

Welcome

Welcome to the online Public Information Centre No. 1

Dixie-Dundas Flood Mitigation Project

Schedule C Municipal Class Environmental Assessment

<http://www.mississauga.ca/flooding>

PRIME STRATEGY & PLANNING
innovative planning for sustainable communities

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Contact Information

If you would like to be included on the project mailing list and/or provide input, please complete the project comment form available at

<http://www.mississauga.ca/flooding>

and submit by email to

anthony.digiandomenico@mississauga.ca

or

adoherty@matrix-solutions.com

Input from Public Information Centre No. 1 will be received until

September 4, 2020

Thank you for participating!

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EA Public Information Centre (PIC) Overview

PIC No. 1

1. Project Overview
2. Existing Conditions
3. Problem and Opportunity
4. Hydraulic Screening
5. Conceptual Alternative Solutions
6. Preliminary Impact Assessment
7. Next Steps

The purpose of this PIC No. 1 is to:

- Introduce the public to the project
- Present conceptual alternative solutions for input
- Provide opportunity for interested parties to offer input on the evaluation criteria and identify any concerns or local information that will support the Municipal Class Environmental Assessment (EA) process

PIC No. 2, which will be announced later in the project, will:

- Present results of a detailed evaluation of alternative solutions, including incorporating public input, to select a preferred solution
- Present the alternative designs of the preferred solution for input
- Provide opportunity for interested parties to identify any concerns or local information that will support the EA process

Engagement

- Consultation is an essential part of the Municipal Environmental Assessment process. We want to ensure that anyone with an interest in the study has the opportunity to provide input as the study proceeds.
- We are engaging the following stakeholders to provide the opportunity to express concerns and preferences:
 - Residents and businesses
 - Regulators
 - Indigenous community
- Engagement will provide an opportunity to collaborate on the project and identify concerns or additional studies that may be required. Cambium Indigenous Professional Services will facilitate discussions with the Indigenous community regarding traditional lands and knowledge.



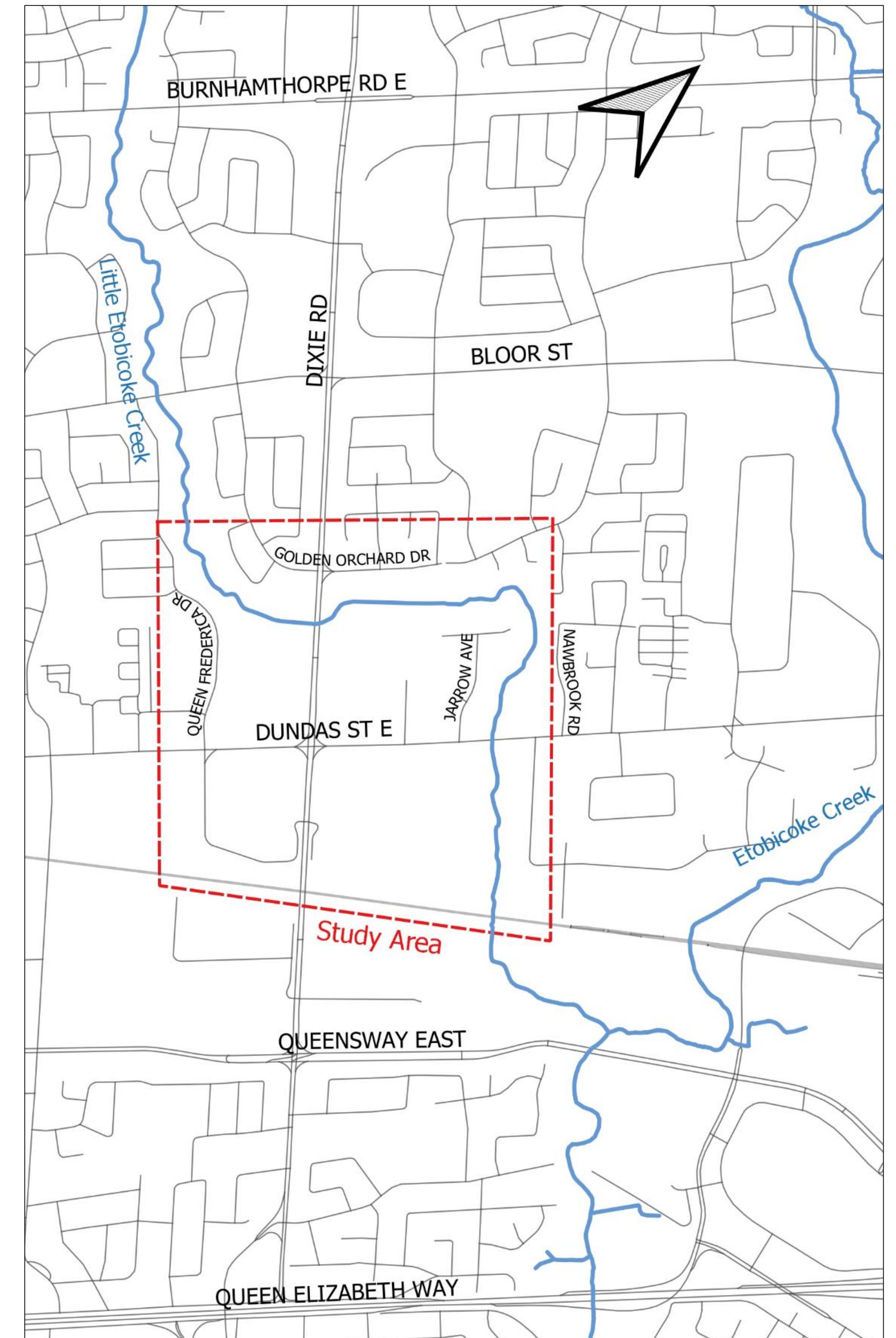
Little Etobicoke Creek (Matrix 2020)

Project Overview

Project Overview

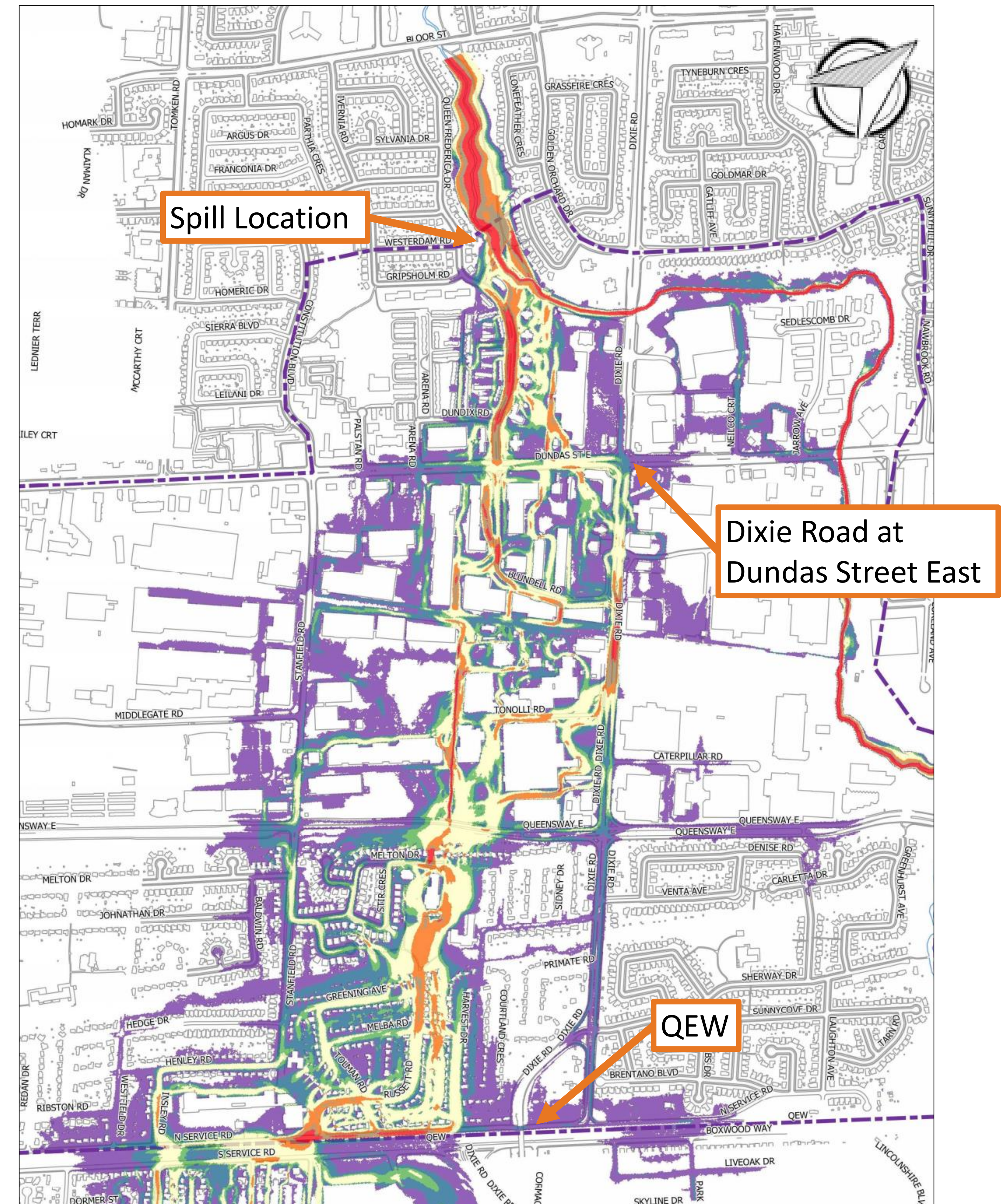
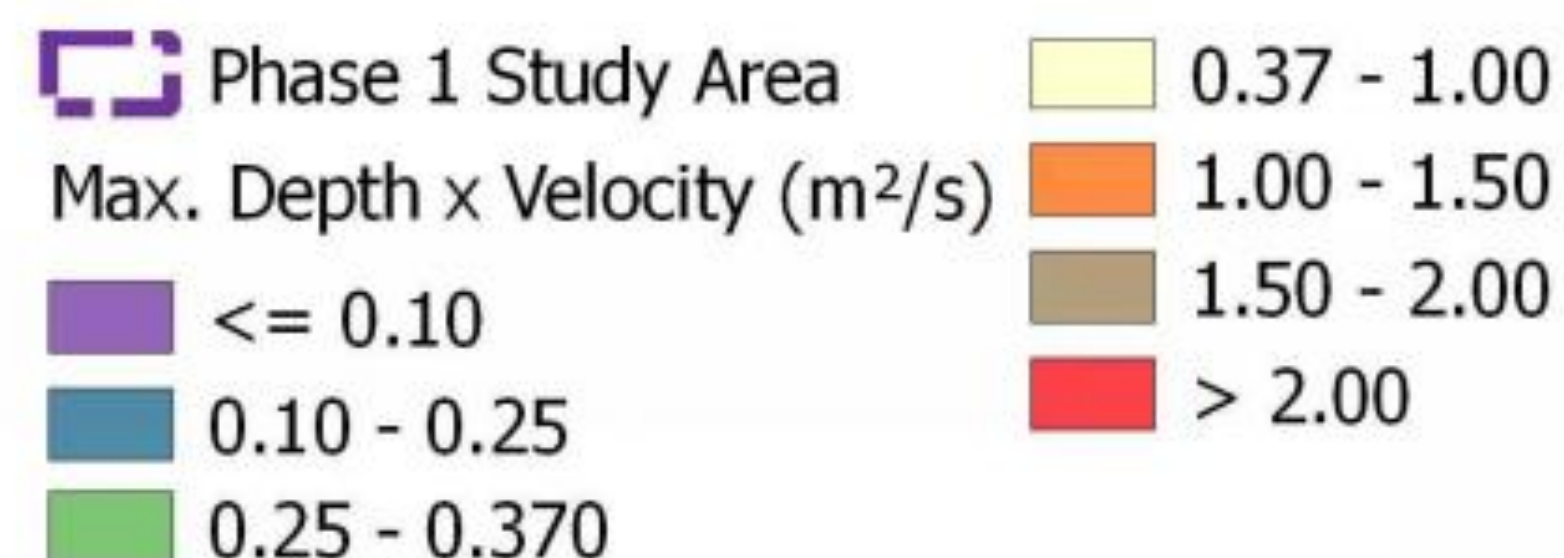
The *Dixie-Dundas Flood Mitigation Feasibility Study* and Municipal Class EA process seeks solutions to address flooding from Little Etobicoke Creek to protect existing residences and businesses as well as to enable future growth.

- Over 1,000 residential, commercial, and industrial properties between the Little Etobicoke Creek study area and the Queen Elizabeth Way are at risk of flooding
- The City of Mississauga has an interest to intensify Dixie-Dundas to fulfill the vision of growth expressed in the *Dundas Connects Master Plan* (City of Mississauga 2018)



Extent of Flooding

- As part of Phase 1 of the *Little Etobicoke Creek Flood Evaluation Study and Master Plan* (in progress), the following extent of flooding was determined through detailed flood mapping of the Regional event
- The detailed mapping more clearly indicates where over 1,000 residential, commercial, and industrial properties have been determined to be at flood risk
- The *Little Etobicoke Creek Flood Evaluation Study and Master Plan* only mapped as far as the QEW. Flooding is anticipated to continue beyond the QEW to Lake Ontario.



Dundas Connects Master Plan

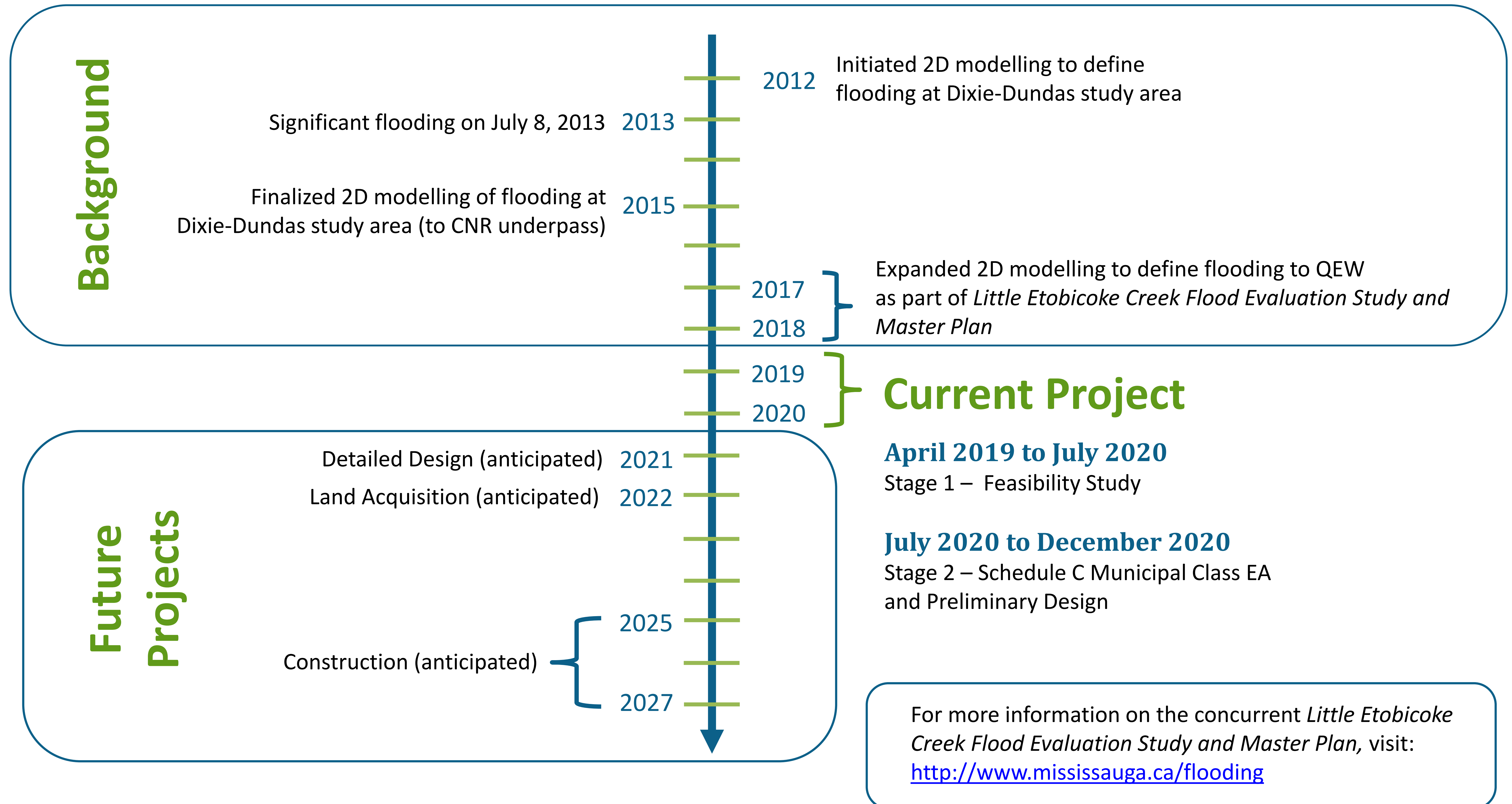
- The City of Mississauga's *Dundas Connects Master Plan* is a separate but related project which expresses a vision of growth centered around the Dixie GO Station and proposed higher-order transit along Dundas Street
- This vision of growth cannot be fully implemented without first addressing the flooding in the study area
- For more information visit <https://www.dundasconnects.ca>



Image: [The Dundas Connects 3D Mass Model](#) (Davkra, 2018)



Project Timeline



Feasibility Study

Background Review

- Review of previous flood and creek studies near study area
- Review City of Mississauga, Region of Peel, and TRCA data in study area

Technical Studies

Four technical studies were completed to identify constraints and opportunities for developing flood mitigation solutions. These studies include:

- Geomorphology assessment
- Natural heritage study
- Geotechnical study
- Stage 1 archaeology assessment

Hydraulic Screening

Hydraulic screening was completed to assess potential mitigation approaches including:

- Conveyance improvements
- Flood containment
- Flow diversions
- Storage
- Policy measures

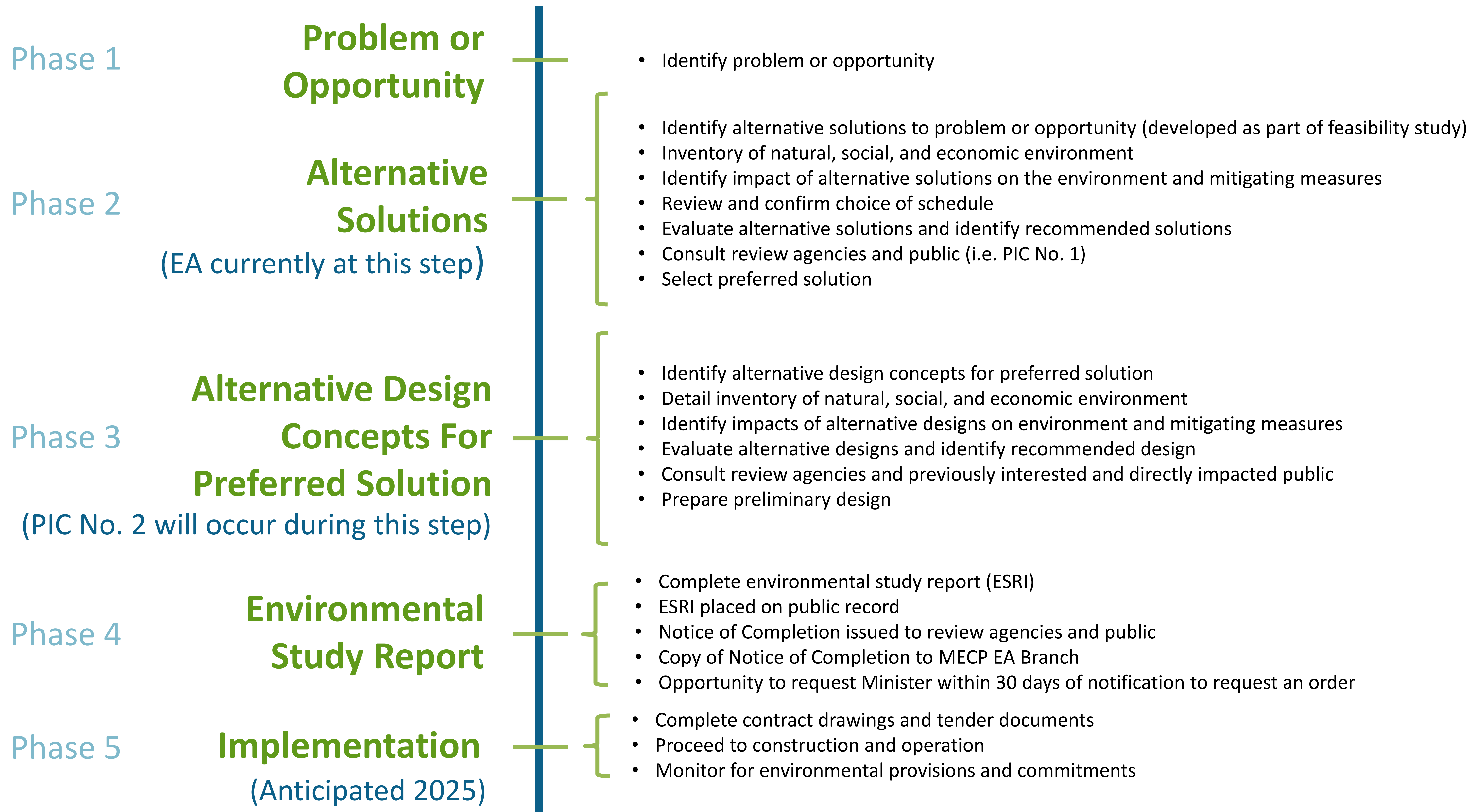
Conceptual Alternative Solutions

Based on the results of the technical studies and screening of high-level solutions, three alternative solutions were developed to conceptual design:

- **Option 1:** Improved Conveyance with Minimized Footprint
- **Option 2:** Improved Conveyance by Making Room for the Creek
- **Option 3:** Flood Containment with Mitigation for Upstream Impacts

Stage 2 EA (Current)

Municipal Class Environmental Assessment



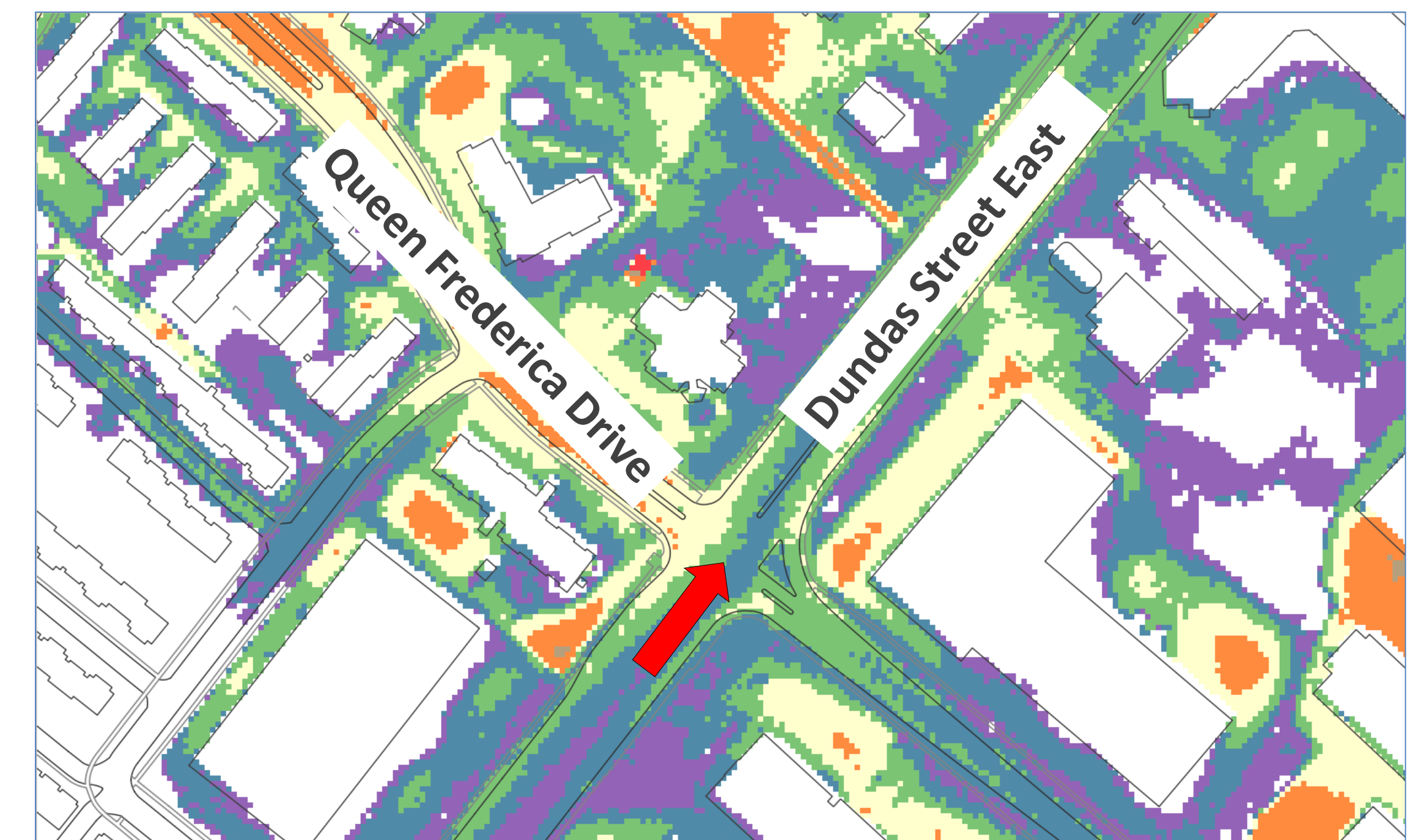
Existing Conditions

Dundas Street East – July 8, 2013

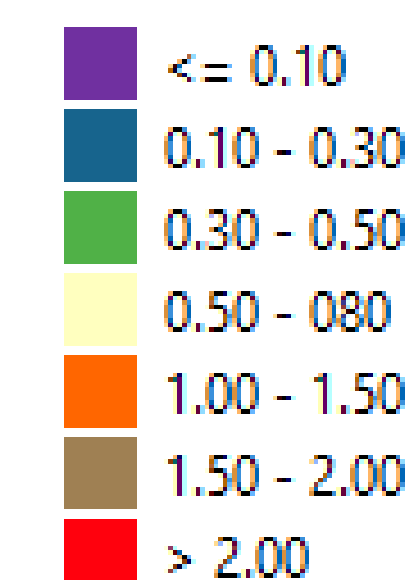


Video Source: <https://www.youtube.com/watch?v=vHedGvWa5Q>

- The estimated Little Etobicoke Creek peak flow on July 8, 2013 was 130 m³/s in the study area
- For comparison, the Regional event has a significantly higher estimated peak flow of 200 m³/s
- The project will seek a solution that addresses the larger Regional event



Max Depth (m)



Camera location and
general direction



CNR Underpass – July 8, 2013

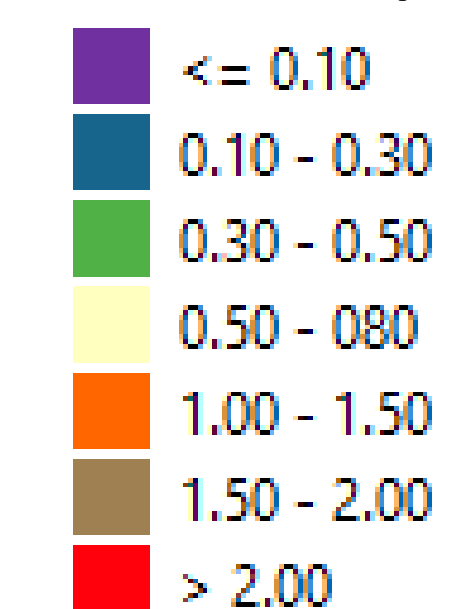


- Estimated water depth exceeded 2 m at the CNR underpass at Dixie Road
- The risk of flooding in this area is expected to be reduced or eliminated by implementing flood mitigation solutions



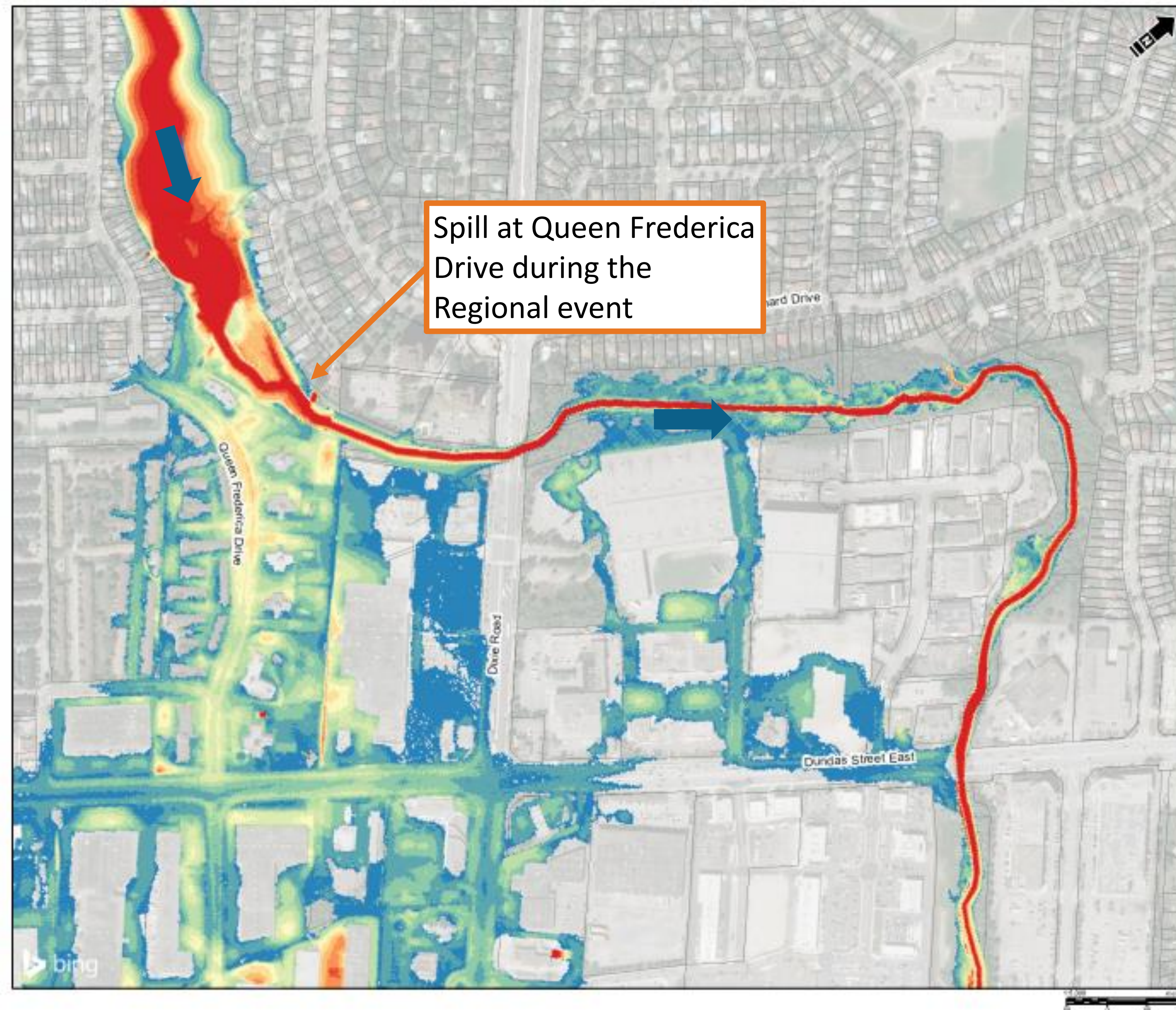
Video Source: <https://www.youtube.com/watch?v=Bf8xB31pLeU>

Max Depth (m)



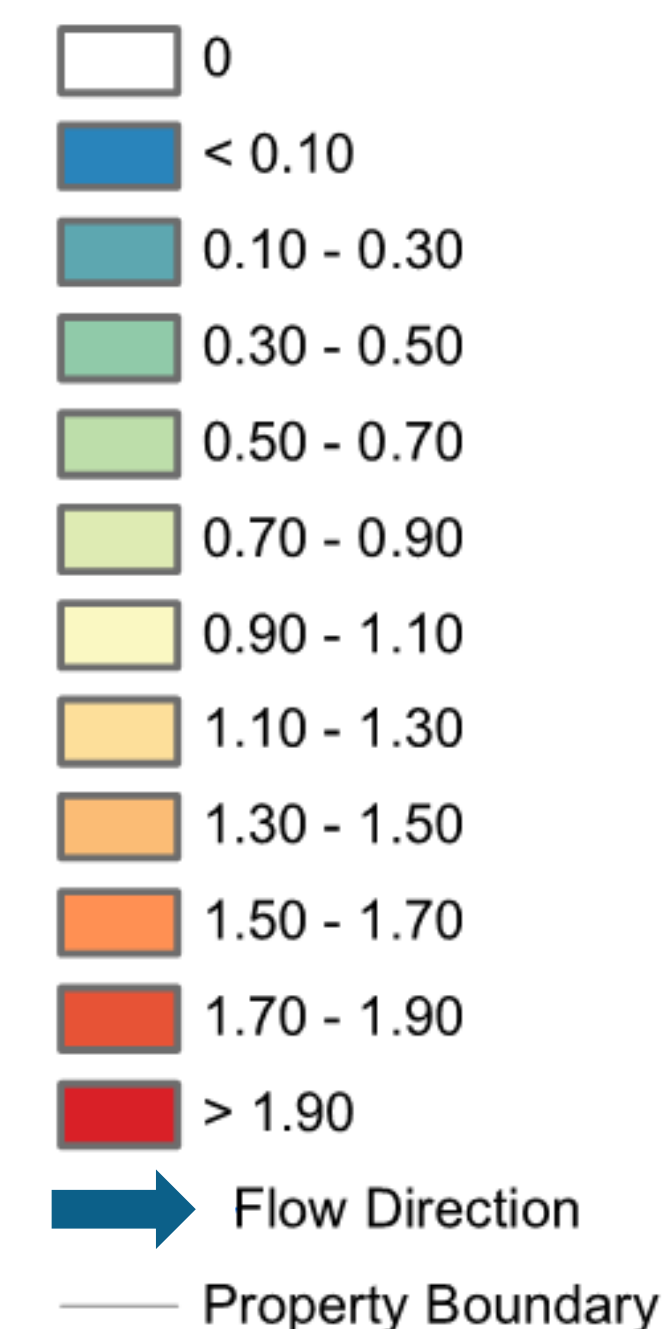
Camera location and
general direction
0:00 to 0:30 →

Existing Conditions



- Approximately 130 m³/s of the total 200 m³/s Regional event flow spills at Queen Frederica Drive and exits the Little Etobicoke Creek valley corridor
- The Regional event, which is derived from Hurricane Hazel (1954), is recognized as the regulatory flood in the study area
- The area that floods during the Regional event (i.e. the regulatory floodplain) expands over a wide urbanized area

Existing Conditions Regional Flood Depths (m)



Little Etobicoke Creek



Upstream of Dixie Road



Downstream of Dixie Road

Types of Flooding

	Riverine	Urban
Major System (Overland Flow)	<p>Flooding is a natural feature of river systems.</p> <ul style="list-style-type: none"> • High water levels from creeks and rivers • Standing and flowing water in floodplains 	<p>Occurs when the roadways and other surface flow paths cannot contain major flows.</p> <ul style="list-style-type: none"> • Large, less frequent storm events • Flooding onto private property from the public right of ways • Ponding in low areas (e.g. road sags and underpasses) • Basement flooding via windows or doors
Minor System (Storm Sewers)	<p>Occurs when culverts or ditches cannot convey flows from a certain storm event.</p> <ul style="list-style-type: none"> • Flow spilling from ditches 	<p>Occurs when the storm sewer system does not have capacity to convey a certain storm event.</p> <ul style="list-style-type: none"> • Smaller, more frequent storm events • Basement flooding via floor drains • Flow coming out of catch basins (perhaps at reverse sloped driveways)

The focus of the Dixie-Dundas Flood Mitigation is to solve the **Major System Riverine Flooding** by keeping flows within the Little Etobicoke Creek valley corridor. Note that urban flooding can also occur independently within private property due to poor lot grading or blockages (downspouts, private ditches, or catch basin inlets).

Minor system and urban flooding are being assessed in the concurrent *Little Etobicoke Creek Flood Evaluation Study and Master Plan*. More information will be available at this link upon study completion: <http://www.mississauga.ca/flooding>.

Agency Roles and Responsibilities

There are multiple government agencies working together to regulate flood risk and maintain drainage infrastructure within the City of Mississauga. The roles and responsibilities of each are summarized below. These agencies have come together in order to complete project.

City of Mississauga	Region of Peel	Conservation Authority (TRCA*)
<ul style="list-style-type: none">▪ Road drainage▪ Storm sewers▪ Parks▪ Greenbelt▪ Trails▪ City trees▪ Creek erosion and flow management	<ul style="list-style-type: none">▪ Regional roads▪ Sanitary sewers▪ Watermains	<ul style="list-style-type: none">▪ Floodplain mapping and management policies▪ Flood forecasting and warning▪ Flood messaging▪ Flood hazard management

* Note: Infrequent floods currently spill to Credit Valley Conservation (CVC) jurisdiction

Problem and Opportunity

Problem Statement

The lands south of Little Etobicoke Creek surrounding Dixie Road, referred to as “Dixie-Dundas” for this project, are subject to flooding from as little as a 5-year storm event. This urban area consists of park and trail, commercial, industrial, and residential land uses and includes designated Special Policy Areas (SPAs) which regulate future development due to flood risks. The City of Mississauga has an interest to protect flood-vulnerable residences and businesses as well as to intensify Dixie-Dundas to fulfill the vision of growth expressed in the *Dundas Connects Master Plan*. This vision of growth centres around the Dixie GO Station and proposed higher-order transit along Dundas Street and it cannot be fully implemented without first addressing the flooding and updating the SPA policies as part of a concurrent initiative by the City Planning Strategies Division.

Opportunity Statement

The Dixie-Dundas Flood Mitigation Feasibility Study and subsequent Municipal Class Environmental Assessment (EA) process seeks solutions to address flooding from Little Etobicoke Creek to protect existing residences and businesses as well as to enable future growth. Any acceptable flood protection solution will, to the extent possible, lower or maintain delineated flood lines, and minimize impacts to landownership, land use conditions, and existing and proposed infrastructure. Floodplain mapping would be updated to reflect a flood mitigation solution, in addition to the concurrent SPA initiatives by the City, to provide greater certainty for future development and provide confidence that existing assets are protected to the extent possible.

Summary Statement

Residences and businesses near the major transit station area at Dixie-Dundas are currently highly vulnerable to flooding from Little Etobicoke Creek. *The Dixie-Dundas Flood Mitigation Feasibility Study* and Class EA will assess solutions to provide flood protection to residences and business as well as to enable future growth.

Screening of Potential Mitigation Options

Screening of Potential Mitigation Options

Conveyance Improvements

Screening Scenarios

- Increase Channel Conveyance – widen the Creek
- Channel Lowering – deepen the Creek
- Bridge Replacement – replace the Dixie Road Bridge with a larger structure that spans the width of any channel improvements

Screening Outcome

- Combining channel conveyance improvements with replacement of the Dixie Road Bridge is technically feasible
-

Flood Containment

Screening Scenarios

- Berm/Dyke – raised bank/long wall or embankment
- Flood Protection Landform (FPL) – a wide, berm-like structure on the south side of the Creek
- Floodwall – high walls designed to contain flooding

Screening Outcome

- Floodwall and berm/dykes are not considered permanent solutions under Provincial Policy and therefore would not meet project objectives of enabling growth at Dixie-Dundas
 - FPL is technically feasible and the use of an FPL has been accepted as a permanent solution on the Don River in the City of Toronto
-

Screening of Potential Mitigation Options

Flow Diversion

Screening Scenarios

- Upstream Flow Diversion – buried pipes upstream of study area to divert flows from Little Etobicoke Creek to Etobicoke Creek
- Local Flow Diversion – flow diversion conduit along Queen Frederica Drive and Dundas Street East

Screening Outcome

- Upstream flow diversion anticipated to be impractical due to cost, utility conflicts, and ecological considerations
 - Local flow diversion is not considered feasible on its own due to significant land and pipe requirements
-

Flow Storage

Screening Scenarios

- Regional Flood Control – install large storage facility upstream to contain floods
- Online Storage – reduce capacity of upstream bridges to reduce flows at Dixie-Dundas

Screening Outcome

- Regional flood control is not considered feasible on its own due to significant storage volume requirements
 - Online storage would not be acceptable in Ontario
-

Screening of Potential Mitigation Options

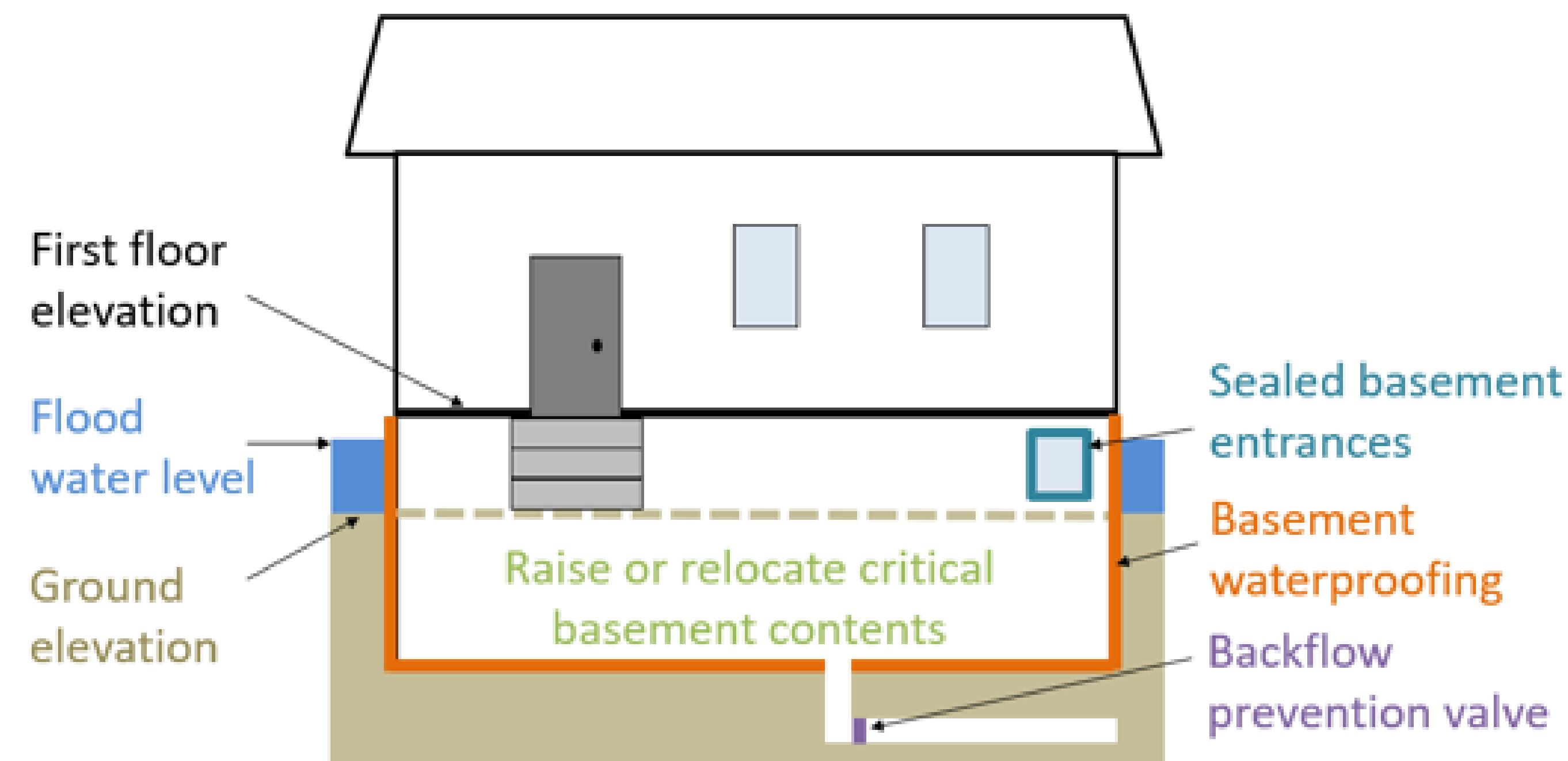
Policy Measures

Screening Scenarios

- Floodproofing – includes structural alterations to buildings to reduce flood damages
- Land Acquisition – reducing flood risks through expropriation or property purchases

Screening Outcome

- Policy measures are not considered practical on their own as over 1,000 residential, commercial, and industrial properties between the spill location and the QEW are at risk of flooding
- Policy measures would not meet project objectives of enabling growth at Dixie-Dundas area



Floodproofing (Matrix 2019)

Conceptual Alternative Solutions

Technical Studies

Geotechnical Study (Thurber 2019)

Assessment of existing conditions including:

- Slope stability
- Pavement conditions
- Preliminary recommendations for bridge foundation
- Recommended geotechnical drilling for design



Dixie Road Bridge (Thurber 2019)

Fluvial Geomorphology Study (Matrix 2020)

Characterization of the Creek's geomorphology including:

- Channel stability and any potential erosion concerns
- Fish habitat considerations
- Channel design recommendations



Little Etobicoke Creek (Matrix 2020)

Stage 1 Archaeology Assessment (ASI 2019)

Assessment of the archaeological potential that:

- Confirmed no known archaeology sites near the study area
- Concluded test pits as part of a Stage 2 assessment were required before construction



Applewood Trail (ASI 2019)

Natural Heritage Study (Matrix 2020)

Inventory of the natural heritage within the study area including:

- Woodlands
- Wildlife habitat
- Fish and fish habitat



Riparian habitat (Matrix 2020)



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Conceptual Alternative Solutions

The hydraulic screening concluded that keeping flow within the Little Etobicoke Creek valley corridor is hydraulically feasible and determined the best approaches to fit the land constraints imposed by the highly urbanized watershed. Based on this conclusion, three alternative solutions were developed to conceptual design. These concepts will be evaluated against the “Do Nothing” option.

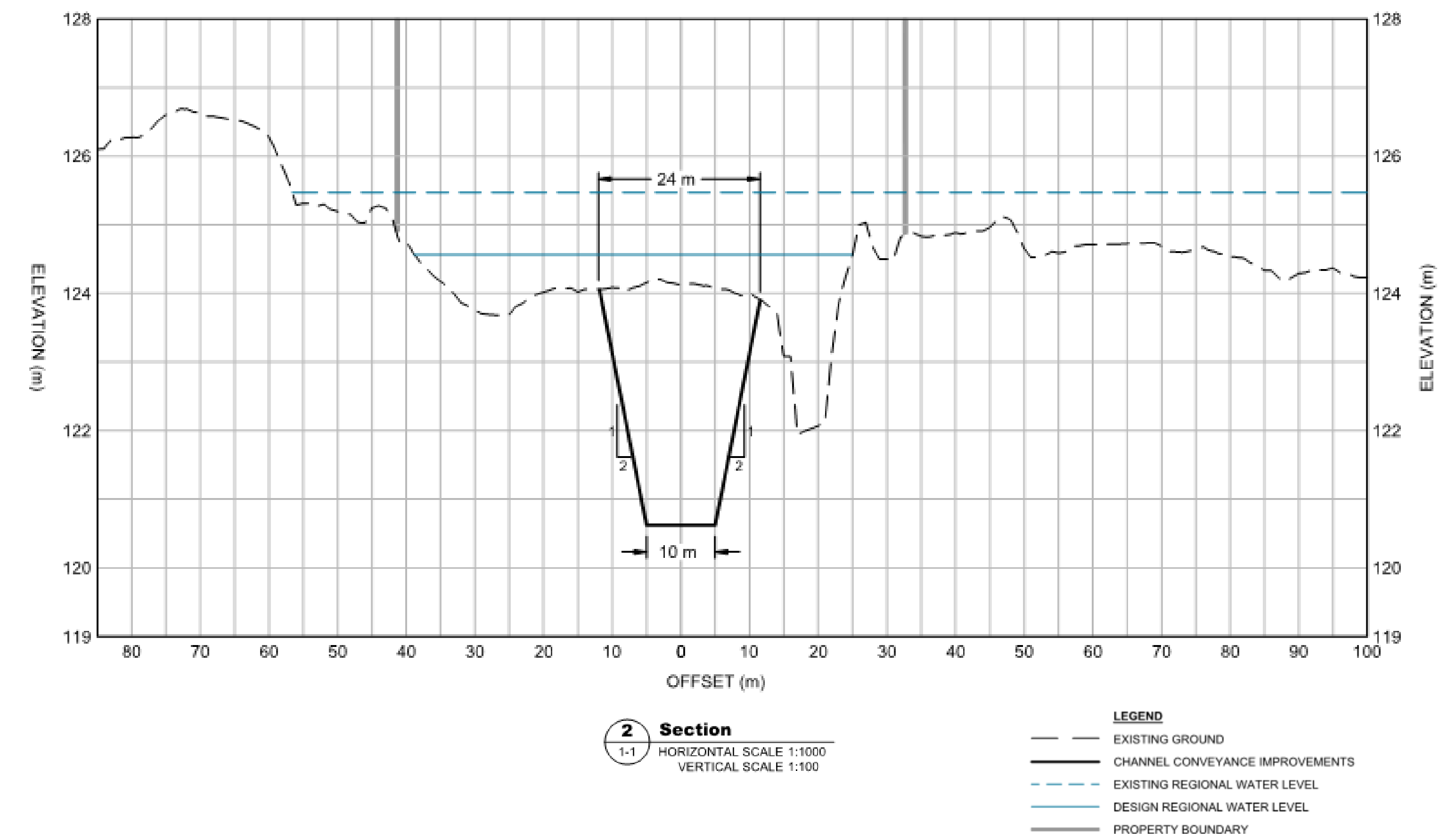
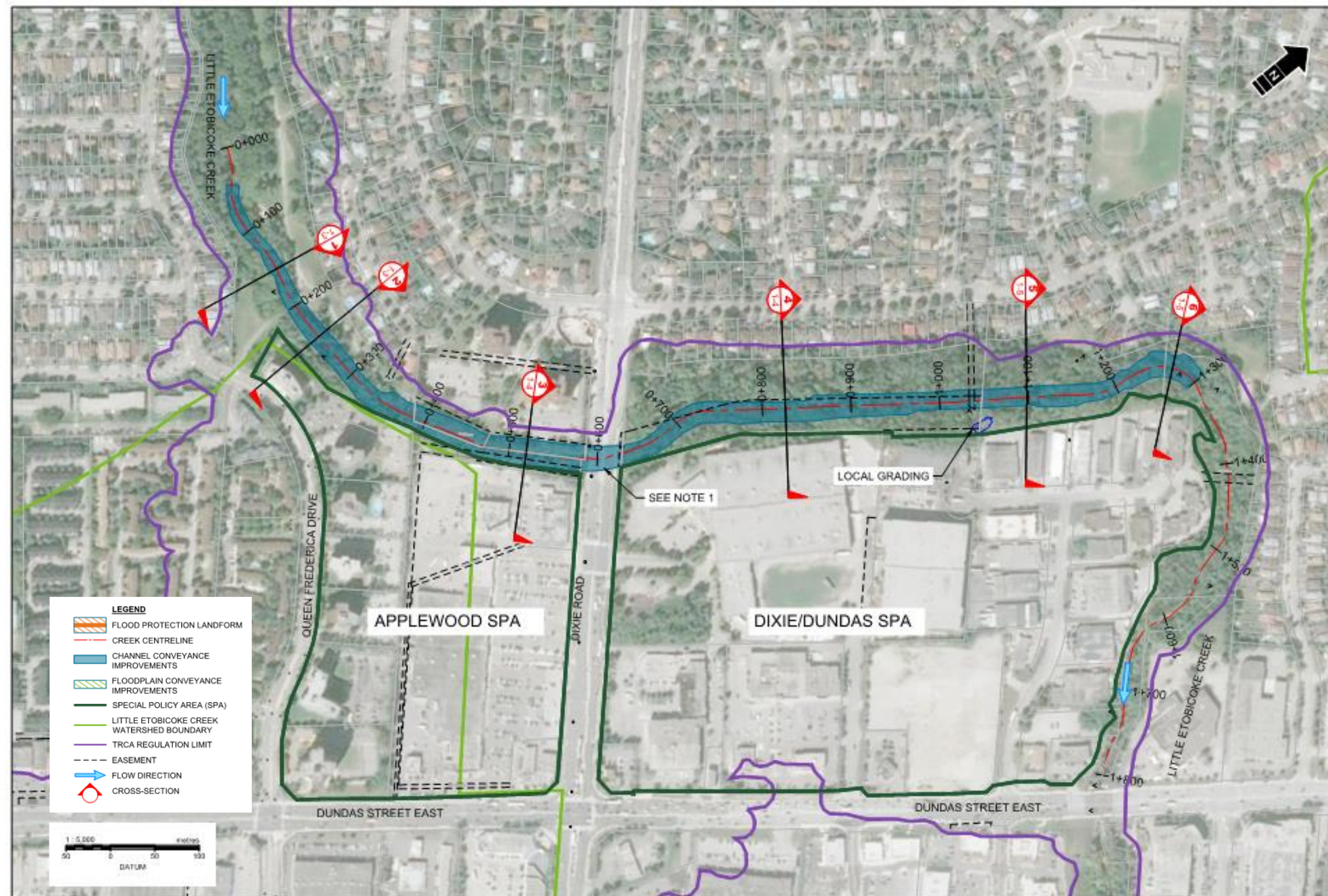
- **Option 1 – Improved Conveyance with Minimized Footprint**
- **Option 2 – Improved Conveyance by Making Room for the Creek**
- **Option 3 – Flood Containment with Mitigation for Upstream Impacts**
- **Option 4 – Do Nothing**

Each alternative represents a different approach to keep flow within the Little Etobicoke Creek valley corridor combined with a Dixie Road Bridge replacement.

Option 1 – Improved Conveyance with Minimized Footprint

The concept of this alternative is to create a narrow and deep channel from 500 m upstream of Dixie Road to 700 m downstream.

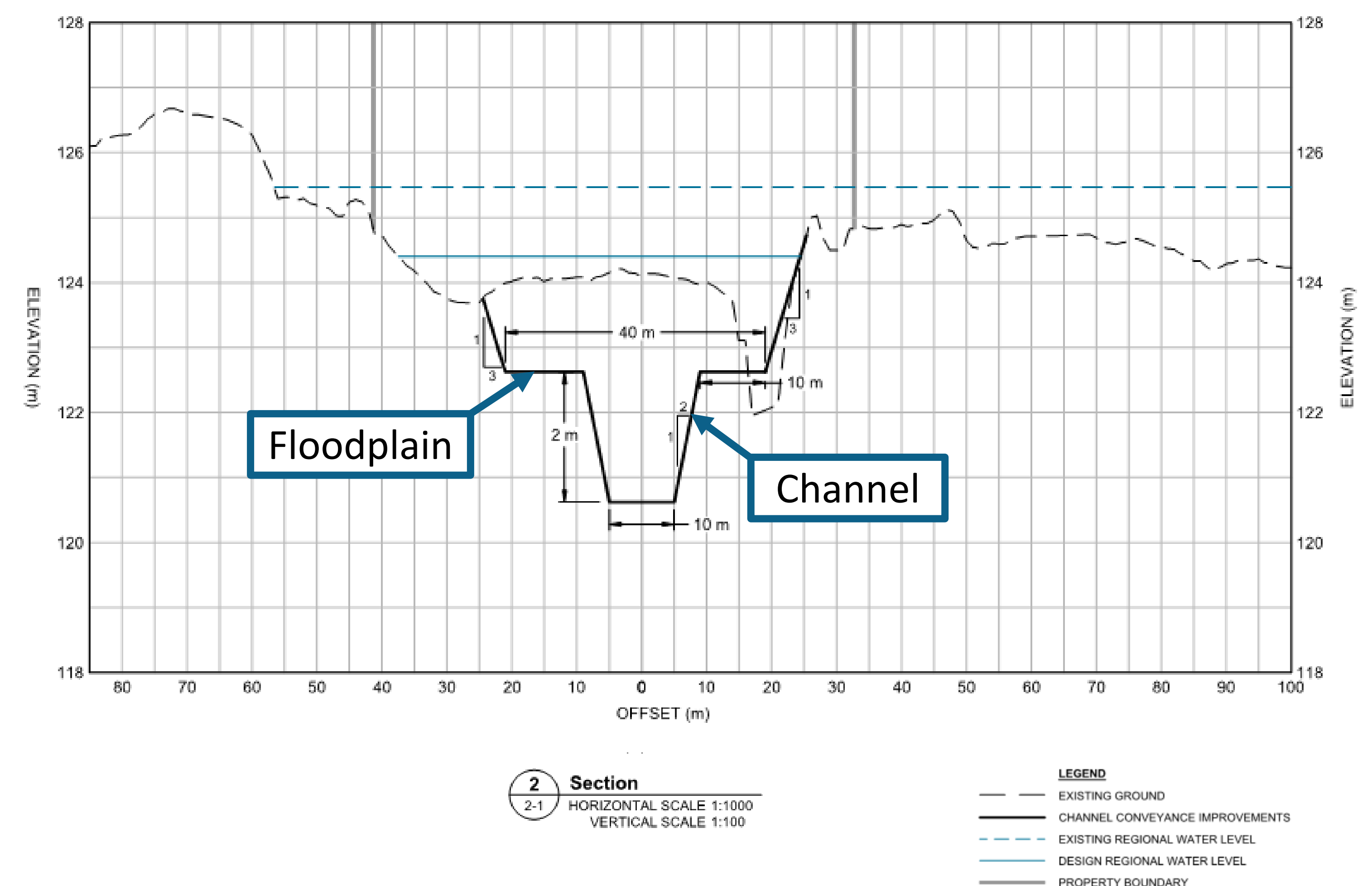
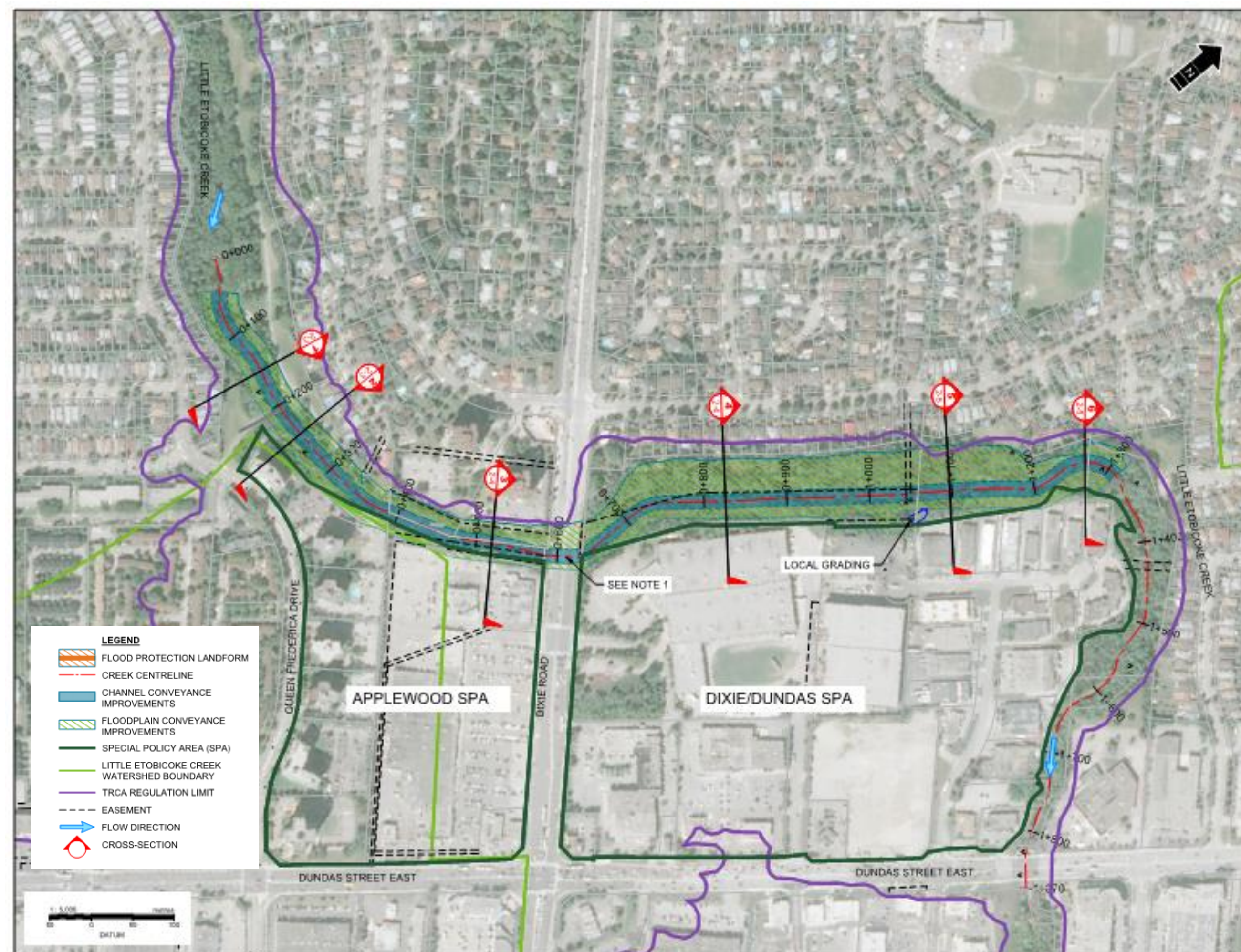
- Channel top width increased from the existing 10 to 20 m (varies) to 17 to 30 m (varies)
- Upstream 600 m of channel lowered by 1 m on average
- Preliminary cost estimate \$23M (includes bridge replacement)



Option 2 – Improved Conveyance by Making Room for the Creek

This alternative is modelled on natural channel design concepts, with a widened channel and lowered adjacent ground that creates a wider and better-connected floodplain, from 500 m upstream of Dixie Road to 700 m downstream.

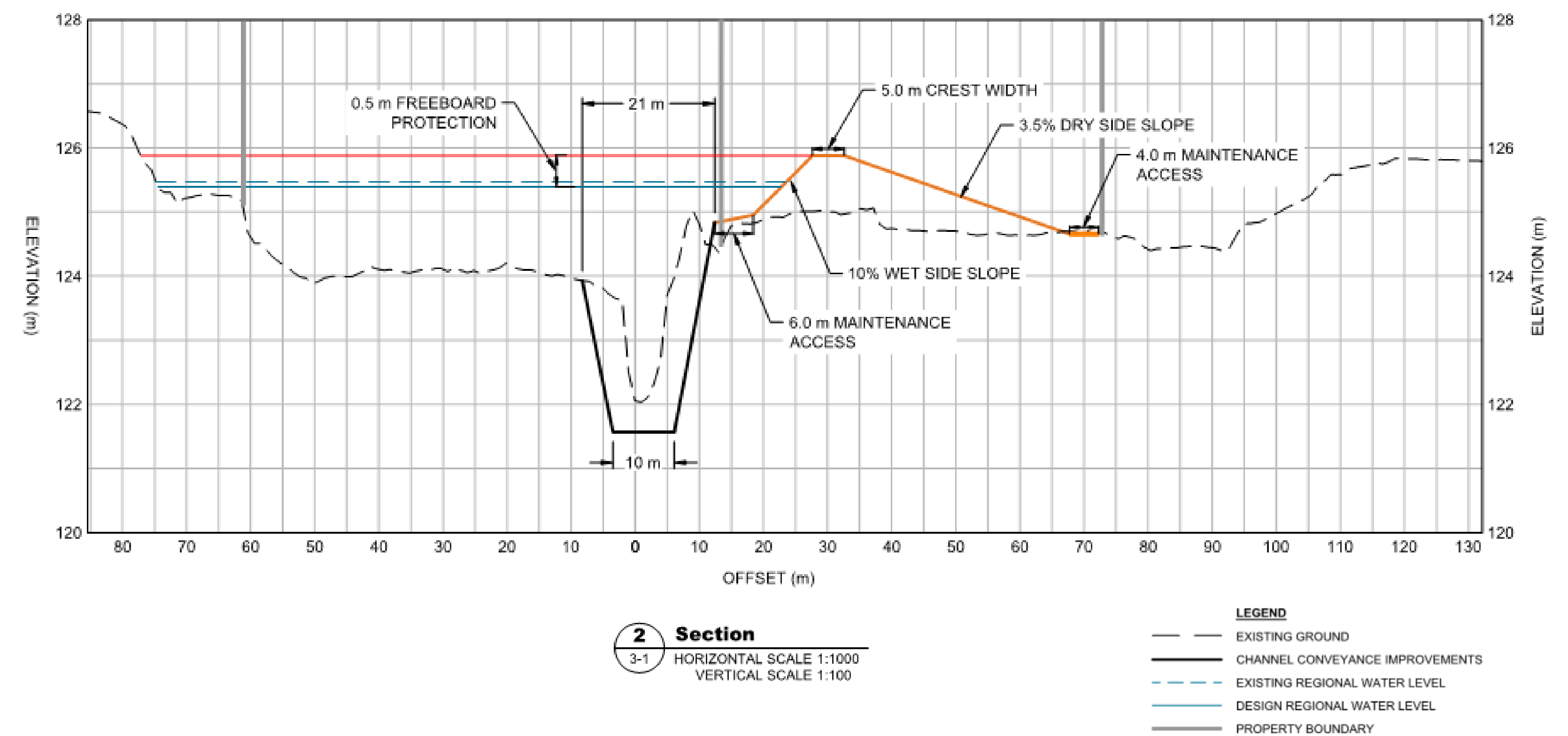
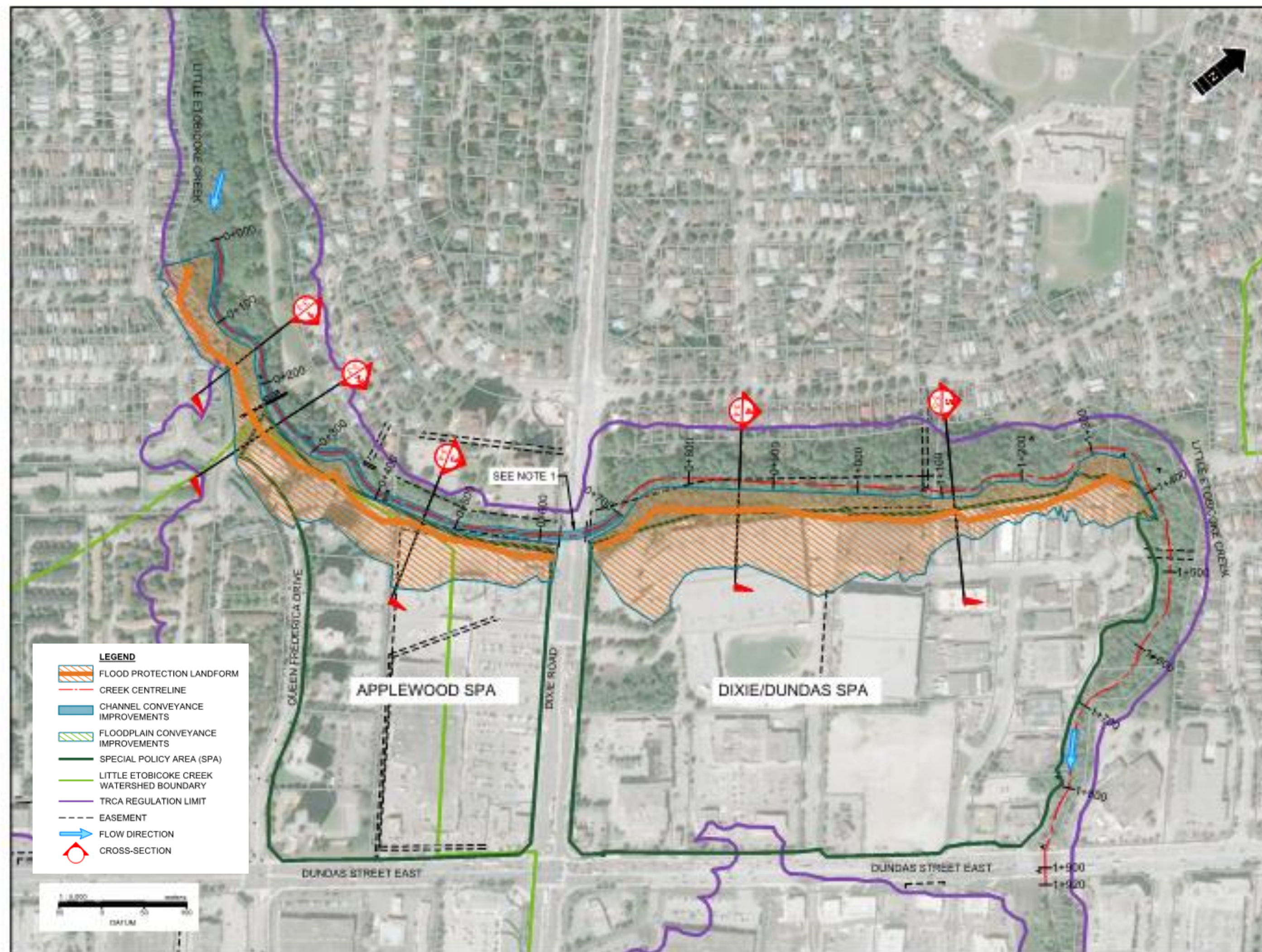
- Channel top width increased from the existing 10 to 20 m (varies) to 17 to 21 m (varies)
- Channel depth reduced from the existing 1.6 to 3.5 m (varies) to 1.6 m to 2.0 m (varies) by lowering adjacent ground to create a floodplain
- Upstream 600 m of channel lowered by 1 m on average
- Preliminary cost estimate \$22M (includes bridge replacement)



Option 3 – Floodplain Containment with Mitigation for Upstream Impacts

The concept of this alternative is to contain the Regional event within the valley corridor using a Flood Protection Landform (FPL). The FPL would extend from 500 m upstream of Dixie Road to 700 m downstream.

- Requires a wide footprint area due to the shallow slope on the dry side of the FPL
- Minor widening for the upstream 600 m of channel to counter backwater impacts of FPL
- Preliminary cost estimate \$146M (due to bridge replacement and significant property impacts)



Dixie Road Bridge Replacement

- Currently over half of the Regional event spills from the creek upstream of the Dixie Road Bridge, with this spill partially caused by backwater created from the bridge
- The existing Dixie Road Bridge is not able to convey flow from the Regional event, and especially not if all flow were to remain in the creek valley corridor as part of a flood mitigation solution
- Solving the spill by keeping flow within the valley corridor requires the bridge to be replaced



12 m span Dixie Road Bridge (Thurber 2019)



The current Dixie Road Bridge at Little Etobicoke Creek provides six lanes of traffic plus a left turn lane.

Dixie Road Bridge Replacement

The conceptual bridge replacement options for each alternative solution is summarized as follows (R.V. Anderson Associates Limited 2020):

Option 1: *Improved Conveyance with Minimized Footprint*

- **Bridge Span:** Single-span with total opening width of 26 m
- **Road Construction:** Dixie Road would need to be raised 1.7 m resulting in significant road construction
- **High-Level Cost Estimate:** \$7.6M for bridge and road construction (\$23M total for Option 1)

Option 2: *Improved Conveyance by Making Room for the Creek*

- **Bridge Span:** Two-span with a total opening width of 45 m
- **Road Construction:** Dixie Road would need to be raised 0.7 m resulting in less road construction compared to Options 1 and 3
- **High-Level Cost Estimate:** \$5.4M for bridge and road construction (\$22M total for Option 2)

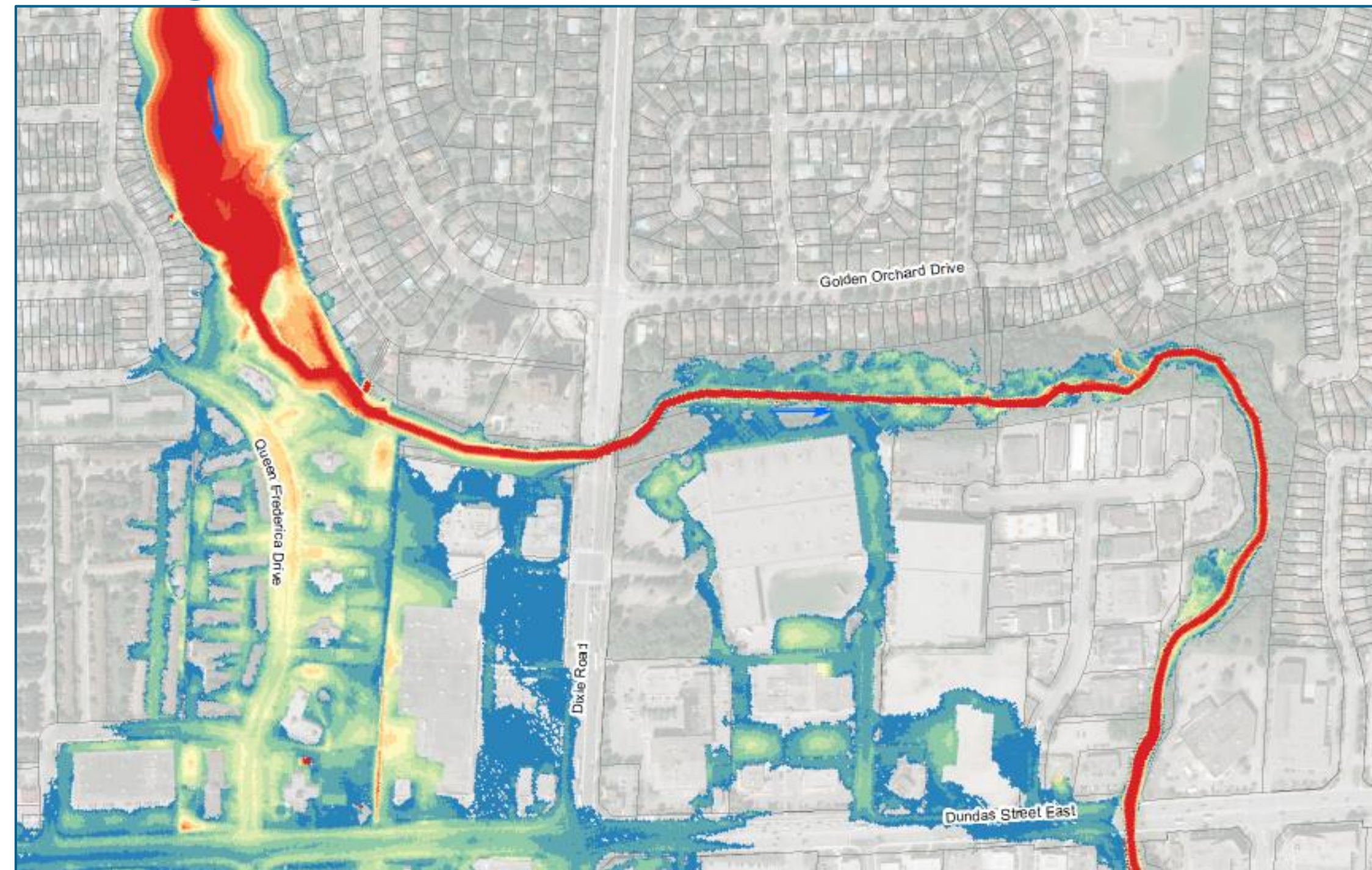
Option 3: *Flood Containment with Mitigation for Upstream Impacts*

- **Bridge Span:** Single-span with total opening width of 28 m
- **Road Construction:** Dixie Road would need to be raised 2.3 m resulting in major road construction
- **High-Level Cost Estimate:** \$8.4M for bridge and road construction (\$146M total for Option 3)

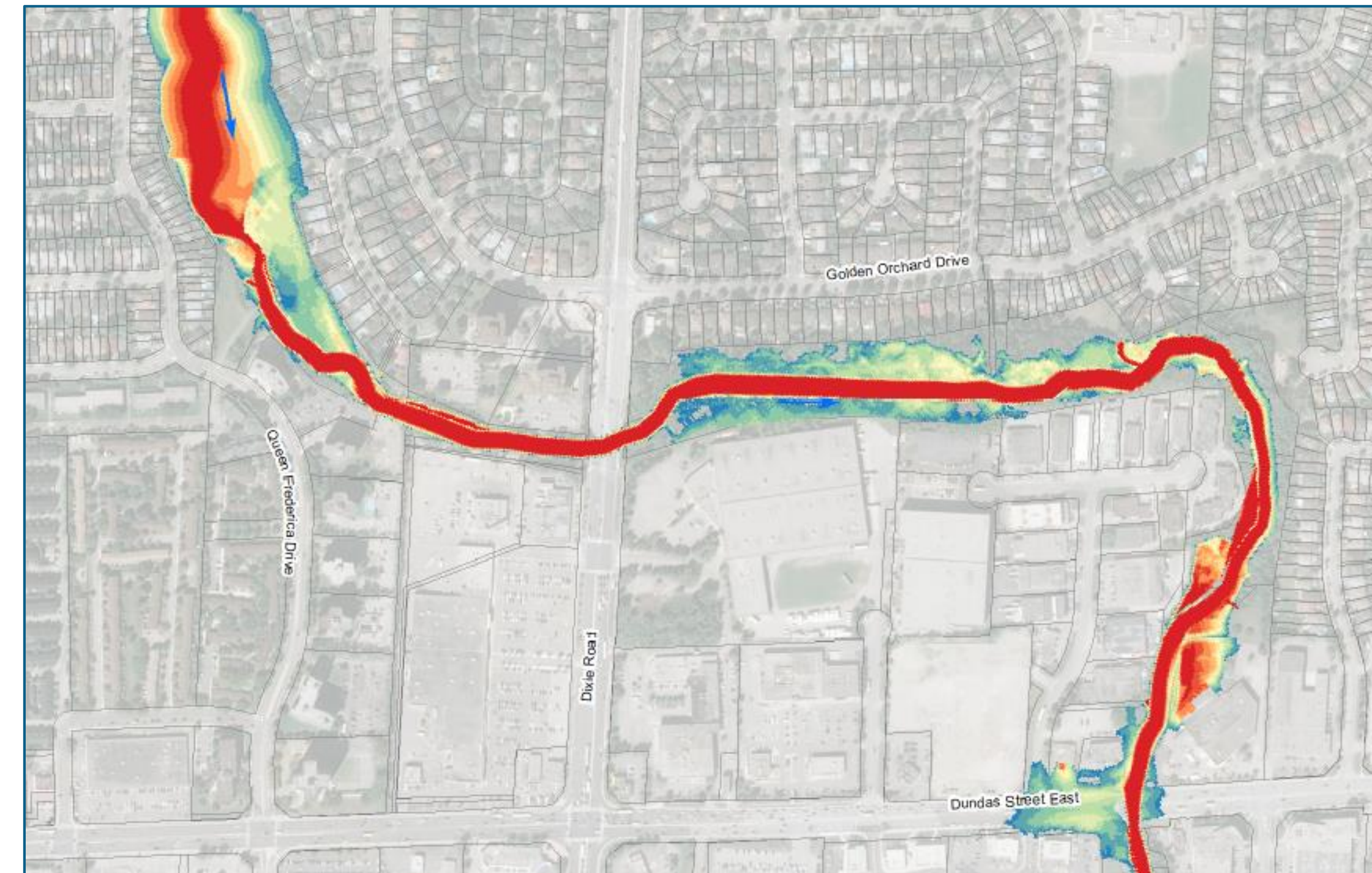
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- A longer but lower bridge has a cost advantage over a shorter bridge that otherwise requires a higher road profile
 - Four lanes of traffic and a left turn lane are expected to be maintained throughout construction

Hydraulic Modelling

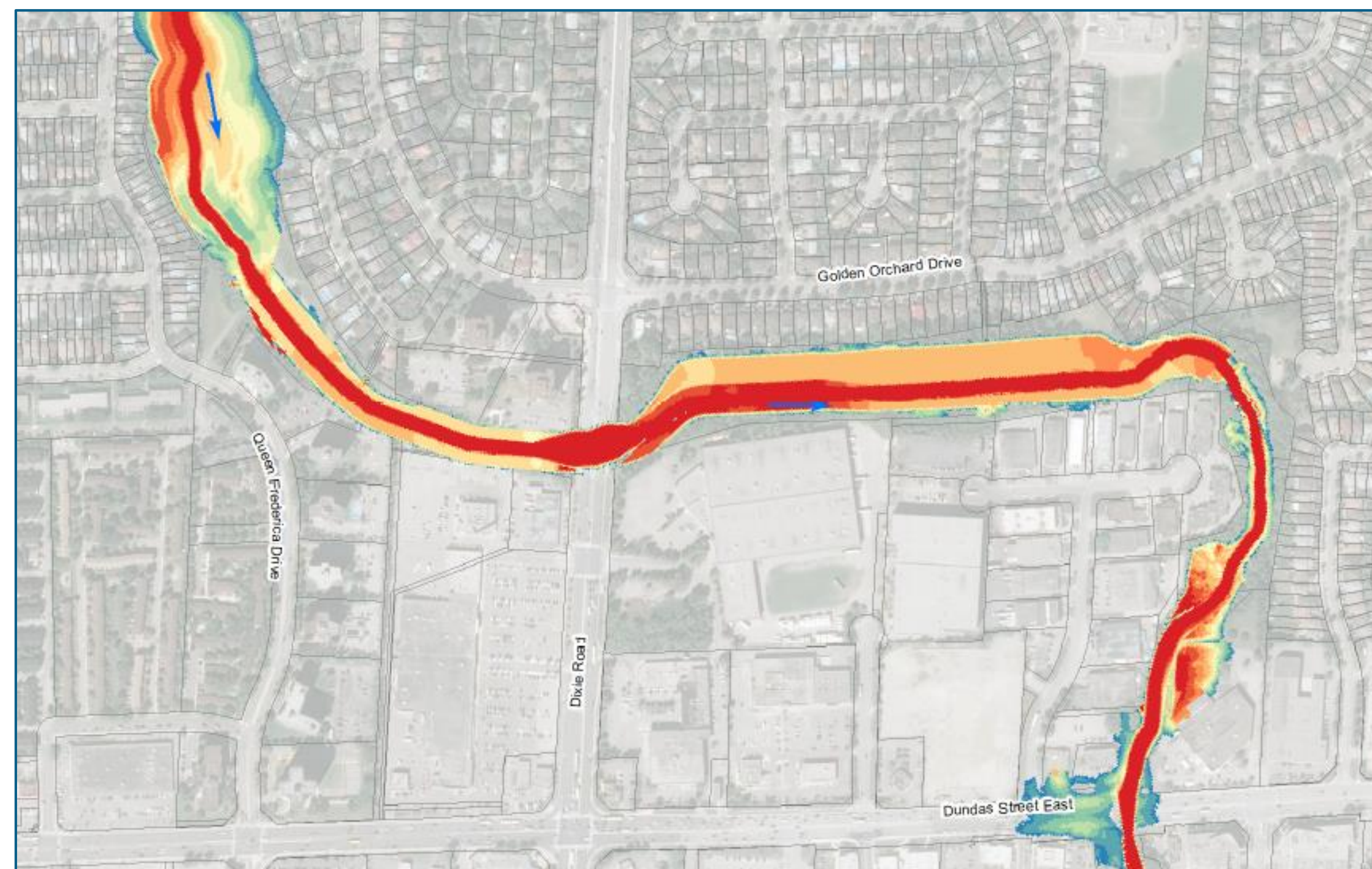
Existing Conditions



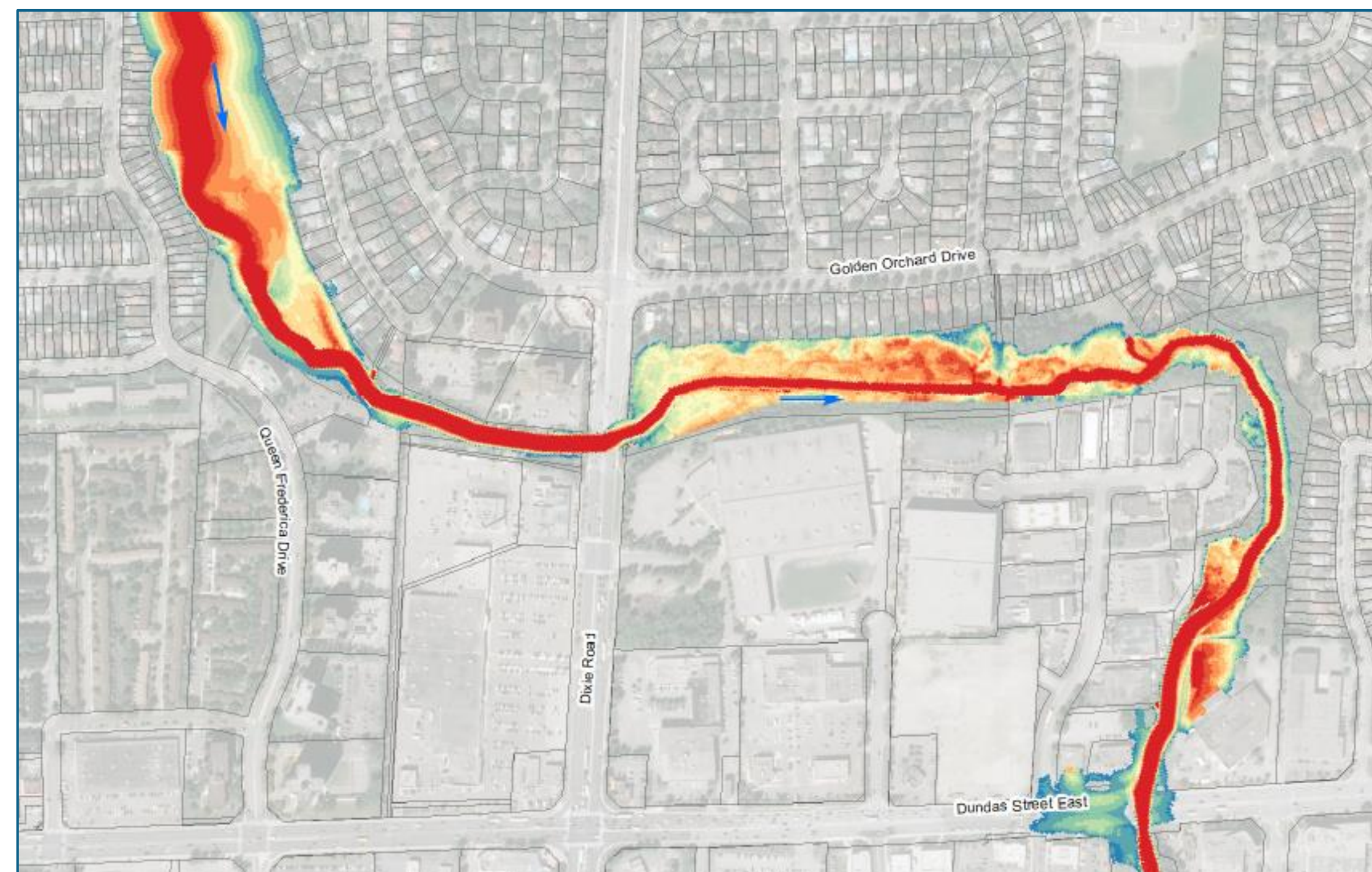
Option 1: Minimized Footprint



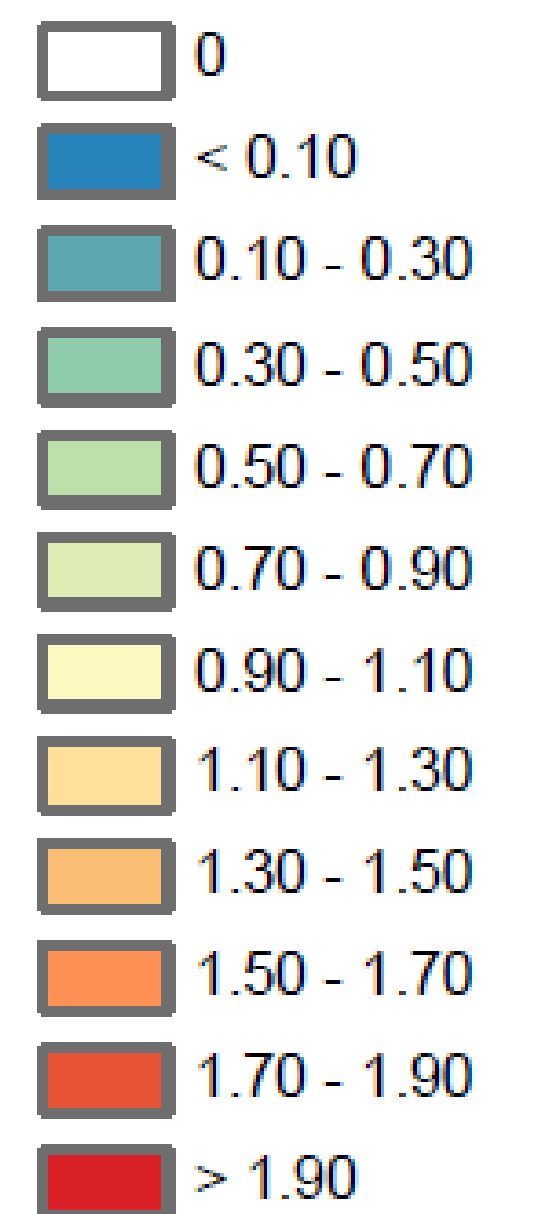
Option 2: Making Room for the Creek



Option 3: Flood Containment



Regional flood depths (m)



Preliminary Impact Assessment

Preliminary Impact Assessment – Infrastructure and Property

- Infrastructure crossing below the Creek at Dixie Road is expected to be modified to provide adequate cover depth (all options) and/or to facilitate channel lowering (Option 1 and Option 2). This infrastructure includes a 900 mm sanitary sewer, a 400 mm watermain, and an exposed utility conduit.
- There is opportunity to provide adequate cover depth above a 450 mm sanitary sewer (550 m downstream of Dixie Road Bridge) as part of mitigation works

Option 1 – Improved Conveyance with Minimized Footprint:

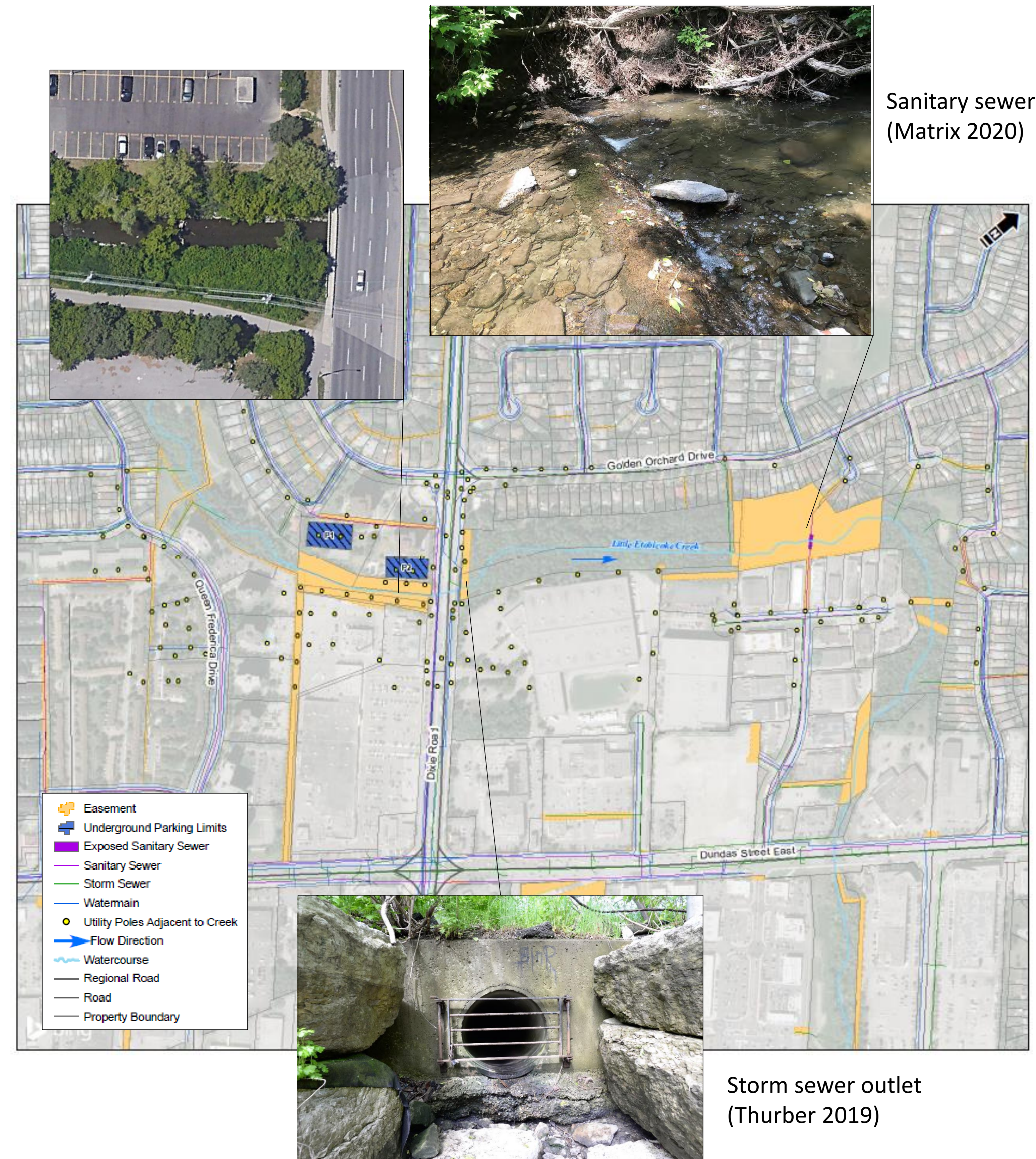
- Expected modification of eight storm sewer outlets
- Relocate power lines to raise Dixie Road

Option 2 – Improved Conveyance by Making Room for the Creek

- Expected modification of eight storm sewer outlets
- Relocate power lines for channel and floodplain works immediately upstream of Dixie Road
- Parking lots are in close proximity to the Creek on the north and south side from Dixie Road to 300 m upstream. These parking lots are constraints for Option 2 and some of these lands may be needed in order to reduce flood risk.

Option 3 – Flood Containment with Mitigation for Upstream Impacts

- Expected modification of five storm sewer outlets
- Relocate power line to raise Dixie Road
- Significant property acquisition requirements include apartment buildings, single-detached homes, and industrial/commercial buildings



Preliminary Impact Assessment – Natural Heritage

The City of Mississauga Master Plan designates the valley corridor in the study area as a Significant Natural Area. The integrity of this Natural Area will be considered in the design of a flood mitigation solution (e.g. landscaping and restoration plans).

- The study area provides habitat for common fish species. No in-water works will be permitted during the fisheries timing window (April 1 to June 30).
- The study area downstream of Dixie Road provides wildlife habitat for the following Species at Risk:
 - **Eastern Wood Pewee:** To protect habitat, no tree removal will be permitted during the breeding bird window (April 1 to August 30) and its habitat should be considered in restoration and landscaping
 - **Potential Bat Maternity Roosting:** The habitat will be preserved or impacts mitigated (e.g., placing bat boxes to offset lost habitat)
- A Butternut tree (Species at Risk) is located downstream of Dixie Road. Any construction activities occurring within 25 m of the Butternut will require an offsetting plan (e.g. planting Butternut seedlings) if the tree is confirmed to be a pure species.

Option 1 – Improved Conveyance with Minimized Footprint:

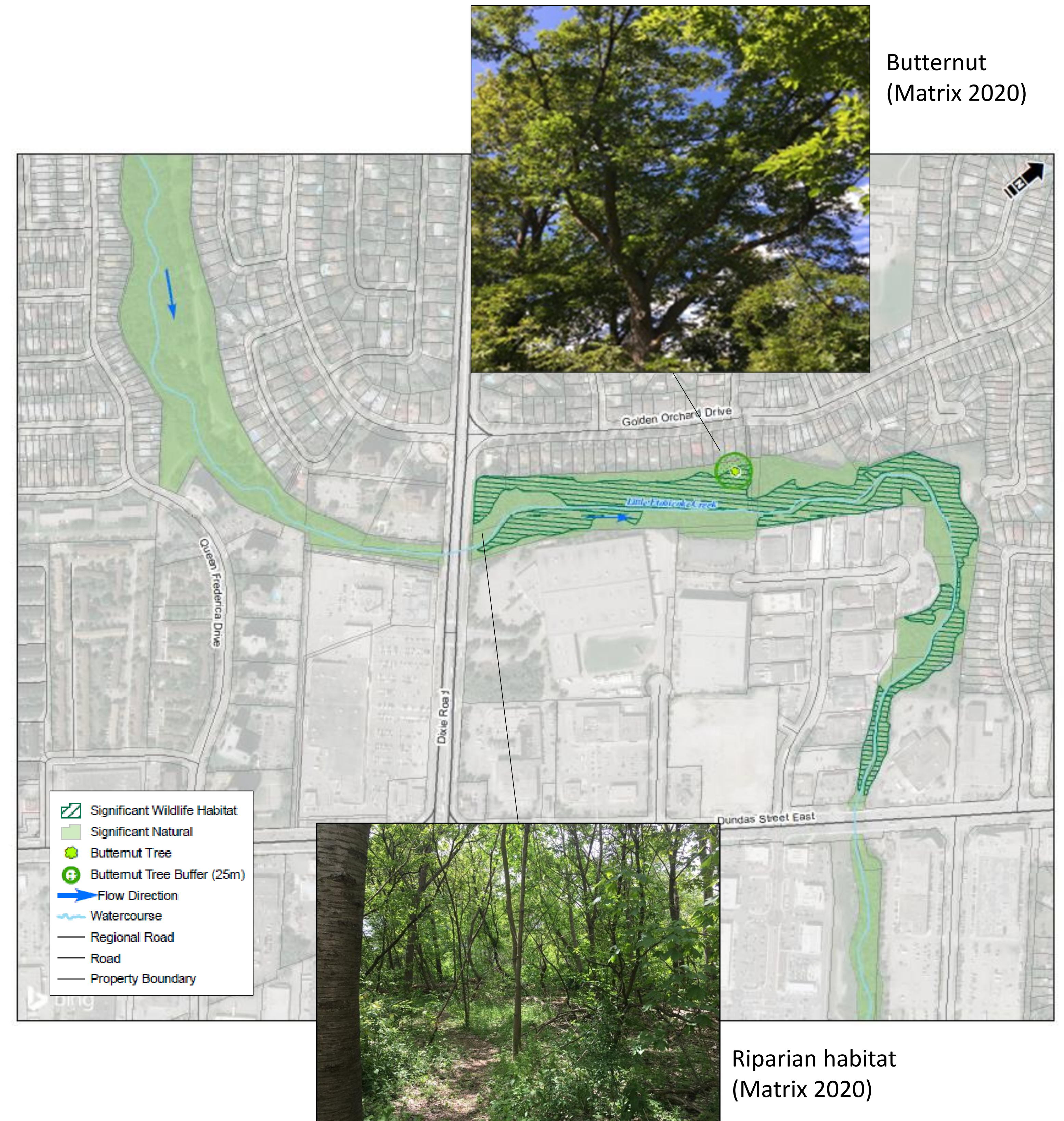
- Site disturbance (e.g. tree removal) required to construct an oversized channel

Option 2 – Improved Conveyance by Making Room for the Creek

- Floodplain works may require disturbance within 25 m radius of the identified Butternut
- Site disturbance (e.g. tree removal) required across the valley corridor to construct a widened channel and provide a better-connected floodplain
- Best opportunity to improve fish habitat using natural channel design approaches

Option 3 – Flood Containment with Mitigation for Upstream Impacts

- Site disturbance (e.g. tree removal) required for minor channel widening
- Significant works in urban area rather than natural area



Preliminary Impact Assessment – Archaeology

- Previously undisturbed areas in the valley corridor have archaeological potential requiring test pits before construction. This archaeological potential is based on:
 - Historical water source provided by the Creek
 - Existence of historic transportation routes at Dixie Road and Dundas Street East
 - Proximity of early settlements including the Villages of Dixie, Summerville, and Burnhamthorpe
- Previously disturbed areas and banks with steep slopes have no archaeological potential

Option 1 – Improved Conveyance with Minimized Footprint:

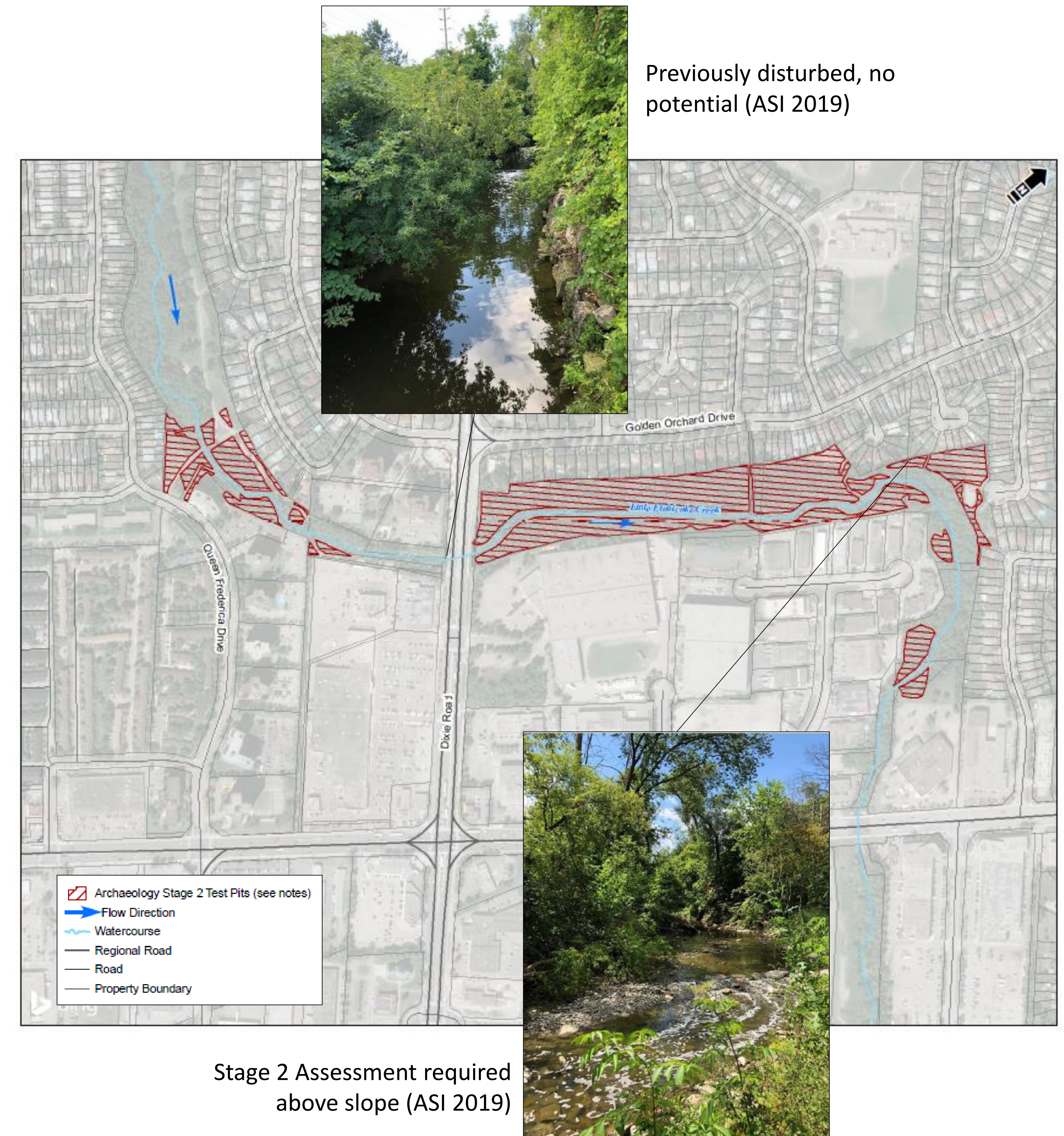
- Test pits required along the channel before construction disturbance

Option 2 – Improved Conveyance by Making Room for the Creek

- Test pits required across the valley corridor before construction disturbance

Option 3 – Flood Containment with Mitigation for Upstream Impacts

- Test pits required along the channel before construction disturbance
- The FPL is largely located along previously disturbed areas



Evaluation Criteria

The conceptual alternative solutions including the “Do Nothing” approach will be evaluated based on the following criteria:

Technical	Economic	Environment	Social
<ul style="list-style-type: none">• Flood risk improvement• Construction approaches• Climate change improvements	<ul style="list-style-type: none">• Capital costs• Operation and maintenance• Urban development considerations	<ul style="list-style-type: none">• Ecology• Geomorphology• Archaeology	<ul style="list-style-type: none">• Policy considerations• Public input• Property impacts• Public safety• Support of parallel planning initiatives

The criteria may be expanded and adjusted based on the input and comments received from First Nations and Indigenous individuals and will also incorporate Traditional Knowledge. Regulatory agencies and members of the public will also have input towards these criteria. A preferred solution will be selected using the evaluation criteria in collaboration with key stakeholders that include the City of Mississauga, Region of Peel, and TRCA. The preferred solution will then be advanced to preliminary design.

Next Steps

Next Steps

Next Steps in the EA process include:

1. Integrate input from stakeholders
2. Complete a detailed evaluation of conceptual alternative solutions
3. Select a preferred solution
4. PIC No. 2
5. Advance the preliminary design of the preferred solution which is anticipated to include:
 - Increased attention to constructability, geomorphology, and natural heritage
 - Preliminary bridge general arrangement
 - Preliminary road design
 - Active transportation concepts (i.e. trails)
 - Baseplans for sanitary sewers, watermains, and utility relocations
 - Climate change design criteria

Reminder

- Further ongoing study information is available at: <http://www.mississauga.ca/flooding>
- To sign up for the mailing list and/or to provide comments, please complete the project comment form from the website above and email anthony.digiandomenico@mississauga.ca or adoherty@matrix-solutions.com
- Input will be received until **September 4, 2020**

COVID-19 Community Engagement Update: While we continue to respond to this pandemic, we are working hard to deliver essential services and projects to keep our City moving and safe. While we can't connect in-person at this time, we still want to connect! Please find above how we can connect on this project and for you to share your input.