Restoring Local Creeks:
Voisin Creek and Borden Creek in Concordia Park

May 22, 2024, from 5:00 to 8:00 p.m.

Bart Mazan, C.E.T
Project Manager
City of Kitchener
VoisinBordenCreeks@kitchener.ca

Mariëtte Pushkar, M.Sc., P.Geo.
Project Manager
Matrix Solutions Inc.
mpushkar@matrix-solutions.com

Project Background

75% of Kitchener has no stormwater management facilities.

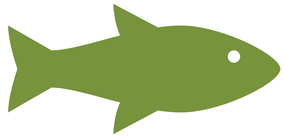
Urban stormwater can have drastic effects on the natural environment

- Degraded surface water and groundwater quality
    - Negative effects on human and animal health
- Increased flooding and creek erosion
    - Increased sediment deposited in local creeks
    - Loss of fish and wildlife habitat
- Loss of the ability of natural surface water to regulate temperature
- Other environmental concerns

The City of Kitchener approved a City-wide Stormwater Master Plan in 2016.

- Twelve stream systems were identified with opportunities to address existing erosion risks, including Borden Creek and Voisin Creek.

This project is funded in part by the Government of Canada. For more information about the City of Kitchener's partnership with the Government of Canada through the Disaster Mitigation and Adaptation Fund, visit kitchener.ca/Stormwater

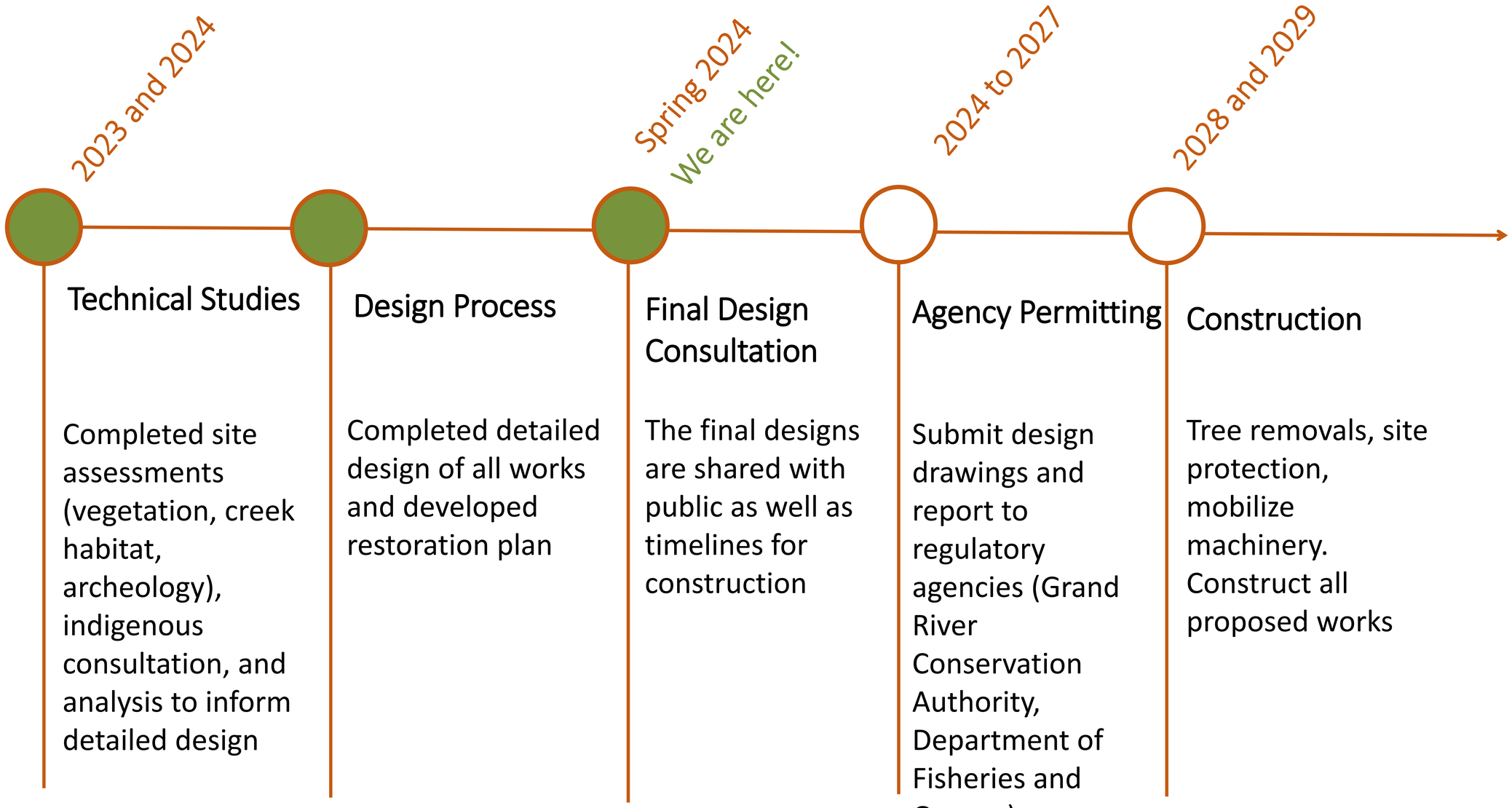


Enhance fish habitat

Protect and improve water quality

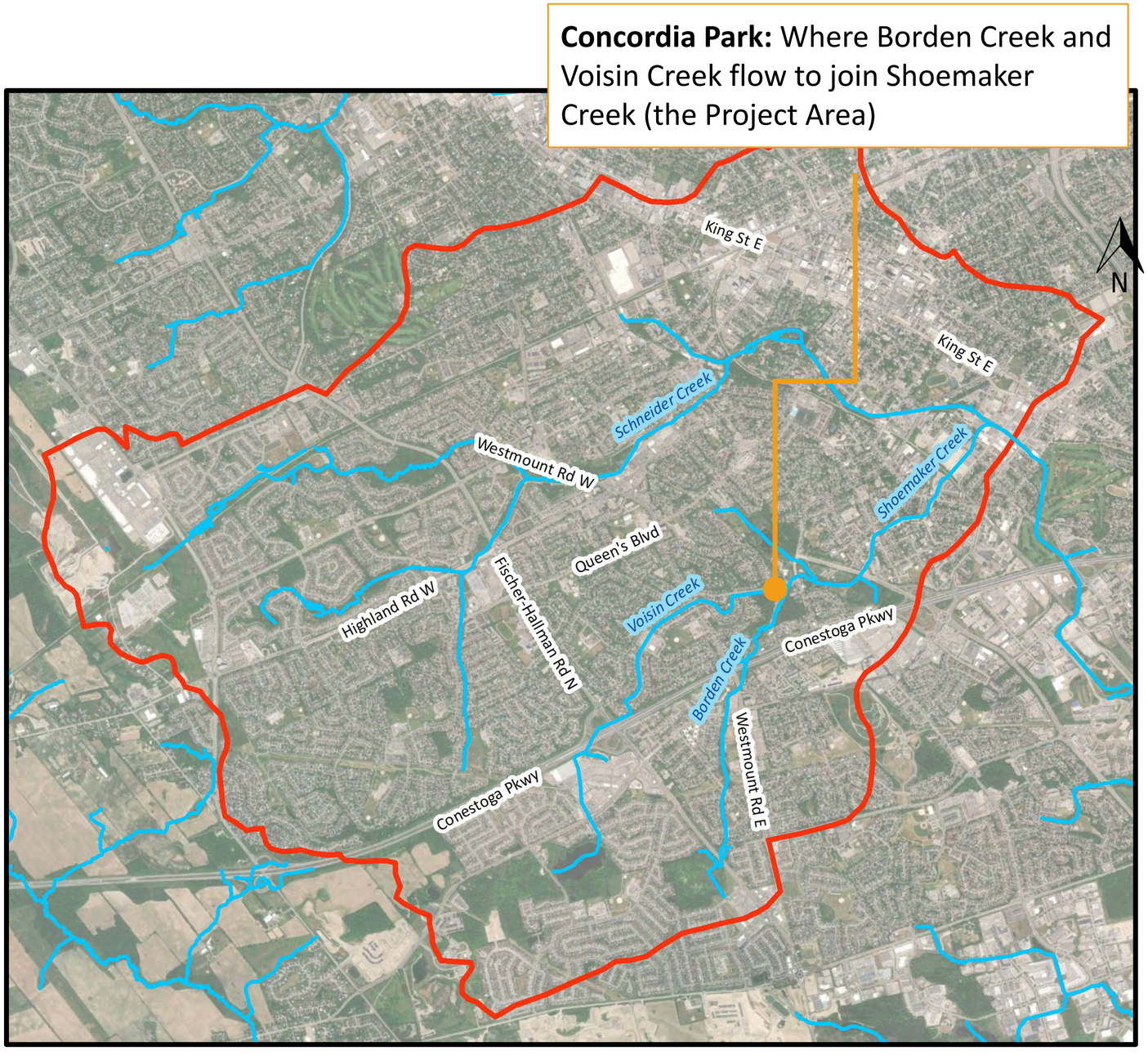
Increase Climate resilience

Timeline


2023 and 2024
Technical Studies
Completed site assessments (vegetation, creek habitat, archeology), indigenous consultation, and analysis to inform detailed design
Design Process
Completed detailed design of all works and developed restoration plan
Spring 2024
We are here!
Final Design Consultation
The final designs are shared with public as well as timelines for construction
2024 to 2027
Agency Permitting
Submit design drawings and report to regulatory agencies (Grand River Conservation Authority, Department of Fisheries and Oceans)
2028 and 2029
Construction
Tree removals, site protection, mobilize machinery. Construct all proposed works

The Big Picture: Schneider Creek Subbasin

- Schneider Creek Subbasin
  - Part of the Grand River Watershed
  - 3,165 ha of area
  - Includes numerous major creeks in the City of Kitchener
    - Shoemaker Creek
    - Borden Creek
    - Voisin Creek
    - Schneider Creek



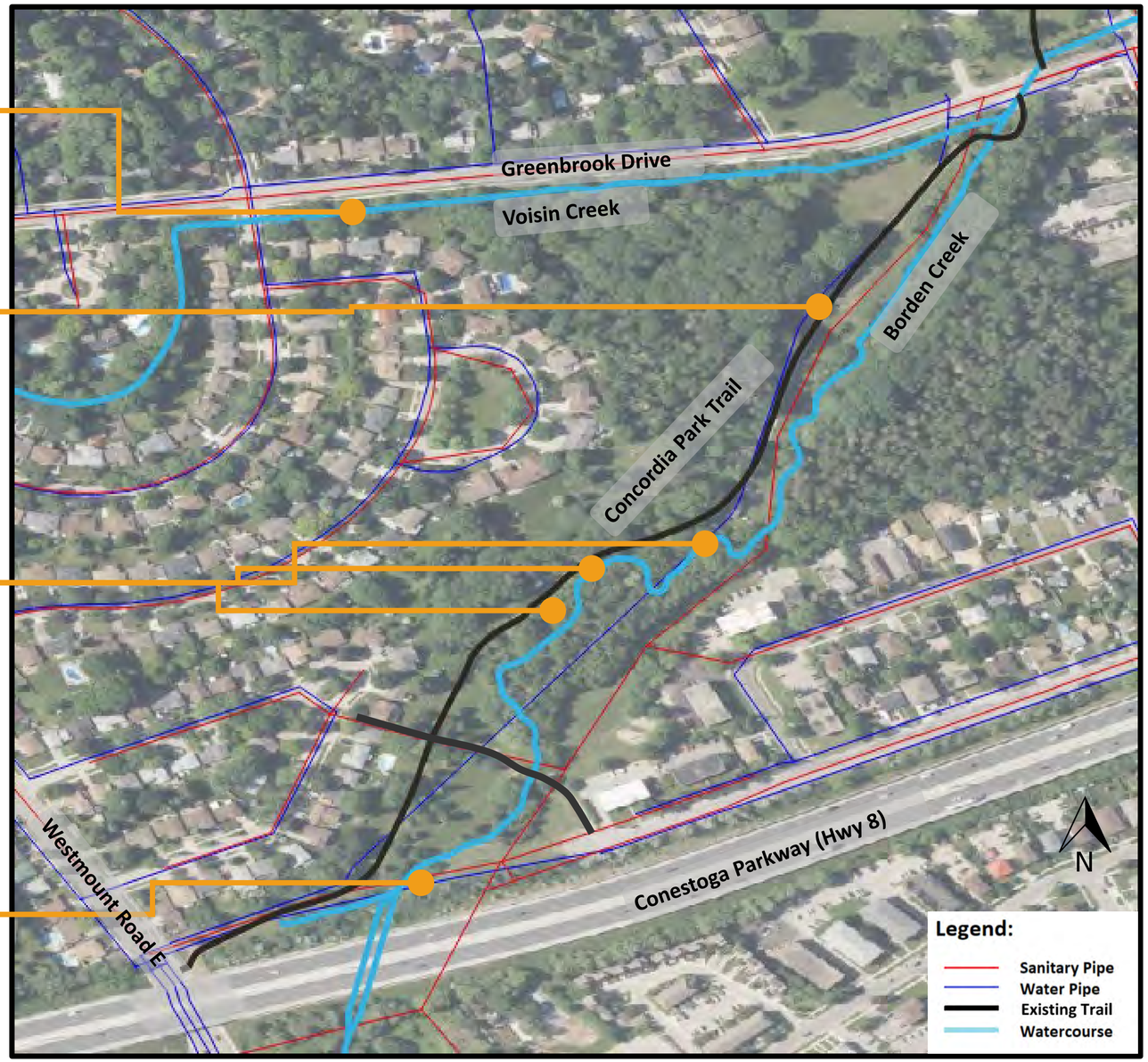
Concordia Park:
Risks and Opportunities

Voisin Creek: Straightened creek next to Greenbrook Drive with damaged retaining walls and erosion. Erosion and poor vegetation cover is decreasing water quality.

Concordia Park Trail: Existing gravel path does not meet current City standards.

Borden Creek: Erosion within the creek has caused a watermain to be uncovered, and is approaching other park infrastructure (pump house, stormwater outlet, and trail). The exposed watermain is also causing localized erosion, impacting water quality and fish habitat.

Borden Creek (south): Channel erosion has caused a sanitary pipe to become exposed near Conestoga Parkway. Erosion in this area is also reducing bank stability and damaging aquatic habitat downstream of the sewer. The exposed sanitary pipe is also creating a barrier to fish passage.

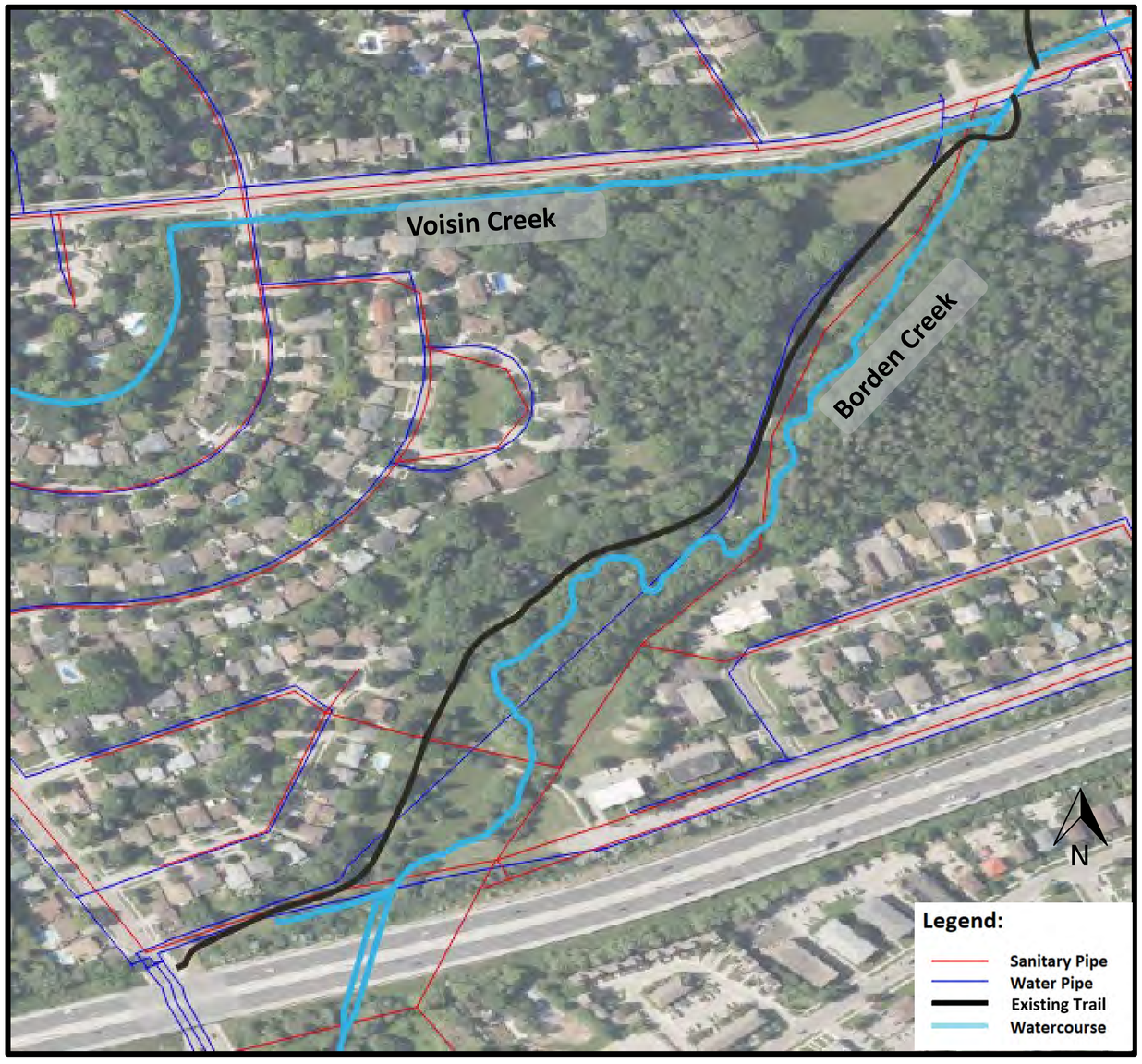


Concordia Park: Common Species

Aquatic Species		Woody Species	
Profiles	Images	Profiles	Images
Brook Stickleback – Native: Small freshwater fish averaging 5 cm long. Generally found in cool ponds or slow-moving water with abundant vegetation cover.		**Black Walnut – Native:** Common, long-lived deciduous tree that prefers moist soils and is often found in floodplains and near rivers and creeks.	
Fathead Minnow – Native: Small member of the minnow family. Generally, 5 to 8 cm long, with a blunted head. Found throughout Ontario in a variety of habitats.		**Eastern Hemlock – Native:** Large, shade-tolerant coniferous tree that prefers very moist soils. Provides shelter and nesting habitat for species of deer, birds, and other small wildlife year-round.	
Goldfish – Invasive: Member of the carp family. Native to eastern Asia. Popular as pets, released individuals can establish in native water systems. Can be long-lived, and grow to over 40 cm. Can prey on native fish eggs, larvae and aquatic plants		**Manitoba Maple – Invasive:** A robust and hardy maple species that is common in floodplains but can survive in most habitats. This species was native in the Grand River watershed but has been able to spread due to human disturbance. It is now considered invasive in most habitat areas of Southern Ontario.	
Chinese Mystery Snail – Invasive: Thick-shelled snail, up to 6 to 8 cm long. Shells vary from olive green to reddish brown. Native to southeast Asia and eastern Russia. Outcompetes native mollusks		**European Buckthorn – Invasive:** A robust shrub which grows into dense thickets. Originally native to Eurasia, this species can establish in many different habitats.	

Concordia Park Trail Upgrades

- Concordia Park Trail System
  - 1,100 m of trail
  - Connects Westmount Drive East, Greenbrook Drive, Gilmour Crescent, and Avalon Place
  - Current trail is a gravel path, and not up to City standards
  - Existing trail to be upgraded:
    - 3 m wide
    - Asphalt surface
- Will follow existing trail with minor changes if necessary

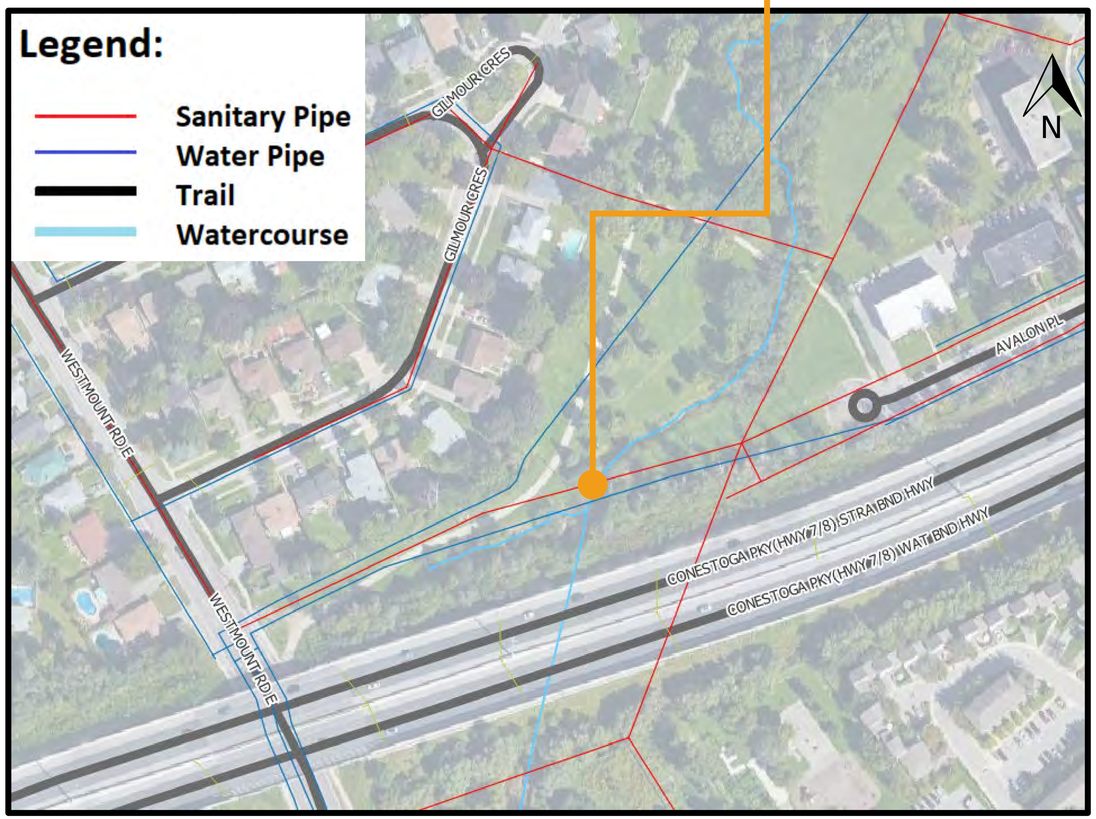


Borden Creek at Conestoga Parkway: Erosion Risk

Exposed sanitary pipe (concrete-encased)

Eroding banks, exposed bare soil

Exposed Sanitary Pipe, Culvert Outlets, Creek Erosion



Design Element	Final Design Concept
Infrastructure Risks	Lowering of exposed sanitary pipe not feasible. Propose to move sanitary west of Borden Creek, removing sanitary risks in the watercourse. Culvert outlet adjacent to Hwy 8 to be stabilized with the addition of plunge pool and river stone.
Natural Channel Design	Natural channel design will be used to restore fish passage which is limited due to the exposed sanitary pipe. Channel alignment to be modified and banks sloped to reduce future erosion in the park.
Ecological Restoration	Native seed mixes, shrubs, and trees will be used to restore areas. Native strong-rooting shrubs will help stabilize channel bank areas. Invasive species will be removed or controlled where possible

Borden Creek at Conestoga Parkway: Repairing Erosion

Realign sanitary line to eliminate crossing at Borden Creek:

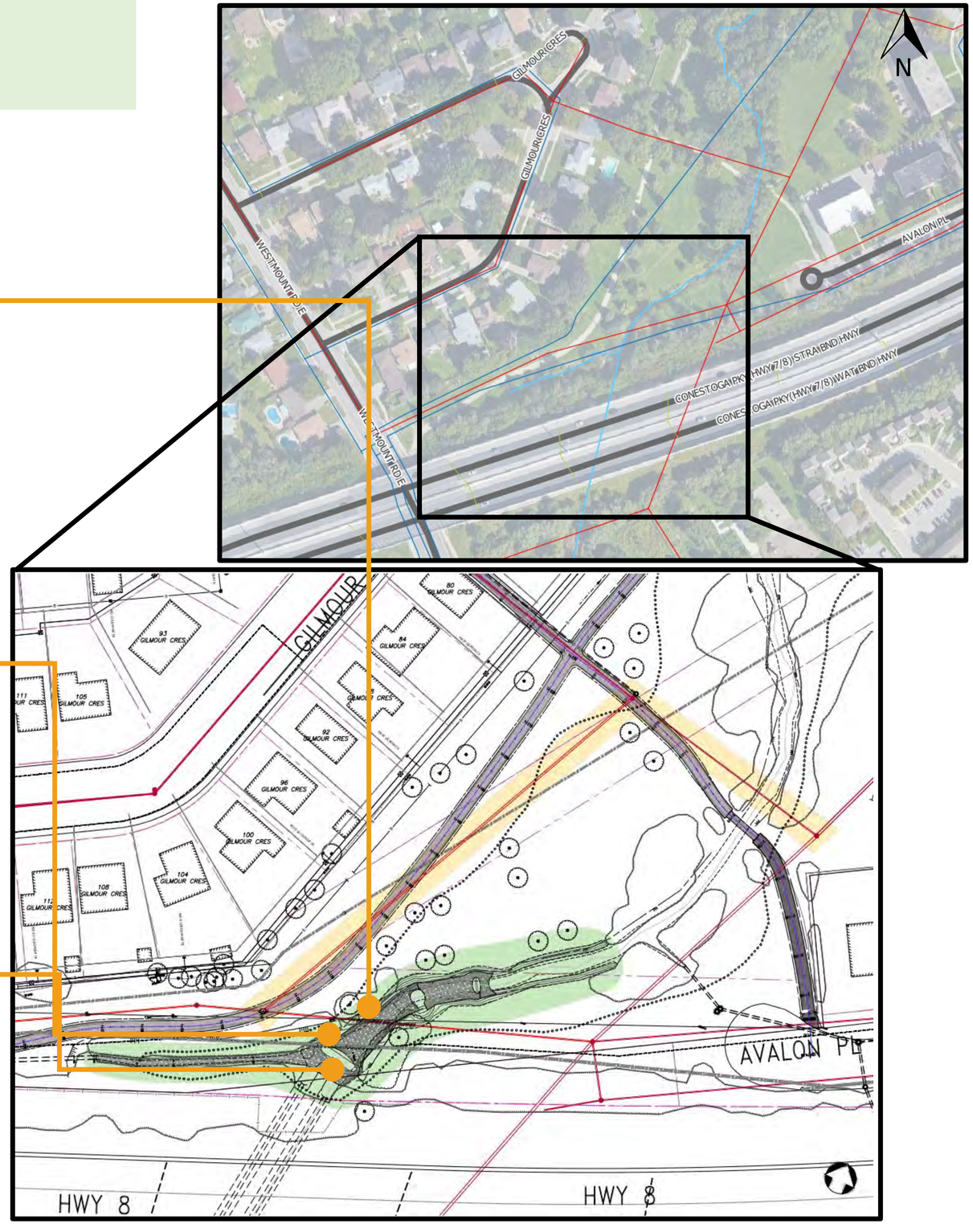
- Install additional manholes
- Connect to existing sanitary pipeline from Gilmour Crescent and upgrade existing connection
- Restore lawn and trail

Re-establish riparian corridor:

- Remove invasive species (e.g., European buckthorn)
- Restore eroded banks to establish more stable slopes
- Vegetate with native species
- Enhance aquatic and terrestrial habitat
- Improves water quality

Enhance stability at Existing Outlet:

- Add river stone and energy dissipation pool
- Remove barrier to fish crossing, reestablish gradual channel slope



Borden Creek at Conestoga Parkway: Restoring Nature

Re-establish native vegetation along channel banks:

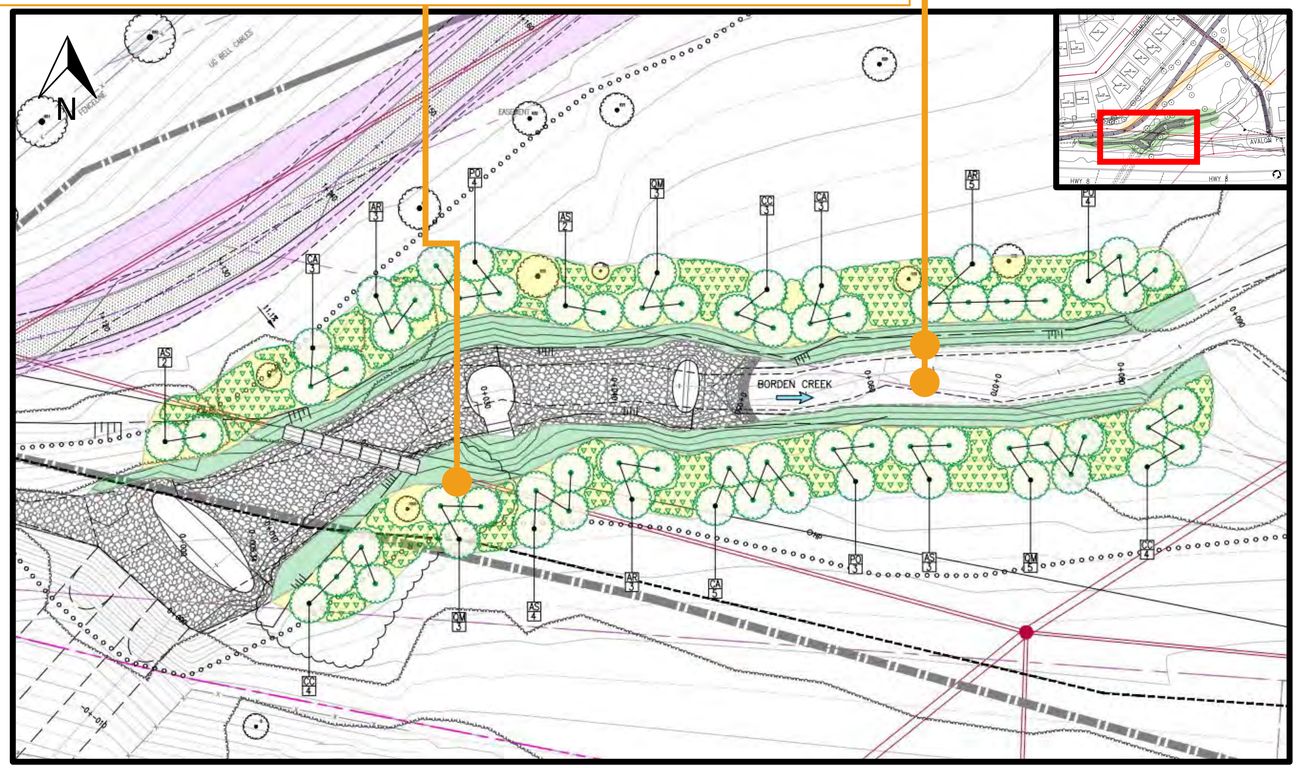
- Incorporate native seed, shrubs, and trees
- Vegetation corridor helps treat rainwater before it enters the creek. It also provides habitat, and supports fish species

Stabilize channel:

- Reshape bend
- Bioengineering on banks
- Make slope more gradual, allowing fish to travel upstream

What is bioengineering?

- Supports soils and reduces erosion with vegetation
- Provides habitat with living plant material and organic material
- Improves water quality
- Planting native shrub and seed species that root quickly



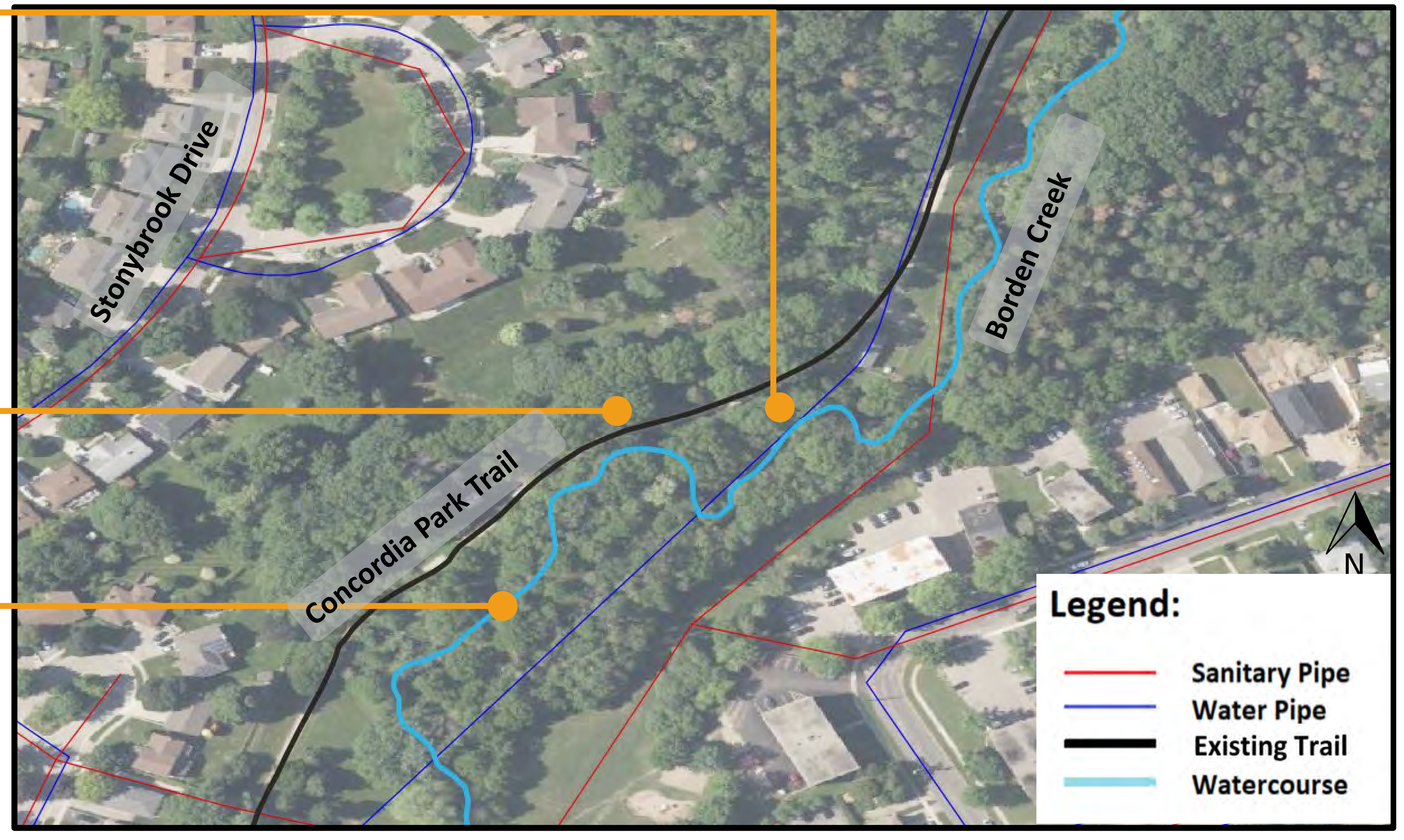
Native Species Used for Bioengineering	
Red-osier Dogwood	
Bebb's Willow	
Pussy Willow	
Speckled Alder	

Borden Creek at Concordia Park: Erosion Risk

Erosion Near Trail

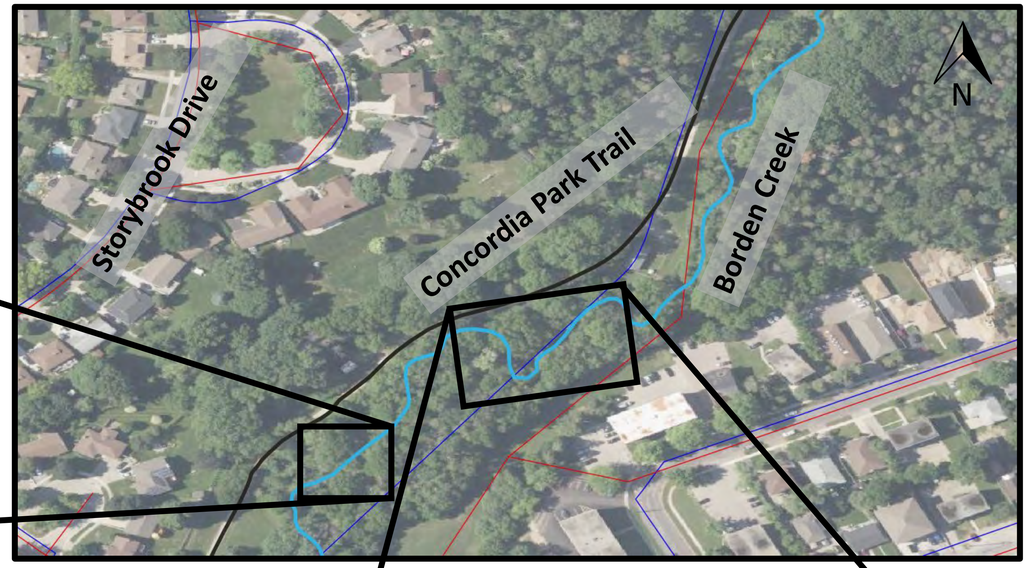
Exposed Watermain

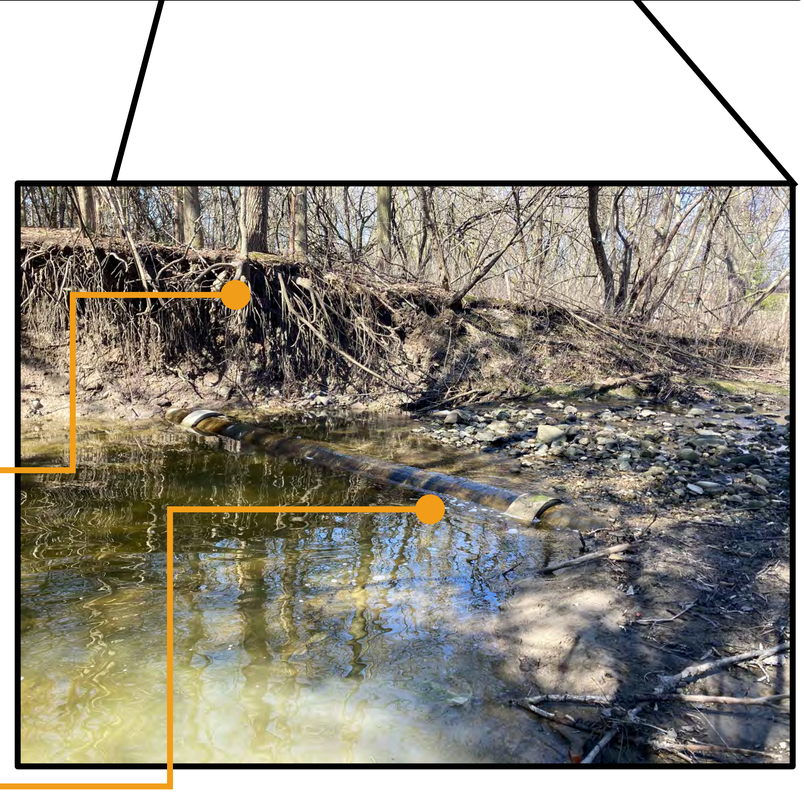
Failed Stormwater Outlet



Design Element	Final Design Concept
Infrastructure Risks	Watermain to be decommissioned by Waterloo Region. Only exposed sections of watermain to be removed. Confirmed by regional staff that watermain does not need to be replaced/realigned.
Natural Channel Design	Natural channel design methods will be used to restore Borden Creek where it is impacted by the water main removal.
Ecological Restoration	Native seeds mixes, shrubs, and trees will be used restored areas. Native strong-rooting shrubs will help stabilize channel bank areas.

Borden Creek at Concordia Park: Addressing Erosion





Repair failed storm outlet:

- Remove broken concrete pipe
- Install poured concrete foundation
- Construct energy dissipation pool and apron out of river stone.

Protect trail with vegetated stone:

- Existing bank to be protected with boulders and planted with native shrub species
- Add a buried trough of stone to protect the trail in the future

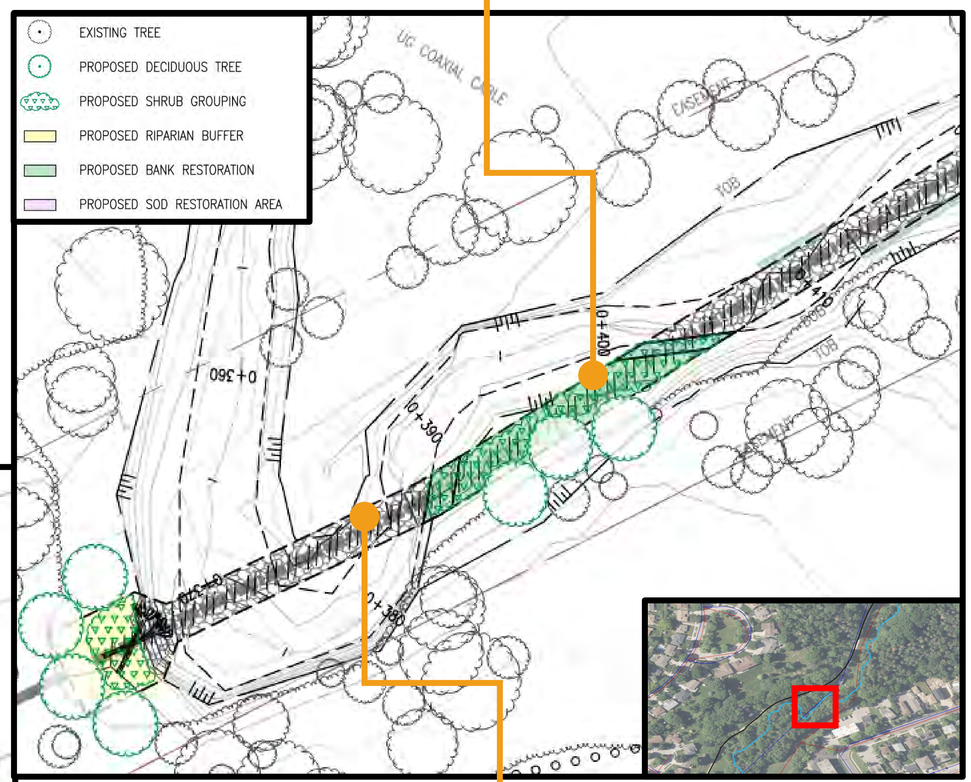
Remove and cap exposed watermain:

- Once decommissioned by the Region, the pipe will be capped and removed from the creek
- Repair channel bed and banks
- Incorporate native vegetation on banks and floodplain areas

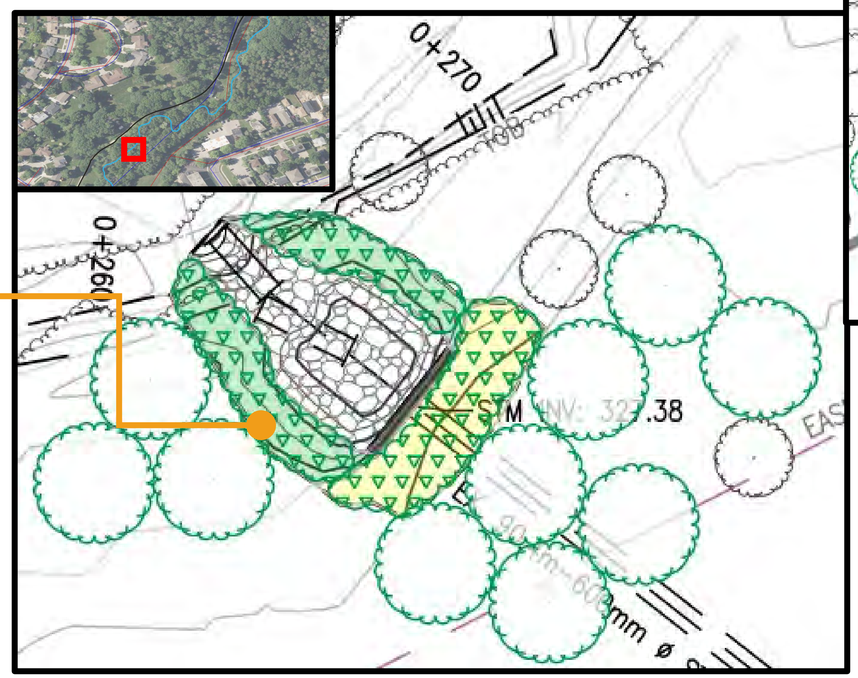
Borden Creek at Concordia Park: Restoring Nature

- Borden Creek works within the park are only anticipated to impact small areas of natural habitat
  - Spot repair banks with coir matting and native seed
  - Plant native trees and shrubs where space permits
  - Potential for additional tree plantings within mowed lawn areas

Removed Watermain (channel bed):
Channel bed surfaces impacted by watermain removal to be restored using river stone mix.



Rehabilitated Storm Sewer Outlet:
Bioengineering/slope stability, tree and shrub planting

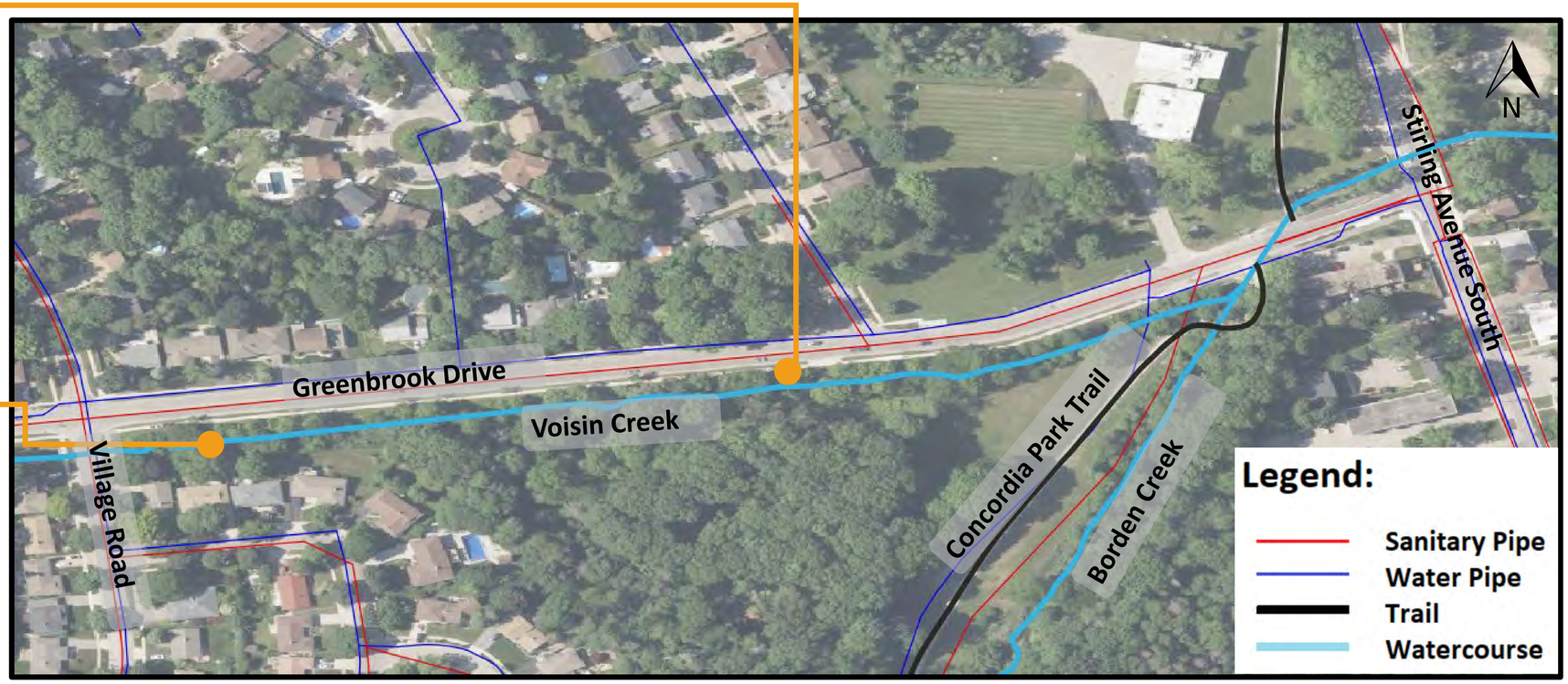


Removed Watermain (channel banks):
Only small sections of bank are anticipated to be impacted. To be restored with native seed, coir, and trees where space permits

Voisin Creek at Greenbrook Drive: Erosion Risk

Bank Erosion

Slumping Retaining Wall



Design Element	Final Design Concept
Infrastructure Protection	Remove existing “sack” concrete wall, replace with armourstone to protect Greenbrook Drive
Natural Channel Design	Use natural channel design when possible. Add rock to protect banks near infrastructure. Create floodplain in Concordia Park to enhance local habitat.
Ecological Restoration	Native seeds mixes, shrubs, and trees will be used restored areas. Native strong-rooting shrubs will help stabilize channel bank areas.

Voisin Creek at Greenbrook Drive: Addressing Erosion

Replace Failed Retaining Wall:

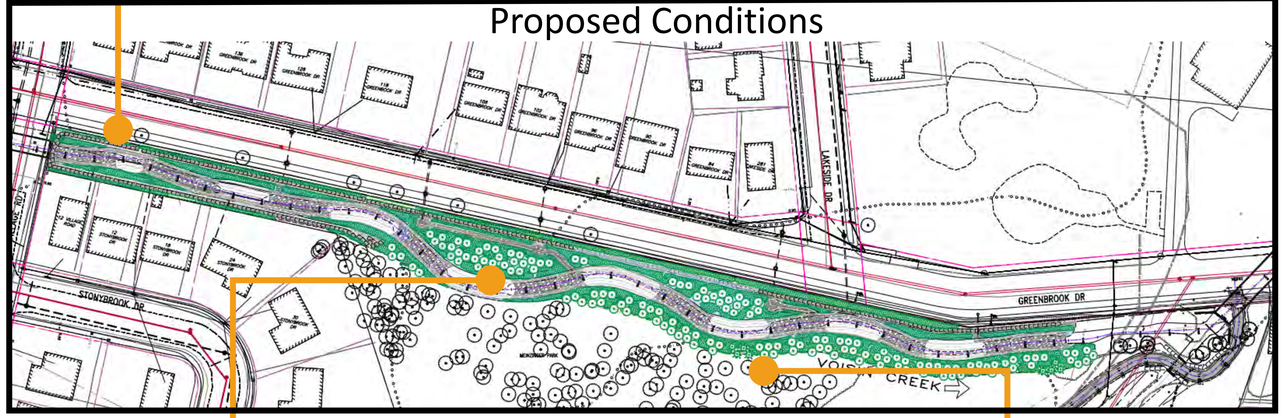
- Retaining wall to be replaced by armourstone and extended along the northern end to enhance protection of Greenbrook Drive.

Natural Channel Design:

- Create a natural profile.
- Widen existing floodplain and include native species.
- Reduce erosion, and improve water quality, aquatic habitat, and surface water temperature.

Existing Conditions

Proposed Conditions



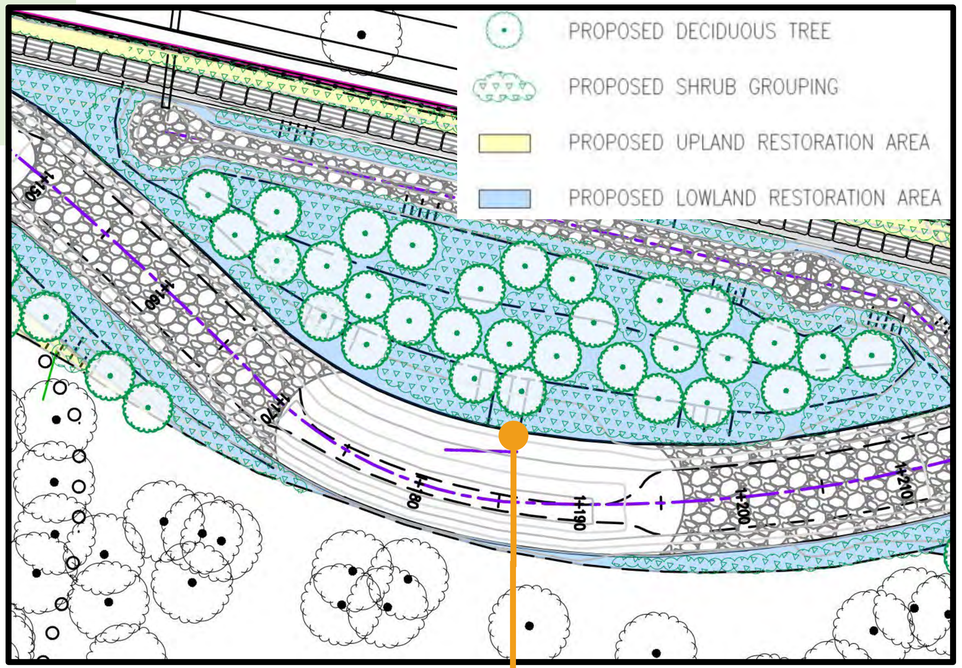
Tree Removal and Plantings:

- Any tree required to be removed to complete the proposed work will be replaced in line with the City of Kitchener guidelines.

Voisin Creek at Greenbrook Drive: Restoring Nature

Riparian and Brush Layer Vegetation:

- Biodegradable coconut fiber matting (coir) used to stabilize slopes while vegetation grows
- Woody vegetation (trees and shrubs) planted in and around coir are allowed to root and mature
- Within 1 to 2 years, native species begin to grow and further stabilize the ground



Targeted Planting Plans

- Different species are used for lower, wetter areas near Voisin Creek (blue) and upper, drier areas further away from the water.