Assessment (acting) | Credit Valley Conservation
905-670-1615 ext 296
iftekhar.ahmad@cvc.ca | cvc.ca

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From: Talpur, Mir <mir.talpur@woodplc.com>
Sent: Tuesday, November 9, 2021 3:31 PM
To: Ahmad, Iftekhar <Iftekhar.Ahmad@cvc.ca>
Cc: Kilis, Jakub <Jakub.Kilis@cvc.ca>; anthony.digiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Godard, Michael <michael.godard@woodplc.com>; Snow, Julie <julie.snow@woodplc.com>; bill.degeus@sympatico.ca
Subject: [External] RE: CVC's high level comments - Carolyn Creek Erosion Control Project along Barbertown Road - Schedule 'B' Municipal Class EA

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Hi Ahmad,

Thank you for taking the time to provide CVC's high level comments on this Municipal Class EA Study. We would like to meet with CVC staff to discuss the alternatives under consideration for this project. I have included our availability below. Could you please let me know if any of these times work best for the CVC staff? I will then send out a MS Teams invite.

- Tuesday, November 30: 9 AM – 10:30 AM & 3 PM – 4 PM
- Thursday, December 2: 1 PM – 3 PM

Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
www.woodplc.com

From: Ahmad, Iftekhar <Iftekhar.Ahmad@cvc.ca>
Sent: Tuesday, September 28, 2021 3:31 PM
To: Talpur, Mir <mir.talpur@woodplc.com>
Cc: Kilis, Jakub <Jakub.Kilis@cvc.ca>; anthony.digiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Godard, Michael <michael.godard@woodplc.com>; Snow, Julie <julie.snow@woodplc.com>
Subject: CVC's high level comments - Carolyn Creek Erosion Control Project along Barbertown Road - Schedule 'B' Municipal Class EA

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Hi Mir,

Thank you for providing the information about the project as subjected above.

Please find below our high level input into the proposed project at this time. Additional information can be provided upon submission of the Notice of Study Commencement and PIC materials when they are available. We would suggest a virtual meeting via MS Teams to discuss the preliminary results of your investigations and potential solutions prior to the site visit being conducted.

CVC COMMENTS

1. **Site Characteristics** (based on CVC mapping)
    a. Regulated Area - The subject study area is located entirely within the Regulated Area. A permit from CVC will be required for any grading or construction works within this area.
    b. Watercourse - The study area is traversed by Carolyn Creek and is located adjacent to the Credit River. Any alteration to a watercourse requires a permit from CVC. Our concerns for new construction would include sediment control during construction, and to ensure no degradation to water quality.
    c. Floodplain - The study area is located entirely within the regulatory storm floodplain associated with the Credit River and Carolyn Creek. Our primary concern is the protection of life and property from the flood hazard. We have specific criteria and requirements for construction in the floodplain.
    d. Valley System - The study area is located within the valley associated with the Credit River.
    e. Credit River Watershed Natural Heritage System - The study area is located within the Credit River Watershed Natural Heritage System (CRWNHS). The CRWNHS consists of High Functioning and Supporting terrestrial and aquatic natural heritage features, buffers, and complementary natural heritage areas (Centers for Biodiversity). Based on a watershed scale, the CRWNHS is intended to support Provincial, Regional and local municipal natural heritage systems as identified in their respective Strategies or Plans. As a watershed based management agency and landowner, CVC intends to implement the CRWNHS by using it as a strategic program guidance tool; to inform further development of CVC projects and policies; to assist CVC staff in providing technical advice to landowners and stakeholders at a watershed scale; and to promote a more consistent approach to natural heritage system planning across CVC's jurisdiction. For more detailed information or questions please contact the undersigned to discuss further.
    f. Municipal Greenlands - The study area is located entirely within an area designated as Core Greenlands by the Region of Peel. It is the policy of the Region of Peel to protect the form and function of these natural areas. CVC provides technical support to the Region with respect to delineation of natural features and reviewing potential impacts from subsequent development within and adjacent to these lands. We suggest that you contact the Region if you have questions on this matter.
    g. Mississauga Natural Areas Survey - The study area is located partially within the City of Mississauga's Natural Areas Survey and designated as Significant Natural Site (CRR5). CVC provides technical support to the City of Mississauga with respect to the identification and delineation of natural heritage features or areas as well as reviewing proposals for potential negative impacts to the natural features or areas. For more detailed information or any questions on this matter, we suggest that you contact the appropriate internal staff of the City to discuss further.

2. **Aquatic Habitat and Valleylands:** The proposed project needs to evaluate alternatives that minimize impacts to the form and function of the Credit River and Carolyn Creek valley and if possible include opportunities for enhancement. The EA should list and describe the natural features (fish habitat, etc.) and site characteristics (topography, high water table, buffering vegetation, etc.) in the study area that may pose constraints to the project.

3. **Hydraulics and Geomorphology:** Any alterations to a watercourse may require a hydraulic analysis to ensure that there are no negative upstream or downstream impacts and must also consider impacts to the geomorphic functions.

4. **Subwatershed Study:** The EA should ensure that the subwatershed study environmental targets and objectives are identified and identify proposed measures that implemented these targets and objectives.

5. **Erosion and Sediment Controls:** During the detailed design period of this project, all proposed methods to control sedimentation during construction and potential erosion following the completion of the project must be detailed. Furthermore, as means of minimizing impacts to aquatic habitat, all works must be completed in the dry.

6. **Restoration:** All disturbed areas will need to be stabilized and restored with native/non-invasive seed mixes and woody species.

Given our interest, we would like to be kept informed of future meetings and proceedings through the EA process. Please forward any information or reports when available to ensure that this Authority's policy and program interests are reflected in the planning and design components of this project.

Please note that CVC's review fee of $2500 will apply for this EA project and we can invoice the City once we receive the formal Notice of Study Commencement.

Please also note that Liam Marray is no longer working with CVC.

If you have any questions, please contact me.

Thanks,

Best regards,
Iftekhar

I'm working remotely. The best way to reach me is by email or Microsoft Teams.

Iftekhar Ahmad | he/him/his
Planner, Environmental Assessment (acting) | Credit Valley Conservation
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From: Talpur, Mir <mir.talpur@woodplc.com>
Sent: Friday, September 24, 2021 1:40 PM
To: Kilis, Jakub <Jakub.Kilis@cvc.ca>; Marray, Liam <Liam.Marray@cvc.ca>; ZZG-CVC-Planning <planning@cvc.ca>
Cc: Anthony DiGiandomenico <Anthony.DiGiandomenico@mississauga.ca>; Bishop, Brian <brian.bishop@woodplc.com>; Godard, Michael <michael.godard@woodplc.com>; Snow, Julie <julie.snow@woodplc.com>
Subject: [External] Carolyn Creek Erosion Control Project along Barbertown Road - Schedule 'B' Municipal Class EA

Some people who received this message don't often get email from mir.talpur@woodplc.com. Learn why this is important

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Good Afternoon,

The City of Mississauga has retained Wood Environment & Infrastructure Solutions (Wood) to undertake a Schedule 'B' Municipal Class Environmental Assessment (Class EA) and to prepare detailed design and associated construction drawings for the "Carolyn Creek Erosion Control Project along Barbertown Road". The study area is the lower 200 m of Carolyn Creek, which is located immediately south of Barbertown Road and north of the Slovak Canadian Culture Society (Koliba Park), from the Barbertown Road box culvert downstream to the Credit River. A map illustrating the location of the study area is provided at the end of this email.

The City will be issuing a combined Notice of Study Commencement and Public Information Centre for this Class EA Study. We will share the notices for this Class EA Study with you as they become available. (We note that we have previously contacted Credit Valley Conservation (CVC) in late 2020 to request and receive the HEC-RAS model for the creek).

At this time, we would like to request input from the CVC on matters that should be considered in this Class EA, including identification and evaluation of alternative solutions. We would also like to meet with the CVC staff at the end of October 2021, to share preliminary results of various technical investigations and to discuss potential alternative options for the creek. We would appreciate if you could please confirm your preference on the format of this meeting (i.e., site visit or a virtual meeting via MS Teams).



Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
3450 Harvester Road, Suite 100
Burlington ON L7N 3W5
www.woodplc.com

wood.

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As a recipient of an email from a John Wood Group Plc company, your contact information will be on our systems and we may hold other personal data about you such as identification information, CVs, financial information and information contained in correspondence. For more information on our privacy practices and your data protection rights, please see our privacy notice at https://www.woodplc.com/policies/privacy-notice

Talpur, Mir

From: Ahmad, Iftekhar <Iftekhar.Ahmad@cvc.ca>
Sent: Monday, December 13, 2021 11:11 AM
To: Talpur, Mir
Cc: Kilis, Jakub; anthony.digiandomenico@mississauga.ca; Bishop, Brian; Godard, Michael; bill.degeus@sympatico.ca
Subject: RE: [External] Carolyn Creek Erosion Control - CVC Meeting Minutes

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Hi Mir,

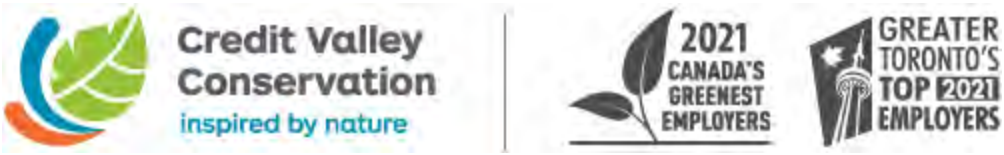
Thank you for providing the minutes of the meeting. We have no comments.

Hope you had a nice weekend.

Best regards,
Iftekhar

I'm working remotely. The best way to reach me is by email or Microsoft Teams.

Iftekhar Ahmad | he/him/his
Planner, Environmental Assessment (acting) | Credit Valley Conservation
905-670-1615 ext 296
iftekhar.ahmad@cvc.ca | cvc.ca



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From: Talpur, Mir <mir.talpur@woodplc.com>
Sent: Friday, December 10, 2021 9:45 AM
To: Ahmad, Iftekhar <Iftekhar.Ahmad@cvc.ca>
Cc: Kilis, Jakub <Jakub.Kilis@cvc.ca>; anthony.digiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Godard, Michael <michael.godard@woodplc.com>; bill.degeus@sympatico.ca
Subject: [External] Carolyn Creek Erosion Control - CVC Meeting Minutes

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Hi Iftekhar,

Please find attached the minutes of yesterday's meeting regarding Carolyn Creek Erosion Control project. If you could share these minutes with Lori and Matteo, that would be appreciated.

Let me know if there are any changes to the minutes. Thanks!

Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
www.woodplc.com

From: Ahmad, Iftekhar <Iftekhar.Ahmad@cvc.ca>
Sent: Friday, November 12, 2021 7:57 AM
To: Talpur, Mir <mir.talpur@woodplc.com>
Cc: Kilis, Jakub <Jakub.Kilis@cvc.ca>; anthony.digiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Godard, Michael <michael.godard@woodplc.com>; bill.degeus@sympatico.ca
Subject: RE: [External] CVC's high level comments - Carolyn Creek Erosion Control Project along Barbertown Road - Schedule 'B' Municipal Class EA

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Good Morning Mir,

No problem. We are fine with discussing the project in the City's next monthly meeting. Can you please contact Greg Frew (Stormwater Drainage Engineer) at the City to add this item to the agenda of the meeting on December 9th.

Thanks, have a nice Friday and weekend.

Best regards,
Iftekhar

I'm working remotely. The best way to reach me is by email or Microsoft Teams.

Iftekhar Ahmad | he/him/his
Planner, Environmental Assessment (acting) | Credit Valley Conservation
905-670-1615 ext 296
iftekhar.ahmad@cvc.ca | cvc.ca





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From: Talpur, Mir <mir.talpur@woodplc.com>
Sent: Thursday, November 11, 2021 2:00 PM
To: Ahmad, Iftekhar <Iftekhar.Ahmad@cvc.ca>
Cc: Kilis, Jakub <Jakub.Kilis@cvc.ca>; anthony.digiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Godard, Michael <michael.godard@woodplc.com>; bill.degeus@sympatico.ca
Subject: [External] CVC's high level comments - Carolyn Creek Erosion Control Project along Barbertown Road - Schedule 'B' Municipal Class EA

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Hi Iftekhar,

Our PM, Brian Bishop has to attend a Council Meeting on December 2nd. He has been informed that there has been a slight change in the agenda, and that meeting could stretch into the afternoon of December 2nd.

We apologize for this, but December 2nd would not work for us, and we are hoping we can select another day for this meeting. Anthony noted that the City has a tentative meeting with CVC set aside each month. For the next month, it is booked for December 9, from 1-4 PM. Would it be possible to combine this meeting with that monthly meeting for December? If for some reason that doesn't work, I have identified below our additional availability:

- **Monday, December 6:** 10 AM – 11 AM
- **Wednesday, December 8:** 9 AM – 12 PM & 1 PM – 3 PM
- **Friday, December 10:** All day

Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
www.woodplc.com

wood.

From: Ahmad, Iftekhar <Iftekhar.Ahmad@cvc.ca>
Sent: Thursday, November 11, 2021 10:34 AM
To: Talpur, Mir <mir.talpur@woodplc.com>
Cc: Kilis, Jakub <Jakub.Kilis@cvc.ca>; anthony.digiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Godard, Michael <michael.godard@woodplc.com>; Snow, Julie <julie.snow@woodplc.com>; bill.degeus@sympatico.ca
Subject: RE: [External] RE: CVC's high level comments - Carolyn Creek Erosion Control Project along Barbertown Road - Schedule 'B' Municipal Class EA

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Hi Mir,

CVC staff are available on Thursday, December 2 (1-3 pm). Please include me, Jakub, and the following CVC staff members in the meeting invite.

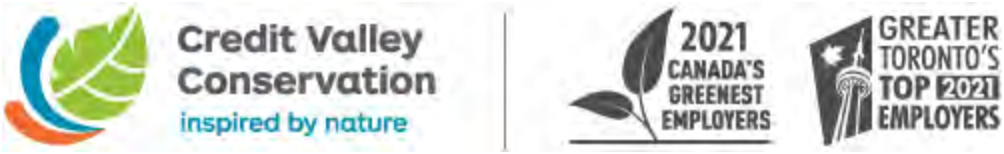
Lori Cook, lori.cook@cvc.ca
Matteo De Stefano, matteo.destefano@cvc.ca

Thanks,

Best regards,
Iftekhar

I'm working remotely. The best way to reach me is by email or Microsoft Teams.

Iftekhar Ahmad | he/him/his
Planner, Environmental Assessment (acting) | Credit Valley Conservation
905-670-1615 ext 296
iftekhar.ahmad@cvc.ca | cvc.ca



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From: Talpur, Mir <mir.talpur@woodplc.com>
Sent: Tuesday, November 9, 2021 3:31 PM
To: Ahmad, Iftekhar <Iftekhar.Ahmad@cvc.ca>
Cc: Kilis, Jakub <Jakub.Kilis@cvc.ca>; anthony.digiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Godard, Michael <michael.godard@woodplc.com>; Snow, Julie <julie.snow@woodplc.com>; bill.degeus@sympatico.ca
Subject: [External] RE: CVC's high level comments - Carolyn Creek Erosion Control Project along Barbertown Road - Schedule 'B' Municipal Class EA

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Hi Ahmad,

Thank you for taking the time to provide CVC's high level comments on this Municipal Class EA Study. We would like to meet with CVC staff to discuss the alternatives under consideration for this project. I have included our availability below. Could you please let me know if any of these times work best for the CVC staff? I will then send out a MS Teams invite.

- Tuesday, November 30: 9 AM – 10:30 AM & 3 PM – 4 PM
- Thursday, December 2: 1 PM – 3 PM

Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
www.woodplc.com

From: Ahmad, Iftekhar <Iftekhar.Ahmad@cvc.ca>
Sent: Tuesday, September 28, 2021 3:31 PM
To: Talpur, Mir <mir.talpur@woodplc.com>
Cc: Kilis, Jakub <Jakub.Kilis@cvc.ca>; anthony.digiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>; Godard, Michael <michael.godard@woodplc.com>; Snow, Julie <julie.snow@woodplc.com>
Subject: CVC's high level comments - Carolyn Creek Erosion Control Project along Barbertown Road - Schedule 'B' Municipal Class EA

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Hi Mir,

Thank you for providing the information about the project as subjected above.

Please find below our high level input into the proposed project at this time. Additional information can be provided upon submission of the Notice of Study Commencement and PIC materials when they are available. We would suggest a virtual meeting via MS Teams to discuss the preliminary results of your investigations and potential solutions prior to the site visit being conducted.

CVC COMMENTS

1. **Site Characteristics** (based on CVC mapping)
    a. Regulated Area - The subject study area is located entirely within the Regulated Area. A permit from CVC will be required for any grading or construction works within this area.
    b. Watercourse - The study area is traversed by Carolyn Creek and is located adjacent to the Credit River. Any alteration to a watercourse requires a permit from CVC. Our concerns for new

construction would include sediment control during construction, and to ensure no degradation to water quality.

c. Floodplain - The study area is located entirely within the regulatory storm floodplain associated with the Credit River and Carolyn Creek. Our primary concern is the protection of life and property from the flood hazard. We have specific criteria and requirements for construction in the floodplain.
d. Valley System - The study area is located within the valley associated with the Credit River.
e. Credit River Watershed Natural Heritage System - The study area is located within the Credit River Watershed Natural Heritage System (CRWNHS). The CRWNHS consists of High Functioning and Supporting terrestrial and aquatic natural heritage features, buffers, and complementary natural heritage areas (Centers for Biodiversity). Based on a watershed scale, the CRWNHS is intended to support Provincial, Regional and local municipal natural heritage systems as identified in their respective Strategies or Plans. As a watershed based management agency and landowner, CVC intends to implement the CRWNHS by using it as a strategic program guidance tool; to inform further development of CVC projects and policies; to assist CVC staff in providing technical advice to landowners and stakeholders at a watershed scale; and to promote a more consistent approach to natural heritage system planning across CVC's jurisdiction. For more detailed information or questions please contact the undersigned to discuss further.
f. Municipal Greenlands - The study area is located entirely within an area designated as Core Greenlands by the Region of Peel. It is the policy of the Region of Peel to protect the form and function of these natural areas. CVC provides technical support to the Region with respect to delineation of natural features and reviewing potential impacts from subsequent development within and adjacent to these lands. We suggest that you contact the Region if you have questions on this matter.
g. Mississauga Natural Areas Survey - The study area is located partially within the City of Mississauga's Natural Areas Survey and designated as Significant Natural Site (CRR5). CVC provides technical support to the City of Mississauga with respect to the identification and delineation of natural heritage features or areas as well as reviewing proposals for potential negative impacts to the natural features or areas. For more detailed information or any questions on this matter, we suggest that you contact the appropriate internal staff of the City to discuss further.

2. **Aquatic Habitat and Valleylands:** The proposed project needs to evaluate alternatives that minimize impacts to the form and function of the Credit River and Carolyn Creek valley and if possible include opportunities for enhancement. The EA should list and describe the natural features (fish habitat, etc.) and site characteristics (topography, high water table, buffering vegetation, etc.) in the study area that may pose constraints to the project.

3. **Hydraulics and Geomorphology:** Any alterations to a watercourse may require a hydraulic analysis to ensure that there are no negative upstream or downstream impacts and must also consider impacts to the geomorphic functions.

4. **Subwatershed Study:** The EA should ensure that the subwatershed study environmental targets and objectives are identified and identify proposed measures that implemented these targets and objectives.

5. **Erosion and Sediment Controls:** During the detailed design period of this project, all proposed methods to control sedimentation during construction and potential erosion following the completion of the project must be detailed. Furthermore, as means of minimizing impacts to aquatic habitat, all works must be completed in the dry.

6. **Restoration:** All disturbed areas will need to be stabilized and restored with native/non-invasive seed mixes and woody species.

Given our interest, we would like to be kept informed of future meetings and proceedings through the EA process. Please forward any information or reports when available to ensure that this Authority's policy and program interests are reflected in the planning and design components of this project.

Please note that CVC's review fee of $2500 will apply for this EA project and we can invoice the City once we receive the formal Notice of Study Commencement.

Please also note that Liam Marray is no longer working with CVC.

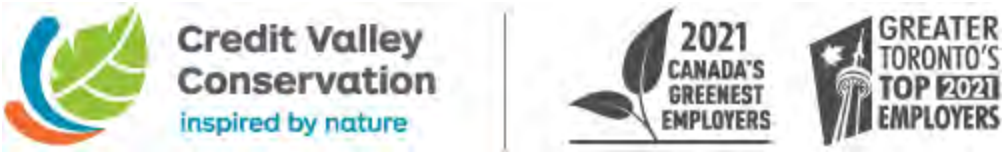
If you have any questions, please contact me.

Thanks,

Best regards,
Iftekhar

I'm working remotely. The best way to reach me is by email or Microsoft Teams.

Iftekhar Ahmad | he/him/his
Planner, Environmental Assessment (acting) | Credit Valley Conservation
905-670-1615 ext 296
iftekhar.ahmad@cvc.ca | cvc.ca



View our privacy statement

From: Talpur, Mir <mir.talpur@woodplc.com>
Sent: Friday, September 24, 2021 1:40 PM
To: Kilis, Jakub <Jakub.Kilis@cvc.ca>; Marray, Liam <Liam.Marray@cvc.ca>; ZZG-CVC-Planning <planning@cvc.ca>
Cc: Anthony DiGiandomenico <Anthony.DiGiandomenico@mississauga.ca>; Bishop, Brian <brian.bishop@woodplc.com>; Godard, Michael <michael.godard@woodplc.com>; Snow, Julie <julie.snow@woodplc.com>
Subject: [External] Carolyn Creek Erosion Control Project along Barbertown Road - Schedule 'B' Municipal Class EA

Some people who received this message don't often get email from mir.talpur@woodplc.com. Learn why this is important

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Good Afternoon,

The City of Mississauga has retained Wood Environment & Infrastructure Solutions (Wood) to undertake a Schedule 'B' Municipal Class Environmental Assessment (Class EA) and to prepare detailed design and associated construction drawings for the "Carolyn Creek Erosion Control Project along Barbertown Road". The study area is the lower 200 m of Carolyn Creek, which is located immediately south of Barbertown Road and north of the Slovak Canadian Culture Society (Koliba Park), from the Barbertown Road box culvert downstream to the Credit River. A map illustrating the location of the study area is provided at the end of this email.

The City will be issuing a combined Notice of Study Commencement and Public Information Centre for this Class EA Study. We will share the notices for this Class EA Study with you as they become available. (We note that we have previously contacted Credit Valley Conservation (CVC) in late 2020 to request and receive the HEC-RAS model for the creek).

At this time, we would like to request input from the CVC on matters that should be considered in this Class EA, including identification and evaluation of alternative solutions. We would also like to meet with the CVC staff at the end of October 2021, to share preliminary results of various technical investigations and to discuss potential alternative options for the creek. We would appreciate if you could please confirm your preference on the format of this meeting (i.e., site visit or a virtual meeting via MS Teams).



Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
3450 Harvester Road, Suite 100

Burlington ON L7N 3W5
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Talpur, Mir

From: Talpur, Mir
Sent: Tuesday, May 24, 2022 1:32 PM
To: Ahmad, Iftekhar
Cc: Kilis, Jakub; anthony.digiandomenico@mississauga.ca; Bishop, Brian
Subject: RE: CVC comments (evaluation of alternative solutions) - EA 21/011 - PIC - Carolyn Creek Erosion Control Project

Hi Iftekhar,

Thank you for sharing CVC staff's comments on Carolyn Creek preferred solution. We would like to confirm that ESC Plans and Tree Protection and Replacement Plans will be developed during detailed design phase and will be provided to CVC for review at that time. Tree Protection and Replacement Plans will be developed taking into consideration CVC's Ecosystem Offsetting Guidelines and any City guidelines for natural heritage systems.

With regards to hydraulic assessment, we would like to clarify that the hydraulic assessment for the baseline/existing conditions was completed using CVC's model and included in the evaluation document that we had shared with you. A second assessment will be developed during the detailed design phase for the preferred alternative, and will also be based on the CVC model.

We trust above are satisfactory. Please let us know if you have any questions.

Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
www.woodplc.com

wood.

From: Ahmad, Iftekhar <Iftekhar.Ahmad@cvc.ca>
Sent: Friday, April 29, 2022 3:48 PM
To: Talpur, Mir <mir.talpur@woodplc.com>
Cc: Kilis, Jakub <Jakub.Kilis@cvc.ca>; anthony.digiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>
Subject: CVC comments (evaluation of alternative solutions) - EA 21/011 - PIC - Carolyn Creek Erosion Control Project

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Hi Mir,

CVC staff have reviewed the document entitled “Evaluation of Alternative Solutions” dated March 7, 2022 and provide these comments for your consideration.

CVC comments

1. The Erosion and Sediment Control (ESC) plans will be a requirement for the first submission. The ESC plans must identify measures and controls to prevent excess sediment from entering either Carolyn Creek or the Credit River throughout the construction of the proposed works. CVC guidelines for the ESC plan can be found here and mandatory standard notes to be included in the ESC plan can be found here.

2. It is currently unclear if any fill or grading will be required within Carolyn Creek cross-sections. There was discussion of altering the channel profile to mitigate erosion by reducing flow velocity. Furthermore, it is anticipated that the roughness of the channel will be altered with the use of armourstone to protect the bank. It appears that a hydraulic assessment will be required to show the impact these changes will have to the existing flood hazard. Any changes to the model should reflect the standard modelling parameters from CVC (see attached), unless otherwise justified.

3. Please consider using our Ecosystem Offsetting Guidelines and associated replacement ratios for all proposed vegetation removals within the regulated area.

If you have any questions, please contact me.

Thanks,

Best regards,
Iftekhar

I’m working remotely. The best way to reach me is by email or Microsoft Teams.

Iftekhar Ahmad | he/him/his
Planner, Environmental Assessment | Credit Valley Conservation
905-670-1615 ext 296
iftekhar.ahmad@cvc.ca | cvc.ca

Credit Valley Conservation
inspired by nature

2021 CANADA'S GREENEST EMPLOYERS

GREATER TORONTO'S TOP 2021 EMPLOYERS

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From: Talpur, Mir <mir.talpur@woodplc.com>
Sent: Tuesday, April 12, 2022 4:23 PM
To: Ahmad, Iftekhar <Iftekhar.Ahmad@cvc.ca>
Cc: Kilis, Jakub <Jakub.Kilis@cvc.ca>; anthony.digiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>
Subject: [External] RE: CVC response - Carolyn Creek Erosion Control - Notice of Study Commencement & PIC (Agencies)

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Hi Iftekhar,

Please find attached the draft evaluation of alternatives and preliminary preferred solution for Carolyn Creek, along Barbertown Road. We would appreciate if you can share any comments by the end of the month.

Feel free to let me know if you have any questions.

Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
www.woodplc.com

From: Ahmad, Iftekhar <Iftekhar.Ahmad@cvc.ca>
Sent: Friday, April 1, 2022 3:19 PM
To: Talpur, Mir <mir.talpur@woodplc.com>
Cc: Kilis, Jakub <Jakub.Kilis@cvc.ca>; anthony.digiandomenico@mississauga.ca; Bishop, Brian <brian.bishop@woodplc.com>
Subject: CVC response - Carolyn Creek Erosion Control - Notice of Study Commencement & PIC (Agencies)

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Hi Mir,

Thank you for providing the information.

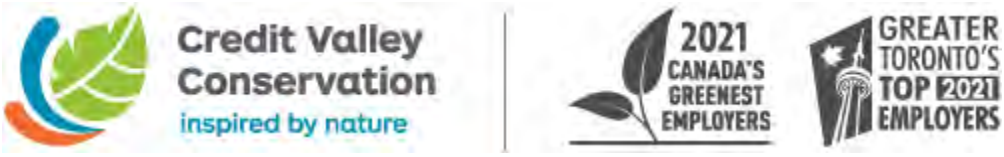
It is noted through City's website that the evaluation criteria is included in the presentation for virtual PIC. Please note again that we will also require technical studies/reports/analysis completed in support of the preliminary preferred solution for our review before PIC or before selection of the preferred solution.

Thanks, have a great weekend.

Best regards,
Iftekhar

I'm working remotely. The best way to reach me is by email or Microsoft Teams.

Iftekhar Ahmad | he/him/his
Planner, Environmental Assessment | Credit Valley Conservation
905-670-1615 ext 296
iftekhar.ahmad@cvc.ca | cvc.ca



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From: Talpur, Mir <mir.talpur@woodplc.com>
Sent: Wednesday, March 23, 2022 8:54 AM
To: Ashley.Bedford@dfo-mpo.gc.ca; FisheriesProtection@dfo-mpo.gc.ca; Bell, Trevor (MECP) <Trevor.Bell@ontario.ca>; eanotification.cregion@ontario.ca; dan.l.thompson@ontario.ca; aurora.mcallister@ontario.ca; Jawaid, Maria (MNRF) <Maria.Jawaid@ontario.ca>; karla.barboza@ontario.ca; Minkin, Dan (MHSTCI) <Dan.Minkin@ontario.ca>; Watt, Heather (MMAH) <heather.watt@ontario.ca>; lisa.myslicki@infrastructureontario.ca; Ahmad, Iftekhar <Iftekhar.Ahmad@cvc.ca>; Kilis, Jakub <Jakub.Kilis@cvc.ca>; Saddi, Asha <asha.saddi@peelregion.ca>; nimarta.gill@peelregion.ca; sally.rook <sally.rook@peelregion.ca>; andrew.farr@peelregion.ca; joanna.pietkiewicz@peelregion.ca; Maad.AbidAlHadi@peelregion.ca; Nicholas.gan@peelregion.ca; Pugliese, Frank <frank.pugliese@peelregion.ca>; brian.gibson@peelregion.ca; dana.banke@peelregion.ca; jim.greenfield@mississauga.ca; katie.henley@mississauga.ca; deryn.rizzi@mississauga.ca; fire.prevention@mississauga.ca; ron.starr@mississauga.ca
Cc: Anthony DiGiandomenico <anthony.digiandomenico@mississauga.ca>; Bishop, Brian <brian.bishop@woodplc.com>
Subject: [External] Carolyn Creek Erosion Control - Notice of Study Commencement & PIC (Agencies)

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23 March 2022

Notice of Study Commencement and Online Public Information Centre
Municipal Class Environmental Assessment Study for Carolyn Creek Erosion Control along Barbertown Road

The City of Mississauga is undertaking a Schedule 'B' Municipal Class Environmental Assessment (Class EA) to identify a preferred solution to address erosion problems along a section of Carolyn Creek along Barbertown Road. The study has examined the creek and associated natural environment to identify existing erosion problems, potential future risks, and opportunities for restoration and environmental enhancement.

A Public Information Centre is being hosted to allow local residents, interested members of the public, Indigenous Nations, Government Agencies and interested stakeholders an opportunity to review and comment on the alternative solutions, the evaluation process, the preliminary preferred solution and

the next steps in the study. Please visit the Project webpage to review information materials, and provide any comments by **April 20, 2022**: www.mississauga.ca/carolyncreekstudy

Please refer to the attached Notice of Study Commencement and Public Information Centre for more information.

Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
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Burlington ON L7N 3W5
www.woodplc.com



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APPENDIX

F-3 *Region of Peel*

Talpur, Mir

From: Talpur, Mir
Sent: Tuesday, May 24, 2022 1:32 PM
To: Abid Al Hadi, Maad
Cc: Gill, Nimarta; Saddi, Asha; Ponce Vanelli, Italia; ZZG-PWI; Anthony DiGiandomenico; Abid Al Hadi, Maad; Hercia, Rose; Anthony DiGiandomenico; Bishop, Brian
Subject: RE: Carolyn Creek Erosion Control - Notice of Study Commencement & PIC (Agencies)
Attachments: 13204-D.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Maad,

Please see below our responses to Region's comments related to Carolyn Creek Erosion Control along Barbertown Road.

The City will daylight and verify the location of the existing sanitary sewers, and will show the edge of sewer on the design drawings.

Travelling over the existing sewer is proposed to be avoided, and the City proposes to use long-reach equipment, to enable as much work as possible to be done with the equipment on the road. However there may need to be travel parallel/adjacent to the sewer, where it crosses under the creek in the concrete-encased section shown on the Region drawings 13204-D (attached). Avoiding of all equipment near the sewer is not possible. A review of the details of the proposed proximity of the creek works to the sewer, will be undertaken as part of detailed design.

Armour stone is proposed to replace existing gabion stone-filled baskets, in select locations along Carolyn Creek, near the Credit River. This location is currently shown to be over a Region sewer. With the exchange between gabion baskets and armour stone, there is not anticipated to be a significant change in loading.

The detailed design will indicate the standard clearances.

The City acknowledges that an encroachment agreement will be required.

Landscape restoration vegetation will not plant any trees within the sewer easements or on top of existing sanitary sewers.

Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
www.woodplc.com

From: Abid Al Hadi, Maad <maad.abidalhadi@peelregion.ca>
Sent: Thursday, March 24, 2022 1:03 PM
To: Talpur, Mir <mir.talpur@woodplc.com>
Cc: Anthony DiGiandomenico <anthony.digiandomenico@mississauga.ca>; Bishop, Brian <brian.bishop@woodplc.com>
Subject: RE: Carolyn Creek Erosion Control - Notice of Study Commencement & PIC (Agencies)

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Hi Mir,

Thanks for sharing the Notice of Study Commencement & PIC. Below my comments to be considered during the design stage. Please keep us informed about any progress regarding this project.

- As mentioned in slide #6-28, of the PIC, there is a 675mm sanitary sewer in this area and have to be protected.
- Applicant to daylight and verify the location of the existing sanitary sewers within the construction limits, including edge of the sewer to show on the design drawings.
- In case of travelling over existing sanitary sewers, please specify the loading expected over our sewers. Details and calculations demonstrating that the most conservative type of equipment/vehicles will have no negative impact on the sewer based on static and dynamic loading, depth of cover, type of soil, pipe class, etc.
- No equipment movement over existing sanitary manholes.
- In case applicant will be placing armor stone or boulders over or very close to our existing sanitary sewers, please provide details on the loading expected over our sewer. Applicant to provide details and calculations demonstrating that the additional load will have no negative impact on the sewer based on depth of cover, type of soil, pipe class, pipe age, etc.
- Standard Region of Peel clearances will be maintained between existing sanitary sewers and proposed works.
- Existing sewer is within an Easement. For Proposed Works that are within a Regional Easement an Encroachment Agreement may be required. Please contact Rose Hercia at Rose.Hercia@peelregion.ca to confirm.
- Please ensure that proposed landscape vegetation avoids the planting of any trees within the sewer easements or on the top of existing Sanitary Sewers.
- Coordination with Region of Peel may be required during the construction in case there are any regional projects in this area.

Thank you,

Maad Abid Al Hadi, P.Eng.
Technical Analyst, Engineering
Wastewater Collection and Conveyance
Engineering Services Division
Public Works
Region of Peel
10 Peel Centre Drive, Suite B
Brampton, ON L6T 4B9
(905) 791-7800 Ext. 7822
C 437-236-4583
Maad.AbidAlHadi@peelregion.ca

From: Talpur, Mir <mir.talpur@woodplc.com>
Sent: March 23, 2022 8:54 AM
To: Ashley.Bedford@dfo-mpo.gc.ca; FisheriesProtection@dfo-mpo.gc.ca; Bell, Trevor (MECP) <trevor.bell@ontario.ca>; eanotification.cregion@ontario.ca; dan.l.thompson@ontario.ca; aurora.mcallister@ontario.ca; Jawaid, Maria (MNRF) <Maria.Jawaid@ontario.ca>; karla.barboza@ontario.ca; Minkin, Dan (MHSTCI) <Dan.Minkin@ontario.ca>; Watt, Heather (MMAH) <heather.watt@ontario.ca>; lisa.myslicki@infrastructureontario.ca; Iftekhar Ahmad (CVC) <iftekhar.ahmad@cvc.ca>; Kilis, Jakub <Jakub.kilis@cvc.ca>; Saddi, Asha <asha.saddi@peelregion.ca>; Gill, Nimarta <nimarta.gill@peelregion.ca>; Rook, Sally <sally.rook@peelregion.ca>; andrew.farr@peelregion.ca; Pietkiewicz, Joanna <joanna.pietkiewicz@peelregion.ca>; Abid Al Hadi, Maad <maad.abidalhadi@peelregion.ca>; Gan, Nicholas <nicholas.gan@peelregion.ca>; Pugliese, Frank <frank.pugliese@peelregion.ca>; Gibson, Brian <brian.gibson@peelregion.ca>; dana.banke@peelregion.ca; jim.greenfield@mississauga.ca; katie.henley@mississauga.ca; deryn.rizzi@mississauga.ca; fire.prevention@mississauga.ca; Starr, Ron <ron.starr@mississauga.ca>
Cc: Anthony DiGiandomenico <anthony.digiandomenico@mississauga.ca>; Bishop, Brian <brian.bishop@woodplc.com>
Subject: Carolyn Creek Erosion Control - Notice of Study Commencement & PIC (Agencies)

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23 March 2022

Notice of Study Commencement and Online Public Information Centre
Municipal Class Environmental Assessment Study for Carolyn Creek Erosion Control along Barbertown Road

The City of Mississauga is undertaking a Schedule 'B' Municipal Class Environmental Assessment (Class EA) to identify a preferred solution to address erosion problems along a section of Carolyn Creek along Barbertown Road. The study has examined the creek and associated natural environment to identify existing erosion problems, potential future risks, and opportunities for restoration and environmental enhancement.

A Public Information Centre is being hosted to allow local residents, interested members of the public, Indigenous Nations, Government Agencies and interested stakeholders an opportunity to review and comment on the alternative solutions, the evaluation process, the preliminary preferred solution and the next steps in the study. Please visit the Project webpage to review information materials, and provide any comments by **April 20, 2022**: www.mississauga.ca/carolyncreekstudy

Please refer to the attached Notice of Study Commencement and Public Information Centre for more information.

Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
3450 Harvester Road, Suite 100
Burlington ON L7N 3W5
www.woodplc.com



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APPENDIX

G

Utility Consultation

APPENDIX

G-1 *Hydro One Networks Inc.*

Talpur, Mir

From: TPUCC DRAWINGS <TPUCCDrawings@hydroone.com>
Sent: Wednesday, March 30, 2022 1:07 PM
To: Talpur, Mir
Cc: TPUCC DRAWINGS
Subject: RE: Carolyn Creek Erosion Control - Notice of Study Commencement & PIC (Utilities)

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Hello,

Thank you for informing Hydro One of your upcoming project. Hydro One **does not** own nor operates underground high voltage transmission facilities within 3m of the area described in your request.

Best Regards,
PUCC Markup - Hydro One Networks Inc.
tpumarkup@hydroone.com



https://www.on1call.com/

From: Talpur, Mir <mir.talpur@woodplc.com>
Sent: Wednesday, March 23, 2022 8:54 AM
To: chris.kafel@alectrautilities.com; Jimmy.Truong@alectrautilities.com; Mark-Ups@enbridge.com; utilitycirculations@enbridge.com; Enzo.Greco@enbridge.com; dquilty@mhbcplan.com; ORIOTIS Jim <Jim.Oriotis@HydroOne.com>; TPUCC DRAWINGS <TPUCCDrawings@hydroone.com>; Kevin.li@netricom.com; bell.moc@netricom.com; Lily.Apa@rci.rogers.com; GTA.Markups@rci.rogers.com; telusutilitymarkups@netricom.com; utility.circulations@zayo.com; utility.circulations@cogecodata.com
Cc: Anthony DiGiandomenico <anthony.digiandomenico@mississauga.ca>; Bishop, Brian <brian.bishop@woodplc.com>
Subject: Carolyn Creek Erosion Control - Notice of Study Commencement & PIC (Utilities)

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23 March 2022

Notice of Study Commencement and Online Public Information Centre
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Carolyn Creek Erosion Control along Barbertown Road

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Please refer to the attached Notice of Study Commencement and Public Information Centre for more information.

Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
3450 Harvester Road, Suite 100
Burlington ON L7N 3W5
www.woodplc.com

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APPENDIX

G-2 *Zayo*

Talpur, Mir

From: phil.arbeau@zayo.com on behalf of Utility Circulations <utility.circulations@zayo.com>
Sent: Thursday, March 31, 2022 6:00 PM
To: Talpur, Mir
Subject: Re: Carolyn Creek Erosion Control - Notice of Study Commencement & PIC (Utilities)

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Good afternoon,

Zayo has no existing plant in the area indicated in your submission. No markup and no objection. Thank you.

Phil Arbeau
Utility Circulations

On Wed, 23 Mar 2022 at 08:54, Talpur, Mir <mir.talpur@woodplc.com> wrote:

> 23 March 2022
>
> **Notice of Study Commencement and Online Public Information Centre**
>
> **Municipal Class Environmental Assessment Study for**
>
> **Carolyn Creek Erosion Control along Barbertown Road**
>
> The City of Mississauga is undertaking a Schedule 'B' Municipal Class Environmental Assessment (Class EA) to identify a preferred solution to address erosion problems along a section of Carolyn Creek along Barbertown Road. The study has examined the creek and associated natural environment to identify existing erosion problems, potential future risks, and opportunities for restoration and environmental enhancement.
>
> A Public Information Centre is being hosted to allow local residents, interested members of the public, Indigenous Nations, Government Agencies and interested stakeholders an opportunity to review and comment on the alternative solutions, the evaluation process, the preliminary preferred solution and the next steps in the study. Please visit the Project webpage to review information materials, and provide any comments by **April 20, 2022**: www.mississauga.ca/carolyncreekstudy

Please refer to the attached Notice of Study Commencement and Public Information Centre for more information.

Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP

Environmental Planner
Mobile: +1 (647) 545 8974

3450 Harvester Road, Suite 100

Burlington ON L7N 3W5

www.woodplc.com



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APPENDIX

G-3 *Telecon on behalf of Rogers Communications*

ROGERS

Rogers Communications
Outside Plant Engineering
3573 Wolfdale Road
Mississauga, ON
L5C 3T6

Markup Response Form

Application Date	March 24, 2022	**Applicant:**	Rogers Make More Possible
Date Returned:	May 10, 2022		
Rogers Ref. No.:	M222116	**Applicant Ref. No.:**	N/A
Location / Municipality:	Notice of Study Commencement & PIC		

Rogers Communications has reviewed your drawing(s) as requested.
Our comments follow below with an "X" indicating Rogers' stance on your proposed plan.

Please inform Rogers Communications a minimum of 6 - 12 months in advance of the proposed construction schedule in order to coordinate our plant relocation.

Contact Ontario One Call at 1-800-400-2255 or www.on1call.com at least 5 business days before beginning work to obtain utility locates.
Hand dig / Vac truck when crossing, or within 1.0m of existing Rogers plant.
Plant is to approximation.

Comments:

☐	**Markup Only**	Not for PUCC Approval
☐	**For your Reference**	Rogers Communications currently has existing plant as marked on your drawing. Our standard depth in this municipality is: 1m. Please ensure you maintain clearances of 0.3m vertically and 0.6m horizontally.
☒	**No Conflict**	Rogers Communications currently does not possess existing plant in the area indicated on your attached plans.
☐	**CONFLICT**	Your proposed construction appears to encroach within existing Rogers Communications plant. Please ensure you maintain clearances of 0.3 m vertically and 1 m horizontally. For hand dig maintain 0.6 m and for directional bore maintain 1.0 m horizontally. Please relocate your proposed construction to allow adequate clearance.

CAUTION NOTES:

☐	Use vactruck and expose ducts, maintain minimum of 0.6m clearance.
☐	Rogers Communications has aerial plant in this area, as it is indicated on the attached plans.
☐	Fiber Optic Cable is present in the area of your proposed construction. Please obtain locates and maintain minimum 1.0m/1.0m clearance.
☐	Proposed Fiber Optic Cable in a joint use duct structure .
☐	Plant currently under construction.

Ayashkanta Sahoo

Rogers.MOC@telecon.ca

May 10, 2022
DATE

Talpur, Mir

From: Rogers.MOC <Rogers.MOC@telecon.ca>
Sent: Thursday, May 12, 2022 9:51 AM
To: Talpur, Mir
Cc: GTAW.Markups
Subject: M222116_CAROLYN CREEK
Attachments: M222116_CAROLYN CREEK EROSION CONTOL_Rogers Markup Response Letter.pdf

CAUTION: External email. Please do not click on links/attachments unless you know the content is genuine and safe.

Hi,
Please find attached completed markup request.

Thanks & Regards,

Manju Mohan

Permit Coordinator
Outside Plant Engineering TOR

Manju.mohan@telecon.ca

7777 Weston Rd, Vaughan (Ontario) L4L 0G9

www.telecon.ca

From: Talpur, Mir < >
Sent: March 23, 2022 8:54 AM
To: chris.kafel@alectrautilities.com; Jimmy.Truong@alectrautilities.com; Mark-Ups <mark-ups@enbridge.com>; utilitycirculations@enbridge.com; Enzo.Greco@enbridge.com; dquilty@mhbcplan.com; jim.oriotis@hydroone.com; tpumarkup@hydroone.com; Kevin.li@netricom.com; bell.moc@netricom.com; Lily Apa <Lily.Apa@rci.rogers.com>; GTA Mark-ups <GTA.Markups@rci.rogers.com>; telusutilitymarkups@netricom.com; utility.circulations@zayo.com; utility.circulations@cogecodata.com
Cc: Anthony DiGiandomenico <anthony.digiandomenico@mississauga.ca>; Bishop, Brian <brian.bishop@woodplc.com>
Subject: Carolyn Creek Erosion Control - Notice of Study Commencement & PIC (Utilities)

23 March 2022

Notice of Study Commencement and Online Public Information Centre
Municipal Class Environmental Assessment Study for
Carolyn Creek Erosion Control along Barbertown Road

The City of Mississauga is undertaking a Schedule 'B' Municipal Class Environmental Assessment (Class EA) to identify a preferred solution to address erosion problems along a section of Carolyn

Creek along Barbertown Road. The study has examined the creek and associated natural environment to identify existing erosion problems, potential future risks, and opportunities for restoration and environmental enhancement.

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Please refer to the attached Notice of Study Commencement and Public Information Centre for more information.

Sincerely,

Mir

Mir Ahsan Talpur, M.Env.Sc., EP
Environmental Planner
Mobile: +1 (647) 545 8974
3450 Harvester Road, Suite 100
Burlington ON L7N 3W5
www.woodplc.com



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