PORT

2024

LANDS

May 14, 2019

Port Lands Flood Protection Project

Lake Ontario Evenings

Canada Ontario Toronto WATERFRONTToronto

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Waterfront Toronto

Overview

- What is the PLFP
- Project Background
- PLFP is 23 Projects in 1
- Environmental Management
- River Valley Design & Construction
- River Ecologies and Habitat
- Questions

What is the Port Lands Flood Protection Project?

Project Timeline and Process

Amalgamation of two approved Environmental Assessments (EAs)

Don Mouth Naturalization and Port Lands Flood Protection EA

TRCA with Waterfront Toronto and the City of Toronto

Objective:

"Establish and sustain the form, features, and functions of a natural river mouth within the context of a revitalized City environment while providing flood protection up to the Regulatory Flood."

2005-2015

Lower Don Lands (LDL) Class EA

Waterfront Toronto with the City of Toronto and Toronto Transit Company

Used the DMNP EA as baseline to determine footprint for naturalization and developable lands

Identified location and type of roads, bridges, servicing and transit infrastructure required in LDL area.

2008-2015

Due Diligence

Port Lands Flood Protection and Enabling Infrastructure Due Diligence Study: 2015-2016

Merged the results of two EAs into a single project

Confirmed costs, constructability considerations and schedule

Cherry Street Lakefilling received tri-government funding in October 2016

Tri-government funding for the remainder of the project announced in June 2017

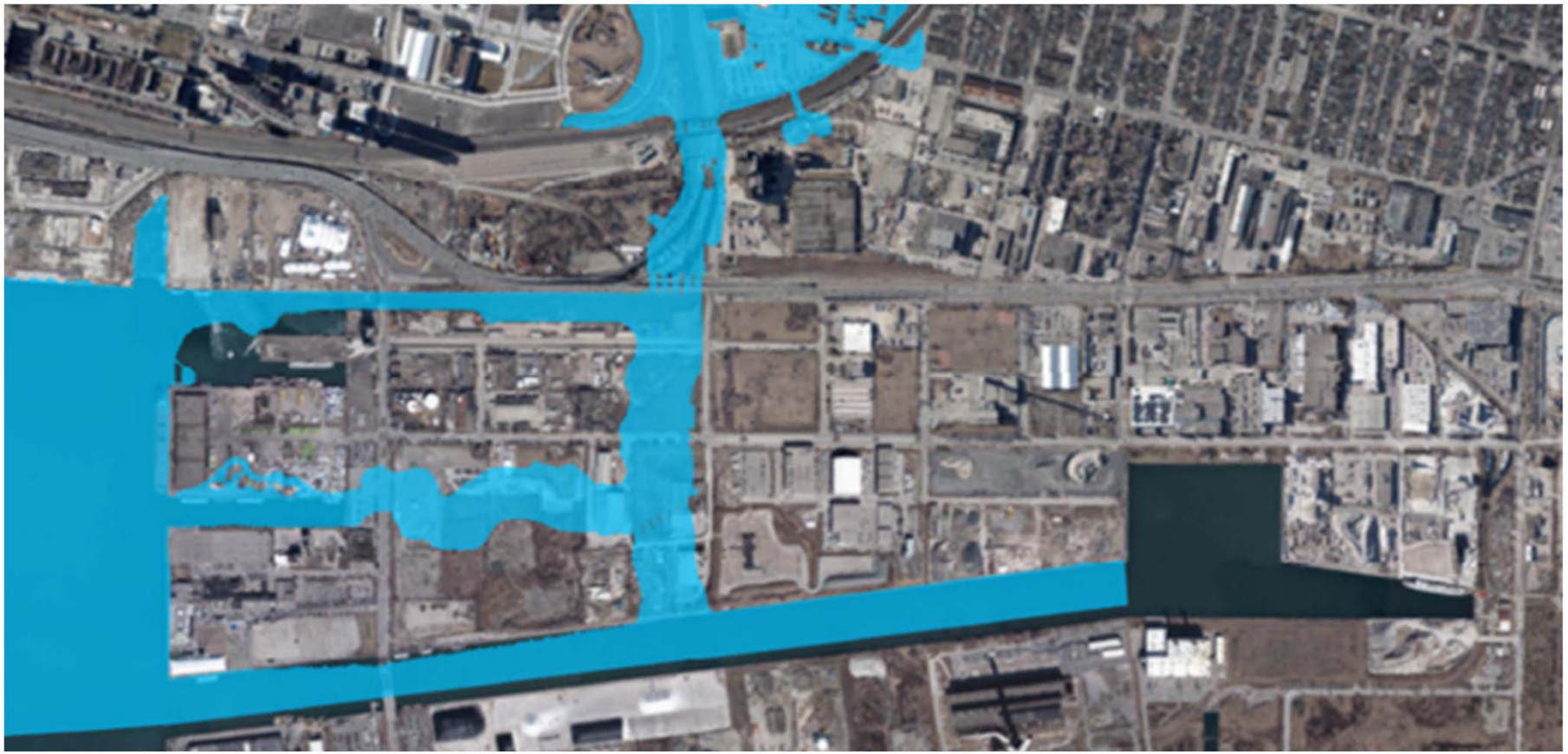
Project Background

Looking east during construction of the Keating Channel in 1914.

Industrial uses like the oil storage tanks seen in this photo in the 1920s have left a legacy of contamination in the Port Lands.

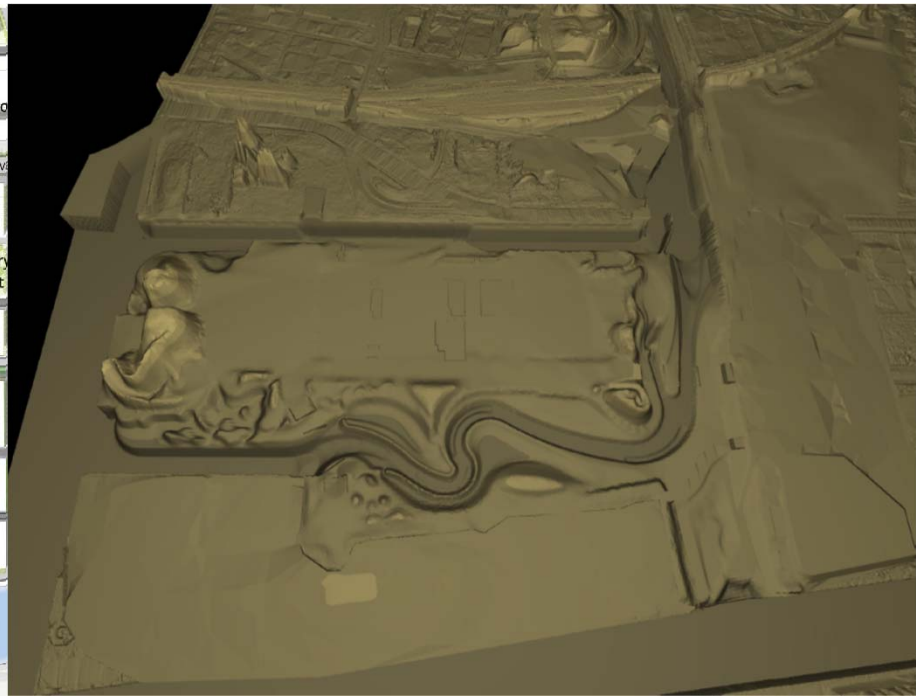
Regulatory Flood – Current Conditions

Regulatory Flood – Future Conditions



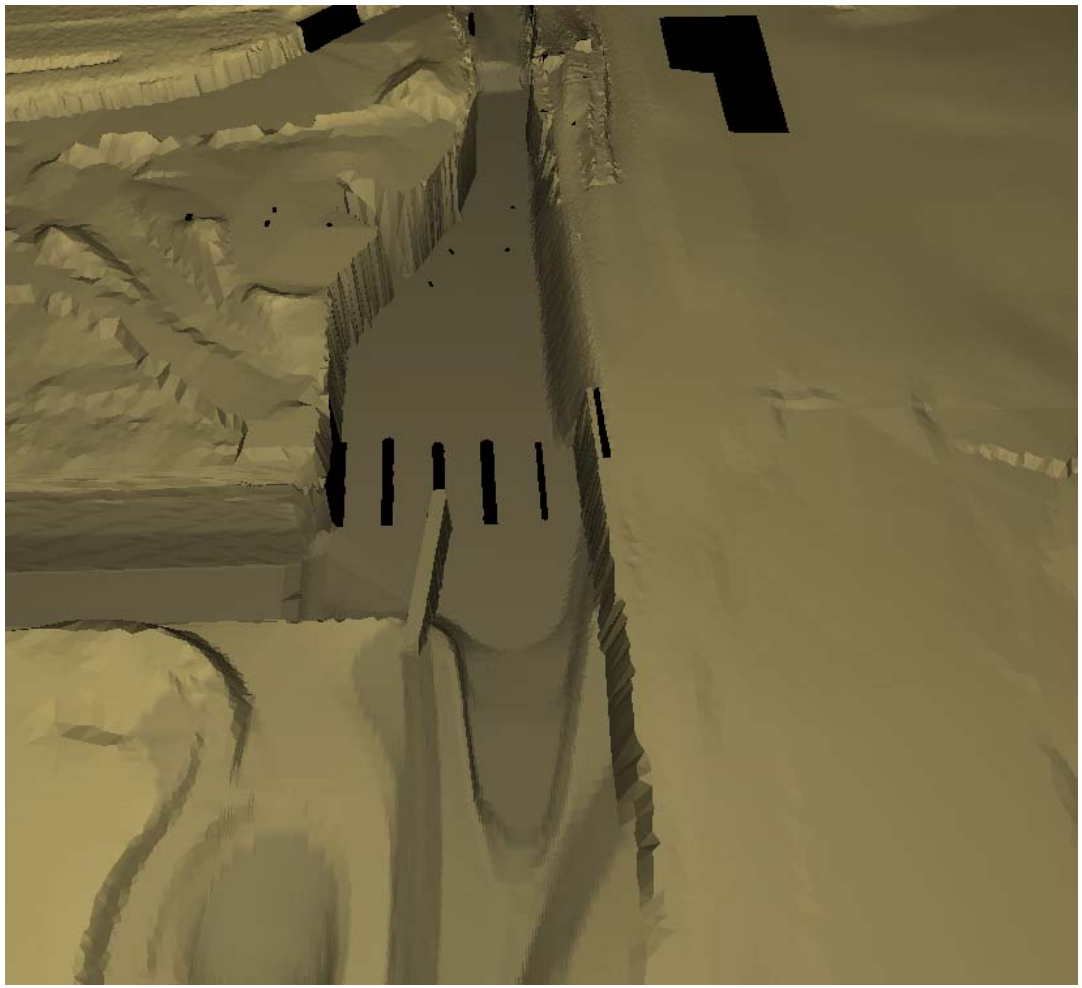
Flood Protection Design

Flood Remediation Design



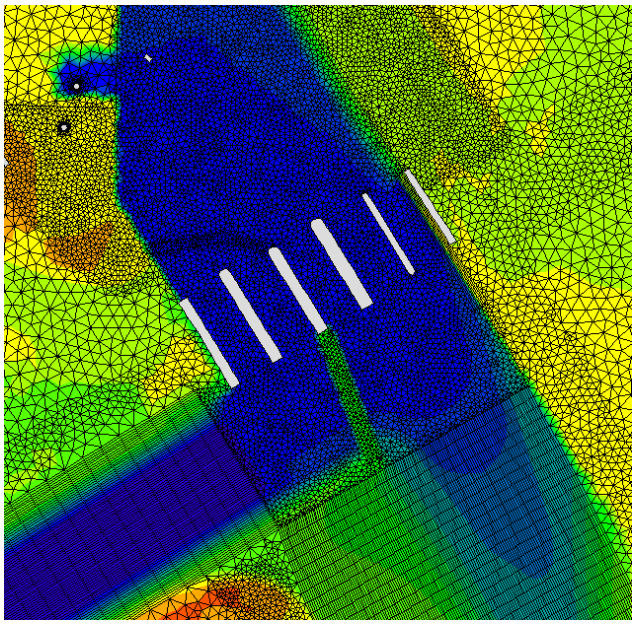
Sediment Management Area

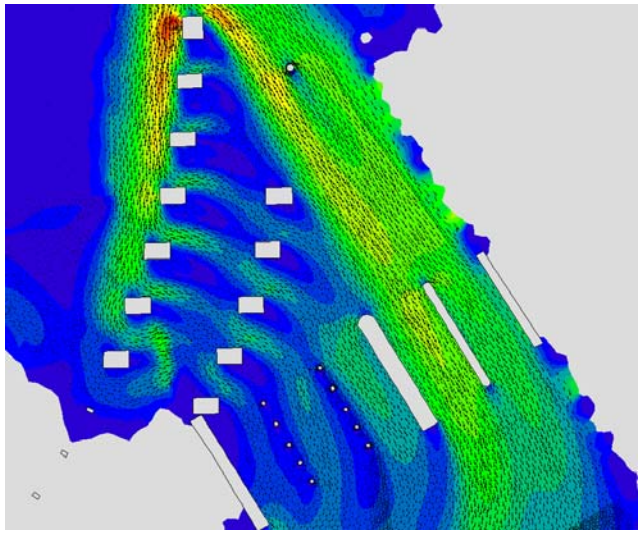
- Hydraulically the most constrained area: around Lake Shore Blvd East / Sediment Debris Management Area
- Impact to upstream flood elevations
- 2D flow: flow is split between Keating Channel and new river mouth
- Freeboard is limited
- Need to maintain dredging

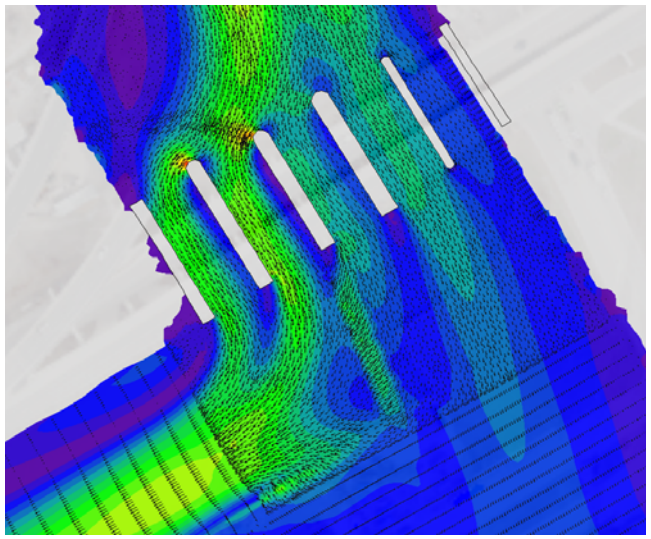


Influence of Infrastructure on 2D Flows

- Modelling done using high resolution flexible mesh
- Quasi-steady flow to be conservative
- 2D model - necessary to model flow split and the flow around piers and weirs
- Only bridge piers modelled - no pressure flow







23 Projects in 1

What are we building?

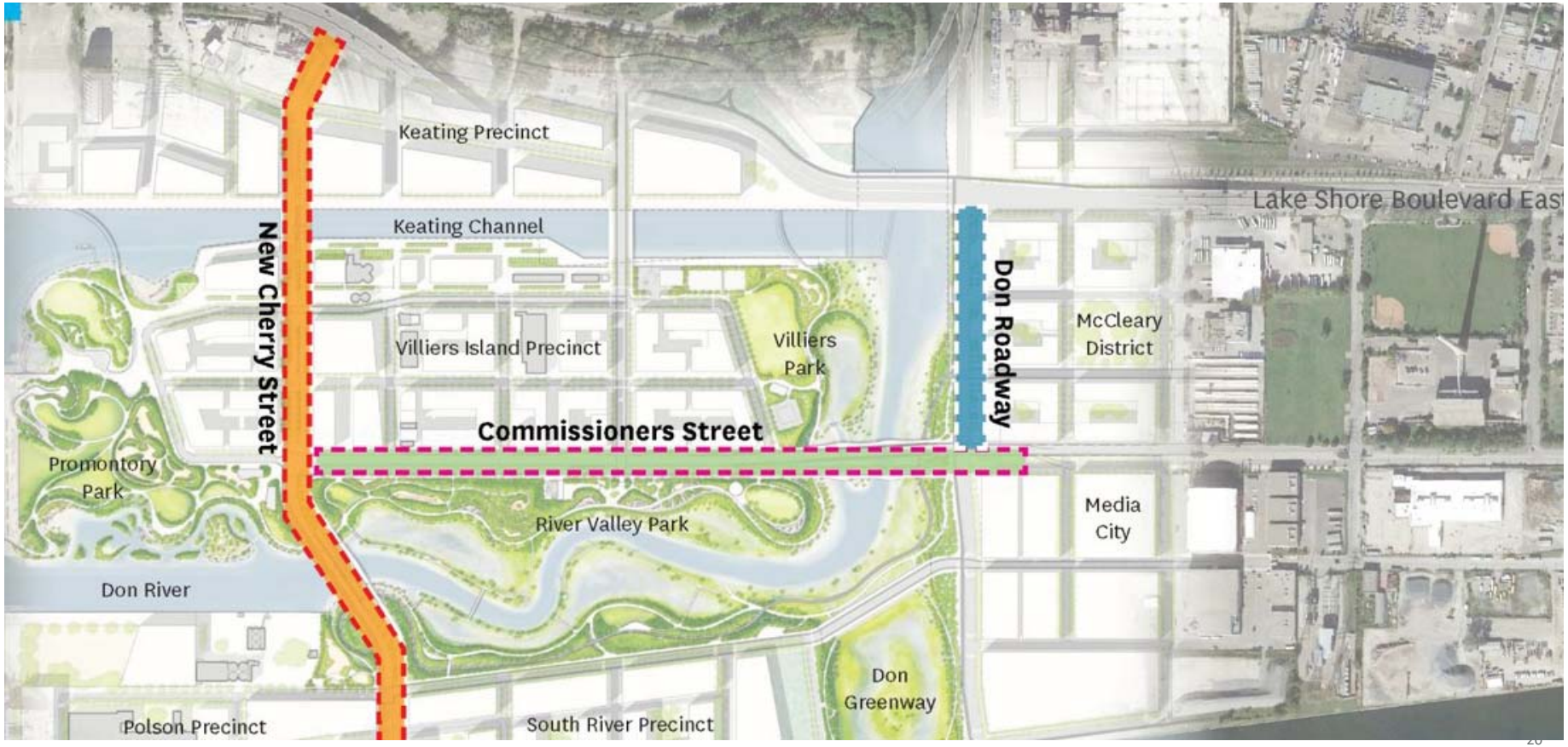
- A Cherry Street Stormwater and Lakefilling
- B Polson Slip Naturalization
- C Flood Protection - River Valley
- D Don Greenway (Spillway & Wetland)
- E Don Roadway Valley Wall Feature
- F East Harbour Flood Protection Land Form
- G Sediment and Debris Management Area
- H Flow Control Weirs
- I Eastern 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

Full Vision Plan

Funded Project Areas

Three Streets for the Port Lands



Three Bridges for the Port Lands

Cherry Street North Bridge

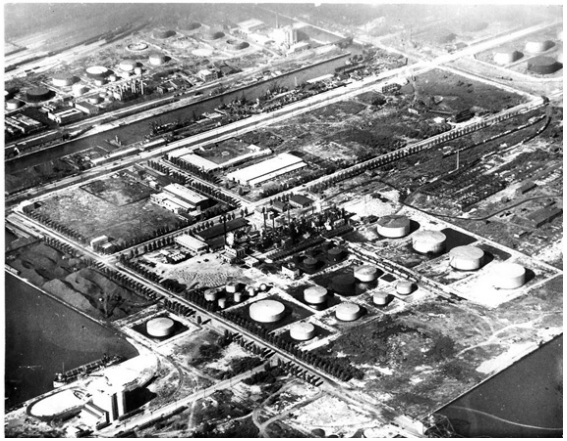
Cherry Street South Bridge

Commissioners Street Bridge

Environmental Management

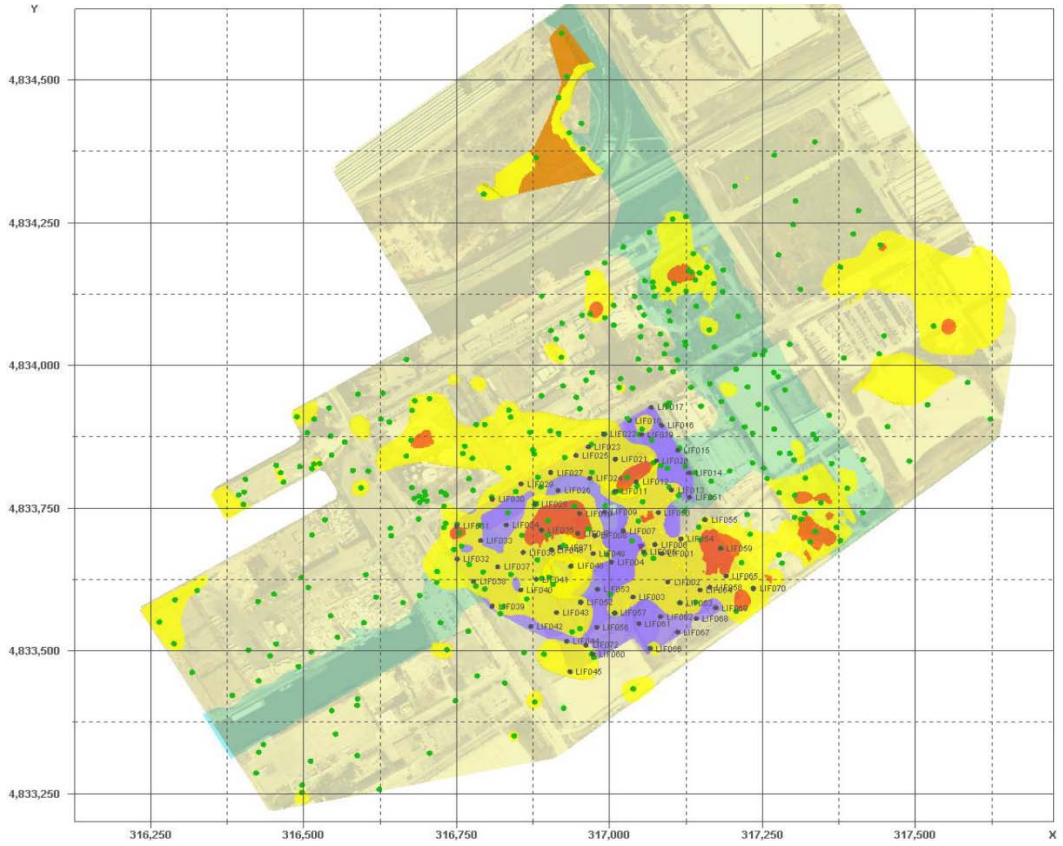
Historical Site Use

- Historical infilling
- Crude Oil/Petroleum Refining and Storage
- Explosives and Ammunition Manufacturing
- Metal Treatment and Fabrication
- Concrete and Cement Manufacturing



Images from http://www.blogto.com/city/2012/02/what_the_port_lands_used_to_look_like/

Contaminant Extent



Total PHC (µg/g)

8000

1500

Correlated LIF to Total PHC (µg/g)

8000

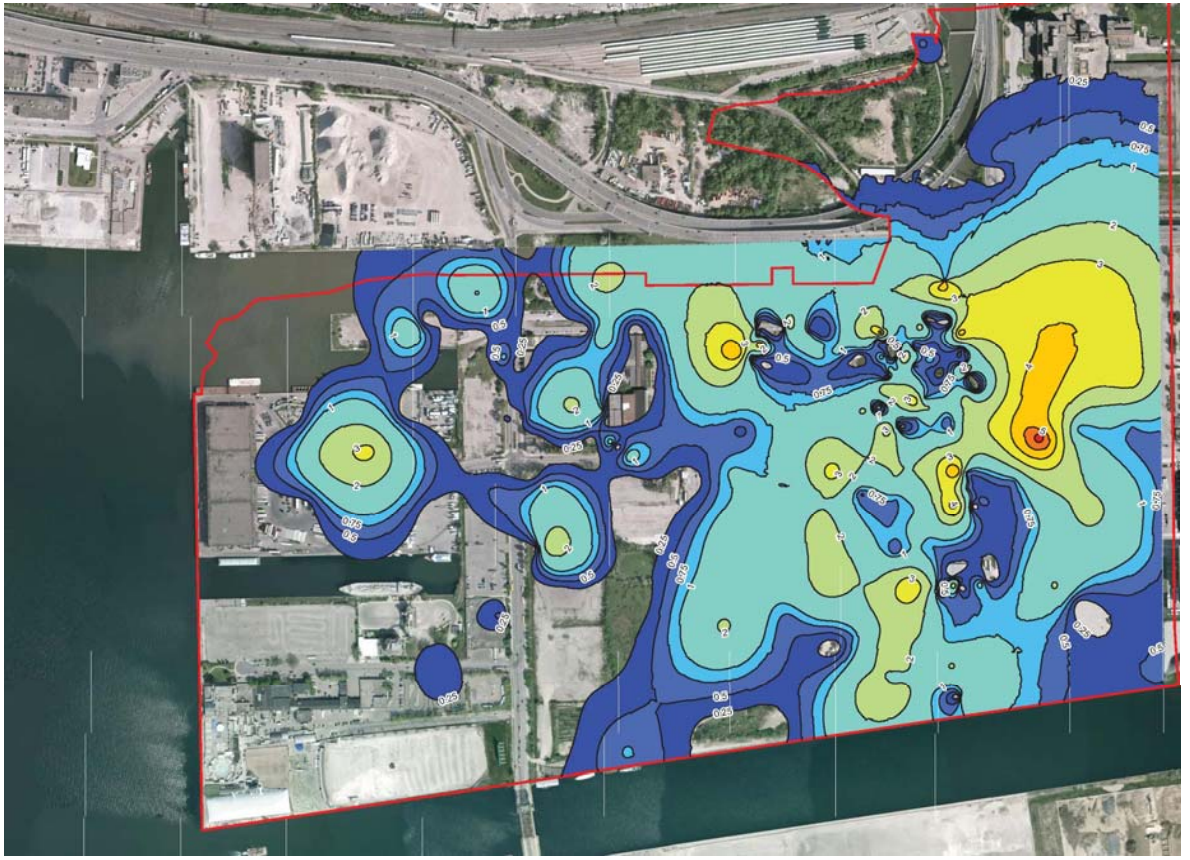
1500

Boring with analytical data

Boring with LIF data

Peat Assessment

- former marshland of the Don River has left a legacy of peat deposits



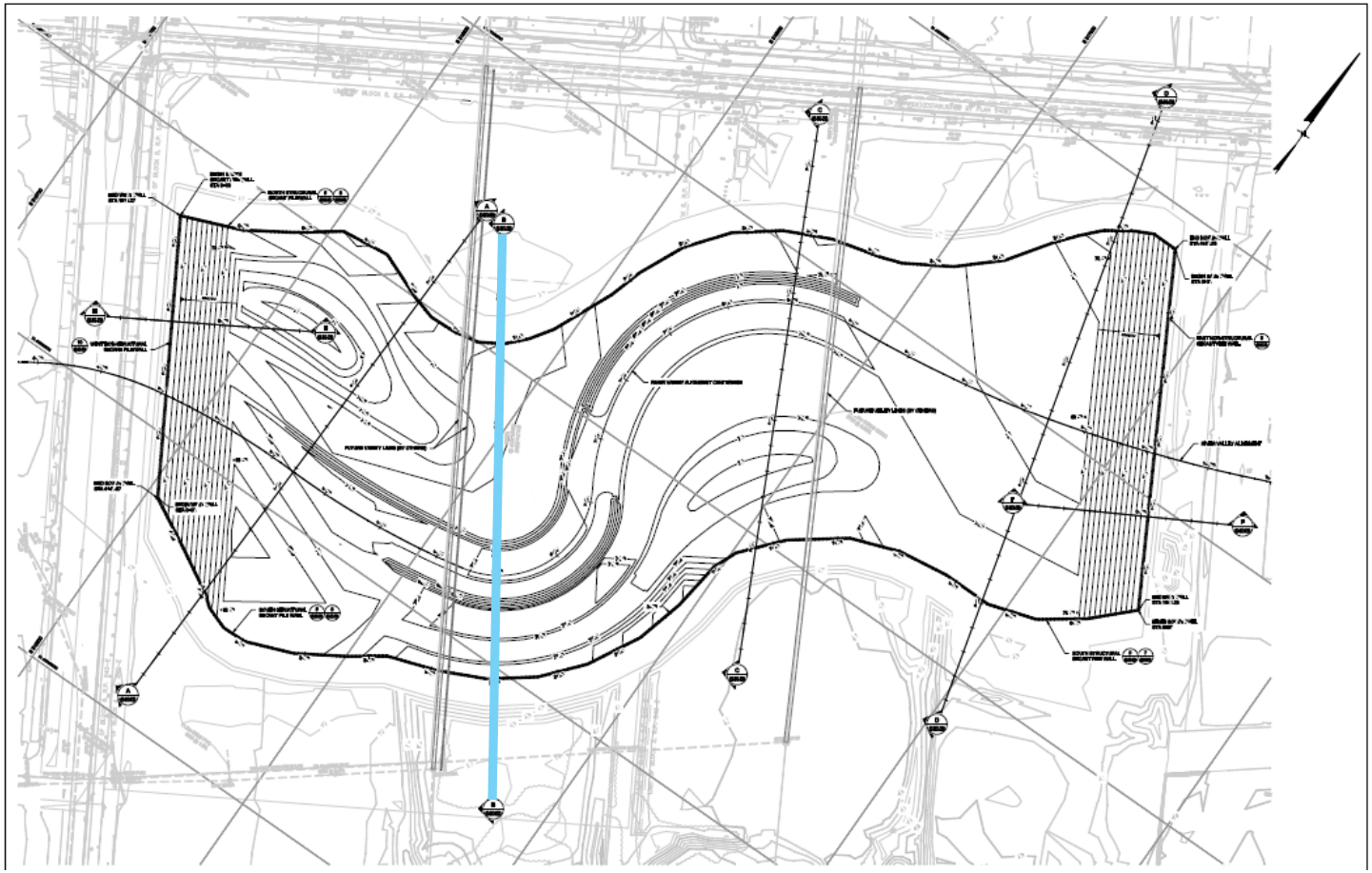
Peat Contour Map

River Valley Design
&
Construction Overview

Cutoff Wall Installation

- Multiple construction methods available: secant pile wall, slurry wall
- Specifications will included performance requirements during installation and post installation
- Also provides constructability benefits: minimizes dewatering and permits drier excavation

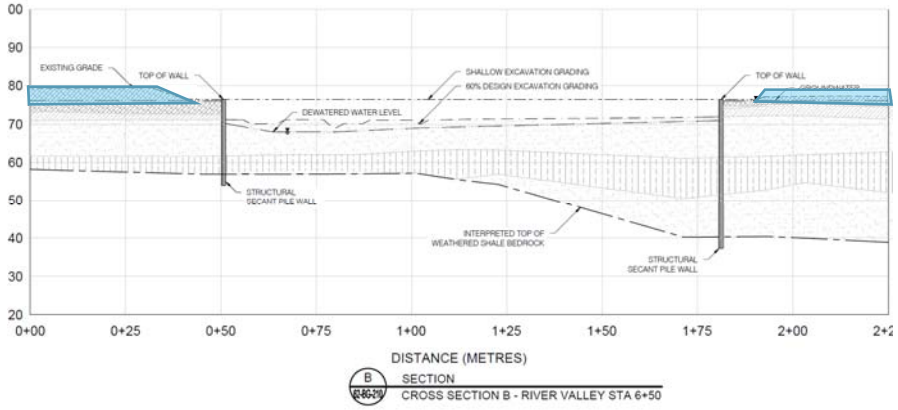
Example Cross-Section



Step 1 and 2

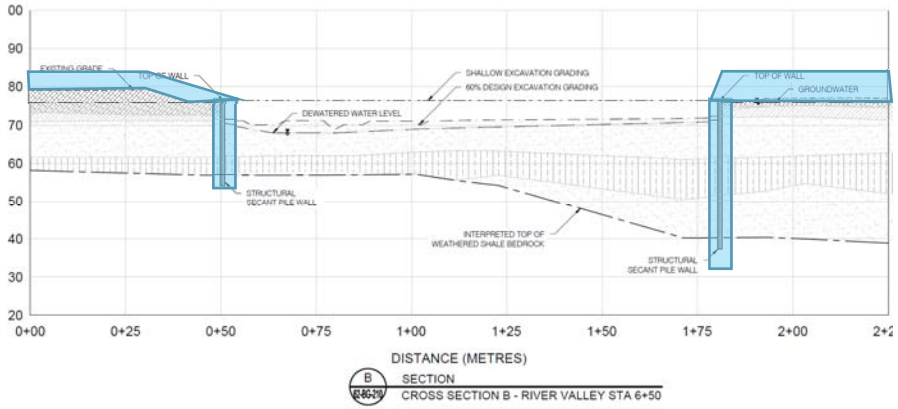
Step 1 – Shallow Excavation (above groundwater table)

- Remove and treat excavated soils (as required)
- Local dewatering (as required)



Step 2 – Cut-off Wall Installation

- Install secant pile walls into weathered bedrock
- Local dewatering (as required)



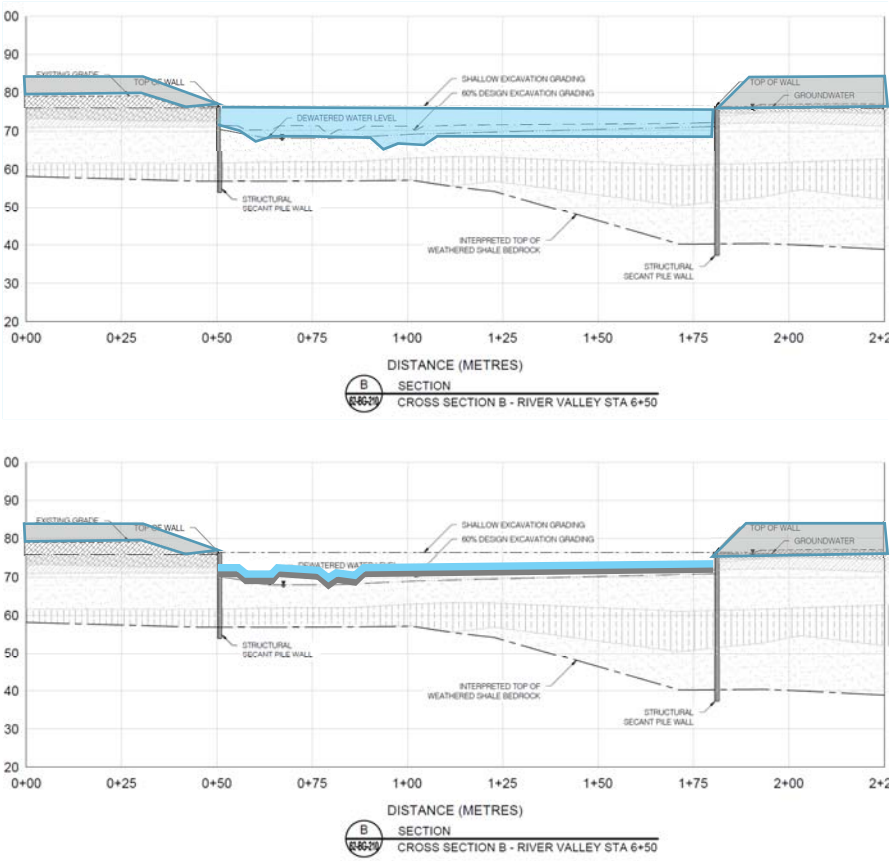
Step 3 and 4

Step 3 – Deep Excavation (below groundwater table)

- Excavate to design depth (below final grade elevation)
- Dewatering (pore water + surface storm water + limited GW seepage)
- Removed water will require treatment

Step 4 – Install Underdrain and Horizontal Barrier Systems

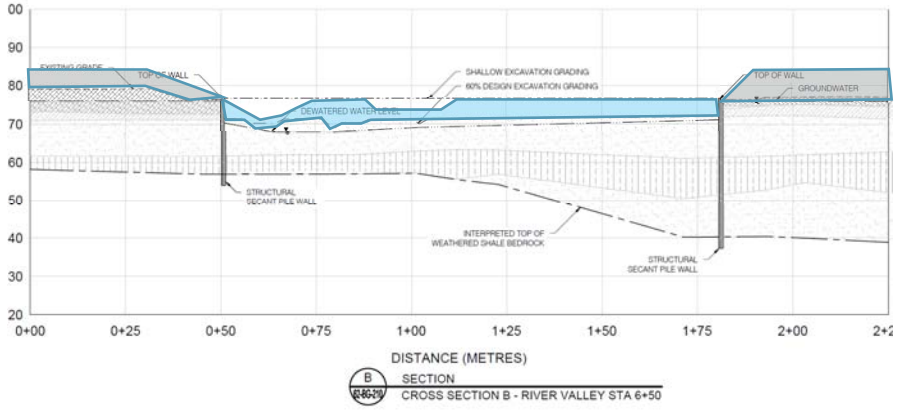
- Manage groundwater seepage during construction of river finishes
- Maintains hydraulic head and prevent uplift pressures on barrier until flooded
- Temporary for construction
- Removed water may require treatment
- Composed of GCL + geomembrane + protective cover with option for reactive treatment layer
- Surface water dewatering performed to maintain dry conditions (may not require treatment



Steps 5 and 6

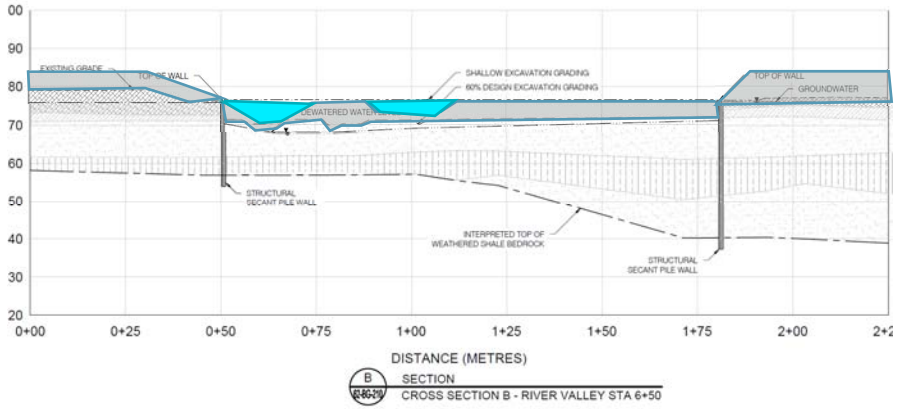
Step 5 – Install River Finishes

- Install barrier protections
- Install clean rough grading
- Install soils and habitat finishes
- Underdrain still in operation until connected to lake

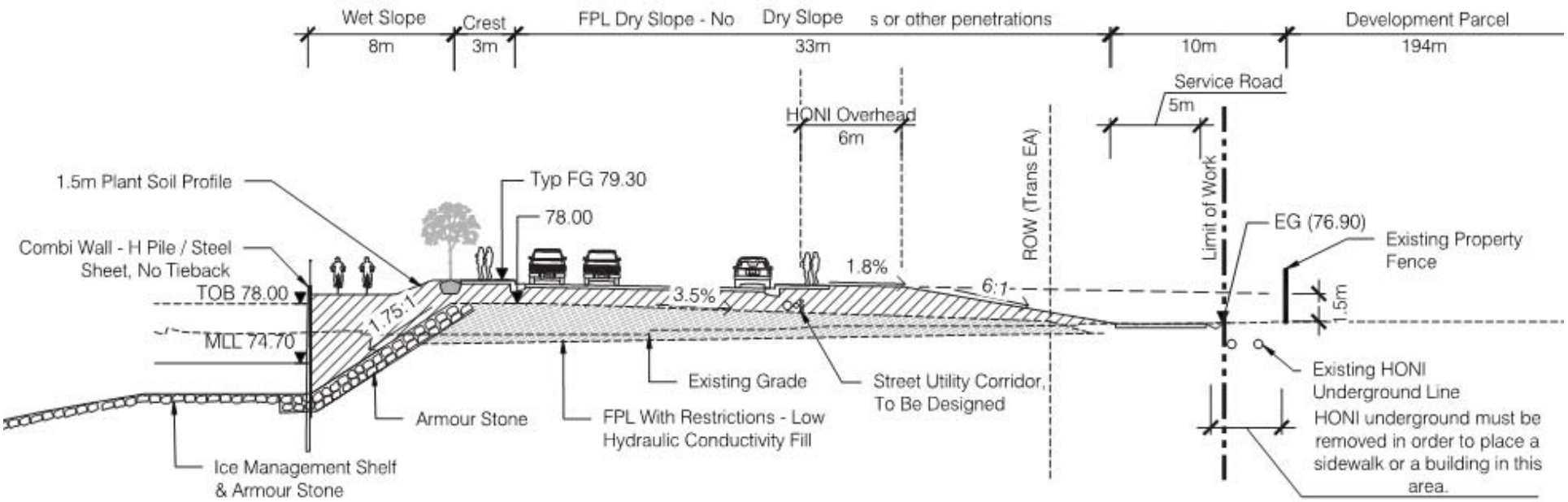


Step 6 – Connecting to the Lake

- River opened to the lake
- Underdrain is abandoned and grouted



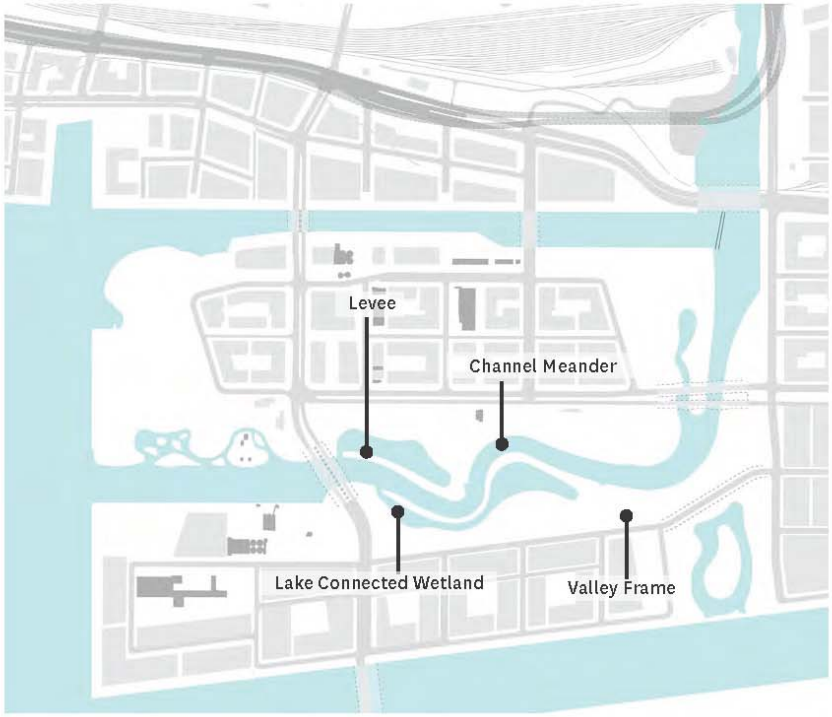
Flood Protection Landform & Valley Wall Feature



River Ecologies and Habitat

Design Shapes and Features Informed by Research

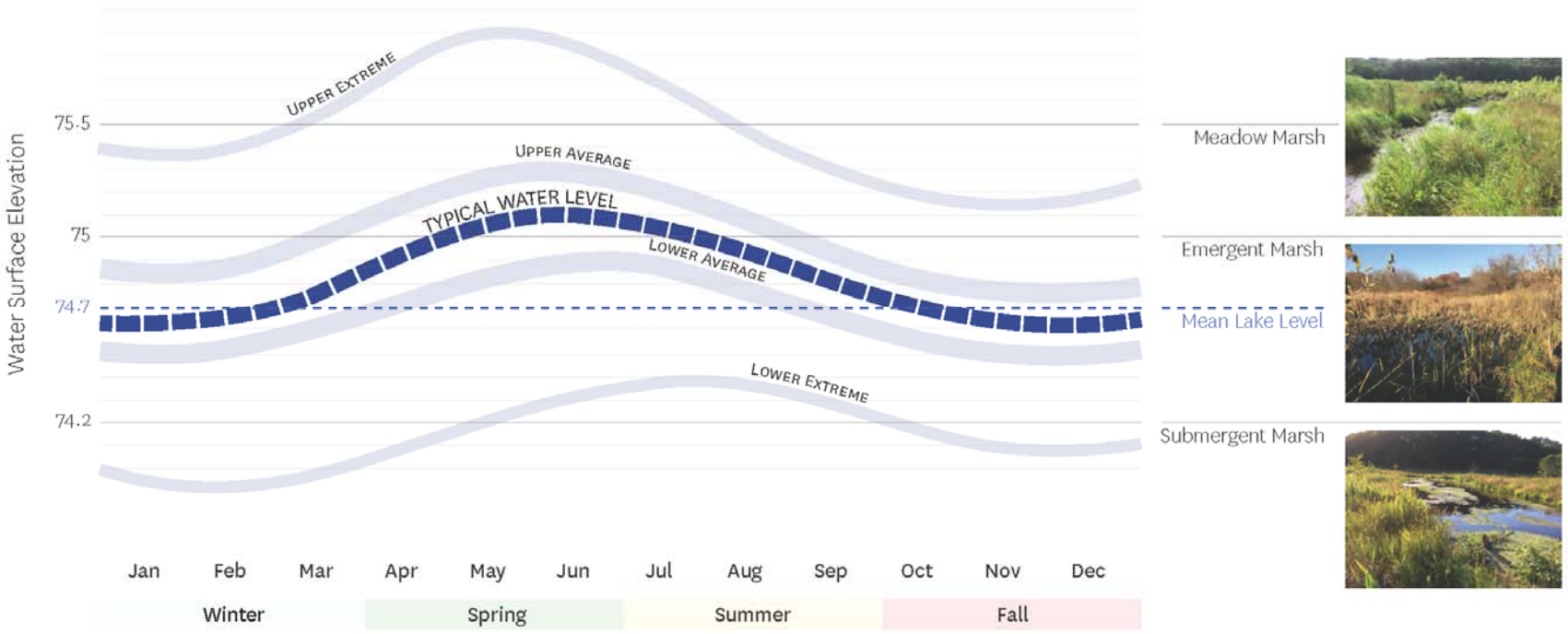
Rouge River



Lower Don Mouth

0 100 200M

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

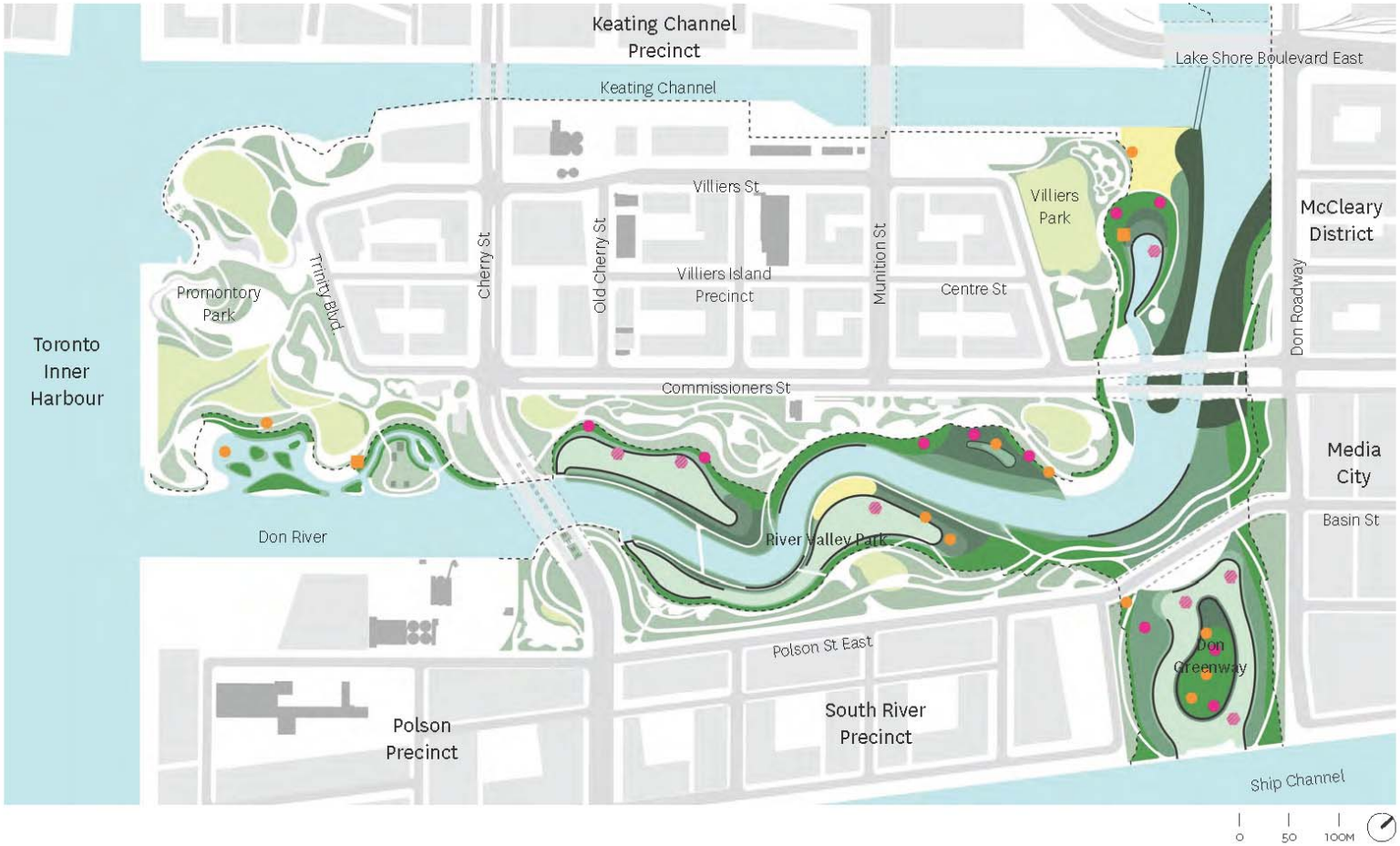
Emergent Marsh

Meadow Marsh

Floodplain Forest

River Ecology: 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)



PARKS, PUBLIC REALM, AND RIVER PROJECTS

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Presented by EllisDon

Questions