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# Integrated Monitoring of Stormwater and Stream Health in the Dingman Creek Subwatershed



**A Partnership between City of London and Upper Thames River Conservation Authority**

Adrienne Sones (City of London) and Laura Flynn (UTRCA)

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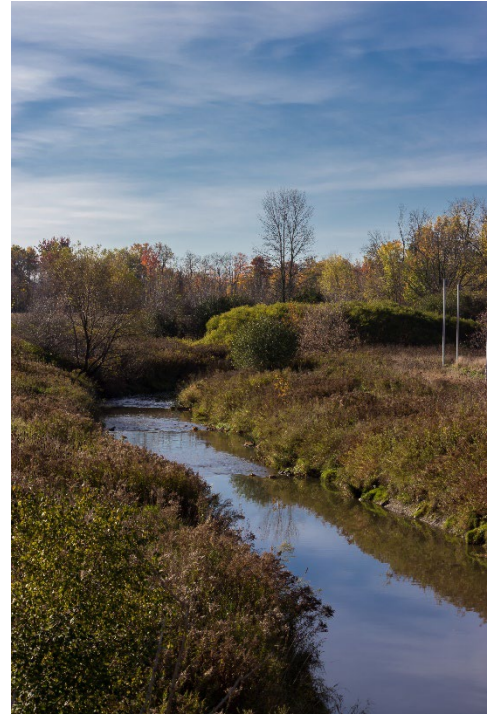
# Monitoring Program Overview

- **Who:** City of London engaged UTRCA to monitor water quality, quantity, benthic and fish in the Dingman Creek Subwatershed
- **Purpose:** Establish baseline conditions by reconciling various historical monitoring programs and datasets and confirmation with new data and protocols
- **Why:** Leverage existing data sets, share data, and capture conditions in an area with significant development pressure



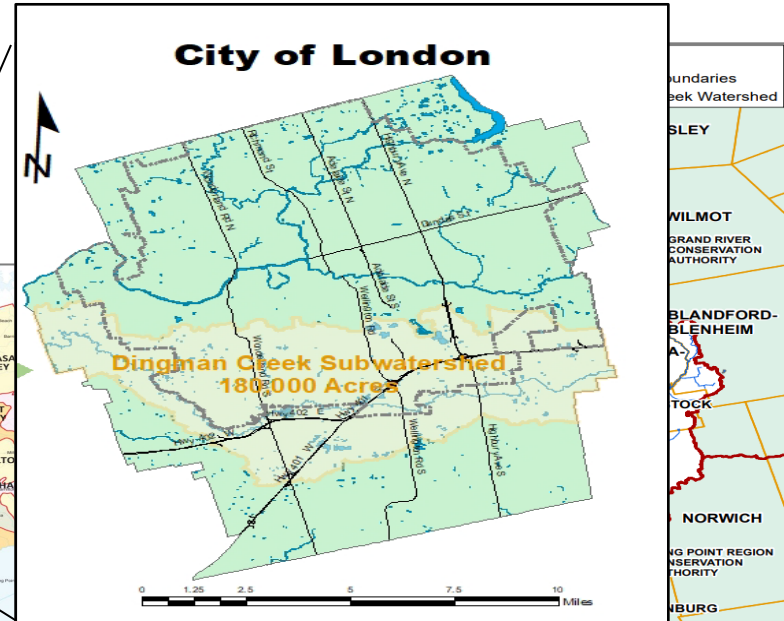
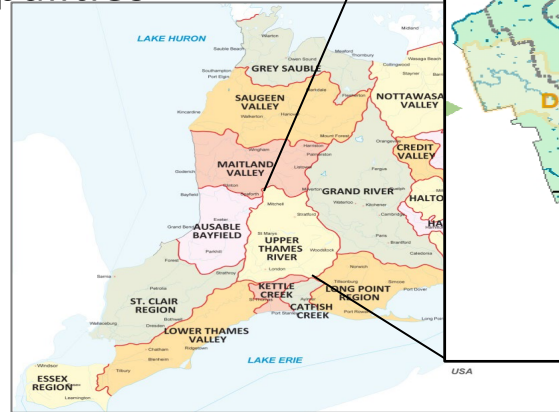
# Outline

- Trigger for the program (Dingman EA)
- City of London Stormwater Management
- Overview of collaborative program
- Program evolution
- Benefits
- Future considerations



# Upper Thames River Conservation Authority

- Medium-sized CA (~100 full-time employees)
- Upper watershed of the Thames River, covers 3,430 km<sup>2</sup> in southwestern Ontario
- London, Woodstock, Stratford, St. Mary's and Ingersoll; 17 municipalities
- Home to approximately 593,700 people



# City of London

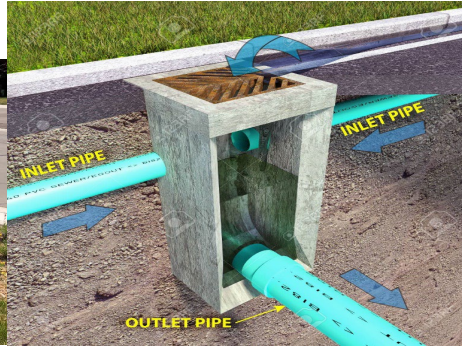
## Stormwater Engineering Division

- Single tier municipality (Population ~425,000)
- Dedicated Stormwater Engineering Division of 14 employees
- Issued Consolidated Linear Infrastructure Environmental Compliance Approval from MECP
- Work closely with Sewer Operations to operation and maintain our SWM system

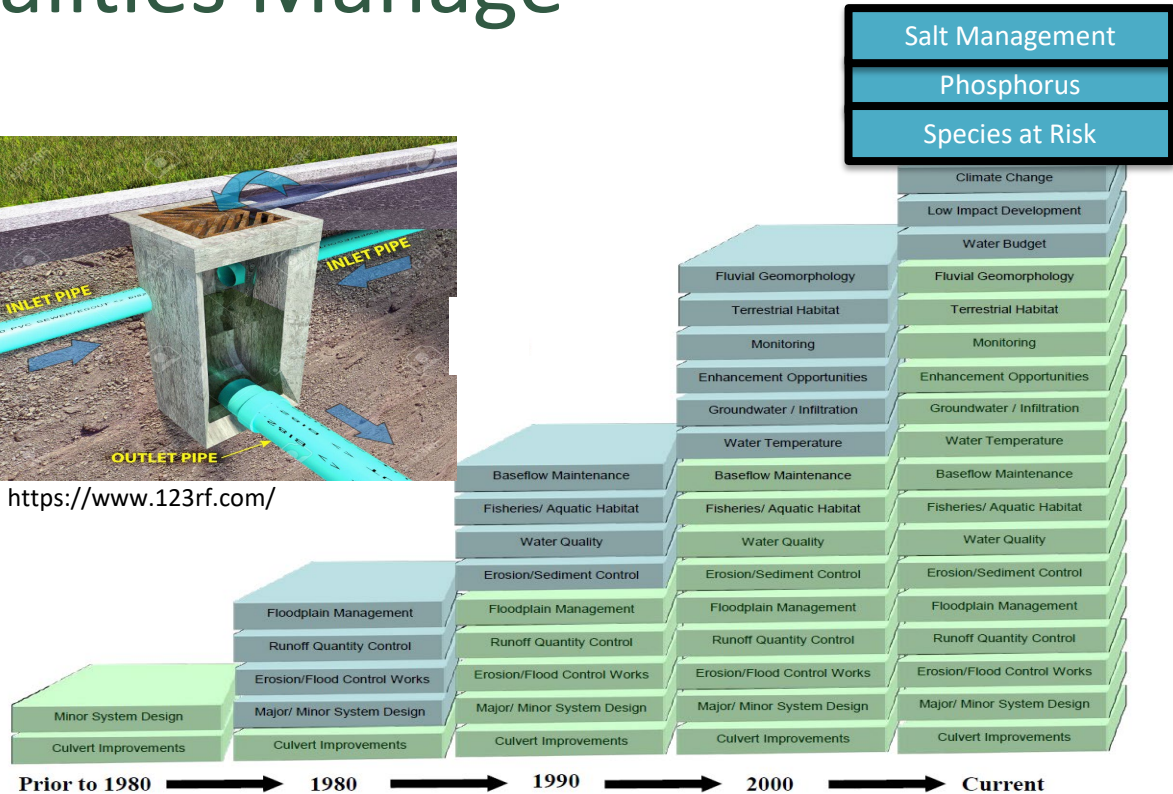


- Lead SWM project construction for Growth and non growth, funded by Development Charges and rates
- Support road construction work to retrofit stormwater controls, where practical
- Review development applications

# How Do Municipalities Manage Stormwater?

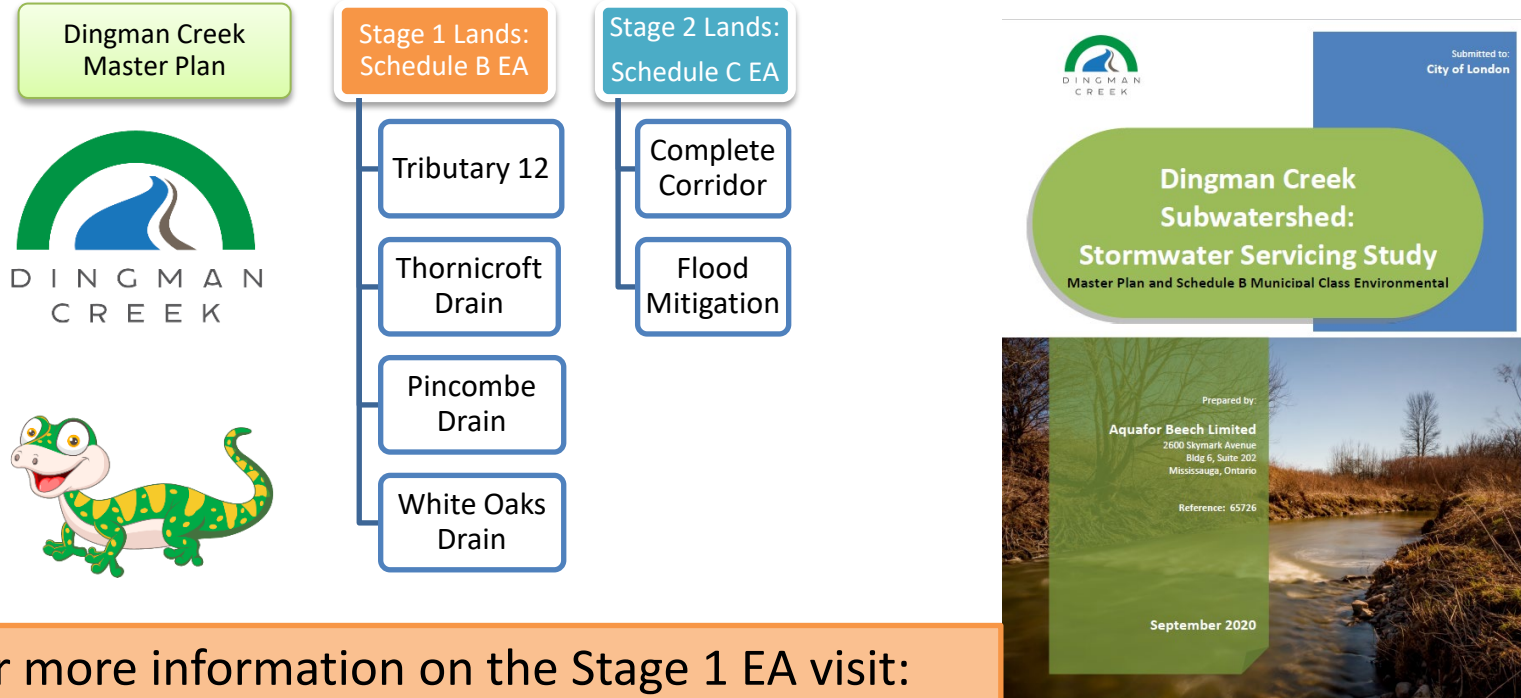


<https://www.123rf.com/>



Prior to 1980 → 1980 → 1990 → 2000 → Current

# Dingman Creek Subwatershed SWM Servicing EA

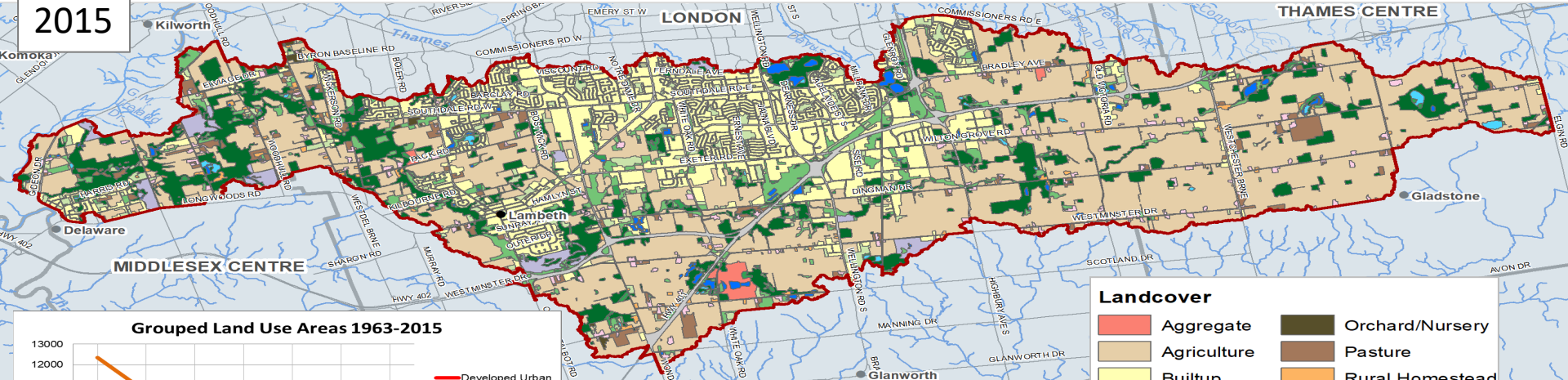


For more information on the Stage 1 EA visit:  
<https://getinvolved.london.ca/DingmanCreek>



# Dingman Creek Subwatershed Land Use

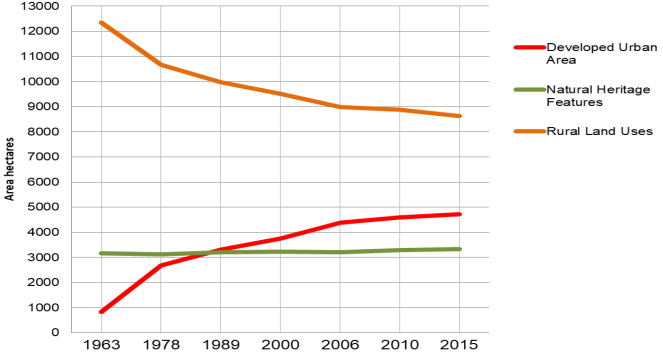
2015



**Landcover**

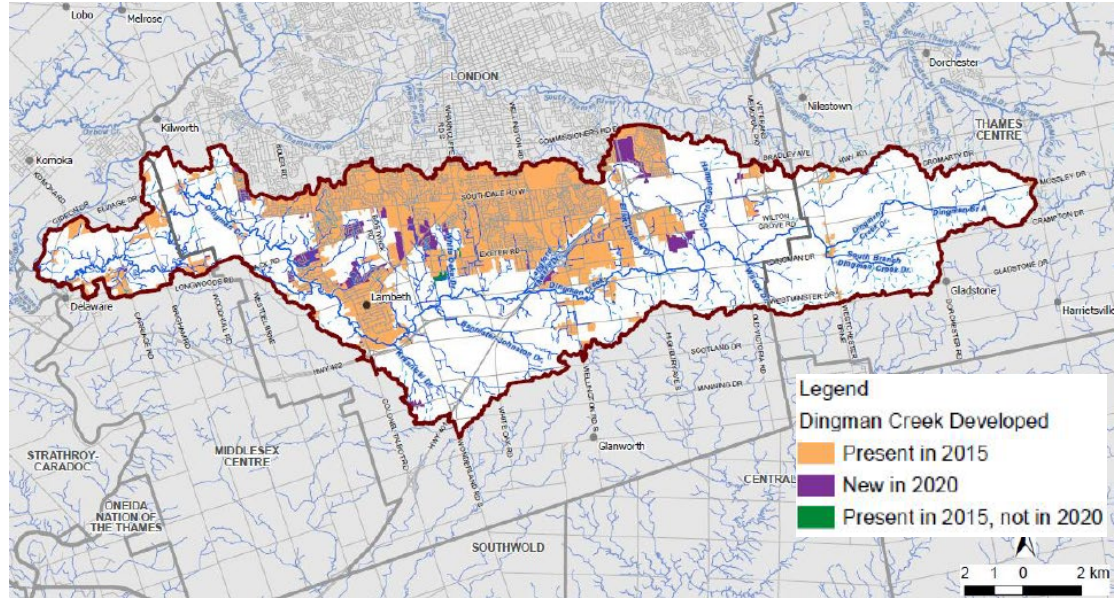
Aggregate	Orchard/Nursery
Agriculture	Pasture
Builtup	Rural Homestead
Farmstead	Thicket
Golf Course	Transportation
Marsh	Water
Meadow	Wooded
Open Space	Woodland

**Grouped Land Use Areas 1963-2015**



- Developed area grew 9.2% between 2015 and 2020 in the Dingman Creek watershed

# Dingman Creek Subwatershed

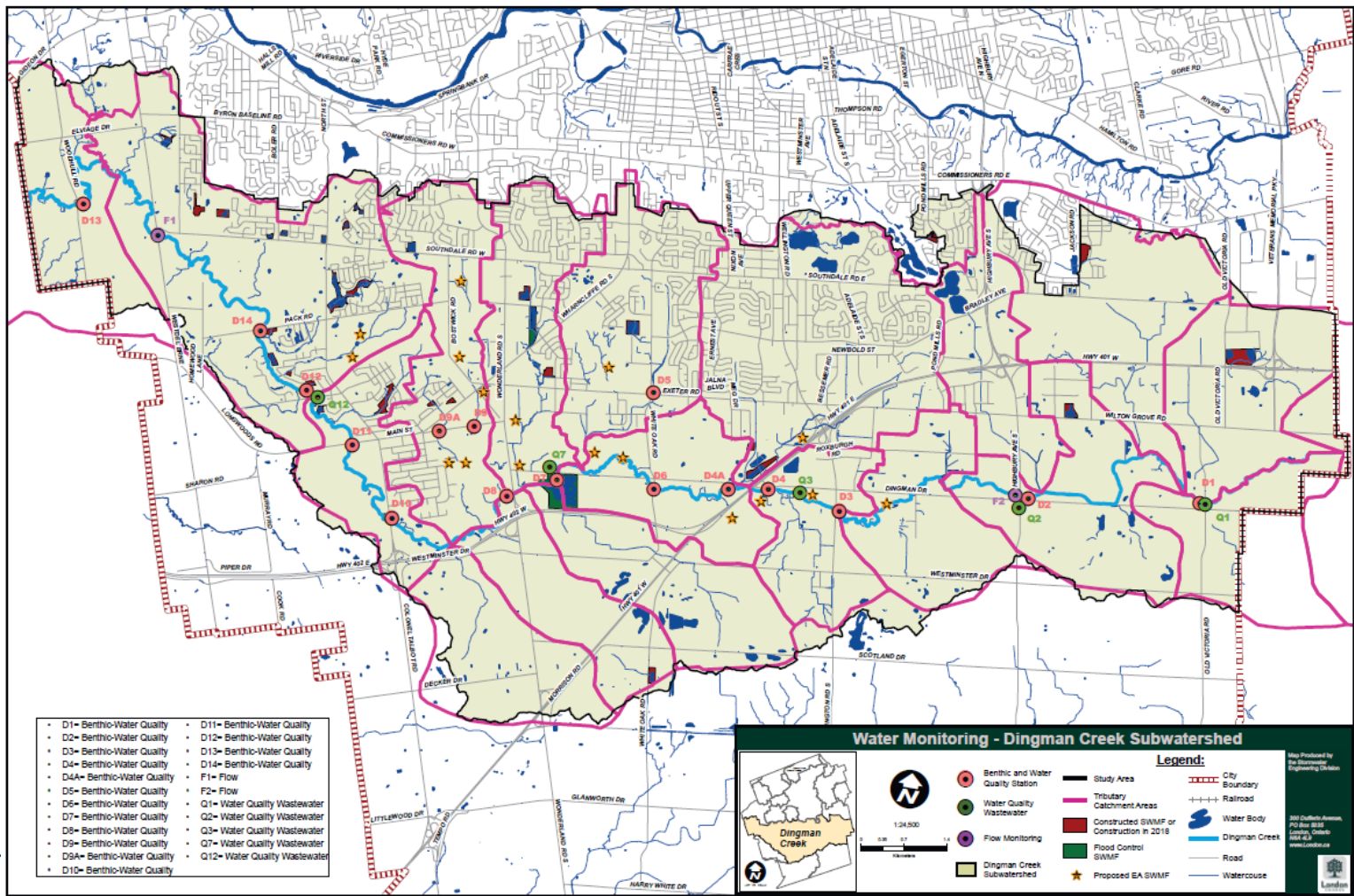


- 75% (126 km<sup>2</sup>) of Dingman Creek watershed is within City of London
- Watercourse Characteristics: 35% natural, 42% channelized, 22% buried/closed
- Eroded channel system, significant floodplain, flat topography

# Historical Dingman Creek Data



- PWQMN
- Water Survey Canada (WSC) and UTRCA surface water stations
- Environment & Climate Change Canada (ECCC) climate station
- City of London
  - Water quality data (Wonderland pumping station, SWM Facilities, MOECC data, benthics)
  - Rain gauges



- D1= Benthic-Water Quality
- D2= Benthic-Water Quality
- D3= Benthic-Water Quality
- D4= Benthic-Water Quality
- D4A= Benthic-Water Quality
- D5= Benthic-Water Quality
- D6= Benthic-Water Quality
- D7= Benthic-Water Quality
- D8= Benthic-Water Quality
- D9= Benthic-Water Quality
- D9A= Benthic-Water Quality
- D10= Benthic-Water Quality
- D11= Benthic-Water Quality
- D12= Benthic-Water Quality
- D13= Benthic-Water Quality
- D14= Benthic-Water Quality
- F1= Flow
- F2= Flow
- Q1= Water Quality Wastewater
- Q2= Water Quality Wastewater
- Q3= Water Quality Wastewater
- Q7= Water Quality Wastewater
- Q12= Water Quality Wastewater

### Water Monitoring - Dingman Creek Subwatershed

Dingman Creek

1:24,000

**Legend:**

- Benthic and Water Quality Station
- Water Quality Wastewater
- Flow Monitoring
- Proposed EA SWMF
- Study Area
- Tributary Catchment Areas
- Constructed SWMF or Construction in 2018
- Flood Control SWMF
- City Boundary
- Railroad
- Water Body
- Dingman Creek
- Road
- Watercourse

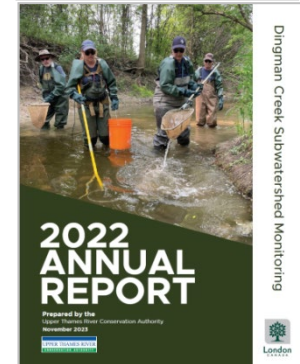
Map Produced by  
The Environment  
Department

2022 Dundas Avenue  
PO Box 938  
Dundas, Ontario  
L9A 4J3  
www.dundas.ca

# Monitoring Program Agreement



- Initial pilot project agreement (2019-2020)
  - Benthic monitoring began in 2018
  - Based on historical monitoring
- Annual agreements in 2021, 2022, 2023
  - Requires approval by City of London Committee Council
- Program costs are ~\$150-\$170k per year
- Waiting for guidance (pending CLI-ECA monitoring guidance)
  - Current timeline would affect 2025 monitoring data



# Monitoring Program Agreement

- Category 2: Municipal programs and services provided at the request of a municipality (*with municipal funding through an MOU/agreement*)
- Other category 2 examples between COL and UTRCA:
  - Beaver management
  - Environmentally Significant Areas (ESA) management of all lands



# Monitoring Program



## Initial project scope (2018-2020):

- Annual Monitoring
  - Monthly water quality grab sampling
  - Fall benthic sampling
  - Fish inventory sampling
  - Establish 3 new surface water stations; operation and maintenance
- Land cover change spatial analysis (2019)
- Compilation of historic data (2006-2016) into WISKI database
  - Established baseline conditions and trends

# Monitoring Program



- **Growing network**
  - Rating curve development
  - New water quality sites (tributaries)
  - New climate station
  - Annual land cover analysis added back in 2022
- **Adapting**
  - Additional reporting parameters
  - Benthic sampling protocols
  - Flow and climate reporting metrics
  - Extended reporting (5 year intervals)
    - Trend analysis
    - Rural vs urban impacts

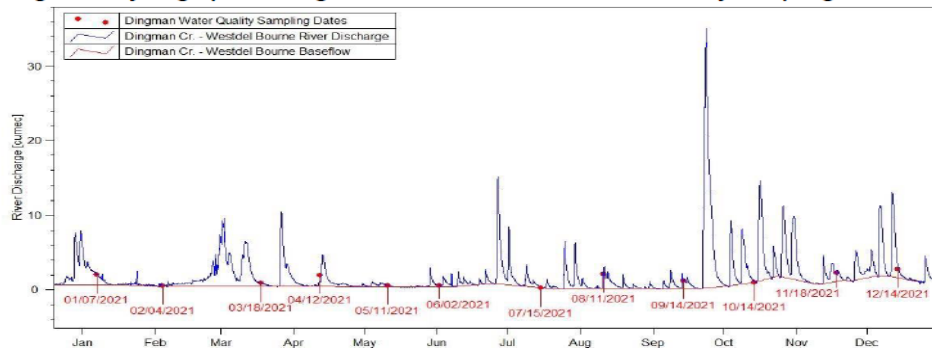


# Data Management

- All monitoring data stored in WISKI database
- Membership in Western Ontario WISKI Data Hub
- Integrated data storage & analysis
- Easy access to other program data (e.g. WSC, PWQMN)
- Data connection to other software programs (e.g. R, Excel)



Figure 1: Hydrograph for Dingman Creek for 2021 with Water Quality Sampling Dates



# Data Management

- Accessible data
  - Membership in Western Ontario WISKI Data Hub (remote network access)
  - Web-based queries/reports (KiWIS API tool)

OCWDV Public | Collaborative Water Data Viewer

Station Overview Water Quantity About Us

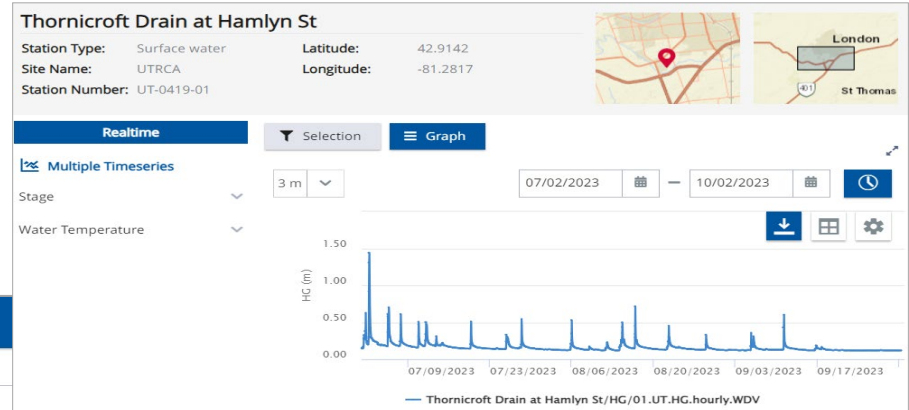
Station Overview Filter 52 / 125 Stations Clear filter

Station Type All

Site Name All

Parameter Type

Thorncroft Drain at Hamlyn St (UT-0419-01)  
Station Type: Surface water  
Site Name: UTRCA  
Station Parameter: TW:HG

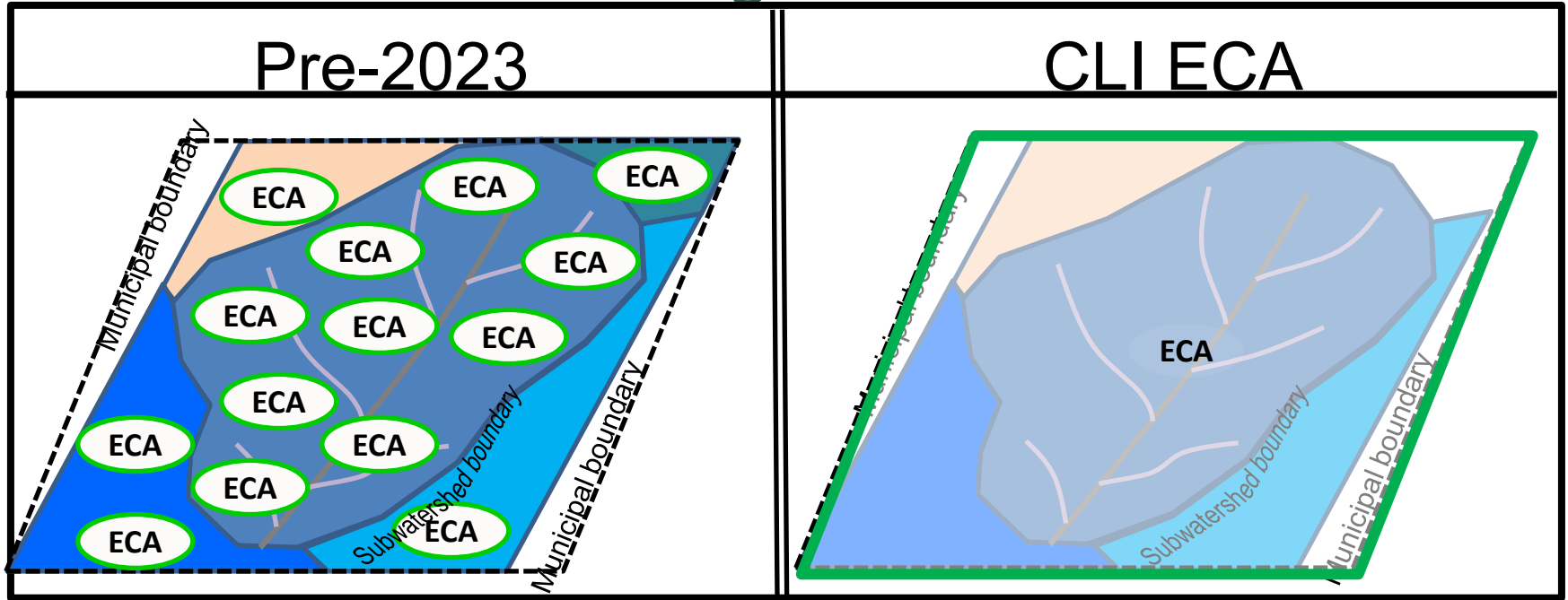


# Monitoring Program Challenges

- Historical data compilation
  - Multiple consultants
  - Variable reporting and data standards
  - Analysis involved assumptions and filling data gaps
- Rating curve development takes time
  - Capturing peak water levels during events
  - Gauge readings reflect variable conditions
- Program agreements require approval by Committee Council
  - UTRCA continues monitoring prior to approval
- Annual agreements
  - MECP's CLI-ECA monitoring guidelines are pending



# Receiver Based Monitoring Data and O&M Inspection Program



Subwatershed Based Environmental Compliance Approval



# ECA Monitoring Plan

- The Ministry's monitoring guidance has not yet been published
- They are working with key stakeholders to finalize the guidance, ensuring that it is scalable, practical and recognizes monitoring activities already taking place
- Anticipate that a draft of the guidance will be posted on the Environmental Registry for broader comments and feedback (2024)
- Estimate that the final guidance document will be available in 2024.



# ECA Monitoring Plan

- Municipalities are anticipated to be required to complete receiver-based monitoring as part of CLI-ECA
- Benefit to collaborate with Conservation Authorities to leverage monitoring expertise, staff knowledge, standard protocols, efficiencies
- Consistent results
- Municipality to focus on SWM O&M Programs



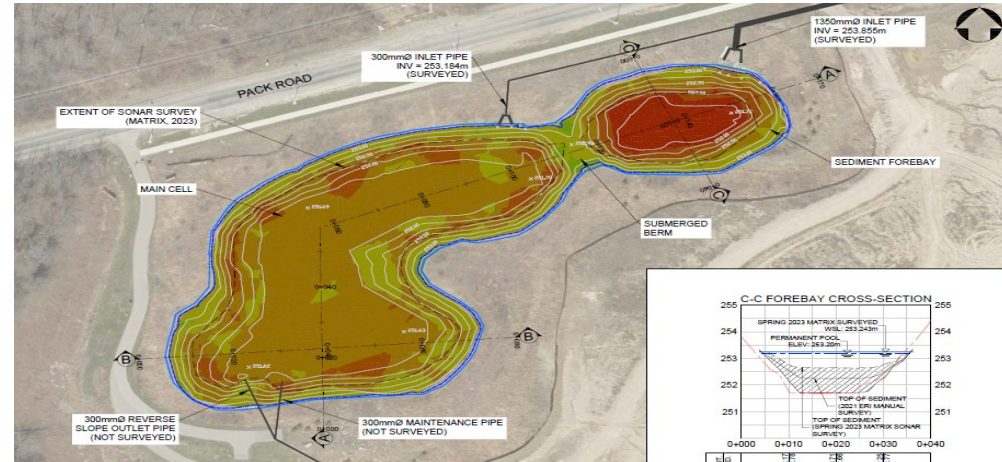
# Operation and Maintenance of SWM Infrastructure

- As per ECA and City O&M program
- City O&M program initiated in 2010 and based on proactive inspection and asset management requirements
- Sewer Operations has 4 dedicated staff for SWM O&M
- Right tool for the job (Vacall vs Combo vs pickup truck with shovel)



# Operation and Maintenance of SWM Infrastructure

- City Works for maintenance planning and tracking
- Infrastructure is mapped (e.g. inlets, outlet, weir, etc.)
- ~3 pond cleanouts per year, SWM Ponds are surveyed for sediment accumulation approx. every 5 years
- Implement inspection programs to inform effective cleaning cycles





# Benefits

## City of London

- Fulfill monitoring initiatives with reliable, archived data
- Baselines to better establish future monitoring programs based on CLI-ECA monitoring requirements
- Adaptable and evolving (per ECA requirements)

## Other/Public

- Datasets available for external purposes e.g. UWO's Thornicroft Drain Study

- Accessible long-term data

- CAs have regional expertise and existing resources
- Relationship building
- Future project potential

## UTRCA

- Reoccurring funding opportunity
- Useful integrated datasets
- Localized data to support knowledge-based work

# Growing Partnerships

- Additional phosphorus sampling at a SWM pond to understand algae growth
- Review of benthic data and comparison of methodology to support a single protocol with the City of London (BioMAP vs. CABIN)
- Coordination of fish sampling to support City capital projects



# In Summary, this partnership:

- Ensures greater baseline data confidence
- Provides accessible long-term data for both organizations and the public
- Initiated opportunities for additional monitoring collaboration
- Consolidated, digitized, and archived existing data
- Developed potential for new collaborations between Municipalities and Conservation Authorities



# Thank you!



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