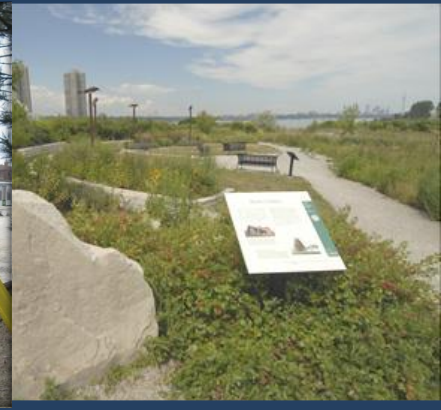


Controlling CSO Discharges in the City of Toronto: Don River and Central Waterfront Project



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Montreal, Canada

Presentation Overview

- City of Toronto Sewer Infrastructure
- Wet Weather Flow Water Quality Impacts in Toronto
 - International Joint Commission “Area of Concern”
- Lower Don River and Central Waterfront
 - Project Study Components
 - Receiving Water-based Approach
 - Dry Weather Overview and Wet Weather Sources
- Receiving Water Response
- Cost versus Level of Control
- Final Integrated Plan
 - Collection and Storage
 - Treatment
- Concluding Comments

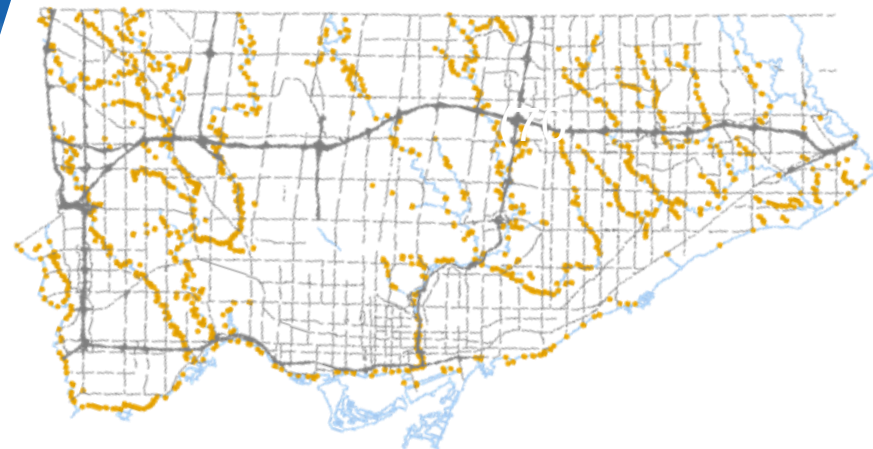
Toronto's Sewer Infrastructure

- Sewer infrastructure: 10,400 km
 - Storm Sewers 4,550 km
 - Combined Sewers 1,300 km
 - Sanitary Sewers 4,150 km
 - Large Trunks 400 km
- 80 combined sewer overflow outfalls (34 directly into Lake Ontario)
- 2,600 storm sewer outfalls directly into Lake Ontario)

Combined Sewer Service Area



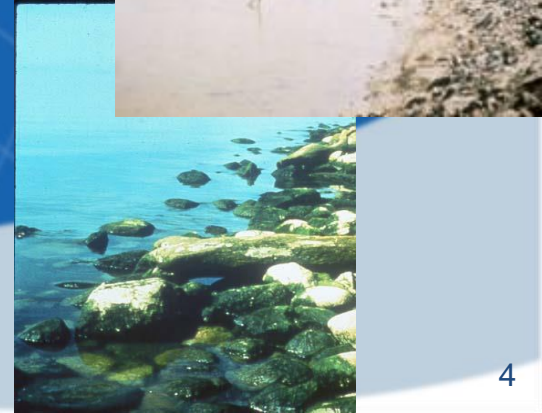
Sewer Outfall Locations



Wet Weather Flow Environmental Impacts

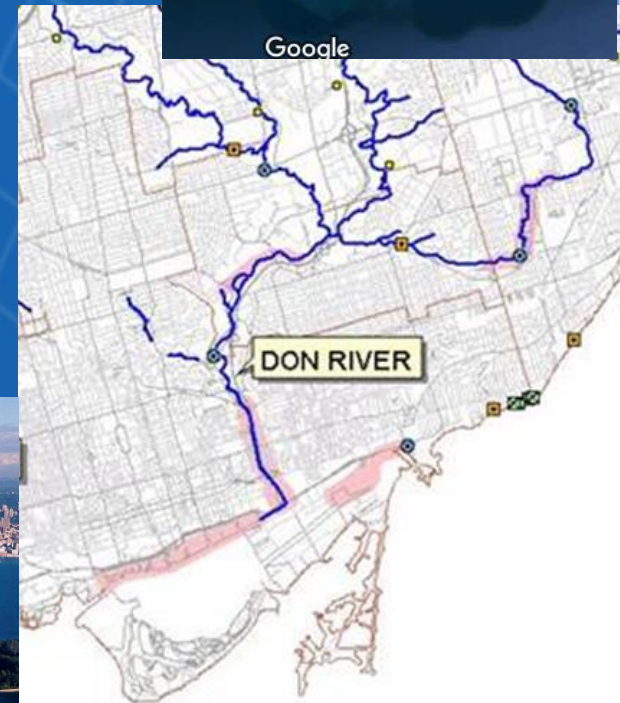
Toronto – “Area of Concern” (as identified by the International Joint Commission - 1987)

- “Impaired Beneficial Uses” attributed largely to discharges from:
 - Combined sewer overflows
 - Storm sewers
- Impacts on fisheries and aquatic biota
- Sediment quality and benthic invertebrates
- Contributes to fish consumption advisories
- Loss of fish habitat
- Nutrient enrichment: nuisance algal growth



Lower Don River and Central Waterfront

- Original focus of International Joint Commission assessment of Toronto's water quality conditions
- Don River – long recognized as one of Canada's most polluted rivers
- Water quality impairment due to CSOs and stormwater:
 - Elevated nutrient and bacteria levels
- Inner Harbour being revitalized from heavy industrial to mixed use luxury residential and recreation



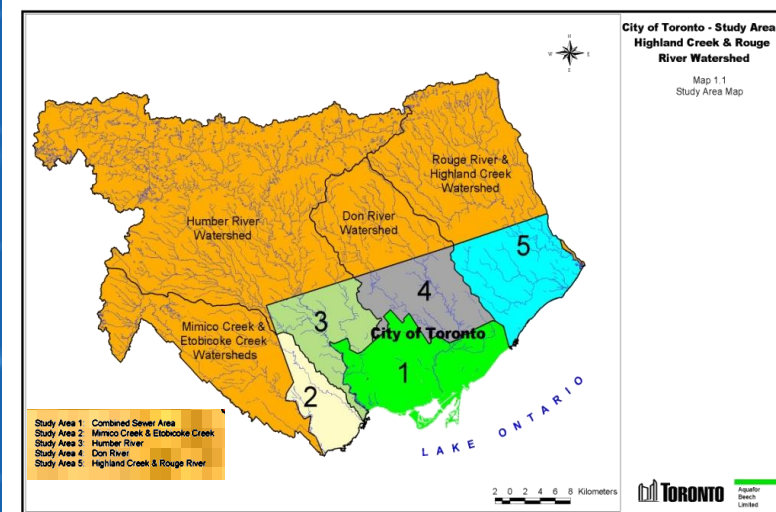
Wet Weather Flow Master Plan

- Adopted by City Council in 2003
- Watershed based approach
- Mitigate water quality and flooding impacts from wet weather flows
- Receiving water-based approach aimed at achieving Provincial Water Quality Objectives
- Hierarchy to managing stormwater
 - Source Control (lot level)
 - Conveyance System (road allowance)
 - End-of-pipe (before discharge)
- Public education a key component
- 25-year implementation schedule

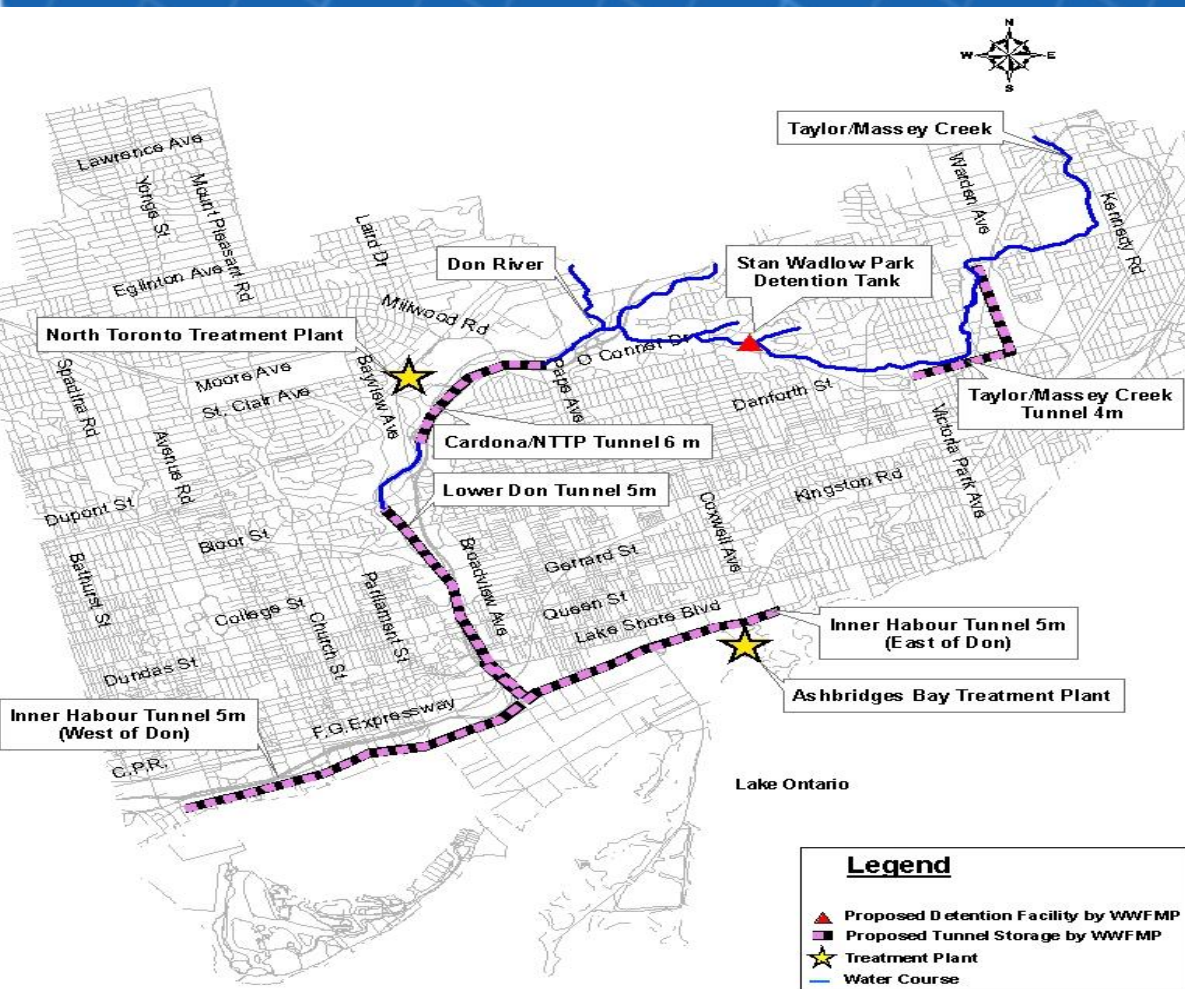
Wet Weather Flow Master Plan

Implementation Report 2006

Toronto Water



Wet Weather Flow Master Plan (Lower Don River)

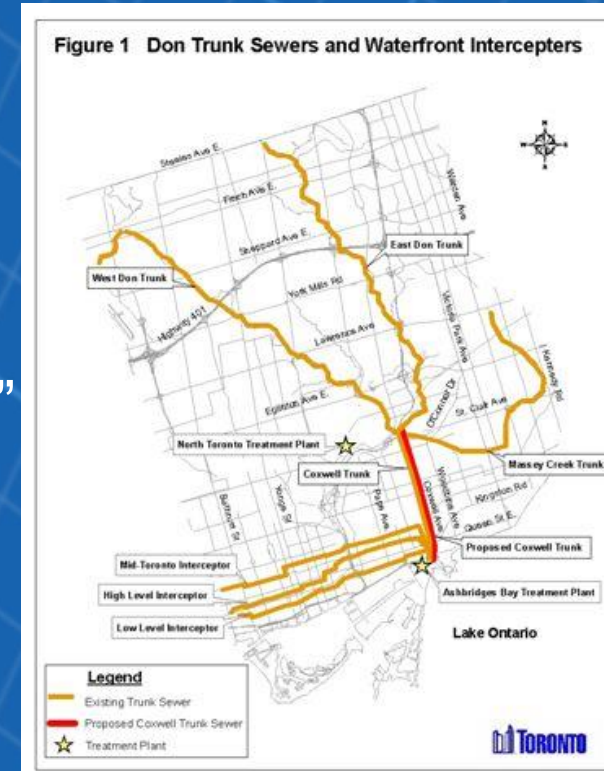


Recommended Facilities:

- Lower Don Tunnel
- Cardona/NTTP Tunnel
- Taylor Massey Creek Tunnel
- Stan Wadlow Park Tank
- Inner Harbour Tunnel:
West and East Don

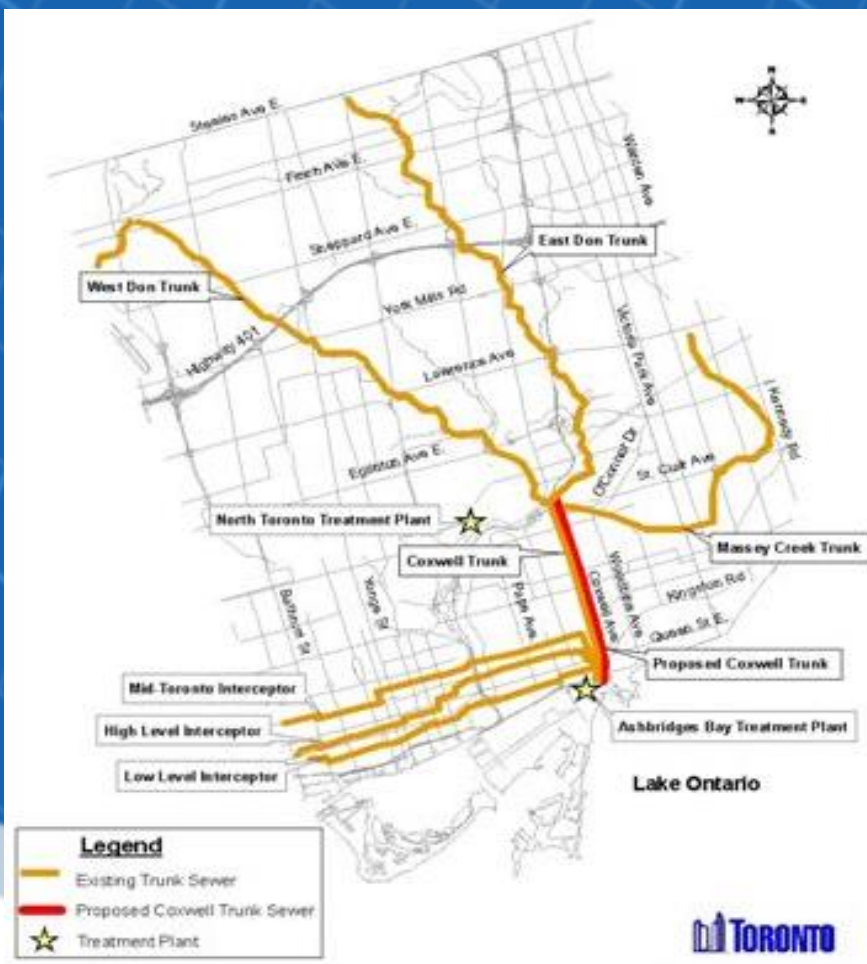
Lower Don River and Central Waterfront “Dry Weather” Overview

- Don Trunk Sewer System:
 - Services 750,000 population
 - Continued growth requirements and additional capacity requirements
 - Downstream end “Coxwell Trunk Sewer”
 - Deep tunnel built in 1950s
 - 2.6 metre (9') diameter
 - Depths reaching 40 metres
 - Maintenance hole spacing of 1.5 km
 - No redundancy
 - Flows: 400 million litres/day
(3 X Don River base flows)

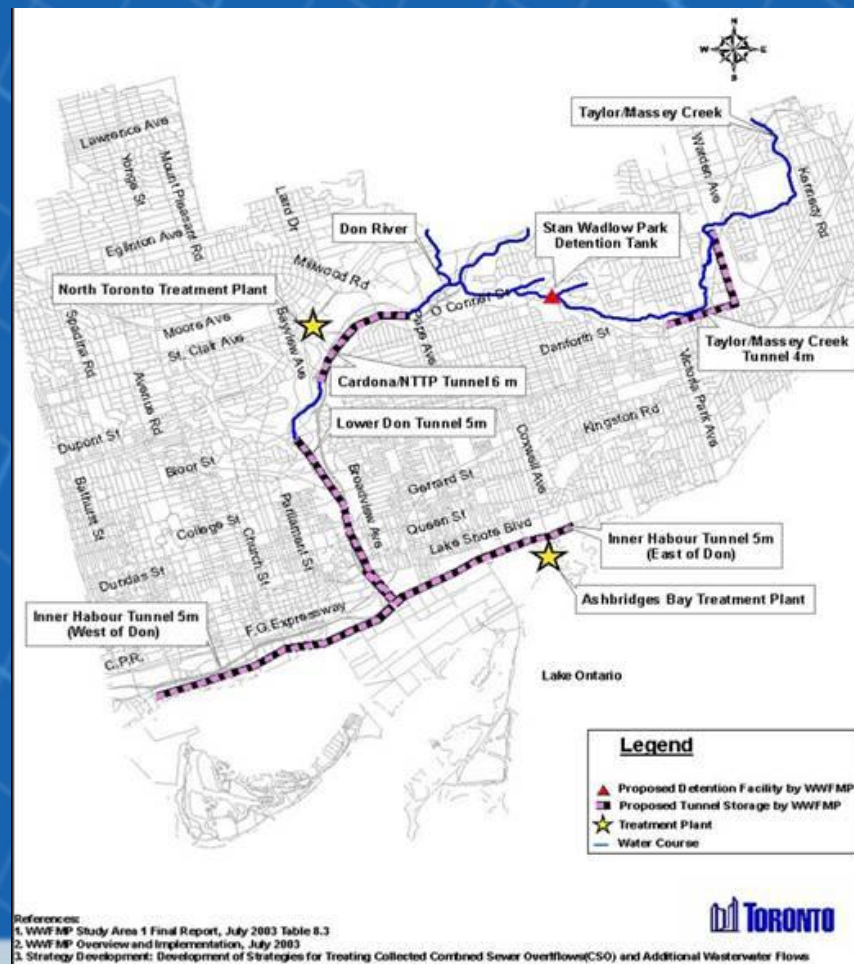


Integrated Study Approach

Dry Weather Servicing

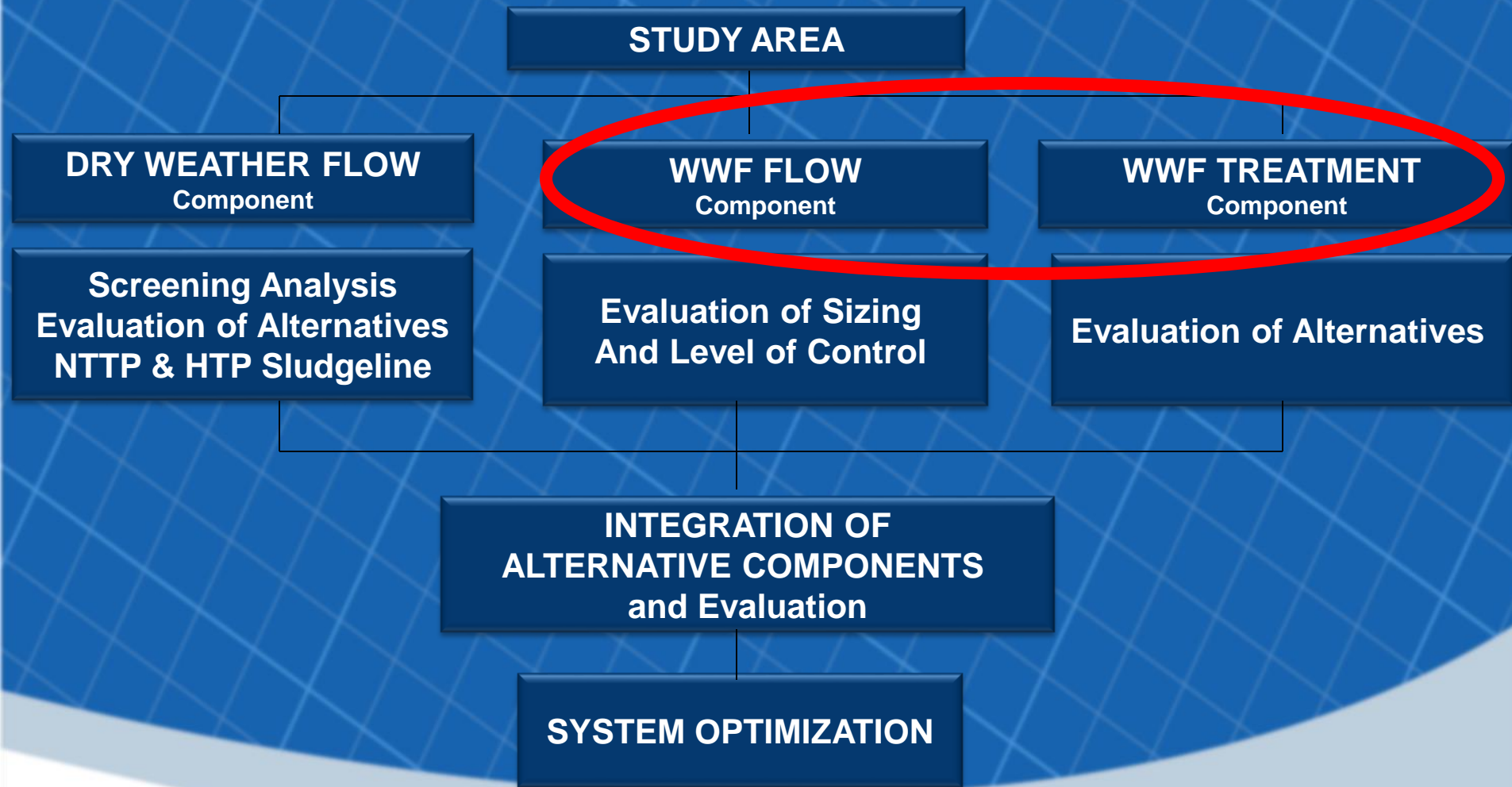


Wet Weather Flow Control



References:
 1. WWFMP Study Area 1 Final Report, July 2003 Table 8.3
 2. WWFMP Overview and Implementation, July 2003
 3. Strategy Development: Development of Strategies for Treating Collected Combined Sewer Overflows (CSO) and Additional Wastewater Flows

Project Study Components

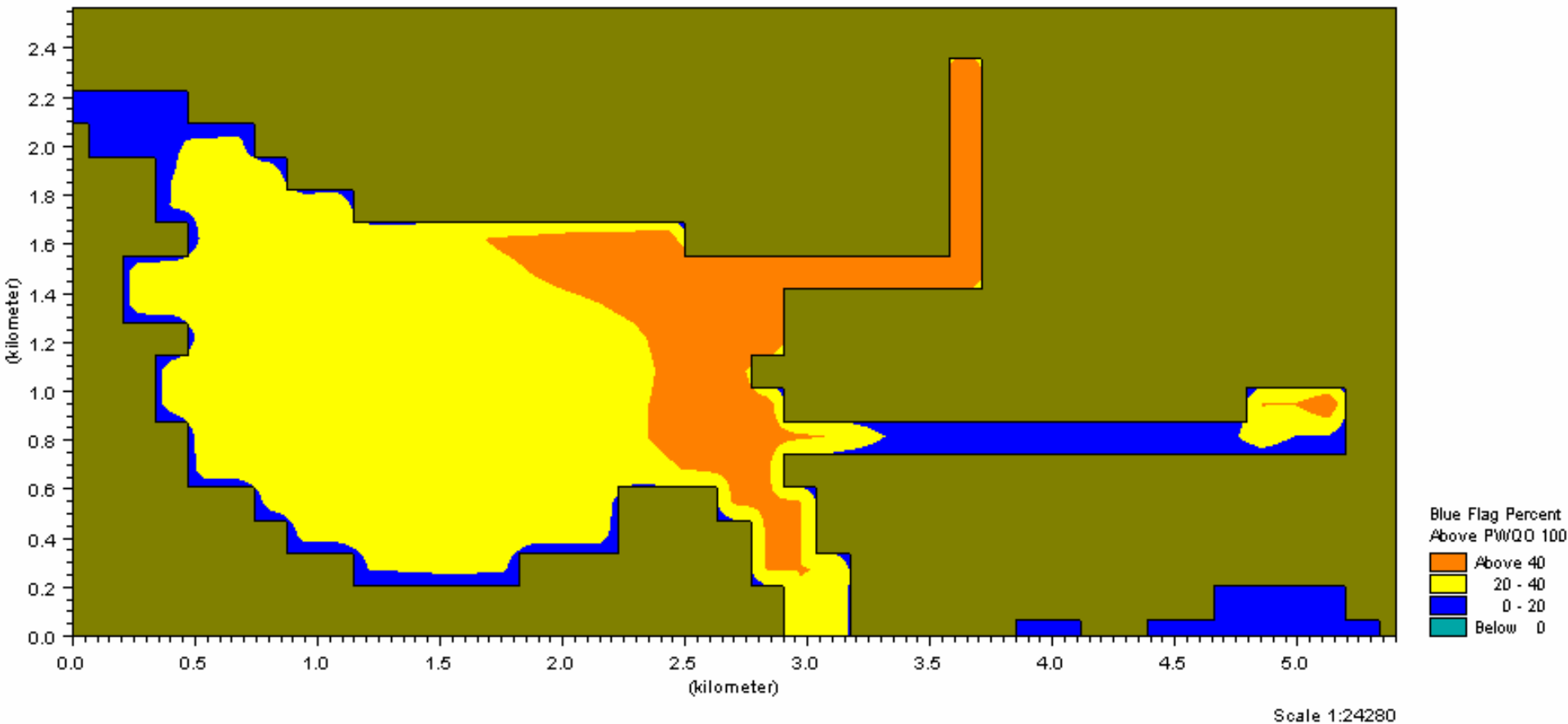


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- Inner Harbour:
 - 11 CSO & 16 Storm Sewers
- Taylor Massey Creek:
 - 13 CSO & 6 Storm Sewers
- Lower Don River:
 - 27 CSO & 19 Storm Sewers
- **TOTAL:**
 - CSOs - 51**
 - Storm Sewers - 41**

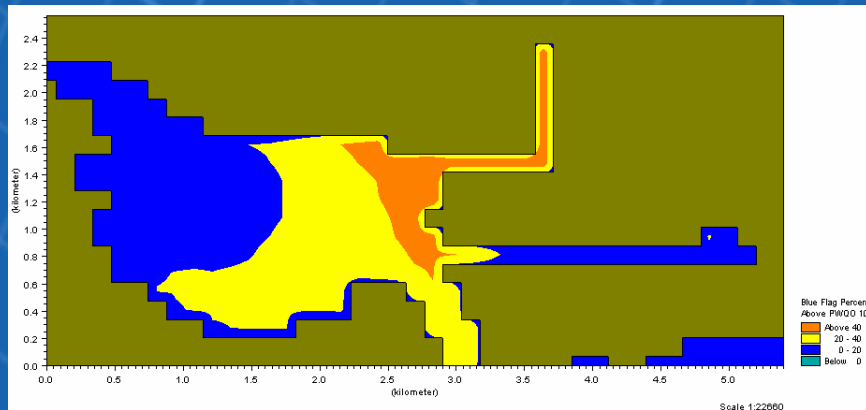
[Average 42 CSO events/year]

Receiving Water Quality Response Existing Conditions

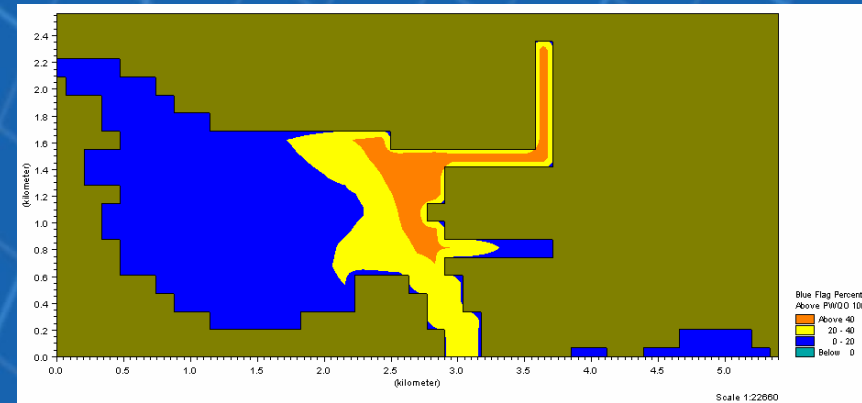


Receiving Water Quality Response Existing Conditions

MOECC: F-5-5 Control Level *

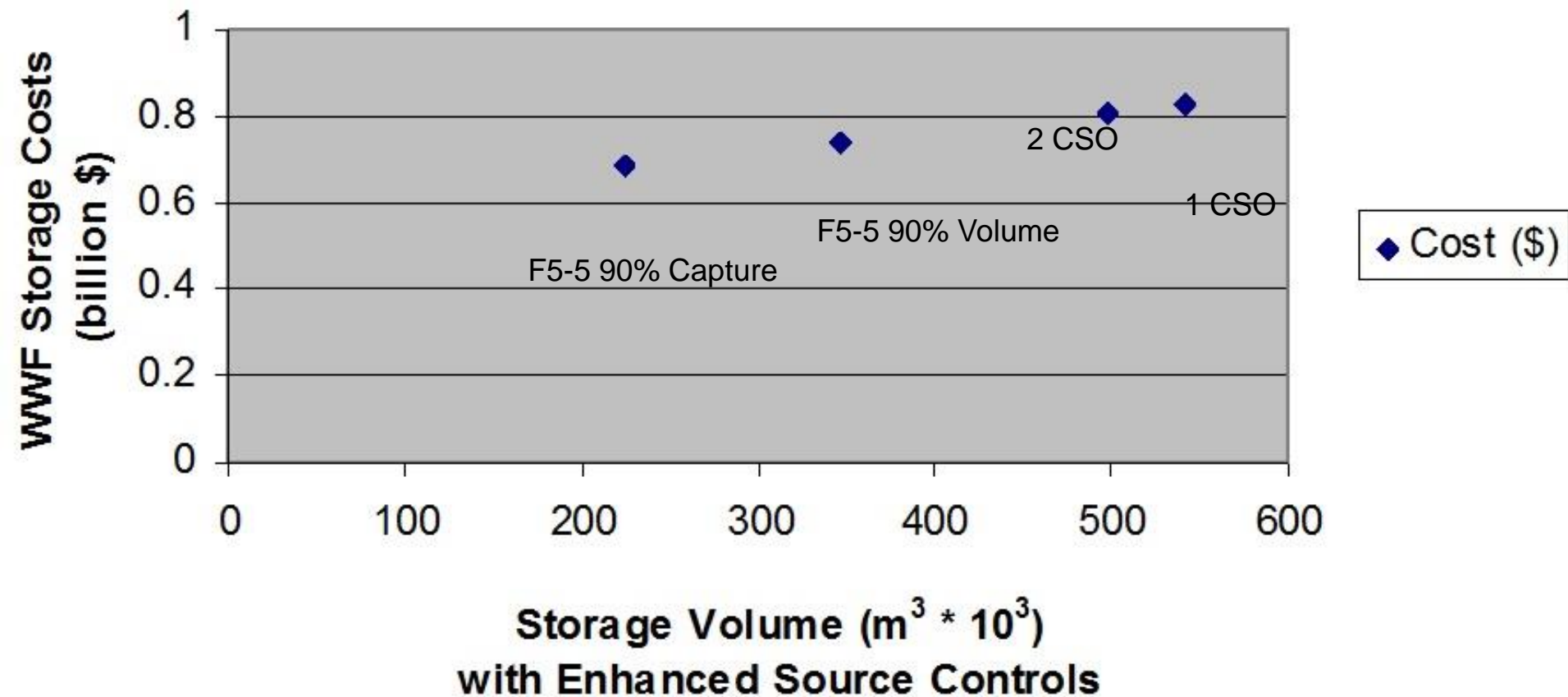


1 overflow per season - Blue Flag Status



* During a seven-month period (April to November), capture and treat for an average the dry weather flow plus 90% of the volume resulting from wet weather flow that is above the dry weather flow.

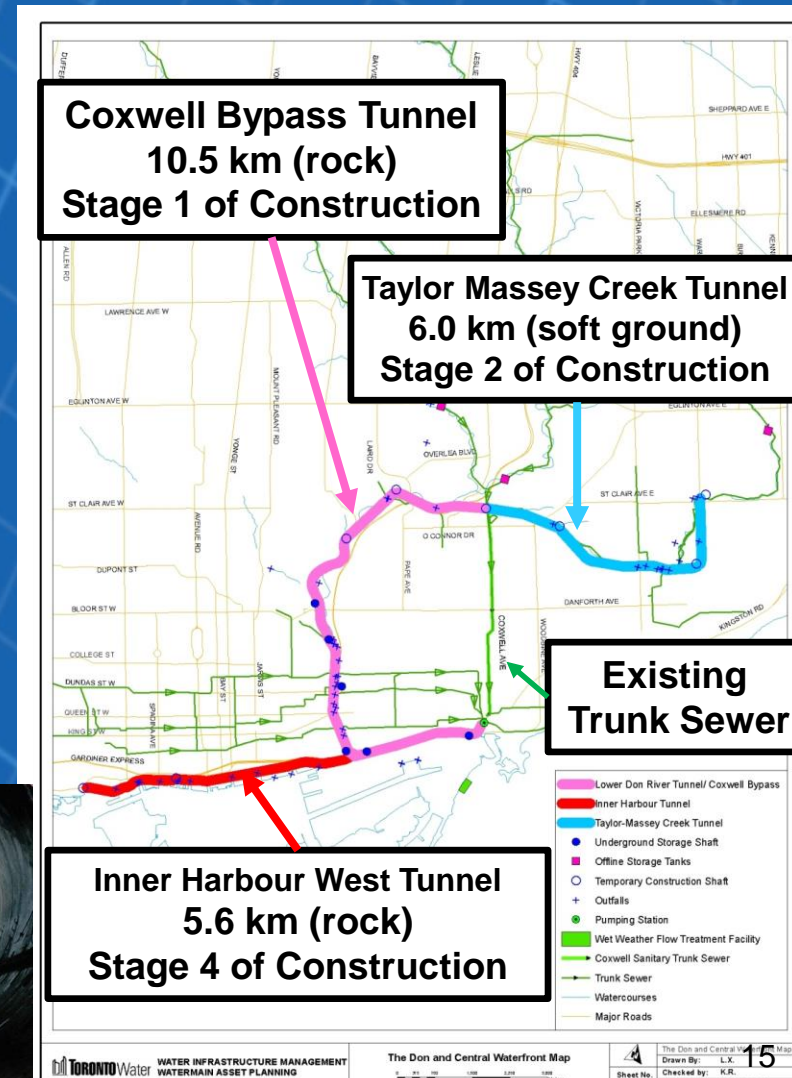
Receiving Water Quality Response Cost versus Level of Control



Final Integrated Plan

Wet Weather Flow Collection and Storage

- 3 tunnels (22.1 km)
 - 16 km - 6.3m dia. rock tunnel
 - 6 km - 4.5m dia. soft ground tunnel
- 737,900 cubic metres of storage
- 12 Tunnel Shafts
 - Diameter: 8 metres to 20 metres
 - Depth: up to 50 metres
- 3 offline storage tanks for wet weather flows in remote areas



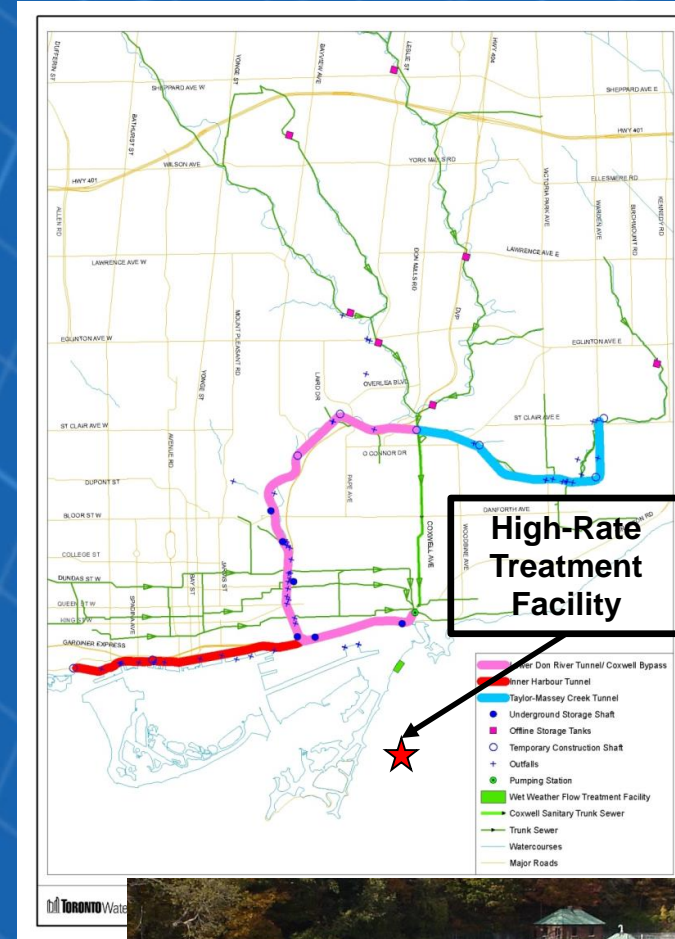
Coxwell Bypass Tunnel



Final Integrated Plan

Wet Weather Flow Treatment

- High-rate treatment facility for CSOs and stormwater intercepted
- UV disinfection of effluent
- Wet weather flow pumping station treatment capacity of 500 MLD
- Full Scale Demonstration – CSO Tank Retrofit
 - increase in flow rate X 10
 - 70% suspended solids removal
- Commercial examples:
 - Actiflo; Densadeg
- Located at Ashbridges Bay Treatment property
 - New pumping station
 - Wet weather flows separated from wastewater flows



Final Integrated Plan

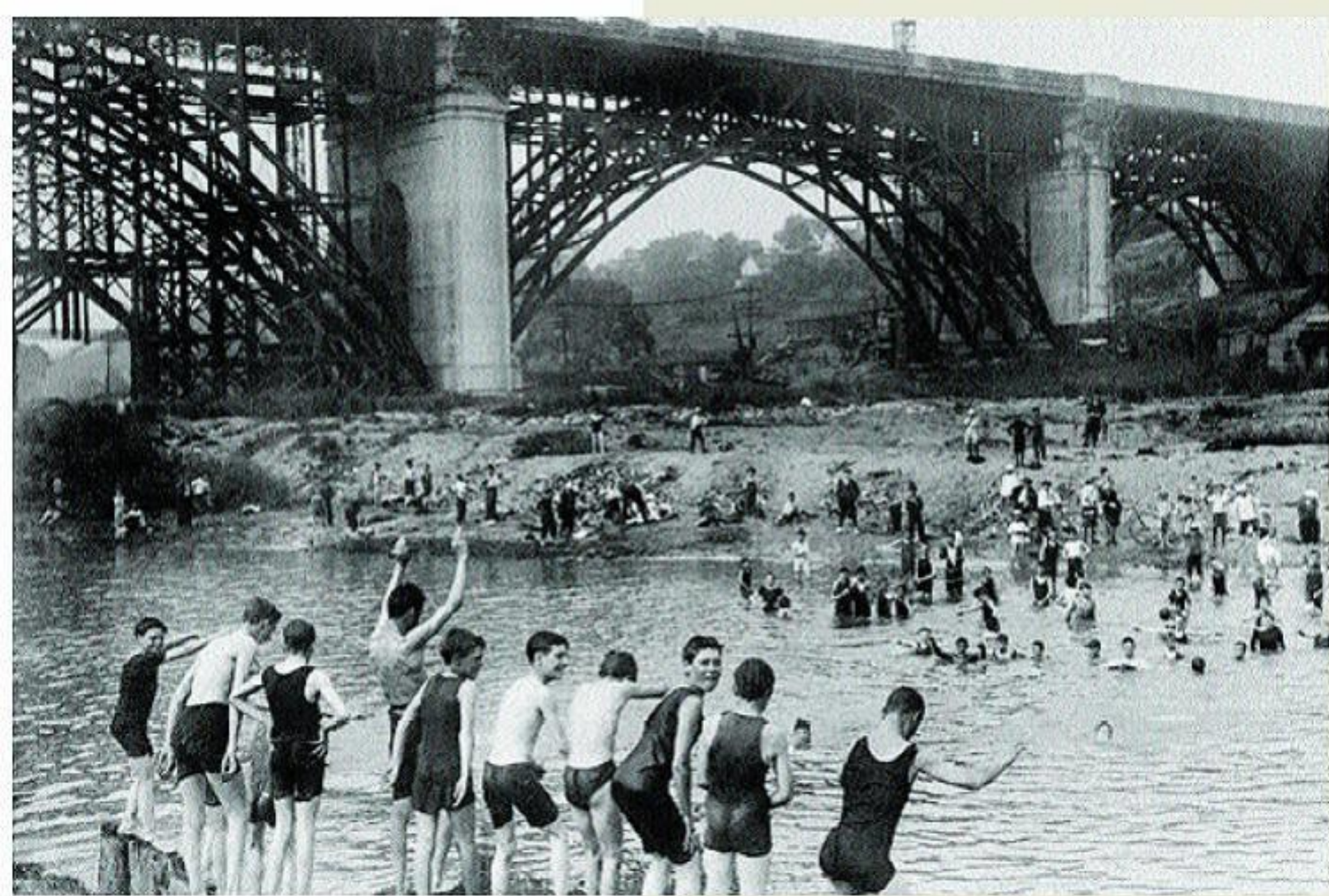
Project Stages	Year																		Estimated Cost (\$millions)
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	
Stage 1 - Coxwell Bypass																			\$500
<i>High Rate Treatment Plant</i>																			\$300
Stage 2 - Taylor Massey Tunnel																			\$260
Stage 3 - Off-line Storage Tanks																			\$140
Stage 4 - Inner Harbour West Tunnel																			\$245
Stage 5 - Diversion Chambers																			\$280

- Total estimated cost for 5 stages of the Plan is \$1.425 Billion
 - *Increases to \$1.725 Billion when High Rate Treatment Plant is included*

Concluding Comments

- We have been discussing the need for significant improvements in Don River and Inner Harbour for decades
- Our desire is to move towards action and realize improvements: long overdue!
- Must join fellow municipalities in the Great Lakes Basin as they to move to delist as “Areas of Concern”
- Implementation based on current funding by Toronto Water – rate supported exclusively
- Need for support in ensuring successful completion of this project; and advancing the delisting of Toronto as an “Area of Concern”





THANK YOU / MERCI

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