TRIECA CONFERENCE

LECA Great Lakes Chapter

Toronto and Region Conservation for The Living City

Thank you to all of our 2015 sponsors:

AQUATECH DEWATERING COMPANY

Lake Simcoe Region Conservation Authority

CVC Credit Valley Conservation

GEMS

RM CONSTRUCTION

DYNEX CONSTRUCTION INC Since 1989

filtrexx CANADA SUSTAINABLE TECHNOLOGIES let nature do it.

GEOSTORM

Holland Pioneers in international business

Geosyntec consultants

NILEX CIVIL ENVIRONMENTAL GROUP Unearthing better results.

terrafix geosynthetics inc.

UNILOCK

VERDYOL Biotic Earth AN ORGANIC APPROACH TO SOIL BUILDING

York Region

Canada Green Building Council – Conseil du bâtiment durable du Canada – Chapter – Greater Toronto

Media Partner

WATER CANADA THE COMPLETE WATER MAGAZINE

Channel Naturalization: Planning and Implementation in Peel Region

TRIECA March 25 & 26, 2015

The Living City Foundation

Toronto and Region Conservation for The Living City

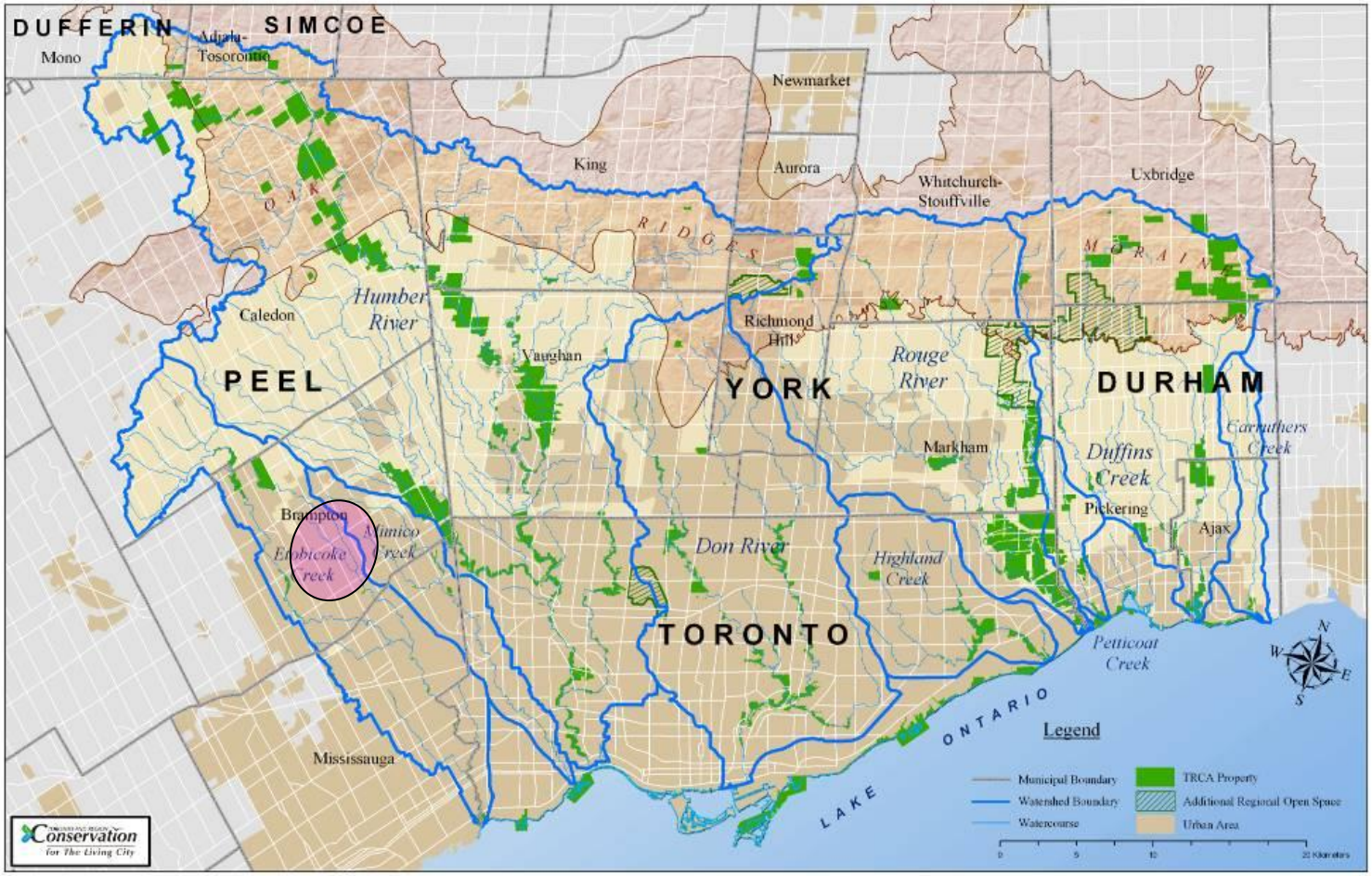
Peel Region Channel Remediation Strategy – An Urban Context

- Climate Change
- Aging Infrastructure
- Natural Channel Design Principles
- Adaptive Management
- Collaboration
- Natural Heritage System Resilience
- Ecosystem Services
- Co-Benefits for SWM

Spring Creek Subwatershed Pilot Project

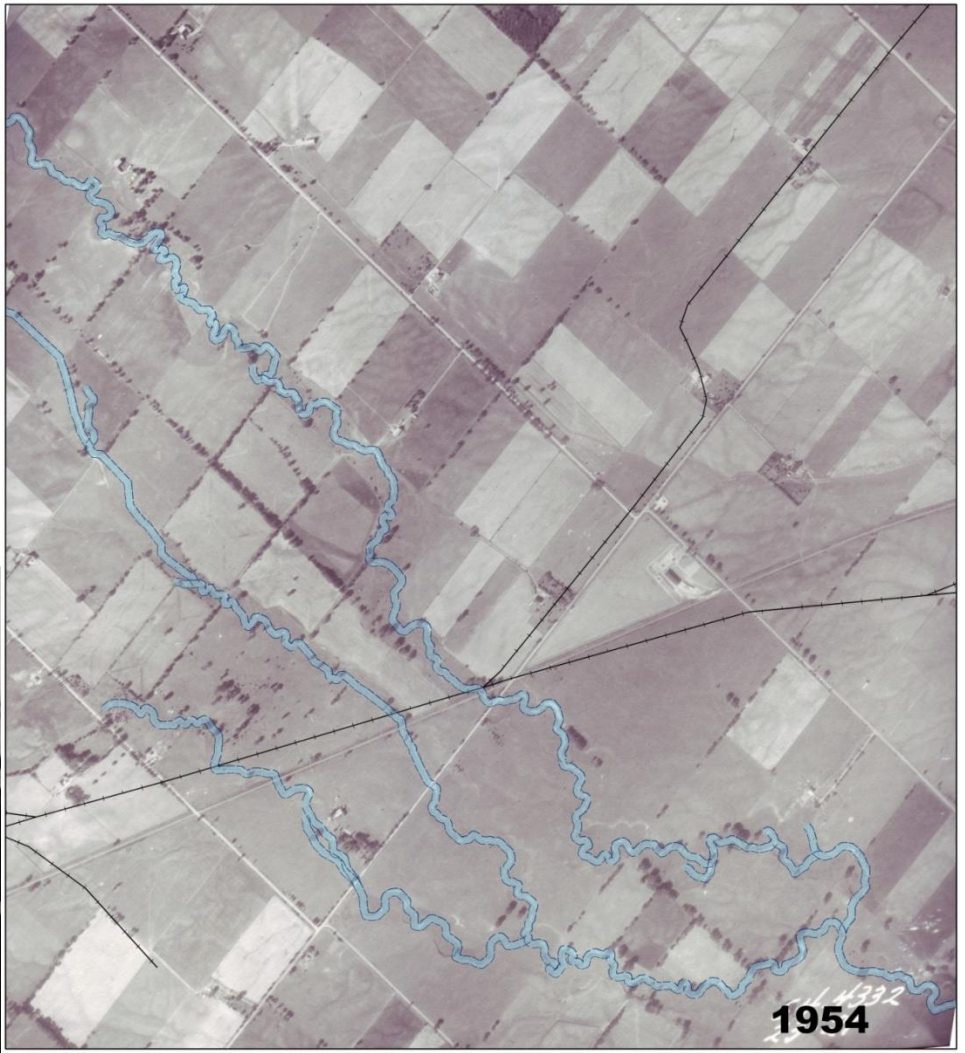
2012 - 2013

Spring Creek, City of Brampton



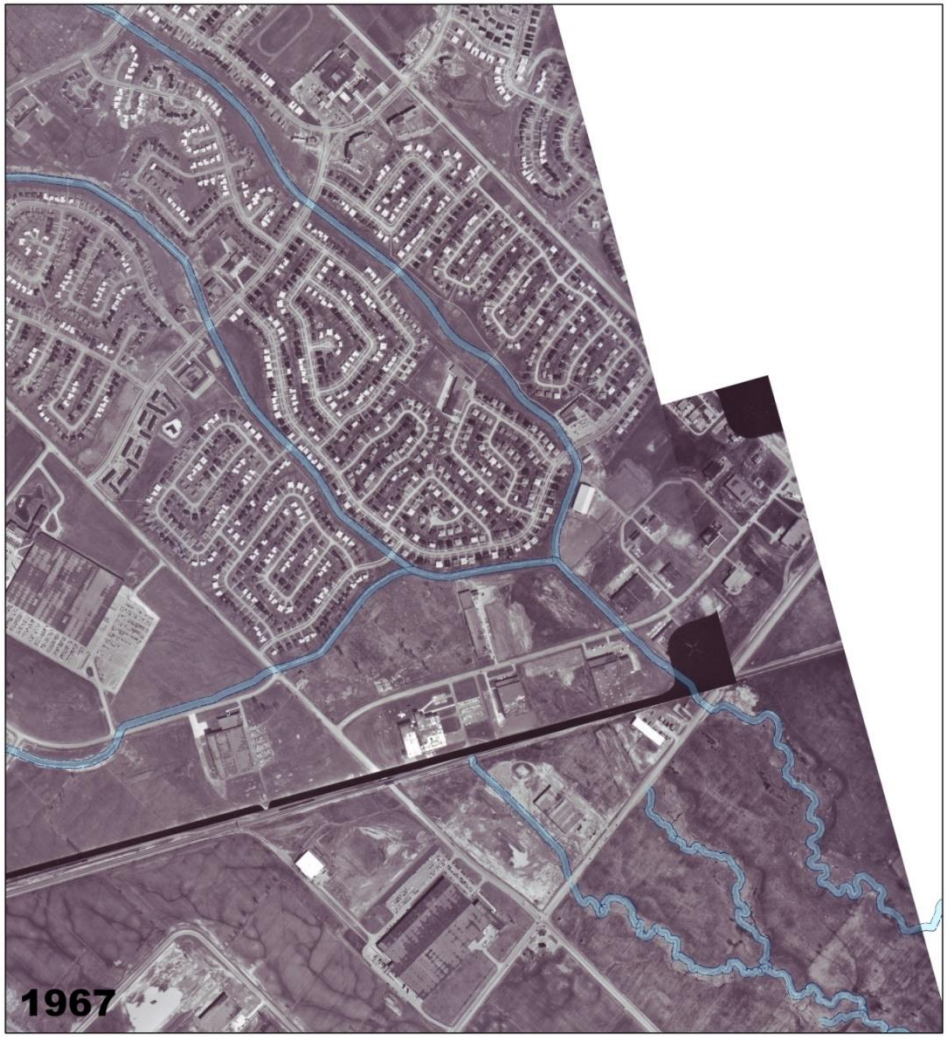
Spring Creek - 1954

- Rural landscape
- Natural watercourse
- Pre- Brampton Flood

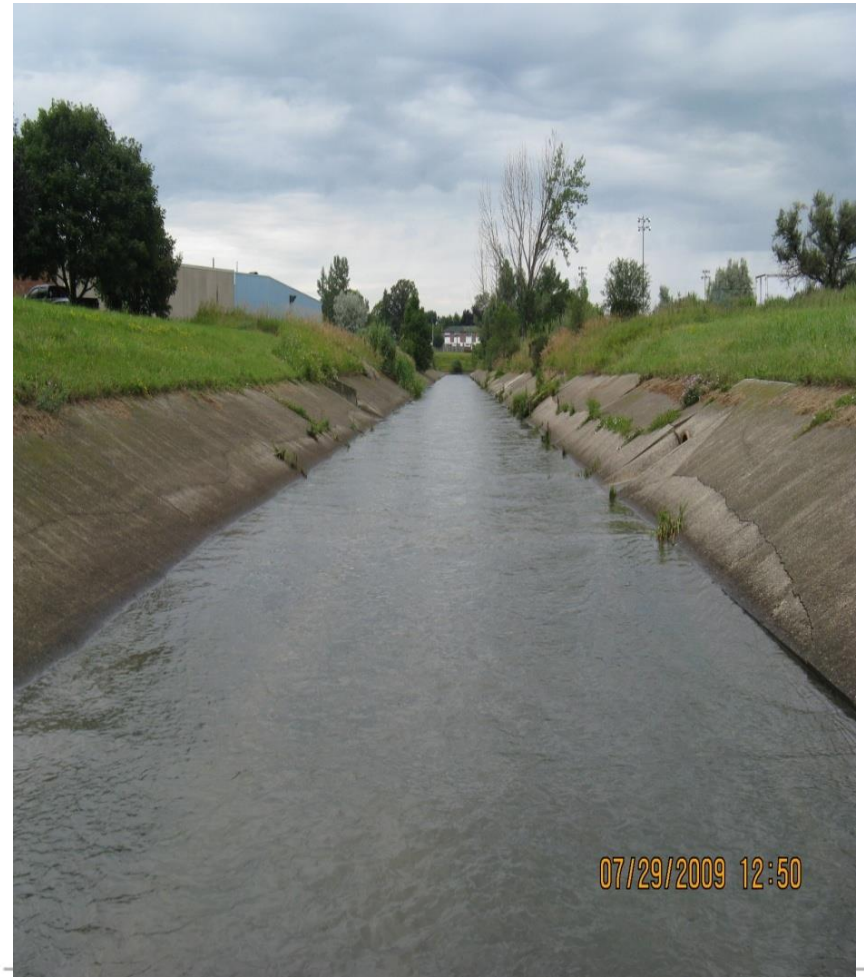


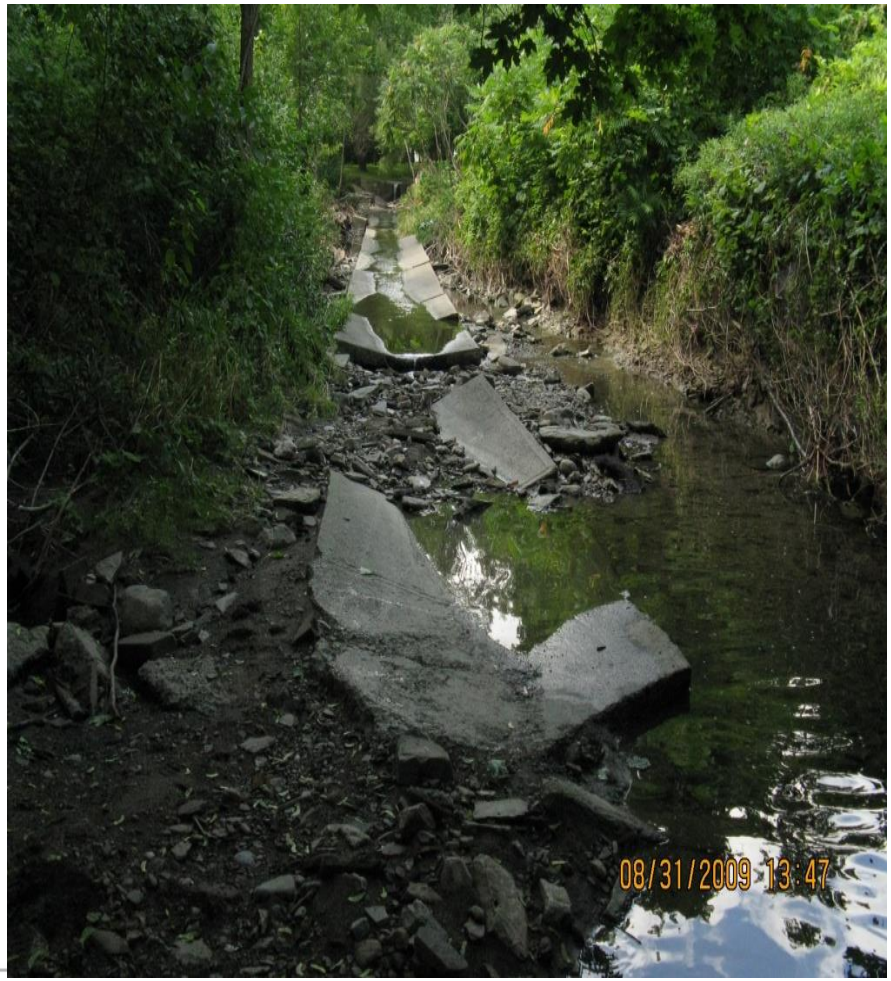
Spring Creek - 1967

- Rapid Urbanization
- Stream channel realignment
- Straightened for conveyance
- Hardened
  - Concrete lined
  - Gabion bed and bank



Condition of Channels Today





Who was Involved?

- **Project Team:**
  - TRCA and City of Brampton Technical Staff
- **Steering Committee:**
  - Region of Peel
  - City of Brampton
  - City of Mississauga
  - TRCA
  - CVC
  - Town of Caledon (expressed interest)
  - Etobicoke-Mimico Coalition
- **Stakeholders:**
  - GTAA, PPG, Public Utilities, MNR, DFO (not all engaged)

Project Activities

- Flood Risk Modelling

- Categories of Interest
  - *Stakeholder Input*
- Metrics, Analysis, Ranking
  - *Stakeholder Input*
- Scenarios & Weighted Sum Matrix
  - *Stakeholder Input*

Flood Risk Assessment

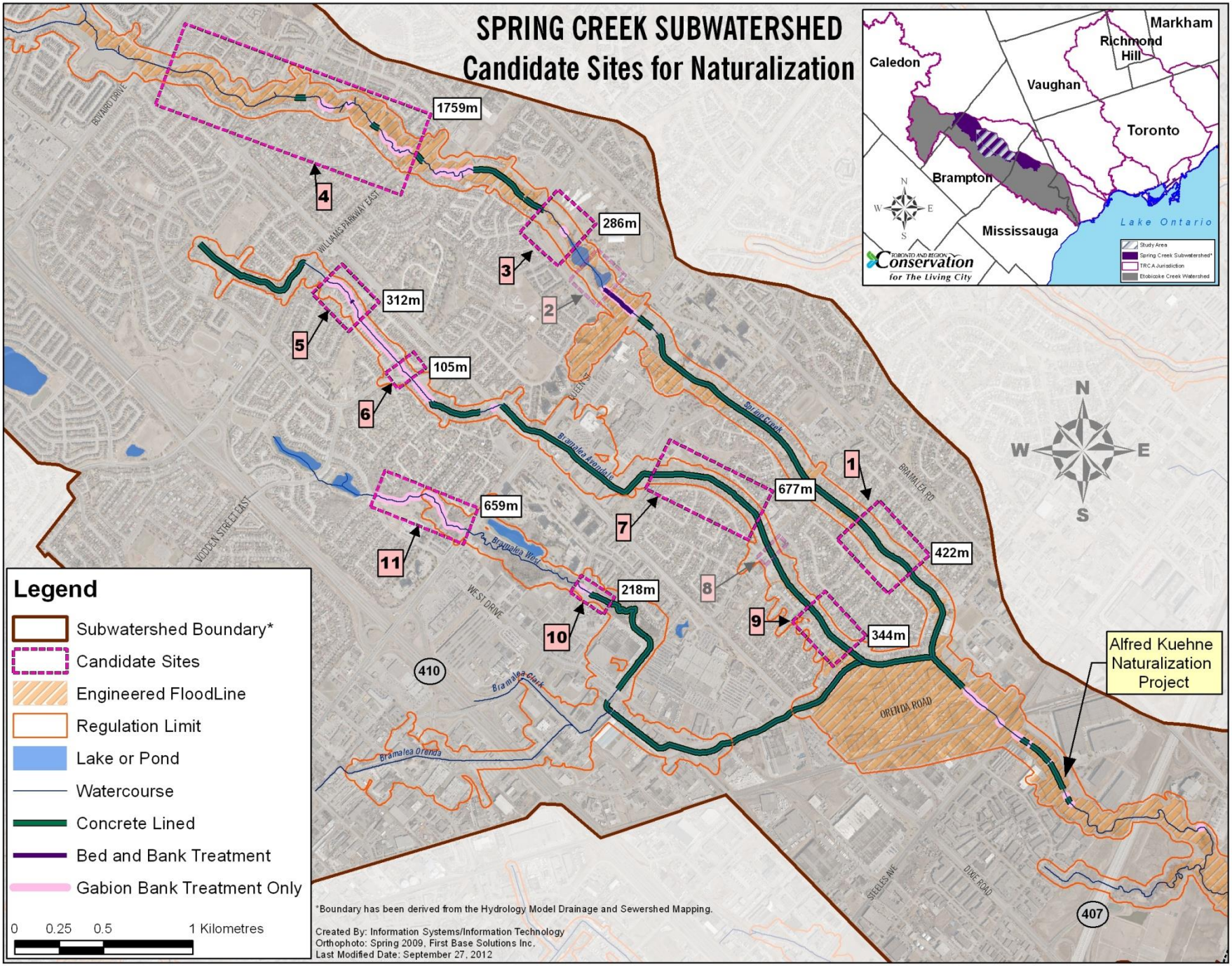
Naturalizing the concrete channels will:

Create deeper, longer stream reaches and this slows the velocity of water within the channel.

Δ Local water level

Δ Peak flow
timing downstream

Identify Constraints

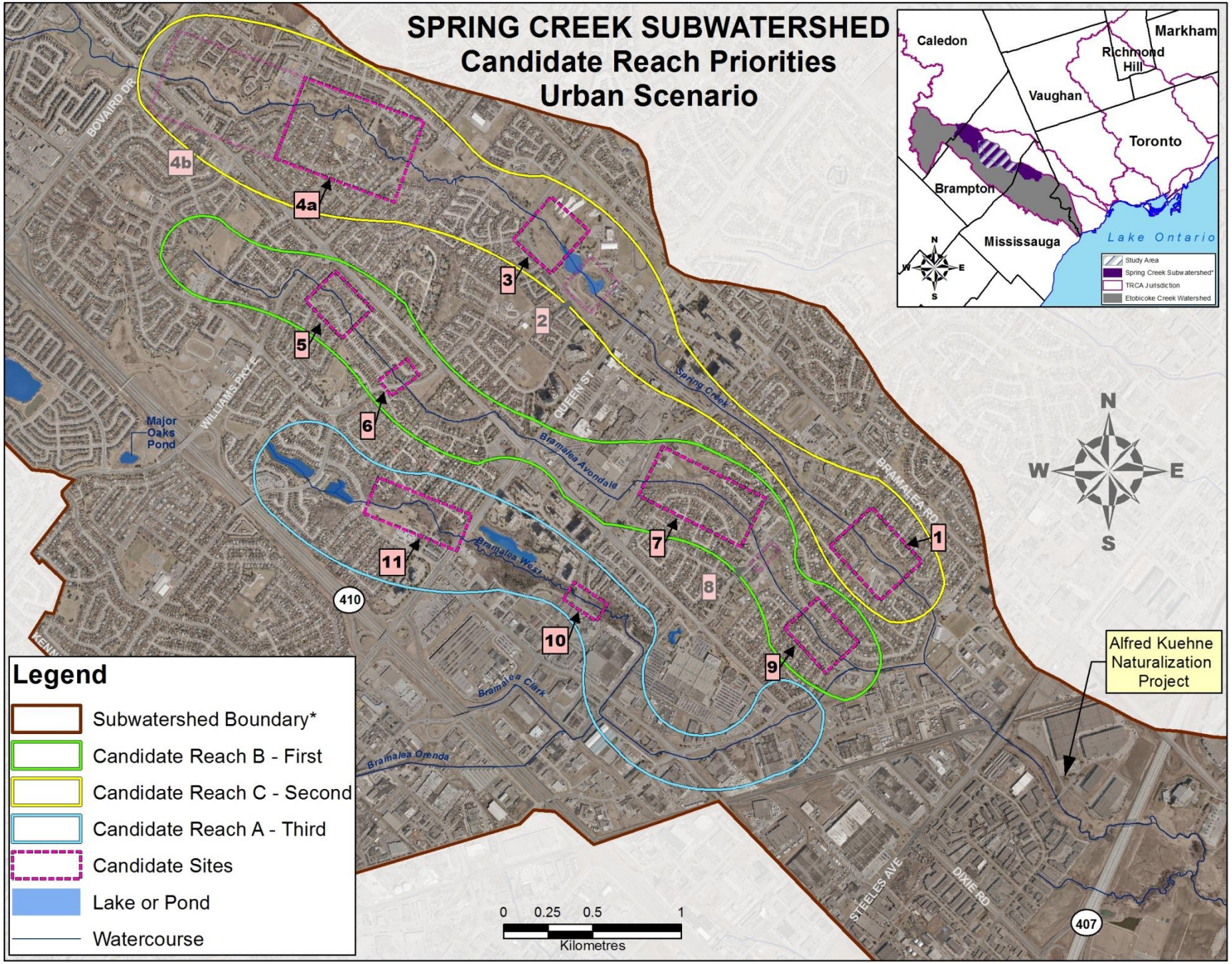

SPRING CREEK SUBWATERSHED
Candidate Sites for Naturalization
Markham
Richmond Hill
Caledon
Vaughan
Toronto
Brampton
Mississauga
Lake Ontario
Study Area
Spring Creek Subwatershed*
TRCA Jurisdiction
Etobicoke Creek Watershed
TORONTO AND REGION Conservation for The Living City
1759m
286m
312m
105m
659m
677m
422m
218m
344m
4
3
2
5
6
11
7
1
8
9
10
Legend
Subwatershed Boundary*
Candidate Sites
Engineered FloodLine
Regulation Limit
Lake or Pond
Watercourse
Concrete Lined
Bed and Bank Treatment
Gabion Bank Treatment Only
0 0.25 0.5 1 Kilometres
*Boundary has been derived from the Hydrology Model Drainage and Sewershed Mapping.
Created By: Information Systems/Information Technology
Orthophoto: Spring 2009, First Base Solutions Inc.
Last Modified Date: September 27, 2012
Alfred Kuehne Naturalization Project
BOVAIRD DRIVE
WILLIAMS PARKWAY EAST
VODDEN STREET EAST
QUEEN ST
BRAMALEA RD
WEST DRIVE
ORENDA ROAD
STEELES AVE
DIXIE ROAD
Spring Creek
Bramalea Avondale
Bramalea West
Bramalea Creek
Bramalea Orenda
410
407

Category of Interest	Metric (Ranked)
1. In-stream Ecology	• Fish Passage • Natural Substrate • ESA species
2. Habitat Connectivity	• Subwatershed Scale • Regional Scale
3. Forest Health	• Plantable Space • Coverage of Ash and Invasive Trees • Level of Natural Regeneration • ESA species
4. Restoration Opportunity Planning	• TRCA program priorities
5. Infrastructure at Risk	• Channel Condition • Type of Infrastructure • Location
6. Flexibility of Design	• Water Level Increase • Impact on Adjacent Lands
7. Public Use	• Safety • Park Experience • Education & Outreach Potential
8. Project Coordination with Municipalities	• Water/Wastewater • Transportation

URBAN SCENARIO

Project Outputs

- 9 Candidate Sites
- 3 Prioritized Reaches for Spring Creek
- 1 Stakeholder Engagement Video
- Interim Report for Spring Creek


SPRING CREEK SUBWATERSHED
Candidate Reach Priorities
Urban Scenario
Caledon
Markham
Richmond Hill
Vaughan
Toronto
Brampton
Mississauga
Lake Ontario
Study Area
Spring Creek Subwatershed*
TRCA Jurisdiction
Etobicoke Creek Watershed
N
W
E
S
4b
4a
3
2
5
6
7
8
9
10
11
1
Major Oaks Pond
BOVAIRD DR
WILLIAMS PKWY E
QUEEN ST
Spring Creek
Bramalea Avondale
BRAMALEA RD
Bramalea West
Bramalea Clark
Bramalea Orenda
410
407
STEELES AVE
DIXIE RD
Alfred Kuehne Naturalization Project
Legend
Subwatershed Boundary*
Candidate Reach B - First
Candidate Reach C - Second
Candidate Reach A - Third
Candidate Sites
Lake or Pond
Watercourse
0 0.25 0.5 1
Kilometres

Implementation Steps

- **Cost-Benefit Study –** 2014 – Winter 2015
- **New 2D Modelling -** 2014 - Spring 2015
- **Fluvial Geomorphic Assessment** – Complete Spring 2014
  - All of Spring Creek
  - Informing opportunities between sites
  - Site expansion?

- **Master Plan Environmental Assessment** – 2014 - 2015
  - Municipal EA Process
  - Preferred Alternative (includes “Do Nothing”)
  - Design concepts for narrow, urban stream corridors
  - Public Consultation (Maybe quite extensive)

- **Naturalization Planning for the rest of Peel Region** – 2015 - 2016

Channel Remediation Implementation

From THIS …..

Channel Remediation Implementation

To THIS …..

Channel Remediation Implementation

ALFRED KUEHNE STREAM RESTORATION PROJECT

Channel Remediation Implementation

ALFRED KUEHNE STREAM RESTORATION PROJECT

PRE EXSITING CONDITIONS

Within the restoration area natural channel processes were heavily impacted

The entire channel was lined with 500m of concrete

No low flow or velocity refugia

Channel Remediation Implementation

ALFRED KUEHNE STREAM RESTORATION PROJECT

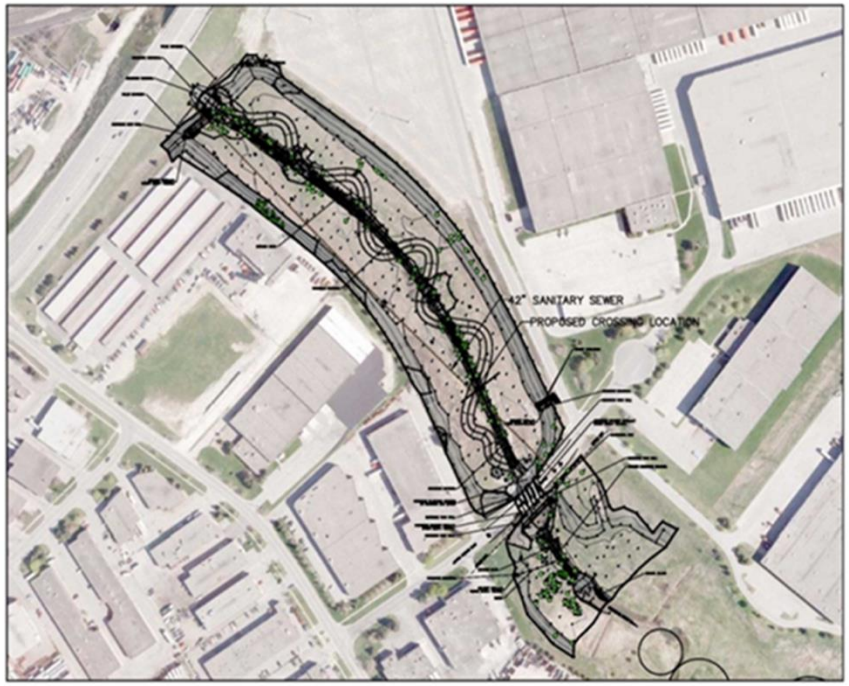
1967

PRE EXSITING CONDITIONS

2012

Channel Remediation Implementation

ALFRED KUEHNE STREAM RESTORATION PROJECT



PLANNING

A natural corridor design to restore natural channel form and function.

Must address potential flooding and erosion objectives within exciting floodplain footprint while improving habitat for fish and wildlife

Holistic approach – considered geomorphology, hydrology and biology

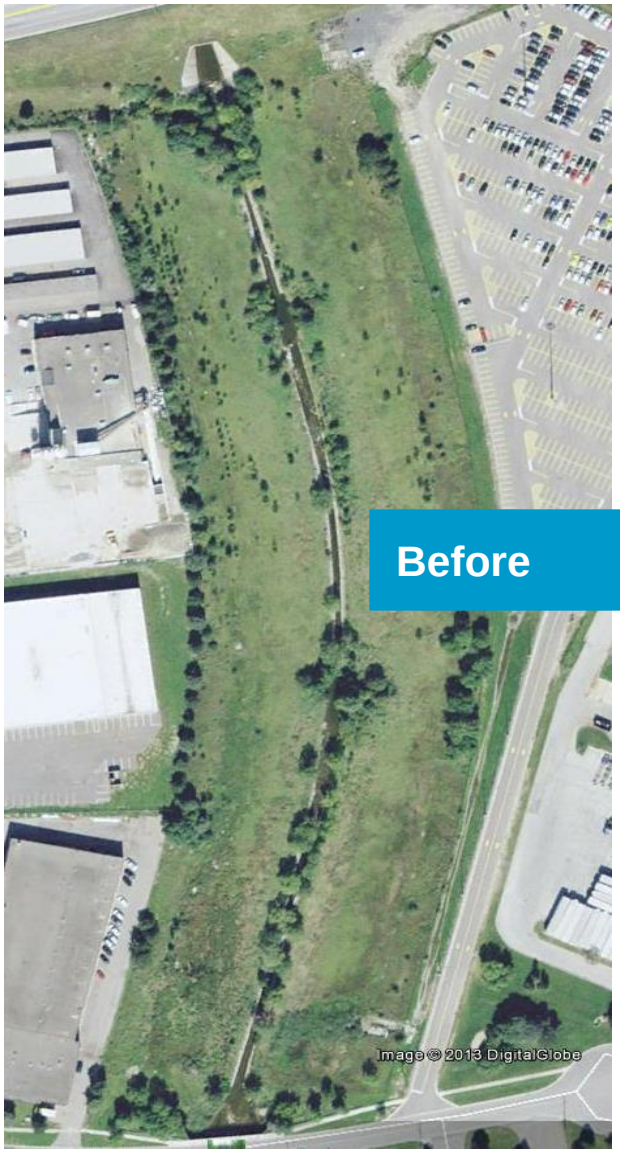
Final design to provide the same level of flood and erosion control through geomorphic principles and bio-engineering

Provide variability to topography and vegetation on the floodplain to improve terrestrial and aquatic habitat

Enhance water and sediment retention through the use of wetlands

Channel Remediation Implementation

ALFRED KUEHNE STREAM RESTORATION PROJECT



Before

After

Channel Remediation Implementation

ALFRED KUEHNE STREAM RESTORATION PROJECT

LESSIONS LEARNED – Modular Construction

- Allows localized repair work if required
- Appropriate to localized stream conditions
- Hard treatment, natural substrate
- Field fit components

Channel Remediation Implementation

ALFRED KUEHNE STREAM RESTORATION PROJECT

- Softer Treatment
- Natural Substrate
- Habitat Structures
- Needed to Maintain Stability

Channel Remediation Implementation

ALFRED KUEHNE STREAM RESTORATION PROJECT

LESSIONS LEARNED – Constructing on Shale

- **Challenging construction on shale**
- **Must be properly keyed in**
- **Angular stone used** for securement

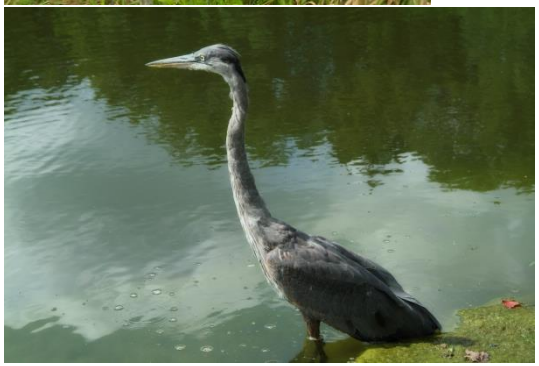
Channel Remediation Implementation

ALFRED KUEHNE STREAM RESTORATION PROJECT

LESSIONS LEARNED – Bypass Channels

Science Based Monitoring Program

ALFRED KUEHNE STREAM RESTORATION PROJECT



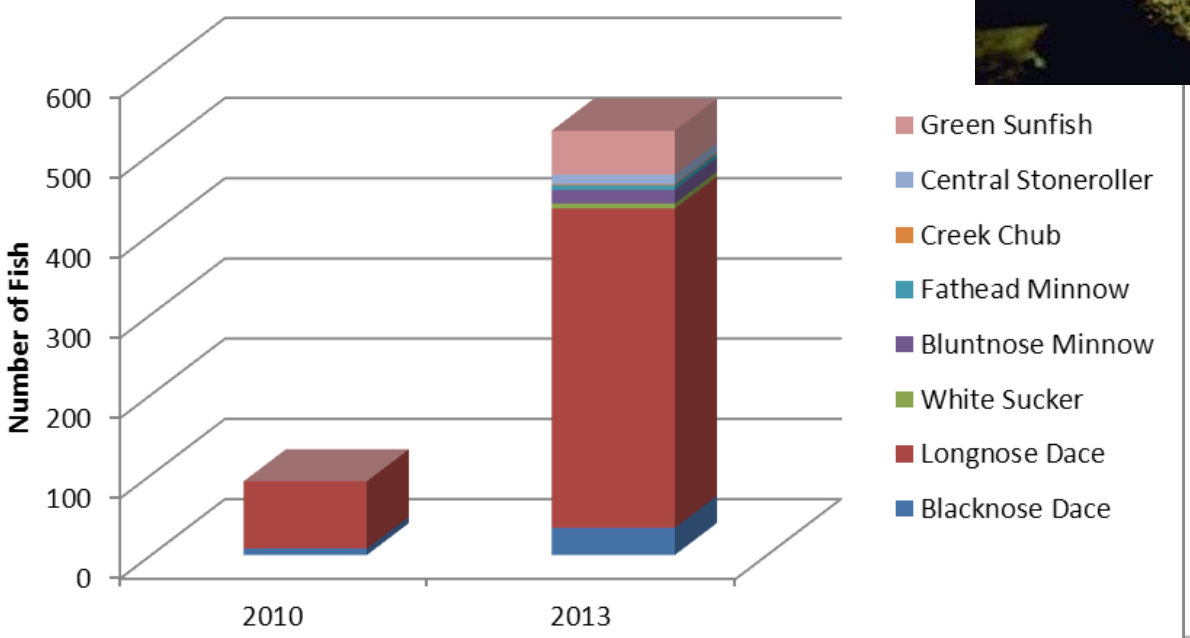
Following TRCA Procedures For Evaluating the Effectiveness of Natural Channel Design Projects

Using A Science Based Monitoring and Reporting Program

- Ontario Stream Assessment Protocol (OSAP)
  - standardized methodologies for identifying sites, evaluating benthic macro-invertebrates, fish communities, water quality and physical habitats
- Long profile and substrate characterizations at cross-section locations
- Terrestrial Natural Heritage Inventory
  - Vegetation communities
  - Wildlife

ALFRED KUEHNE STREAM RESTORATION PROJECT

FISHERIES RESULTS



	2010	2013
Blacknose Dace	8	34
Longnose Dace	84	398
White Sucker	0	6
Bluntnose Minnow	0	17
Fathead Minnow	0	6
Creek Chub	0	1
Central Stoneroller	0	12
Green Sunfish	0	55
TOTAL	92	529

Channel Remediation Implementation

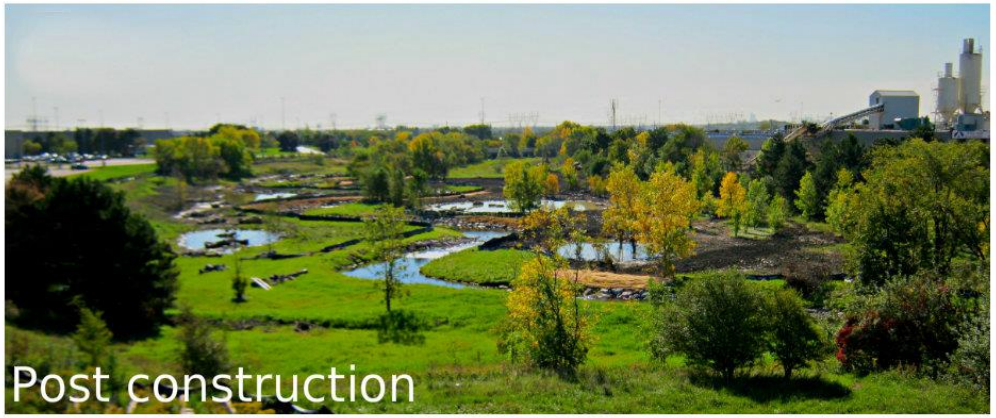
Now have a proof of concept

Provides an alternative maintenance treatment to address the issue of failing concrete channels

~500 m concrete channel decommissioned

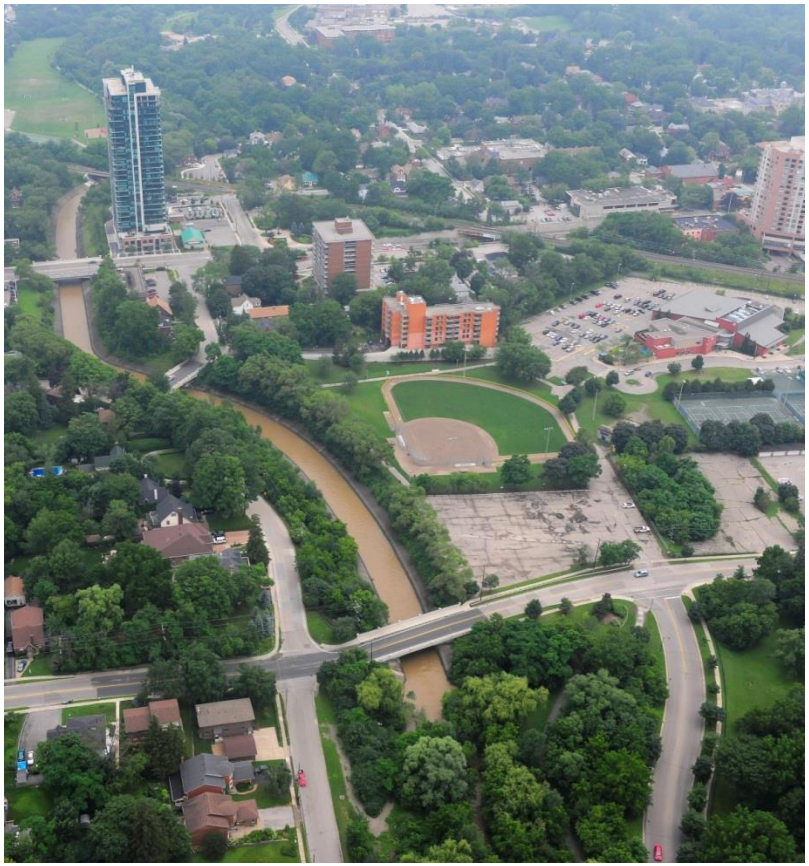
9 floodplain wetlands

Native Tree and Shrub Plantings



Channel Remediation Implementation

FUTURE CHALLENGES



Thank You

Rick Portiss, rportiss@trca.on.ca

Christine Tu, ctu@trca.on.ca

ctu@trca.on.ca

Photo Credit: PAMA
Spring Creek pre-1930

Region of Peel
Working for you

MISSISSAUGA
Leading today for tomorrow

CVC Credit Valley Conservation

BRAMPTON
Flower City
brampton.ca

GEOMORPHIC SOLUTIONS

GEO MORPHIX