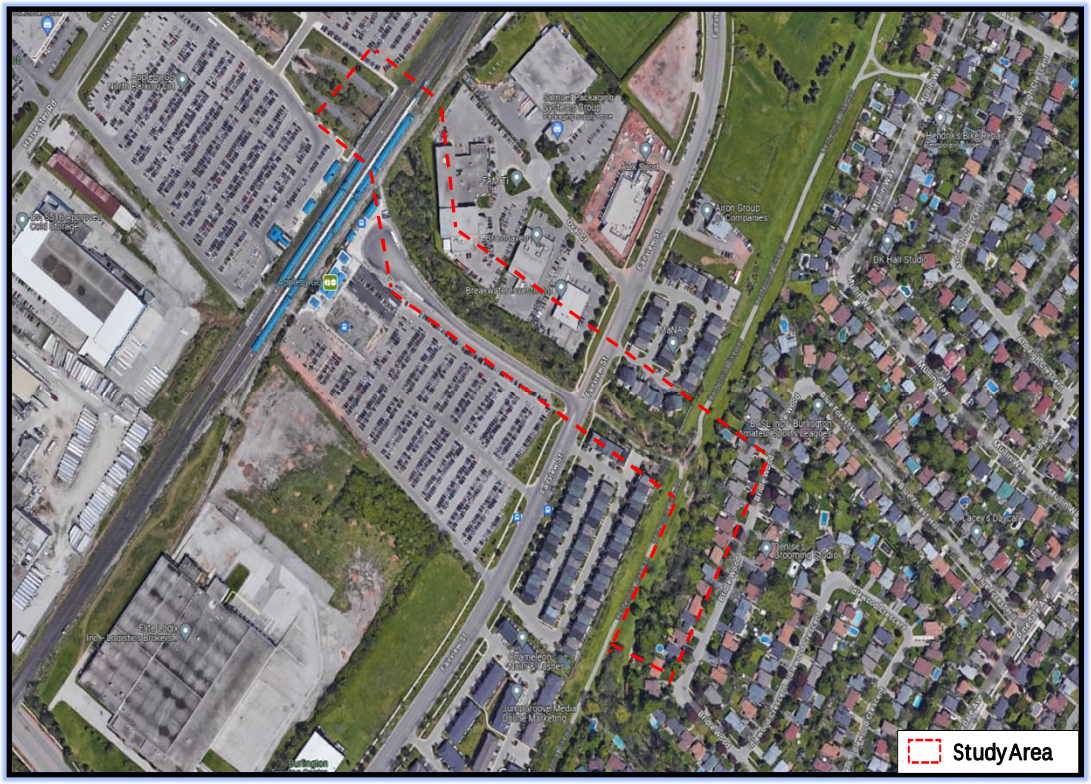
Appleby Creek Flood Mitigation Municipal Class Environmental Assessment Addendum



Public Open House

June 17, 2024, 6:00 – 8:00p.m.

Appleby Ice Centre – Community Room No. 1

1201 Appleby Line, Burlington, ON L7L 5H9

Welcome

Public Open House
Appleby Creek Flood Mitigation
Municipal Class Environmental EA
Study Addendum

• Sign In

• Please Sign in and review the information on the boards
• Please discuss your questions with the Study Team

• Fill out a Comment Sheet

• Please fill out a comment sheet and return to the Study
• Team in person, by email or mail by **June 28, 2024.**

Study Purpose

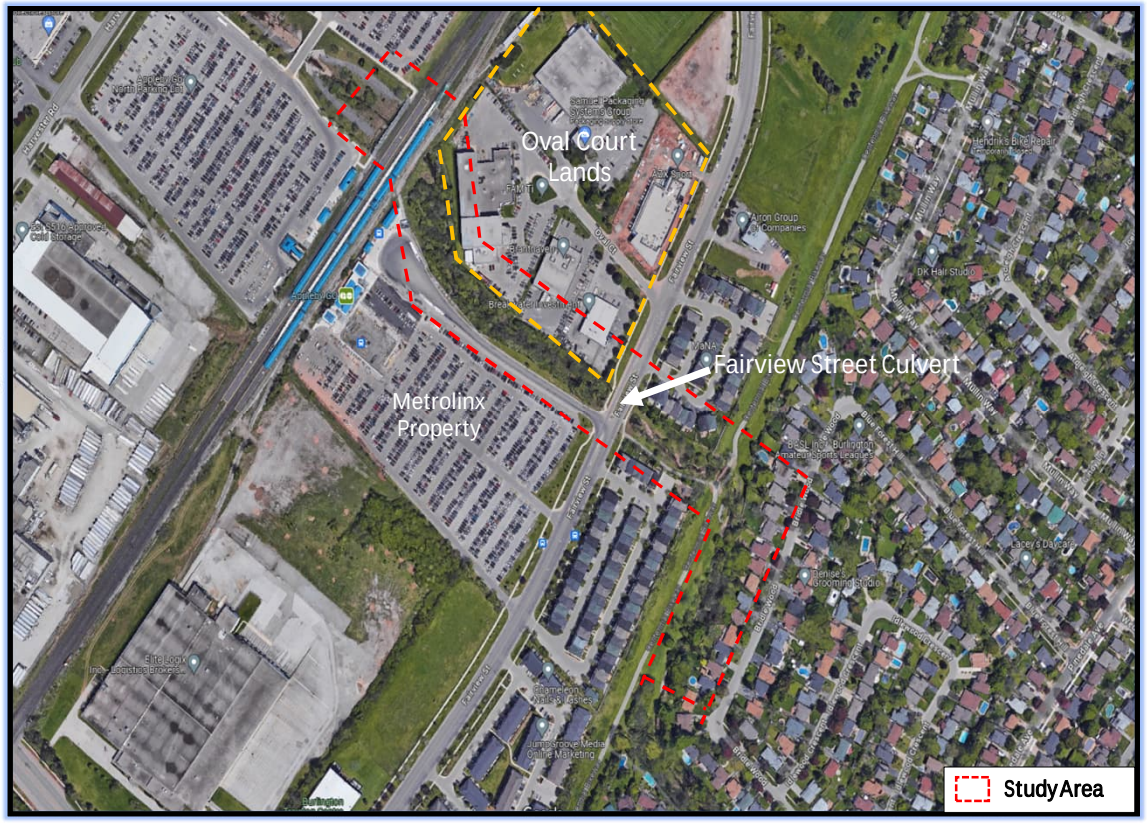
In February 2019, Aquafor Beech completed the **Appleby Creek Flood Mitigation Study** under the Municipal Class Environmental Assessment (MCEA) process.

Since the 2019 study, the socio-cultural and economic environments of the study area between Fairview Street and New Street have changed due to:

- Plans for land use intensification
- Proposed development within the vicinity of the Fairview Street crossing.

The preferred solution identified for the Fairview Street crossing structure does not adequately address the flooding risks within the flood limits of adjacent development lands, specifically development lands known as Oval Court Lands.

An addendum to the 2019 Appleby Creek Flood Mitigation Study is being conducted to review and evaluate alternative solutions for the hydraulic structure crossing at Fairview Street to reduce flooding impacts to Oval Court lands under Regional Storm Conditions.



Purpose of this Public Open House is to:

- Provide an overview of the MCEA Addendum process
- Provide information on the changes to the environment of the Study Area
- Identify the revised preferred solution
- Identify next steps and implementation

Addendum Process and Timeline

The Addendum Study is carried out according to the guidelines set out in the Municipal Engineers Association (MEA) Class Environmental Assessment document (February 2024) when it may not be feasible to implement a project in the manner outlined in the MCEA project report due to unforeseen circumstances or changes in the environment after the project is authorized to proceed.

➢ **February 2019** **Appleby Creek Flood Mitigation Study Municipal Class EA**

➢ **February 2024** **MCEA Addendum**

Review alternatives relative to current environment

- ➢ Review recommended crossing solutions for Fairview Street
- ➢ Review existing and future needs and opportunities
  - Review natural, social / cultural conditions
  - Planned development
  - Policy framework

Public Open House

Present the recommended solution

Confirm recommended solution and complete Addendum Report

- ➢ Identify and Evaluate Alternative Solutions/Strategies
- ➢ Review Impacts and Mitigation Measures
- ➢ Recommend Preferred Solution
- ➢ Complete Appleby Creek Flood Mitigation Study Addendum Report

Notice of Addendum

30-day public review of Addendum

Future Phases (not within the scope of the Addendum)

- ➢ Detailed designs, permits
- ➢ Implementation

Appleby Creek Flood Mitigation Study 2019

Background & Purpose

- Evaluated alternative solutions along Appleby Creek from New Street to GO Transit Corridor to identify specific opportunities to reduce flooding risks
- Recommended preferred solutions for three flood vulnerable areas including the subject study area in the vicinity of the Fairview Street crossing
- Existing Fairview Street crossing has max hydraulic conveyance capacity of the 5-year storm and becomes inundated during the Regional Storm event
- The existing structure at the Fairview Street crossing is a 2.74 m rise x twin 3.35 m wide x 29 m long closed bottom box culvert

Fairview Street Crossing Alternative Options

- **3 options** were considered for Fairview Street Crossing to reduce extent of flood hazard
- **Option 1**
  Do Nothing
- **Option 2**
  Replace the existing Fairview St. Bridge with a 17metre span structure to convey the 100- year storm
- **Option 3**
  Replace the existing Fairview St. Bridge with a 60m span structure to convey the Regional Storm

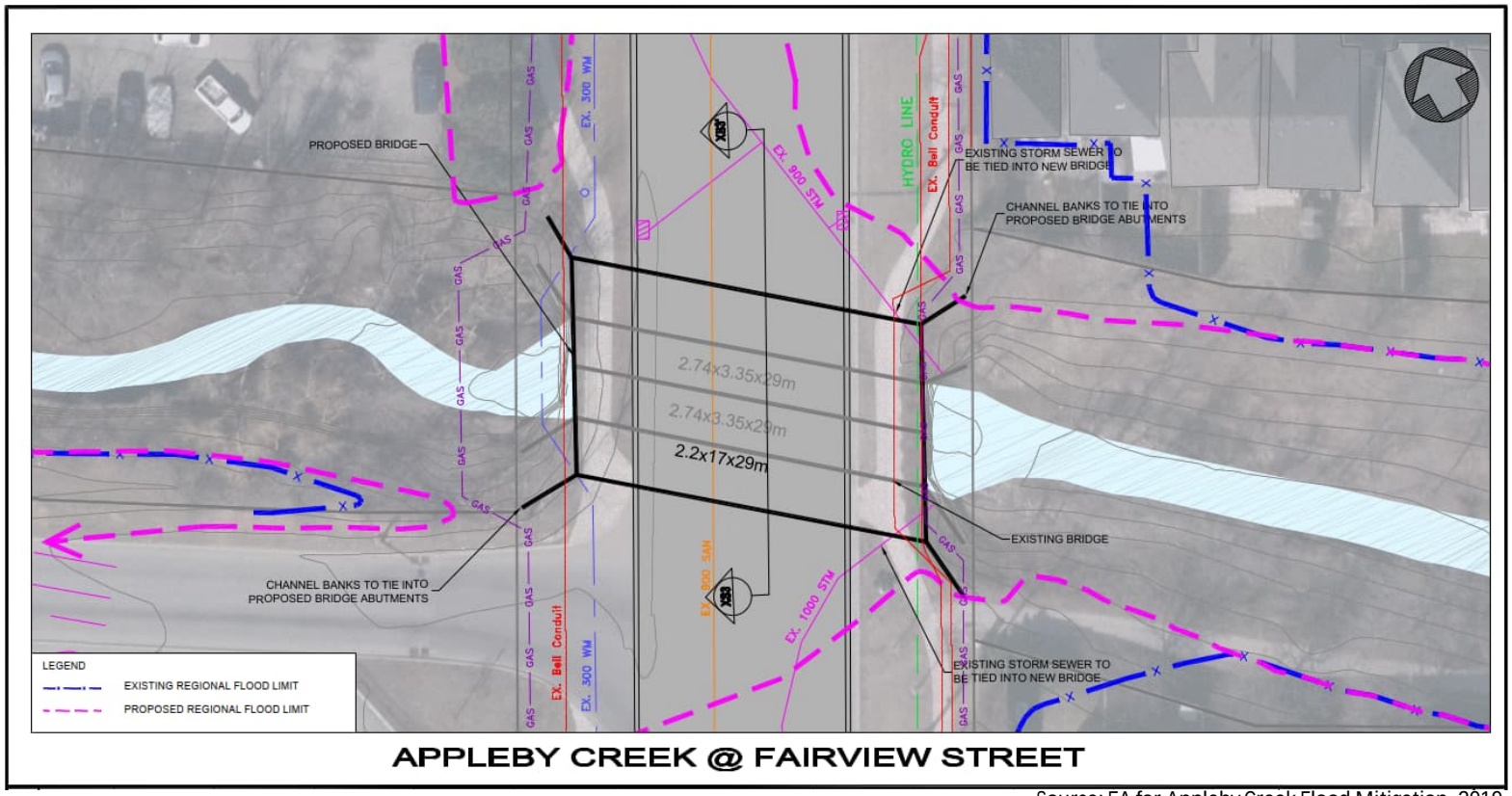
Preferred Solution

- **Option 2**
  a 17 m Clear span bridge that could pass the 100-year storm event, was selected as the preferred alternative
- Included channel works at the upstream and downstream sections of the bridge
- Selected primarily due to the concerns of the capital cost at the time of evaluation
- **Still results in flooding of private property and the overtopping of Fairview Street under Regional Storm conditions**

While the 2019 Appleby Creek MCEA Study acknowledged that the preferred option still resulted in flooding of private property and the overtopping of Fairview Street under Regional Storm conditions, Option 2 was selected based on concerns of capital cost, the current condition of existing bridge and the uncertainty of the pace of development growth at the time of evaluation.

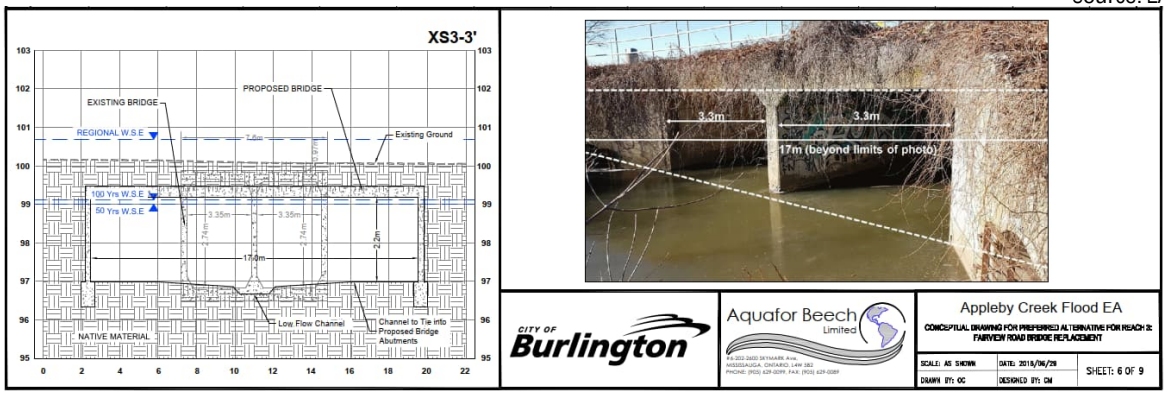
Appleby Creek Flood Mitigation Study 2019

2019 Preferred Solution Fairview Street Crossing

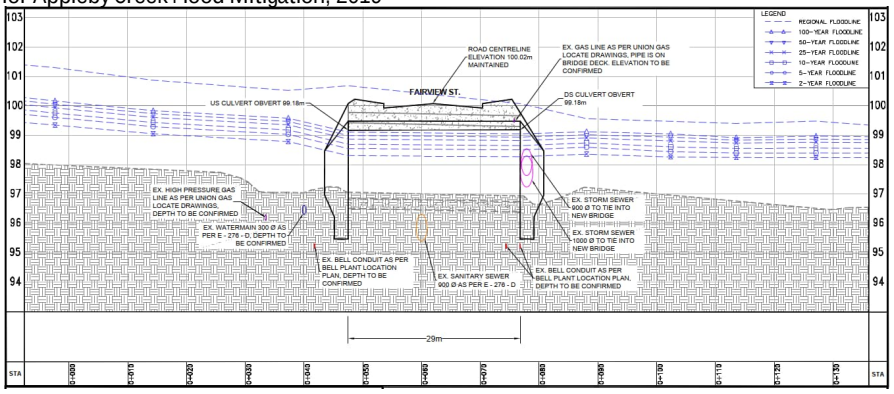


Source: EA for Appleby Creek Flood Mitigation, 2019

The hydraulic assessment completed as part of the 2019 study determined the Fairview Street crossing structure would need to be 17m wide to pass the 100-year storm while maintaining the existing road surface elevation



Source: EA for Appleby Creek Flood Mitigation, 2019



Source: EA for Appleby Creek Flood Mitigation, 2019

What Has Changed?

Changes since the February 2019 Appleby Creek Flood Mitigation Study:

January 2019

- Development plans for the Oval Court lands identify the need to increase table lands to support the planned development

September 2023

- Update to the flood hazard mapping for the 'East Burlington Creeks'
  - identified the need to convey the Regional Storm to maximize table lands allowing for the increase development density and intensification (EBC, 2023).

November 2023

- As part of the Ontario Land Tribunal Minutes of Settlement between City of Burlington, Conservation Halton and the Oval Court Land Owners, the following conditions were agreed upon:
  - "The Fairview Street road crossing upgrades will be comprised of a culvert or bridge structure capable of conveying the Regional Storm event without overtopping Fairview Street, determined through a detailed design process, to the satisfaction of the City of Burlington and Conservation Halton…"
  - "The Parties agree that the Owner shall prepare an update to the Environmental Assessment dated [February 11, 2019] (the "Flood Control EA"). This update shall be appended to the Flood Control EA as an addendum to evaluate the upgraded culvert or bridge structure in combination with the widening of the creek channel to increase the conveyance capacity to convey Regional Storm Flows without overtopping Fairview Street,

What Has Changed?

Changes since the February 2019 Appleby Creek Flood Mitigation Study:

November 2023

- City of Burlington amendment to the Official Plan to permit mixed-use and high density on the Oval Court Lands was based on the following:
  - Intensification consistent with the Provincial Policy Statement;
  - Conformity to the Halton Region Official Plan and Official Plan for the Burlington Planning Area; and,
  - Subject to the existing limits flooding being refined due to future upgrades to the Fairview Street creek crossing and alterations to Appleby Creek and associated hazard lands to ensure development is outside of hazardous lands and to provide safe access.

November 2023

- City of Burlington completed a review of the portion of the cost of the creek crossing and creek works that are eligible for Development Charge, included in the Development Charge By-law.

February 2024

- Addendum to the 2019 Appleby Creek Flood Mitigation MCEA initiated.

Revised Preferred Solution

To increase the capacity of the crossing structure to convey the Regional Storm Flows without overtopping Fairview Street, the alternatives considered in the 2019 Appleby Creek Flood Mitigation Study were reviewed.

A larger span structure was preferred when compared to the 17m span structure based on the following:

- Ability to convey the 100-year and Regional storm
- Limited increase in road surface elevation above the current profile
- Less grading required for access and connection to adjacent properties
- Similar cost for each option (within 5%)
- Shorter duration of construction

Criteria for Evaluating Alternatives	Larger Span Rigid Frame Structures	Clear Span Bridge (17m)
Summary Natural Environment Impact to water quality, quantity, aquatic habitat, impact to terrestrial habitat, species at risk, impact to climate change	◔	◔
Summary Socio-Cultural Environment conformity to local planning provisions, property impacts, access to adjacent properties, impact to cultural resources, construction duration	○	◔
Summary Financial Factors Capital Costs (cost of each option is within 5%), Operating and Maintenance Costs	○	◔
Summary Technical Factors Bridge Profile / Impact to Road Elevation, hydraulic performance, foundation requirements	○	◑
Problem / Opportunity Statement		
Addresses Problem / Opportunity Statement	Yes	Yes
Overall Summary	**Most Preferred**	**Least Preferred**

Least Preferred ●
Less Preferred ◕
Somewhat Preferred ◑
More Preferred ◔
Most Preferred ○

Revised Preferred Solution

2019 Fairview Street Crossing Evaluation- Updated

Table 4-28. Evaluation Matrix of Alternatives for Reach 3

EVALUATION CRITERIA		Alternative 1 - Do Nothing		Alternative 2 - Fairview Street Bridge Improvements (17m Span - 100-yr Conveyance)		Alternative 3 - Fairview Street Bridge Improvements (60m Span - Regional Conveyance)	
		Score	Explanation	Score	Explanation	Score	Explanation
Physical, Technical and Engineering Criteria							
Potential Impact to Flood Risks	Reduction to the number of building within the flood limits	0	9 buildings within regional flood limit and 2 buildings in 100-yr flood limit	5	4 buildings within regional flood limit and 2 buildings in 100-yr flood limit	8	3 buildings within regional flood limit and 2 buildings in 100-yr flood limit
	Maximum bridge conveyance capacity (i.e., limited backwatering)	1	No increase to flood flow capacity (10-yr flood)	8	100-year floods conveyed	10	Regional floods conveyed
	Decrease in frequency of road overtopping	5	Only regional flood overtops New Street	5	Only regional flood overtops New Street	7	No analyzed flows are expected to overtop New Street
Channel Erosion	Potential impact to channel erosion within reach	5	No significant erosion issues at this time	7	Increased conveyance at bridge will decrease shear and velocity	7	Increased conveyance at bridge will decrease shear and velocity
Impact on Existing Infrastructure	Potential impact to the surrounding infrastructure (e.g., sewers, watermains, gas, roads) during and after constructions	10	Surrounding utilities are well protected from erosion or deterioration. No relocation required at this time.	5	Significant relocation of utilities	0	Significant relocation of utilities. Also, road and all driveways will have to be raised.
Lifespan of Works	Potential to increase the expected lifespan/years of works before intervention needs to be repeated	5	Infrastructure approaching half of lifespan	10	New bridge lifespan > 50 years	10	New bridge lifespan > 50 years
Physical, Technical and Engineering Criteria Subtotal		**26**		**40**		**42**	
Weighted Score for Physical and Natural Criteria (maximum of 50 pts)		**22**		**33**		**35**	
Natural, Social and Cultural Criteria							
Aquatic Habitat	Potential to impact aquatic habitat conditions, including channel features and overhanging vegetation	2	No improvements to the degraded aquatic habitat. Culvert prevents fish passage creates an impervious in channel bed	8	Potential to increase fish passage through bridge. Opportunities to remove fish barrier upstream of the bridge.	8	Potential to increase fish passage through the culvert. Opportunities to remove fish barrier upstream of the bridge.
Terrestrial Vegetation	Potential impact to the existing mature trees and canopy cover in river corridor	10	No tree removals required	7	Minimal tree removals required for culvert replacement	7	Minimal tree removals required for culvert replacement
Terrestrial Habitat	Potential impact to connectivity, diversity and quantity / quality of terrestrial habitat	5	No impact on the existing terrestrial habitat. Limited bridge span currently restricts terrestrial passage.	8	Improved terrestrial connectivity through new culvert. Limited disturbance upstream.	10	Further improved terrestrial connectivity through new culvert. Limited disturbance upstream.
Public Health and Safety	Potential impact to public health and safety includes risk to private property, parking lots, roads, footbridges and public trails	2	Continued flood risks (no risks of infrastructure failure)	6	Flood frequency reduced, & many houses removed from flood limits	9	Flood frequency further reduced, & many houses removed from flood limits
Landowner Impacts	Potential impacts associated with the construction of facilities, particularly with respect to land uses such as residential and schools. Access / egress also needs to be considered	10	No disturbance to private properties	3	High level of disruption to local residents during construction as Fairview Street will be closed, potentially for several months.	0	High level of disruption to local residents during construction as Fairview Street will be closed, potentially for several months. A section of Fairview Street will need to be reconstructed and could impact driveway access.
Aesthetic Value	Potential for alternative to be an asset to the community by integrating facility into the surrounding community aesthetics	4	Aging infrastructure is not aesthetically pleasing.	8	New bridge will be aesthetically pleasing	8	New bridge will be aesthetically pleasing
Natural, Social and Cultural Criteria Subtotal		**33**		**40**		**42**	
Weighted Score for Social and Cultural Criteria (maximum of 25 pts)		**14**		**17**		**18**	
Economic Criteria							
Capital Costs	The relative estimated costs of implementing the proposed treatment based on factors such as location, access / egress and area to dispose material	10	No capital costs	5	Second highest costs associated with minor channel work and bridge replacement	0	Most significant capital costs, with minor channel work, bridge replacement and road realignment
Operations & Maintenance Costs	The relative cost of operating and maintaining the facility based on factors such as location, access / egress and availability of sediment drying area	8	Minimal maintenance presently required.	8	Minimal maintenance required.	8	Minimal maintenance required.
Economic Criteria Subtotal		**18**		**13**		**8**	
Weighted Score for Economic Criteria (maximum of 25 pts)		**18**		**13**		**8**	
Total Weighted Score (*maximum of 100 pts*)		53		63		61	

Revise Score from 7 to 8 - The 60 meter span would further decrease velocity and potentially decrease scour down potential in major storm.

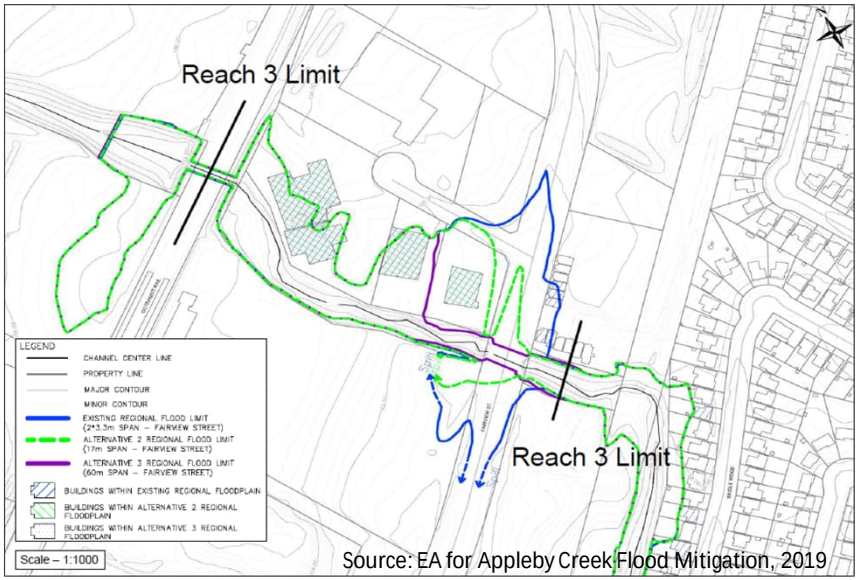
Revise Score from 0 to 3
The disruption for reconstruction of the road in either case is similar in application and duration.

Revise Score from 0 to 3
The review of current cost estimates indicate the variance between the cost of a structure to convey a region storm vs a 100 year storm is <5%
Additional cost may be off set by development charges.

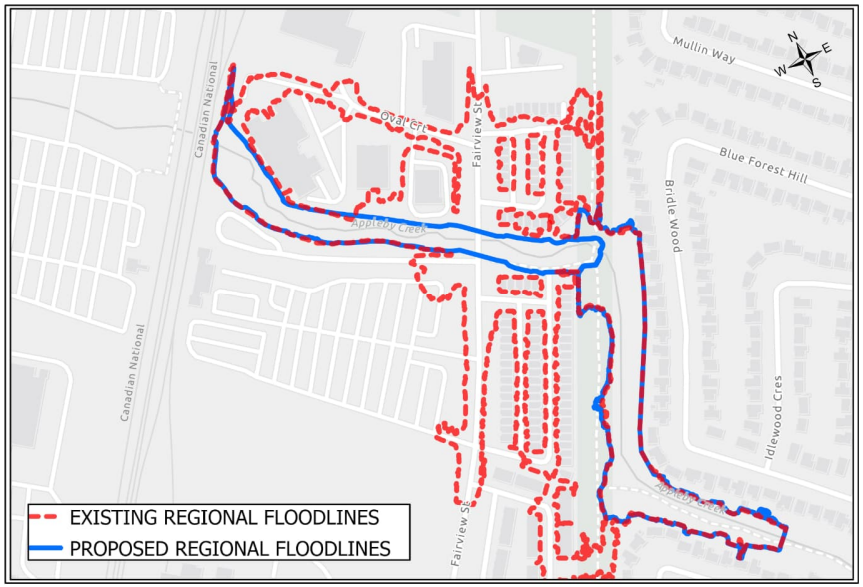
Revise Total Score from 61 to 68
After applying the revised evaluation scores to the table, Alternative 3, the wider span structure becomes the preferred solution.
In addition, Alternative 3 provides a significant increase in the hydraulic conveyance capacity. It is also anticipated to reduce backwater conditions that might occur during the more frequent storm events

Revised Preferred Solution

Flood Conditions - Fairview Street Crossing



Source: EA for Appleby Creek Flood Mitigation, 2019



2019 MCEA Preferred Solution (Option 2)

- Fairview Street crossing structure 17m wide to pass the 100-year storm
- maintains the existing road surface elevation
- four (4) buildings on the Oval Court Lands would be located within the Regional floodplain
- water would overtop Fairview Road under Regional storm conditions

2024 MCEA Addendum Revised Solution (Option 3)

- Fairview Street crossing with a larger span structure to pass the 100-year storm and Regional storm conditions
- Minor grade elevation increase on the road surface depending on type of structure selected. Adjacent driveway and may require restoration.
- Existing and proposed buildings on Oval Court lands would be removed from within the Regional floodplain.

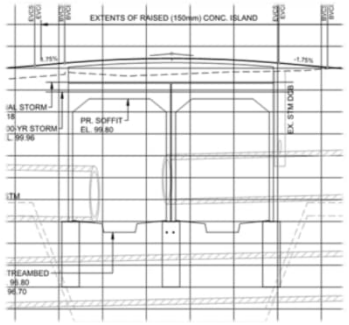
Fairview Street Crossing Structure

Proposed Design Options

To achieve a larger span crossing structure that will pass the Regional storm, three design options are proposed for consideration in detailed design.

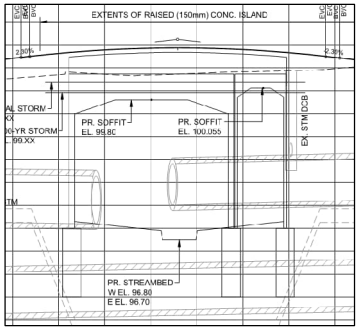
Each option includes upstream and downstream channel improvements as recommended in the 2019 MCEA.

Each option is sized to convey the Regional storm within a modified creek cross-section, without overtopping Fairview Street.



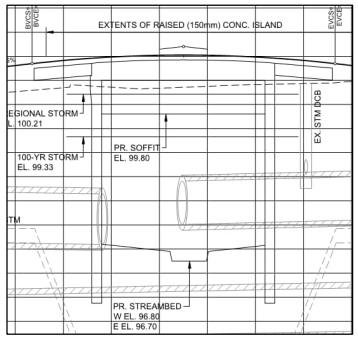
Option 1: Twin Equal Span Precast Rigid Frame Culverts

- two equal precast concrete rigid frame spans of 10 meters, separated by a central pier created by the legs of the frames



Option 2: Two Unequal Span Precast Rigid Frame Culverts

- two unequal precast concrete ridged frames with spans of 16 meters and 4 meters separated by a pier created by the legs of the culverts

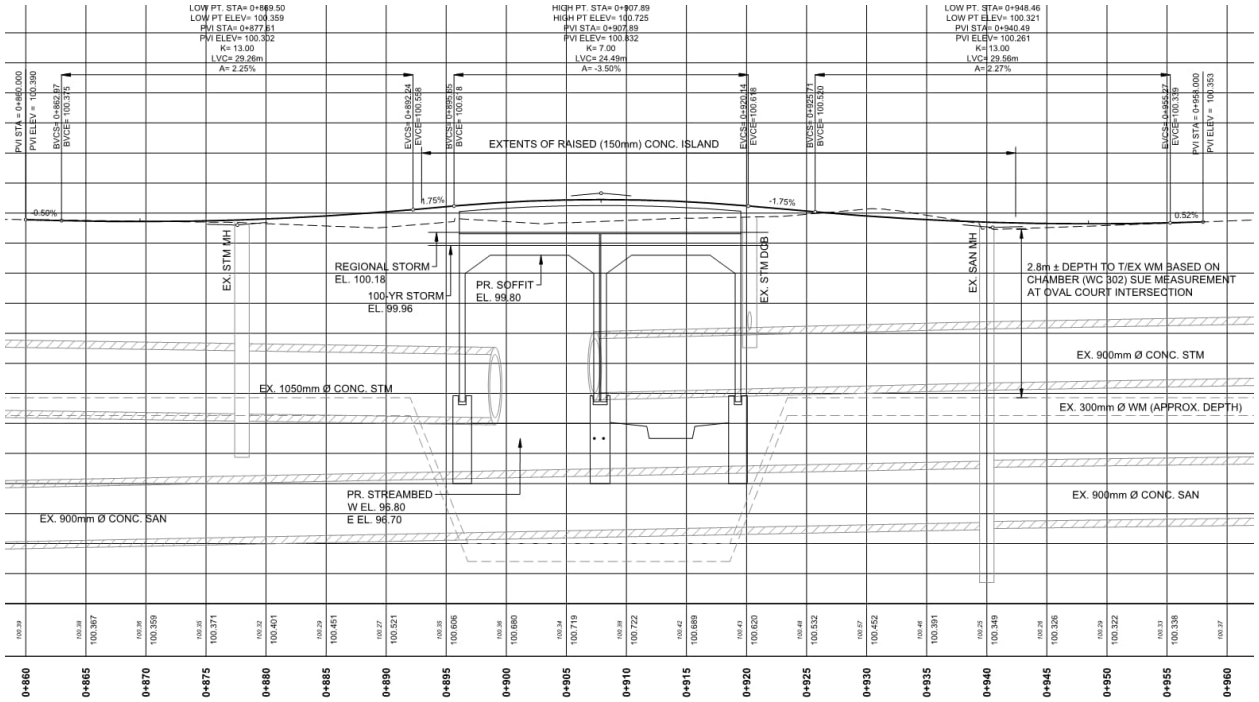


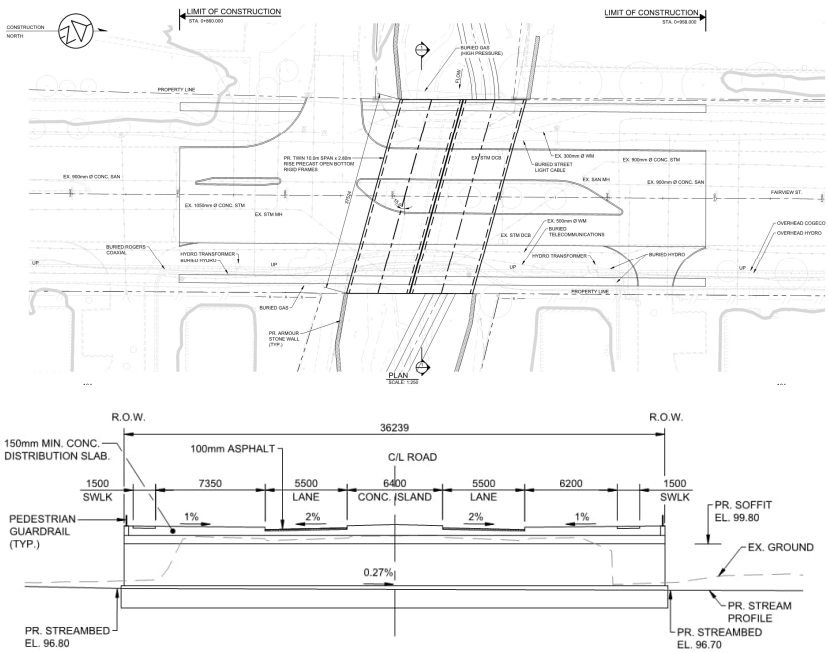
Option 3: Clear Span Precast Box Girder Bridge 17m

- one 17meter clear span box girder bridge structure with no central pier.

Alternative Design Option 1

Twin Equal Span Precast Rigid Frame Culverts

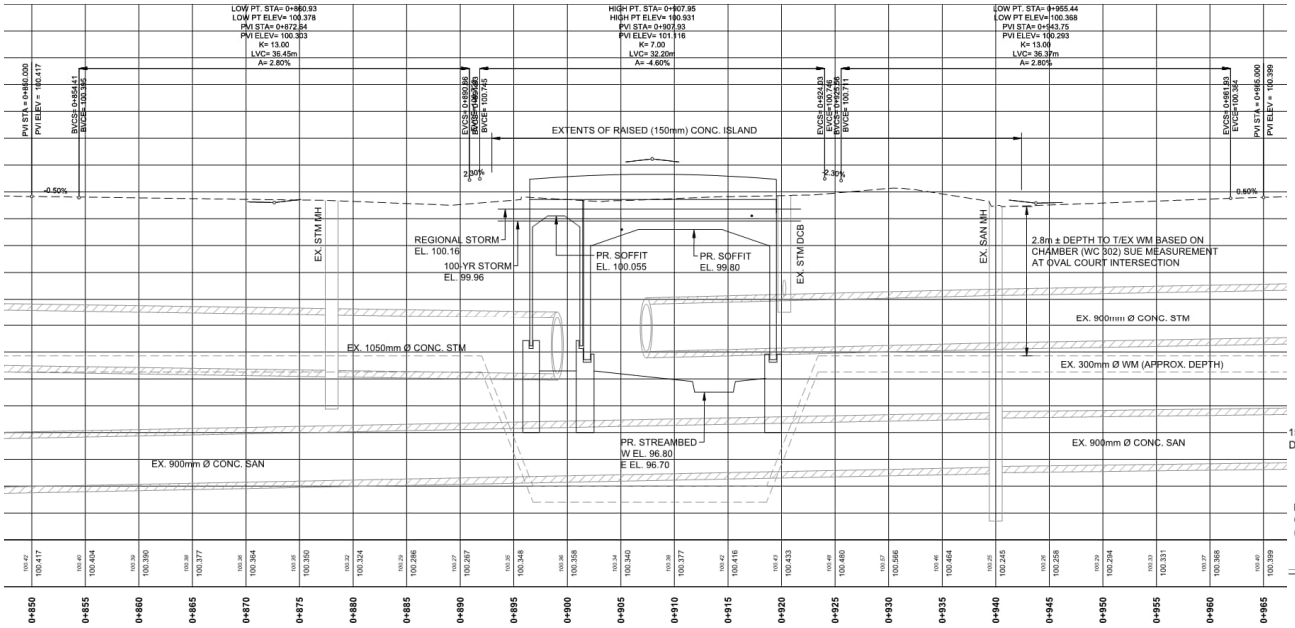


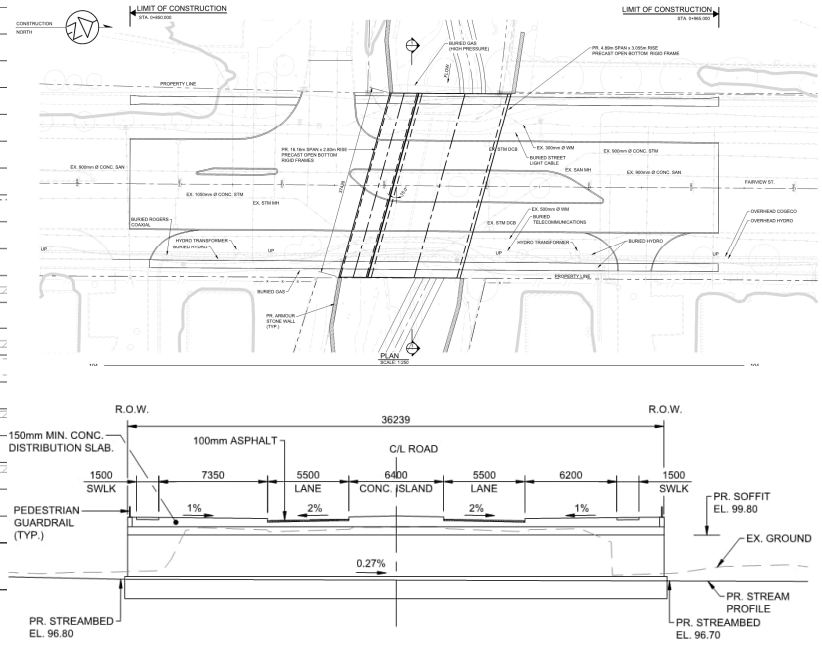


- Twin 10.363 x 2.440 meter precast rigid frames (standard precast size) separated by a central pier, with soffits of both frames set at the same elevation
- Open-bottom rigid frame structures will sit on cast-in-place concrete foundations set into sound rock
- Increase in road elevation above the current road profile is expected to be approximately 350 millimeter based on the thickness of deck of the precast frame and the need for a load distribution slab with built in sidewalks and boulevards
- Bridging over the existing sanitary sewer system may be required where necessary.

Alternative Design Option 2

Two Unequal Span Precast Rigid Frame Culverts

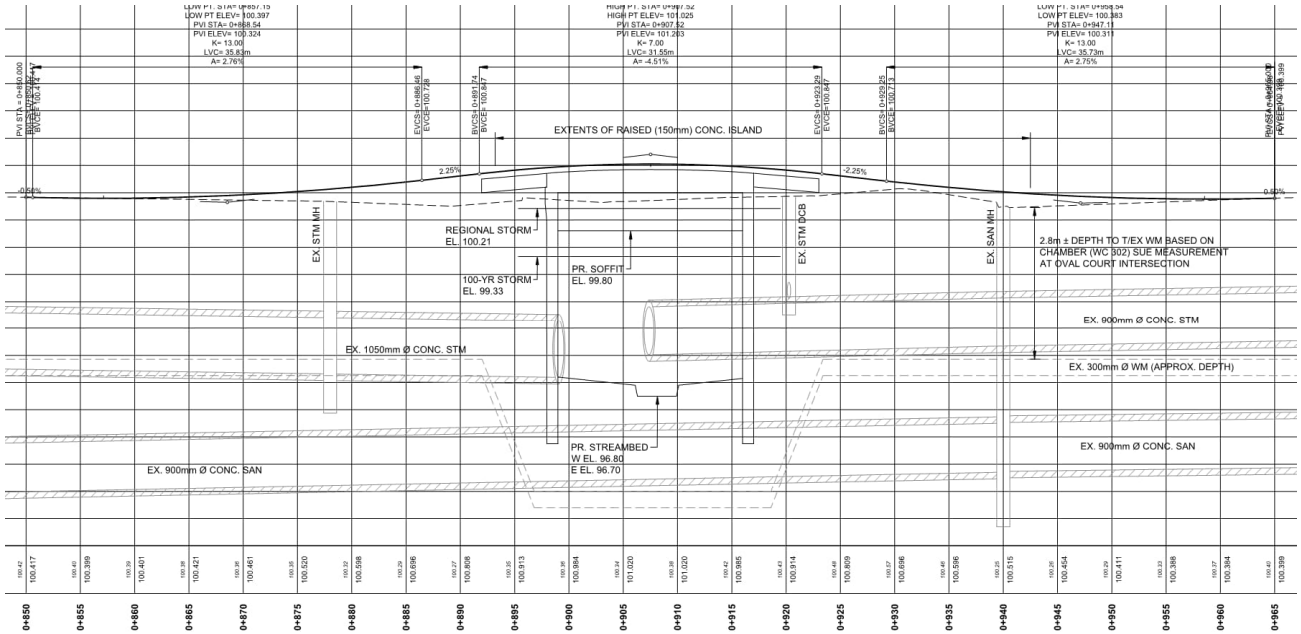


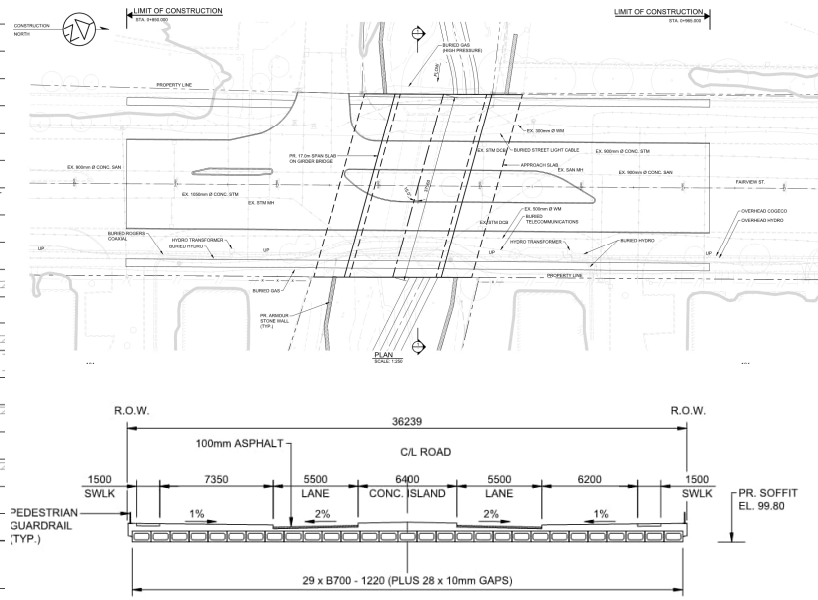


- Two unequal precast rigid frames with spans of 16 meters and 4 meters separated by a pier, with soffits of both frames set at different heights
- Open-bottom rigid frame structures will sit on cast-in-place concrete foundations set into sound rock
- Increase in road elevation above the current road profile is expected to be approximately 550 millimeter based on the thickness of deck of the precast frame.
- Bridging over the existing sanitary sewer system may be required where necessary.

Alternative Design Option 3

Clear Span Precast Box Girder Bridge 17m





- One clear span box girder bridge structure with a span of 17 meter with no central pier
- Open-bottom structure will sit on cast-in-place concrete foundations set into sound rock
- Increase in road elevation above the current road profile is expected to be approximately 700 millimeter based on the thickness of deck of the span box girders
- Bridging over the existing sanitary sewer system may be required where necessary.

Example Barrier Construction

Source: R.J. Burnside and Associates Limited

Parapet Wall with Patterned Concrete and Pedestrian Height Handrail

Source: R.J. Burnside and Associates Limited

Pedestrian Guard Only, with Bicycle Height Handrail

Source: R.J. Burnside and Associates Limited

Parapet Wall with Plain Concrete and Bicycle Height Handrail

Construction Staging

Construction

The construction of the Fairview Street crossing structure must be staged to ensure that access is provided to residential and business areas beyond the structure, including access to Sherwood Forest Park.

First phase -south (downstream) end of the structure:

Starting at the south end allows for enough work area to slide the crossing structure under the existing hydro lines and onto the foundations.

The structure is anticipated to be constructed at the same time as the stream grading and channelization works.

The work area will be isolated from the creek flows using cofferdams. Base creek flows will by-pass the work area using pumping, temporary culverts, temporary channels, or some combination of these as permitted.

Traffic

- Provide one lane in each direction throughout construction.
- Maintain access to driveways and entrances throughout construction.
- Potential for temporary traffic disruption at specific times to be managed by traffic control personnel.

Construction Staging

Stage 1

- Remove centre medians and west boulevard and portions of the sidewalk at the bus entrance road
- Provide a temporary paved road in areas of removals

Stage 2

- Place temporary traffic control devices
- Provide temporary line painting for traffic diversion
- Divert traffic to the west side of the crossing structure
- Remove existing boulevard and sidewalk on the east side
- Remove east portion of the existing crossing structure

Stage 3

- Construct a portion of the crossing structure and headwall

Stage 4

- Place temporary traffic control devices
- Provide temporary line painting for traffic diversion
- Divert traffic to the east side of the crossing structure
- Remove existing sidewalk and road on the west side
- Remove west portion of the existing crossing structure

Stage 5

- Construct remaining portion of the crossing structure, headwall and pedestrian guiderail
- Pave west side of roadway

Stage 6

- Grind out and pave east side of roadway
- Remove all temporary traffic barriers and temporary control devices

Design Considerations

Natural Features

- Proposed mitigation measures should be implemented to minimize potential impacts to natural heritage features which are anticipated to be low and short-term.
- Management of surface water (Appleby Creek) and groundwater will be required to construct footings. Mitigation measures and permits from approval authorities may be required.

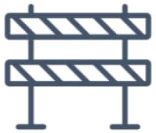
- Construction, including foundations and modifications to the creek are required to be completed during appropriate timing windows to minimize or avoid impact to habitat. Replacement of the existing structure will lead to an overall improvement in fish habitat and valleyland conditions.
- Significant Woodlands, Significant Valleylands, Provincially Significant Wetlands, Significant habitat of Endangered and Threatened species, and Significant Wildlife Habitat are all absent from the proposed project study area.

Utilities

- Infrastructure will need to be managed during construction and / or relocated prior to construction e.g. watermains, storm sewers, sanitary sewers (not to be moved), gas, cable, communications, telephone, and hydro. Excavation should be minimized to limit impact on existing infrastructure.

Road Elevation

- Road profile, intersections and driveways will be impacted to varying degrees by each of the crossing structure options



Access

- Construction activities may impact access to adjacent properties. Access to the park and the residences and businesses beyond Appleby Creek will be maintained at all times.

Next Steps

June 28, 2024
- Review feedback from the Open House

July 8 to August 6, 2024
- 30-Day Addendum review comment period
  - Appleby Creek Flood Mitigation Study Addendum posted for public review and comment until August 8, 2024

Following the Addendum Process

September 2024
- Selection of the preferred design of the Fairview Street crossing structure and complete detailed design

- Implementation

October 2024 to February 2025
  - Obtain required permits and approvals
  - Begin construction

Thank You

Help shape decisions made in this Study

Please fill out a comment form, or complete and submit the comment form available on the Project website at the link provided.

Open House information materials about the Addendum study will be made available online at *burlington.ca/applebyflood* for review and comment until **June 28, 2024**.

An electronic copy of the Addendum report will be available for viewing on the City webpage for public review and comment for 30 days starting **July 8 and ending August 6, 2024.**

If you would like more information or if you have any questions or concerns, please contact:

Arif Shahzad, M.Eng., P.Eng.
Stormwater Engineer - Capital
City of Burlington
426 Brant Street, P.O. Box 5013
Burlington ON L7R 3Z6
Phone: 905-335-7600 ext. 7486
Email: Arif.Shahzad@burlington.ca

Philip A. Rowe, C.E.T., EP.
Consultant Project Manager
R.J. Burnside & Associates Limited
1266 South Service Road, Suite C2
Stoney Creek ON L8E 5R9
Phone: 905-821-5915
Email: Philip.Rowe@rjburnside.com