PORTLANDS FLOOD PROTECTION

Toronto RAP Science Centre

November 21, 2018

WATERFRONTorontoo

At Waterfront Toronto, we work with our partners at the City of Toronto, Toronto and Region Conservation Authority, Province of Ontario and Government of Canada.

TORONTO Ontario Canada

The Port Lands Flood Protection Project: An Overview

Ken Dion
Project Director, Port Lands Integration, Waterfront Toronto


Don River
Corktown Common
CN Tower
Union Station
Keating Channel
Pinewood Studios
Ship Channel
The Hearn
Tommy Thompson Park
Lafarge
Billy Bishop Airport
Inner Harbour
RCYC
Cherry Beach
Centre Island
Port Lands Flood Protection Project Boundary


Don River
Keating Channel
Ship Channel
Port Lands Flood Protection
Project Boundary

Full Vision Plan

What are we building?

- A Cherry Street Stormwater and Lakefilling
- B Polson Slip Naturalization
- C Flood Protection - River Valley
- D Don Greenway (Spillway & Wetland)
- E Don Roadway Valley Wall Feature
- F East Harbour Flood Protection Land Form
- G Sediment and Debris Management Area
- H Flow Control Weirs
- I Eastern Avenue Flood Protection
- J Villiers Island Grading
- K Keating Channel Modifications
- L Promontory Park South
- M River Park
- N Lake Shore Road and Rail Bridge Modifications
- O Cherry Street Bridge North
- P Cherry Street Bridge South
- Q Commissioners Street Bridge
- R Old Cherry Street Bridge Demolition
- S Site Wide Municipal Infrastructure
- T Don Roadway
- U Hydro One Integration
- V Commissioners Street
- W Cherry Street Re-alignment

- Port Lands Flood Protection and Enabling Infrastructure Boundary
- Earthworks/Flood Protection
- Parks
- Bridges & Structures
- Roads and Municipal Infrastructure

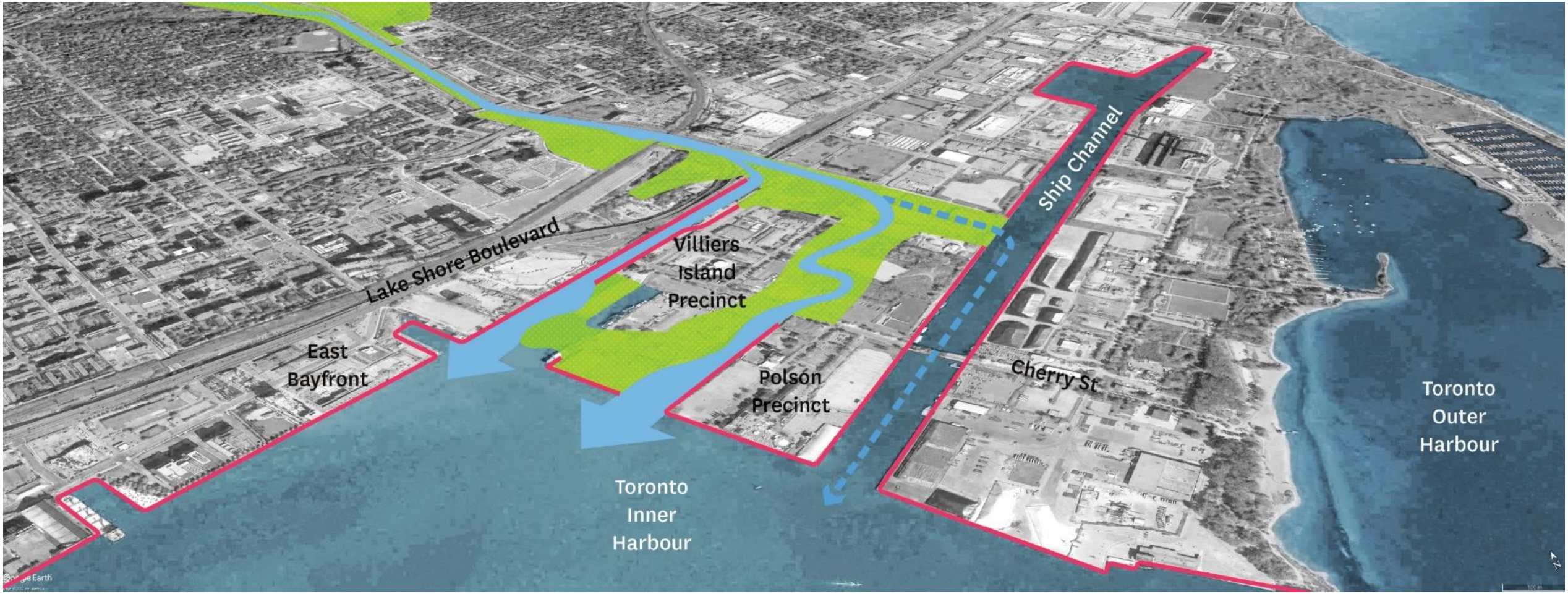
Building a River - Conceptually

Constructing an Urban River Park

5. Building + Precinct Infrastructure

Toronto Port Lands Flood Protection - Setting the Footprint

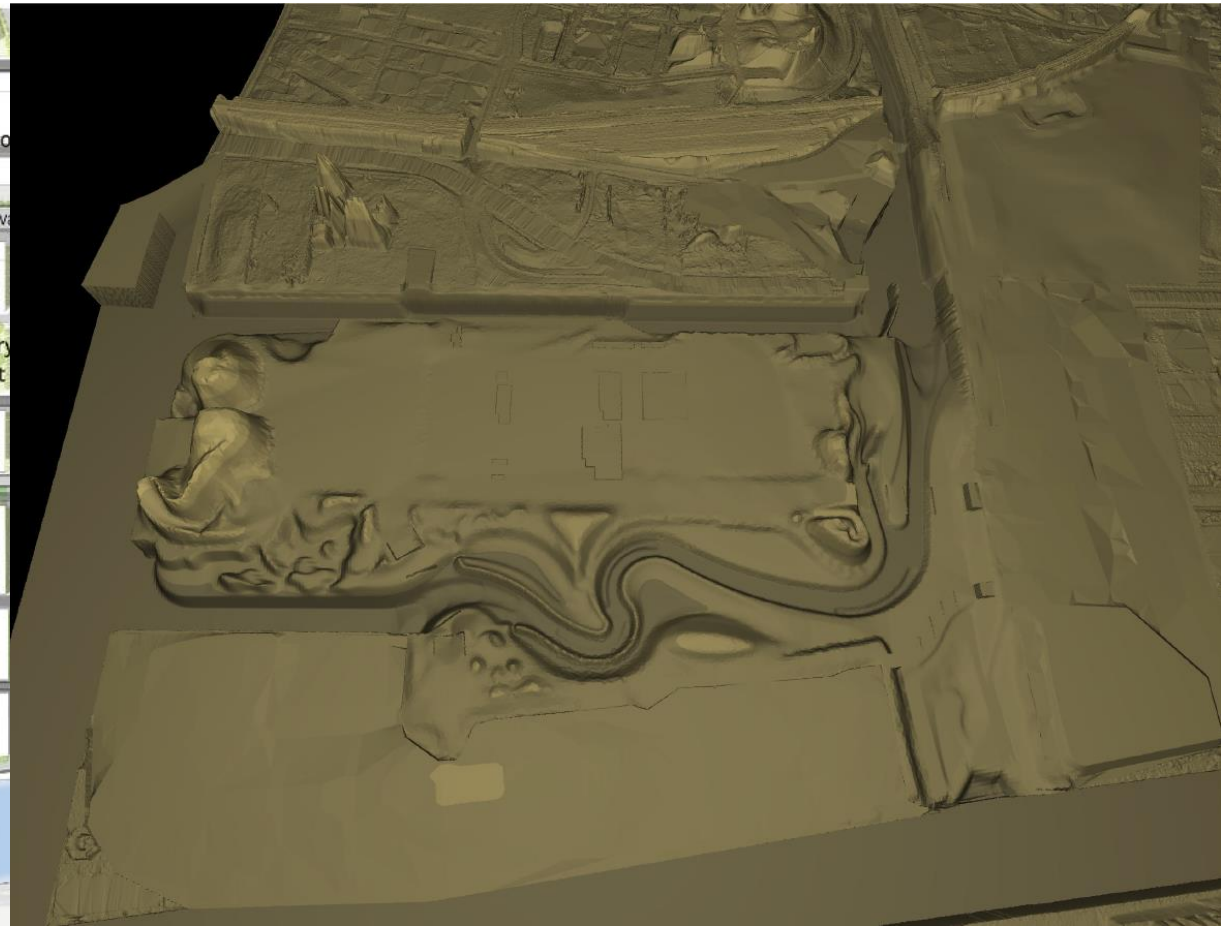
Flood Protection Design



Overview – Port Lands Flood Protection

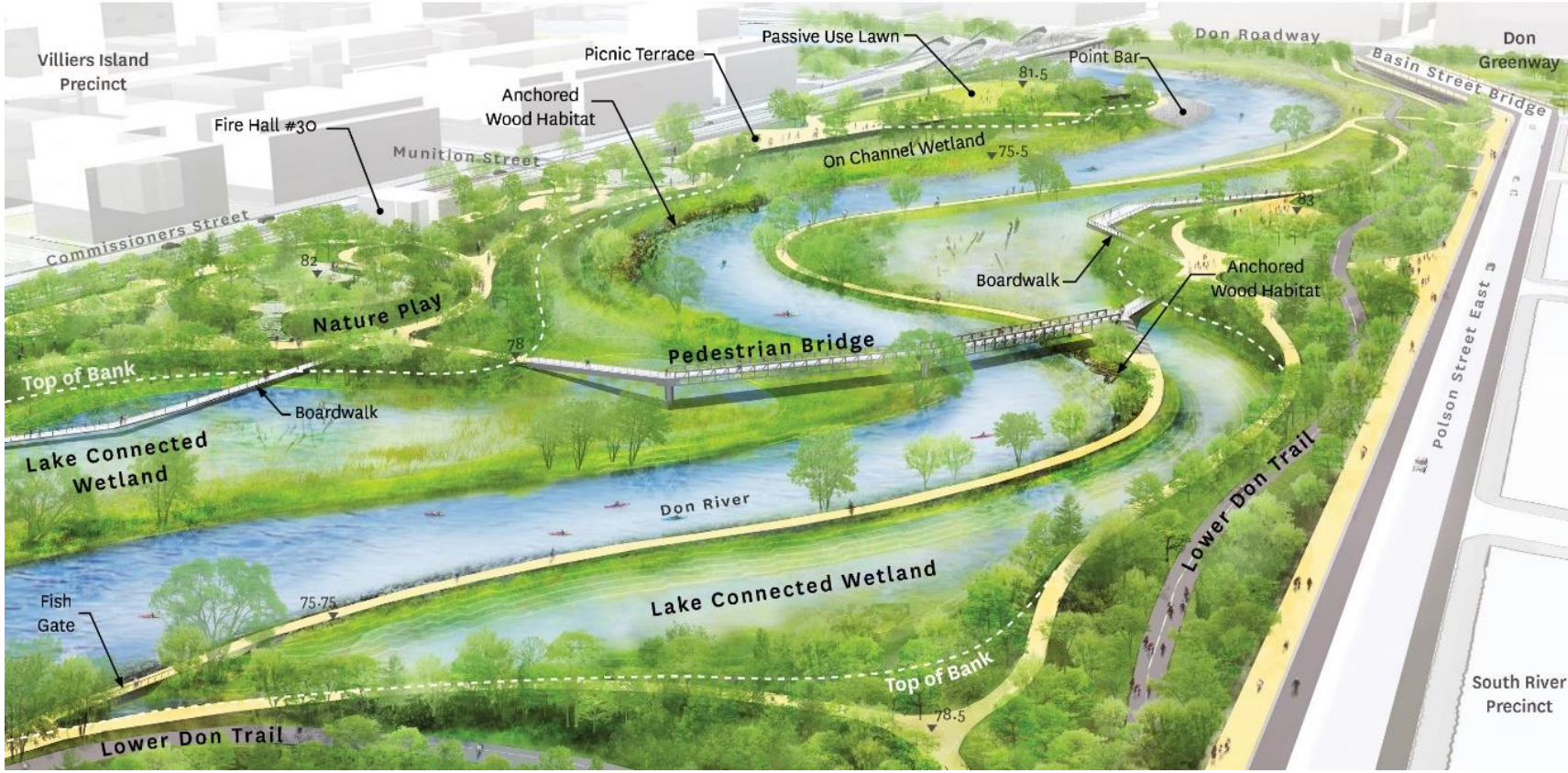
Flood Remediation – Ultimate Floodplain

Flood Remediation Design



Design Considerations

- Achieving freeboard targets around existing sensitive areas
- Directing base flow to new river while diverting high flows to the Keating Channel and Ship Channel
- Coordinating with planned infrastructure
- Dredging and disposal of sediment annually



Toronto Port Lands Flood Protection - Making a Valley

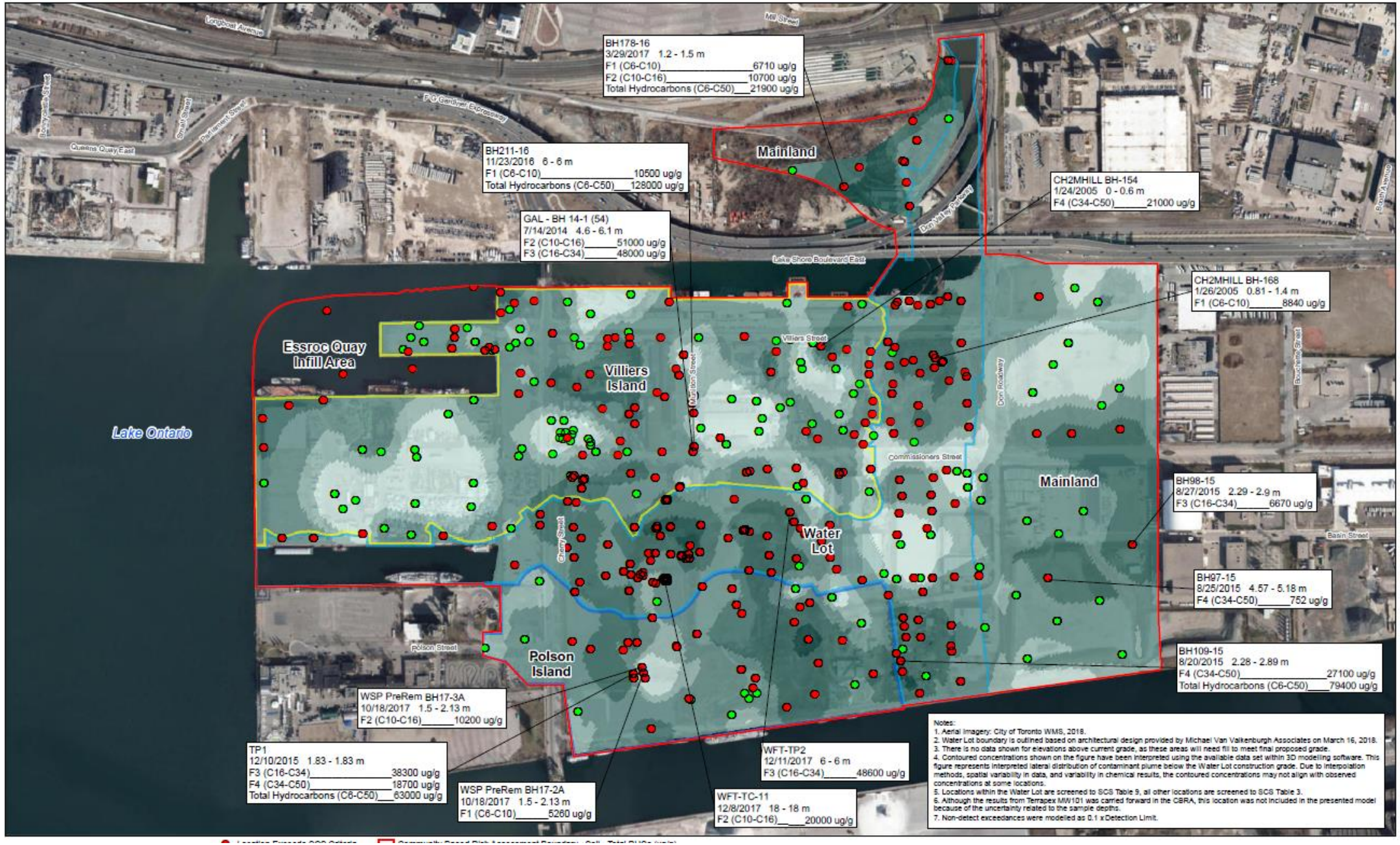
Challenges

- Geotechnical
  - Heterogeneous fill
  - Peat
  - Settlement and rebound
  - Consolidation

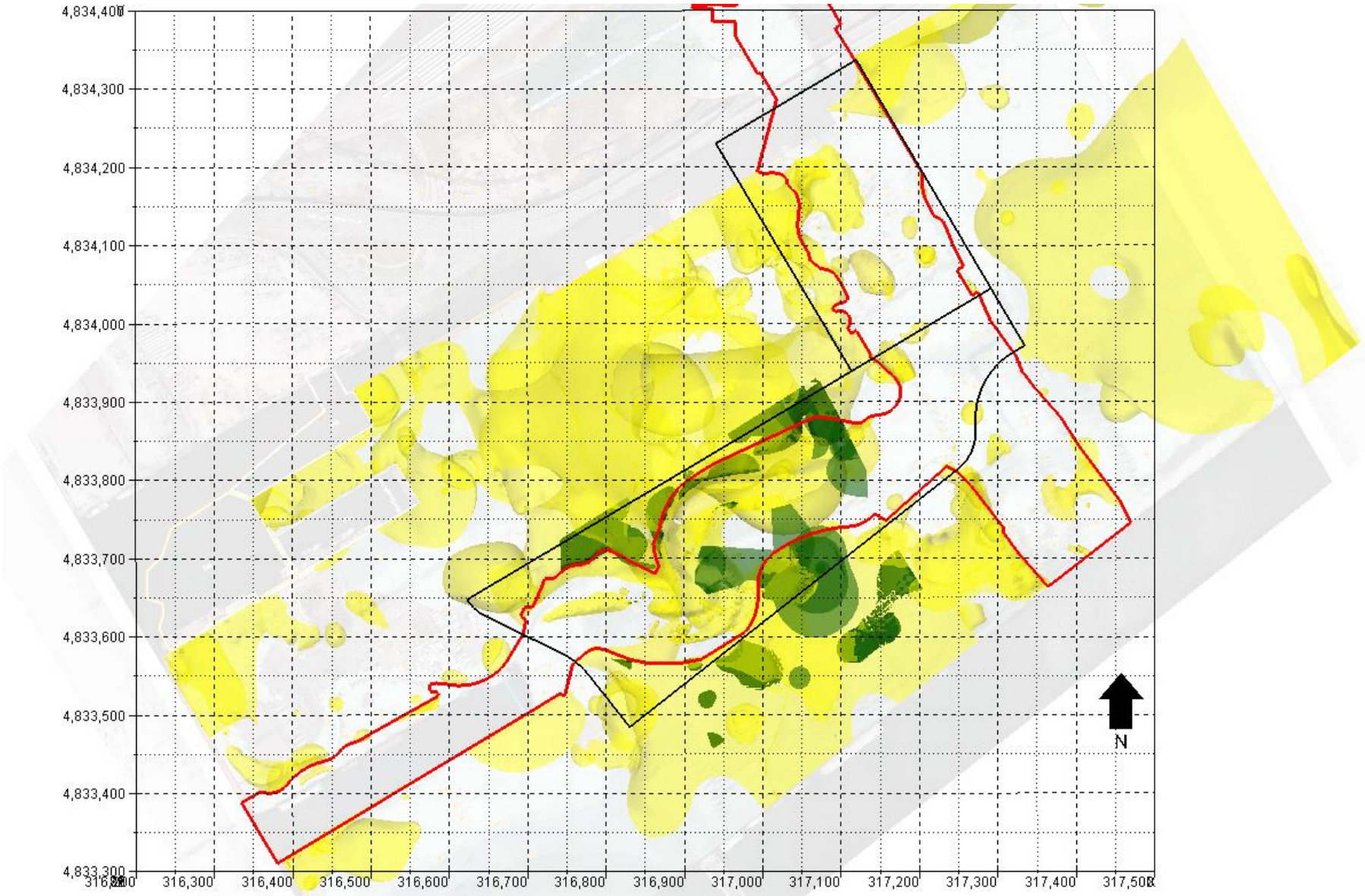
- Hydrogeological
  - Shallow water table
  - Dewatering and Discharge

- Soil Management
  - Quality
  - Quantity
  - Sequencing

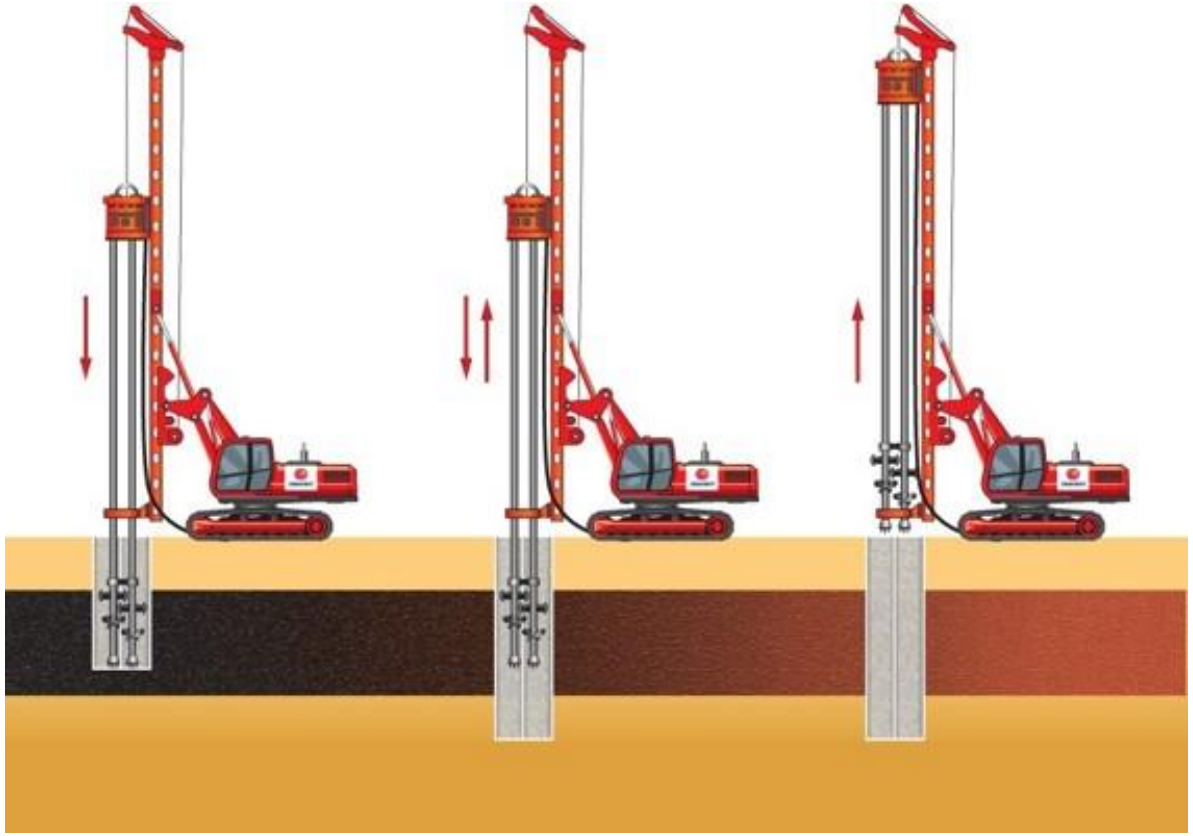
Environmental Investigations



Environmental Investigations



Approaches to Construction - Soil Stabilization: Option 1



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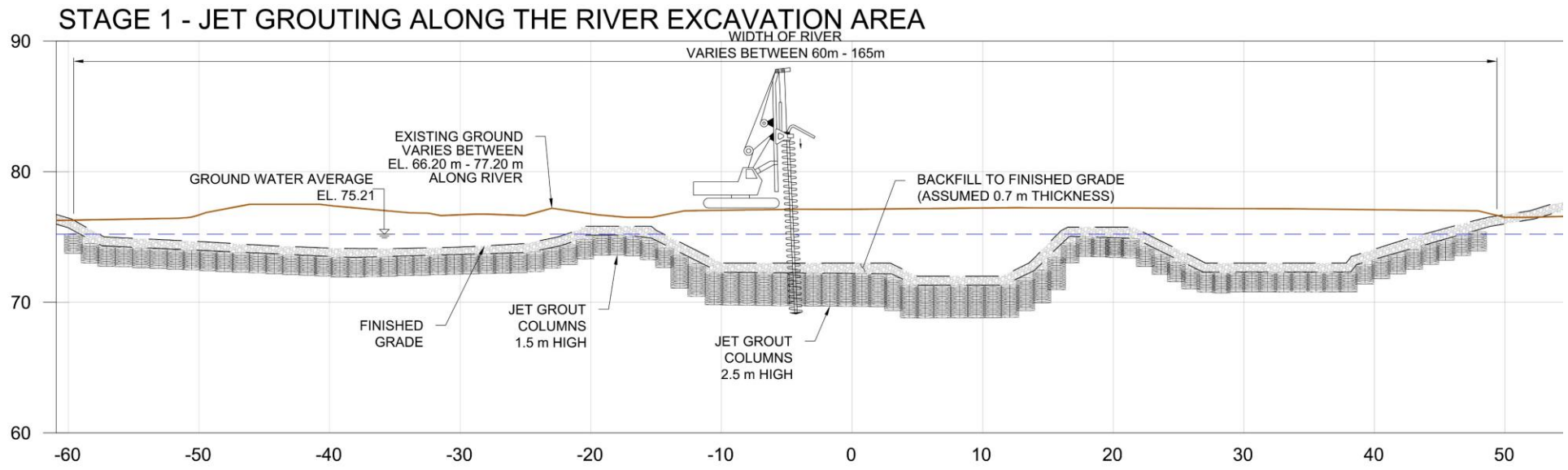
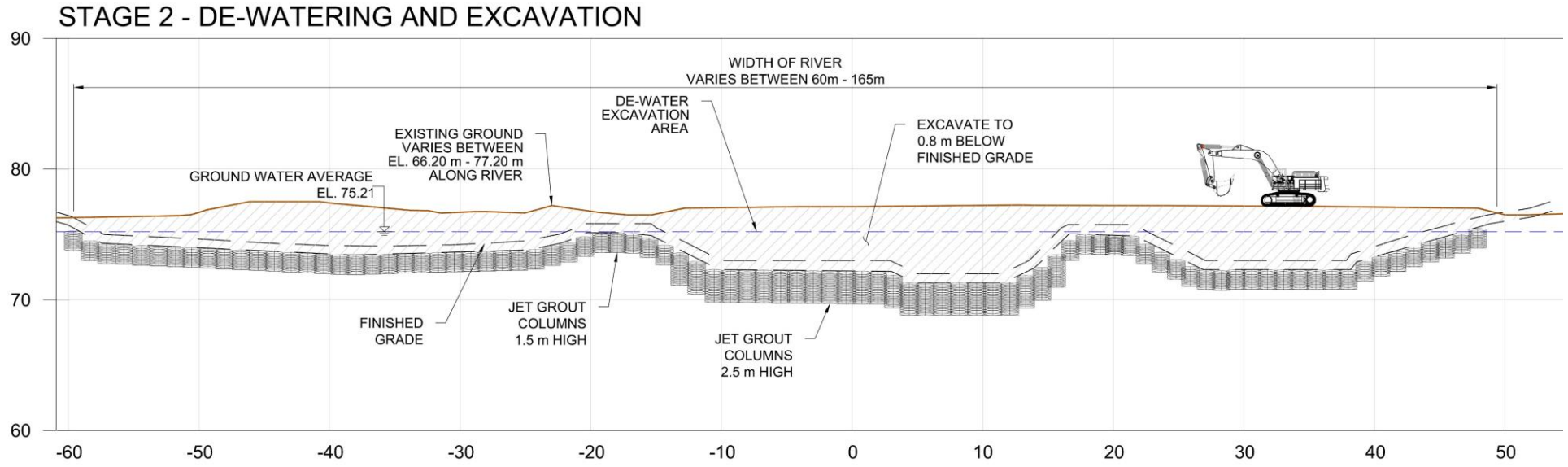
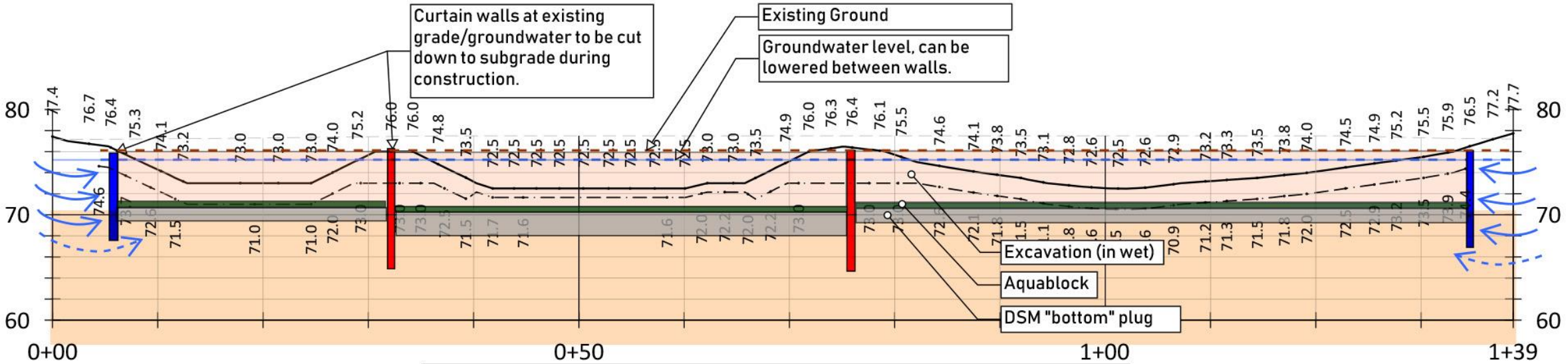




Approaches to Construction – Soil Stabilization: Option 2

Approaches to Construction – Soil Stabilization: Option 2



River & Wetland Cross section of ISS/DSM Curtain wall method

Toronto Port Lands Flood Protection - Ecology

Performance Criteria and Design Considerations for the River

Design Considerations:

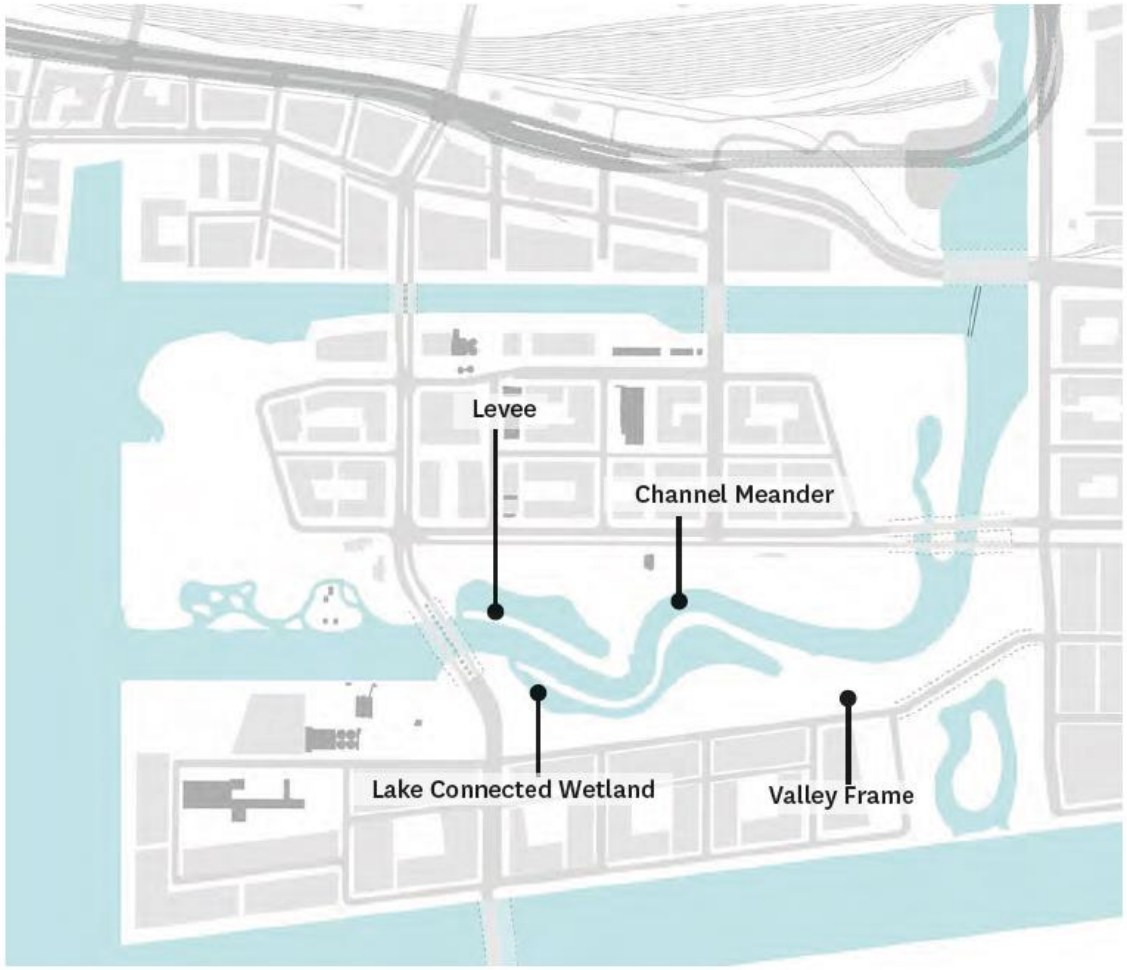
- Immobile channel form under regulatory flood
- Urban estuary hydrology and hydraulics
- Recreation use/park programming

Performance criteria:

- Flood conveyance and capacity
- Contiguous riparian corridor
- Habitat complexity
- Analog idea for geomorphology, hydraulics, and ecology
- Analytical approaches

Design Shapes and Features Informed by Research

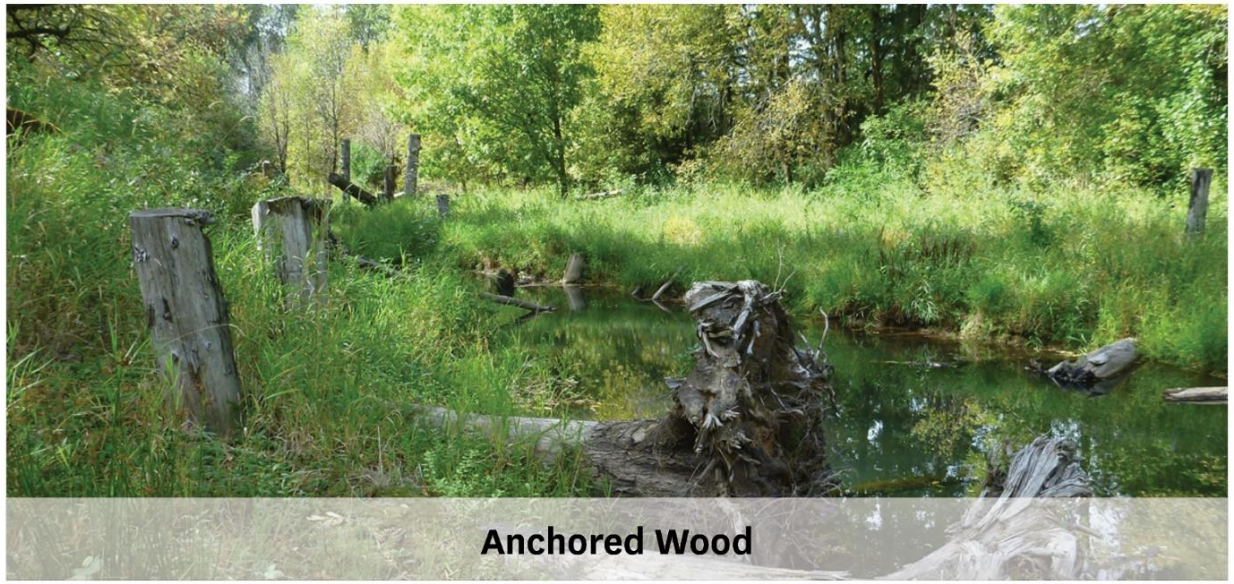
Rouge River



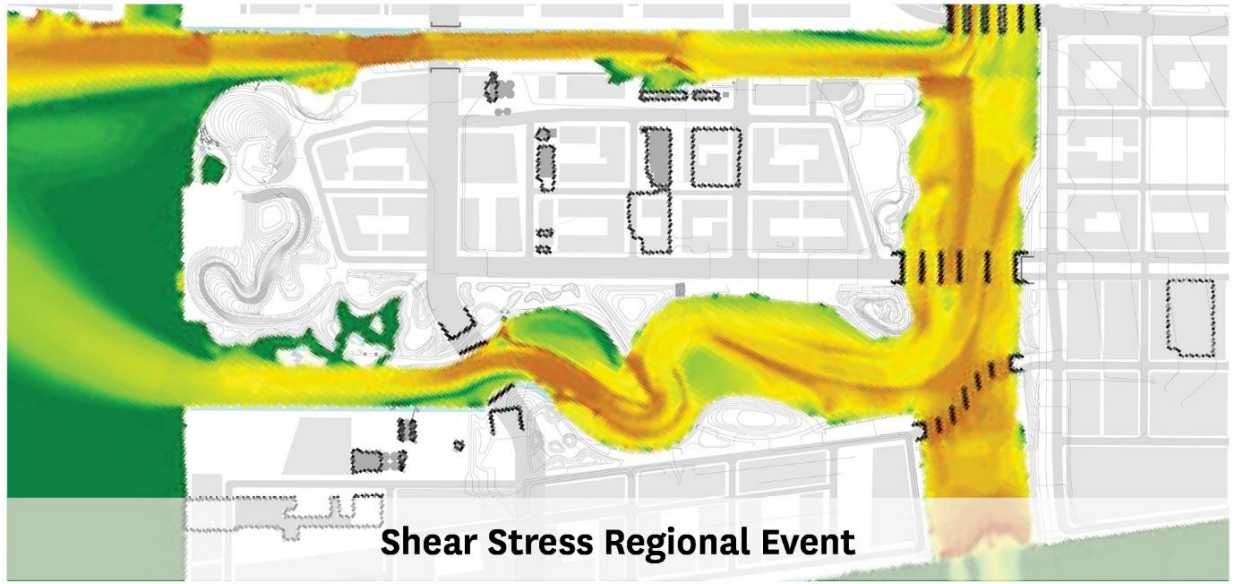
Lower Don Mouth

River Flow: Engineering and Resilience

Shear Stress 100 Year Event



Anchored Wood

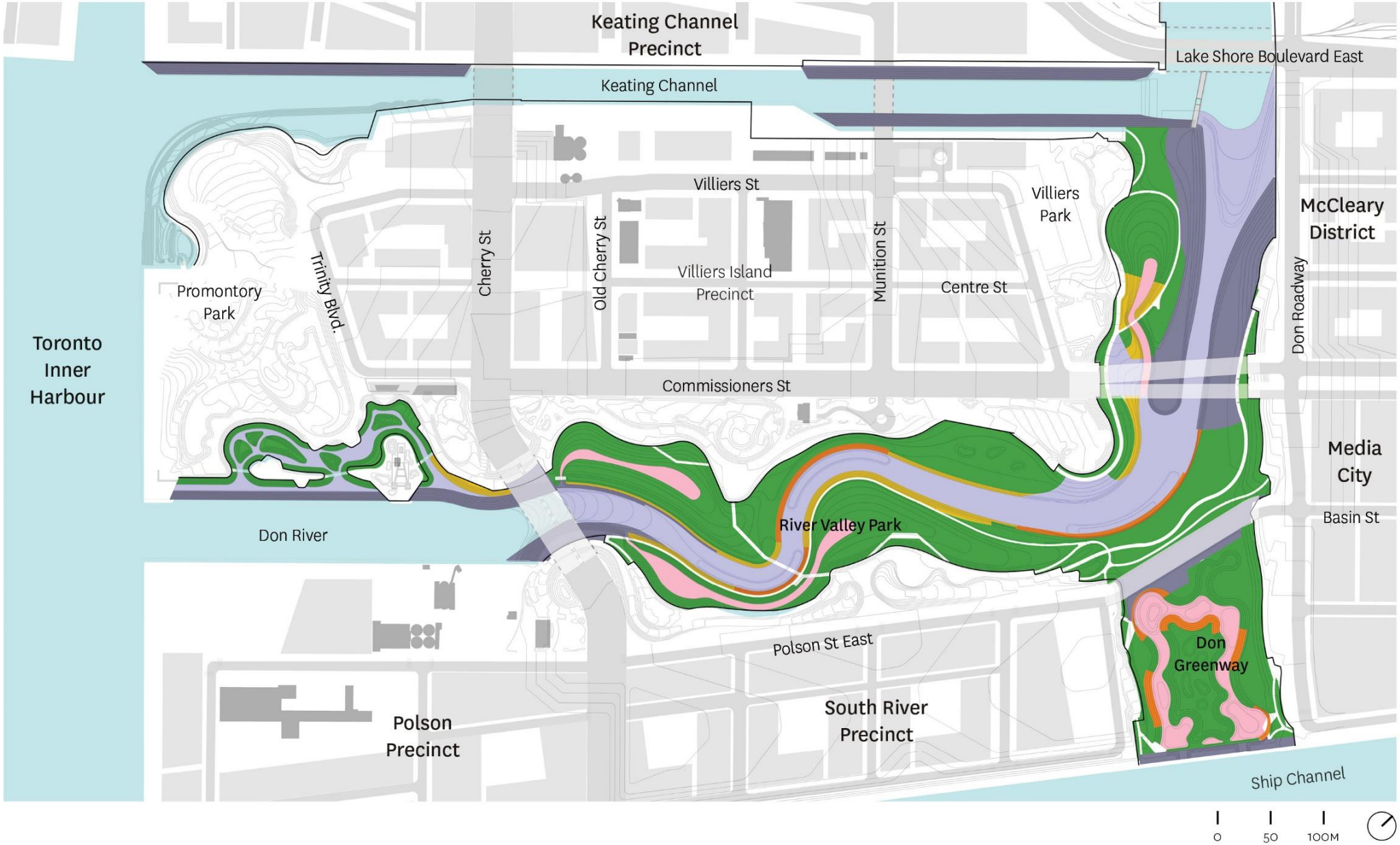


Shear Stress Regional Event

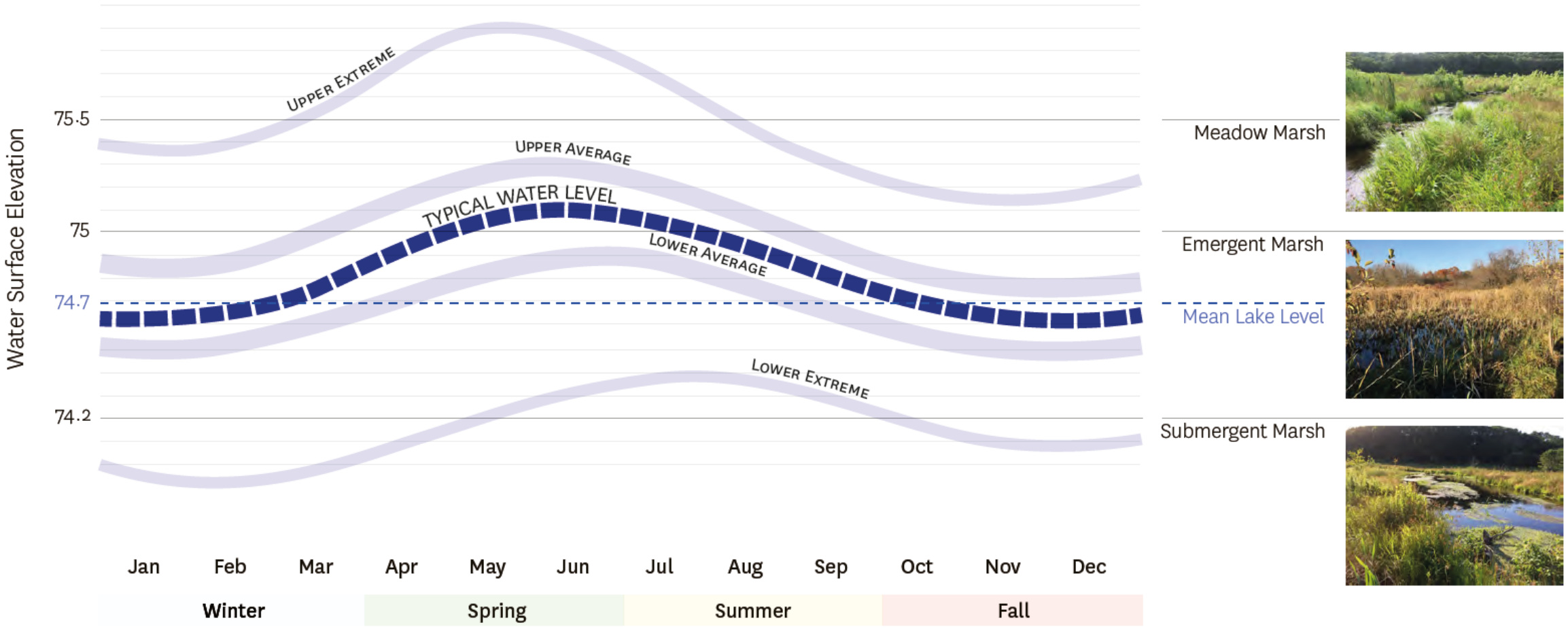
Stone Armour

Flood Remediation Modelling

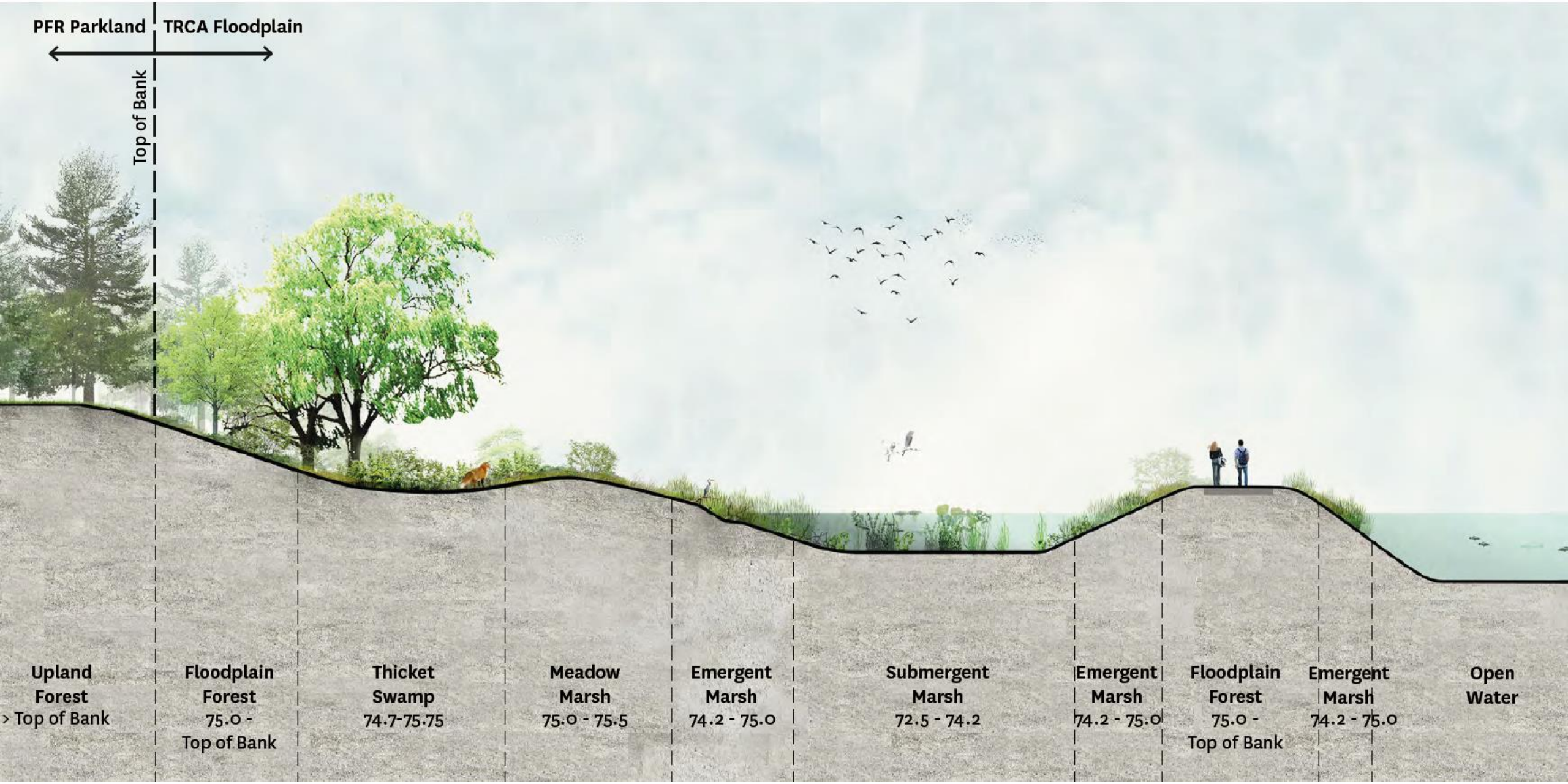
- Open Water
- Floodplain Planting
- Bioengineered Bank (FES)
- Crib Wall
- Stone Armour
- Habitat Gravel
- Spawning Gravel
- Top of Bank (TOB)



Seasonal Water Fluctuations Influence on Plant Community Distribution



Plant Communities - Section



Habitat

Aquatic

Submergent Marsh

Emergent Marsh

Meadow Marsh

Floodplain Forest

Fauna

Aquatic

Submergent Marsh

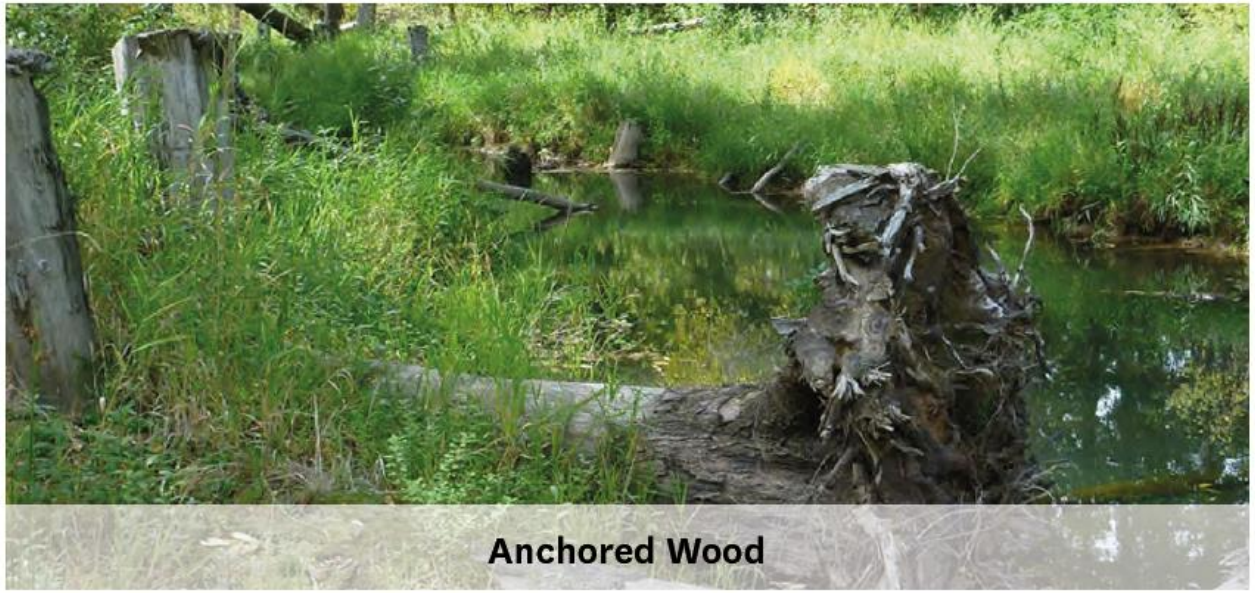
Emergent Marsh

Meadow Marsh

Floodplain Forest

River Ecology: Constructed Habitat

Bird Boxes



Anchored Wood

Osprey Platforms

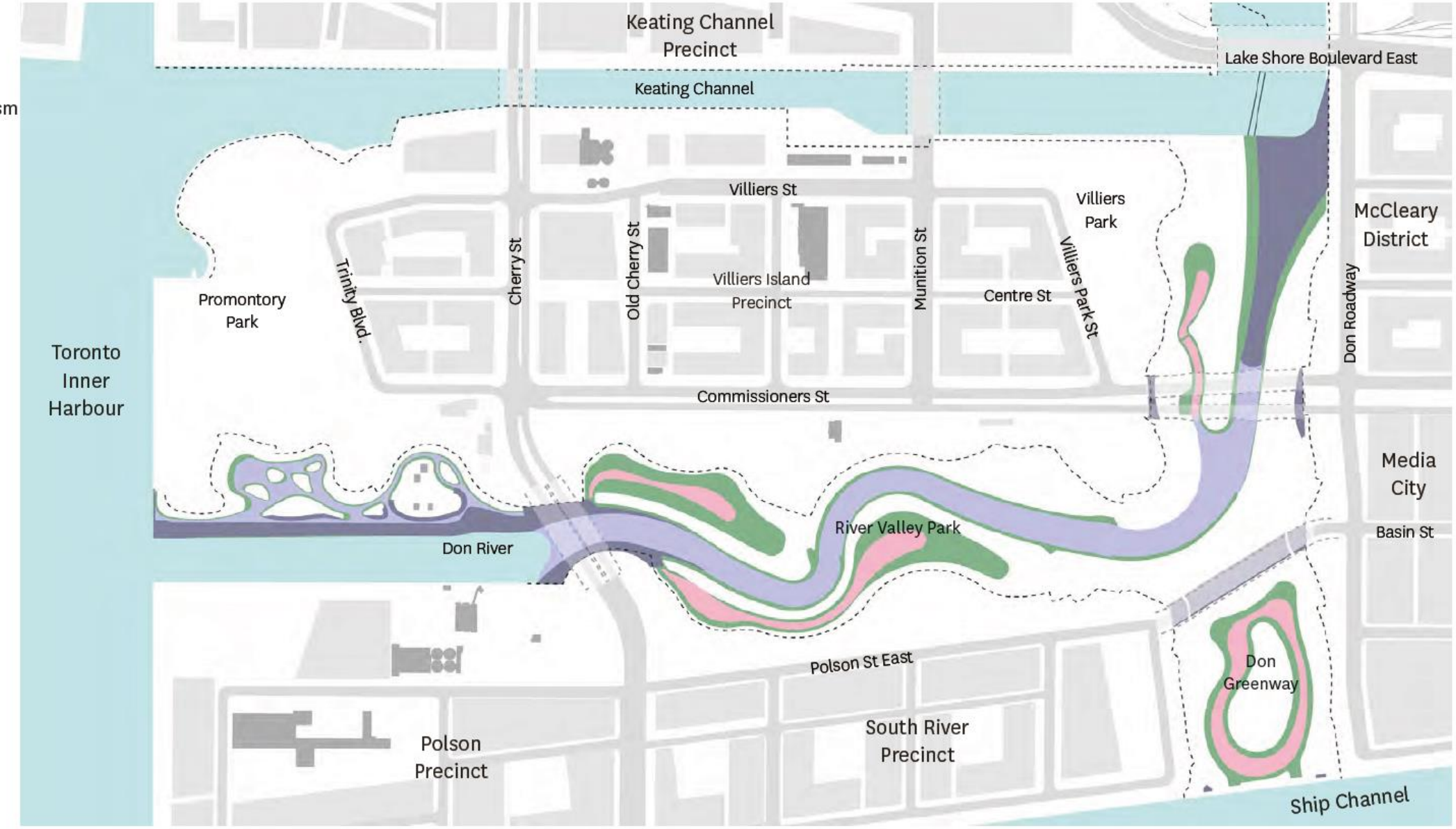
Turtle Habitat

River Ecology: Plant Communities and Habitat

- Submergent Marsh: 72.5 - 74.2
- Emergent Marsh: 74.2 - 75.0
- Meadow Marsh: 75 - 75.50
- Thicket Swamp: 74.7 - 75.75
- Floodplain Forest: 75.0 - TOB
- Upland Forest: > TOB
- Planted Armour Stone
- Vernal Pool
- Nest Boxes
- Turtle Bank Habitat
- Anchored Wood Habitat
- Nesting Platform
- Top of Bank (TOB)

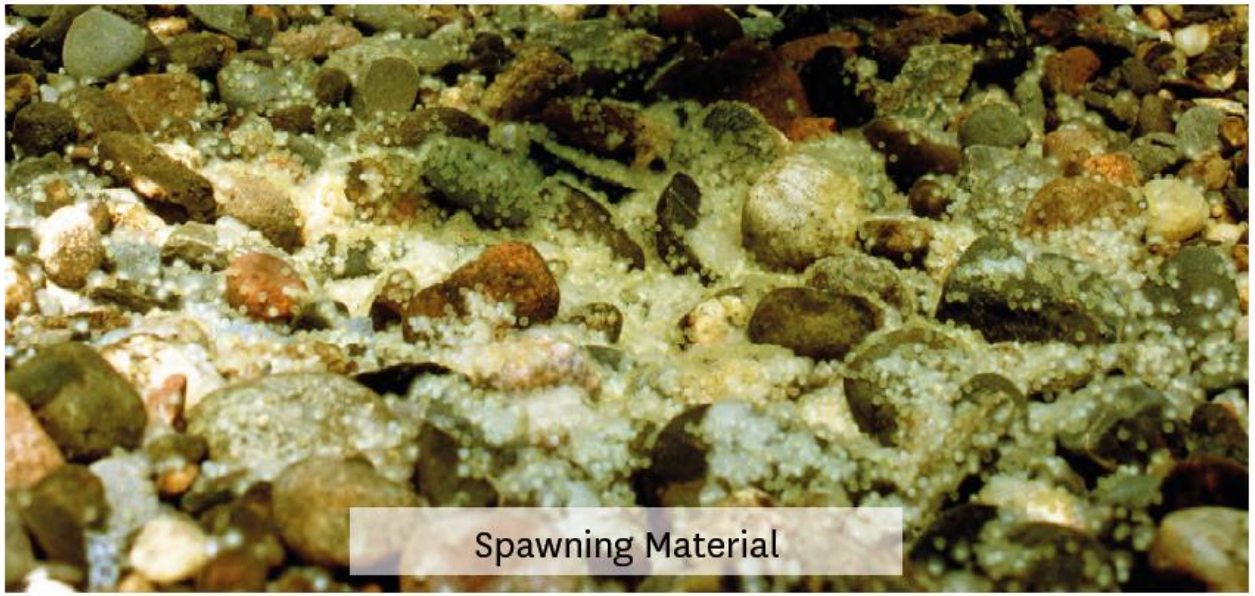
Aquatic Substrates

- Wetland Soil
- Open Water
- Spawning Gravel: 9,500 sm
- Streambed Material: 28,500 sm
- Stone Armour, In Water
- Top of Bank



Streambed Material


Spawning Material


Spawning Material


Cobbles: Well Graded, Poorly Sorted


Lake Ontario Cobble Bottom

View Looking East from Canoe Cove at Promontory Park

View Looking East from Overlook at Don Greenway

View Looking South at Ice Management Area at Villiers Park