Stormwater Engineering Projects: We’re more than just ponds

Stormwater Engineering Division (SWED)
Environment and Infrastructure
City of London
ESACAC - June 7, 2023

Stormwater Engineering

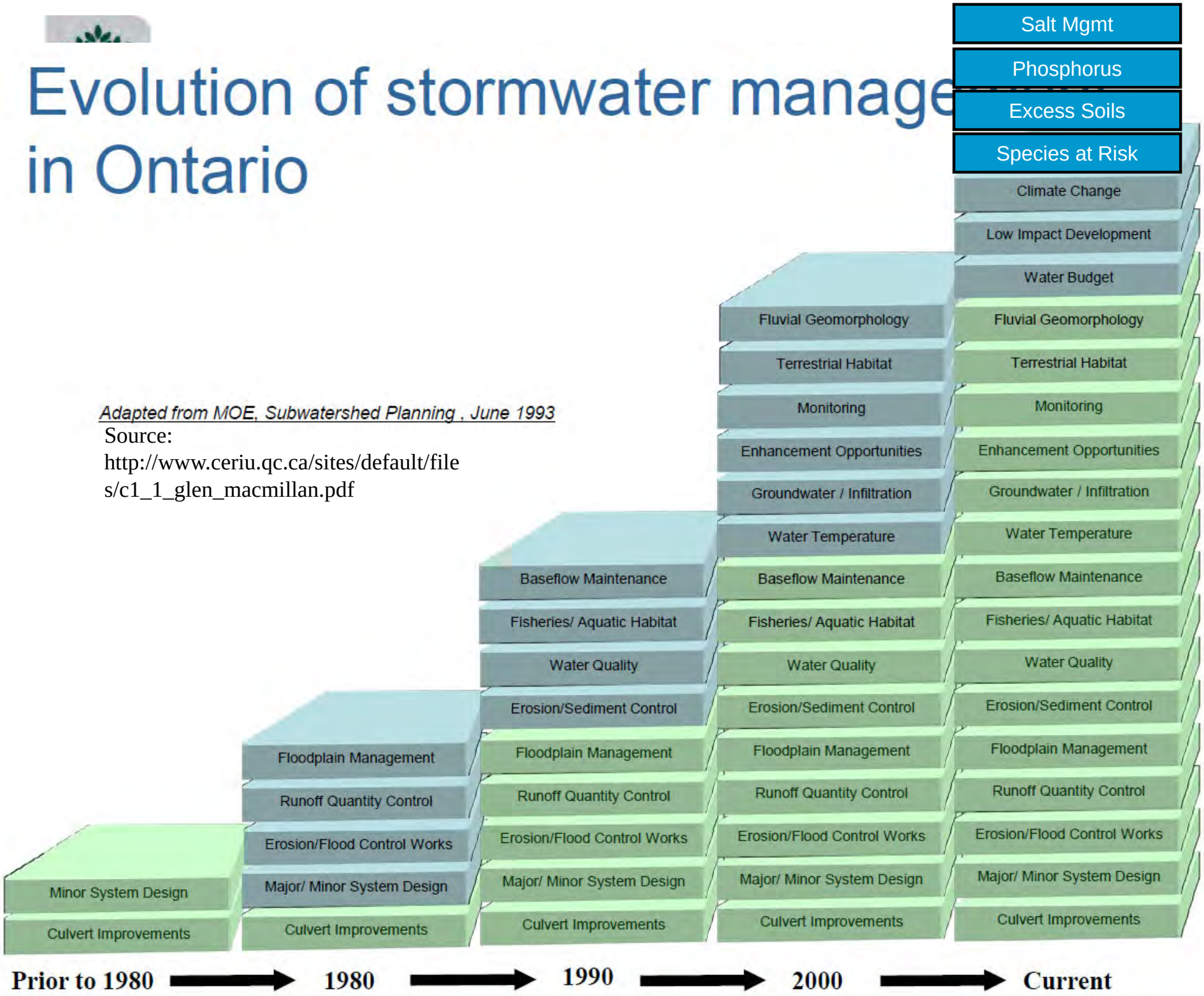
- Today's SWM approach
- Construction Project Map
- Channel Rehabilitation
- Slope Remediation
- Climate Change Adaptation
- Low Impact Development

Filter Phil – Raingarden Mascot (2018);
SOHO Waterloo St. Rain Gardens (2017);
"Archie" at Fire Hall 11 Rain Garden (2018)

London's Stormwater Engineering Division

- 13-person team of Engineers, Technologists, Hydrogeologist and Ecologist
- Provide input related to all SWM matters in City
- Funded by Storm Rates established in 1996
- Construct development SWM projects for new subdivisions
- 2019 design standard update includes Low Impact Development (LID)s

Evolution of stormwater manage in Ontario



Adapted from MOE, Subwatershed Planning , June 1993

Source:
http://www.ceriu.qc.ca/sites/default/files/c1_1_glen_macmillan.pdf

Traditional SWM – End of Pipe Facilities

Post-2002 practices:

- Stormwater wet ponds
- Can be isolated from ecological systems
- Loosely integrated with pathways
- Costly to remove sediment

Opportunity for LIDs

- MECP Bulletin, Expectations for Stormwater Management (*February 2015*)
- Maintain natural hydrologic cycle
- Provincial LID Manual (Jan 2022 Draft)
- Consolidated Linear Infrastructure-Environmental Compliance Approval

> **Going forward, the Ministry expects that stormwater management plans will reflect the findings of watershed, sub-watershed, and environmental management plans, and will employ LID in order to maintain the natural hydrologic cycle to the greatest extent possible.**

Filter Phil – Raingarden Mascot (2018);

Waterloo St Rain Gardens (2017)

Increasing Biodiversity

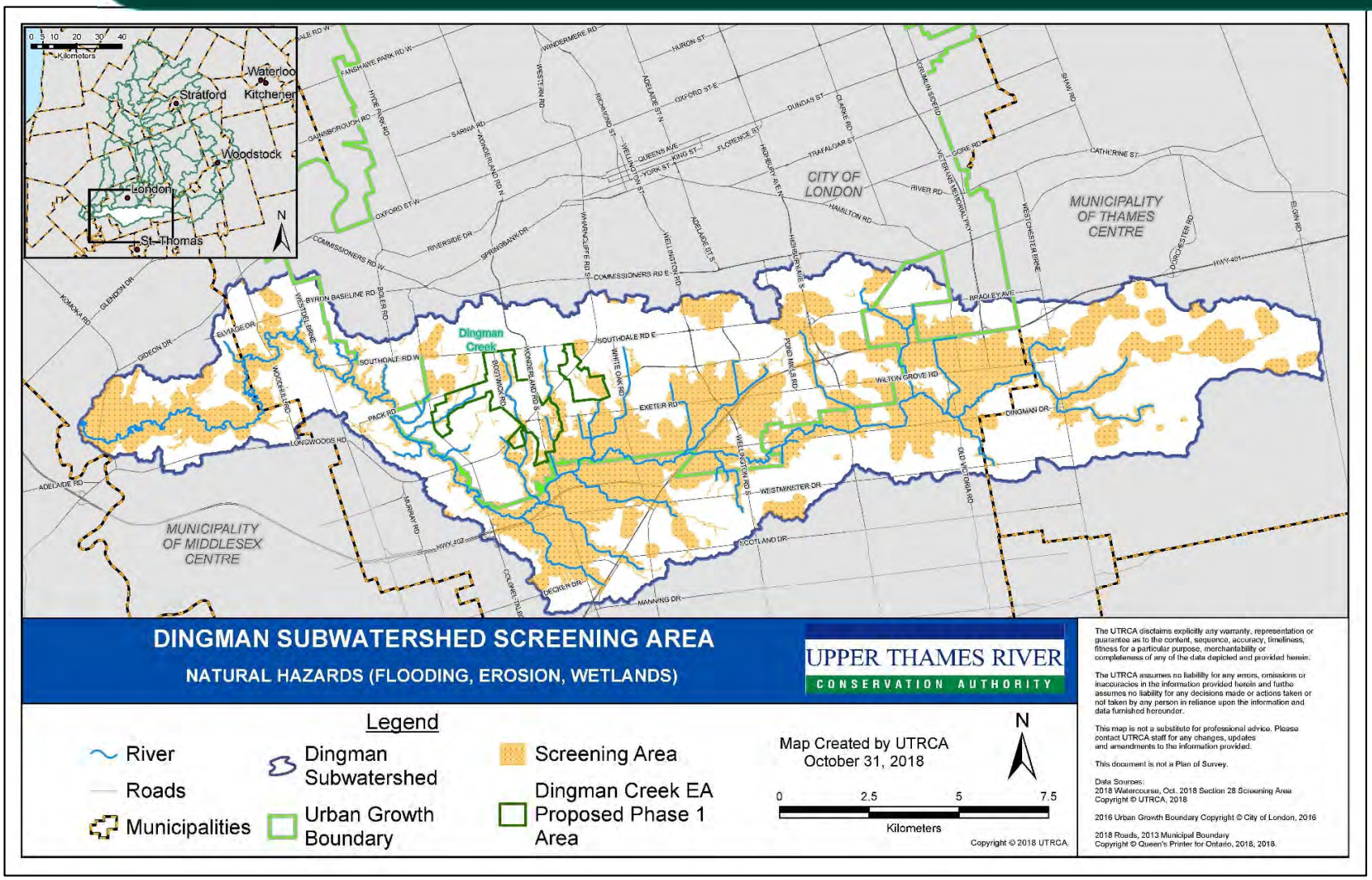
- **New nesting site: Blue-Wing Teal Duck** discovered by Environment Canada Biologist summer 2019
- Media release Feb 20, 2020: Blackburn, Global, CTV and CBC

Dingman Wetland (2014):
401 rest stop for migratory birds

"Breeding [of the Blue-Wing Teal Duck] in Ontario is on the decline, and the fact that a successful brood was raised at the Dingman site, speaks to the quality of the habitat in there."
- Denby Sadler, Environment Canada Wildlife Biologist

https://www.cbc.ca/news/canada/london/dingman-creek-wetland-1.5475134

Regulatory Floodplain Updates

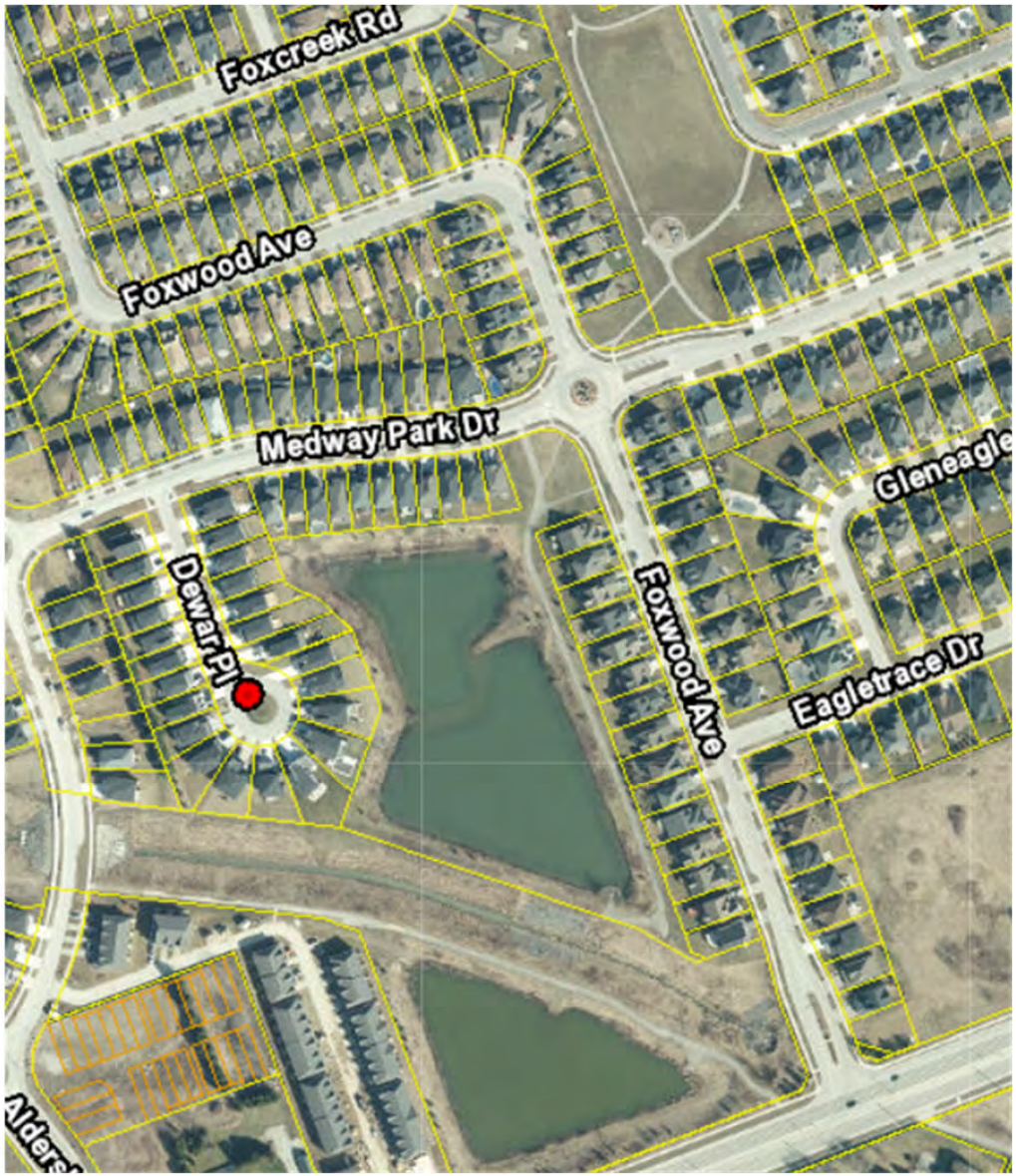


- Province-wide floodplain updates led by Conservation Authorities
- Regional 250-year floodplain limits and developable lands are changing

SWM with Parks and Pathways

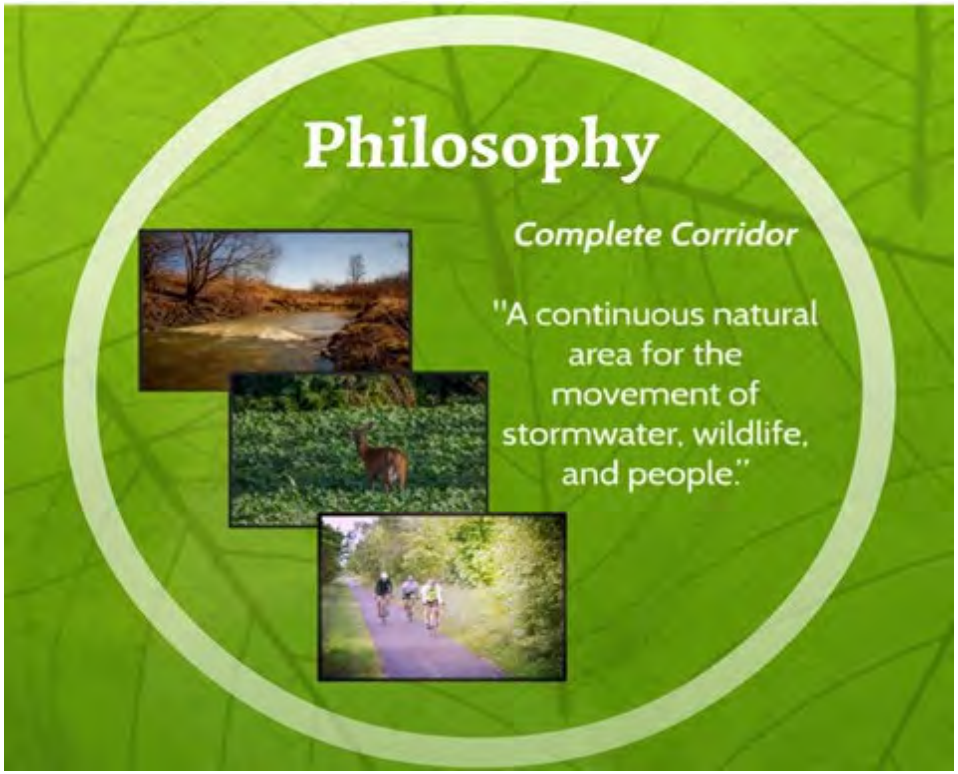
- London has over 500 parks and +240km of trails; >40km of Thames Valley Parkway
- Pathways often located around stormwater management ponds

Semi-integrated SWM and Pathways:
Fox Hollow Subdivision London, ON
Mid-2000s



Complete Corridor Approach

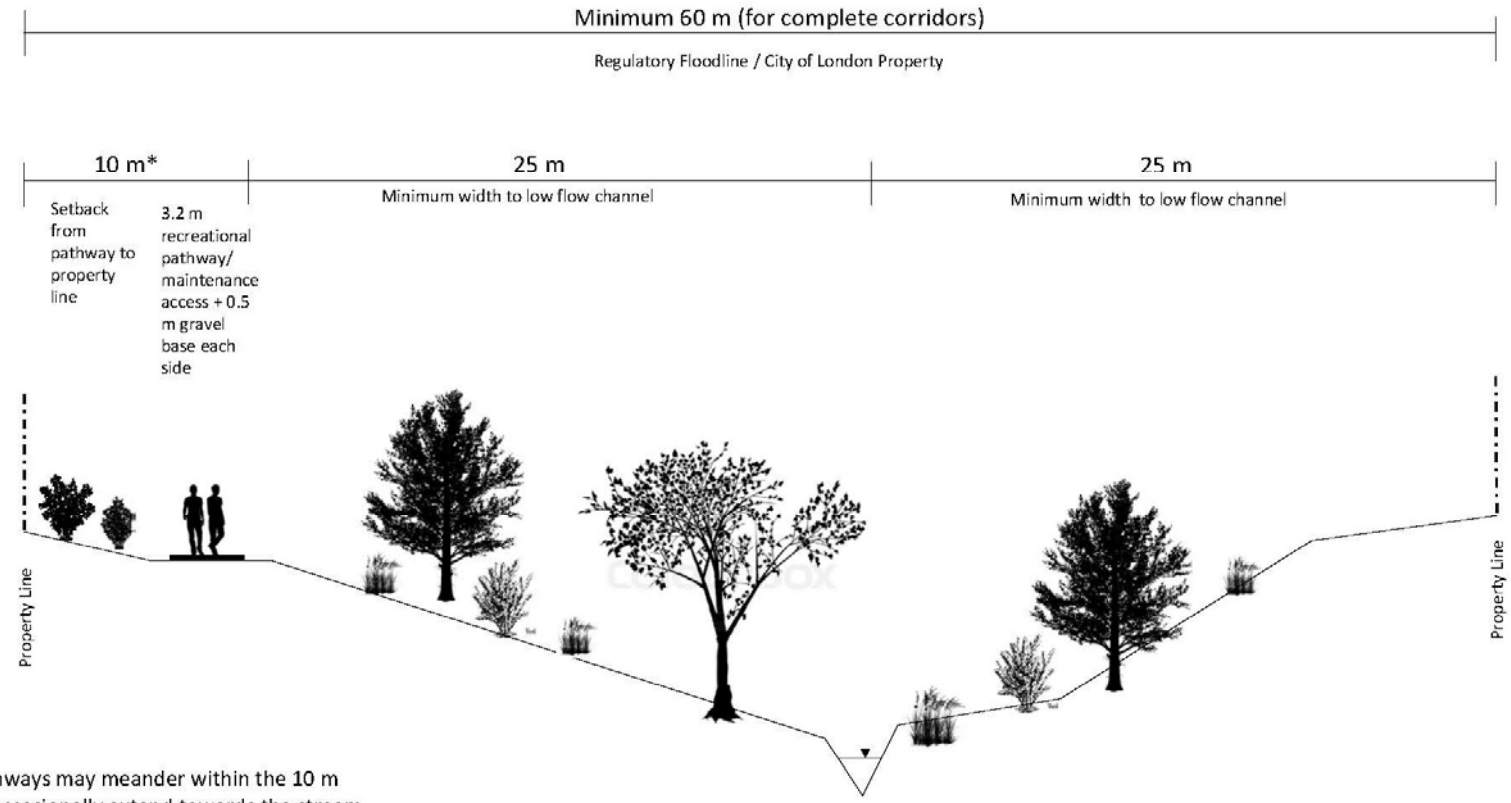
- Integrate natural heritage, open space, recreational, and SWM
- Continuous corridor to protect, maintain, rehabilitate, and restore ecological functions
- Central focus for neighbourhood planning



The studies “point in one direction: Nature is not only nice to have, but it’s a have-to-have for physical health and cognitive function.”
-Jim Robbins, Yale Environment 360

Conceptual Design

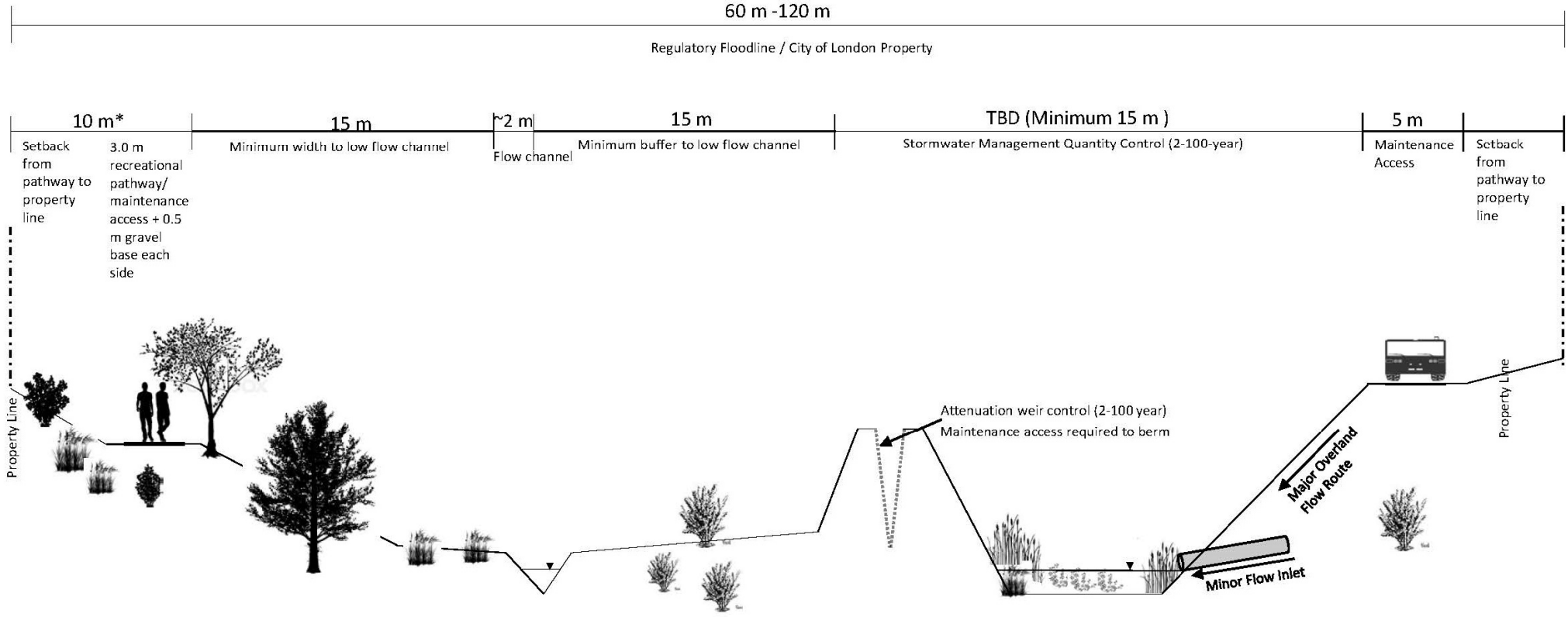
Example 1 – Minimum Corridor Requirements



*Pathways may meander within the 10 m and occasionally extend towards the stream or other feature where appropriate.

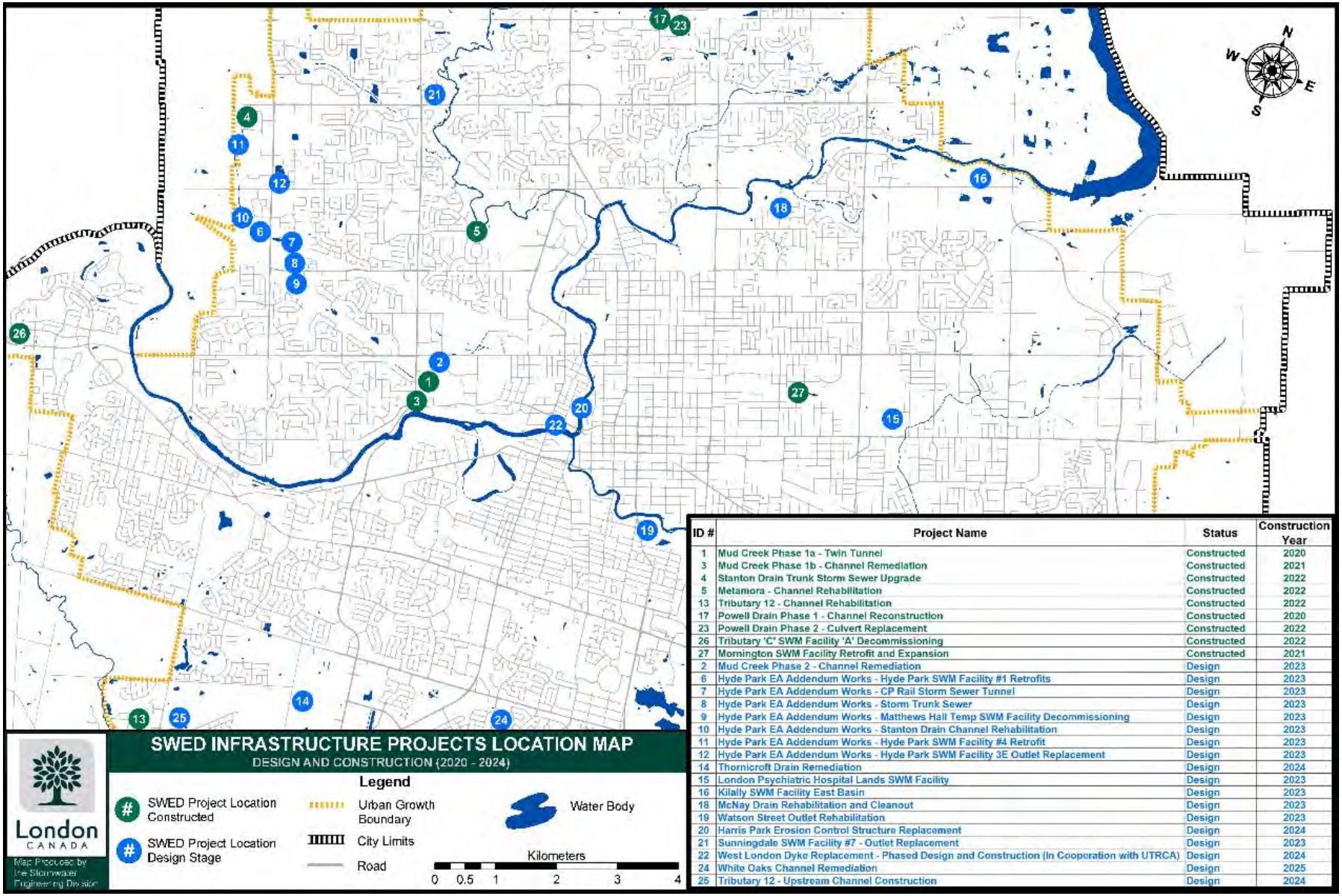
Conceptual Design

Example 2 – Corridor with Stormwater Management (Quantity Control), Maintenance access on both sides of corridor



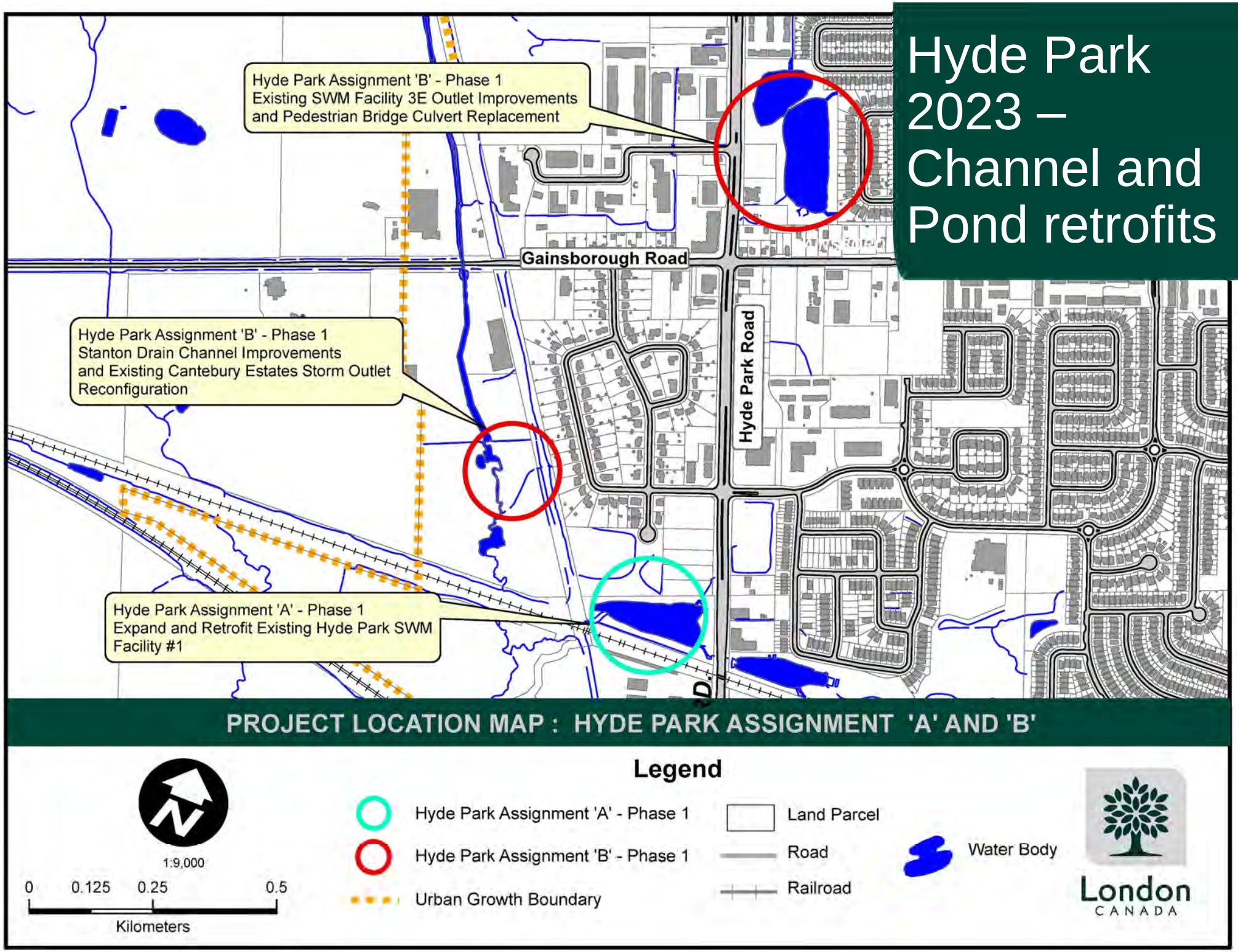
*Pathways may meander within the 10 m and occasionally extend towards the stream or other feature where appropriate.

Construction Map (2020-2025)



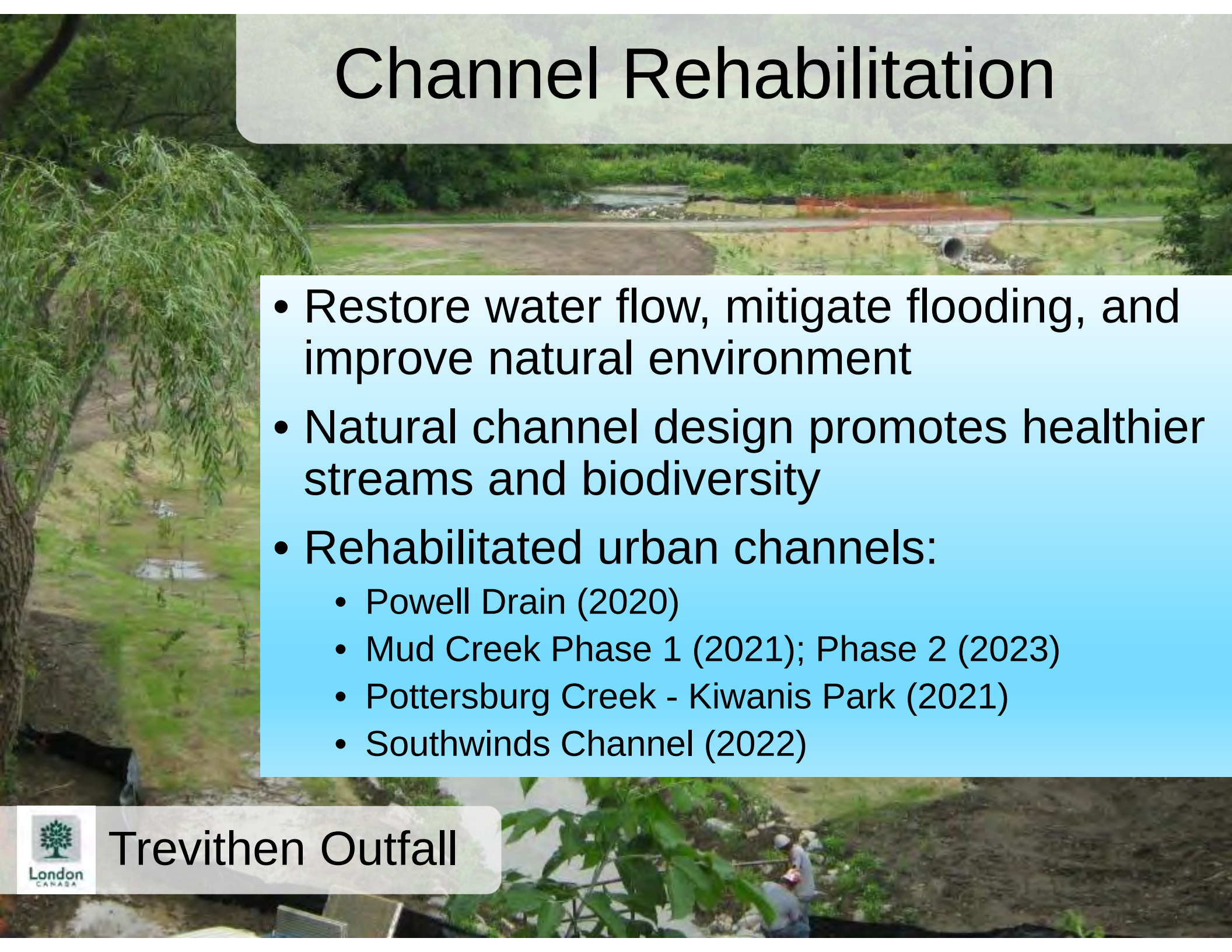
ID #	Project Name	Status	Construction Year
1	Mud Creek Phase 1a - Twin Tunnel	Constructed	2020
3	Mud Creek Phase 1b - Channel Remediation	Constructed	2021
4	Stanton Drain Trunk Storm Sewer Upgrade	Constructed	2022
5	Metamora - Channel Rehabilitation	Constructed	2022
13	Tributary 12 - Channel Rehabilitation	Constructed	2022
17	Powell Drain Phase 1 - Channel Reconstruction	Constructed	2020
23	Powell Drain Phase 2 - Culvert Replacement	Constructed	2022
26	Tributary 'C' SWM Facility 'A' Decommissioning	Constructed	2022
27	Mornington SWM Facility Retrofit and Expansion	Constructed	2021
2	Mud Creek Phase 2 - Channel Remediation	Design	2023
6	Hyde Park EA Addendum Works - Hyde Park SWM Facility #1 Retrofits	Design	2023
7	Hyde Park EA Addendum Works - CP Rail Storm Sewer Tunnel	Design	2023
8	Hyde Park EA Addendum Works - Storm Trunk Sewer	Design	2023
9	Hyde Park EA Addendum Works - Matthews Hall Temp SWM Facility Decommissioning	Design	2023
10	Hyde Park EA Addendum Works - Stanton Drain Channel Rehabilitation	Design	2023
11	Hyde Park EA Addendum Works - Hyde Park SWM Facility #4 Retrofit	Design	2023
12	Hyde Park EA Addendum Works - Hyde Park SWM Facility 3E Outlet Replacement	Design	2023
14	Thornicroft Drain Remediation	Design	2024
15	London Psychiatric Hospital Lands SWM Facility	Design	2023
16	Kilally SWM Facility East Basin	Design	2023
18	McNay Drain Rehabilitation and Cleanout	Design	2023
19	Watson Street Outlet Rehabilitation	Design	2023
20	Harris Park Erosion Control Structure Replacement	Design	2024
21	Sunningdale SWM Facility #7 - Outlet Replacement	Design	2023
22	West London Dyke Replacement - Phased Design and Construction (In Cooperation with UTRCA)	Design	2024
24	White Oaks Channel Remediation	Design	2025
25	Tributary 12 - Upstream Channel Construction	Design	2024

Hyde Park 2023 – Channel and Pond retrofits



Channel Rehabilitation

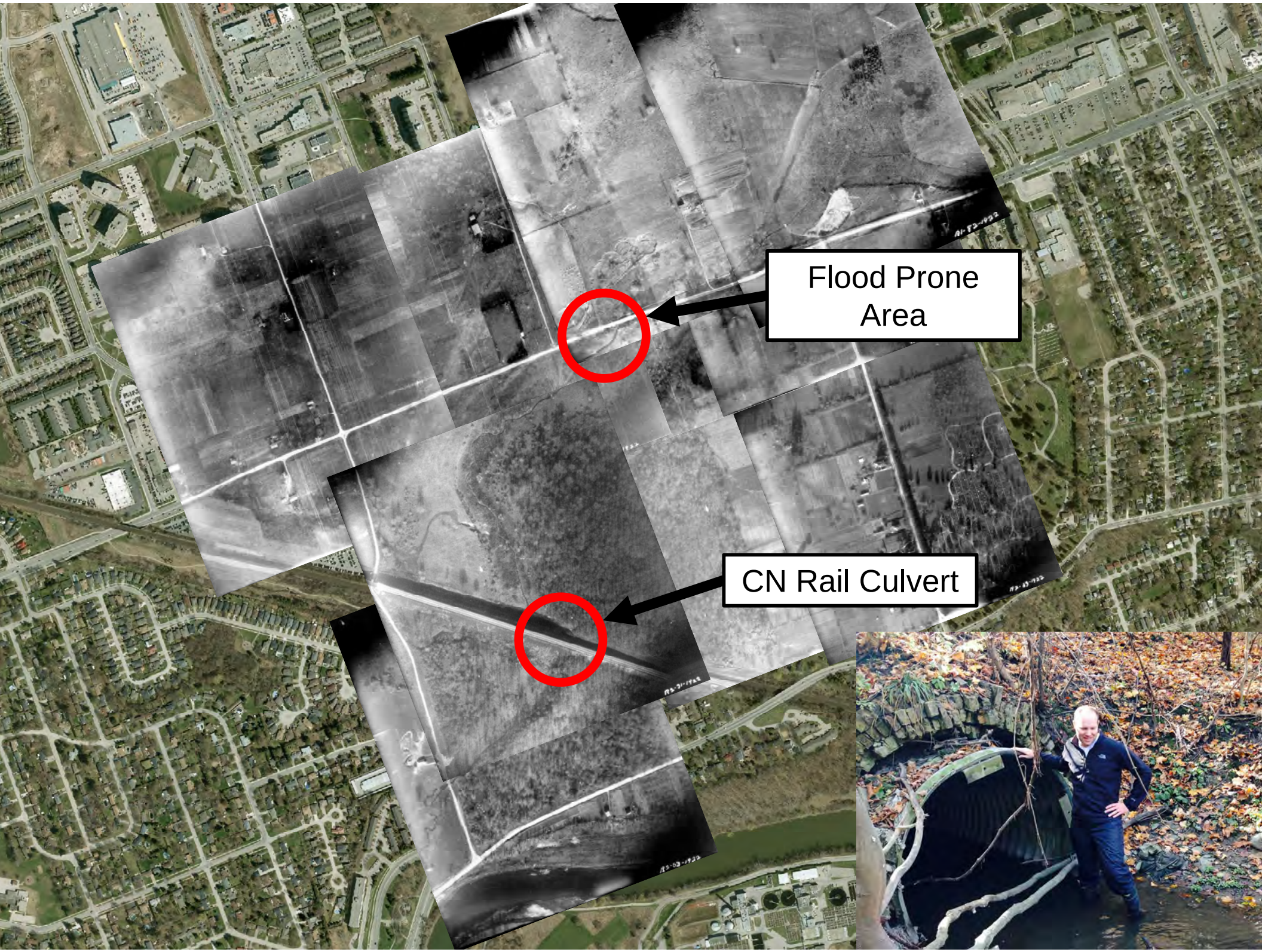
- Restore water flow, mitigate flooding, and improve natural environment
- Natural channel design promotes healthier streams and biodiversity
- Rehabilitated urban channels:
  - Powell Drain (2020)
  - Mud Creek Phase 1 (2021); Phase 2 (2023)
  - Pottersburg Creek - Kiwanis Park (2021)
  - Southwinds Channel (2022)



London CANADA

Trevithen Outfall

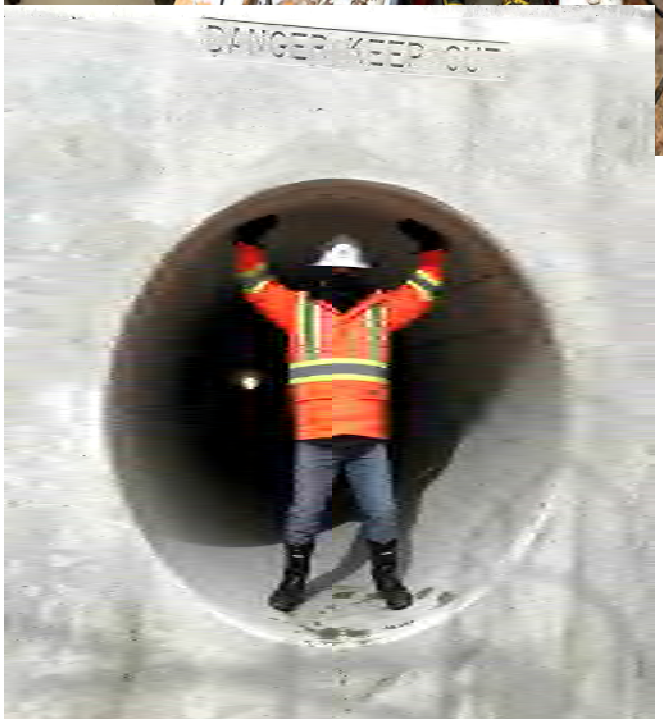
Mud Creek Channel Reconstruction


Flood Prone Area
CN Rail Culvert

Mud Creek EA (2017)

- Improve flood conveyance at Oxford and reduce flood risk to property
- Facilitate 54 ha of draft-approved medium and high density infill development
- EA recommended upsizing CN culvert and channel reconstruction.

Phase 1A:
Mud Creek Tunnels



Phase 1B: Channel Reconstruction

March 25, 2020

June 30, 2022

- Previously constrained and overgrown corridor
- 280m of 60m-wide corridor restoration
- $3.56M construction tender

Matrix Solutions Inc.
ENVIRONMENT & ENGINEERING

JACOBS

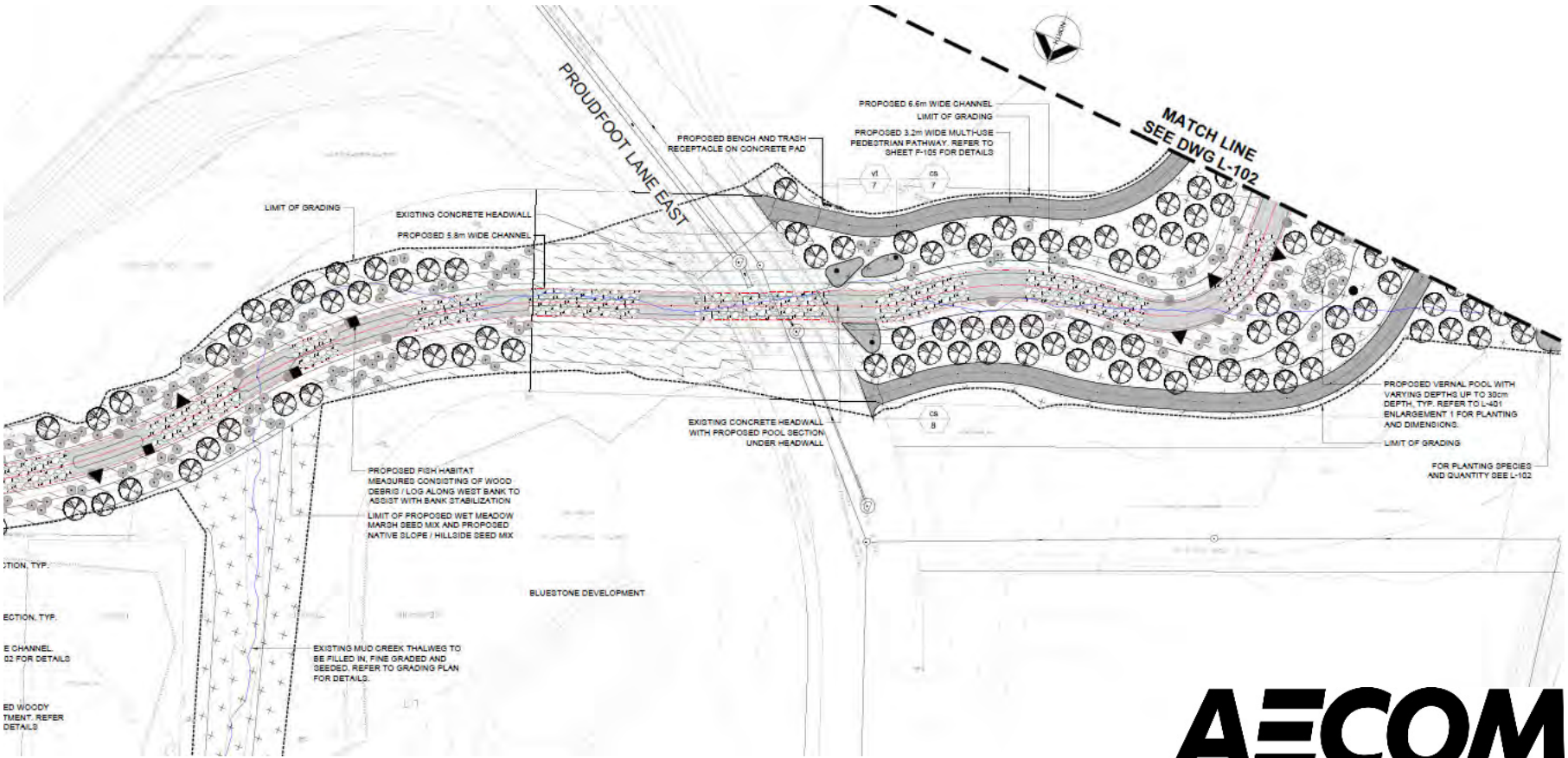
J-AAR EXCAVATING


London
CANADA
Mud Creek Reconstruction
Wetland Feature


Mud Creek Reconstruction
https://youtu.be/BU2lh9fLOwQ

Phase 2: Coming soon! 2023-2025

- Expand/relocate Oxford Street box culvert
- 775m of 40 to 60m-wide channel corridor creation



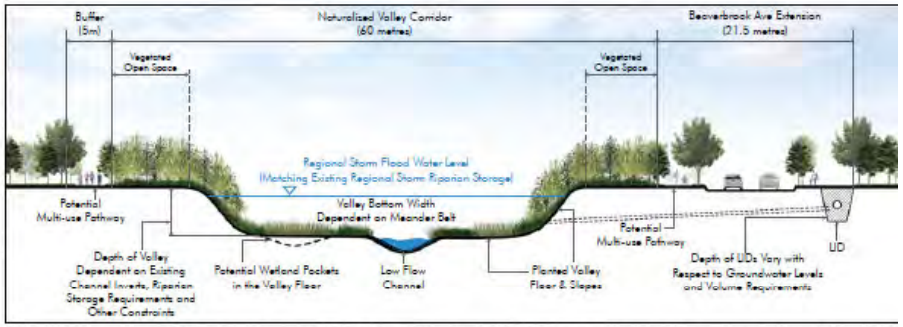
Phase 3: 2025+
Future Infill Subdivision

The Municipal Infrastructure Group Ltd. (TMIG) was retained in 2016 by Sam Katz Holdings Limited to provide a solution for the uncontrolled flooding that occurs on the subject lands, at 323 Oxford Street West, with the intention that the proposed solution would be appended to the final Mud Creek Subwatershed Class Environmental Assessment. TMIG has been coordinating their modelling, calculations and proposed solution with City staff and their consultant team throughout the duration of this exercise.

TMIG Memorandum "Conceptual Design Of Mud Creek Re-Alignment On The ESAM Lands For Informing The Mud Creek Subwatershed Class Environmental Assessment"

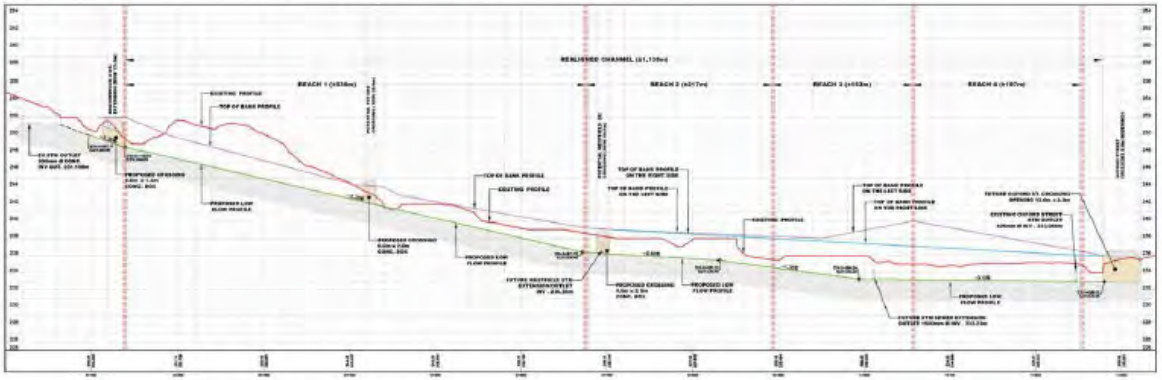
The memorandum prepared by TMIG addresses design considerations such as the Beaverbrook Avenue Extension, potential local roadway crossings, the preferred alternative of the Mud Creek Subwatershed Class Environmental Assessment, existing culverts and storm sewers, storm event peak flows, meander belt width, and riparian storage. The proposed corridor provides opportunities for an enhanced creek and vegetation system, and comprises the following areas:

Features of the Defined Valley & Creek Corridor	Area (ha)
Low Flow Channel	0.58
Valley Floor	2.21
Embankment (max 3:1 side slope)	1.57
Vegetated Open Space	1.66
Total Creek Corridor	**6.02**
5 Metre Buffer with Multi-Use Path (located outside of the valley corridor)	0.42
Total Creek Corridor + Buffer	**6.44**

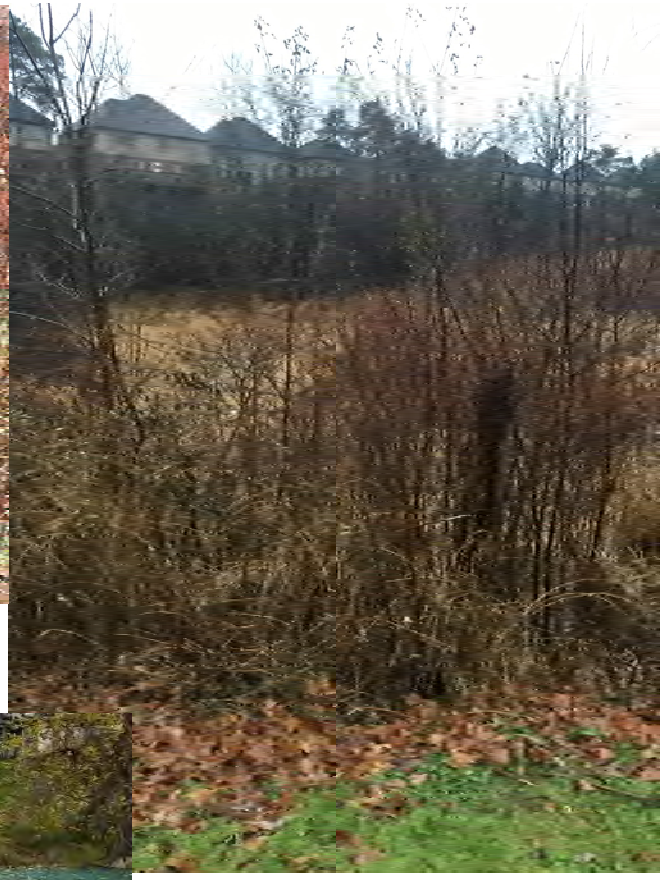


Where possible, Site Plans for blocks adjacent to the Mud Creek valley corridor shall orient outdoor amenity space adjacent to the valley corridor.

Conceptual Creek Alignment and Restoration Opportunities



Powell Drain (2020)



Powell Drain Reconstruction (2020)

Pottersburg Creek Before (2020)

Pottersburg Creek at Kiwanis Park (2021-2022)

Pottersburg Creek After (2022)

Pottersburg Creek at Kiwanis Park (2021-2022)

Southwinds Channel

- Floodprone area identified in Dingman EA

Southwinds Channel

- After

Southwinds Channel

- Corridor features
  - Pocket wetlands
  - Snake hibernaculum
  - Vegetation
  - Brush layers and rootwads
- Instream features
  - Riffle logs
  - Rootwads
  - Pools
  - Riffles

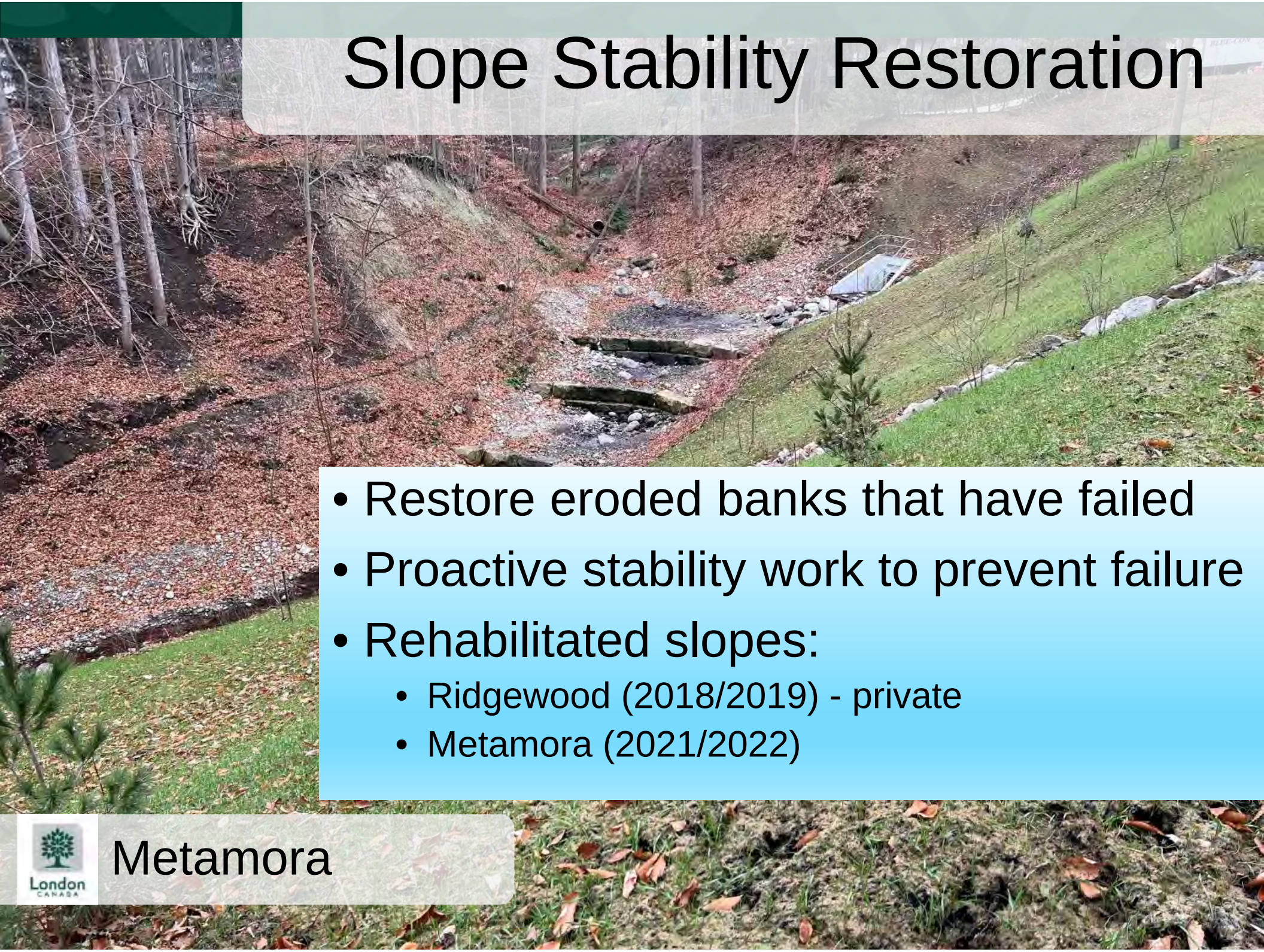
Then, During, and Now

Downstream of Colonel Talbot Road

Upstream of Isaac Drive/ Ped bridge

Southwinds Channel Before and After: https://youtu.be/Z3gEz8uU7-8

Slope Stability Restoration



- Restore eroded banks that have failed
- Proactive stability work to prevent failure
- Rehabilitated slopes:
  - Ridgewood (2018/2019) - private
  - Metamora (2021/2022)

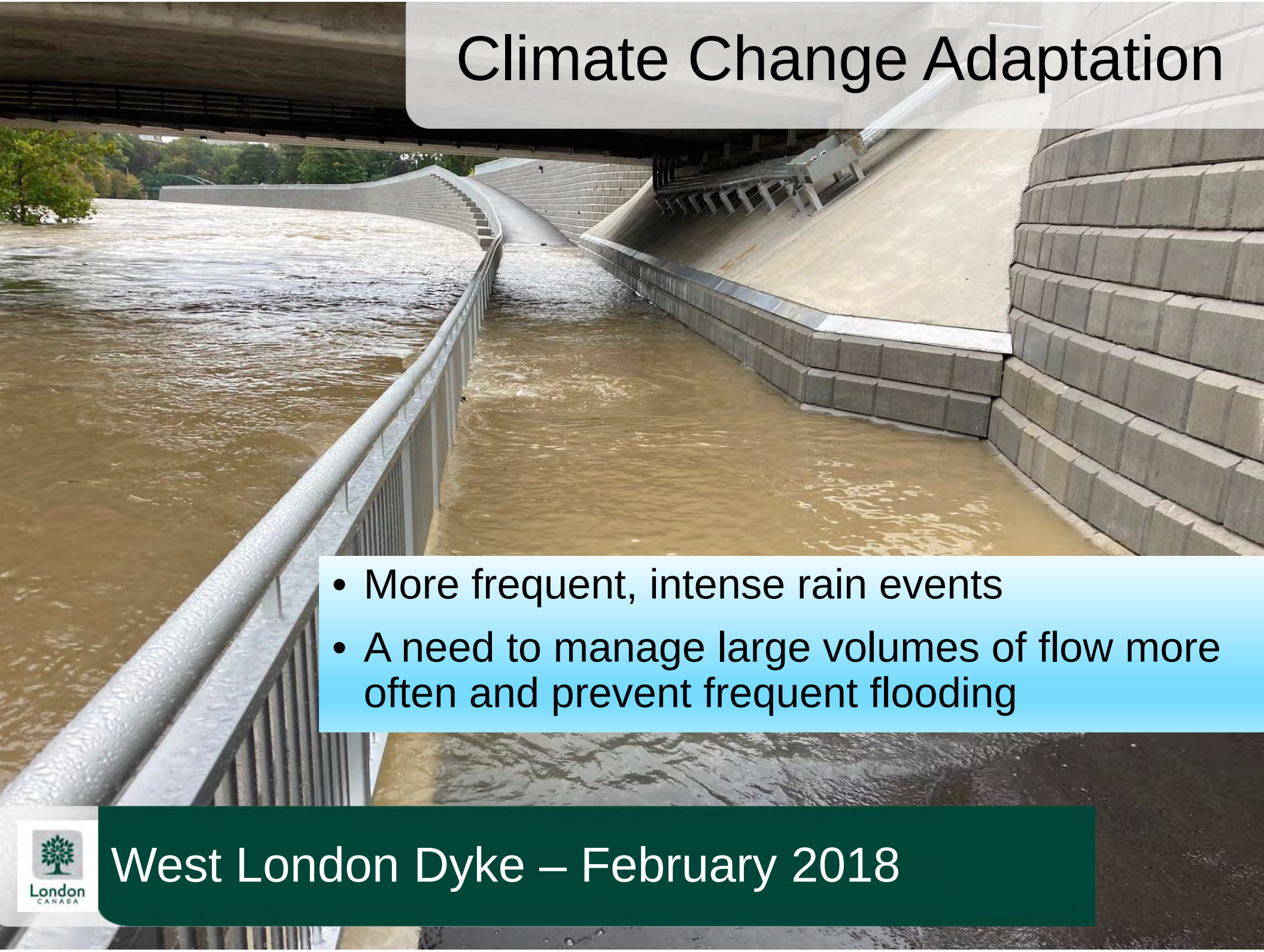
Metamora

Metamora Crescent

- Before

- After

Climate Change Adaptation



- More frequent, intense rain events
- A need to manage large volumes of flow more often and prevent frequent flooding

West London Dyke – February 2018

Flood Protection: Dyke Reconstruction

West London Dyke

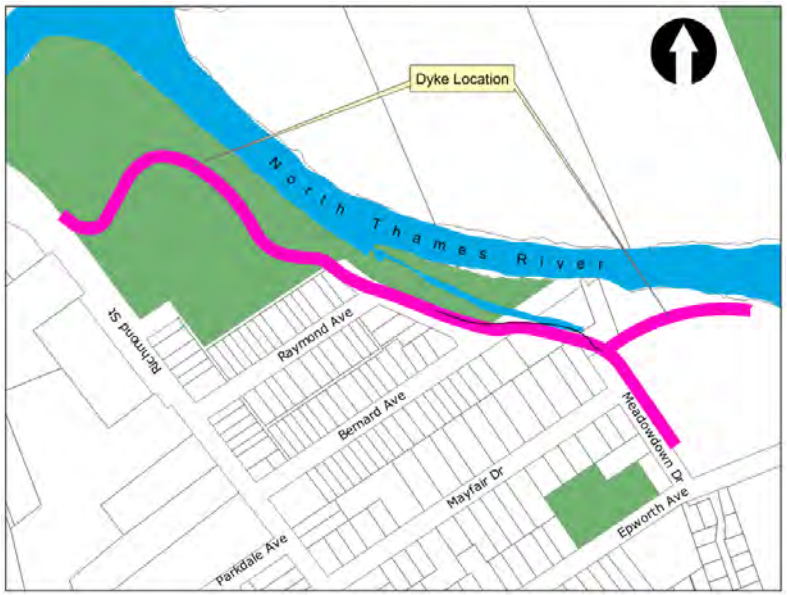
- Partnership with UTRCA to reconstruct West London Dyke.
- Protects Blackfriars and Cavendish neighbourhoods.
- Phases 1-7 complete from Forks to north of Oxford Street.
- Phases 8-10 to be completed by 2028 from the Forks to Cavendish Park.

West London Dyke Reconstruction

Flood Protection: Dyke Reconstruction

Broughdale Dyke

- 40% Federal funding received to reconstruct Broughdale Dyke of $9.09M project.
- Protects 190 properties from Thames River Flooding
- Design to commence in 2023 with construction in 2025-2027



Broughdale Dyke Reconstruction Limits

Low Impact Development

- Green infrastructure or LIDs:
  - Provide water quality benefits
  - Soak up 5-25mm of rainfall

Waterloo Street Bioretention Cell

Low Impact Development

Filter Fill Raingarden Mascot (2018)

- Create “sponges” on the surface to absorb rainwater
- Promote groundwater recharge, reduce runoff, and flooding
- Tree planting initiatives
- City Pilot Projects:
  - Bostwick Community Centre
  - SOHO at Waterloo/Horton
  - Fire Station 11
  - Oakridge Acres
  - East Lions Park
  - And more…
- LIDs incorporated into 2019 City Design Standards.

SOHO Rain Gardens (2017); “Archie” at Fire Hall 11 (2018)

Low Impact Development: Monitoring

- Partnering with Western University to better understand salt loadings and performance in tight soils
- Refining design standards for specific types of LIDs and materials

Wellington Road Exfiltration System (2019); East Lions Park (2020)

SWED Policy Initiatives – Continuous Improvement

Ecology Services

- EA/EIS scoping for Infrastructure projects
- Erosion and Sediment Control Strategy Support
- “Complete corridor” policy development
- SWM/Wetland mitigation/compensation
- City-wide Invasive Species management

SWED – Preparing for the future!

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