East Morrison Creek Erosion Mitigation Study

Welcome to the September 17, 2024
Public Information Center for the
East Morrison Creek Erosion Mitigation Study
Municipal Class Environmental Assessment
Schedule B

For additional information, please contact one of the study team members:

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OAKVILLE

Land Acknowledgement

Honouring the Land and Territory

- Oakville, as we know it today, is rich in the history and modern traditions of many First Nations. From the lands of the Anishinaabe, to the Attawandaron and Haudenosaunee, these lands surrounding the Great Lakes are steeped in First Nations history. As we gather today on the sacred lands of Treaties 14 and 22, we are in solidarity with Indigenous brothers and sisters to honour and respect Mother Earth, the original nations of the trees and plants, the four legged, the flyers, the finned and the crawlers as the original stewards of Mother Earth. We acknowledge and give gratitude to the waters as being life and being sacred and to the carriers of those water teachings, the females. We acknowledge and give gratitude for the wisdom of the Grandfathers and the four winds that carry the spirits of our ancestors that walked this land before us.

- The Town of Oakville is located on the Treaty Lands and Territory of the Mississaugas of the Credit. We acknowledge and thank the Mississaugas of the Credit First Nation, the Treaty holders, for being stewards of this traditional territory.

Study Area/Background

Town of Oakville Erosion Studies

- Stream erosion is routinely assessed within the Town of Oakville and has been documented in a series of reports since 2001. Stream erosion is a natural process, but historic land use changes can result in accelerated rates of erosion that put infrastructure and property at risk when near the watercourse.

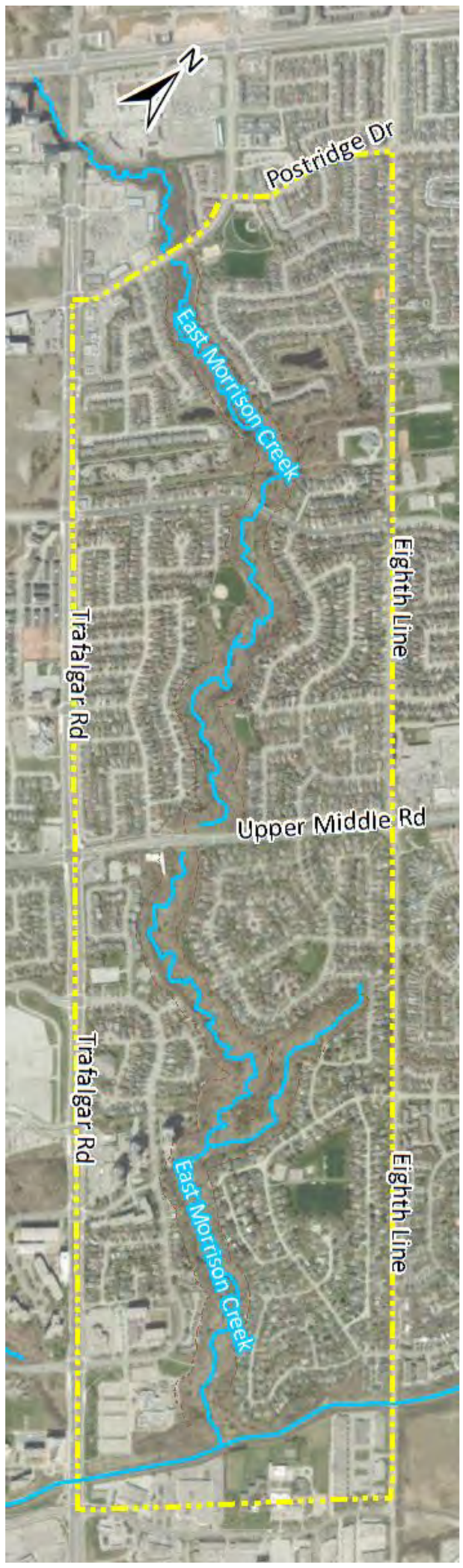
- The most recent Creek Inventory and Assessment Study was completed in 2021. This study identified East Morrison Creek, from the Morrison-Wedgewood Diversion Channel to Postridge Drive (Reaches 39-45), as the highest priority “long” reach of concern. The 2021 study recommended an Environmental Assessment (EA) to address erosion issues within these reaches. The current study fulfills this recommendation.

East Morrison Creek Erosion Mitigation EA Study

- The purpose of this study is to mitigate stream erosion risks and to identify stream restoration opportunities. Given the potential environmental impacts and public implications, this study will conform with the Municipal Class EA planning process (Schedule B) which includes public consultation. Schedule B projects include Phase 1 to identify the problems and Phase 2 to evaluate alternative solutions. This study focuses on fluvial erosion and is not related to flood mitigation.

Study Area Conditions

- The study area is situated from the Morrison-Wedgewood diversion channel located in the downstream lengths of the watershed to the upstream boundary along Postridge Drive. A pedestrian pathway is located through the Morrison Valley along East Morrison Creek. Through the study area, East Morrison Creek is generally characterized by active erosion, with local bank hardening measures including gabion baskets, armourstone and rip rap bank protection. In some locations, these channel engineering structures are failing.




East Morrison Creek (2023)


East Morrison Creek (2023)


East Morrison Creek (2023)

Environmental Assessment Study Outline

- Through its ongoing erosion monitoring program, the Town of Oakville identified this reach of East Morrison Creek as a high priority site to review possible rehabilitation opportunities. Key concerns include bank erosion within the creek, bank and valley slope stability, failure of erosion control measures, and threats to private property and municipal infrastructure.

- The study will examine the creek and associated natural resources to identify existing erosion concerns, potential future risks, and opportunities for restoration and environmental enhancement. Through the Class EA process, multiple alternative solutions will be developed and evaluated by the Study Team and refined through public and agency consultation (see below) and including engagement with interested Indigenous Peoples. The Study Team will then select a Preferred Alternative. Detailed design and construction would be scheduled in the future through capital budget process. The Town will work with CH to obtain permits for detailed design and construction of erosion mitigation measures as necessary

- This study is being completed under Schedule "B" of the Municipal Class EA process. This portion of the study specifically addresses Phases 1 & 2 of the EA Process.

Class EA Process:

Phase 1

- ✓ Identify Problem or Opportunity
- ✓ Identify Potential Solutions
- ✓ Inventory Natural, Social, Economic Environment
- ✓ Identify Alternative Solutions
- ✓ **Public Consultation (PIC #1)**

We are here!

Phase 2

- ✓ Evaluate Alternative Solutions
- ✓ Select Preferred Solution
- ✓ **Public Consultation (PIC #2)**

Phase 3

- ✓ Examine Alternative Methods and Evaluate Impacts

Phase 4

- ✓ Environmental Study Report
- ✓ **Agency and Public Review**

Phase 5

- ✓ Implementation

Indigenous Engagement and Archeology

Indigenous Engagement

There are legal duties to consult with Indigenous Peoples. The project study area is located in treaty 13a, 1805 Mississaugas, within the traditional territory and claim of the Mississaugas of the Credit, and within the 1701 Nanfan Deed. As such, consultation is required with:

- Mississaugas of the New Credit First Nation
- Six Nations of the Grand River
- Haudenosaunee Confederacy Chiefs Council
- Métis Nations of Ontario

With the distribution of the initial Notice of Commencement for the project, interested Indigenous Peoples will be invited to review and comment on draft EA and archeological reports.

Archeological Assessment

A Stage I archeological assessment of the study area has been completed by TMHC Inc., included a review of current land use, historic and modern maps, registered archaeological sites and previous archaeological studies, past settlement history for the area, and a consideration of topographic and physiographic features, soils and drainage. Known, registered archeological sites are limited to the upstream study area near Postridge Drive, however most undisturbed grassed and treed areas surrounding East Morrison Creek have archaeological potential and would require Stage 2 test pits for areas likely to be impacted by future erosion mitigation works during detailed design.

STAGE 1 RESULTS & RECOMMENDATIONS

Project Area

Contours (1m)

STAGE 1 ASSESSMENT RESULTS

Areas of Archaeological Potential

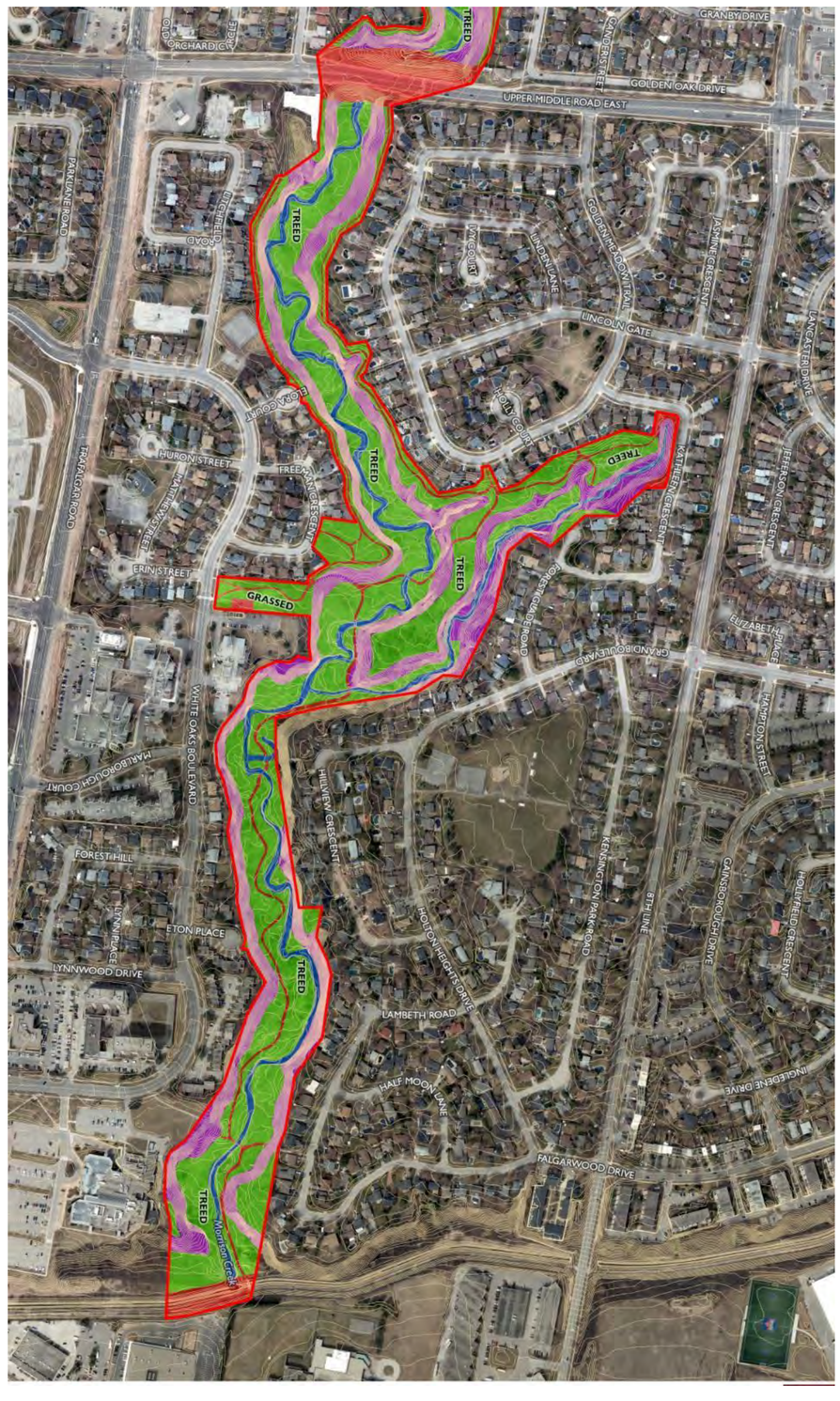
Grassed, Treed (Test Pit Survey Required)

Areas of Low Archaeological Potential (No Assessment Required)

Disturbed (Channelized Drain, Pathways, Roads)

Steeply Sloped

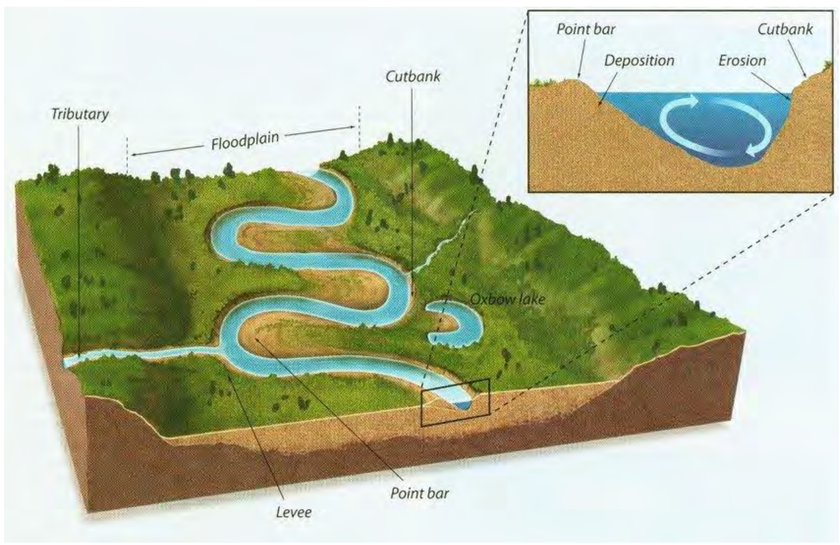
Low-Lying/Wet



Erosion Assessment Introduction

What is Fluvial Geomorphology

Fluvial geomorphology is the study of rivers and streams to understand how channels change over time due to erosion and deposition of sediment.



Source: Bierman, P. and Montgomery, D. (2013). Key Concepts in Geomorphology, W.H. Freeman & Co (MacMillan)

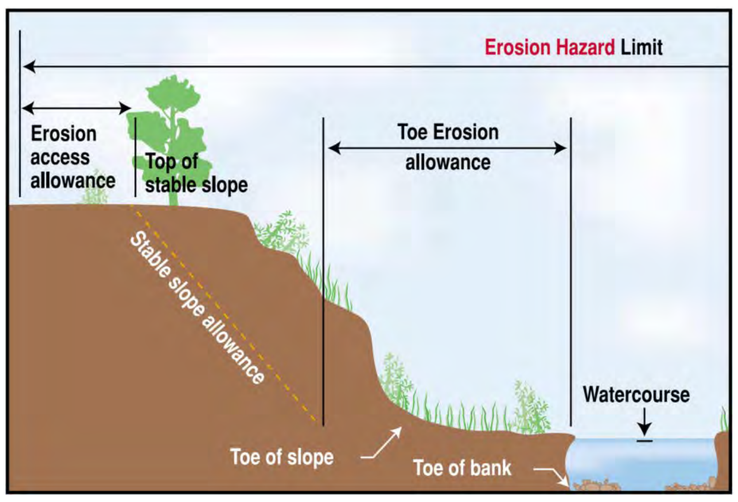
It helps engineers and geoscientists to better manage erosion and flooding hazards around watercourses, and to develop more environmentally sensitive solutions that can help restore and protect our green spaces and wildlife habitat.

Erosion Assessment

The objective is to identify the risks due to erosion hazards.

Erosion Hazards
- Bed Erosion
- Bank Erosion
- Slope Instability

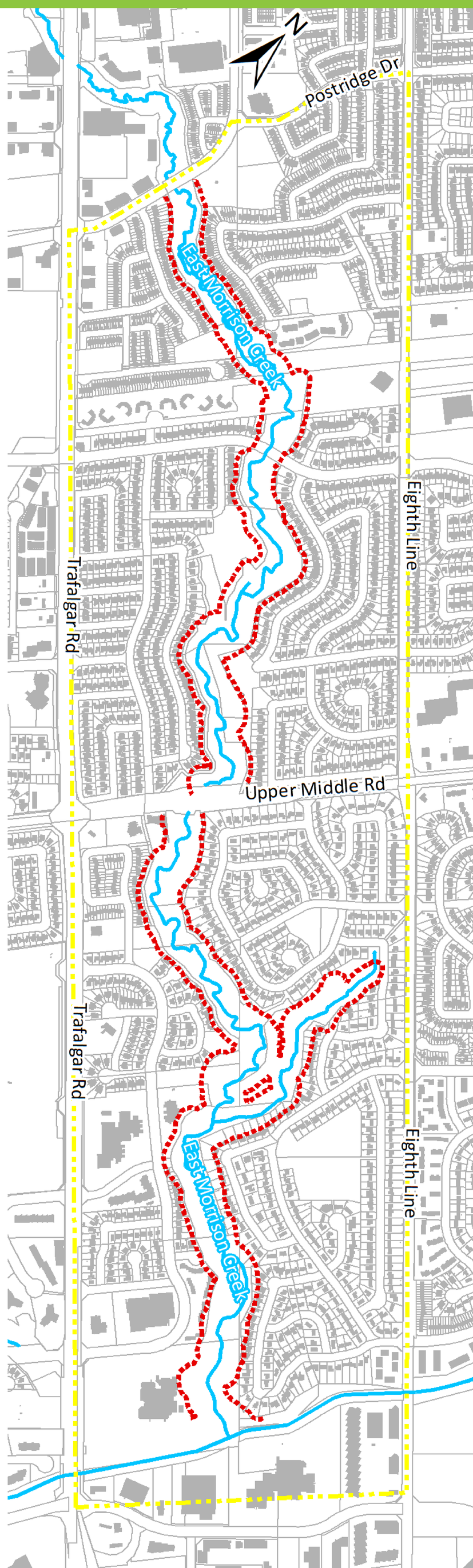
Risks to
- Public Infrastructure
- Private Property
- Environment, habitat



Source: Ontario Ministry of Natural Resources, 2001

Erosion Hazard Zones

Long-term, streams and rivers have erosion hazard zones. Engineering and channel design can mitigate erosion risks in hazard zones, but such works may require ongoing maintenance. Managing risks within the erosion hazard zone may require collaboration between the Town and private landowners to mitigate future problems.



Erosion Assessment Methodology

Erosion Site Scores

Erosion sites were reassessed in 2023 following the scoring framework applied in the 2021 erosion inventory.

Sites were scored based on 8 erosion hazard criteria. A total erosion score out of 100 was calculated for each site by summing the score for the 8 criteria.

Criteria	Weight
Risk Type	45
Distance to Risk	20
Site Length	5
Site Height	5
Erodibility	10
Erosion Potential	5
Riparian Habitat	5
Aquatic Habitat	5
Total	**100**

Erosion Site	Risk Type	Total Score
E11	Critical Infrastructure (sanitary sewer)	79
E4	Private Property	65
E6	Private Property	64
E10	Private Property	60
E24	Private Property	59
E7	Private Property	56
E14	Private Property	54
E9	Private Property	53
E16	Private Property	53
E15	Private Property	53
E17	Private Property	51
E5	Secondary Infrastructure (gabion baskets)	51
E22	Private Property	44
E19	Private Property	44
E20	Pedestrian Bridge	43
E21	Pedestrian Bridge	43
E13	Pedestrian Bridge	43
E12	Secondary Infrastructure (stormwater outfall)	42
E18	Trail	39
E8	Trail	38
E23	Trail	37
E1	Trail	35
E3	Trail	34
E2	Trail	26

Erosion Sites Included in EA Evaluation of Alternatives

The highest scoring erosion sites with scores of 50/100 and above have been identified for inclusion in the Environmental Assessment evaluation of alternatives. These sites were assessed to be higher risk and require consideration of erosion mitigation opportunities. The higher priority sites are typically located at valley slope contacts (or within the Tributary) where private property or critical infrastructure is at risk. For private properties, rear yards, trees and fences may be at risk. All higher priority erosion sites are located south of Upper Middle Road.

Lower priority erosion sites (scores below 50/100) will continue to be monitored as part of the Town's regular watercourse monitoring program. These sites are typically in locations where non-critical infrastructure, such as recreational trails, are at risk.

The erosion site scores will be confirmed following a site inventory update being completed to document any impacts from the July 2024 storm event.

East Morrison Creek Erosion Sites Reaches 43-45

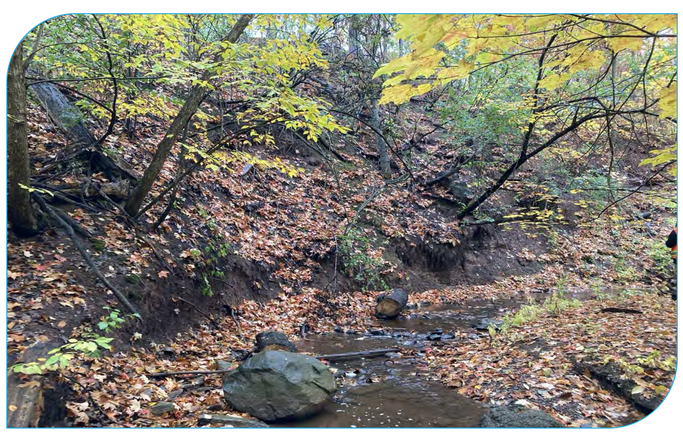
Site: E23
Score: 37
Issue: Valley wall contact; eroding valley slope
Risk: Potential risk to pedestrian trail system and private property
Length: 10 – 20 m

Site: E21
Score: 43
Issue: Erosion around pedestrian bridge; footing exposed within the channel. No damage to the concrete footing currently.
Risk: Trail infrastructure including pedestrian trail and pedestrian bridge crossing
Length: < 10 m

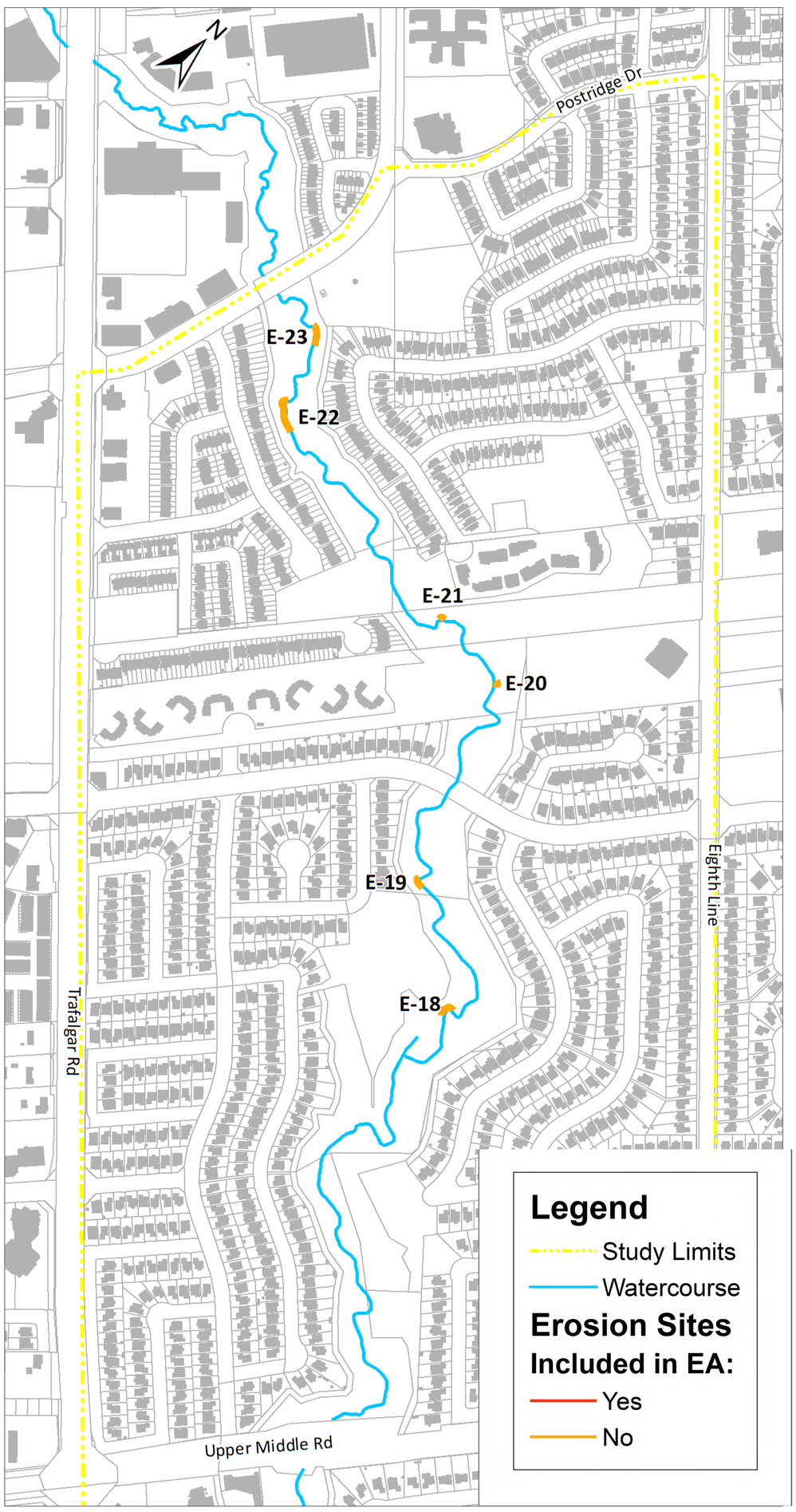
Site: E19
Score: 44
Issue: Valley wall contact along meander bend (90 degrees); gabion basket protection in fair condition (leaning)
Risk: Pedestrian trail system; private property
Length: 20 – 50 m

Site: E22
Score: 44
Issue: Valley wall contact; eroding valley slope
Risk: Potential risk to pedestrian trail system and private property
Length: 10 – 20 m

Site: E20
Score: 43
Issue: Erosion around pedestrian bridge crossing; footing exposed on the outer meander bend.
Risk: Trail infrastructure including pedestrian trail and pedestrian bridge crossing
Length: < 10 m



Site: E18
Score: 39
Issue: Valley wall contact; toe erosion along valley slope
Risk: Pedestrian trail system; park
Length: 20 – 50 m



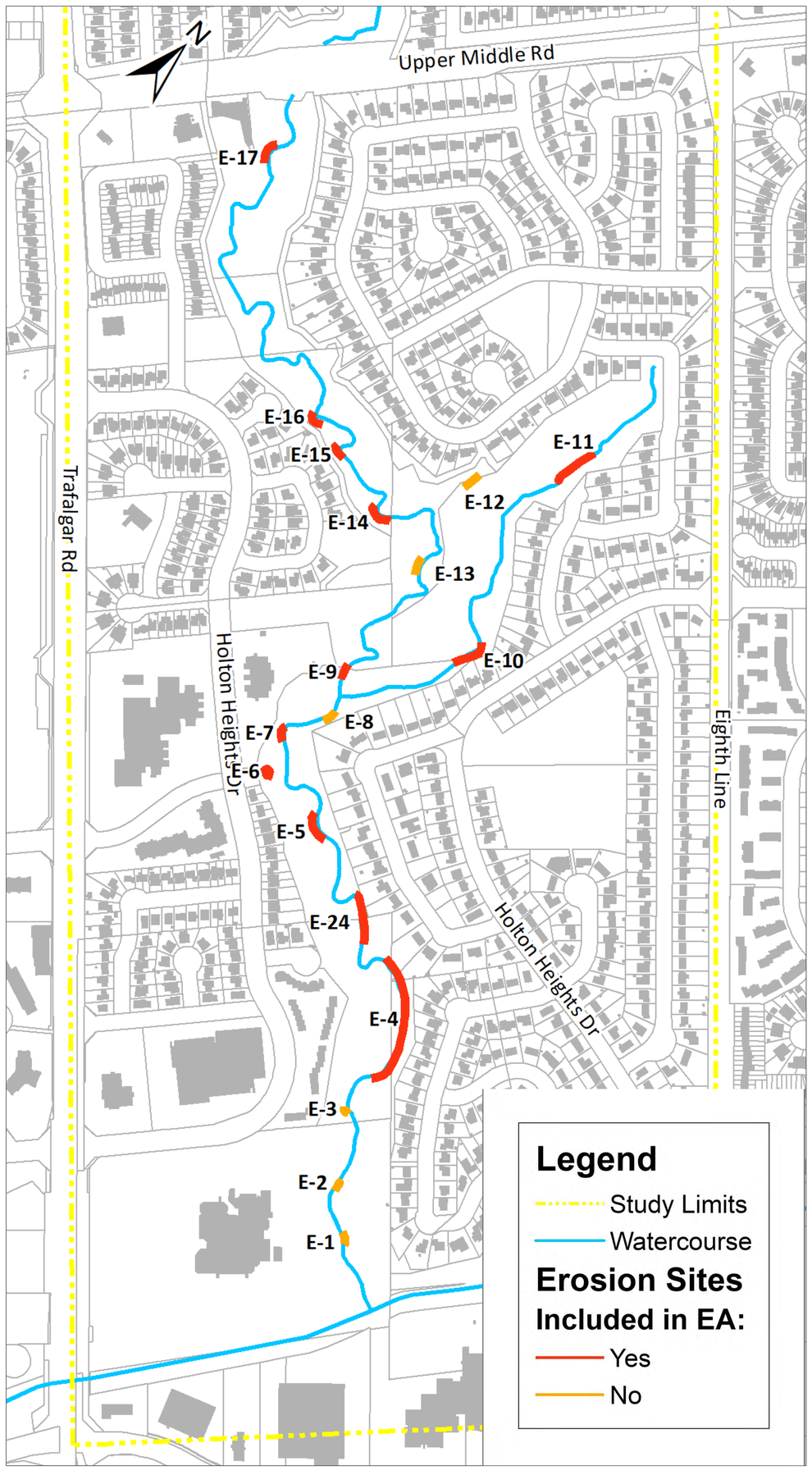
East Morrison Creek Erosion Sites Reaches 39-42

Site: E14, E15, E16, E17
Score: 54, 53, 53, 51
Issue: Toe erosion at valley contact (unprotected). ~5 to 10 m from fence line.
Risk: Private property, pedestrian trail
Length: 20 – 50 m

Site: E7, E9
Score: 56, 53
Issue: Toe erosion of valley slope (unprotected)
Risk: Private property (parking lot)
Length: 10 – 20 m

Site: E6
Score: 64
Issue: Perched outfall on valley slope, outfall drop structure suspended, scour pool below
Risk: Private property; secondary infrastructure (outfall)
Length: 50 – 100 m

Site: E5
Score: 51
Issue: Gabion baskets lining both banks. Failing at downstream end and large scour pool.
Risk: Secondary infrastructure (gabion baskets), pedestrian trail
Length: 20 – 50 m



Site: E1, E2, E3, E8, E12, E13 (not included in EA)
Score: 35, 26, 34, 38, 42, 43
Issue: Bank erosion in proximity to pedestrian trail system; not valley contacts.
Risk: Mainly pedestrian trail system, pedestrian bridge (E13), secondary infrastructure (stormwater outfall - E12)
Length: varies

Site: E11
Score: 79
Issue: CSP culvert below trail, bottom corroded. Scour pool downstream. Buried sanitary sewer.
Risk: Critical infrastructure (sanitary sewer), pedestrian path/crossing
Length: 20 – 50 m

Site: E10
Score: 60
Issue: Erosion at toe of valley slope in tributary (unprotected); private property at top of slope.
Risk: Private property
Length: 10 – 20 m

Site: E24 (new site)
Score: 59
Issue: Valley contact/slope erosion. Gabion toe protection - fair condition (functioning, some wire failure at toe)
Risk: Private property
Length: 20 – 50 m

Site: E4
Score: 65
Issue: Valley wall contact and slope erosion. Gabion protection near upstream end of erosion is in poor condition (bottom tier corroded/emptied)
Risk: Private property
Length: > 100 m

Ecology and Natural Heritage Assessment

Ecological Land Classification (ELC)

Vegetation Community

- Valley contains extensive areas of mature woodland
- Contains a mixture of native and exotic species, high amounts of sugar maple and red oak

- Red Oak
- Sugar Maple
- White Birch
- Shagbark Hickory
- Ironwood
- Blue Beech
- American Elm
- Black Cherry
- Crack Willow (I)
- Manitoba Maple (I)
- Norway Maple (I)
- European Buckthorn (I)
- European Privet (I)
- Dog-strangling Vine (I)
- Garlic Mustard (I)
- English Ivy (I)

*(I) indicate non-native


Typical woodland along East Morrison Creek

Terrestrial Wildlife

- Mature trees and understory habitat support numerous wildlife species, including birds and mammals

Birds

- Hairy Woodpecker
- Northern Flicker
- Great Crested Flycatcher
- Blue Jay
- Black-capped Chickadee
- Cardinal

Mammals

- Chipmunk, Raccoon, Squirrel, skunk, bat


Black-capped Chickadee


Big Brown Bat

Species at Risk & Special Concern

- Habitat is present which may support protected species
- Species at risk with potential to occur in the study area include:

- Species at Risk bats (Little Brown Myotis, Northern Myotis, Tri-coloured Bat)
- Chimney Swift
- Red-headed Woodpecker


Red-headed Woodpecker


Tri-coloured Bat

Aquatic Habitat

- Substrate variability and cool-water temperatures with substantial erosion and anthropogenic pressures

- Minnow species
- Creek Chub
- Brook Stickleback
- Blacknose Dace
- Common Carp
- Goldfish


Creek Chub

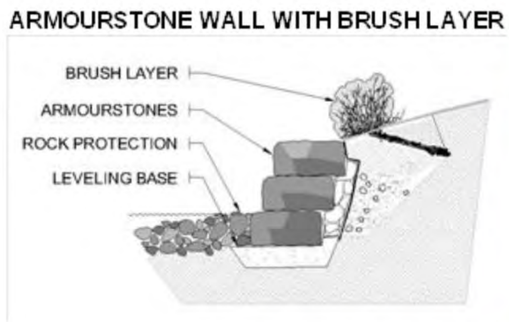

Brook Stickleback


Common Carp

Long List of Erosion Mitigation Techniques

There are many techniques used to rehabilitate creeks that have been degraded due to erosion and that address the erosion mechanisms identified above. The use of each technique will depend on the site-specific requirements, including the available space, flow and velocity characteristics, location along the creek (i.e., at a riffle or bend), aquatic habitat requirements and the height of the bank. Common erosion mitigation techniques include:

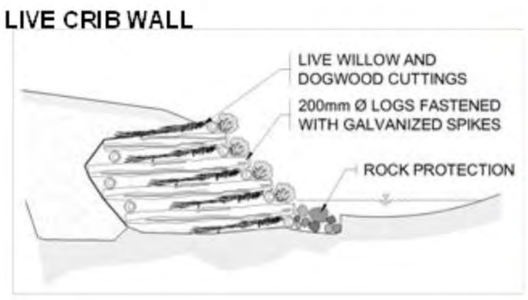
- **Armourstone Retaining Wall**
  - ‘Hard’ solution
  - Cost-effective way to mitigate high erosion potential in constrained situations but provide less habitat potential



Armour Stone Wall with Brush Layer Concept

- **Rock Vanes and Vortex Rock Weirs**
  - Reduces stream energy and redirects flow
  - Provides grade control to minimize bed erosion

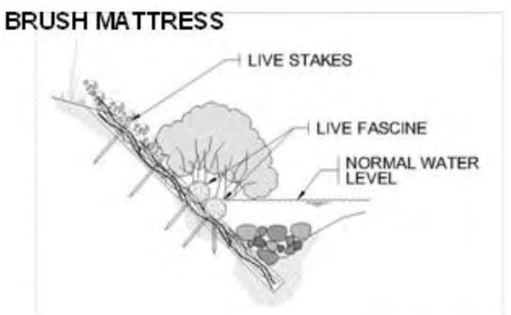
- **Live Log Crib Wall**
  - Structure of logs filled with soil and rocks
  - Can be used in constrained situations (similar to armourstone walls) while providing habitat



Live Log Crib Wall Concept

- **Vegetated Rock Revetment**
  - Use of rock on sloping banks
  - Bioengineering features can be placed between rock (‘soft’ solution)

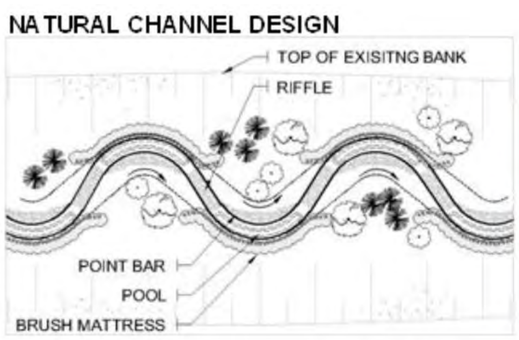
- **Bioengineering** (brush mattress, brush layer, live fascine)
  - Use of live dormant plant material to stabilize banks
  - Does not generally resist high velocities



Brush Mattress Concept

- **Terraced Floodplain**
  - Cost-effective way to decrease the stream energy by expanding the channel cross-section and flow area
  - Requires a large amount of space

- **Creek Realignment**
  - Channel realignment away from risk
  - Opportunity to use natural channel design concepts
  - Requires large area and high initial cost but can offer the most long-term benefit



Stream Realignment Design Concept

- **Morphological Channel Modifications**
  - Modification to channel planform, profile, or cross section
  - Opportunity to use natural channel design concepts

Green Solutions

Alternatives to be Evaluated

Evaluation of alternatives will be completed for each erosion site:

1: Do Nothing

- Do nothing must be considered as part of Municipal Class EA process. Regular monitoring
- May be recommended where, for example, other alternatives have extensive environmental impacts and/or are not economically feasible


East Morrison Creek (2023)

2: Continuous Monitoring

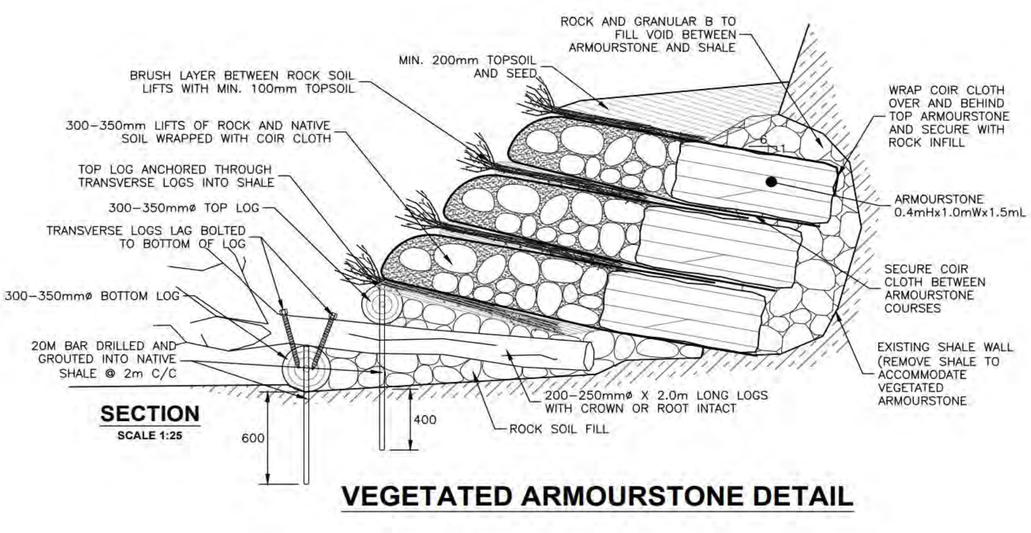
- Detailed study of erosion site for up to 5 years
- Accurate measurements of erosion hazard rates
- In cases where detailed studies identify higher risk sites, an addendum to the EA study may be submitted to allow for additional mitigation works


Credit River

3: Selective Works

- Localized erosion mitigation
- Addresses erosion risks over years to decades
- Promoting '***green solutions***' to incorporate use of natural materials


Grindstone Creek



VEGETATED ARMOURSTONE DETAIL


East Mimico Creek

4: Reach-Scale Natural Channel Design

- Channel design over longer lengths of the creek
- Balance between 'hard' control and 'soft' restoration approaches
- Higher costs and disturbance of habitat


Claire Creek


Cooksville Creek

5: Remove from Hazard Zone

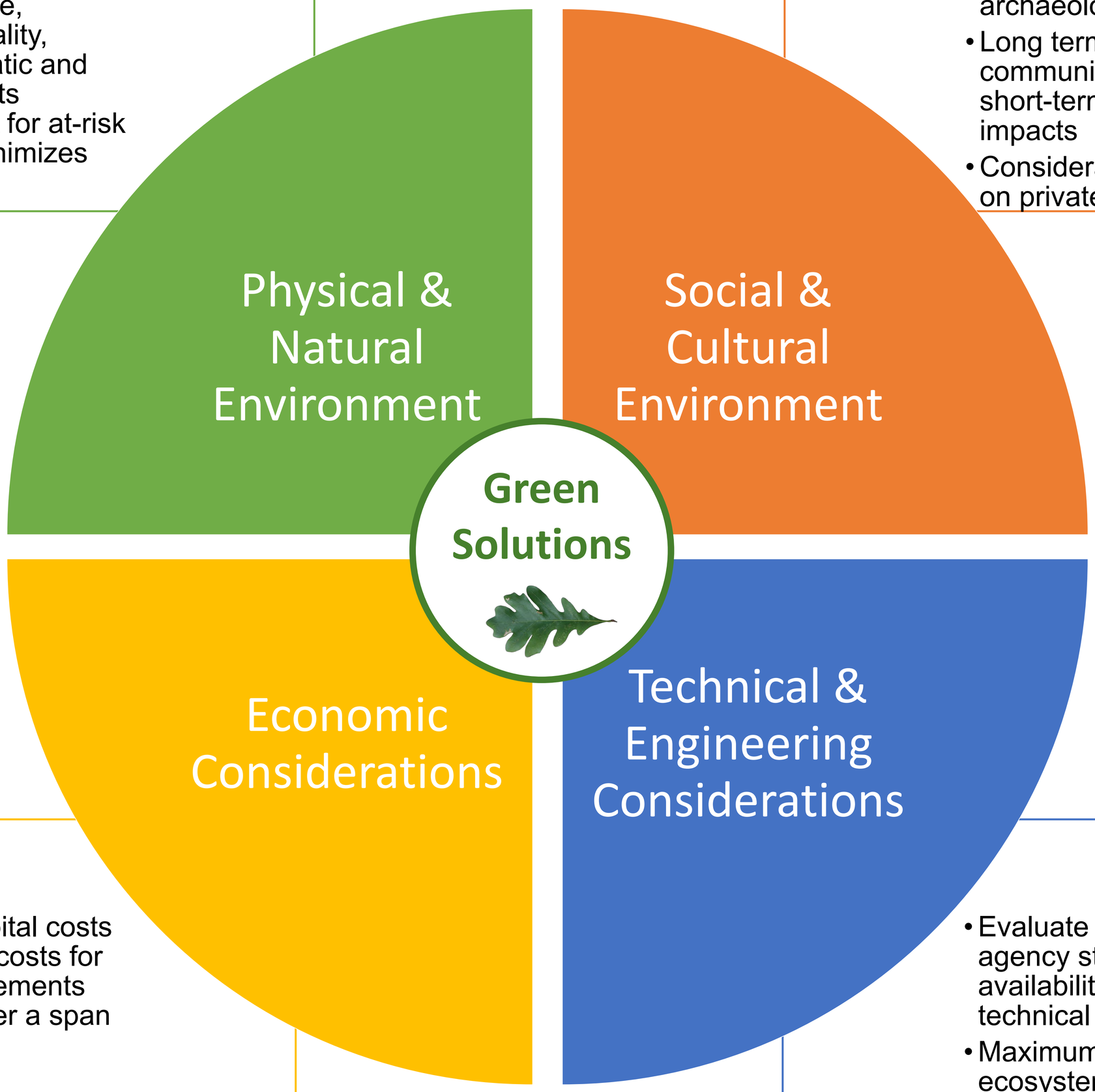
- Remove infrastructure or property from hazard zone
- Easements and/or land acquisition within hazard zone
- See erosion hazard zones on alternative concept figures

Evaluation Criteria

The following four (4) categories of criteria are used to evaluate alternatives. Evaluation of alternatives will be completed for each erosion site:

- Improves stability of stream and valley walls, flood conveyance, groundwater quality, vegetation, aquatic and terrestrial habitats including habitat for at-risk species, and minimizes tree removals

- Protects built and cultural heritage landscape and archaeological resources
- Long term benefits for the community, minimum or short-term negative impacts
- Consideration for impacts on private property



- Evaluate total capital costs against recurring costs for maximum improvements and outcomes over a span of 30 years

- Evaluate regulatory agency standards, availability of staff and technical resources
- Maximum improvement for ecosystem and infrastructure

Promote Green Solutions:

*Promoting '**green solutions**' which emphasize use of natural materials / natural channel design approaches in combination with engineering techniques to encourage environmentally sustainable solutions. Emphasis on reduction of impacts (spatial and temporal) of the selected alternatives on the natural environment.*

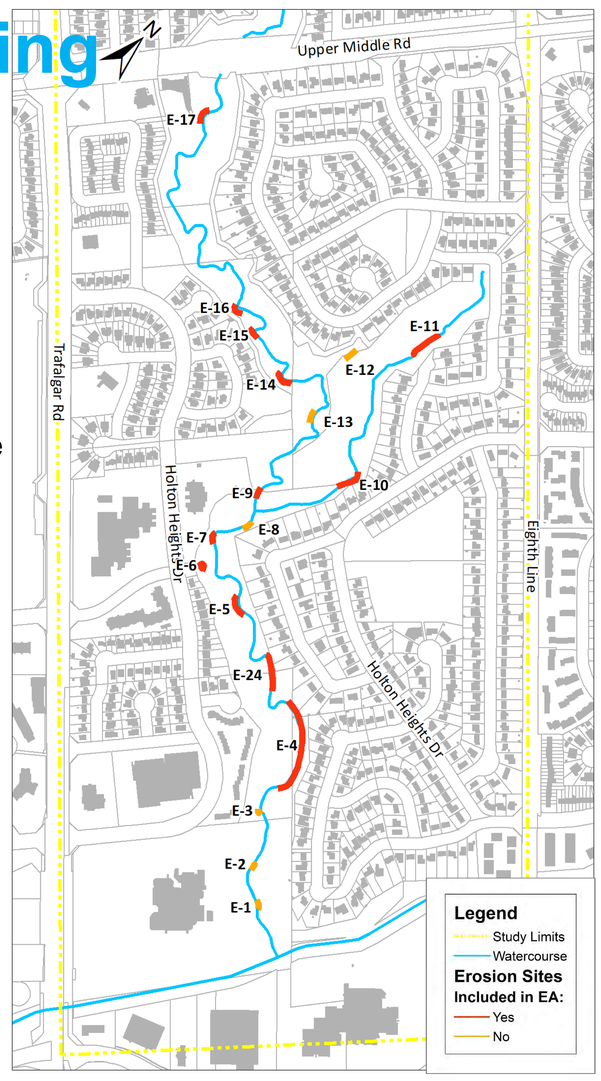
Potential Erosion Mitigation Concept

Reaches 40-42 (including Tributary)

Note: Sites upstream of Upper Middle Road were deemed lower priority and not included in the EA evaluation

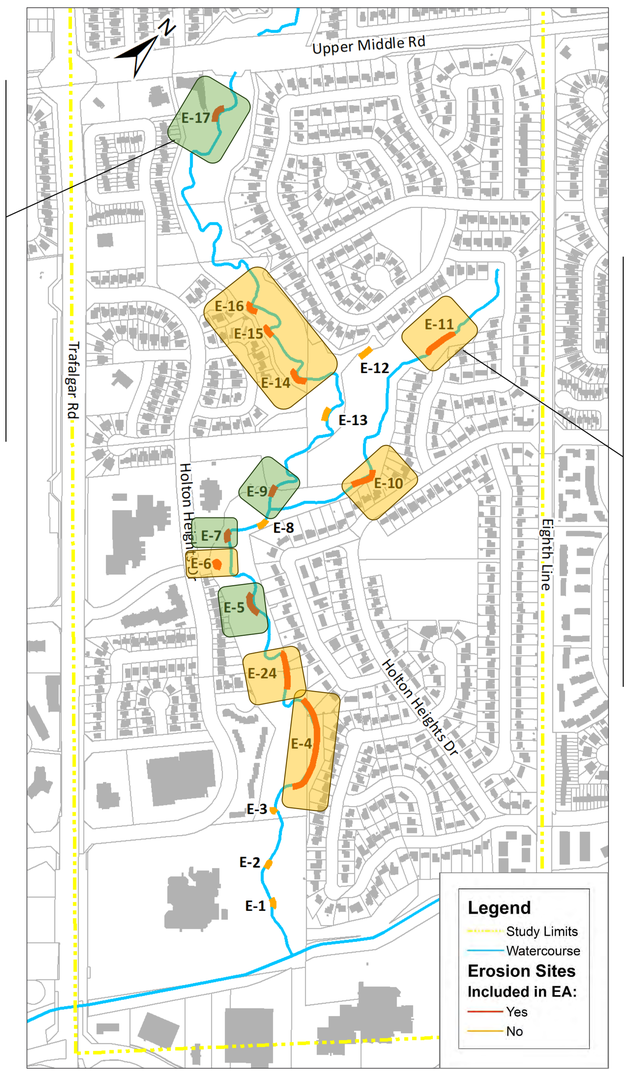
Alternative 1: Do Nothing or Alternative 2: Continuous Monitoring

'Do Nothing' Alternative:
Active valley wall / channel erosion anticipated to continue, increasing potential risk to infrastructure and private property.
Town-wide erosion is monitored on a 5-year cycle. The erosion sites will continue to be monitoring as part of the Town's routine watercourse monitoring program



Continuous Monitoring Alternative:
Continuous monitoring of active erosion sites to identify rates of erosion and assess potential of increased risk in the future. Erosion sites will be monitored in detail for a 5-year period following the EA to provide an accurate assessment.

Alternative 3: Selective Works

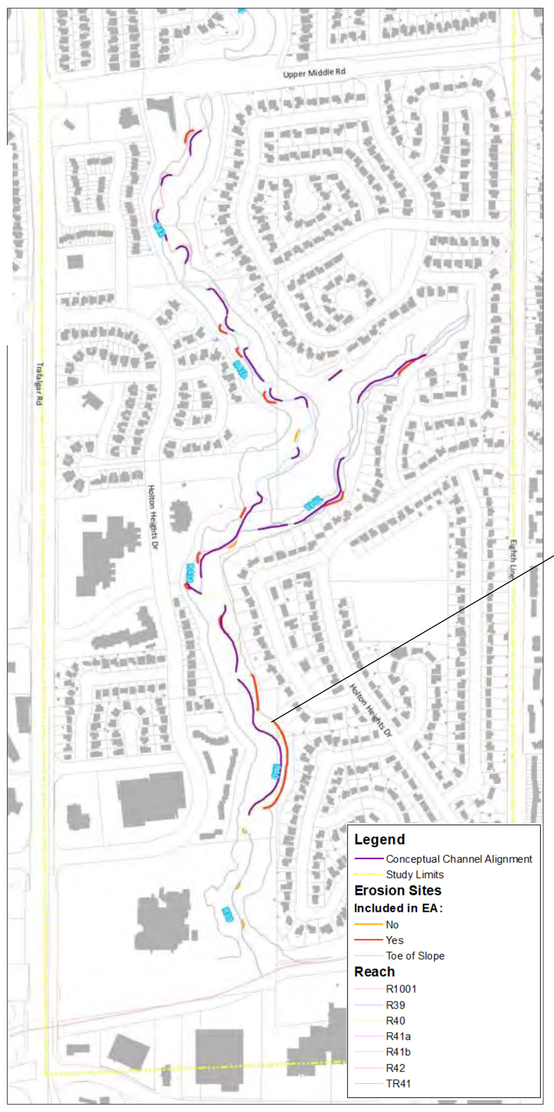


'Soft' solutions (i.e., vegetated rock revetment) and/or channel reconfiguration to reduce risk of erosion to assets (infrastructure, private property)

'Hard' solutions (i.e., armourstone) and/or channel reconfiguration in areas where erosion site is within proximity to assets (infrastructure, private property)

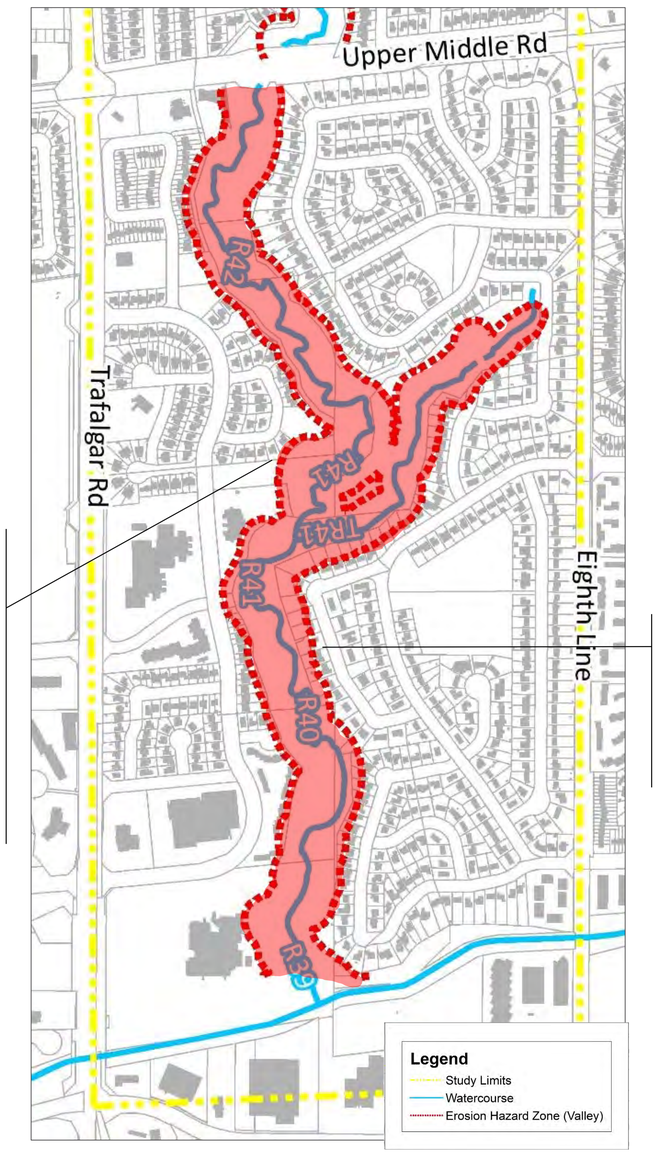
Alternative 4: Reach-Scale Natural Channel Design

Local channel re-alignment and reconfiguration works through Reach 41 – 42



Re-alignment of the channel planform away from erosion hazard; potential cross-section reconfiguration

Alternative 5: Removal of Risk



Removal of select infrastructure from hazard zone (valley), including trail realignments further from hazard

Potential land acquisitions and easements along private properties

Public Feedback & Next Steps

Thank you for your participation!

Please submit a comment sheet

After tonight's meeting, the study team will gather your comments, review your input, and undertake the following steps:

Erosion Mitigation EA Study

- ❑ Evaluate erosion mitigation alternatives **– Fall 2024**
- ❑ Identify the preferred erosion mitigation solutions **– Fall 2024**
- ❑ Prepare preliminary functional designs **– Winter 2025**
- ❑ Present findings at a second public meeting **– Spring 2025**
- ❑ EA finalization **– 2025**
- ❑ Detailed design **– 2026, subject to budget approval**
- ❑ Phased Construction to start – **2028 to 2029, subject to budget approval**

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