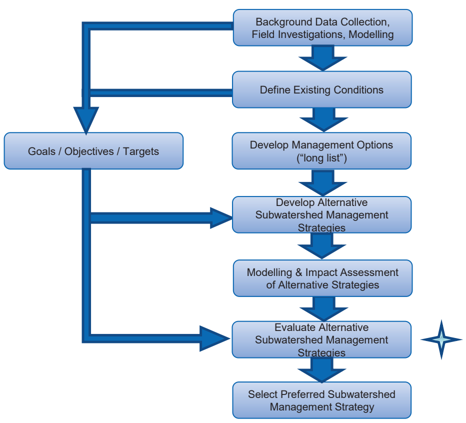
Dingman Creek Subwatershed: Stormwater Servicing Strategy

JUNE 12, 2019

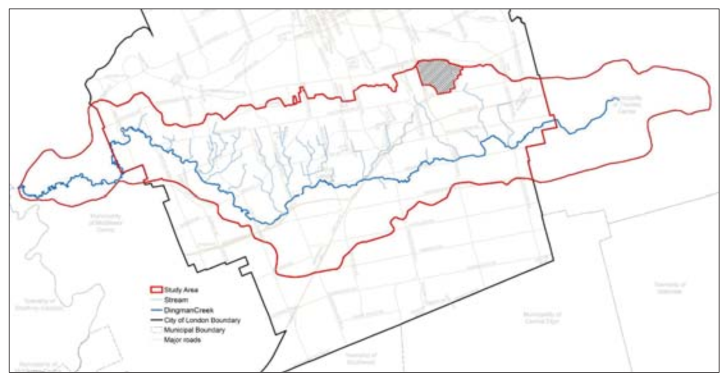
AGENDA

1. **Review of Alternative Subwatershed Management Strategies**
2. **Discussion of Evaluation Approach**
3. **Discussion on potential flood prone areas**
4. **Questions & Discussion**

STUDY PROCESS

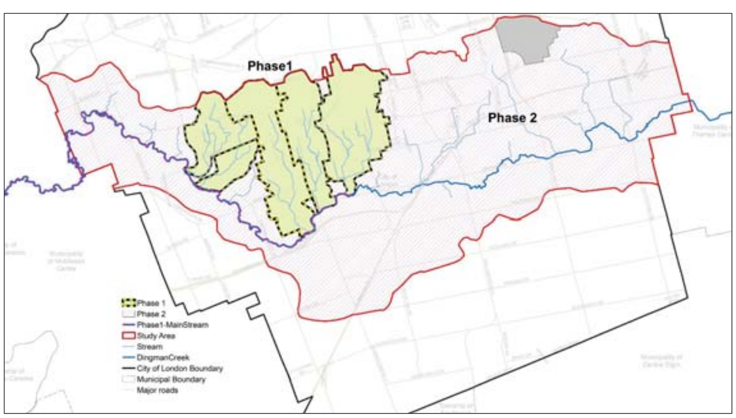


OVERALL MAP OF DINGMAN

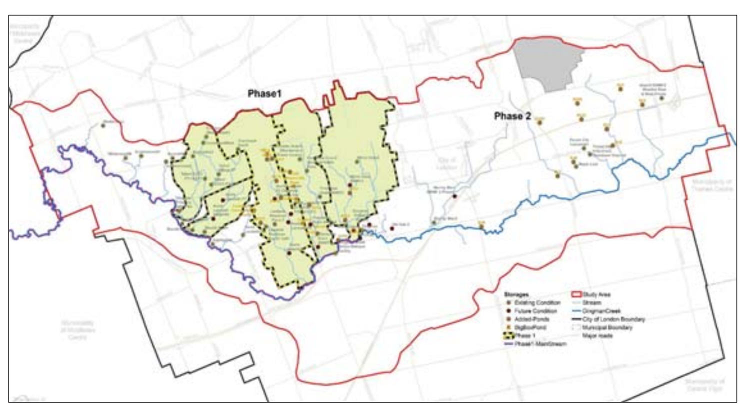


The Dingman Creek subwatershed is outlined in red, above. The headwaters originate in the Municipality of Thames Centre. Approximately 74% of the subwatershed is located within the City of London.

STAGE 1 AND 2 STUDY AREAS



EXISTING AND PROPOSED PONDS – STAGE 1 LANDS



1. REVIEW OF ALTERNATIVE SUBWATERSHED STRATEGIES PRESENTED AT LAST MEETING

Subwatershed Management Strategies:

1. **Do Nothing**
2. **Traditional SWM Strategy (end-of-pipe only)**
3. **Low Impact Development (LID) Strategy**
4. **Combined Traditional & LID**

(examples of each on the following slides)

City of London
- LID Workshop-

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June 20, 2017

LIDs - Single Family Residential

- Recommended LID Approaches
  - Private property
    - Soil Amendments
  - Municipal Property:
    - 3rd Pipe
    - Perforated pipe systems
    - Grassed Swale Perforated Pipe Systems (GSPP)

LIDs – Multi-Family (Med Density)

- Condominium properties
  - O&M is the responsibility of the Condo
- Recommended LID Approaches
  - Soil Amendments
  - Perforated Pipe Systems
  - Permeable Pavements
  - Bioretention & Bioswales
  - Enhanced Swales
  - Soakaway Pits, Infiltration Trenches and Chambers

LIDs - Multi-Family (High Density)

- Condominium properties
  - O&M is the responsibility of the Condo
- Recommended LID Approaches
  - Soil Amendments
  - Perforated Pipe Systems
  - Permeable Pavements
  - Enhanced Swales
  - Bioretention & Bioswales
  - Soakaway Pits, Infiltration Trenches and Chambers
  - Green Roofs
  - Rainwater Harvesting

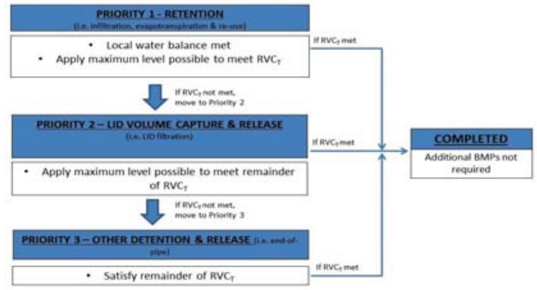
LIDs - ICI

- Recommended LID Approaches
  - Soil Amendments
  - Perforated Pipe Systems
  - Permeable Pavements
  - Enhanced Swales
  - Bioretention & Bioswales
  - Soakaway Pits, Infiltration Trenches and Chambers
  - Green Roofs
  - Rainwater Harvesting
  - etc

OBJECTIVE

The objective was to model perforated pipes in subcatchments with LIDs.

From our extensive LID modelling experience and past projects, infiltration trenches have been used to represent perforated pipe systems and appropriately simulate response times, as well as the allocation of infiltration, filtration and detention mechanisms.



LID KEY PARAMETERS (NON-CALIBRATED)

Parameters	Value in the Model	Default	Unit	Description
Berm height	100	N/A	mm	Maximum depth to which water can pond within the unit before overflow occurs (in inches or mm).
Vegetation volume (fraction)	0.0	N/A	-	The fraction of the volume within the storage depth filled with vegetation. Assuming perforated pipes are in the road way.
Surface roughness	0.3	0.1	-	Manning's n for overland flow over the surface.
Surface slope (%)	0.25	1.0	(%)	Slope
Thickness of Storage	450	N/A	(mm)	Thickness of the storage
Void Ratio of Storage	0.65	0.75	-	The volume of void space relative to the volume of solids. Typical values range from 0.5 to 0.75.
Seepage Rate	Varies (2.5-18)	0.5	(mm/hr)	The maximum allowable rate at which water infiltrates into the native soil below the layer (in inches/hour or mm/hour). This would typically be the Saturated Hydraulic Conductivity of the surrounding area.

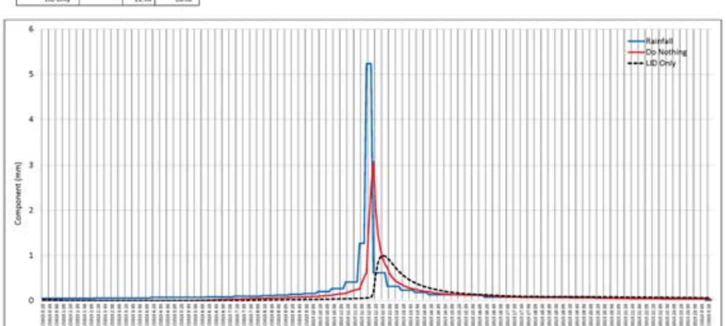
Runoff Volume and depth-2year			
Scenario	Rainfall (mm)	Vol (ML)	Runoff (mm)
Do Nothing	51.3	15.33	35.90
LID Only		11.96	28.02

Runoff Volume and depth – 100year			
Scenario	Rainfall (mm)	Vol (ML)	Runoff (mm)
Do Nothing	107.1	39.16	91.71
LID Only		35.78	83.78

[1] ML: Million litres

RUNOFF VOLUME AND DEPTH – 2 YEAR

Table 2. Runoff Volume and depth – 2 year			
Scenario	Rainfall	Vol (ML)	Runoff (mm)
Do Nothing	51.3	15.33	35.90
LID Only		11.96	28.02



RUNOFF VOLUME AND DEPTH – 100 YEAR

Table 2. Runoff Volume and depth – 100 year			
Scenario	Rainfall (mm)	Vol (ML)	Runoff (mm)
Do Nothing	107.1	39.16	91.71
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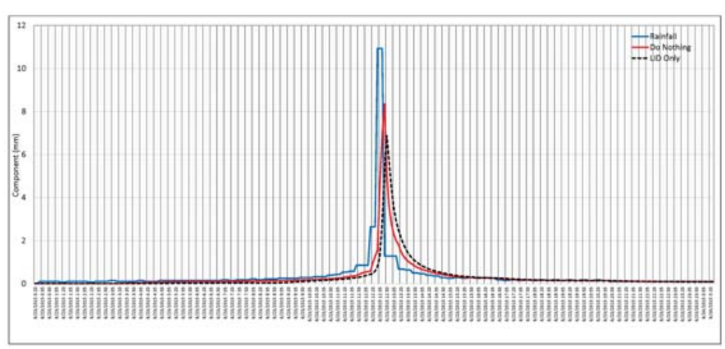


SUBWATERSHED MANAGEMENT STRATEGY 2: TRADITIONAL STORMWATER MANAGEMENT OPTIONS

Traditional end-of-pipe options:

- **Wet pond**
- **Dry pond**
- **Constructed wetland**
- **Oil-grit separator**

Recall: Traditional conveyance control SWM options are not proposed.



DINGMAN CREEK SUBWATERSHED: STORMWATER SERVICING STRATEGY

SUBWATERSHED MANAGEMENT STRATEGY 3: LOW IMPACT DEVELOPMENT (LID) STORMWATER MANAGEMENT OPTIONS

Source Control Options:

- **Bioretention**
- **Rainwater Harvesting**
- **Permeable Pavement**
- **Infiltration Galleries**


Conveyance Control Options:

- **Grassed swales**
- **Bioswales**
- **Perforated pipe / exfiltration systems**
- **Permeable pavement**


DINGMAN CREEK SUBWATERSHED: STORMWATER SERVICING STRATEGY

SUBWATERSHED MANAGEMENT STRATEGY 4: COMBINED TRADITIONAL & LID STORMWATER MANAGEMENT OPTIONS

End-of-Pipe and Conveyance Control Options (select examples):

- **Wet Pond**
- **Dry Pond**
- **Bioretention**
- **Grassed swales**
- **Bioswales**
- **Permeable pavement**
- **Etc.**

Wet pond

Downspout rainwater capture

Permeable Pavers (left) & Infiltration Gallery (centre)

DINGMAN CREEK SUBWATERSHED: STORMWATER SERVICING STRATEGY

APPROACH TO EVALUATING ALTERNATIVE SUBWATERSHED STRATEGIES

Detailed Evaluation Criteria:

1. Natural Environment:

- Water quality
- Flooding
- Erosion
- Aquatic natural heritage
- Water balance

2. Economic:

- Capital cost
- O & M costs
- Infrastructure Protection

3. Social:

- Aesthetics/Recreation
- Integration with City/Agency Plans
- Compatibility with adjacent land uses
- Potential to increase private property land values

DINGMAN CREEK SUBWATERSHED: STORMWATER SERVICING STRATEGY

APPROACH TO EVALUATING ALTERNATIVE SUBWATERSHED STRATEGIES

Scoring for Evaluation Criterion:

THE SCORING SYSTEM

Score	Condition
4	Strategy maintains or improves existing conditions
3	⇩
2	Strategy somewhat impacts existing conditions
1	⇩
0	Strategy adversely impacts existing conditions

DINGMAN CREEK SUBWATERSHED: STORMWATER SERVICING STRATEGY

EVALUATION OF ALTERNATIVES

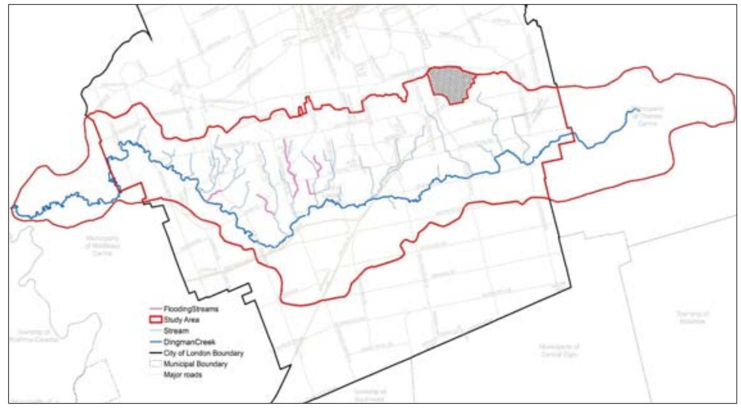
Evaluation Criteria	Do Nothing	Traditional SWM Strategy (end-of-pipe only)	Low Impact Development (LID) Strategy	Combined Traditional & LID
1. Natural Environment (Score out of 33.3)	0.0	20.0	23.3	30.0
Potential to improve water quality based on existing water quality conditions and ability to provide required water quality as per the MECP requirements	0	3	3	3
Potential Impact on Flooding	0	3	2	4
Potential Impact on Erosion	0	2	3	4
Potential Impact on Aquatic Habitat	0	2	3	4
Potential Impact on Water Balance	0	0	3	3
2. Social (Score out of 33.3)	2.1	18.7	18.7	31.2
Aesthetics/Recreation	1	3	3	4
Integration with other City/Agency plans, policies and initiatives (programs)	0	2	2	4
Compatibility with adjacent land uses	0	2	2	4
Potential to increase private property values	0	2	2	3
3. Economic (Score out of 33.3)	22.2	19.4	19.4	16.7
Construction Costs	4	2	3	1
Long Term Operation and Maintenance Costs	4	2	3	1
Infrastructure Protection	0	3	1	4
Total Normalized Score (1+2+3: Score out of 100)	**24.3**	**58.1**	**61.4**	**77.9**

FLOODING IMPLICATIONS

- **The Stage 1 study identified areas within the 5 subwatersheds which are subject to flooding under existing conditions or that would be as a result of development**
- **Assessment takes into consideration MNRF's policy that stormwater facilities are ineffective during the Regulatory (250 year) storm**
- **The Stage 2 study will address these areas in more detail**

Dingman Creek Subwatershed:
Stormwater Servicing Strategy

POTENTIAL AREAS REQUIRING FURTHER ASSESSMENT



QUESTIONS?


SWM Pond “Murray Marr 3”

Thank you for your participation and feedback!

Dingman Creek Subwatershed:
Stormwater Servicing Strategy

EVALUATION OF ALTERNATIVES

Evaluation Criteria	Do Nothing	Traditional SWM Strategy (end-of-pipe only)	Low Impact Development (LID) Strategy	Combined Traditional & LID
1. Natural Environment				
Potential to improve water quality based on existing water quality conditions and ability to provide required water quality as per the MECP requirements	0	3	3	3
Potential Impact on Flooding	0	3	2	4
Potential Impact on Erosion	0	2	3	4
Potential Impact on Aquatic Habitat	0	2	3	4
Potential Impact on Water Balance	0	0	3	3
2. Social				
Aesthetics/Recreation	1	3	3	4
Integration with other City/Agency plans, policies and initiatives (programs)	0	2	2	4
Compatibility with adjacent land uses	0	2	2	4
Potential to increase private property values	0	2	2	3
3. Economic				
Construction Costs	4	2	3	1
Long Term Operation and Maintenance Costs	4	2	3	1
Infrastructure Protection	0	3	1	4
Total Score	9	26	30	39