

**3RD REPORT OF THE
ENVIRONMENTAL AND ECOLOGICAL PLANNING
ADVISORY COMMITTEE**

Meeting held on February 15, 2018, commencing at 5:05 PM, in Committee Room #1 & #2, Second Floor, London City Hall.

PRESENT: S. Levin (Chair), E. Arellano, A. Boyer, C. Dyck, P. Ferguson, S. Hall, B. Krichker, C. Kushnir, K. Moser, N. St. Amour, S. Sivakumar, C. Therrien, R. Trudeau and I. Whiteside and H. Lysynski (Secretary).

ABSENT: E. Dusenge, C. Evans and S. Madhavji.

ALSO PRESENT: C. Creighton, J. MacKay, M. McKillop, A. Rameloo, J. Ramsay and A. Sones.

I. CALL TO ORDER

1. Disclosures of Pecuniary Interest

That it BE NOTED that no pecuniary interests were disclosed.

II. SCHEDULED ITEMS

2. Pollution Prevention and Control Plan

That it BE NOTED that the Environmental and Ecological Planning Advisory Committee received the attached presentation from M. McKillop, Environmental Services Engineer, Wastewater and Drainage Engineering Division with respect to the Pollution Prevention and Control Plan.

3. Dingman Creek Subwatershed Environmental Assessment and Low Impact Development Stormwater Controls

That it BE NOTED that the Environmental and Ecological Planning Advisory Committee received the attached presentation from A. Sones, Environmental Services Engineer, Stormwater Engineering Division, with respect to the Dingman Creek Subwatershed Environmental Assessment and Low Impact Development Stormwater Controls and reviewed and received a Notice of Project Commencement for the South London Wastewater Servicing Study, Municipal Class Environmental Assessment Master Plan from K. Oudekerk, Environmental Services Engineer, with respect to this matter.

4. Environmental Impact Study for London's Rapid Transit Project

That a Working Group consisting of S. Levin, B. Krichker, S. Sivakumar and C. Therrien BE ESTABLISHED to review the Environmental Impact Statement for the Rapid Transit Project; it being noted that the Environmental and Ecological Planning Advisory Committee received the attached presentation from J. Ramsay, Project Director, Rapid Transit and E. Fitzpatrick, WSP, with respect to this matter.

III. CONSENT ITEMS

5. 2nd Report of the Environmental and Ecological Planning Advisory Committee

That it BE NOTED that the 2nd Report of the Environmental and Ecological Planning Advisory Committee from its meeting held on January 18, 2018, was received.

6. Municipal Council Resolution - 1st Report of the Environmental and Ecological Planning Advisory Committee

That it BE NOTED that the Municipal Council resolution adopted at its meeting held on January 16, 2018, with respect to the 1st Report of the Environmental and Ecological Planning Advisory Committee, was received.

IV. SUB-COMMITTEES & WORKING GROUPS

7. Issues for Investigation

That the attached Issues for Investigation Working Group comments BE APPROVED and BE INCORPORATED into the 2018 Environmental and Ecological Planning Advisory Committee's (EEPAC) Work Plan; it being noted that the EEPAC received the attached presentation from C. Therrien, with respect to research objectives and methods for pet interference in Environmentally Significant Areas (ESA), particularly the Medway Valley Heritage Forest ESA.

V. ITEMS FOR DISCUSSION

8. Workplan

That the following matters BE INCORPORATED into the 2018 Environmental and Ecological Planning Advisory Committee Work Plan:

- dogs off leash in Environmentally Significant Areas;
- the possible impacts of manufactured surfaces on trails; and,
- the creation of informal trails.

VI. DEFERRED MATTERS/ADDITIONAL BUSINESS

9. (ADDED) Green Standards for Light Pollution and Bird-Friendly Development

That the attached Green Standards for Light Pollution and Bird-Friendly Development brochure BE FORWARDED to Corporate Communications for approval.

VII. ADJOURNMENT

The meeting adjourned at 7:30 PM.

NEXT MEETING DATE: March 15, 2018



Pollution Prevention and Control Plan

Environmental and Ecological Planning Advisory Committee
February 15, 2018

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Pollution Prevention and Control Plan (PPCP)

- Overview
- Phases
- Mitigation Strategies
- Current Status

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PPCP Overview

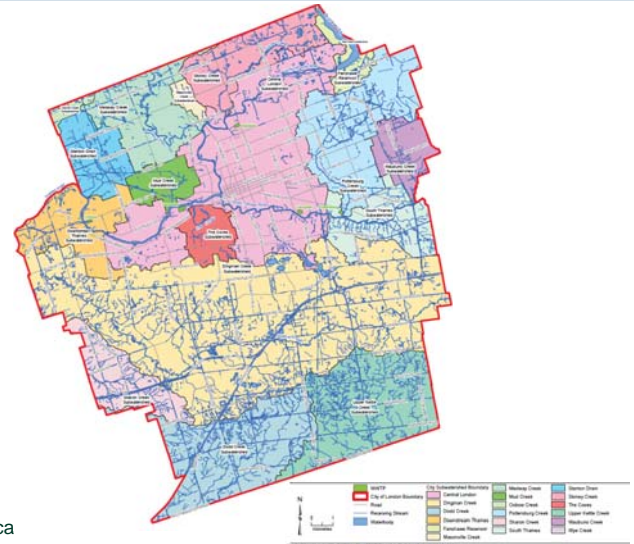
- Long term strategy to identify, investigate, and reduce sewer system overflows (SSOs) in the City
- Initiated in 2012 in accordance with MOECC Procedure F-5-5
- Undertaken as a Master Plan in accordance with the Municipal Engineers Association Municipal Class Environmental Assessment
- Mission Statement:



Sanitary sewer manhole with overflow to storm sewer

The PPCP will provide the City of London with a road map for implementation of infrastructure improvement projects that will mitigate the impacts of wet weather system overflows on the Thames river and its tributaries, in alignment with the City's commitment to environmental stewardship and protection of water resources.

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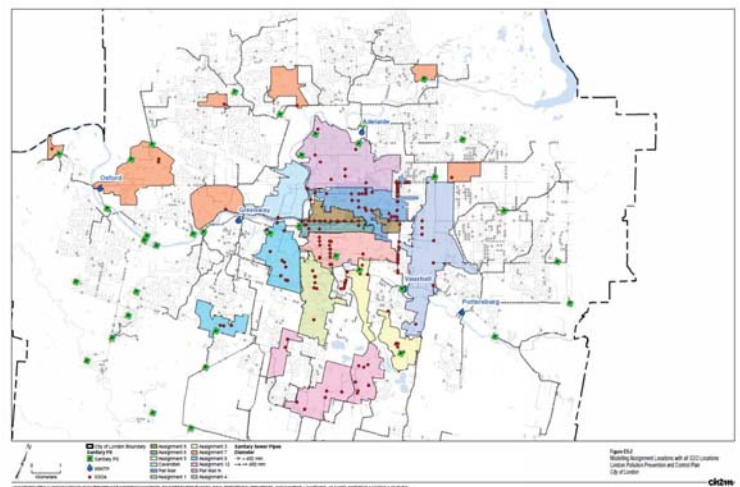
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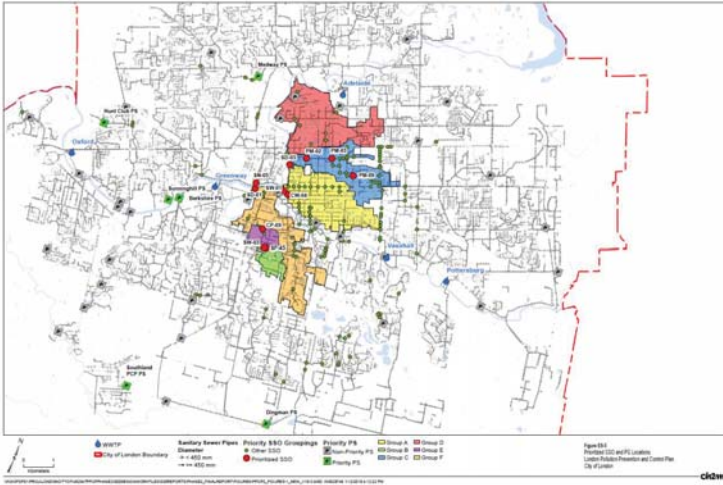
PPCP Phases

- Focus: conveyance system including pumping stations
- Implemented in three phases:
 - Phase 1:
 - Develop an inventory of SSOs by sewershed
 - Assess available water quality data for the Thames River
 - Phase 2:
 - Complete benthic and water quality characterization of the Thames River
 - Characterize SSOs through 12 separate flow monitoring and hydraulic modelling assignments
 - Develop a priority list of SSOs based on:
 - Receiver water quality/level of impairment
 - Volume of overflow (for an average year)
 - Develop groups/families of related SSOs
 - Phase 3
 - Complete screening of prioritized SSO groups to identify preferred strategies for mitigation
 - Review alternatives strategies for prioritized SSO groups
 - Develop an implementation plan

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PPCP – SSO Mitigation Strategies

- Source Control:
 - Best management practices to reduce wet weather flows from entering the sewer system (e.g. weeping tile disconnection)
- Conveyance and End-of-Pipe Controls:
 - Weir and overflow adjustments
 - Sewer separation
 - Real time flow control
 - Inline storage
 - Offline storage
 - Pumping station modifications and/or upgrades
 - High rate treatment

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PPCP Current Status

- Phase 1:
 - Completed in 2014
- Phase 2:
 - Completed in early 2018
- Phase 3
 - Finalizing the report including the evaluation of alternative strategies for the prioritized overflows
 - To be completed in March 2018, including the implementation plan

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Questions?

For more information:
www.london.ca/ppcp

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Table ES-1. Priority SSOs and PSs

Group ID	SSO ID	Group Description	Typical Year Overflow Volume (m ³)	BioMAP WQI Rating	Complies with F-5-5-90% Capture Rate (Y/N)
A	SW-01	King/River, York/Bidout	40251	Unimpaired	N
A	CW-04		2709	Unimpaired	Y
B	SP-45	Cathcart/Devonshire	146	Impaired	Y
B	SW-03		5	Impaired	Y
C	PM-02		10332	Unimpaired	N
C	PM-09	Pall Mall Relief System	7752	Unimpaired	N
C	SD-05		2531	Unimpaired	Y
C	PM-03		1397	Unimpaired	Y
D	SD-01	Cavendish	10070	Unimpaired	Y
E	CP-09	Edward/Tecumseh	325	Impaired	Y
F	SN-05	Evergreen/Riverview	3,337	Unimpaired	N
G	N/A	Berkshire PS	4667	Unimpaired - Transitional	N/A
H	N/A	Medway PS	1198	Unimpaired	N/A
I	N/A	Sunninghill PS	863	Unimpaired - Transitional	N/A
J	N/A	Hunt Club PS	343	Transitional	N/A
K	N/A	Dingman Creek PS	0	Impaired	N/A
L	N/A	Southland PS		Impaired	N/A

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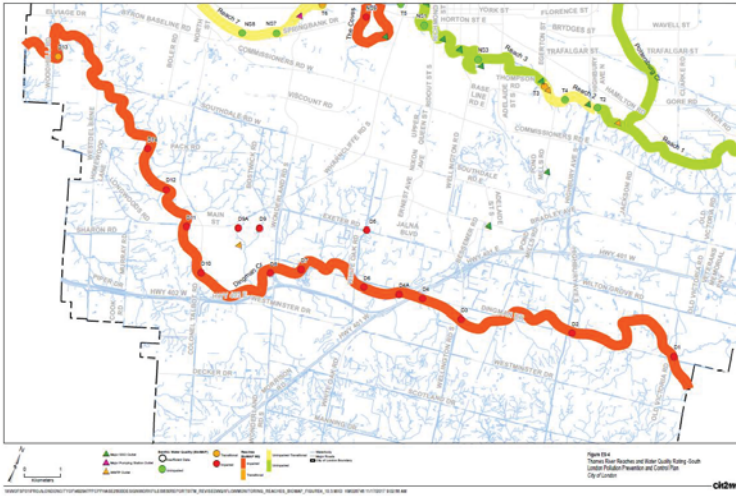


Table 8-2. Priority SSO Infrastructure Projects

Group ID	Group Description	SSO IDs	Infrastructure Project	Year
A	King/River, York/Ridout	SW-01, CW-04	Seven phases of sewer separation in the downcore, along York St. and King St. form the Thames River to Colborne St.	Commencing in 2018
D	Cavendish	SD-01	The planned construction of the new Cavendish Trunk in 2019 will replace the existing trunk with a larger capacity trunk. This new trunk would directly impact the overflow volume at SD-01. Additionally, any overflow from SSO SD-01 post construction will overflow to a storm sewer instead of directly to the Thames River, allowing any sanitary overflow to dilute before being discharged.	2019
F	Evergreen/Riverview	SN-05	The proposed Horton/Wharncliffe Sewer Realignment involves directing the flow at SN-05 along Riverview Avenue south instead of siphoning under the Thames River. Flows along Wharncliffe will also be diverted towards Horton, further reducing flows to SN-05. A new twin sanitary sewer along Horton Street would then convey the flows to the Greenway WWTP.	TBD

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Table 8-4. Priority PS Infrastructure Projects

Group ID	Priority PS	Infrastructure Project	Year
G	Berkshire PS	Planned adjustment to Westmount PS would allow flows from Westmount PS to toggle between Berkshire PS and Dingman PS and has the potential to remove 350 L/s of flow from Berkshire PS.	TBD
H	Medway PS	N/A	
I	Sunninghill PS	N/A	
J	Hunt Club PS	Flows to PS were reduced by redirecting Hyde Park PS out of the Hunt Club sewershed.	2016
K	Dingman PS	There is an EA being completed outside of the PPCF to investigate improvement alternatives for a new Dingman PS with increased capacity.	2017
L	Southland PS*	N/A	

SL12211707466/WD CH2M HILL CANADA LIMITED • COMPANY PROPRIETARY 8-5

SECTION 8 – SELECTION OF RECOMMENDED ALTERNATIVES

* Southland PS was commissioned in early 2018.

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DINGMAN CREEK SUBWATERSHED: STORMWATER SERVICING STRATEGY



FEBRUARY 15, 2018

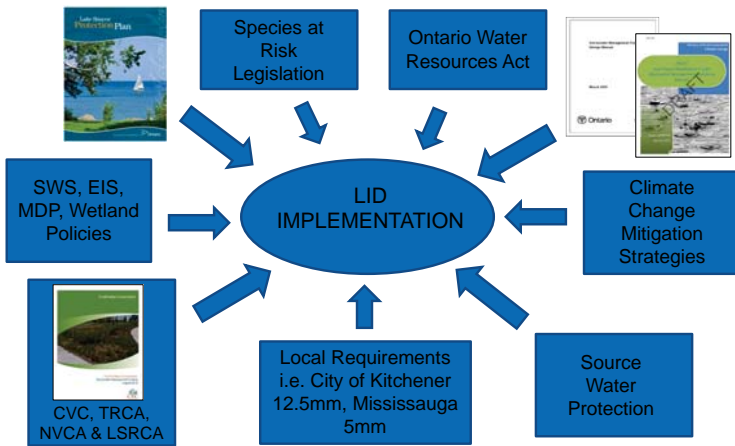


AGENDA

1. Overview of new MOECC Low Impact Development Document
2. General Approach for LID
3. Discuss Preliminary Approach to Evaluating Management Strategies



THE ONTARIO POLICY PUSH

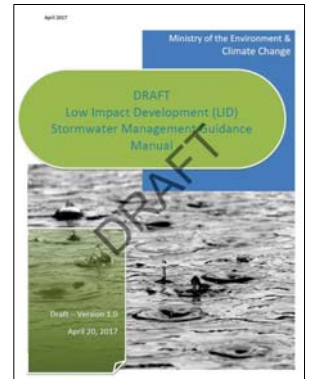


GUIDELINES AND POLICES



MOECC LID SWM Guidance Doc

- Volume control requirements for Ontario
- Model selection criteria
- Groundwater protection criteria
- Climate Change process
- Linked to other manuals:
 - Low Impact Development Planning and Design Manual (TRCA/CVC, 2010),
 - Grey to Green: LID Retrofit Guides (CVC as part of MOECC's SWI program) – (2014) CVC LID Construction Guide (v 1.0) – (2012) etc.



WHAT IS LID?



**Simple, distributed and cost effective
engineered landscaped features**

**Infiltrate, absorb, filter, evaporate and detain
rainfall for re-use or release**

Mimic natural systems

Treatment Train Approach



PRINCIPLES OF LID



- Rainwater is a resource**
- Treat stormwater as close to the source area as possible**
- Utilize and preserve existing natural systems**
- Focus on runoff prevention**
- Create multifunctional landscapes**
- Educate and maintain**



RUNOFF VOLUME CONTROL TARGET (RVCT)

❖ The RVCt is not an 'infiltration target'.....
it is a 'control target'

❖ **Key Principle: Treatment Train from 1991-2003 MOECC Manuals**

- Infiltration
- Evapotranspiration
- Re-use
- Filtration
- Detention
- Mechanical Treatment (i.e. hydro-dynamic separation)



Source: Team-creativity.com

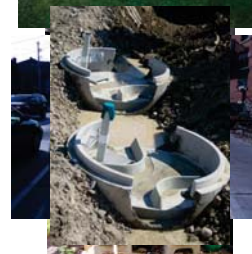
MANDATORY CONTROL HIERARCHY

Better Site Design (reduced land clearing, preserve natural systems etc.) & Pollution Prevention

Priority 1 (Retention) – infiltration, evapotranspiration and or re-use. The volume does not become runoff.

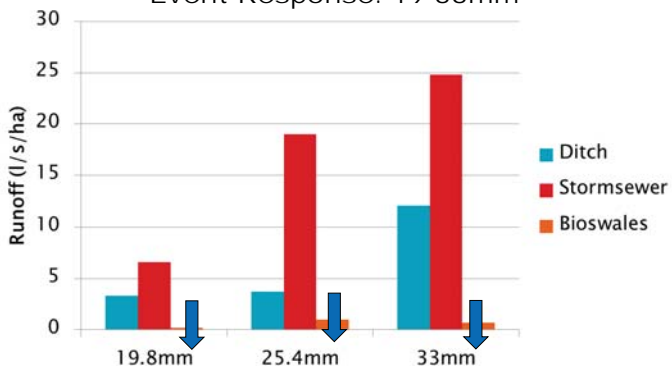
Priority 2 (LID Volume Capture and Release) –utilize LID filtration. The controlled volume is filtered and released to the municipal sewer networks or surface waters at a reduced rate and volume (a portion may be infiltrated or evapotranspirated).

Priority 3 (Other Volume Detention and Release) – Other technologies which utilize filtration, hydrodynamic separation and or sedimentation (to detain and treat runoff). The controlled volume is treated and released to the municipal sewer networks or surface waters at a reduced rate.



WHY LID?

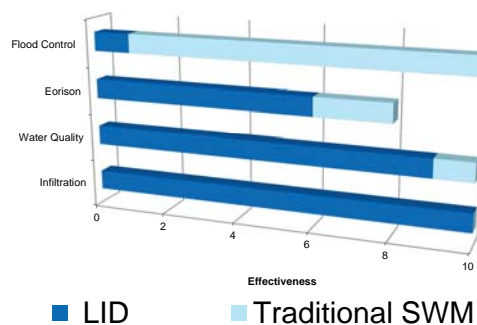
Event Response: 19-33mm



Mississauga, Ontario

WHY LID?

Holistic SWM Approach vs. Criteria



WHY LID?

Water Quality

Influent



Effluent

Mississauga, Ontario

LID Options by Landuse

KEY PRINCIPLES

- ❖ City of London would like to be a 'practical partner' with the development industry to move towards LID in conformance with the pending MOECC direction
- ❖ Simple and cost effective approaches are being proposed
 - Better site design
 - Material substitutions
- ❖ Foster and support innovation
- ❖ Shared risk model – City and Developers

LIDS - SINGLE FAMILY RESIDENTIAL

Recommended LID Approaches

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



SOIL AMENDMENTS

Waterridge Village – Ottawa, ON



SOIL AMENDMENTS

Proposed LIDs

- ❖ Soil Amendments on all single-family residential and townhomes



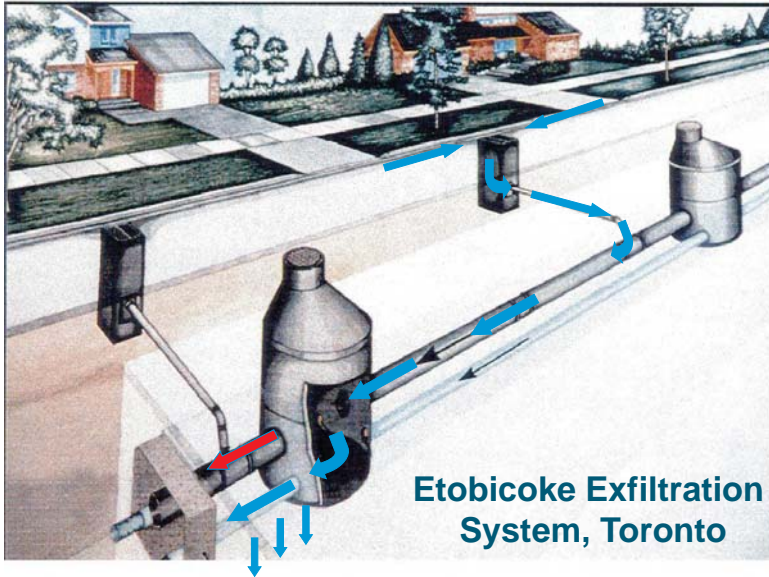
PERFORATED PIPES

- ❖ Perforated pipe systems can be thought of as long infiltration trenches or linear soakaways that are designed for both conveyance and infiltration of stormwater runoff.
- ❖ They are composed of perforated pipes installed in gently sloping granular stone beds that are lined with geotextile fabric that allow infiltration of runoff into the gravel bed and underlying native soil while it is being conveyed from source areas or other BMPs to an end-of-pipe facility or receiving waterbody



HOGG'S HOLLOW PERFORATED PIPE SYSTEM





Etobicoke Exfiltration System, Toronto

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



PERMEABLE PAVEMENTS



BIORETENTION



SOAKAWAYS, INFILTRATION TRENCHES & CHAMBERS



- ❖ Soakaways are rectangular or circular excavations lined with geotextile fabric and filled with clean granular stone or other void forming material, that receive runoff from a perforated pipe inlet and allow it to infiltrate into the native soil
- ❖ Can also provide a conveyance and or storage function



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



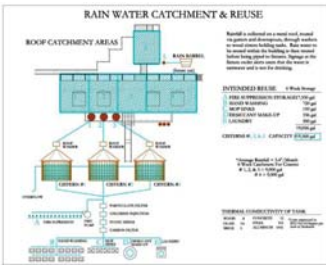
BIORETENTION & BIOSWALES



GREEN ROOFS



RAINWATER HARVESTING (RWH)



LIDS - ICI

❖ Recommended LID Approaches

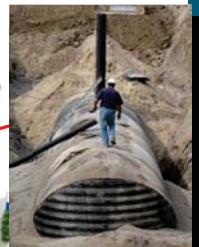
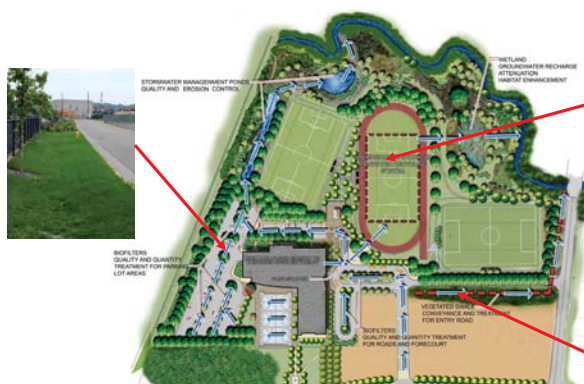
- Soil Amendments
- Perforated Pipe Systems
- Permeable Pavements
- Enhanced Swales
- Bioretention & Bioswales
- Soakaway Pits, Infiltration Trenches and Chambers
- Green Roofs
- Rainwater Harvesting
- etc

COMMERCIAL

❖ IMAX VIDEO



SCHOOLS AND UNIVERSITIES



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
5. Integrated Dingman Creek Corridor

(examples of each on the following slides)

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.



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



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

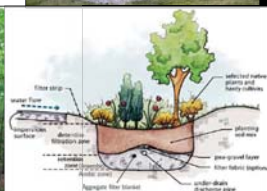


SUBWATERSHED MANAGEMENT STRATEGY 5: INTEGRATED DINGMAN CREEK CORRIDOR

Primary goal:

Integrate natural heritage, open space, recreational, and SWM opportunities into a continuous corridor while providing for the protection, maintenance, rehabilitation, and restoration of the corridor's ecological functions.

- ↳ Evaluate opportunities for the integration of SWM into NHS restoration areas and buffers.
- ↳ Unique opportunity for the City of London.



PRELIMINARY APPROACH TO EVALUATING ALTERNATIVE SUBWATERSHED STRATEGIES

Evaluation of Subwatershed Strategies based on the following categories:

1. Ability to meet targets
2. Natural Environment
3. Social
4. Economic
5. Implementation
6. Technical
7. Legislative

Subwatershed Strategies:

1. Do Nothing
2. Traditional Strategy (end-of-pipe only)
3. Low Impact Development (LID) Strategy
4. Combined Traditional & LID
5. Integrated Dingman Creek Corridor

PRELIMINARY APPROACH TO EVALUATING ALTERNATIVE SUBWATERSHED STRATEGIES



Evaluation Criteria: Relative Weighting:

- 1. Ability to meet targets 30%
 - 2. Environmental 12%
 - 3. Social 12%
 - 4. Economic 12%
 - 5. Implementation 12%
 - 6. Technical 12%
 - 7. Legislative 10%
- Total: 100%

Note:
Proposed scoring system will differ between that of EC #1 and ECs #2-7.

PRELIMINARY APPROACH TO EVALUATING ALTERNATIVE SUBWATERSHED STRATEGIES (CONT'D..)



Detailed Evaluation Criteria:

- 1. Ability to Meet Targets:**
- H1 – Minimize flood risk
 - H2 – Re-establish hydrologic cycle
 - H3 – Natural channel stability
 - H4 – Protect/support aquatic communities
 - H5 – Surface water withdrawals
 - H6 – Support terrestrial communities
- WQ1 – Support human/wildlife uses
 - WQ2 – Prevent algal growth
 - WQ3 – Protect groundwater quality
 - WQ4 – Support aquatic communities
 - A1 – Healthy aquatic communities
 - T1 – Protect/restore/enhance terrestrial resources
 - T2 – Protect/restore/enhance watershed ecosystem

PRELIMINARY APPROACH TO EVALUATING ALTERNATIVE SUBWATERSHED STRATEGIES (CONT'D..)



Scoring for Evaluation Criterion #1 (Ability to meet targets):

THE SCORING SYSTEM	
Score	Condition
0	SS results in level worse than existing conditions
2	SS results in level same as existing conditions
3	↓
5	SS results in level mid-way between existing conditions and target
7	↓
10	SS results in level that meets target

PRELIMINARY APPROACH TO EVALUATING ALTERNATIVE SUBWATERSHED STRATEGIES



Evaluation Criteria #1: Ability to Meet Targets

Example:

Objective H1 – Minimize Flood Risk

Flow target: Maintain existing peak flows ($Q_{100} = 73 \text{ m}^3/\text{s}$ at Highway 401)

Target	Condition Resulting from Subwatershed Strategies				
	1: Do Nothing	2: Traditional SWM	3: LID	4: Traditional SWM + LID	5: Dingman Integrated Corridor
Maintain existing peak flows ($Q_{100} = 73 \text{ m}^3/\text{s}$)	$Q_{100} = 110 \text{ m}^3/\text{s}$	$Q_{100} = 95 \text{ m}^3/\text{s}$	$Q_{100} = 90 \text{ m}^3/\text{s}$	$Q_{100} = 70 \text{ m}^3/\text{s}$	$Q_{100} = 70 \text{ m}^3/\text{s}$
Score:	0	0	1	8	8

0 = worse than existing conditions, 10 = meets target

PRELIMINARY APPROACH TO EVALUATING ALTERNATIVE SUBWATERSHED STRATEGIES



Evaluation Criterion 1: Ability to Meet Targets

Objectives	Targets	Condition Resulting from Subwatershed Strategies				
		1: Do Nothing	2: Traditional SWM	3: LID	4: Traditional SWM + LID	5: Dingman Integrated Corridor
H1: Minimize Flood Risk	Maintain existing peak flows ($Q_{100} = 73 \text{ m}^3/\text{s}$)	$Q_{100} = 110 \text{ m}^3/\text{s}$ Score: 0	$Q_{100} = 95 \text{ m}^3/\text{s}$ Score: 0	$Q_{100} = 90 \text{ m}^3/\text{s}$ Score: 0	$Q_{100} = 70 \text{ m}^3/\text{s}$ Score: 8	$Q_{100} = 70 \text{ m}^3/\text{s}$ Score: 8
H2: Re-establish Natural Hydrologic Cycle	<ul style="list-style-type: none"> • $Q_{\text{peak}} / Q_{\text{baseflow}} = 24$ • $Q_{\text{bankfull}} / Q_{\text{baseflow}} = 8$ 	<ul style="list-style-type: none"> • $Q_{\text{peak}} / Q_{\text{baseflow}} =$ • $Q_{\text{bankfull}} / Q_{\text{baseflow}} =$ Score:	<ul style="list-style-type: none"> • $Q_{\text{peak}} / Q_{\text{baseflow}} =$ • $Q_{\text{bankfull}} / Q_{\text{baseflow}} =$ Score:	<ul style="list-style-type: none"> • $Q_{\text{peak}} / Q_{\text{baseflow}} =$ • $Q_{\text{bankfull}} / Q_{\text{baseflow}} =$ Score:	<ul style="list-style-type: none"> • $Q_{\text{peak}} / Q_{\text{baseflow}} =$ • $Q_{\text{bankfull}} / Q_{\text{baseflow}} =$ Score:	<ul style="list-style-type: none"> • $Q_{\text{peak}} / Q_{\text{baseflow}} =$ • $Q_{\text{bankfull}} / Q_{\text{baseflow}} =$ Score:
H3: Ensure Natural Channel Stability and Protect Against Erosion and Sedimentation	Infiltration: 105 to 182 mm/year Critical shear stress (CSS) below current level of # hrs/year	125 mm/year Score:	90 mm/year Score:	130 mm/year Score:	165 mm/year Score:	180 mm/year Score:
		CCS= # hrs/year Score:	CCS= # hrs/year Score:	CCS= # hrs/year Score:	CCS= # hrs/year Score:	CCS= # hrs/year Score:
	Total Score:	#	#	#	#	#

PRELIMINARY APPROACH TO EVALUATING ALTERNATIVE SUBWATERSHED STRATEGIES (CONT'D..)



Detailed Evaluation Criteria:

- 2. Natural Environment:**
 - Water quality
 - Flooding
 - Erosion
 - Water balance
 - Terrestrial natural heritage
 - Aquatic natural heritage
 - Corridors
 - Potential Naturalization Areas
- 3. Economic:**
 - Capital cost
 - O & M costs
 - Land requirements
 - Property values
- 4. Social:**
 - Existing landuses
 - Aesthetics
 - Benefit to community
 - Public acceptance

PRELIMINARY APPROACH TO EVALUATING ALTERNATIVE SUBWATERSHED STRATEGIES (CONT'D..)



Detailed Evaluation Criteria:

5. Implementation

- Landowner participation
- Land acquisition

6: Technical

- Feasibility

7. Legislative

- City of London: London Plan
- UTRCA regs.
- MNRF
- MOECC
- DFO
- Etc.

PRELIMINARY APPROACH TO EVALUATING ALTERNATIVE SUBWATERSHED STRATEGIES (CONT'D..)



Scoring for Evaluation Criteria 2 – 7:

Score

Condition

- | | |
|---|---|
| 0 | Subwatershed Strategy (SS) results in worse than existing conditions (i.e. negative impact) |
| 1 | SS results in level same as existing conditions |
| 2 | SS results in minor improvement |
| 3 | SS results in moderate improvement |
| 4 | SS results in significant improvement |

PRELIMINARY APPROACH TO EVALUATING ALTERNATIVE SUBWATERSHED STRATEGIES (CONT'D..)



Scoring for Evaluation Criteria 2 – 7:

Evaluation Criteria	Subwatershed Strategies				
	1: Do Nothing	2: Traditional SWM	3: LID	4: Traditional SWM + LID	5: Dingman Integrated Corridor
2: Natural Environment		2			
3: Social		2			
4: Economic		1			
5: Implementation		1			
6: Technical		1			
7: Legislative		2			
Score:		9			

0 = worse than existing conditions, 4 = significant improvement

PRELIMINARY APPROACH TO EVALUATING ALTERNATIVE SUBWATERSHED STRATEGIES (CONT'D..)



Recap:

5 Subwatershed Strategies:

1. Do Nothing
2. Traditional SWM Strategy (end-of-pipe only)
3. Low Impact Development (LID) Strategy
4. Combined Traditional & LID
5. Integrated Dingman Creek Corridor



Previously developed preliminary Targets (under objectives H1, H2, H3, etc.) will be discussed with City of London and UTRCA prior to being finalized.

7 Evaluation Criteria:

- EC #1 (Ability to Meet Targets) score scaled from 0-10; weighted at 30%.
- ECs #2-7 score scaled from 0-4; collectively weighted at 70%.

QUESTIONS?



Thank you for your participation and feedback!



Environmental Impact Study

February 15, 2018

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Introduction



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Public Information Centre #5



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What's next for TPAP

- Compile feedback from December and January engagement events.
- Refine designs and evaluate options to identify technical preferred design
- Present preferred Preliminary Design to public and stakeholders
- Bring forward draft Environmental Project Report to Council
- Initiate formal TPAP process with additional consultation opportunities.

We Are
Here



Today's Presentation



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Presentation Overview



1. Background
2. Policy Context
3. Study Area
4. Infrastructure, potential impacts, mitigation and net effects
5. Net Environmental Gains Summary
6. Questions

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Background

- SLSR published February 2017
- EIS Scoping Meeting April 2017
- 2017 Field Work
 - Route changes and additions
 - Western University
 - Site 7 – Park and Ride
 - Passive mussel searches
 - ELC refinement
 - Chimney Swift, Barn Swallow and Cliff Swallow

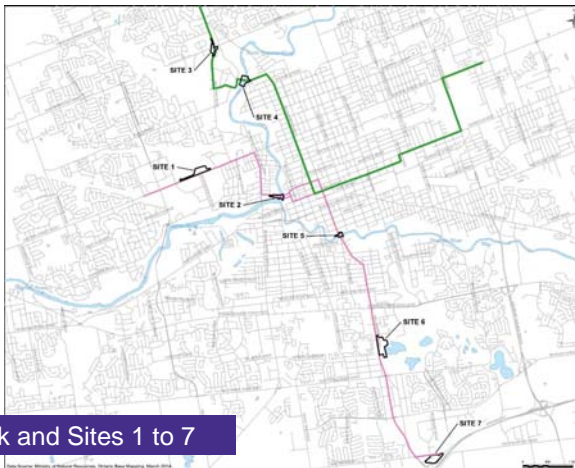


Monarch Caterpillar

Policy Context



Study Area



BRT Network and Sites 1 to 7

Site 1: Mud Creek Crossing at Oxford Street West



Road widening to north

Natural Heritage System:

- significant valleyland
- significant woodlands
- unevaluated, unmapped wetlands
- habitat for endangered and threatened species
- fish habitat
- significant wildlife habitat

Site 1: Mud Creek Crossing at Oxford Street West



Road widening to north

- Mud Creek Subwatershed Environmental Assessment and land development projects
 - channel realignment, new culvert, enhancement of valley
- RT works to follow

Site 2: North Thames Crossing at Queens Ave and Riverside Drive



Widening Queens Avenue bridge to north

Natural Heritage System

- significant valleyland
- habitat for endangered or threatened species
- fish habitat
- significant wildlife habitat

Site 2: North Thames Crossing at Queens Ave and Riverside Drive



Widening Queens Avenue bridge to north

- In-water works are not anticipated
- Avoidance of direct impacts to natural heritage features, including SAR and their habitat

Site 3: Medway Creek Crossing at Western Road



Bridge widening to east

- Natural Heritage System
- Medway Valley Heritage Forest ESA
 - significant valleyland
 - significant woodlands
 - habitat for endangered or threatened species
 - fish habitat
 - significant wildlife habitat

Site 3: Medway Creek Crossing at Western Road

- Avoidance of ESA and significant woodlands
- Endangered Species Act considerations (Overall Benefit Permit)
- Compensatory mitigation
 - Invasive species management strategy
 - Enhancement of existing features



Bridge widening to east

Site 4: North Thames Crossing at University Drive



Structural requirements under review

- Natural Heritage System
- significant valleyland
 - significant woodlands
 - habitat for endangered or threatened species
 - fish habitat
 - significant wildlife habitat

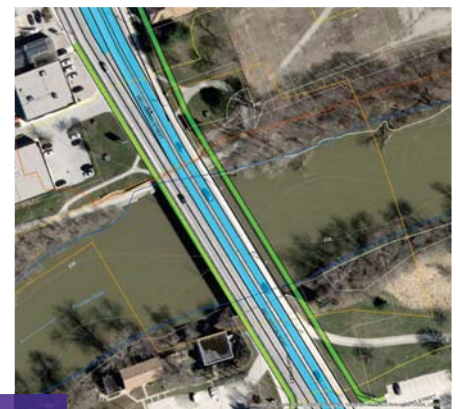
Site 4: North Thames Crossing at University Drive



Structural requirements under review

- Endangered Species Act considerations
- Opportunity for nominal improvement in hydraulic capacity
- Compensatory mitigation
 - > 1:1 habitat replacement
 - Invasive species management strategy

Site 5: Thames River Crossing at Wellington Road



Bridge widening to east

- Natural Heritage System
- significant valleyland
 - significant woodlands
 - habitat for endangered or threatened species (federal and provincial)
 - fish habitat
 - significant wildlife habitat

Site 5: Thames River Crossing at Wellington Road

- Endangered Species Act (provincial) and SARA (federal) considerations
- Compensatory mitigation
 - > 1:1 habitat replacement
 - Invasive species management strategy



Bridge widening to east

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Site 6: Westminster Ponds East of Wellington Road

Natural Heritage System

- ESA / ANSI
- provincially significant wetland
- significant wildlife habitat



Road widening and grading to east

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Site 6: Westminster Ponds East of Wellington Road

- Footprint reduction
- Compensatory mitigation
 - > 1:1 habitat replacement
 - Invasive species management
 - Habitat enhancement with plantings



Road widening and grading to east

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Site 7: Park and Ride at Exeter Road

Park and Ride Lot under consideration



Natural Heritage System:

- significant valleyland
- fish habitat
- unevaluated, unmapped wetland
- Habitat for endangered or threatened species
- Significant wildlife habitat

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Site 7: Park and Ride at Exeter Road

Park and Ride Lot under consideration



- Avoidance of natural vegetation communities and SAR habitat
- Hydraulic modelling to assess possibility of reducing floodplain by re-sizing Wellington Road culvert

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Rapid Transit Corridor



Kentucky Coffeetree

- SAR Trees
 - Kentucky Coffeetree
 - Butternut
- Chimney Swift
- Significant Wildlife Habitat (rare vegetation community)
- Street trees

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Net Environmental Gains Summary

- Reduction in greenhouse gases
- Concentrated development reduces urban sprawl
- Use of existing roadways - no further habitat fragmentation
- Modification to existing in-water features, no new
- Potential to improve flood capacity
- Low Impact Development (LID) features
- Invasive species management (*Phragmites*, Glossy and European Buckthorn, etc.)
- Habitat enhancement and overall benefit for Species at Risk
- Tree replacement and enhancement planting
- Monitoring plans

Questions?

Rare Vegetation Community: FODM6-2



Provincially Rare Vegetation Community:

- FODM6-2: Fresh-Moist Sugar Maple-Black Maple Deciduous Forest within 50 m of Route
- listed as 'S3?' denoting uncertainty regarding its status as Vulnerable within the province

Lambton Drive, Western University

Possible Permits and Approvals

UTRCA

- permits under O.Reg. 157/06 at each site

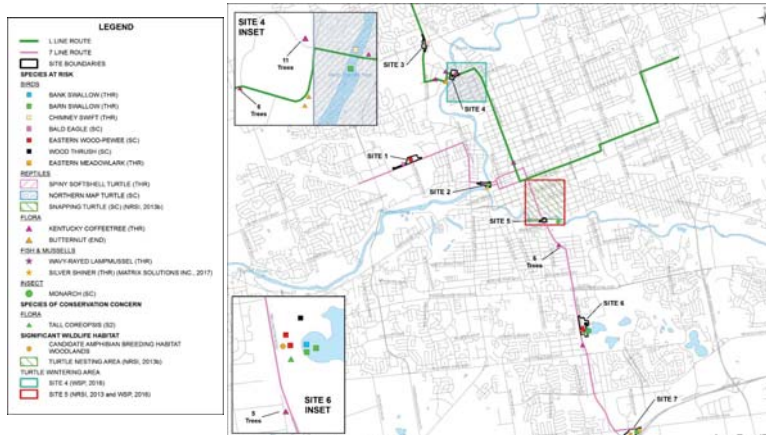
DFO

- Fisheries Act Authorizations if serious harm to fish or fish habitat (Sites 3, 4 and 5)
- SARA permits (critical habitat at Site 5)

MNRF

- Letter of Advice or Overall Benefit Permit under Endangered Species Act (Sites 2, 3, 4 and 5)
- New or modified Licence of Occupation under the Public Lands Act at Sites 2, 3, 4 and 5

Species at Risk – Field Observations



GREEN STANDARDS FOR LIGHT POLLUTION & BIRD-FRIENDLY DEVELOPMENT

Recommendations for the City of London

Prepared by the Ecological and Environmental Advisory Committee (EEPAC), the Advisory Committee on the Environment (ACE), & the Animal Welfare Advisory Committee (AWAC)

- Third Draft -
February 2018



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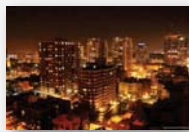
Light pollution in London, Ontario. From <http://lightpollutionmap.info>



1. DEFINITIONS

Definitions were derived from pre-existing standard documents of other municipalities within Ontario¹⁵. For the purpose of this document, terms shall be defined as follows:

- Architectural lighting** – outdoor lighting to illuminate landscaping features (e.g. trees, stones, or water), building facades, etc. (excluding signage)
- Automatic timing device** – any device which controls light fixtures to automatically turn on and off at designated times
- City** – the City of London, Ontario
- Council** – the elected municipal council of the City
- Curfew** – a time defined by the City when outdoor lighting must be reduced or switched off
- Cut-off shielding** – a luminaire having a light distribution in which zero lux intensity occurs at or above and angle of 90° nadir
- Decorative lighting** – see vanity lighting (below)
- Diode** – a device allowing one-directional flow of current
- Direct light** – light directly emitted from the installed light fixture or off of its internal reflector or luminaire
- Emergency conditions** – lighting that is only switched on during an emergency, exit paths during an emergency situation, or security lighting used solely during alarms
- Glare** – undue brightness from a light source. Light emitted from fixtures which diminish a bystander's ability to see and/or causes discomfort
- Grandfathered** – existing light fixtures which may be exempt from these recommendations (Section 6)
- Hardscape** – permanent human-made elements of an outdoor landscape design
- Horizontal illuminance** – amount of light energy landing on a horizontal surface (e.g. the ground)
- IESNA** – Illuminating Engineering Society of North America or any successor organization
- Indirect light** – light which is scattered or reflected off of other surfaces
- Lamp** – any artificial source of light
- LED (Light Emitting Diodes)** – a popular modern type of lamp
- Light fixture** – a complete lamp assembly which includes lamp, housing, reflector, mounting bracket, and/or pole socket
- Light pollution** – any adverse consequence of artificial light including, but not limited to, glare, light trespass, sky glow, energy waste, compromised safety and security, and impacts on the nocturnal environment
- Light trespass** – any light which falls beyond the property it is intended to illuminate
- Lumen** – a measurement unit that quantifies the amount of light produced by a lamp or emitted from a luminaire (distinct from 'watt', a measure of power consumption). Conversion to lux is possible
- Luminaire** – see Light fixture (above)
- Lux** – an international unit used to measure light intensity. Conversion to lumen is possible
- Official Plan** – the City of London and Planning Area's Official Plan, revised periodically
- Outdoor lighting** – any outdoor installed or portable luminaire used for flood lighting, general illumination, or advertisement
- Outdoor recreational facilities** – an outdoor space or venue used for sporting events or entertainment purposes within the city
- Over-illumination** – lighting of an area beyond that which human vision is able to differentiate
- Owner** – the registered owner according to the land registry office or the person in the actual occupation of the land sold to the Director in accordance with the Veterans' Land Act (Canada)
- Point illuminance** – amount of light energy measured at a given point
- Shielded luminaire** – refers to luminaires with an adjustable mounting device allowing aim in any direction and contains a shield, baffle, or baffle to reduce direct view of lamp
- Sky glow** – any brightening of the nighttime sky caused by light directed and/or reflected upwards and/or sideways that reduces the ability to view the night sky
- Sufficient daylight** – adequate natural lighting such that exterior artificial lighting is not required (approximately 30 minutes after sunrise or 30 minutes prior to sunset)
- Vanity lighting** – lighting for the purpose of drawing attention. For example, lighting to illuminate landscaping features (e.g. trees, stones, or water), building facades, etc. (excluding signage)
- Ventilation grate** – street grates or grills which disperse air from structures under roadways and/or sidewalks to reduce heat gain in the summer and allow for passive heating in winter
- Visual markers** – a physical design visible within a bird's optical wavelength to indicate a barrier is present



London, Ontario downtown at night. Photograph by Joanna Kurek



2. PURPOSE & JUSTIFICATION

The City of London plans to become one of the greenest cities in Canada by reducing its impacts on the environment and its carbon footprint (direction 4, The London Plan)¹⁶. Specifically, The London Plan contains the goals of minimizing bird strikes on buildings and reducing negative environmental impacts of light pollution¹⁷. In Canada, it is estimated that 25 million birds die annually from collisions with buildings¹⁸. The purpose of this document is to provide guideline recommendations for by-law development to achieve these goals. Many specifications in this document are derived from pre-existing guidelines of other Ontario municipalities¹⁹, as well as from the Illuminating Engineering Society of North America (IESNA).

2.1 Environmental Impacts

Light pollution impacts the behaviour and survival of birds, mammals, amphibians, fish, and arthropods, and diminishes ecological health both locally and nationally²⁰. Specific threats to wildlife include disruption of movement and migration¹¹⁻¹⁴, changes in communication and reproductive behaviours (e.g. songbird call times)¹¹, shifts in species diversity, altered interactions among species^{14,17}, disruption of foraging behaviour, and increased mortality^{18,21}.

2.2 Carbon Footprint and Cost

Goals of the current London Community Energy Action Plan²² include an 80% reduction in greenhouse emissions by 2050 and energy cost savings. Policy and design standards to reduce wasted lighting energy are crucial if the City of London is to achieve these goals. Reducing wasted energy is an easy way for the City of London to reduce its carbon footprint; total wasted light energy in the United States is estimated between 80 and 225 kg of CO₂ annually²³. The negative economic impacts of light pollution on health, wildlife, and astronomy are estimated at \$7 billion each year in the United States¹⁰.

3. GENERAL INFORMATION

3.1 Light Pollution

The City of London's Advisory Committee on the Environment (ACE), Environmental and Ecological Protection Advisory Committee (EEPAC), and Animal Welfare Advisory Committee (AWAC) (or 'we the committees') collectively recognize that it is beneficial to protect dark skies through responsible city lighting policies. We the committees recognize that other Ontario municipalities have outdoor lighting ordinances to reduce glare and light intrusion while promoting energy conservation and healthy neighbourhoods.

Light pollution has been defined as "excessive or obtrusive artificial light caused by bad lighting design"²⁴. Proper lighting design and illumination standards can reduce light pollution by²⁵:

- Preventing lighting in specific areas
- Limiting lighting duration
- Reducing light trespass
- Reducing light intensity

3.2 Bird-Friendly Design

Bird-friendly design is critical for city-wide progressive green development standards. Designs to reduce bird mortality may be similar to light pollution reduction strategies, with further inclusion of non-reflective glass and ventilation grates. In accordance with The City of London's Humane Urban Wildlife Conflict Policy, the City of London can take the following measures to reduce bird fatalities:

- Placement of bird-friendly exterior light fixtures in conjunction with glass design elements
- Adoption of a migratory bird policy
- Provision of a comprehensive list of design-based development strategy options to architects, planners, urban designers, building owners and managers, tenants, and homeowners that can be applied to new or existing buildings
- A campaign that promotes awareness of the dangers the urban environment poses to migrating birds such as the City of Toronto's 'Lights Out Toronto' event
- Bird-friendly ventilation grates with a porosity no greater than 2 cm² or covered with netting to prevent injured birds from falling through
- If transparent noise barriers must be used, they shall have visual markers for birds to perceive and avoid them
- Eliminate reflective glass and mirrors from exterior landscape and building design. Birds are unable to distinguish between reflected and real habitat, which results in increased collision mortality



The night sky in Toronto, Ontario during a power outage in 2013 (left) and on a night with power (right). Photograph by Brad Cohen



4. LIGHTING DESIGN CRITERIA

All general recommendations found in Section 4.1 are applicable to all newly installed lighting fixtures. Specific design details can be found in the following sections categorized by site usage type (residential, non-residential, special consideration sites). These recommendations and criteria are amalgamated from the design guideline recommendations of the Model Lighting Ordinance²⁶, and various Ontario municipalities (e.g. Toronto, Burlington, and Richmond Hill).

4.1 Hours of Operation

Recommendations for luminaire and timing of lighting are intended to reduce or eliminate unnecessary light pollution. The IESNA and other documents typically use a light curfew to achieve this. The City of London's curfew begins **at dusk and ends at dawn**.

- Facilities requiring a curfew adjustment (e.g. restaurants, bars, sports stadiums, hospitals) will be evaluated on a case-by-case basis. During curfew, outdoor lighting must adhere to Section 4.2, bullet 5 option A or B. All residential and non-residential areas, including illuminated signs, are subject to the curfew²⁶. Some site uses may warrant a curfew extension (e.g. recreation or entertainment) (see Section 6, General Exemptions).

4.2 Universal Outdoor Light Fixture Requirements

The general recommendations laid out below apply to all properties and lots.

- All outdoor light fixture installations must use shielded or cut-off fixtures
- No installed light fixtures will emit light above 90° from a direct downward plane
- Light fixture mounts/poles must have a non-reflective finish to reduce glare
- Maximum lumen levels for different light fixture heights must conform to Table 4.2
- All outdoor installed lighting (unless stated otherwise in Section 4.5) must incorporate one of the following:
 - An automatic switch (or automatic timing device) to extinguish all outdoor lighting curfew. These switches can include photoelectric, astronomical, programmable, or building automation systems. The switch must include a backup power device (battery or sensor)
 - Occupancy or other
 - Occupancy sensors/timers/motion sensors

- Light trespass at the property line will not exceed 11.6 lumens / ft² for commercial/industrial property boundaries or 5.8 lumens / ft² for residential property boundaries. In the case of a mixed residential/commercial boundary, the value for the residential shall take precedence
- Adjustable, or swivel fixtures, are prohibited
- Pole heights cannot exceed: **Height = Distance from pole to property line x 4** and should not exceed height of adjacent structures. Large parking lots and parking garages with >10 parking spaces are exempt from this recommendation. If a non-residential zone light fixture must be installed higher due to safety considerations, cut-off shielding greater than 90° must be installed
- Glare onto adjacent properties, roadways, and pedestrian thoroughways is prohibited. This may require the use of additional shielding
- All light sources (a.k.a bulbs, diodes) must be directed in such a way so that the light source is not directly visible from adjacent properties
- Openings in buildings which will contribute to light spillage must be blocked or shielded to transmit less than 10% light during the overnight hours (11 PM - 6 AM)
- The use of lasers, search lights, strobe lights, twinkle lights, or chasing lights are prohibited unless used for emergency services

Table 4.2

Mounting Height (Feet)	Mounting Height (Meters)	Maximum Single Light Fixture Lumens
6	1.83	400 – 1000
8	2.44	600 – 1600
10	3.05	1000 – 2000
12	3.66	1600 – 2400



4. LIGHTING DESIGN CRITERIA

4.3 Residential

All residential zones (R1 through R11) must adhere to the requirements listed above. If the residential zone is combined with a non-residential zone, the property is strongly encouraged to meet both residential (Section 4.3) and non-residential (Section 4.4) guidelines. Residential guidelines are as follows:

- Maximum single fixture lumen allowance at a main entrance will not exceed 1,200 lumens.
- Maximum lumen allowance for each additional fixture (excluding main entrance, driveway/parking (Section 4.5.2), and motion sensed security lighting (Section 4.5.7)) is 315 lumens/fixture.
- In residential buildings with 5 or more stories, shielded directional fixtures with motion-sensors for security are not to exceed 1,200 lumens each.

Additional design criteria for specific types of sites or property uses (including parking lots and security lighting, which may be utilized for residential properties) are included in Section 4.5.

4.4 Non-Residential

For all non-residential sites, Table 4.4 must be followed. Site total lumen allowance will be determined by number of parking spaces (if site has fewer than 10) or total square footage of hardscape. These site lumens may be divided among all light fixtures on the property, so long as they adhere to the universal guidelines noted above (Section 4.2) and any specific site guidelines below. Some specific types of site usage (e.g. sale lots or service stations) will have additional design considerations or may receive additional lumen allowance (Section 4.5).

Table 4.4

Light Code	City of London Property Zone Code(s)	Lumen Allowance	
		Lumens / parking space (for sites <= 10 parking spaces)	Lumens / ft ² of hardscape (sites > 10 parking spaces)
LZ-0	AG ER OS	350	0.5
	UR		
LZ-1	AG DC HER	490	1.25
	C		
	OC RO RRC		
	T TGS		
	AC GI OF		
LZ-2	ASA HS OR	630	2.5
	BDC LI RSC		
	CC NF NSA		
	CF CSA OB		
	CR		
	DA RF SS		
LZ-3	EX RSA	840	5
	HI RT		

Values obtained from the IESNA. This table is intended for non-residential zones only.
 LZ0 - Recommended default zone for wilderness areas, parks, and preserved and undeveloped rural areas.
 LZ1 - Recommended default zone for rural and low-density residential areas (may include business parks).
 LZ2 - Recommended default zone for light commercial business districts and high density or mixed-use residential districts (may include churches, schools, recreation facilities, light industrial zoning).
 LZ3 - Recommended default zone for large cities business district (may include business zone districts, commercial mixed-use, and heavy industrial zones).



4. LIGHTING DESIGN CRITERIA

4.5 Specific Use Design Considerations and Lumen Allowance Additions
 The following sections have been provided for specific-use zones and may be applicable to residential or non-residential areas.

4.5.1 Entertainment Venues and Events
 Entertainment venues and specific events are to be evaluated individually on a case by case basis.

4.5.2 Parking Lots and Garages
 Lighting in parking lots and garages are primarily for the safety of pedestrians. Parking structure lighting should be modulated so that they transition to match, but not exceed, adjacent roadway lighting levels at exits/entrances. All parking lots must adhere to maximum lumens at property line as described in Section 4.2.

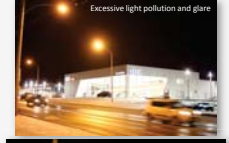
In general, all parking lots shall have an average horizontal illumination of no more than 25 lux with a maximum point illumination not to exceed 40 lux. In the individualized case that a parking lot requires enhanced security due to the threat of vandalism or personal safety, the average horizontal illumination and maximum point illumination may be no greater than 75 lux.

These recommendations apply to any and all residential, institutional, customer, employee, or general use parking lots.

4.5.3 Outdoor Sales Lots
 Sales lots are illuminated to draw attention to displayed products and/or for security purposes. The lighting requirements include a graduated illumination level from the front row (between the roadway and the front row of merchandise) to the last row. In addition to the universal guidelines presented in Section 4.2, site maximum horizontal illumination is not to exceed:
 100 lux at the front row
 50 lux at all other rows
 20 lux at all pathways/drives on the property

In addition to the lumen allowance provided in Table 4.4, outdoor sales lots used exclusively for the sale of vehicles have an additional allowance of:
 LZ-1, additional 4 lumens / ft² hardscape
 LZ-2, additional 8 lumens / ft² hardscape
 LZ-3, additional 16 lumens / ft² hardscape

These recommendations apply to every outdoor sales lot to be illuminated and are to be incorporated into the light fixture design in accordance to the lumen allowance for non-residential areas.



Two commercial lots in London, Ontario with excessive light pollution and glare (top) and relatively low light pollution and low glare (bottom). Photographs © Ryan Frazier 2015



4. LIGHTING DESIGN CRITERIA

4.5.4 Service Stations and Gas Stations

The purpose of lighting a service/gas station is to ensure patron safety and to draw attention and interest to the business. Over-illumination of the property is prohibited, and the illumination limits for property boundaries (Section 4.2) must be maintained. Installed fixtures are to be limited to a canopy whenever possible. In addition to adherence to the universal guidelines presented in Section 4.2, site average horizontal illumination is not to exceed:
 100 lux for pump island/under canopy
 30 lux for service areas
 20 lux for pathways/drives

In addition to the allowance provided in Table 4.4A, service stations/gas stations have additional allowed lumens:
 LZ-1, 4000 additional lumens / pump
 LZ-2, 8000 additional lumens / pump
 LZ-3, 16000 additional lumens / pump

These values are additional design criteria which need to be implemented in conjunction with the lumen allowance provided for non-residential sites.

4.5.5 Sports Recreational Fields

Outdoor sports fields require lighting for clear illumination of players. Sports/recreational fields have been divided into 4 classes:
 1. More than 5,000 attendance seats (e.g. universities, colleges, semi-pro players)
 2. 1,500 – 5,000 attendance seats (e.g. small universities or colleges, high-attendance high schools)
 3. 500 – 1,500 attendance seats (e.g. high schools, training clubs with spectator seats)
 4. Less than 500 attendance seats (e.g. leagues, elementary schools, little league, social events)

Using this classification system, illumination levels and lighting equipment must adhere to the IESNA Recommended Practice for Sports and Recreational Area Lighting (RP-6, latest edition). Illuminance values, fixture positioning, pole height, and curfew timing mandated in the IESNA RP-6 shall take precedence over the requirements outlined in this document.

4.5.6 Architectural and Vanity Lighting

Architectural lighting is used to highlight and attract attention to architectural features, heritage features, and municipal landscaping, monuments, or fountains. No fixture will be installed to emit light above the horizontal plane (e.g. directly upwards). No light fixture will be aimed at reflective or polished surfaces such as glass, smooth stone, glazed tile, etc. The maximum total illumination shall not exceed 100 lux. Architectural/vanity lighting is to be extinguished at curfew, preferably by automatic switch (Section 4.2, bullet 5, option A).

Lumens from architectural light fixtures must be included in the site maximum lumen allowance for non-residential sites (Table 4.4).

4.5.7 Security Lighting

Lighting to ensure the safety of pedestrians shall be used as required. Light fixtures for this purpose shall:
 • Reduce brightness contrast
 • Ensure no light is directed 90° above the horizontal
 • Employ motion sensors (Section 4.2, bullet 5, option B)
 These guidelines shall apply to all pedestrian trafficked areas and will be included in the site/light lumen allowance.

4.5.8 Other

- vehicular and temporary emergency lighting required by Fire and Police departments, or other emergency services shall be exempt from the requirements above.
- Outdoor lighting utilizing fossil fuels, including torches, lanterns, and open flames.
- Lights used by contractors, providing the lights are located on the property where such work is taking place and only during hours where work is occurring.
- Specific instances where concern for public safety conflicts with the guidelines outlined in this document will be evaluated on a case-by-case basis.



5. EXEMPTIONS

5.1 Grandfathered Lighting

All existing light fixtures in place at the time of this policy shall be grandfathered. Grandfathered light fixtures which are determined to cause excessive glare or light trespass may be required to be shielded, redirected, or removed. Any modification, relocation, repair, or reinstallation of any grandfathered light fixture must meet the design criteria laid out below (Section 4). Should a property undergo a use or zoning change, all light fixtures must be updated to meet the design criteria in Section 4. All new fixtures installed after the date of this policy must meet the design criteria in Section 4.

5.2 General Exemptions

These guidelines do not take precedence over highway and road lighting bylaws.

5.2.1 Recreational use - after 11 PM - limitation

Where an outdoor recreational use in an outdoor recreational facility continues after 11 PM, outdoor light fixtures required to be on in connection with that use are permitted, but only while the event takes place or continues.

5.2.2 Entertainment event - after 11 PM - limitation

Where a concert, play or other entertainment event in a park or on other land owned by the Corporation and used for public purposes takes place or continues after 11 PM, outdoor light fixtures required to be on in connection with that event are permitted, but only while the event takes place or continues.

5.2.3 Hospitals

All hospitals shall be exempt to not disturb citizen access to health care.

5.2.4 Temporary Exemptions

Any person may submit a written request for temporary exemption from the recommendations by completing a written request form prepared by the City. The written request should include:

- Specific exemption request
- Type and use of exterior lighting involved
- Date(s) of the event
- Duration of the event
- Location of exterior lighting
- Size, wattage, and height of proposed lighting

The owner of the land upon which the prohibited light(s) will be placed shall apply to the city for an exemption. Plans for the location and fixture specifications for the specified light(s) shall be submitted with the application.

An exemption may be granted in whole or in part with terms and conditions. Any breach by the applicant of any of the terms or conditions will render the exemption null and void.



Keith Urban at Rock the Park music festival, London Ontario. Photograph © Owen Rutten 2015



6. BIRD-FRIENDLY DESIGN

Mortality rates of birds are increasing due to collisions with buildings, especially during the migratory season. Each year nearly 25 million birds die in Canada from building collisions alone, making reflected light from buildings one of the most deadly threats to birds. With new guidelines in place, a building that emits reflected light which injures or kills birds is now a violation of the provincial Environmental Protection Act (EPA) and the federal Species at Risk Act (SARA). Due to these legal offenses, it is important for buildings to follow bird-friendly design guidelines across Canada.

The following strategies outline recommendations for achieving green standards for bird-friendly development, and are derived from the City of Toronto Green Development Standard: Bird-Friendly Development Guidelines (2007), City of Toronto Green Development Standard Version 2.0 (2015) and City of Toronto Bird-Friendly Development Guidelines Best Practices Glass (2016). These documents work together to reduce the threat of death from buildings by making glass less dangerous to birds and by mitigating light pollution. Options for creating visual markers, treating glass, and muting reflection shall be applied to 85% of glass features and windows for the first 12 m above grade (dimensions relate to typical tree height). Dimensions for visual markers and muting reflection applications are subject to building design and site conditions.

6.1 Visual Markers

Visual markers are the most effective technique to reduce window strikes and shall be used on exterior surface glass, balcony railings, fly-through conditions and parallel glass within the first 12 m of the building. The distance between patterns or applications on glass must be a distance of 10 cm by 10 cm or less and at least 5 mm in diameter. Visual markers should have high contrast and be applied to low reflection, exterior surface glass.



A window with visual marker strips and a bird used to prevent bird strikes. Photograph from www.smith.edu/news/preventing-bird-collisions-at-mccorrell/



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6.2 Glass treatments

Glass treatments shall be applied above 12 m to the height of or anticipated height of the surrounding tree canopy and vegetation at maturity in sites close to natural areas such as ravines or woodlots. Glass treatments must also be applied to glass adjacent to or in the vicinity of elevated landscapes such as podium gardens and green roofs. Glass treatment options must also be applied to windbreaks, solariums and greenhouses in order to create sufficient visual markers for birds.

UV glass can be effective since birds are able to see into the UV spectrum, making UV treated glass opaque to birds but translucent to humans. Such UV glass must be tested and approved by a third party for effectiveness as outlined in the 2014 Toronto Green Standard version 2.0.

Patterned or 'fritted' glass refers to glass which contains opaque or translucent images or abstract patterns. The images are created by using dots in a variety of sizes and densities which are most effective on the exterior surface of the glass. Only non-reflective glass should be used when combined with treated patterns. Pattern design should follow the outlines in 6.1: Visual Markers.

Film products refers to external film applications or laminates which contain images or patterns and can be designed to enhance the architectural design of the building. **Decals** with no more than 5 to 10 cm of clear spaces between patterns can be used. Decals must be located on the exterior glass.

Decorative Grilles and Louvers refer to exterior grille features which if applied must be 10 cm by 10 cm or less.

Finestration Patterns refers to multiple paned glass containing horizontal and vertical mullions. Panes must be no more than 28 cm with 10 cm or less the most effective visual marker.

Art work applied to the interior or exterior of windows can be used to provide sufficient visual markers while allowing for natural light.



Effective glass treatments for bird-friendly building design. Photographs from Toronto Bird-Friendly Best Practices Glass ©



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6.3 Muting Reflections Options

Awings and overhangs to mute images at ground floor level.
Sunshades refer to applications to reduce direct sunlight, while allowing indirect light into rooms. This feature mutes reflection thus reducing window strikes.

6.4 External Lighting

Decorative Lighting should be eliminated wherever possible. For existing buildings, decorative lighting should be projected downward and turned off during migratory season (September – November, March – May)

Advertising Lighting must be lit from above to reduce the volume of light being projected unnecessarily into the night sky.

Event and Festival Lighting such as spotlights and search lights must be prohibited during bird migration season.

Roof Top Lighting that should be prohibited. Vanity lighting may be allowed only if the following conditions are met:

- Exterior light fixtures are installed to prevent unnecessary light spillage.
- Vanity lighting is turned off from 11 PM - 5 AM year-round without exception utilizing an automatic device.

Overlites afterwards may be provided by a manual or occupant sensing device with a limit of 30 minutes.

6.5 Interior Lighting

Bird Friendly Operational Systems and Practices refers to the use of operating and system practices by residents, tenants, building owners, and managers to help reduce migratory bird fatalities. The following strategies can be used:

- **Installation of interior task lighting** at work stations be the recommended light source during evening work hours, increasing energy efficiency, reducing light pollution, and migratory bird fatalities. Overhead lighting be turned off at night and focused lighting such as task lighting be used during bird migration season.
- **Provision of shielding from interior generated light** with less than 10 % transmittance overnight for all fenestrations (windows, doors, skylights, curtained walls), for example blinds and curtains.
- **Motion-Sensitive Lighting** to be installed and retrofitted in lobbies, walkways, corridors, and operating systems that automatically turn off lights during after work hours.
- **Internal Location of Greenery:** Building owners and managers must locate greenery away from clear glass and minimize lighting levels through motion sensing lighting in ground floor lobbies, walkways and corridors and retrofit glass in these areas wherever possible with bird friendly window applications in order to meet the Bird Friendly Green Standard (birds drawn into skyscrapers by light pollution seek safety by flying towards greenery and are extremely dangerous in these areas.)



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The Summer Triangle and Milky Way, from Prepal, Ontario. Photograph © Ryan Frazer and Trevor McLaughlin 2012

