



REPORT

# **Rockcliffe Riverine Flood Mitigation Project – Municipal Class Environmental Assessment**

## **Environmental Study Report**

Presented to:

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Final	January 6, 2023	Sam Neale	Serge Ristic

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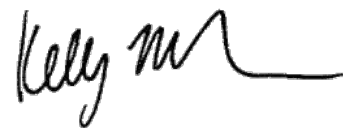
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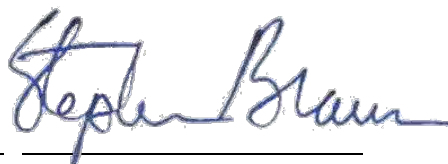


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## **EXECUTIVE SUMMARY**

### **Introduction**

Toronto and Region Conservation Authority (TRCA) and the City of Toronto (the City) as co-proponents have undertaken the Rockcliffe Riverine Flood Mitigation (RRFM) Project Municipal Class Environmental Assessment (MCEA) (the Project) to determine a preferred riverine flood mitigation strategy for the Rockcliffe-Smythe neighbourhood within the City of Toronto.

The Project area is the most flood-vulnerable area in TRCA's jurisdiction and is subject to land use development restrictions through the designation of the Rockcliffe Special Policy Area (SPA) in official plan policy.

There are hundreds of buildings within the Regulatory flood plain, many of which have experienced surface and basement flooding during severe storms due to a combination of riverine flooding, inadequate surface drainage, and urban flooding. Many of the properties within the Regulatory flood plain are at risk of riverine flooding during more frequent storm events as well.

### **Background**

Factors that contribute to the flooding of Black Creek in the Project area relate to alterations to the Black Creek channel and urban development over the past 70 years. Urban development in this area and the corresponding alterations to Black Creek occurred primarily during and after the 1940s. Channelization of Black Creek occurred along Humber Boulevard prior to 1946. These early alterations to Black Creek pre-date 1954's Hurricane Hazel event and were not intended to be flood control measures. Following the substantial flooding caused by Hurricane Hazel, several remediation measures were proposed in the Black Creek Flood Control Plan (1956) and the 1959 Plan for Flood Control by TRCA (formerly Metropolitan Toronto and Region Conservation Authority - MTRCA).

Similar to other post-Hurricane Hazel Flood Control Plans, not every measure identified in the Black Creek Flood Control Plan was implemented. Two key riverine flood control measures that were implemented included the expansion of the Black Creek channel (constructed in 1959), and the Black Creek flow attenuation dam (completed in the 1960s). These flood control measures were designed based on the available methods and information at that time and without the availability of streamflow records. In addition, land use assumptions at the time were different from how the upstream watershed was actually developed. Thus, these flood protection measures on Black Creek, while providing some riverine flood remediation benefits, do not fully protect the area from riverine flooding.

With a highly urbanized and altered watershed, together with the many engineered channel sections, Black Creek is an extremely flashy watercourse with floodwaters that quickly accumulate into and pass through the system. With the historic development in the most low-lying areas of the flood plain, many of the properties in the Regulatory flood plain are at high risk of riverine flooding during more frequent storm events.

In 2014, the Black Creek (Rockcliffe Area) Riverine Flood Management Class Environmental Assessment (Wood (formerly AMEC), 2014) was completed under the Conservation Authority Class EA framework and several flood mitigation alternatives were developed to address riverine flooding. Following this 2014 study, TRCA commissioned several subsequent studies based on updated hydrologic data and higher resolution modelling techniques, which determined that the initial flood mitigation solutions proposed may not be feasible in some locations, and further that the highest risk areas would still be subject to frequent flooding.

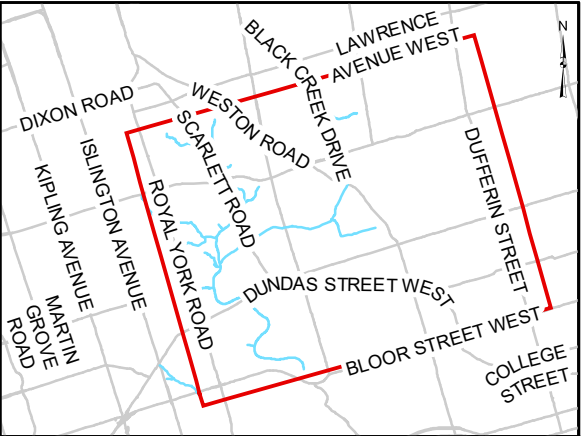
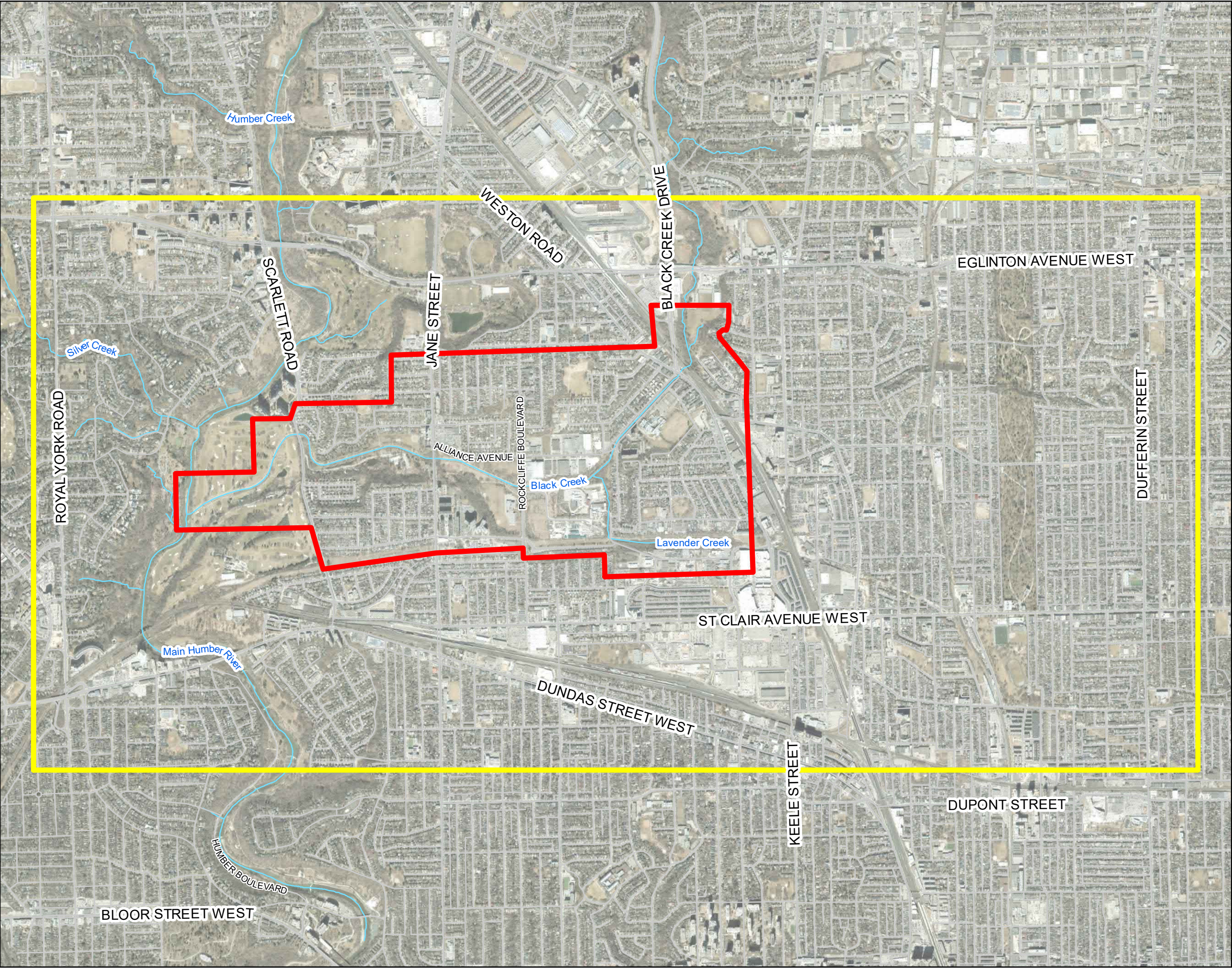
In recognition of this, TRCA and the City commissioned the Black Creek at Rockcliffe Special Policy Area Flood Remediation and Transportation Feasibility Study, (Wood, July 2020), to refine the flood mitigation alternatives developed during the 2014 EA. Through this Feasibility Study, several alternatives were developed and evaluated to identify feasible flood mitigation alternatives to inform this subject Project. The key recommendation from this study was for the City and TRCA to proceed with a Municipal Class Environmental Assessment (MCEA) process under a Schedule C project.

## **Project Location and Study Area**

The Project is located in the community of Rockcliffe-Smythe in Ward 5 (York-South Weston) in the City of Toronto. The Project location is generally bounded by Scarlett Road and the Humber River to the west and to immediately upstream of Weston Road in the east. The Project includes approximately 2.8 km of Black Creek and 1 km of Lavender Creek. Both watercourses are located in the Black Creek subwatershed and the larger Humber River watershed and are under the jurisdiction of TRCA.

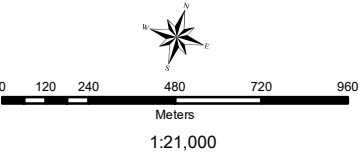
The Project study area has been defined with two overlapping areas. The first is defined as the Scoped Study Area within which direct impacts and benefits from the Project are likely to occur, while the second, the Broad Study Area is the area within which indirect impacts (e.g. traffic detours) are likely to occur. The two study areas are shown in **Figure ES1**.





**Legend**

- Scoped Study Area
- Broad Study Area
- Roads
- Watercourse



Datum:	NAD 1983 UTM Zone 17N North American 1983	Sources:	Toronto and Region Conservation Authority City of Toronto
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**Rockcliffe Riverine Flood Mitigation  
Municipal Class Environmental Assessment**

**Project Location**

Project No.:	202179500
Date:	September 2022

**Figure ES1**



## Project Goals

The Project addresses the following primary objectives:

- To minimize riverine flood risks within the Scoped Study Area to the extent practical in accordance with the MCEA process;
- To develop robust and low maintenance flood mitigation solutions;
- To minimize and mitigate to the extent possible impacts resulting from the implementation of flood mitigation solutions;
- To coordinate riverine flood mitigation designs with concurrent transportation, sewer and drainage projects in the Broad Study Area, allowing for integration with future transportation (e.g., Jane Street transit facility) and municipal servicing initiatives (e.g. Basement Flooding Protection Program) proposed by, or currently being conducted by the City of Toronto; and
- To prepare a phased multi-year implementation plan that optimizes the order in which each infrastructure component of the flood mitigation solution is constructed.

It is acknowledged that riverine flooding is not the only source of flooding within the Project area, and residents continue to experience basement and property flooding as a result of urban flooding of the City's drainage network (e.g. storm and combined sewers, and roadways). Although the RRFM Project is being undertaken to address only riverine flooding, the flood mitigation solution developed from this study will support and benefit the improvements identified through the City's Basement Flooding Protection Program (BFPP) initiatives to address urban flooding within Areas 4 and Area 45 in the City.

## Problem and Opportunity Statement

The Rockcliffe-Smythe area is prone to frequent riverine flooding, posing a risk to life and property. By implementing a combination of flood conveyance improvements and flood protection measures, the flood risk within the area can be reduced. Previously completed studies have identified that flood protection for up to a 350-year storm event is feasible while balancing impacts of infrastructure improvements with flood reduction benefits. As such the target level of flood protection to be achieved for the Rockcliffe-Smythe area through this Project is 350-year or greater. The implementation of infrastructure improvements to reduce **flood risk** will also provide resiliency to climate change for more frequent storm events. Ancillary benefits of the project include synergies with the urban system improvements considered as part of the City of Toronto's Basement Flooding Protection Program, and future transportation improvements planned at the Jane Street Bridge and Rockcliffe Boulevard Bridge.

## Existing Land Uses

The subwatershed of Black Creek in the Project area has an overall contributing drainage area of approximately 65.1 km<sup>2</sup>. The subwatershed is highly urbanized and consists primarily of low to medium density residential areas with some industrial, institutional, and commercial areas throughout. Lavender Creek has a drainage area of 5.8 km<sup>2</sup> and has a predominantly residential

land use. While both the Black Creek and Lavender Creek subwatersheds have some potential for intensification, there is no undeveloped green space available for new development.

The Broad Study Area consists predominantly of established residential communities, with existing small-scale retail and commercial uses interspersed throughout. The Broad Study Area is also characterized by historical industrial and manufacturing operations located along the rail corridors that traverse the Broad Study Area.

Between Weston Road and Scarlett Avenue, Black Creek is generally surrounded by low to medium density residential homes, two schools, commercial properties, the City's Rockcliffe Yard, Smythe Park and pool, and Black Creek East and West Parks.

Lavender Creek between Black Creek and Weston Road is generally surrounded by low density residential homes, commercial properties, the City's Rockcliffe Yard, and Black Creek Park East.

Due to historical development practices, the areas adjacent to Black Creek and Lavender Creek are highly constrained and there are limited public lands available for construction of flood mitigation measures.

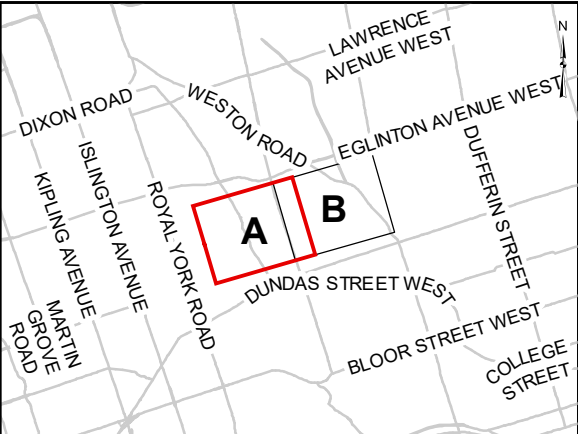
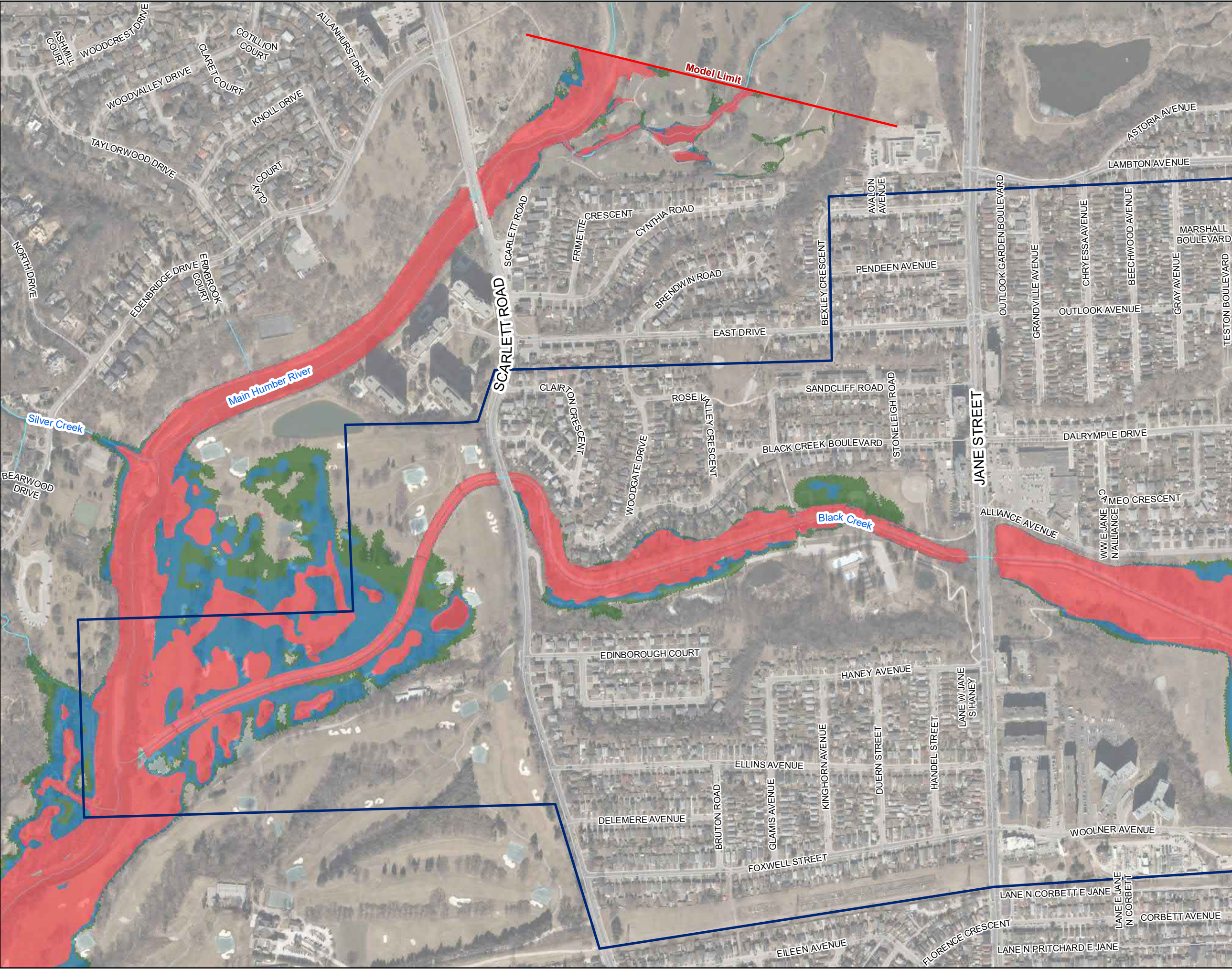
## **Flood Characterization**

Flooding within the Study Area occurs during all modelled storm events (2-year return period storm event through to 350-year return period storm event as well as the Regional storm event). There are two principal riverine flood mechanisms in the Project area:

- Constriction in a channel due to historic development practices (i.e. infilling and development, or engineered channelization) resulting in decreased conveyance and increase in upstream water levels and/or spill over low points in the channel banks. An example for this are the channelized sections of Black Creek and Lavender Creek; and
- Insufficient size of bridges and culverts. When bridges or culverts are not able to adequately convey the required flow under/through them water backs up at the structure and water levels rise upstream of the crossing structure. An example for this is the Jane Street culvert, which represents a significant hydraulic restriction.

The existing flood conditions are illustrated for the 350-year and Regional storm events on **Figure ES2**.





- Legend**
- Scoped EA Study Area
  - Watercourse
  - Model Limit
  - Roads
- Flood Risk**
- Low
  - Medium
  - High

	Risk Level <sup>(1)</sup>		
	Low	Medium	High <sup>(2)</sup>
Depth	≤ 0.3m	> 0.3m and ≤ 0.8 m	> 0.8m
Velocity	≤ 1.7 m/s		> 1.7m/s
Depth x Velocity	≤ 0.37m <sup>2</sup> /s		> 0.37m <sup>2</sup> /s
Access/Egress	Vehicles/pedestrians	Pedestrians Only	No safe access

(1) Adapted from the Technical Guide River & Stream Systems: Flooding Hazard Limit (MNR, 2002).  
(2) Exceedance of any one of the criteria results in high risk.

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Meters  
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Datum: NAD 1983 UTM Zone 17N  
North American 1983

Source: Toronto and Region Conservation Authority  
City of Toronto

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**Rockcliffe Riverine Flood Mitigation  
Municipal Class Environmental Assessment**

**Existing Conditions Overview:  
350-year Storm Flood Risk**

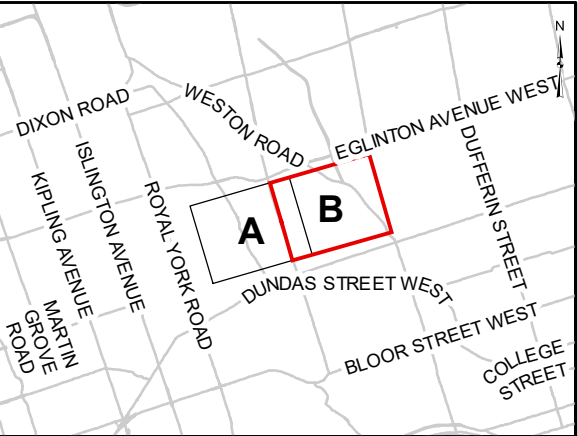
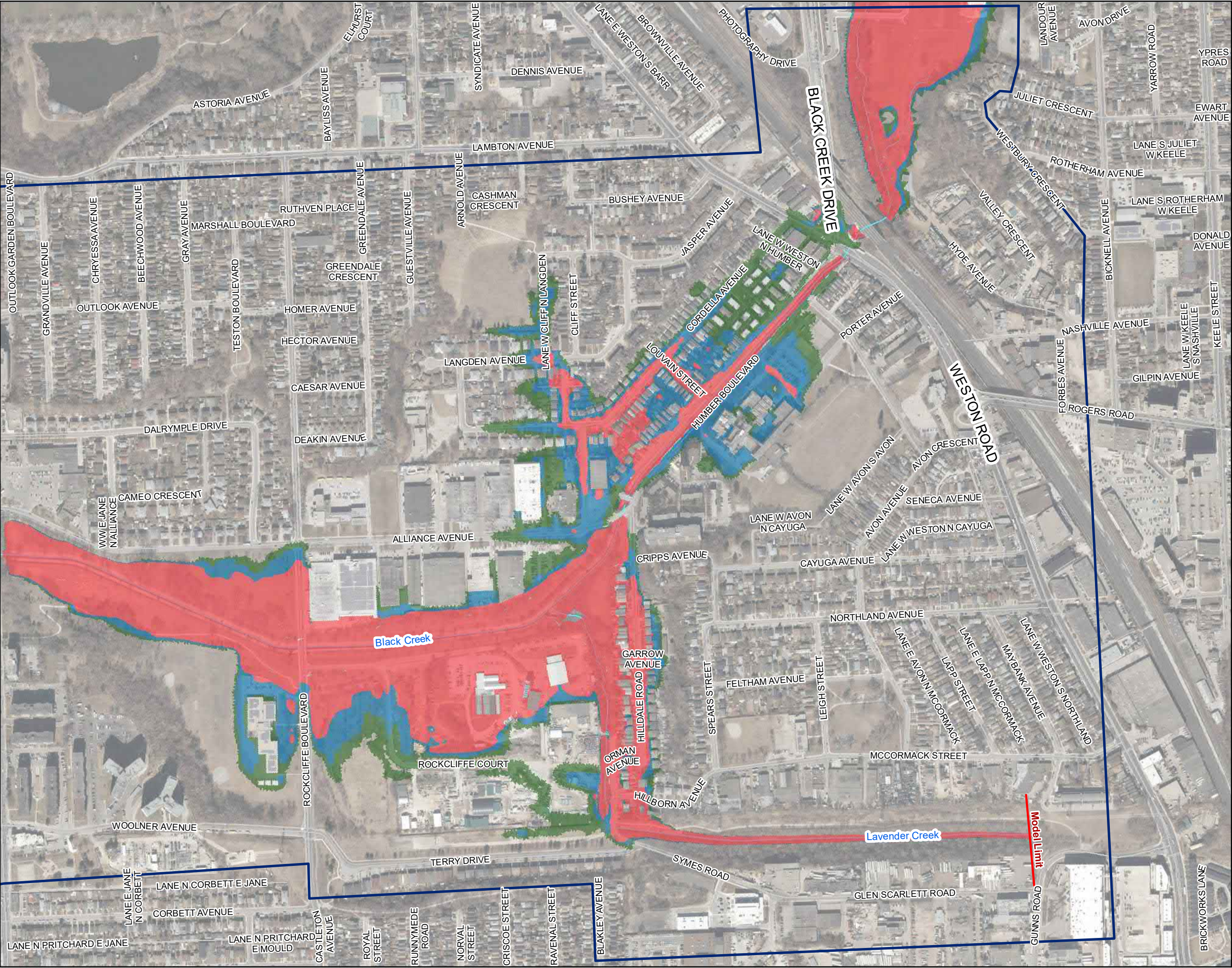
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**202179500**

Date:  
**April 2021**

**Figure ES2A**

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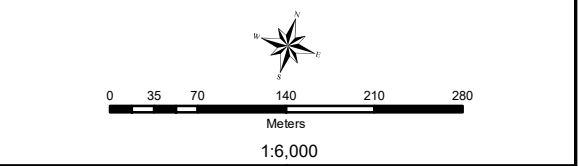


Legend

- Scoped EA Study Area
- Watercourse
- Model Limit
- Roads
- Flood Risk
  - Low
  - Medium
  - High

	Risk Level <sup>(1)</sup>		
	Low	Medium	High <sup>(2)</sup>
Depth	≤ 0.3m	> 0.3m and ≤ 0.8 m	> 0.8m
Velocity	≤ 1.7 m/s		> 1.7m/s
Depth x Velocity	≤ 0.37m <sup>2</sup> /s		> 0.37m <sup>2</sup> /s
Access/Egress	Vehicles/pedestrians	Pedestrians Only	No safe access

(1) Adapted from the Technical Guide River & Stream Systems: Flooding Hazard Limit (MNR, 2002).  
(2) Exceedance of any one of the criteria results in high risk.



Datum:	NAD 1983 UTM Zone 17N North American 1983	Source: Toronto and Region Conservation Authority City of Toronto
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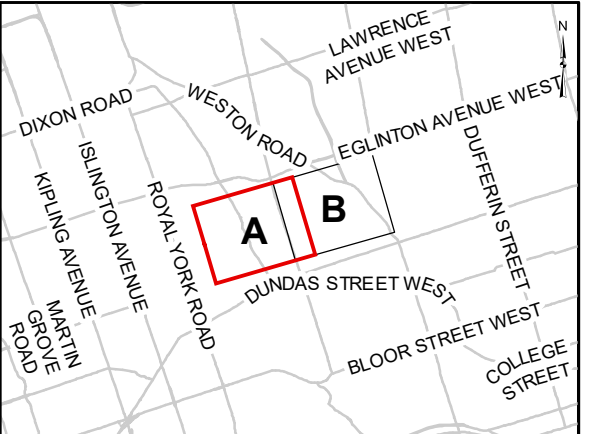
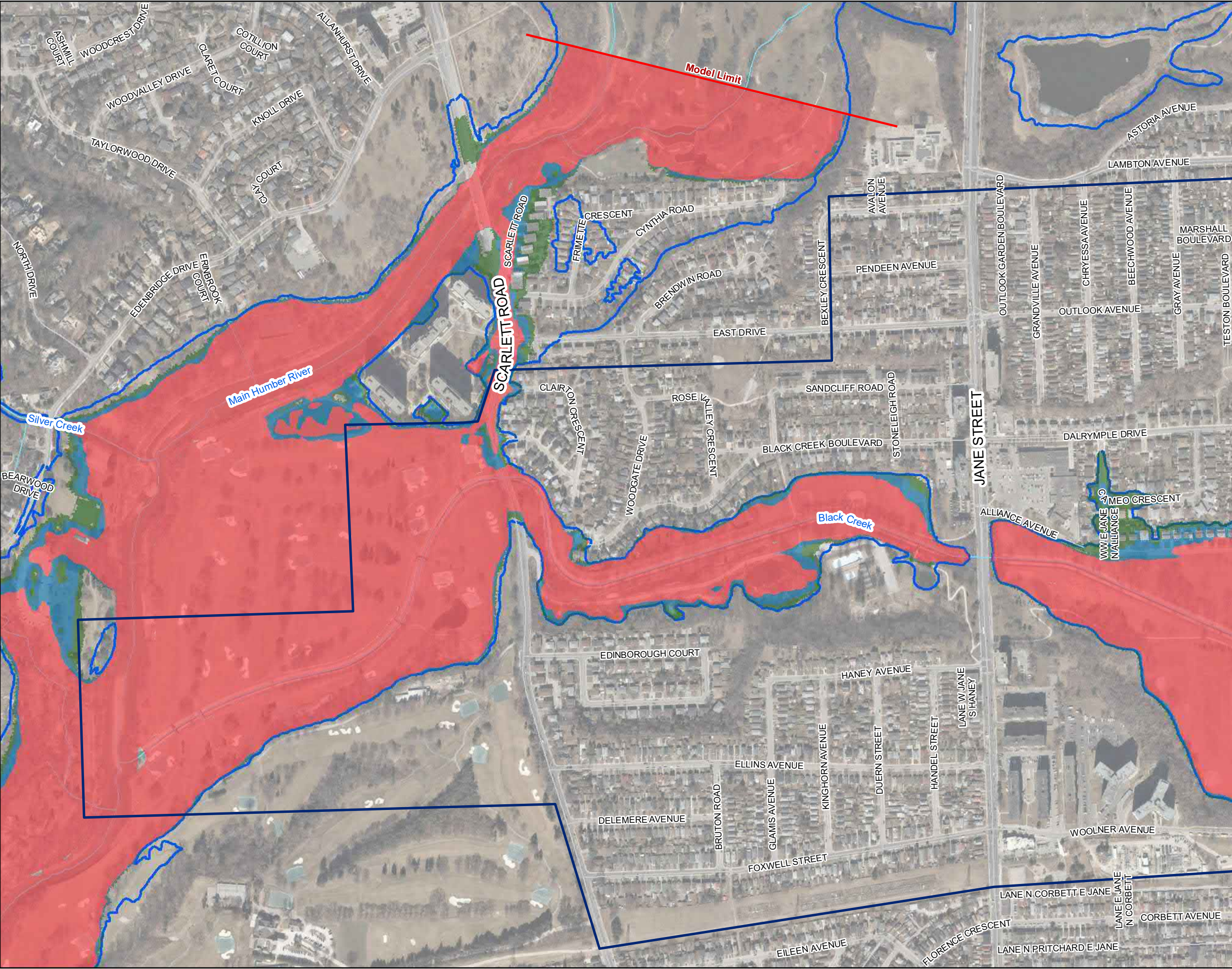
Rockcliffe Riverine Flood Mitigation  
Municipal Class Environmental Assessment

Existing Conditions Overview:  
350-year Storm Flood Risk

Project No.:	202179500	Figure ES2B
Date:	April 2021	

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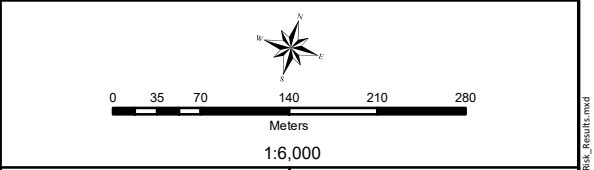
- Scoped EA Study Area
- TRCA Regulatory Floodline
- Watercourse
- Model Limit
- Roads

Flood Risk

- Low
- Medium
- High

	Risk Level <sup>(1)</sup>		
	Low	Medium	High <sup>(2)</sup>
Depth	≤ 0.3m	> 0.3m and ≤ 0.8 m	> 0.8m
Velocity	≤ 1.7 m/s		> 1.7m/s
Depth x Velocity	≤ 0.37m <sup>3</sup> /s		> 0.37m <sup>3</sup> /s
Access/Egress	Vehicles/pedestrians	Pedestrians Only	No safe access

(1) Adapted from the Technical Guide River & Stream Systems: Flooding Hazard Limit (MNR, 2002).  
(2) Exceedance of any one of the criteria results in high risk.



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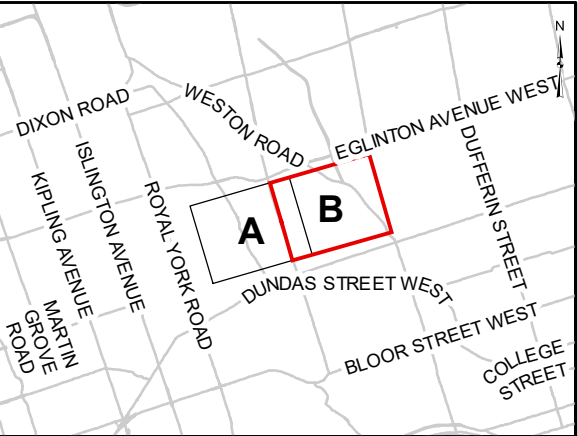
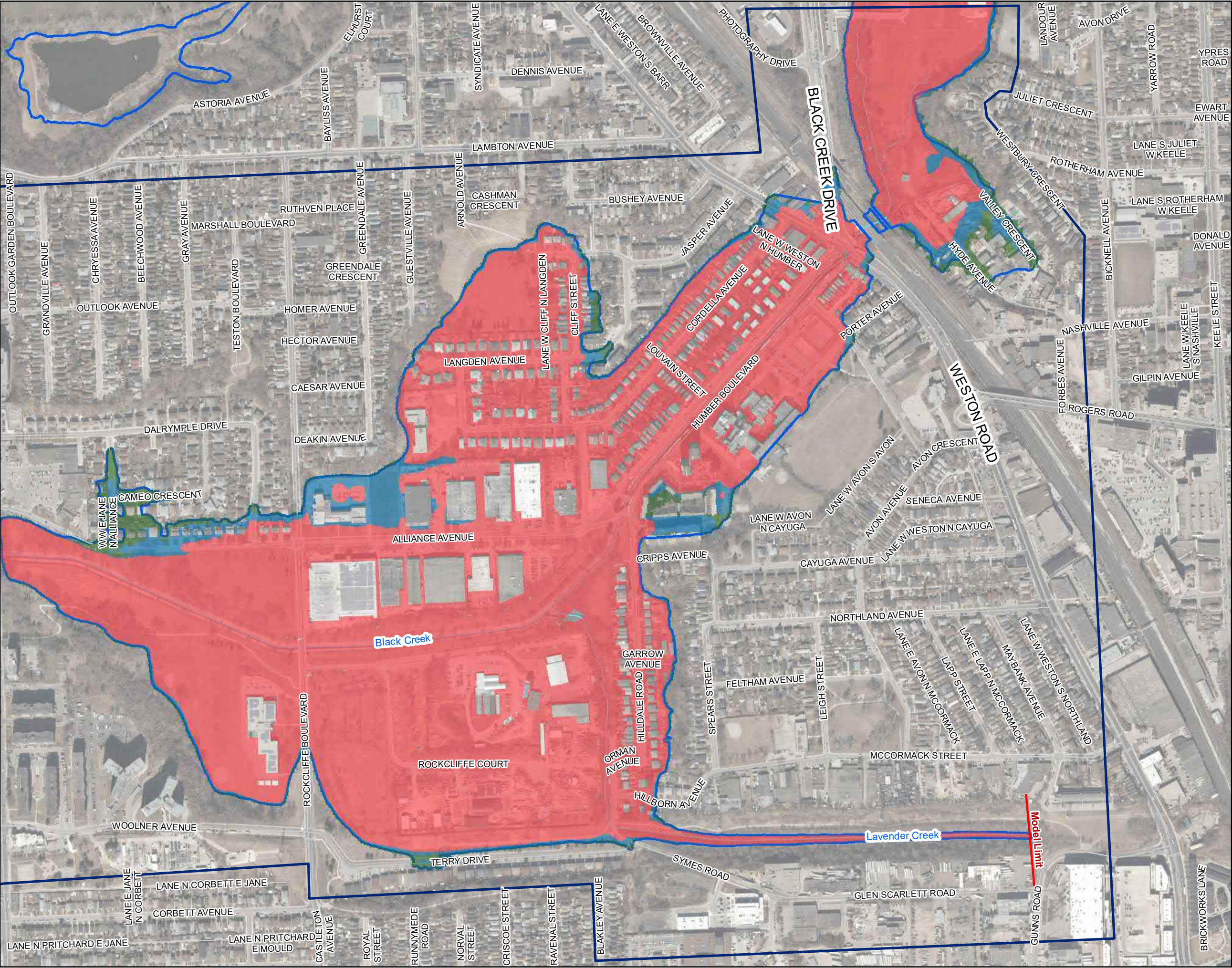
Rockcliffe Riverine Flood Mitigation  
Municipal Class Environmental Assessment

Existing Conditions Overview:  
Regional Storm Flood Risk

Project No.:	202179500	Figure ES2C
Date:	April 2021	

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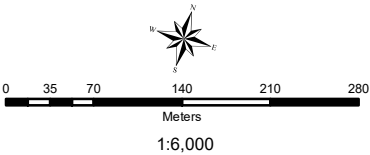
- Scoped EA Study Area
- TRCA Regulatory Floodline
- Watercourse
- Model Limit
- Roads

Flood Risk

- Low
- Medium
- High

	Risk Level <sup>(1)</sup>		
	Low	Medium	High <sup>(2)</sup>
Depth	≤ 0.3m	> 0.3m and ≤ 0.8 m	> 0.8m
Velocity	≤ 1.7 m/s		> 1.7m/s
Depth x Velocity	≤ 0.37m <sup>2</sup> /s		> 0.37m <sup>2</sup> /s
Access/Egress	Vehicles/pedestrians	Pedestrians Only	No safe access

(1) Adapted from the Technical Guide River & Stream Systems: Flooding Hazard Limit (MNR, 2002).  
(2) Exceedance of any one of the criteria results in high risk.



Datum: NAD 1983 UTM Zone 17N  
North American 1983

Source: Toronto and Region Conservation Authority  
City of Toronto



Rockcliffe Riverine Flood Mitigation  
Municipal Class Environmental Assessment

Existing Conditions Overview:  
Regional Storm Flood Risk

Project No.: 202179500

Date: April 2021

Figure ES2D



## Development and Evaluation of Alternative Solutions

Alternative solutions are different ways to reduce riverine flood risk to life and property. Initial high-level screening related to feasibility, constraints, flood reduction potential and ability to meet the Project objectives was completed on a long list of alternative solutions. The long list of alternative solutions was based on the work completed in the previous studies. The following types of alternative solutions were considered for the high-level screening:

- Do nothing;
- Channel conveyance improvements;
- Crossing conveyance improvements;
- Flood barriers;
- Storage;
- Flow diversions; and
- Policy measures.

The next step was to develop a short list of feasible alternative solutions. This included the following:

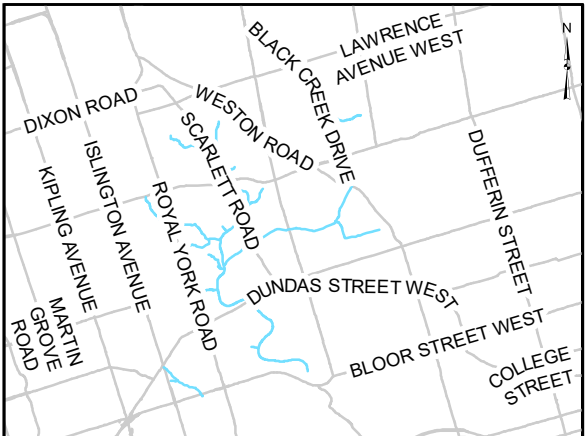
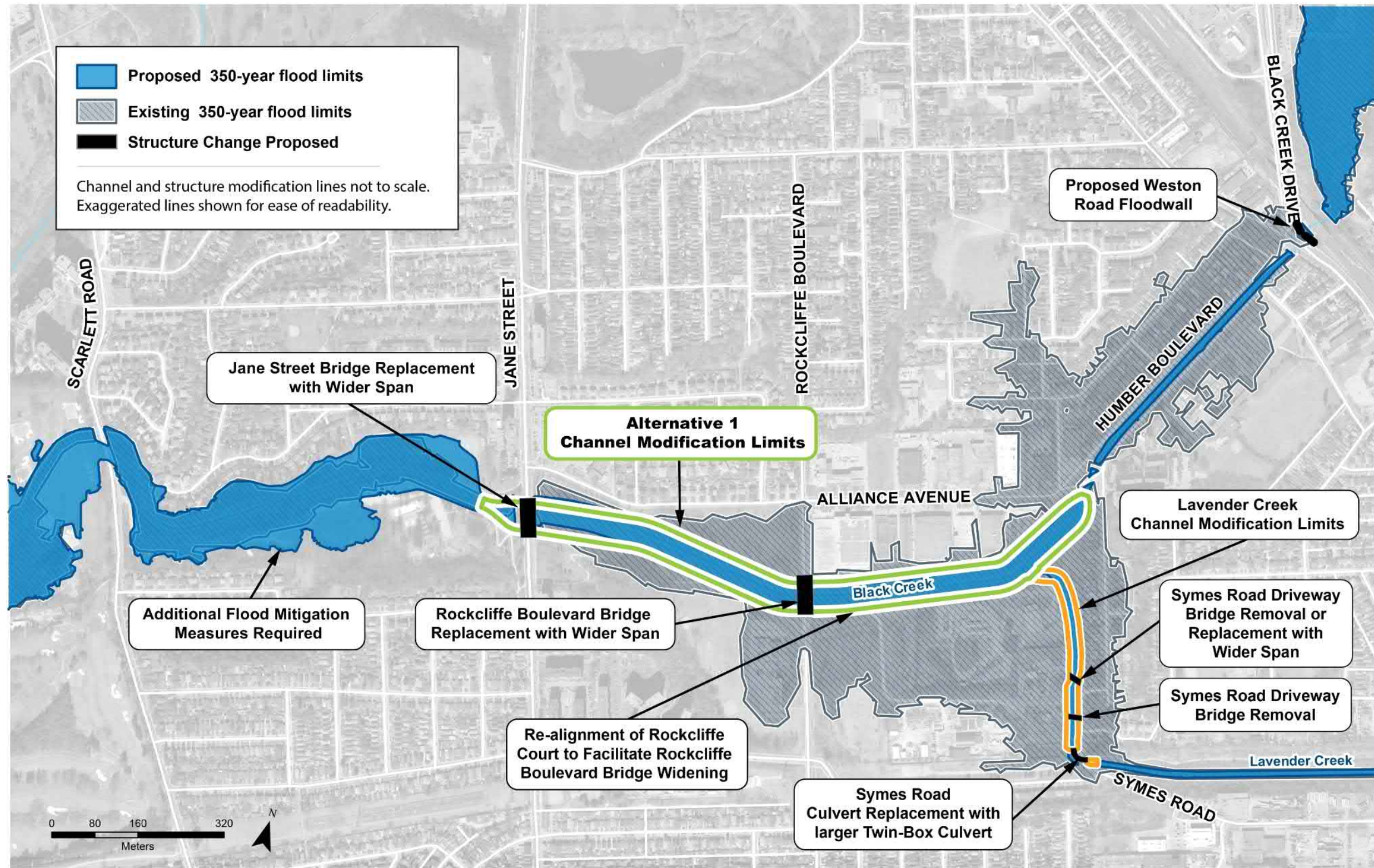
- Alternative 1 – Conveyance improvements between Jane Street and Alliance Avenue
- Alternative 2 – Conveyance improvements between Scarlett Road and Alliance Avenue
- Alternative 3 – Conveyance improvements between Scarlett Road and Weston Road

Flooding on Lavender Creek is highly dependent on the water levels at the confluence with Black Creek. To simplify the assessments at this stage of the Class EA process, the same proposed conveyance improvements on Lavender Creek from the Feasibility Study (Wood, 2020) were considered for all three alternatives. These improvements generally included removing the unused Symes Road south driveway crossing over Lavender Creek, enlarging or removing the Symes Road north driveway crossing over Lavender Creek, enlarging the Symes Road culvert, and widening and deepening the Lavender Creek channel. This approach allows for optimizing the design on Black Creek first, followed by further refinements to the conveyance improvements on Lavender Creek in the subsequent stages of the Project.

The alternatives were evaluated using a set of criteria falling under the categories of natural environment, social and cultural environment, technical considerations and cost. Alternative 1 is illustrated on **Figure ES3** and was selected as the preferred alternative solution based on the EA evaluation process and has the following key strengths over the other alternatives:

- Provides the most efficient use of financial resources to achieve the flood mitigation objective;
- Provides the quickest path to implement in consideration of benefiting the community as quickly as possible;
- Has the least amount of adverse impacts; and
- Avoids significant impacts to Smythe Park.





Not to Scale

Datum: NAD 1983 UTM Zone 17N  
North American 1983

Source: Toronto and Region Conservation Authority  
City of Toronto



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**Rockcliffe Riverine Flood Mitigation  
Municipal Class Environmental Assessment**

**Alternative Solution 1 Overview**

Project No.: 202179500

Date: June 2022

**Figure ES3**

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## Development and Evaluation of Design Concepts

Following the selection of the preferred alternative solution, alternative design concepts were developed and evaluated. Alternative design concepts are different ways to accomplish the preferred alternative solution with the intent for each design concept to meet the objectives and design criteria outlined earlier in the Class EA process.

Three (3) design concepts were developed for Black Creek (BC1, BC2 and BC3), considering a range from engineered channel to full naturalization. Four (4) design concepts were developed for Lavender Creek (LC1, LC2, LC3 and LC4), considering different surface treatments and removal of an underutilized driveway. It is noted that all of the channel design concepts include some common elements. The key features of the design concepts and common elements are identified below:

### Black Creek

- BC1 – Engineered Channel
  - Channel approximately 3 times wider and 1.3 times deeper than existing
  - Concrete and/or grouted armourstone surface treatment
- BC2 – Full Naturalization
  - Channel approximately 9 times wider than existing (3 times wider than BC1)
  - Natural rock and vegetation surface treatments
- BC3 – Hybrid Engineered Channel
  - Channel approximately 3-5 times wider and 1.3 times deeper than existing
  - Concrete and/or grouted armourstone surface treatment below the 100-year water level to maximize benefits to the urban system
  - Armourstone, boulders or grasses/meadow plants above the 100-year water level
- Common Elements
  - Scarlett Road bridge replacement;
  - Jane Street culvert replacement with a bridge;
  - Rockcliffe Boulevard bridge replacement; and
  - Weston Road floodwall construction.

### Lavender Creek

- LC1 and LC2 – Lavender Creek Engineered Channel (without or with north driveway crossing)
  - Channel approximately 1.6 times wider and 1.5 times deeper than existing
  - Concrete or armourstone channel surface treatment
  - Removal (LC1) or replacement (LC2) of Symes Road north driveway crossing
- LC3 and LC4 - Lavender Creek Smooth Concrete Channel (without or with north driveway crossing)
  - Channel approximately 1.3 times wider and 1.5 times deeper than existing
  - Concrete or armourstone channel surface treatment downstream of the Symes Road north driveway crossing



- Smooth concrete between upstream study limits near Symes Road and the Symes Road north driveway crossing
- Removal (LC3) or replacement (LC4) of Symes Road north driveway crossing
- Common Elements (LC1-LC4)
  - Symes Road Culvert replacement
  - Removal of unused Symes Road south driveway crossing

The design concepts were evaluated in keeping with the Class EA requirements and expanding on the evaluation framework developed during the evaluation of alternatives. The preferred design concepts determined through the evaluation were BC1 and LC3 for Black Creek and Lavender Creek, respectively. These design concepts were selected based on the MCEA evaluation process and have the following key strengths over the other design concepts:

- Provides the most efficient use of financial resources to achieve the flood mitigation objective;
- Provides the quickest path to implement in consideration of benefiting the community as quickly as possible;
- Minimizes impacts to Smythe Park amenities and existing greenspace within the community; and
- Minimizes impacts to private properties

There was public interest in the full naturalization design concept for Black Creek (BC2) however this concept was not selected because the adverse impacts outweighed the benefits. Significant adverse impacts included high costs and adverse impacts to the community, private properties and infrastructure.

## Description of Preferred Design

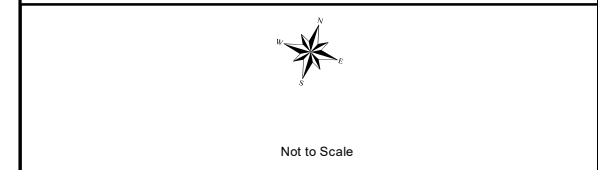
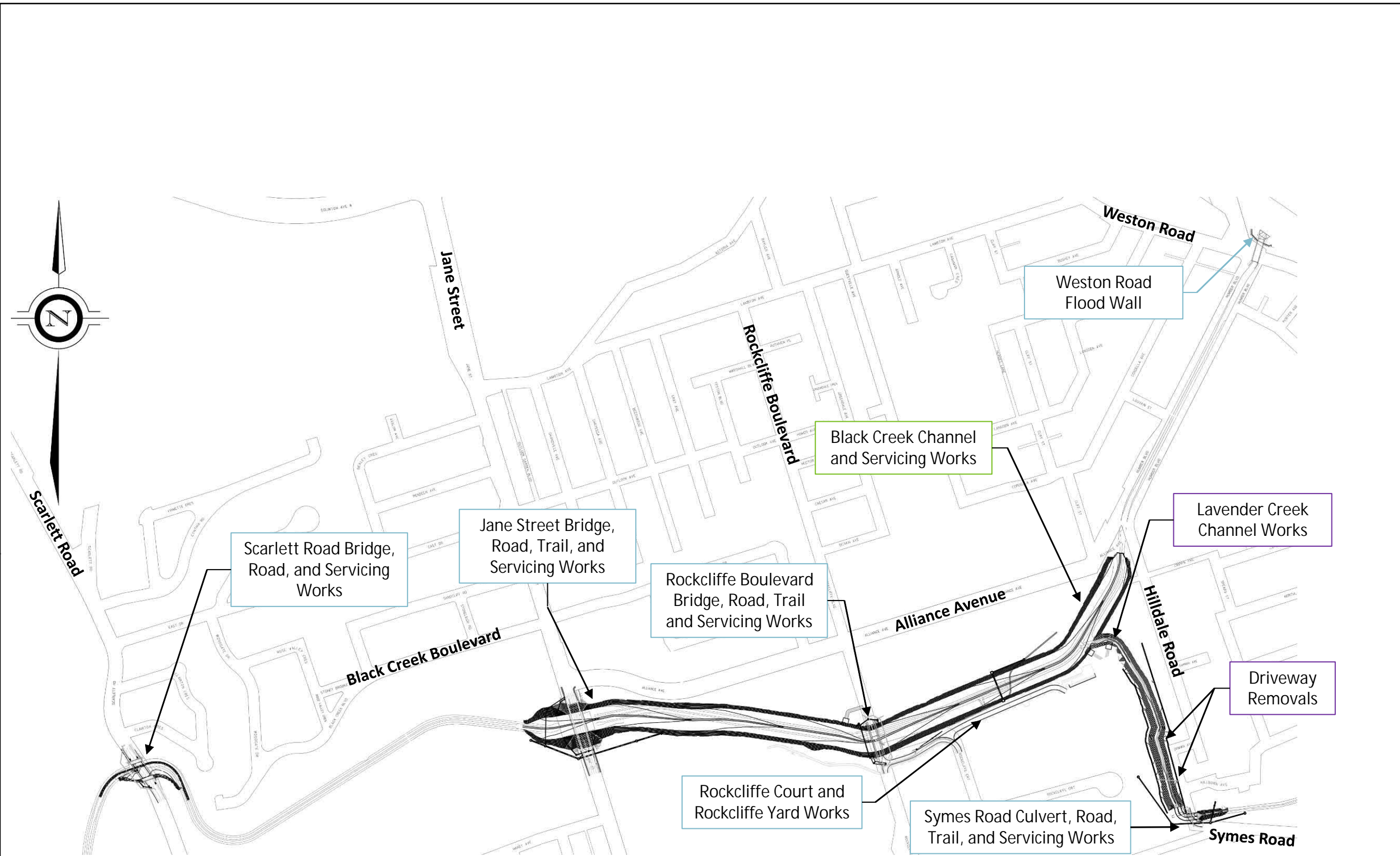
An overview of the Preferred Design is presented in **Figure ES4** and the main components are identified in **Table 1**. Four concept plans and three conceptual renderings are included in **Figure ES5** to **Figure ES11**.

The Jane Street bridge design includes additional design measures to futureproof the structure in anticipation of a future transit facility along Jane Street (e.g., Light Rail or Bus Rapid Transit). The opportunity for potential improvements for cycling infrastructure on Scarlett Road, Jane Street and Rockcliffe Boulevard are recommended to be further explored during detailed design.

Table 1: Summary of the Preferred Design Components

Area	Description
Black Creek Channel Improvements	<p><u>Concrete Channel at Scarlett Road</u></p> <ul style="list-style-type: none"><li>• Transition of the existing concrete trapezoid channel through the widened <b>crossing</b> for Scarlett Road. This includes the expansion and replacement of the concrete channel from the top of the existing <b>low flow channel</b> (south side) to the proposed south abutment of the Scarlett Road Bridge;</li><li>• Concrete channel surface treatment to be hard and smooth to maximize flood protection benefit and protect against erosion. This reach has been designed for a Manning’s n value (i.e. roughness) of 0.013 to match the existing concrete being tied into; and</li><li>• Relocation of impacted municipal services (water, sanitary, and storm) and utilities.</li></ul> <p><u>Engineered Channel from Jane Street to Alliance Avenue</u></p> <ul style="list-style-type: none"><li>• Uniform trapezoidal channel with 40 m bottom width;</li><li>• Channel side slopes, which will be subject to further refinement during detailed design to meet geotechnical requirements:<ul style="list-style-type: none"><li>○ 2:1 where the existing remaining slope plus the proposed slope height are less than 5 m;</li><li>○ 2.5:1 where the existing remaining slope plus the proposed slope height are greater than 5 m;</li><li>○ 2.5:1 and 2 m minimum mid-slope bench where the existing remaining slope plus the proposed height are greater than 6 m; or</li><li>○ Use of vertical walls in combination with the above slope requirements to fit within existing constraints</li></ul></li><li>• Engineered channel surface to be hard and relatively smooth to maximize flood protection benefit and protect against erosion. The reach has been designed for a maximum Manning’s n (i.e., roughness) value of 0.03.</li><li>• Vegetation screening provided to the extent possible along the Black Creek corridor.</li></ul>
Black Creek Crossing and Other Improvements	<ul style="list-style-type: none"><li>• Scarlett Road bridge replaced with 30.6 m span bridge including transition channel and grading to accommodate the larger bridge span;<ul style="list-style-type: none"><li>○ Replacement of cycling infrastructure and sidewalk like-for-like;</li></ul></li><li>• Jane Street culvert replaced with 55 m span bridge;<ul style="list-style-type: none"><li>○ Provision for future cycling infrastructure with allowance for two 2.6 m cycling corridors</li><li>○ 2.5 m wide sidewalks;</li><li>○ Wider bridge abutment and approach embankment to accommodate future expansion for a Jane Street transit facility; and</li><li>○ <b>Realignment</b> of the Jane Street trails to Smythe Park on the north and south sides of Black Creek with AODA and City of Toronto compliant designs.</li></ul></li><li>• Rockcliffe Boulevard bridge replaced with 41.2 m span bridge;<ul style="list-style-type: none"><li>○ 2.5 m wide sidewalks</li></ul></li><li>• <b>Realignment</b> of Rockcliffe Court and Rockcliffe Yard driveway and parking lot;</li><li>• <b>Realignment</b> of the Black Creek Park West trail;</li><li>• Weston Road flood wall constructed to a top of wall elevation of 107.52 m in the City’s vertical datum (CGVD28) or 107.40 m in TRCA’s vertical datum (CGVD28:78) to prevent overtopping of Weston Road in the 350-year storm while avoiding adverse impacts upstream;</li><li>• Relocation of impacted sewer outfalls to above the 100-year riverine water level;</li><li>• Relocation of impacted municipal services (water, sanitary, and storm) and utilities; and</li><li>• Vegetation screening provided to the extent possible along the Black Creek corridor.</li></ul>
Lavender Creek Channel Improvements	<p><u>Proposed Lavender Creek Channel</u></p> <ul style="list-style-type: none"><li>• Vegetation screening provided to the extent possible along the Lavender Creek corridor.</li></ul> <p><u>Upstream of Confluence with Black Creek to Symes Road</u></p> <ul style="list-style-type: none"><li>• Uniform trapezoidal channel with 7 m bottom width including a 3 m maintenance bench on the west side of the low flow channel;</li></ul>

Area	Description
	<ul style="list-style-type: none"><li>• 2.5:1 bank slopes (existing remaining slope plus proposed slopes are less than 6 m in height and a 2 m minimum mid-slope bench is not anticipated to be required, however this may change as the channel is subject to further design refinement at the next stage); and</li><li>• Relocation of impacted municipal services (water, sanitary, and storm) and utilities.</li></ul> <p><u>Upstream of Symes Road to Tie in with Existing Lavender Creek</u></p> <ul style="list-style-type: none"><li>• Channel transition to tie into existing Lavender Creek.</li><li>• Currently designed using 2:1 side slopes, however this will need to be refined at detailed design to meet geotechnical requirements to ensure long term slope stability using 2.5:1 side slopes and vertical walls.</li></ul> <p><u>Smooth Concrete Channel from North Driveway to Symes Road</u></p> <ul style="list-style-type: none"><li>• Smooth concrete channel to maximize flood protection while minimizing footprint and impacts to greenspace and property. The reach has been designed for a maximum Manning's n (i.e. roughness) value of 0.015.</li></ul> <p><u>Engineered Concrete Channel from Upstream of Confluence with Black Creek to North Driveway</u></p> <ul style="list-style-type: none"><li>• Engineered channel surface to be hard and relatively smooth to maximize flood protection benefit and protect against erosion. The reach has been designed for a maximum Manning's n (i.e. roughness) value of 0.03.</li></ul>
Lavender Creek Crossing Improvements	<ul style="list-style-type: none"><li>• North driveway crossing removed</li><li>• South driveway crossing removed</li><li>• Symes Road culvert replaced with twin 5.5 m span x 1.85 m rise concrete box culverts</li></ul>



Datum: NAD 1983 UTM Zone 17N  
North American 1983

Source: Toronto and Region Conservation Authority  
City of Toronto



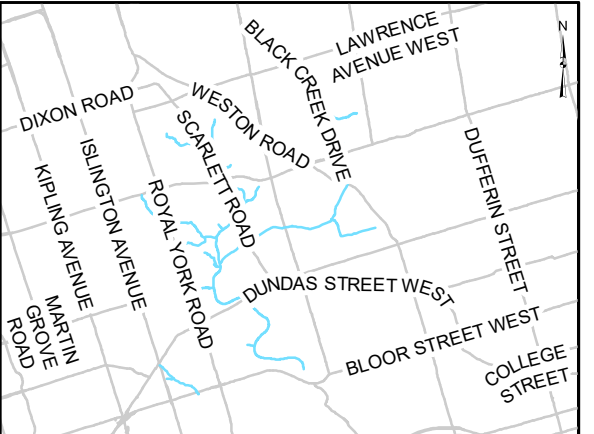
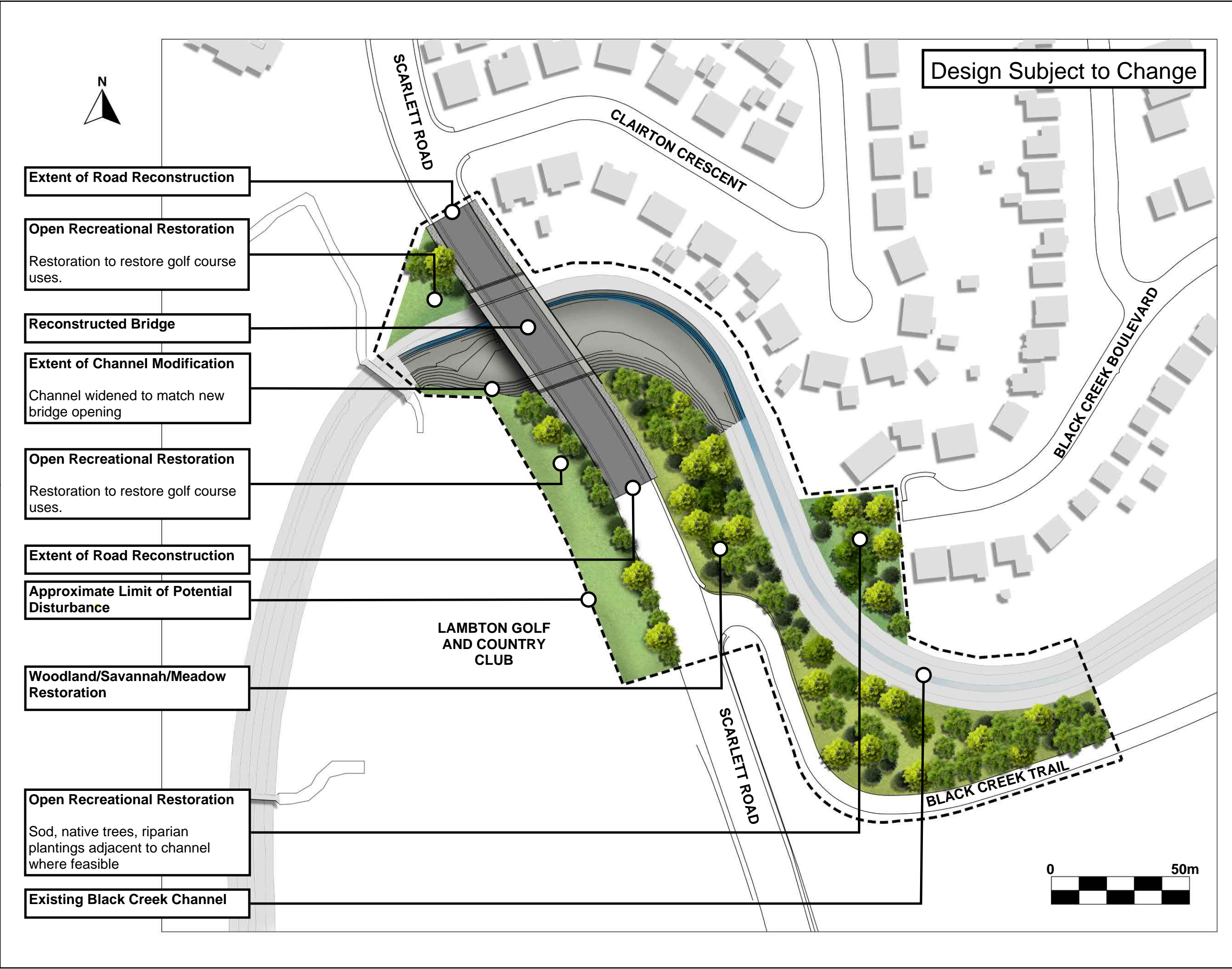
**Rockcliffe Riverine Flood Mitigation  
Municipal Class Environmental Assessment**

**Overview of the Preferred Design**

Project No.: 202179500	<b>Figure ES4</b>
Date: October 2022	


Map location: G:\2020\102179500\mxd\Map\Blank Template for Non GIS Figures.mxd  
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Not to Scale

Datum: Sources: Toronto and Region Conservation Authority  
City of Toronto

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**Rockcliffe Riverine Flood Mitigation  
Municipal Class Environmental Assessment**

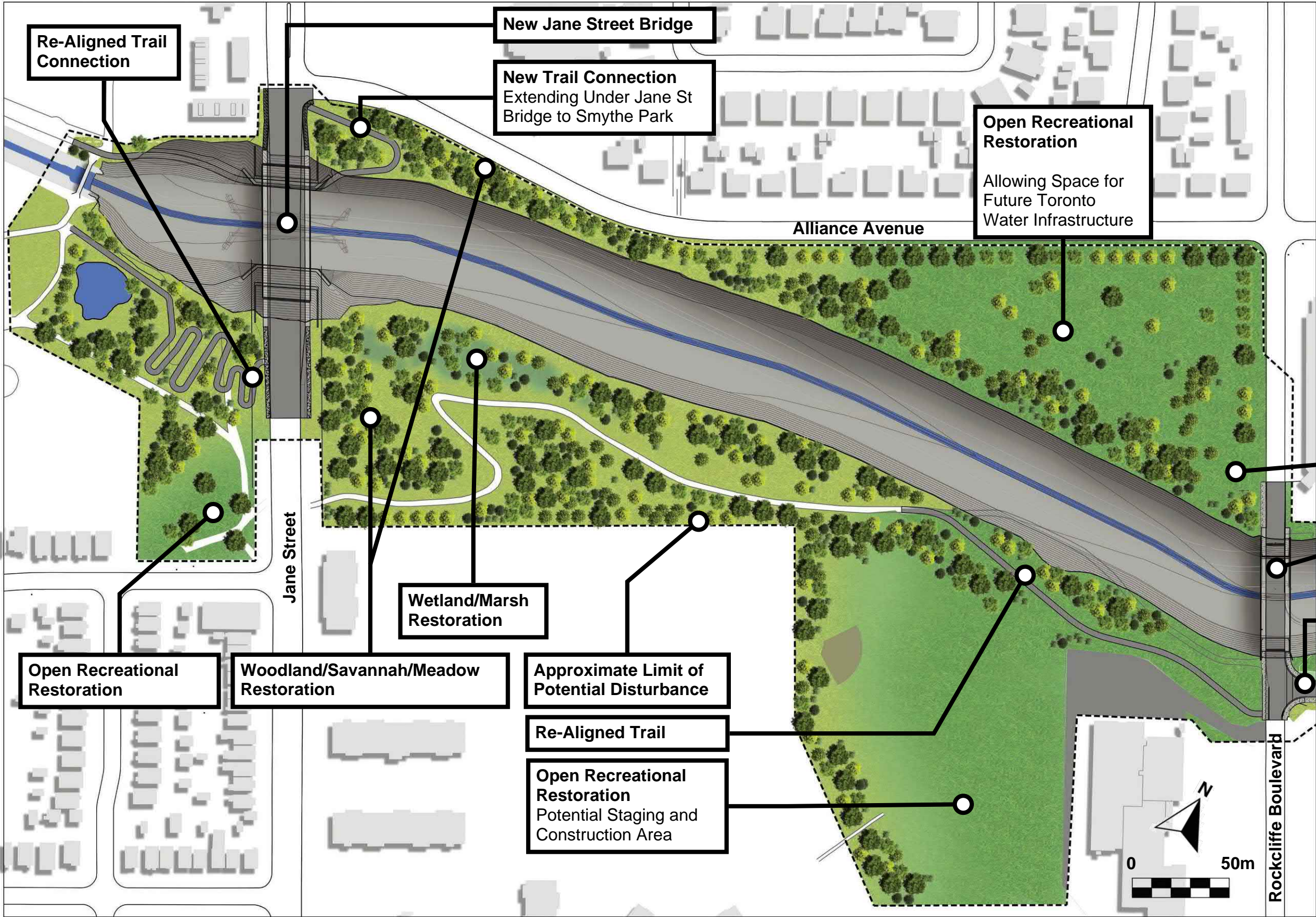
**Conceptual Rendering of the Black Creek  
Preferred Design (Scarlett Road)**

Project No.:	202179500	<b>Figure ES5</b>
Date:	June 2022	

Map location: G:\2020\202179500\mxd\ Template\Blank Template for Non GIS Figures.mxd  
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Design Subject to Change



Maintenance Access to be Maintained to Black Creek Channel

New Rockcliffe Boulevard Bridge

Re-Aligned Rockcliffe Court

Not to Scale

Datum: Sources: Toronto and Region Conservation Authority, City of Toronto



Rockcliffe Riverine Flood Mitigation  
Municipal Class Environmental Assessment

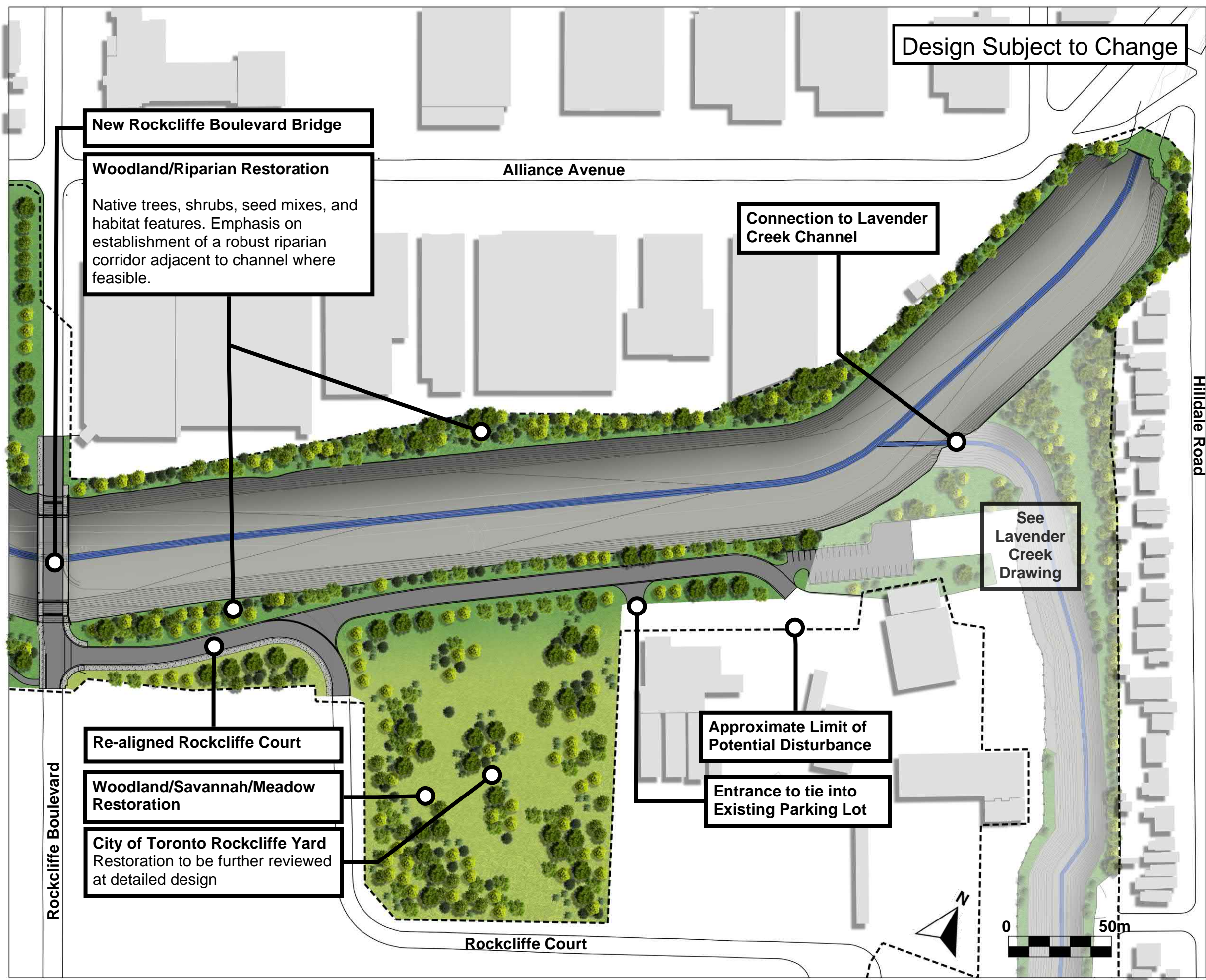
Conceptual Rendering of the Black Creek Preferred Design (Jane Street to Rockcliffe Boulevard)

Project No.: 202179500  
Date: June 2022

Figure ES6

Map created: 03/02/2022 09:09:09, v1.0, 11/14/2022, 11:54:07 AM  
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Datum: Sources: Toronto and Region Conservation Authority  
City of Toronto

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**Rockcliffe Riverine Flood Mitigation  
Municipal Class Environmental Assessment**

**Conceptual Rendering of the  
Black Creek Preferred Design  
(Rockcliffe Boulevard to Alliance Avenue)**

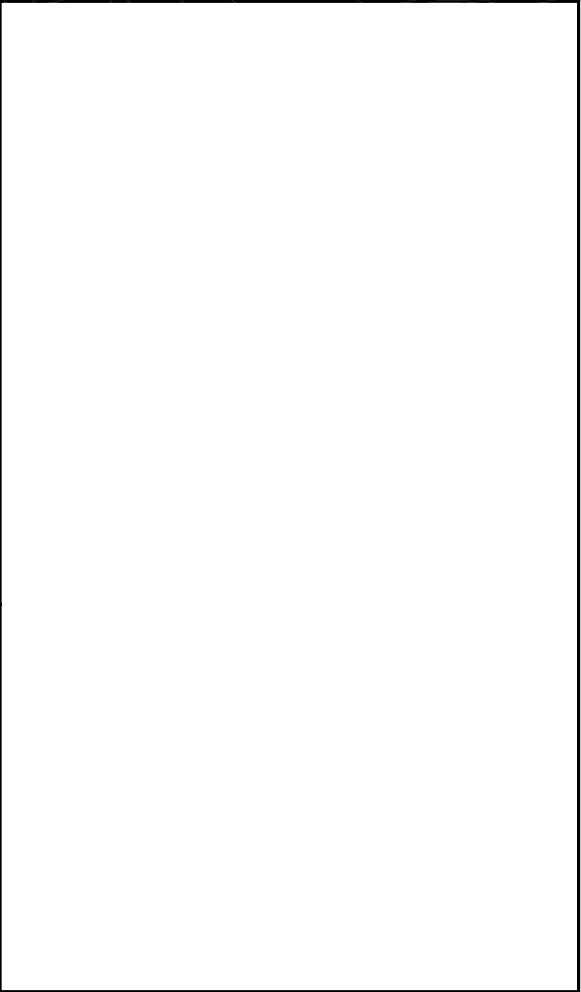
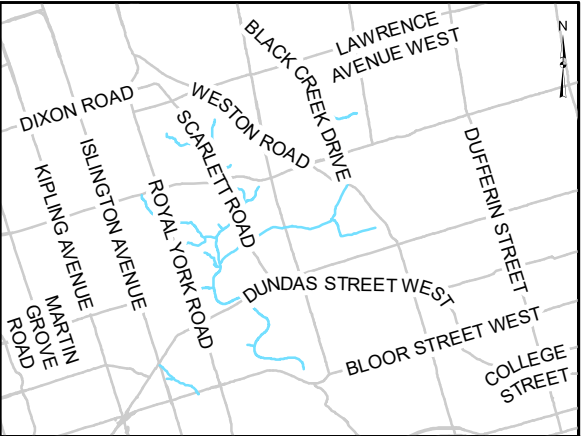
Project No.:	202179500	<b>Figure ES7</b>
Date:	June 2022	

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Design Subject to Change



Not to Scale

Datum: Sources: Toronto and Region Conservation Authority  
City of Toronto



Rockcliffe Riverine Flood Mitigation  
Municipal Class Environmental Assessment

Jane Street Conceptual Rendering  
(Jane Street Bridge)

Project No.: 202179500  
Date: June 2022

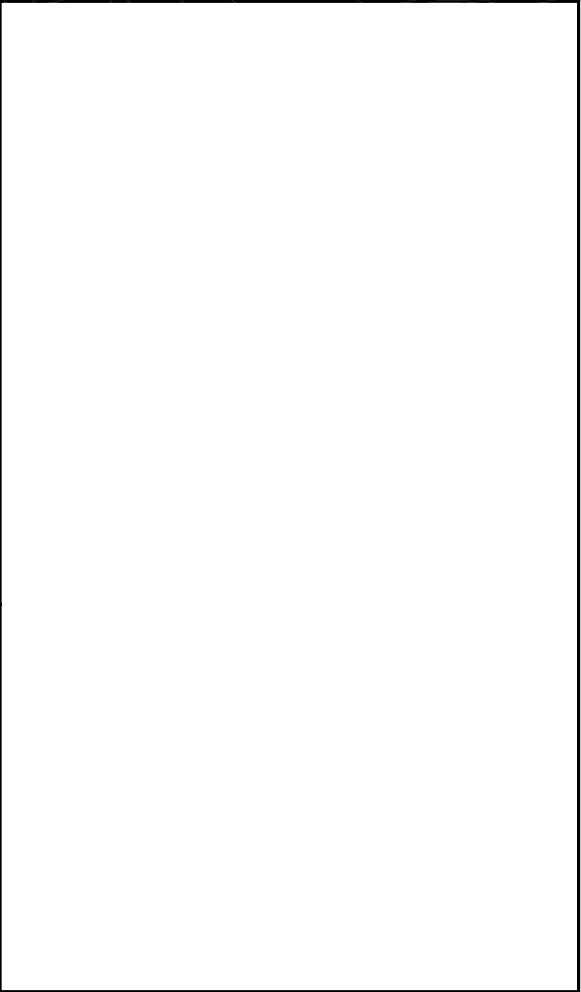
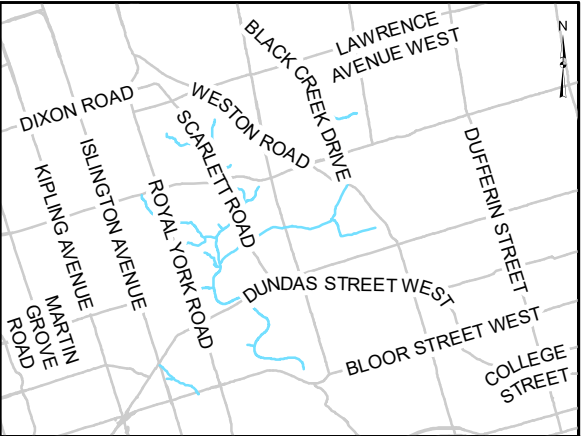
Figure ES8

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Design Subject to Change



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Datum: Sources: Toronto and Region Conservation Authority  
City of Toronto



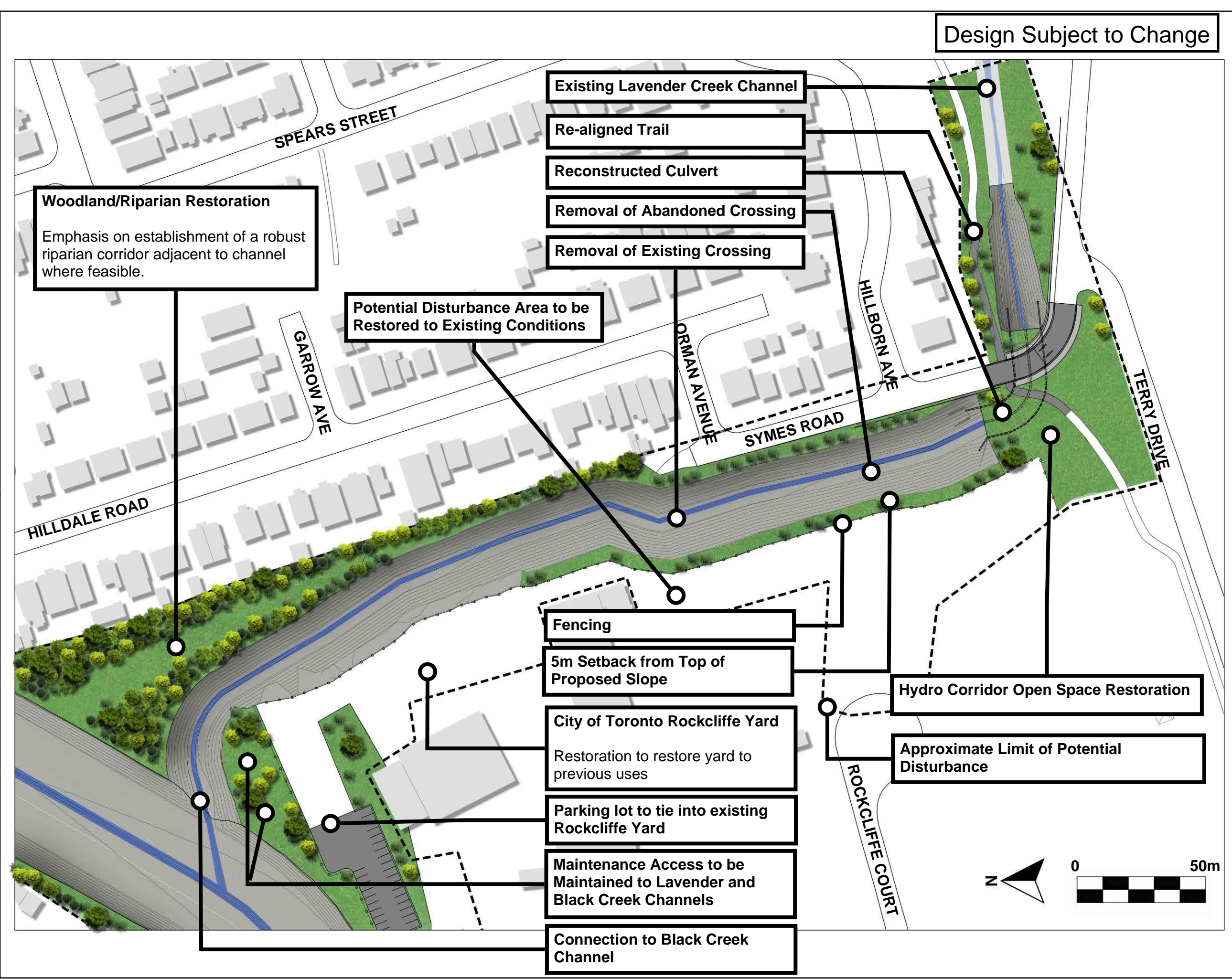
Rockcliffe Riverine Flood Mitigation  
Municipal Class Environmental Assessment

Jane Street Conceptual Rendering  
(Jane Street Northeast Trail)

Project No.: 202179500	Figure ES9
Date: June 2022	

Map location: G:\2020\202179500\mxd\ Template\Blank Template for Non GIS Figure.mxd  
User: Sheale Date saved: 6/7/2022 11:24:57 AM







DIXON ROAD  
KIPLING AVENUE  
ISLINGTON AVENUE  
MARTIN GROVE ROAD  
WESTON ROAD  
SCARLETT ROAD  
ROYAL YORK ROAD  
BLACK CREEK DRIVE  
LAWRENCE AVENUE WEST  
DUNDAS STREET WEST  
BLOOR STREET WEST  
COLLEGE STREET  
DUFFERIN STREET

Not to Scale

Datum:      Source: Toronto and Region Conservation Authority  
City of Toronto



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**Rockcliffe Riverine Flood Mitigation  
Municipal Class Environmental Assessment**

**Conceptual Rendering of the  
Lavender Creek Preferred Design**

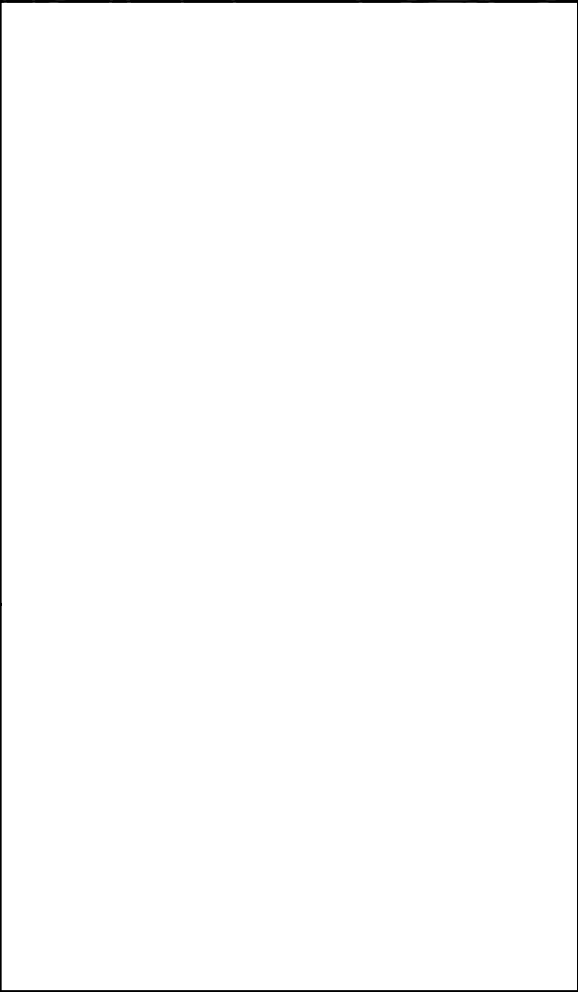
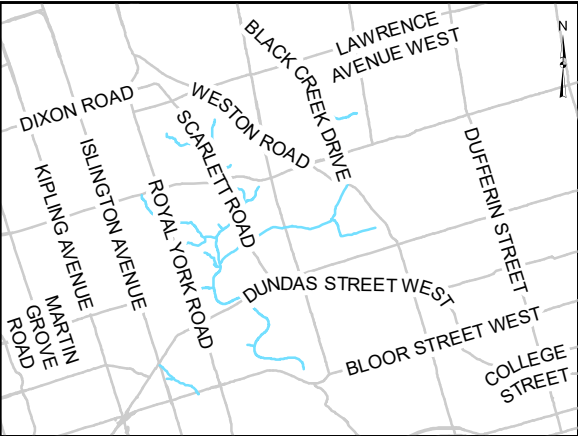
Project No.:	202179500	<b>Figure ES10</b>
Date:	June 2022	

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Design Subject to Change



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Datum:	Sources: Toronto and Region Conservation Authority City of Toronto
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Rockcliffe Riverine Flood Mitigation  
Municipal Class Environmental Assessment

Lavender Creek  
Conceptual Rendering

Project No.:	202179500	Figure ES11
Date:	June 2022	

Map location: G:\2020\202179500\mxd\ Template\Blank Template for Non GIS Figure.mxd  
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## Potential Environmental Impacts, Mitigation Measures and Net Effect

The Project considered a range of environmental impacts, including terrestrial and aquatic environment, Species at Risk (SAR), air quality, surface water quality, groundwater quality, impacts on other infrastructure projects, impacts to private properties, impacts on public properties, disturbance to built heritage, public safety, traffic, transit operations, area businesses, recreational facilities, aesthetics, SPA status and others. Appropriate mitigation measures have been proposed to address the identified impacts when required.

These mitigation measures include vegetated buffers and potentially post and paddle fences to soften the view of the proposed channels; incorporation of murals on concrete surfaces such as bridge abutments; consideration for artificial barriers or mature tree transplants to restore visual barriers sooner; replacing trails impacted by the Project with new trails in compliance of Accessibility for Ontarians with Disabilities Act (AODA); further refinement of channel alignments where feasible to minimize damage to established vegetation; adhering to construction best practices related to noise, dust, vibration, and erosion and sediment control; replacement of municipal servicing infrastructure (e.g., sewers and watermains) with new infrastructure where impacted by the Project; and consideration for future transit and cycling expansion on Jane Street.

Remaining natural areas disturbed during implementation of the Preferred Design will be restored to their vegetated state in consideration of the desired land uses and habitats. Vegetated buffers along the channel edges and along private property boundaries are recommended for screening.

## Monitoring

This design is expected to be implemented in phases over approximately seven or more years, likely requiring separate construction contracts. This implies that different monitoring, operations and maintenance activities may overlap between different phases of the Project. The requirements for monitoring are expected to be further refined as part of the detailed design and tendering, as well as the actual construction sequence developed by the contractor.

In addition, both the City and TRCA will assume responsibility for a number of new assets in terms of their operations and maintenance. For this purpose, defined protocols are typically established and standardized for most of the City's assets (bridges, culverts, roads, servicing infrastructure, park amenities, etc.). A more site-specific protocol is expected for the new sections of the Black Creek and Lavender Creek channels.

The monitoring sequence will generally follow the following:

- Pre-construction monitoring;
- Monitoring during construction; and
- Post-construction monitoring.

The purpose of pre-construction monitoring will be to establish the baseline set of data in order to evaluate the effectiveness of mitigation measures during and after the construction. It is emphasized that some of baseline data may become outdated if collected too far in advance of

a certain implementation phase. As such, the requirements for pre-construction monitoring should be incorporated in individual contracts.

The purpose of monitoring during construction is to ensure that all construction activities are carried out in conformity with pertinent environmental regulations and other industry standards.

The purpose of the post-construction monitoring component is to ensure that all the lands disturbed as a result of construction activities are restored as soon as reasonably possible, as well as to ensure that the preferred design is functioning as intended.

## Consultation Process

The consultation program for this Project followed the requirements of the MCEA process for a Schedule C project and included consultation with the public, landowners, agencies, Indigenous rights holders and other stakeholders.

The consultation program for the Project consisted of the following activities:

- Mandatory notices and electronic advertisements consistent with TRCA's and City of Toronto's notification process:
  - Notice of Commencement
  - Notice of Public Information Centre #1
  - Notice of Public Information Centre #2
  - Notice of Environmental Study Report Completion
  - Indigenous consultation
- Agency, utility and other stakeholder consultation
- City of Toronto and TRCA (who are co-proponents) cross-divisional coordination and consultation via:
  - Technical Advisory Committee meetings
  - Executive Steering Committee meetings
  - Division/issue specific meetings
- Public consultation via:
  - Public Information Centres
  - Community Liaison Committee meetings
  - Site walks, meetings, phone calls and email correspondence with interested community members
  - Consultation with directly impacted landowners via site walks, meetings, email and letter correspondence

As there is no local newspaper, a multi-channel marketing campaign of print, social media, email and digital ads, which are consistent with TRCA's and City of Toronto's notification process for other projects, was used to advertise the mandatory Project notices within the Study Area. Due to the ongoing COVID-19 pandemic and public health protection measures, the Public Information Centres were virtual events hosted via Webex with the option to view Public Information Centre materials online or contact the study team directly via phone or email if they could not attend the virtual event.

The Project website ([trca.ca/rockcliffe](http://trca.ca/rockcliffe)) provided opportunities for the public to learn about the Project, access relevant information about the MCEA, stay up-to-date on study progress and review Project materials. Public consultation materials presented and shared at the two PICs were provided on the website in advance of the meetings. The website also included electronic comment forms, recordings of the PIC presentations as well as contact information for the public to submit questions and comments to the Project Management Team if unable to attend a virtual PIC.

Notices and Project information was sent via courier and email to Indigenous communities. The following Indigenous communities and agencies were engaged based on asserted or established interest:

- Assembly of First Nations
- Haudenosaunee Confederacy
- Huron-Wendat Nation
- Métis Nation of Ontario
- Mississaugas of the Credit First Nation
- Six Nations of the Grand River First Nation

Some of the communities indicated an interest in archaeological assessments and other field work related to this Project. Some of the communities requested that Field Liaison Representatives (FLRs) be included in future field work related to this project. TRCA staff committed to continue to provide information to the interested communities about their stated areas of interest and to continue to meet regularly to discuss archaeological assessments and explore ways to work together.

This consultation program resulted in an extensive consultation record (refer to **Section 11** of the ESR) with input received from the public and stakeholders at various stages of the Project. The input informed the work undertaken during each stage of the project (e.g. background reviews, development of alternative solutions, development of design concepts, etc.). A description of how this input guided the planning and design work undertaken throughout the Class EA process is discussed in **Section 5.5** and **6.7** of the ESR.

## Implementation Horizon

An initial construction phasing and implementation plan has been developed with consideration for flood risk, traffic impacts, funding availability, constructability and staging. The phased multi-year implementation plan optimizes the order in which each infrastructure component of the flood mitigation solution is constructed. The initial construction schedule has been constrained to a 10-year timeline due to current funding assumptions. However, other factors, such as relocation of utilities by the utility owner, can significantly influence the construction schedule and will be examined during detailed design. The implementation schedule and construction phasing will continue to be refined and updated as detailed design advances, and as funding for all Project components is secured.



## **Cost Estimate**

A capital cost estimate was prepared for the 30% Preliminary Design which included construction costs, interim phasing costs, consulting and engineering fees and public art (1% of capital cost). The total estimated cost including +30% for contingency is \$196,470,000.