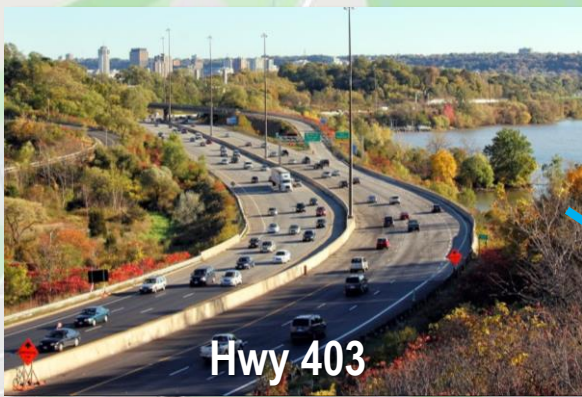




# CHEDOKE CREEK UPDATE

Dan McKinnon, General Manager, Public Works

Gord Wichert, SLR Consulting (Canada)



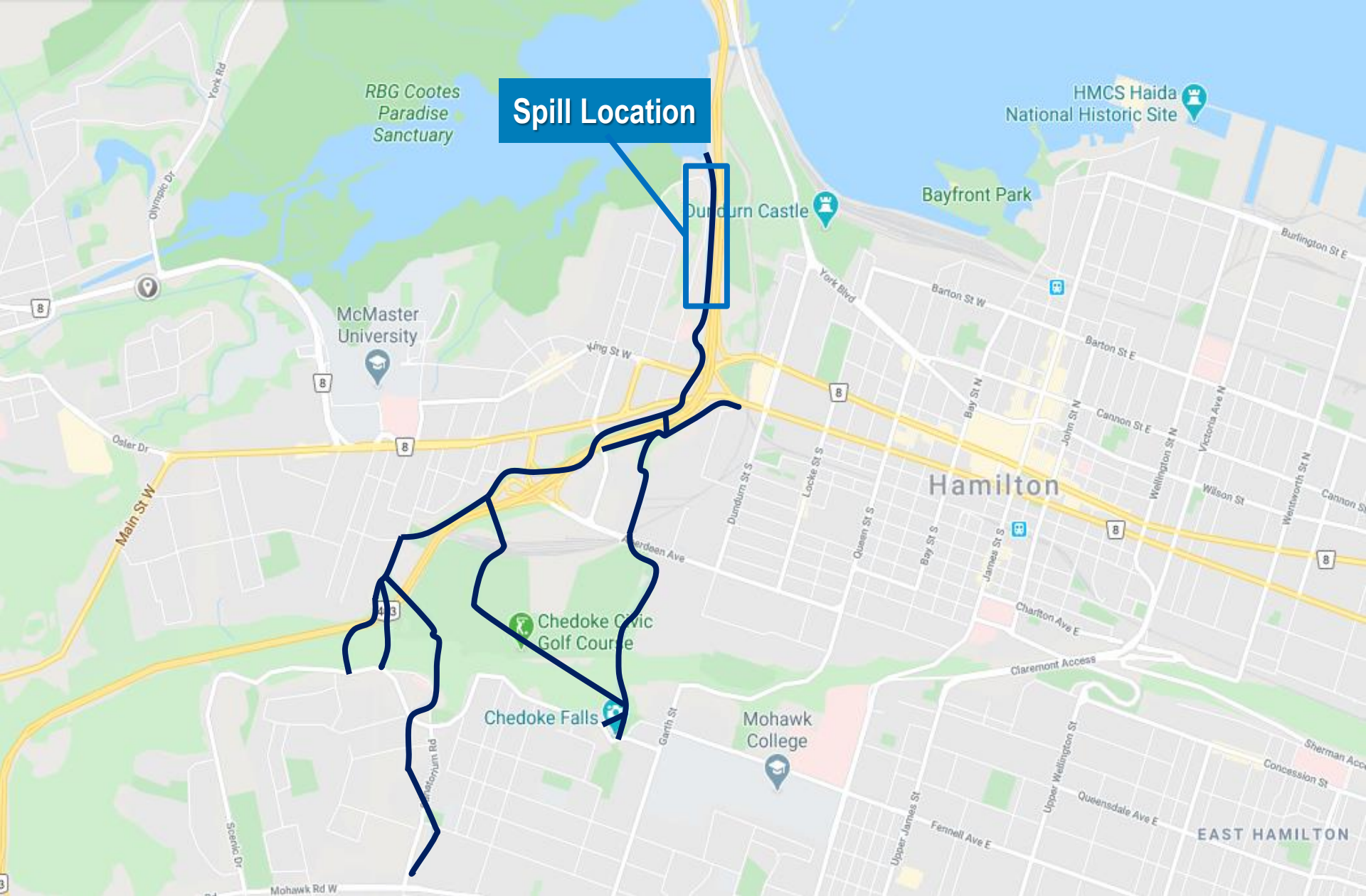
Spill Location

Closed Landfill (Kay Drage Park)

Main/King CSO tank

Sewer Cross Connections

# Video: Combined Sewer System, CSO Tanks & Spill into Chedoke Creek



Spill Location

## **Provincial Officer Order (August 2018)**

- Required the City to retain an expert to evaluate the impacts to Chedoke Creek

## **Second Provincial Officer Order (November 2019)**

- Required a more comprehensive Environmental Risk Assessment and expanded the scope to include Cootes Paradise
- The City formally requested a review of the order

## **Director's Order (November 2019)**

- Required an Ecological Risk Assessment of Chedoke Creek to be completed by **February 14, 2020** and Cootes Paradise by **May 1, 2020**

# Director's Order

1. By February 14, 2020 the City shall submit to the Director a written report setting out the results of an ecological risk assessment in regard to Chedoke Creek (creek). This report shall include but not necessarily be limited to: an evaluation of the environmental impact to the creek from the sewage discharged by the City between January 28, 2014 and July 18, 2018, an identification and evaluation of sewage remaining in the creek, identification of any anticipated on-going environmental impacts to the creek as a result of the sewage spill, and a review of options designed to remediate the creek and monitor the environmental condition of the creek.
2. By February 14, 2020 the City shall submit to the Director written proposed actions with justification in respect to the remediation and the monitoring of the creek including but not necessarily limited to: selected option(s) for environmental remediation and monitoring, including all supporting documentation for the selected option(s), justification for the selected option(s), and an implementation timeline for all work designed to remediate the creek including significant milestones and any approvals required.



# ECOLOGICAL RISK ASSESSMENT SUMMARY

Gord Wichert, SLR Consulting (Canada)

# CHEDOKE CREEK ECOLOGICAL RISK ASSESSMENT

Presentation to Hamilton City Council

February 13, 2020



global **environmental** and **advisory** solutions



# Background

- MECP Director's Order
- SLR Team
  - Celine Totman, Senior Risk Assessor
  - Kathryn Matheson, Risk Assessor
  - Sam Reimer, Technical Director – Risk Assessment
  - Kim Laframboise, Terrestrial Ecologist
  - Kimberley Tasker, Senior Ecologist
  - Gordon Wichert, Technical Director - Ecology



# Why Ecological Risk Assessment

- Accepted standardized tool to support evaluation and management of contaminated sediments.
- Provincial Sediment Quality Guidelines (PSGQ) are not clean-up numbers by themselves, and need to be used in a risk assessment framework (MECP, 2008).
  - Exceedances of environmental guidelines do not mean that adverse effects are occurring.
- To translate scientific data into information about the potential risks and enable informed environmental decisions.



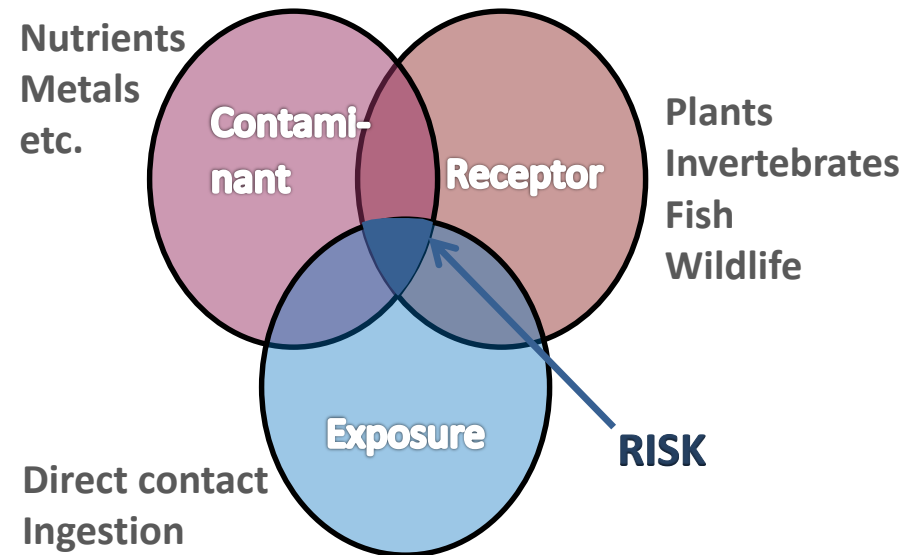
# What is Ecological Risk Assessment?

An evaluation of the **potential for adverse effects** to ecological **receptors** resulting from **exposure** to chemical contamination or physical stressors.

## A Standardized Tool with 4 Main Steps:

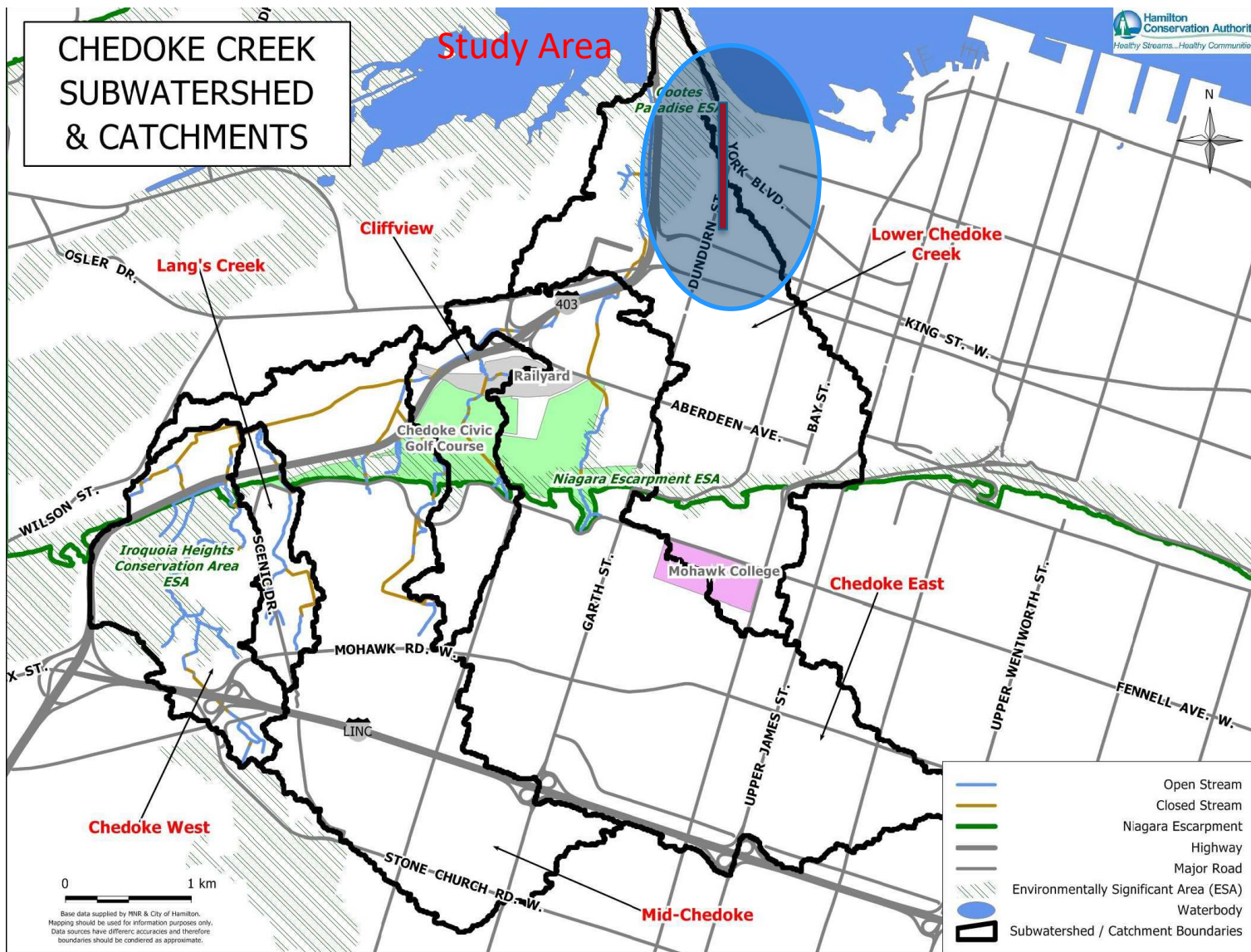
1. Problem Formulation - Setting the scene
2. Exposure Assessment - Quantifying how much of a contaminant a receptor may be exposed to
3. Effects Assessment – Evaluate the effects posed by each contaminant
4. Risk Characterization – Integration of results of exposure/effects assessments to evaluate risk

## Risk Paradigm



EACH ELEMENT MUST BE PRESENT FOR RISK TO EXIST!

# Study Area



# ERA Approach

- Methods based on risk assessment procedures recommended by
  - Ministry of Environment, Conservation and Parks (MECP) and
  - Environment and Climate Change Canada (ECC)
- Background Information – prior to discharge
  - Royal Botanical Gardens
    - water quality monitoring, nutrients and bacteria, 1994 – 2014
    - Sediment in the mouth of Chedoke Creek (upstream from Cootes), nutrients and metals, 2006 and 2013
  - Hamilton Conservation Authority water quality monitoring of nutrients, bacteria, 2014 to present
  - Environment Canada, 2002: sediment quality in Lake Ontario tributaries, metals and PAHs
- Post Discharge Datasets
  - Sediment and water quality chemistry, sediment toxicity and benthic invertebrate samples collected in 2018 and/or 2019
    - Wood in 2018
    - SLR in 2019

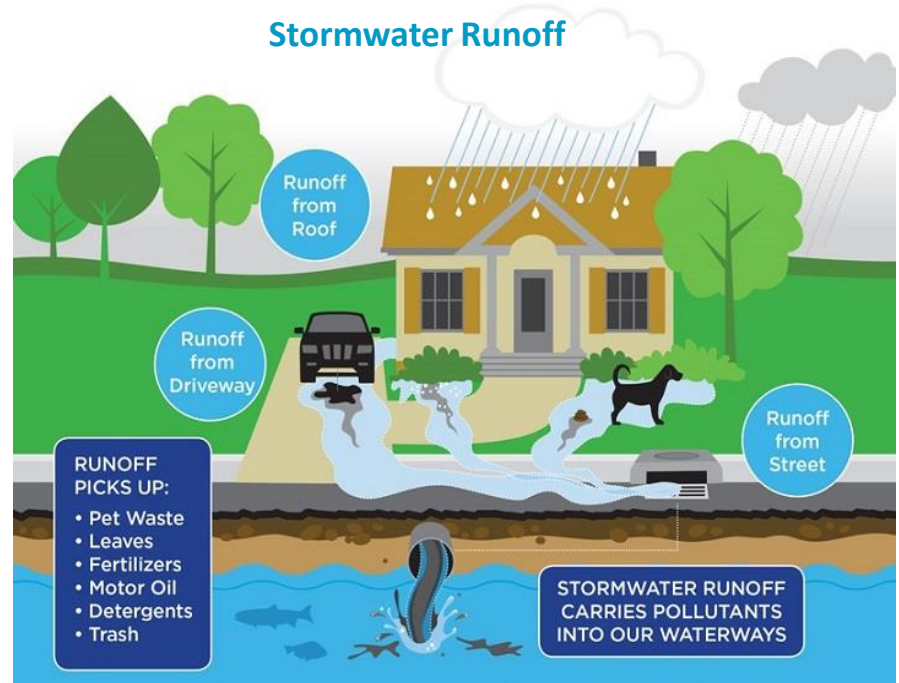
# Ecological Receptors Selected for the ERA

- Aquatic plants:
  - Emergent and submergent
- Aquatic invertebrates
  - Benthic invertebrates: directly exposed to sediment
  - Zooplankton: directly exposed to sediment
  - Food for fish
- Fish
  - White sucker
    - Bottom oriented, feeds on aquatic invertebrates in sediment
  - Northern pike
    - Feeds on fish, recreational fishing, exposed to water and some sediment
- Amphibians
  - Exposed to surface water and sediment, consumes aquatic invertebrates

# Contaminants of Potential Concern (COPCs)

**COPCs:** substances are present at elevated concentrations (above guidelines/standards) in environmental media, typically associated with human activities

- Metals
  - Component of stormwater runoff
- Polycyclic aromatic hydrocarbons (PAHs)
  - Component of stormwater runoff
- Nutrients
  - Component of sewage and stormwater runoff
- Bacteria
  - Associated with sewage



Source: [https://www.urbanailinois.us/Stormwater\\_Pollution](https://www.urbanailinois.us/Stormwater_Pollution)

# ERA Findings

## Risk Associated with Sediment Contact

|                       | COPCs                                       |                   |            |
|-----------------------|---------------------------------------------|-------------------|------------|
| Receptors             | PAHs                                        | Metals            | Nutrients  |
| Benthic invertebrates | Low, moderate or high depending on location | Negligible to low | Negligible |
| Amphibians            | Moderate                                    | Negligible to low | Negligible |
| Fish                  | Moderate                                    | Negligible to low | Negligible |

- Toxicity Test: Sediment toxicity results showed effects to sensitive (amphipod) but not to tolerant (midge) species.
- The benthic invertebrate community makeup was limited to stress tolerant organisms because of contaminants in the study area, low oxygen in sediment and high degree of urbanization and disconnected habitat in the Chedoke Creek subwatershed.

# Director's Order

- **Director's Order**
  - *an evaluation of the environmental impact to the creek from sewage discharged by the City between January 28, 2014 and July 18, 2018, an identification and evaluation of sewage remaining in the creek, identification of any anticipated on-going environmental impacts to the creek as a result of the sewage spill, and a review of options designed to remediate the creek and monitor the environmental condition of the creek.*

# Findings Relevant to Director's Order

- The findings of this ERA and Wood (2019) indicated that some of the COPCs within the study area sediment are likely associated with the 2014-2018 Main/King CSO discharge; however:
  - COPCs, as well as sediment deposition within the study area, have many different point and nonpoint sources.
  - various CSO and stormwater outfalls in the Chedoke Creek subwatershed have discharged sewage and stormwater prior to, during and subsequent to the 2014-2018 Main/King CSO discharge.
  - elevated concentrations of COPCs have been a persistent and ongoing issue in Chedoke Creek sediment and/or surface water prior to and after the 2014-2018 discharge
  - Chedoke Creek is an urban watercourse and observed conditions are consistent with that observed in urbanized watersheds

# Recommendations

- Assessed Alternatives
  - Physical capping
  - Chemical inactivation
  - Direct removal (dredging)
  - No-action
- Recommendations
  - Further remediation unnecessary
    - post-discharge levels of contaminants appear consistent with pre-discharge levels
    - cannot attribute environmental impacts to the sewage spill only as many prior and ongoing sources of COPCs exist
    - direct removal could disturb existing aquatic species and habitat
    - recontamination is likely
- Monitoring
  - environmental condition of the creek as it relates to ongoing operations for the Main/King CSO is occurring



# HISTORICAL REMEDIATION & INVESTMENTS

Dan McKinnon, General Manager, Public Works

# Historical Remediation & Investments

## Infrastructure Projects

- CSO tank construction (9 tanks)
- Chemically enhanced primary treatment at Woodward
- Woodward Upgrades project
- Randle Reef sediment remediation
- Real-time control system
- Sewer-lateral cross connections
- Windemere basin project



**\$494 Million in capital investments**

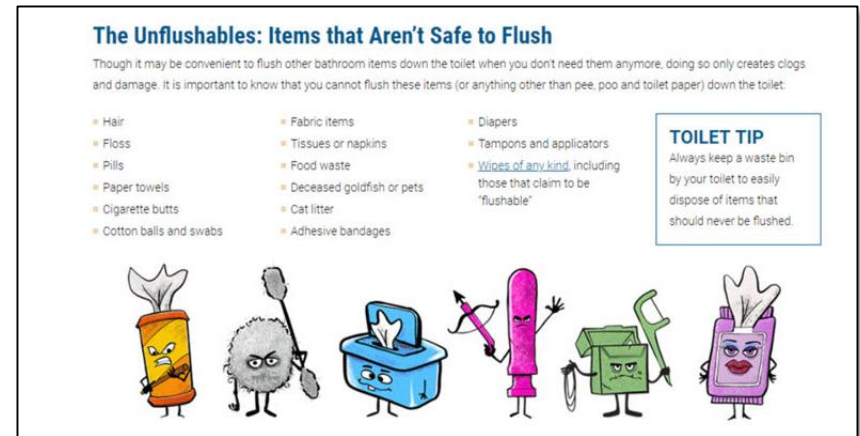
# Historical Remediation & Investments

## Ongoing Annual Investments

- Waterfoul management
- Windemere Basin monitoring
- Red Hill Creek monitoring
- Academic research in harbour
- Hamilton Conversation Authority sampling program and laboratory support services
- HHRAP office
- Royal Botanical Gardens laboratory support services

## Outreach & Research Projects

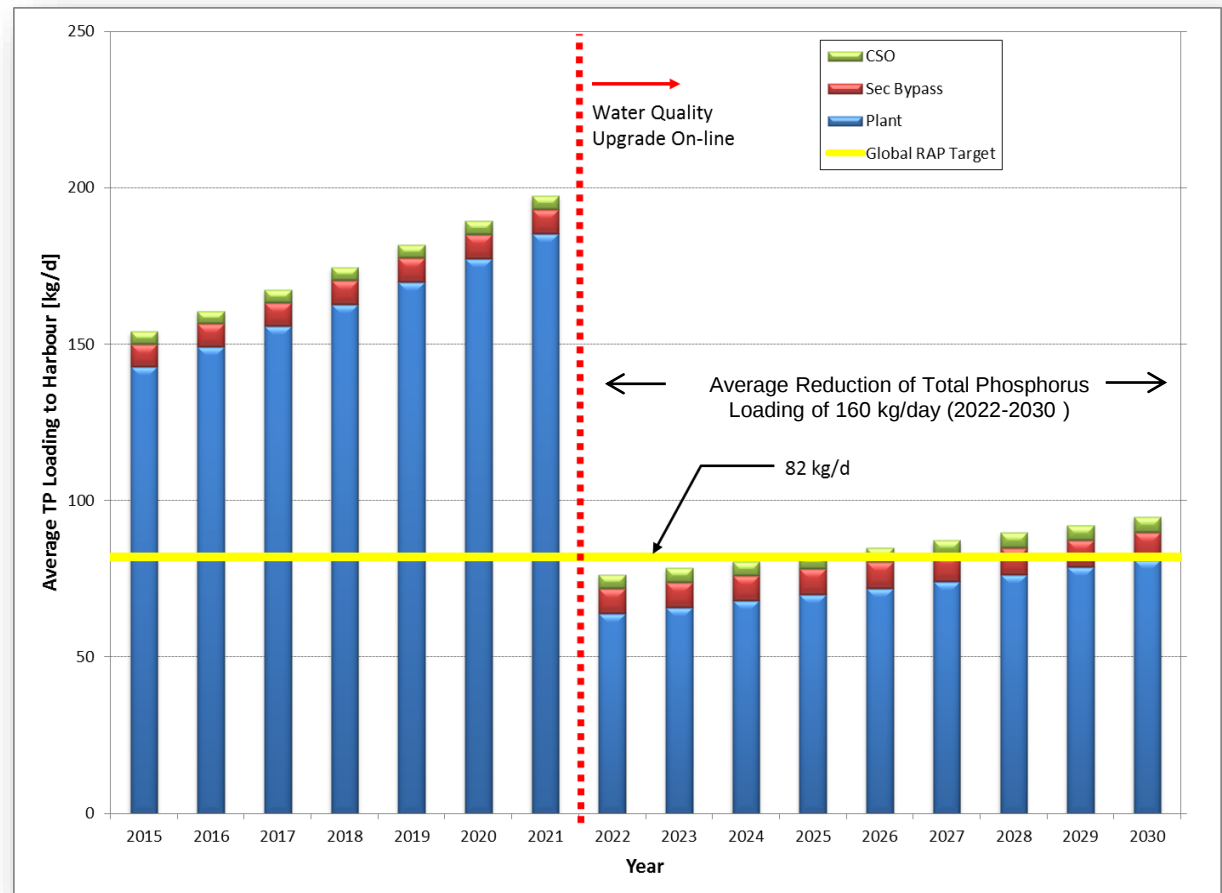
- Clean Harbour Program
- Unflushables Program
- Floatables study



# Investment Impacts: Phosphorous Reductions

Estimated reduction  
over 10 years

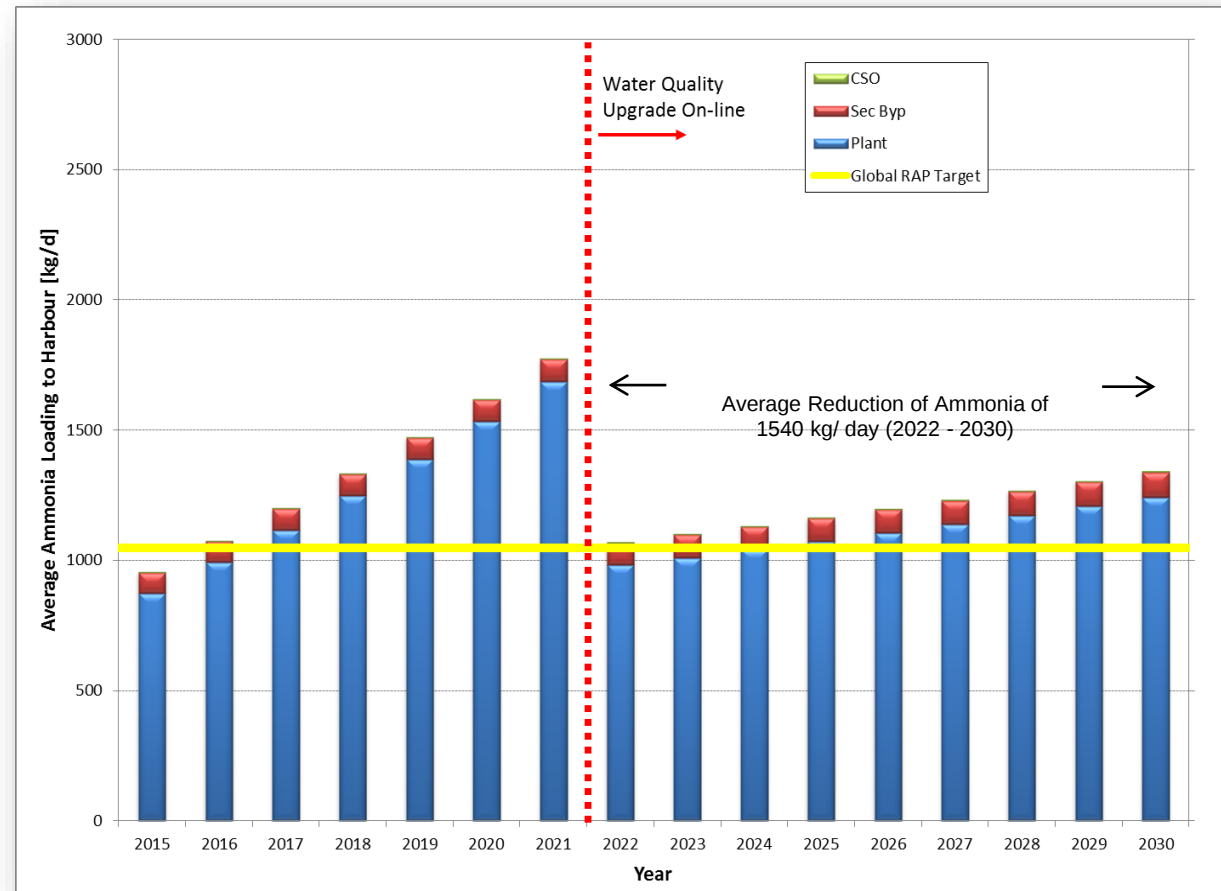
**500 tonnes**  
of phosphorous



# Investment Impacts: Ammonia Reductions

Estimated reduction  
over 10 years

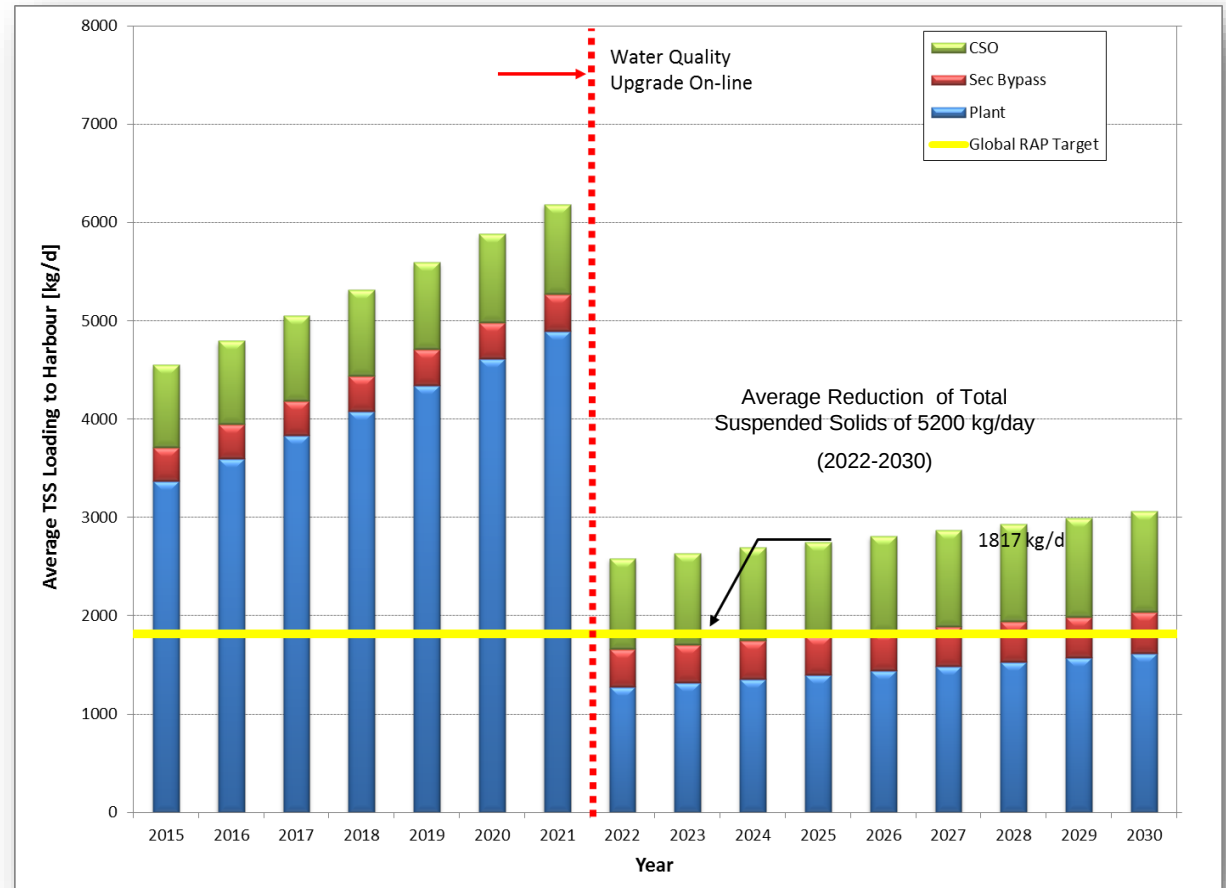
**6,100 tonnes**  
of ammonia



# Investment Impacts: Suspended Solid Reductions

**Estimated  
reduction over 10  
years**

**14,900  
tonnes  
of suspended  
solids**



# Hamilton Harbour Remedial Action Plan: Next Steps

- Traditionally focused on Hamilton Harbor, connected shoreline and point source loading
- Watershed nutrient management and sediment management advisory group created to focus on broader watershed management
  - Urban Runoff Task Force – 26 recommendations
  - Sediment control on construction sites – 31 recommendations
- Initial discussions with external stakeholders around future of RAP
  - Bay Area Restoration Council (BARC)
  - Royal Botanical Gardens (RBG)
  - Hamilton Conservation Authority (HCA)
  - Hamilton Harbour Remedial Action Plan



# Hamilton Harbour Watershed

**HAMILTON HARBOUR WATERSHED**

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Hamilton

THANK YOU