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Communication
PKI : June 18/14
Item: 4

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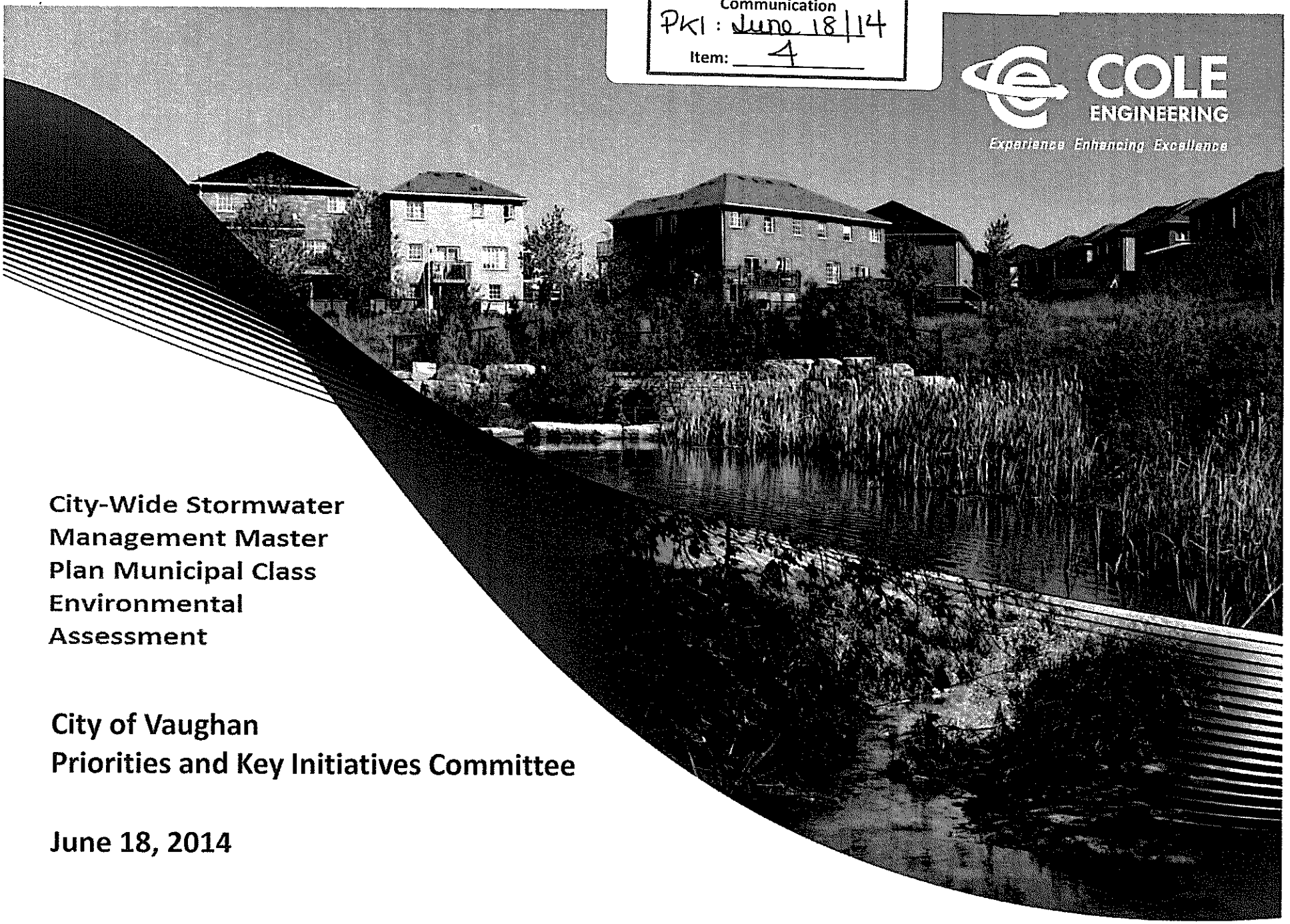


City-Wide Stormwater Management Master Plan Municipal Class Environmental Assessment

City of Vaughan
Priorities and Key Initiatives Committee

June 18, 2014

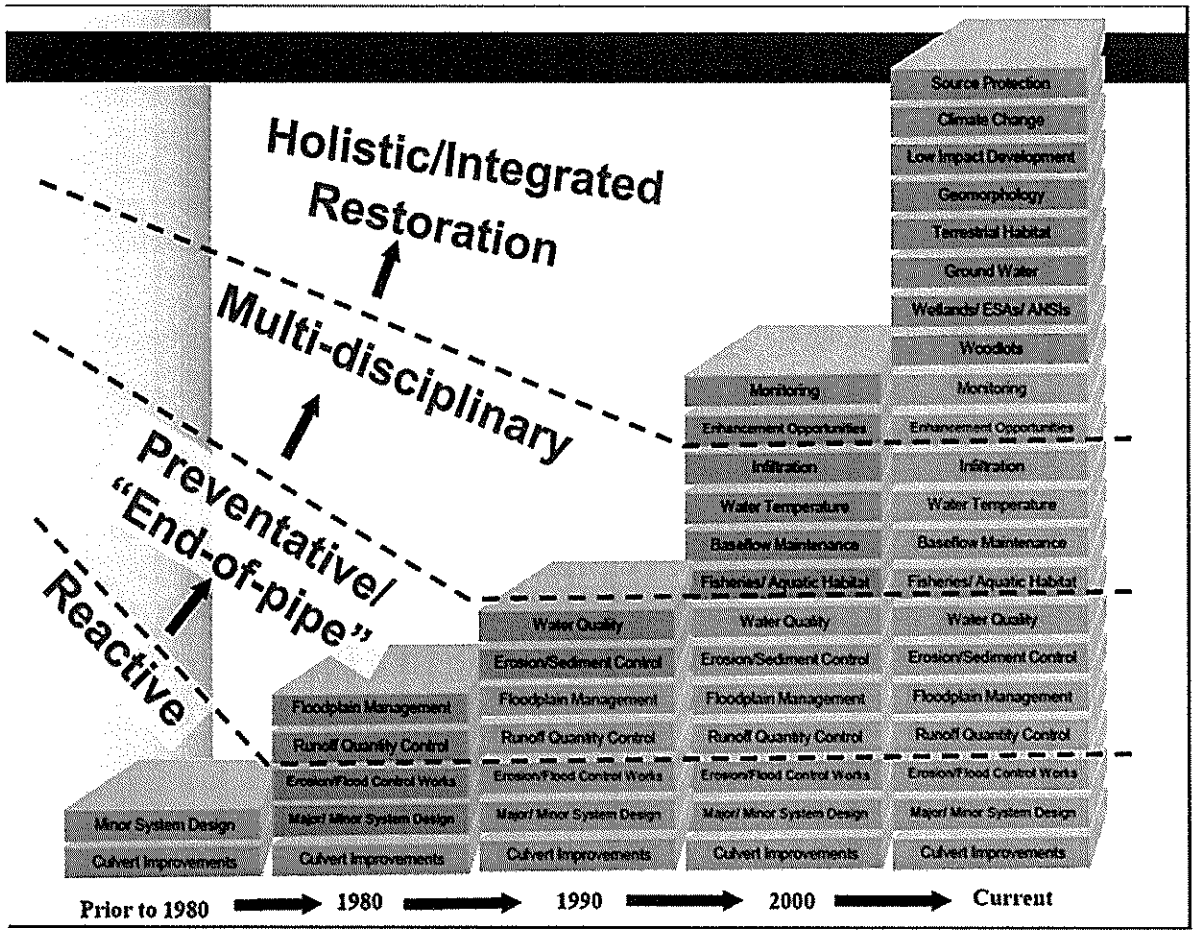
Outline...

- Key Messages
- Evolution of Stormwater Management
- Existing Stormwater Management Infrastructure
- Purpose of the Master Plan Study
- SWM Master Plan Components
- Vaughan's SWM Program
- Overall Master Plan Recommendations
- Resulting O & M Costs
- Next Steps

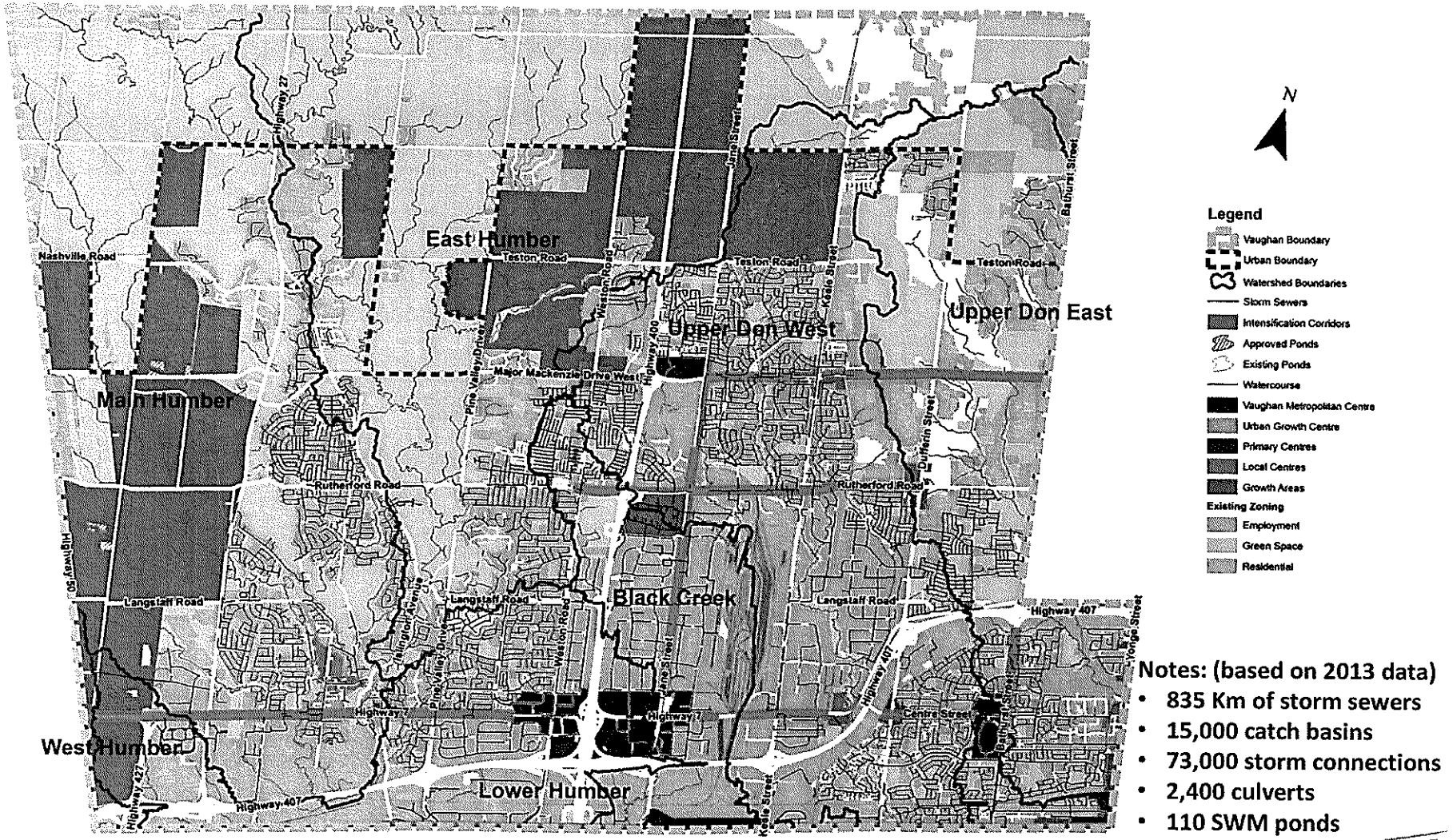
Key Messages...

- City-Wide Stormwater Management Master Plan is complete in support of Official Plan; a Notice of Study Completion can now be issued
- The Master Plan provides guidance on controlling the effects of urban run-off and will ensure an appropriate level of service is provided to citizens and businesses
- The Study has allowed the City to proactively plan for sustainable stormwater management related infrastructure needs to a planning horizon of 2031
- It is estimated the implementation of the Master Plan will require the construction of an additional 85 stormwater management ponds and 272 kilometers of storm sewers at full build out by 2031
- Rainbow Creek Sub-Watershed Study has been updated confirming necessary flood and erosion improvement works
- A dedicated and sustainable long term funding source for annual operating and maintenance costs associated with SWM infrastructure is needed
- A "Stormwater Infrastructure Funding Study" is currently underway

Evolution of Stormwater Management



Existing Stormwater Management Infrastructure

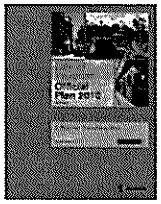


Notes: (based on 2013 data)

- **835 Km of storm sewers**
- **15,000 catch basins**
- **73,000 storm connections**
- **2,400 culverts**
- **110 SWM ponds**

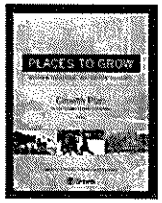
Related Studies

Within the City of Vaughan, there are a number of completed and ongoing studies that were reviewed and referenced as part of this Master Plan. A summary of those studies is provided below.



Vaughan Official Plan

The New Official Plan was completed and adopted by City Council in September 2010, a component of the City's Consolidated Growth Management Strategy to a planning horizon of 2031. The new Official Plan updates the City's community planning policies in a manner consistent with the principles of sustainability.



Places to Grow

The Provincial 2006 Growth Plan for the Greater Golden Horseshoe forecasts 416,600 people, and 266,100 jobs within the City of Vaughan by 2031. This will be achieved through a combination of expansion to the existing urban boundary and also through intensification within existing built-up areas.

The Places to Grow Act and the Growth Plan provided the basis for the updates to the Official Plan.

Greenbelt Plan

The Greenbelt Plan was established in 2005 under the Greenbelt Act.
The City of Vaughan includes lands that are part of the Greenbelt. The Greenbelt Plan acknowledges the need to maintain existing infrastructure to serve existing land uses and the need for additional infrastructure to support future growth. All new infrastructure that will be within the Greenbelt must comply with specific policies prior to implementation.

Rainbow Creek Sub-Watershed Study (1989)
VMC Master Servicing Strategy
Steeles West (OPA 620) Master Servicing Strategy
Black Creek Renewal Class EA

Green Directions Vaughan

Green Directions Vaughan is the City's Community Sustainability and Environmental Master Plan (CSEMP). It influences virtually all aspects of the City's operational and regulatory activities, including the growth management strategy. The plan establishes the principles of sustainability to be used in the development of other plans and master plans to achieve a healthy natural environment, vibrant communities and a strong economy.

Vaughan Transportation Master Plan

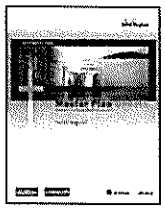
The Transportation Master Plan will define the road and public transit infrastructure, and other initiatives, which are needed to accommodate the population and employment growth that will result from the implementation of the Growth Management strategy.

Black Creek Optimization Study

The overall goal of the Black Creek Optimization Study is to address the ongoing flooding, water quality and channel erosion
issues that have been identified within that Study Area.

York Water/Wastewater Master Plan

In November 2009, York Region updated their Water and Wastewater Master Plan. As the Region supplies water to the City and collects and treats the City's wastewater, the recommendations of the Water/Wastewater Master Plan need to be compared with those of the Region's Master Plan to ensure consistency.



→ Moving forward Master Plan will provide guidance to future Sub-Watershed Studies (Blks 41 and 27)

Purpose and SWM Master Plan Components

Purpose of the Study:

- The SWM Master Plan was prepared to complement the Official Plan 2010
- Identify stormwater management infrastructure improvements / criteria necessary to support build-out of the City's Official Plan

SWM Master Plan Study Components:

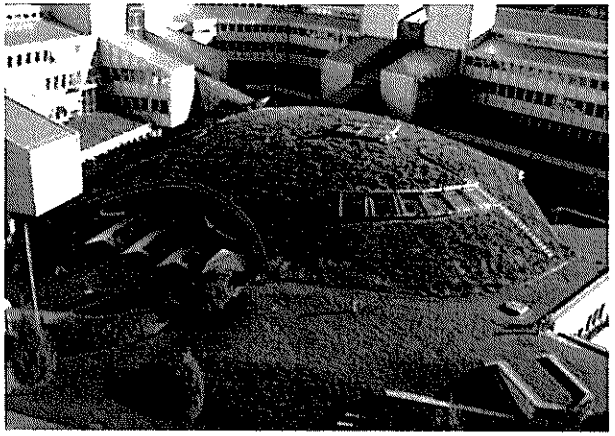
This study has two major components:

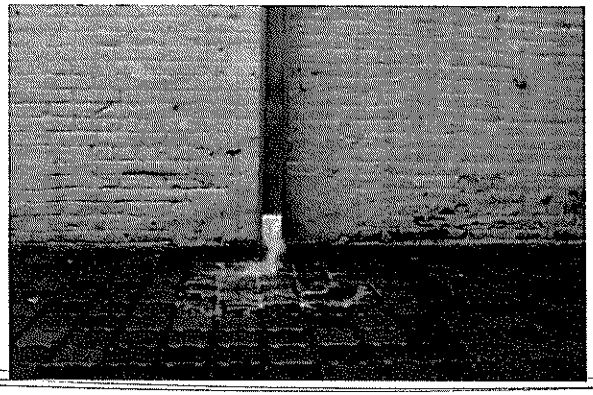
1. City-wide Stormwater Management Master Plan component:
   i. Functional SWM plans for approved and future secondary plan areas
   ii. SWM criteria for intensification corridors
2. Rainbow Creek Sub-Watershed Study Update

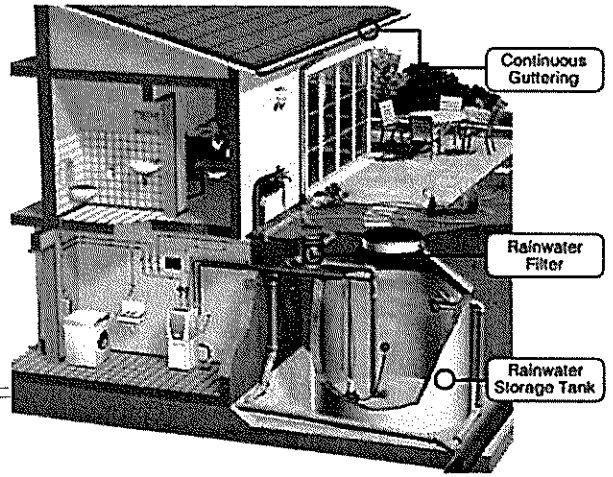
Infrastructure Alternatives Considered

Three options or a combination of options were considered for approved and future secondary plan areas and intensification corridors

1: Source / Lot Level Controls: Rain barrels, green roofs, porous pavements, cisterns, etc. in addition to onsite parking lot and rooftop storage (traditional)

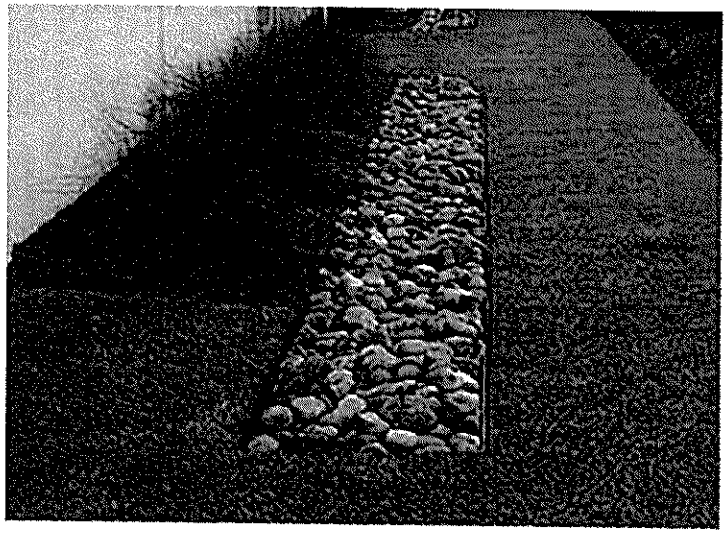






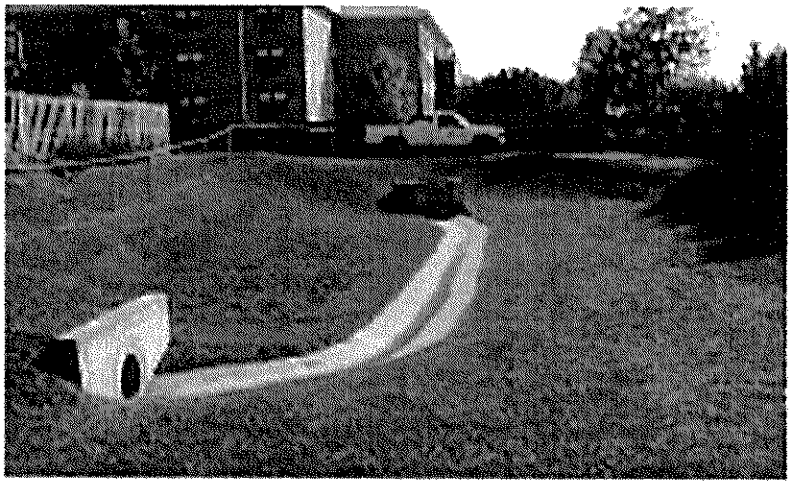
Infrastructure Alternatives Considered

2: Conveyance Controls: bio-swales, infiltration trenches, rain gardens, etc.



Infrastructure Alternatives Considered

3: End of Pipe Controls: Wet SWM Ponds and Dry SWM Ponds



Low Impact Development Measures

- Low Impact Development (LID) measures are recognized to :
  - Decrease runoff volumes
  - Promote infiltration
  - Conserve drinking water through stormwater reuse for irrigating lawns / gardens

- LID measures include:
  - Green roofs
  - Rain gardens
  - Permeable pavements
  - Bio-swales
  - Rain barrels and cisterns
  - Soakaway pits and infiltration trenches

- LID measures reduce maintenance and life cycle costs

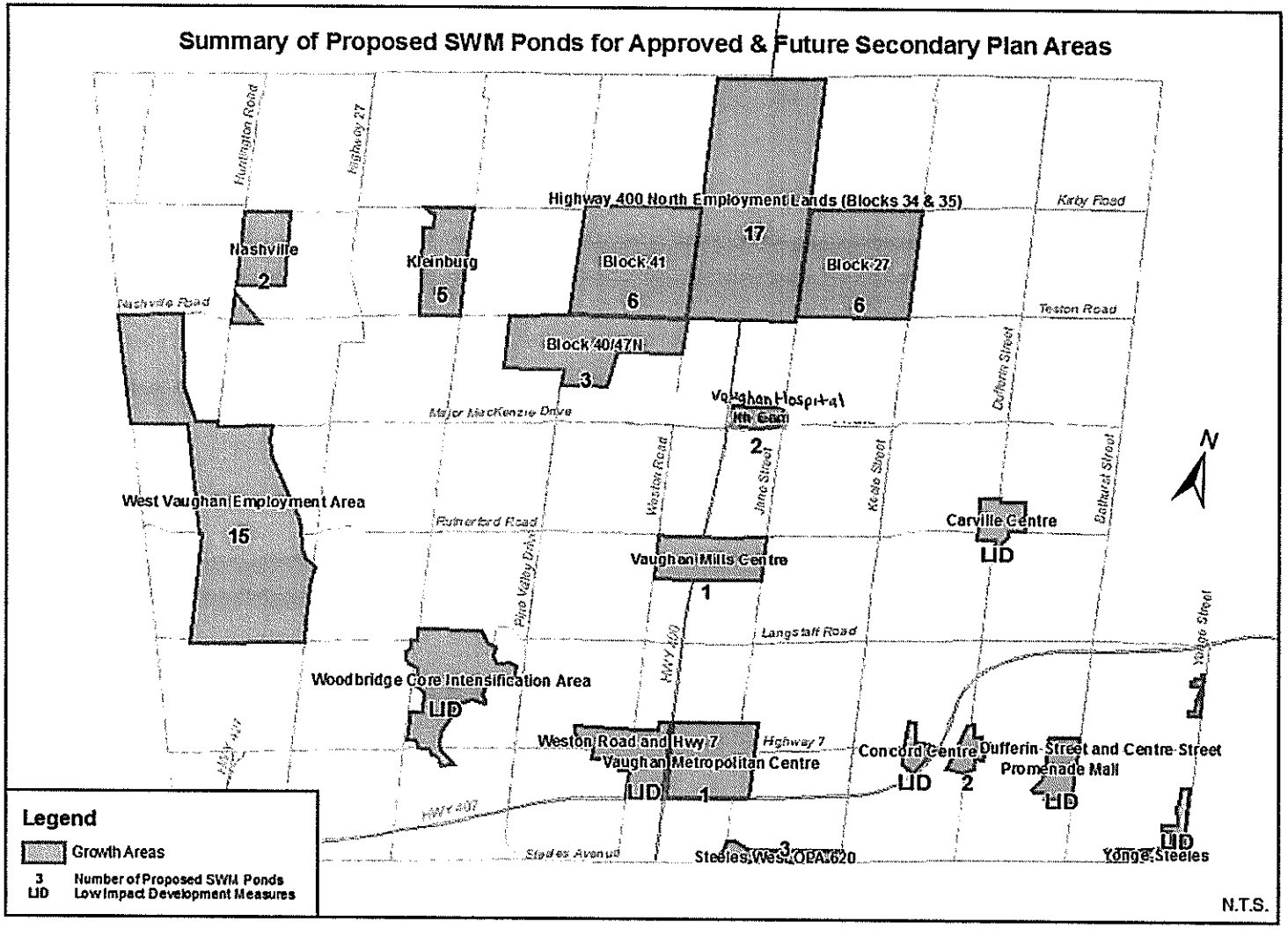
- LID measures and existing SWM pond retrofits are recommended to provide SWM controls for intensification corridors

Resulting City-Wide Preferred SWM Strategy

Item No.	Area Name	Preferred SWM Strategy	No. of new SWM Ponds
1	Approved Secondary Plans	Combination of At Source / Lot Level and Conveyance controls and End of Pipe Measures	47
2	Future Secondary Plans	Combination of At Source / Lot Level and Conveyance controls and End of Pipe Measures	16
3	Intensification Corridors	Combination of Low Impact Development and retrofit of existing SWM ponds	None
4	SWM Retrofit Program-City Wide	Retrofit existing uncontrolled outfalls with new SWM ponds	22
		TOTAL	**85**

Resulting City-Wide Preferred SWM Strategy

Attachment No. 2



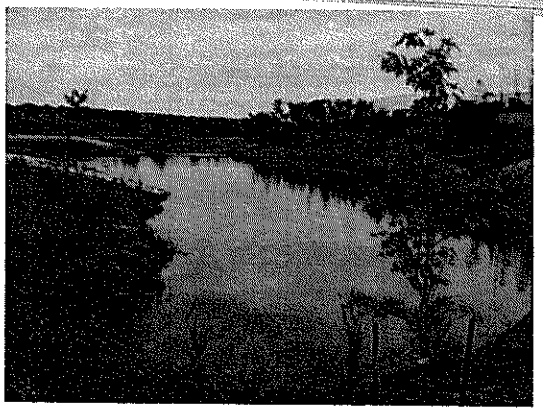
Part 2 : Rainbow Creek Sub-Watershed Study Update

- Rainbow Creek Sub-Watershed Study was originally completed in 1989

- Given the progression of development since 1989, the Sub-Watershed Study Update includes a current assessment of flooding and erosion, including:

  - An analysis of the existing conditions;
  - An analysis of the effects of development;
  - Recommendations for stormwater management criteria to be used for new development within the sub-watershed; and
  - Recommendations for future works and studies within the sub-watershed

Rainbow Creek Recommended SWM Strategy



Quality Control:

- Enhanced level of water quality controls by use of SWM facilities

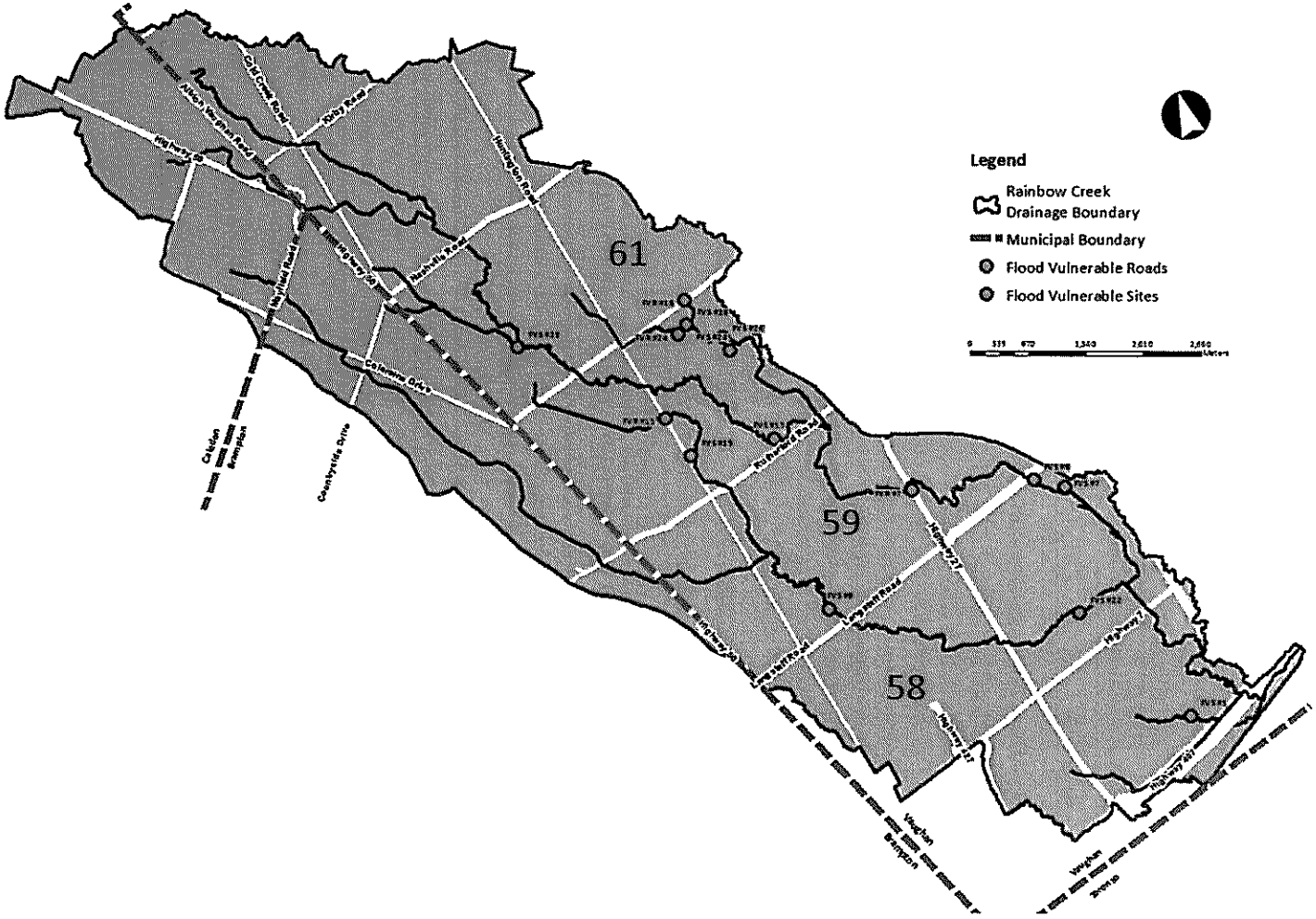
Quantity Control:

- 100 year post development flow control by use of SWM facilities
- Regional controls were not recommended for developments within the Vaughan portion of the Rainbow Creek Sub-watershed area
- Onsite controls (parking and rooftop)

Erosion Mitigation:

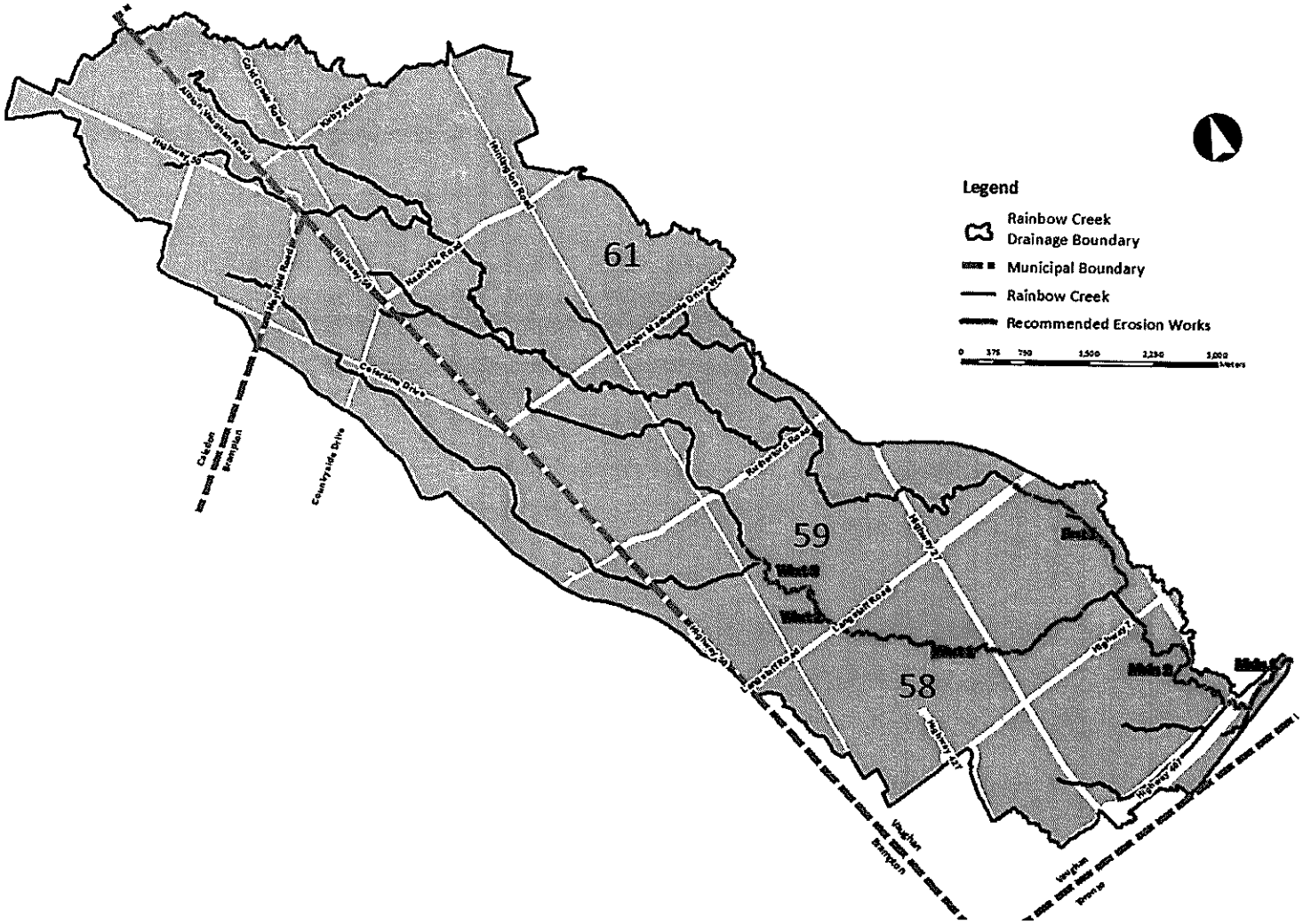
- Due to the low erosion thresholds for Rainbow Creek, it is recommended that future developments retain the first 5 mm of runoff on-site

Rainbow Creek - Recommended Flood Remediation



Note:
61 = City Block Number

Rainbow Creek - Recommended Erosion Works



Note:
61 = City Block Number

Recommendations for Mitigation Works

Flood Mitigation Works		
Detailed Survey and Updated Model / Flood Mapping to determine the frequency and extent of flooding		
Location	**Study Type**	**Study / Capital Costs**
5 Flooding Sites from 1989 Study	Schedule B for McGillivray Road culvert replacement	$472,000
6 New Flooding Sites identified in 2013 Rainbow Creek Study Update	Study based on detailed survey	$81,000
Erosion Mitigation Works		
Repair existing protection, bank stabilization, toe protection, etc.		
Location	**Study Type**	**Study / Capital Costs**
2 sites for restoration – through Block 59 Development works	N/A	N/A
4 sites for restoration between north of Langstaff Road and Hwy 407	Schedule B	$2.1M

Climate Change Impacts on City's Infrastructure

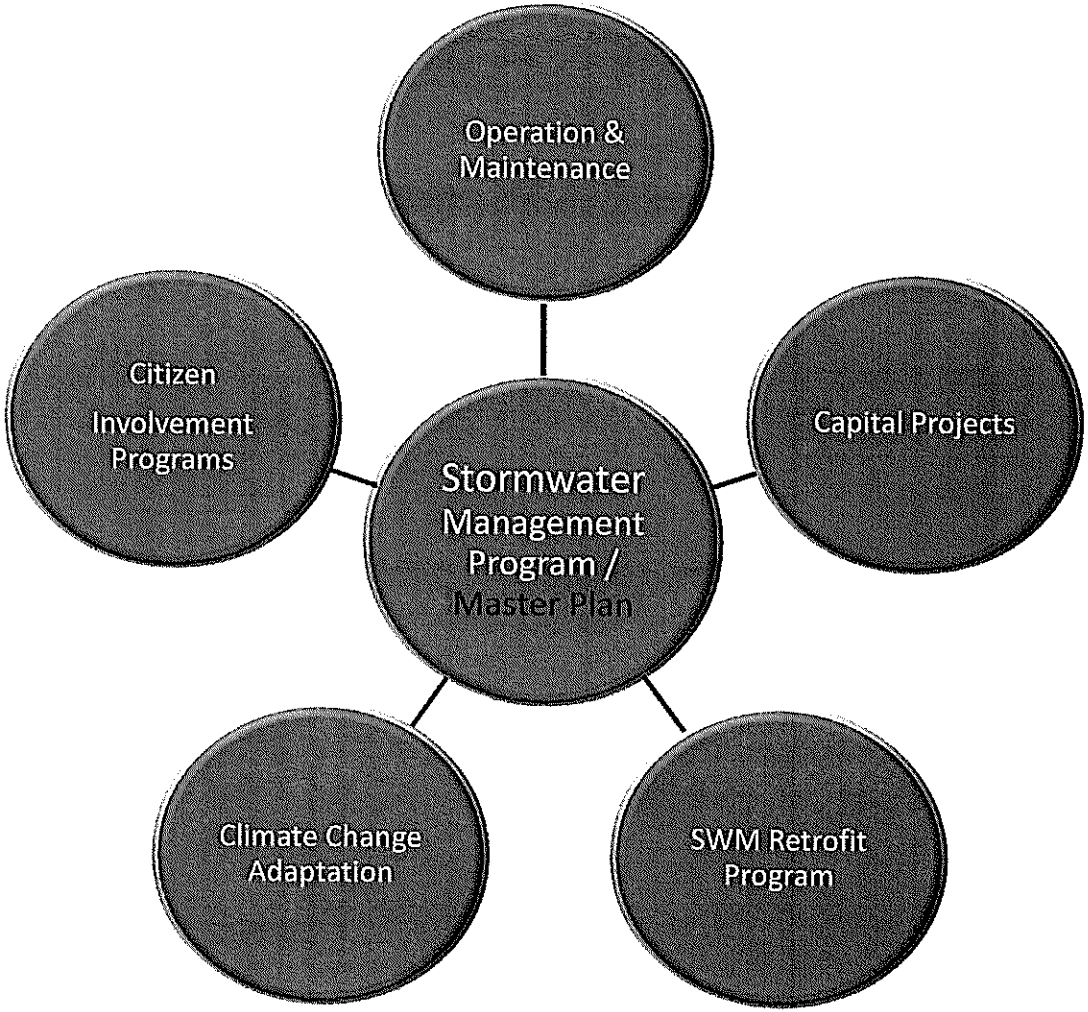
- With Climate Change weather patterns may become more unpredictable leading to an increased risk of extreme weather events
- On August 19, 2005, the most disruptive storm event in recent history was experienced throughout parts of the City
- August 19, 2005 storm event was used to evaluate the overland conveyance capacity of City roadways
- The results generally indicate current roadway design parameters can satisfy ponding and overland flows with minor modifications
- On a go forward basis, the August 19, 2005 storm event will be used to test/tweak roadway design parameters to accommodate overland flows from these types of major storm events

Overall Master Plan Recommendations

Key Master Plan Recommendations include:

- Functional SWM strategies and criteria for secondary plan / intensification areas
- Infrastructure design criteria to be continuously monitored to address potential impacts of Climate Change on City's Infrastructure
- Complete a City-wide erosion assessment study and hydraulic assessment of existing stormwater network
- Complete recommended flood and erosion mitigation works as funds become available within the Rainbow Creek Sub-watershed (funding source existing SAC By-law 046-2013)
- Implementation of the SWM Master Plan will require a sustainable long term funding source

Vaughan's Stormwater Management Program



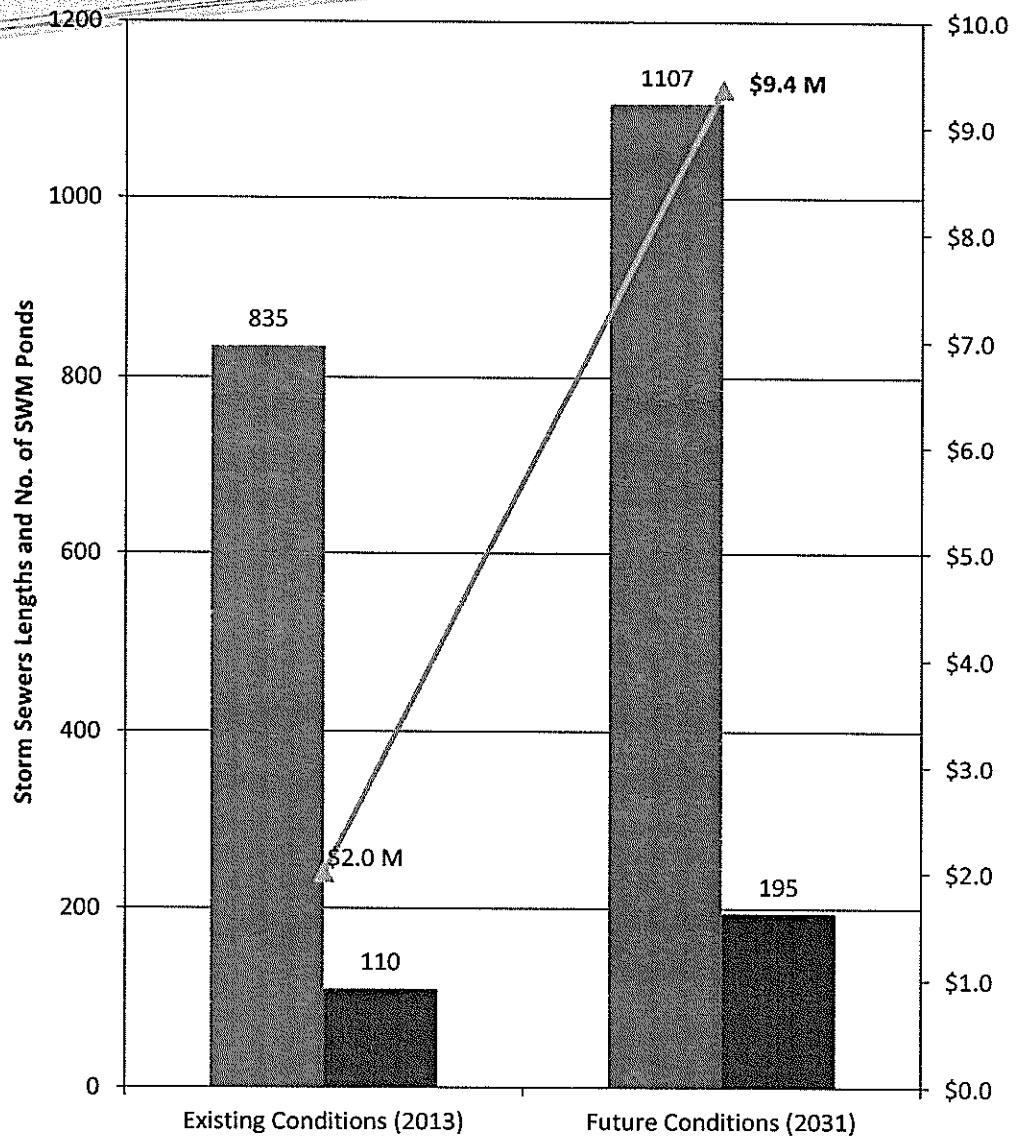
Incremental Infrastructure O & M Costs

(Based on current Level of Service)

Item No.	Type of Infrastructure	Total Storm Sewers (Km)	No. of SWM Ponds	Annual O & M Cost Estimate / Retrofit Costs (Millions)
1	Existing SWM Infrastructure	835	110	$2.0
2	Future SWM Infrastructure	272	63	
3	Future SWM outfall retrofits		22	
	TOTAL	**1,107**	**195**	**$3.5**
	INCREASE	**33%**	**77%**	
	Total O&M Costs in 2013 dollars (Existing + Future)			**$5.5**

Comparison of Existing and Future O & M Costs

(Based on current Level of Service)



Note:
$9.4M is based on 3% inflation rate for $5.5M (Existing + Future O & M costs in 2013) for 18 years (2013 to 2031)

- Storm Sewers Length (kms.)
- No. of SWM Ponds
- Annual Stormwater Infrastructure O & M Costs in Million ($)

Funding Strategy

- The increasing budgetary demands resulting from operation, maintenance and renewal continue to be a challenge
- Council has recognized the need to secure a dedicated and sustainable long term funding source for yearly operating & maintenance costs
- The procurement process to complete a Stormwater Infrastructure Funding Study is currently underway
- Stormwater Infrastructure Funding Study will recommend funding options to operate, maintain and renew stormwater infrastructure and will involve public consultation and engagement
- Stormwater Infrastructure Study is anticipated to be completed by late spring 2015 followed by implementation of strategy & related by-law in 2016

Next Steps

- Notice of Study Completion for the City-Wide Stormwater Management Master Plan Class Environmental Assessment Study will be issued
- Implementation of the SWM Master Plan through the development review and approval process
- Program follow up studies/works as required through Capital Budget process
- A financial strategy to effectively operate, maintain and retrofit stormwater infrastructure is required
- SWM Master Plan is intended to be reviewed and updated every five years in conjunction with City-Wide Official Plan reviews/updates

QUESTIONS