Introduction

Stormwater management standards and criteria documents provide specific objectives and targets for stormwater management design and are themselves a subset of the complete suite of design objectives to address a full range of development considerations. As such these standards should be considered as a first step in the design process.

These standards replace previously issued guidelines. Due to the limitations of existing municipal storm conveyance infrastructure to meet potential increases in both frequency and duration of storm events attributable to Climate Change, these standards encourage both new development and redevelopment to incorporate into their storm water design low impact development (LID) as a strategy that seeks to mitigate the impacts of increased runoff and stormwater pollution by managing runoff as close to its source as possible.

LID comprises a set of site design strategies that minimize runoff and provide distributed, small scale structural practices that mimic natural or predevelopment hydrology through the processes of infiltration, evapotranspiration, harvesting, filtration and detention of stormwater.

These practices can effectively remove nutrients, pathogens and metals from runoff, and reduce the volume and intensity of stormwater flows.

A more complete discussion on the use of these design practises is included in Appendix B of this document and should be referenced by those designers unfamiliar with these concepts.

Areas of the Flood Plain designated as Flood Fringe in the 'Sarnia Official Plan' within the definition of the Provincial Policy Statement require special attention. Specific stormwater management policies also apply to Development Area 1 as set out in the Sarnia official Plan, Chapter 8, Secondary Plans, Sections 4 and 5 (pages 174 to 175). Refer to Appendix C for additional design considerations for these areas.

Standards for the design of stormwater management facilities

1. The Official plan shall be used to determine the forecast land use for tributary areas for storm sewer design for new developments.
2. Use of the Rational Method is acceptable for designing the storm sewers for minor storms using the following formula: $Q = 0.0028 \times C \times I \times A$ m^3/sec.

   where C is the runoff coefficient; I is the rainfall intensity (mm / hour) and A is the catchment area in hectares.
3. Current City standards require collector sewers to be sized for the 5 year return frequency for new developments except for new development within Area 1 (see Appendix C). Surcharging of the existing storm sewer infrastructure is expected during larger storm events and major storm overland flow routes must be established to accommodate these flows.

4. For residential areas the determination of post development runoff shall be based on a two (2) year return period storm events with a maximum time of concentration of ten (10) minutes and with a demonstrated ability to manage events up to and including the one hundred (100) year return period storm event through a combination of at source, LID and end of pipe controls.
5. For Commercial and Industrial developments these storm water standards will apply for stormwater management for both quantity and quality control.
6. The City of Sarnia modified tables of rainfall data and the corresponding IDF curves as modified for Climate Change (refer to Appendix A) and which may be modified from time to time, should be used for all rainfall runoff analysis. The best fit formula provided with IDF curves under Appendix 'A' shall only be used in run off calculations for the development or redevelopment of catchment areas less than 2 Ha. For flood fringe areas the actual modified rainfall data provided in the tables in Appendix 'A' must be used irrespective of catchment size.
7. The post development peak discharge from a development site is to be controlled to the equivalent 2 year predevelopment level for storms up to the 100 year return frequency.
8. Individual infill developments may have more stringent requirements for allowable runoff (e.g. mitigation of peak discharges to the 1 year predevelopment level for areas south of the highway 402 corridor, north of Campbell Street and west of East Street).
9. Re-development or extension to the existing development will be considered as an opportunity for a retro-fit to the above criteria. Such control may be achieved by adopting the policies outlined above using MOECC recommended stormwater best management practices (BMPs) for lot level and conveyance controls.
10. As a minimum, all infill developments or additions to existing development must provide quantity and quality controls for the increased runoff from the site. For the purpose of establishing the increase in the runoff, all proposed changes will be considered changes based on the pre-development pervious surfaces. Existing soil conditions vary across Sarnia but typically the areas north of London Road are comprised of silty sands (use C=0.25) becoming more permeable as they approach Lake Huron, and soils to the south of London Road comprise silty clays (use C=0.35) becoming more impermeable to the south.
11. For infill development of sites up to 2 hectares (5 acres) and for parking lot storage design, use of the rational method (see example in Appendix) is encouraged.
12. In the absence of a detailed analysis of a proposed site based on the specific site parameters such as sub-soils, area, topography and material coverage, the following range of runoff coefficients, C shall be utilized in the Rational Method:

    - Parks and Playgrounds 0.25 to 0.35
    - Residential
        - suburban 0.35
        - single family housing 0.45
        - townhouses 0.60
        - high density apartments 0.70

- Neighbourhood Commercial 0.65 to 0.75
- Commercial and Industrial 0.70 to 0.85
- High Value Commercial 0.85
- Gravel parking area 0.65
- Paved (non porous) parking 0.90 to 0.95

13. The developer's consulting engineer shall evaluate the effect of all applicable storms based on the IDF curves provided for the City of Sarnia and shall recommend the most appropriate design solution on a case-by-case basis.
14. For each problem (i.e. analysis of flood control, quality control, erosion control), a "critical" storm and return period should be selected for design purposes.
15. For stormwater quality control a 25mm design storm should be used.

    Where the development involves:-

    - Gas stations or significant parking areas;
    - Parking for more than 100 vehicles or >3000 m2 allocated to parking;
    - Loading/unloading zones for Commercial and/or Industrial areas;
    - The potential for oil spills.

    Oil/grit interceptors must be designed to treat the peak flow from the site.
16. For suspended solids removal, the normal protection criteria with at least 70% removal rate shall be used for sizing of the BMP facility discharging to municipal storm sewers.
17. A higher level (up to 80%removal) may be required by the City where storms sewer discharges are located close to aquatically sensitive water courses, sensitive aquifers or wet lands habitat or where the proposed use of the development is considered a greater risk to the environment.
18. Stormwater designs may also be required to be reviewed by the St Clair Region Conservation Authority (SCRCA) where stormwater from the proposed site outlets to a water course which falls under their control or jurisdiction.
19. Stormwater design will also require review by the Ontario Ministry of Transportation (MTO) for projects abutting to or discharging to MTO lands in accordance with their Corridor Control regulations.
20. Design of stormwater management facilities such as dry/wet ponds should be carried out based on appropriate flow routing methods. Use of industry standard software/models is encouraged for rainfall runoff analyses and flow routing. However, the accuracy of the results must be independently verified by the developer's engineer.
21. MOECC approval will be required for Stormwater Management designs for projects located on Industrial lands (typically required on sites zoned Industrial or Light

Industrial) which are not exempted by their proposed use under Ontario Regulation 525/98. Refer to the definition of *Industrial Lands* within the legislation to determine whether a Commercial or Institutional project is exempt from Section 53 MOECC Approval for a non-industrial use on zoned Industrial lands.

22. Stormwater management BMPs should also provide for measures for winter runoff control and frozen ground conditions. Maintenance requirements for the recommended BMPs must be discussed in the report and responsible parties identified.
23. Stormwater Management Planning and Design Manual (MOECC, 2003) should be referred to in order to address all other issues, including quality control and ongoing maintenance requirements not covered by these standards.

Additional information to be included in the Stormwater Management Report

A storm water management report shall include where applicable the following:

1. Project location, description, and physical features including existing and proposed development;
2. Adjacent land use and proposed project land use;
3. Watershed contribution and potential impacts to water bodies and existing stormwater outlets either upstream or downstream of the proposed project;
4. Beneficial uses of surface waters and ground water surrounding the project;
5. Characterization of project runoff both pre-project and post-project, conditions of concern, locations of storm water outfall(s), tributary drainage area to outfall(s), changes in downstream erosion potential, and site hydrology;
6. Water quality pollutants of concern, treatment volume based on water quality design storm, site plans and adjacent land use, and soil characteristics;
7. Summary of low impact design (LID) measures proposed for use on the project;
8. Specified orifice controls (minimum size to be 70mm), maximum ponding depths (300mm maximum in paved areas) and bypass routes for overland flows;
9. Mitigation measures to protect water quality, pollution prevention BMPs, site design BMPs, source control BMPs, natural BMPs, and structural treatment BMPs;
10. Mitigation measures to prevent any increase in downstream erosion;
11. Specify agreements, easements, and any licenses relating to the redevelopment and construction of the stormwater management measures proposed, including their location, access for maintenance and any changes in drainage characteristics;
12. Provide a project map identifying relevant watersheds and surface water bodies within the project area;

13. Information relating to threats to water quality including (1) soil erosion potential; (2) site slope; (3) project size and type; (4) sensitivity of receiving water bodies; (5) proximity to receiving water bodies; and (6) non-storm water discharges.
14. Information on maintenance requirements including clean-out access and frequency of clean-out based on location within further development area. Based on the foregoing information, appropriate financial agreements with the developer may be required to offset any costs to the municipality for maintenance during development

Above items may be shown on other application documents such as the tentative map, preliminary grading plan, or preliminary drainage study. If this is done, the SWMP report must identify where each of these component pieces can be found.

As the contents of the SWMP Report are of engineering nature, the report must be signed and sealed by an Ontario licensed professional engineer.

APPENDIX A

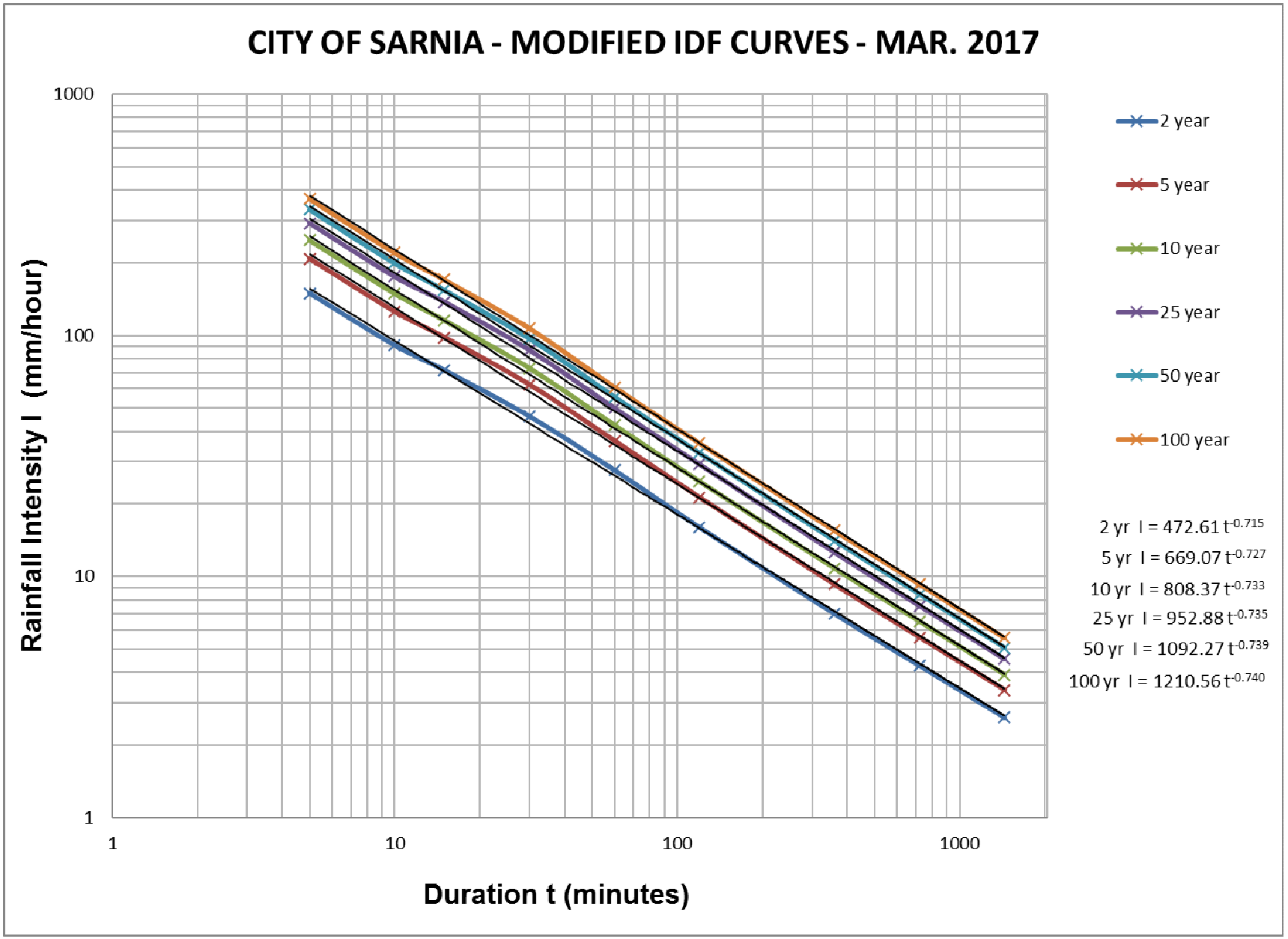
Modified Rainfall Data for the City of Sarnia – updated March 2017

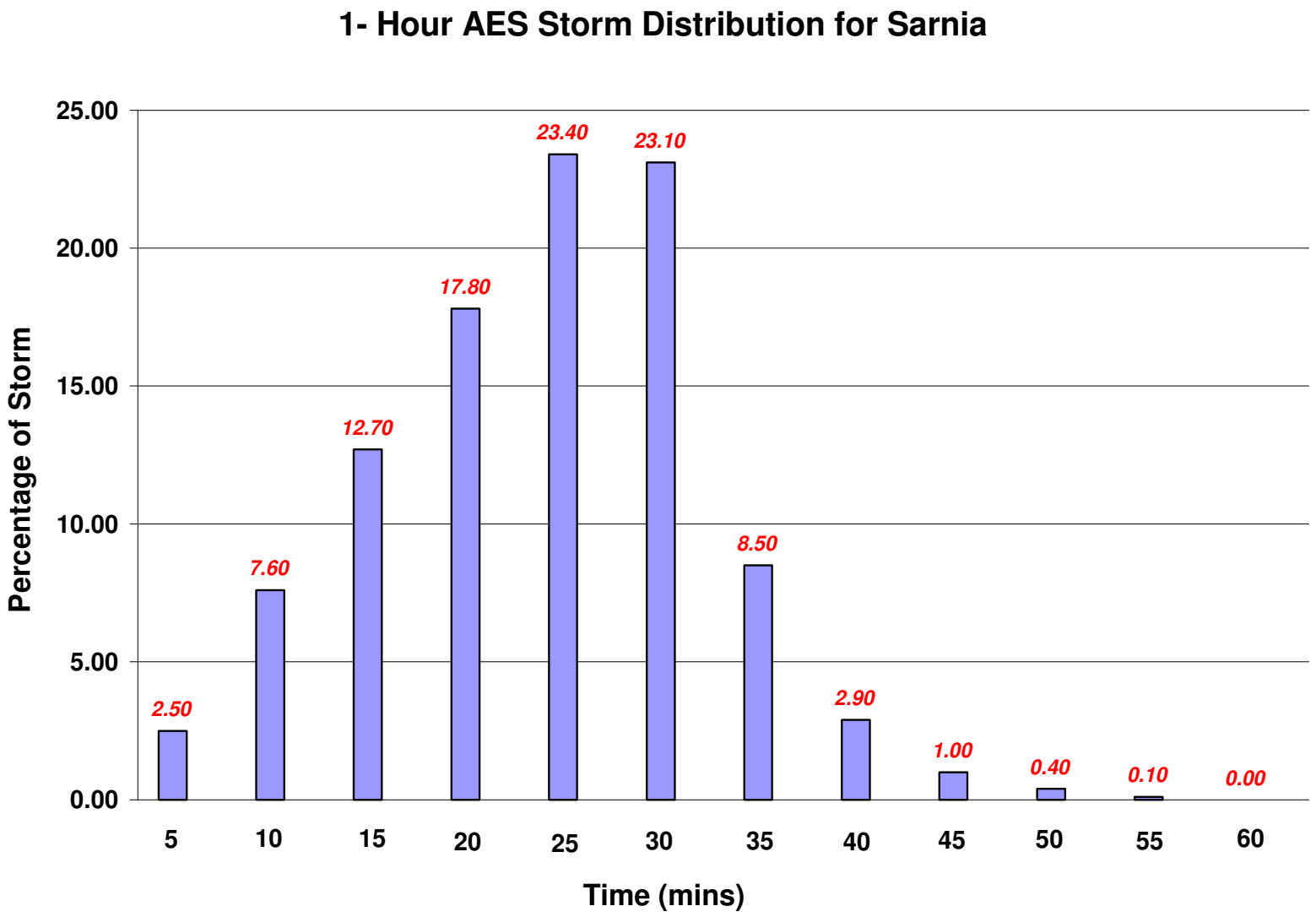
Modified Return Period Rainfall Intensity (mm/hr)

	Return Period (years)					
	2	5	10	25	50	100
I = A*T**B (best fit)						
Coefficient A is	25.3	34.1	40.2	47	53	58.5
Exponent B (T in hrs)	-0.715	-0.727	-0.733	-0.735	-0.739	-0.740
5 min	149.53	207.64	248.47	291.94	332.50	367.92
10 min	91.10	125.45	149.49	175.40	199.22	220.29
15 min	71.72	98.12	115.72	137.72	154.00	170.28
30 min	46.20	62.48	73.26	86.90	97.02	107.14
1 h	27.61	36.52	42.46	49.94	55.55	61.05
2 h	16.01	21.29	24.81	29.21	32.51	35.75
6 h	7.03	9.27	10.81	12.59	14.10	15.54
12 h	4.28	5.60	6.50	7.57	8.45	9.30
24 h	2.61	3.38	3.91	4.55	5.06	5.57

Modified Return Period Rainfall Amounts (mm)

	Return Period (years)					
Duration	2	5	10	25	50	100
5 min	12.46	17.30	20.71	24.33	27.71	30.66
10 min	15.18	20.91	24.91	29.23	33.20	36.71
15 min	17.93	24.53	28.93	34.43	38.50	42.57
30 min	23.10	31.24	36.63	43.45	48.51	53.57
1 h	27.61	36.52	42.46	49.94	55.55	61.05
2 h	32.01	42.57	49.61	58.41	65.01	71.50
6 h	42.16	55.61	64.86	75.56	84.60	93.21
12 h	51.37	67.20	78.05	90.80	101.38	111.62
24 h	62.59	81.20	93.92	109.11	121.48	133.66


CITY OF SARNIA - MODIFIED IDF CURVES - MAR. 2017
Rainfall Intensity I (mm/hour)
1000
100
10
1
1
10
100
1000
Duration t (minutes)
2 year
5 year
10 year
25 year
50 year
100 year
2 yr I = 472.61 t-0.715
5 yr I = 669.07 t-0.727
10 yr I = 808.37 t-0.733
25 yr I = 952.88 t-0.735
50 yr I = 1092.27 t-0.739
100 yr I = 1210.56 t-0.740


1- Hour AES Storm Distribution for Sarnia
Percentage of Storm
25.00
20.00
15.00
10.00
5.00
0.00
2.50
7.60
12.70
17.80
23.40
23.10
8.50
2.90
1.00
0.40
0.10
0.00
5
10
15
20
25
30
35
40
45
50
55
60
Time (mins)

APPENDIX B

Ancillary Design Standards for Low Impact Development (LID)

1 Introduction:

Low Impact Development (LID) comprises a set of site design strategies that minimize runoff and provide distributed, small scale structural practices that mimic natural or predevelopment hydrology through the processes of infiltration, evapotranspiration, harvesting, filtration and detention of stormwater. These practices can effectively remove nutrients, pathogens and metals from runoff, and reduce the volume and intensity of stormwater flows.

The proponents Engineer retained to prepare the Stormwater Management Report accompanying a Site Plan Application (SPA) for either a new “Greenfield” or an existing “Brownfield” site should be familiar with the latest version of the publication entitled Low Impact Development (LID) Stormwater Management Planning and Design Guide 2010. This has been developed as a joint initiative of the Toronto and Region and Credit Valley Conservation Authorities and in consultation with representatives from the Ministry of the Environment, Fisheries and Oceans Canada, GTA municipalities and the development industry.

The *LID SWM Guide* focuses on a number of lot level and conveyance stormwater management practices that have been used extensively in Europe, the United States, British Columbia and at demonstration sites in Ontario. These low impact development practices include green roofs, bioretention, permeable pavement, soakaways, perforated pipe systems, enhanced grass swales, dry swales and rainwater harvesting.

The *LID SWM Guide* recommends and supports the use of the treatment train approach for stormwater management. Accordingly Engineers should also refer to the Stormwater Management and Design Manual (MOECC, March 2003), as a guide for incorporating more traditional practices such as wet ponds and wetlands into the overall stormwater management planning and design process.

This set of standards is not intended to limit innovation or restrict the use of creative solutions for stormwater management. Indeed the municipality encourages the development of innovative designs and technologies.

Acknowledging that it will not always be possible to maintain the predevelopment water budget of a site, predicted increases in runoff from land development that cannot be mitigated through stormwater infiltration practices should be minimized through practices that either evapotranspire (*e.g.,* green roofs, bio-retention), or harvest runoff for non-potable uses (*i.e.*, rainwater harvesting). In areas where development has already taken place, LID can be used as a retrofit practice to reduce runoff volumes, pollutant loadings, and the overall impacts of existing developments on receiving waters.

LID practices can include:

- conservation site design strategies (i.e., non-structural LID practices);
- infiltration practices;
- rainwater harvesting;
- runoff storage and evapotranspiration;
- runoff conveyance;
- filtration practices; and
- landscaping.

Studies show that implementing LID practices can have multiple positive environmental effects including:

- protection of downstream resources;
- abatement of pollution;
- recharge of groundwater;
- improvement of water quality;
- improvement of habitat;
- reduced downstream flooding and erosion;
- conservation of water and energy; and
- improved aesthetics in streams and rivers.

These combined benefits help to mitigate potential negative impacts of climate change on groundwater levels, risk of flooding and stream channel erosion.

Treatment train stormwater management strategies that integrate a full range of facility types have the potential to achieve a broader range of benefits including:

- maintaining and enhancing shallow groundwater levels and interflow patterns;
- maintaining predevelopment drainage divides and catchment discharge points;
- moderating run off velocities and discharge rates;
- improving water quality;
- enhancing evapotranspiration;
- maintaining soil moisture regimes to support the viability of vegetation communities;
- maintaining surface and groundwater supplies to support existing wetland, riparian and aquatic habitats.

It is important that stormwater management plans be developed with consideration of the different types of runoff source areas that will be present, and recognition of source areas with low to moderate contamination potential that represent opportunities for rainwater harvesting, permeable pavement and other stormwater infiltration practices.

Furthermore, it is vital to ensure that relatively clean runoff is not mixed with lesser quality runoff from surfaces that are subject to higher levels of contamination, rendering it less suitable for infiltration or harvesting.

These standards recognise that a number of sites, particularly in infill development, may not be able to incorporate all the above practises within the site limitations due to site specific constraints; however the following lists of potential mitigation measures should be addressed in any design submission made to City staff during the review process.

Potential opportunities to integrate SWMPs at the site level stage in the planning process include:

- harvesting of rainwater from rooftops for non-potable uses (*e.g.*, irrigation, toilet flushing) using rain barrels or cisterns;
- installation of green roofs;
- drainage of runoff from rooftops to pervious or depression storage areas;
- integration of soakaways (*e.g.*, infiltration trenches or chambers) below landscaped areas, parking areas, parks, sports fields, etc.;
- incorporation of bioretention areas, rain gardens, biofilters or constructed wetlands into the landscape design for the site;
- use of permeable pavement in low and medium traffic areas;
- incorporation of bio-retention areas, vegetated filter strips, and swales to intercept and treat parking lot and road runoff;
- incorporation of woodland restoration in upstream areas to reduce runoff rates;
- integration of detention ponds and wetlands as large aesthetic and recreational features within the landscape.

Stormwater management opportunities that should be explored for infill and retrofit developments include:

- roof top storage;
- green roofs;
- rainwater harvesting;
- bio-retention areas;
- bio-filters;
- grassed swales;
- permeable pavement;
- rain gardens;
- stormwater planters and fountains;
- depression storage;
- soakaways;
- constructed wetlands; and
- enhanced urban tree canopy.

Key principles for low impact development design can be summarized as follows:

1 Use existing natural systems as the integrating framework for planning

1.1 Consider regional and watershed scale contexts, objectives and targets;
1.2 Look for stormwater management opportunities and constraints at watershed/sub-watershed and neighbourhood scales;
1.3 Identify and protect environmentally sensitive resources;

2 Focus on runoff prevention

2.1 Minimize impervious cover through innovative site design strategies and application of permeable pavement;
2.2 Incorporate green roofs and rainwater harvesting systems in building designs;
2.3 Drain roofs to pervious areas with amended topsoil or stormwater infiltration practices;
2.4 Preserve existing trees and design landscaping to create urban tree canopies

3 Treat stormwater as close to the source area as possible

3.1 Utilize decentralized lot level and conveyance stormwater management practices as part of the treatment train approach;
3.2 Flatten slopes, lengthen overland flow paths, and maximize sheet flow;
3.3 Maintain natural flow paths by utilizing open drainage (*e.g.*, swales).

4 Create multifunctional landscapes

4.1 Integrate stormwater management facilities into other elements of the development to conserve developable land;
4.2 Utilize facilities that provide filtration, peak flow attenuation, infiltration and water conservation benefits;
4.3 Design landscaping to reduce runoff, urban heat island effect and enhance site aesthetics.

5 Educate and maintain

5.1 Municipality will develop legal agreements to ensure long-term operation and maintenance of private facilities.
5.2 Municipalities to develop guidelines and training for property owners and their managers on how to monitor and maintain lot level stormwater management practices on private property;
5.3 Municipalities to develop training programs for staff to monitor and maintain lot level and conveyance stormwater management practices on public property;

Stormwater Source Area	Runoff Characteristics	Opportunities	Principles
Foundation drains, slab underdrains, road or parking lot underdrains	Relatively clean, cool water.	Suitable for infiltration or direct discharge to receiving watercourses.	Should not be directed to stormwater management facility that receives road or parking lot runoff.
Roof drains, roof terrace area drains, overflow from green roofs	Moderately clean water, contaminants may include asphalt granules, low levels of hydrocarbons and metals from decomposition of roofing materials, animal droppings, natural organic matter and fall out from airborne pollutants, potentially warm water.	- Infiltration; - Filtration; - Harvesting with rain barrels or cisterns and use for non-potable purposes (*e.g.*, irrigation, toilet flushing) after pretreatment; - Attenuation and treatment in wet pond or wetland detention facility.	Runoff should be treated with a sedimentation and/or filtration practice prior to infiltration. Where possible, runoff should not be directed to end-of-pipe facilities to capitalize on potential for infiltration or harvesting. Flow moderation (quantity control) prior to discharge to receiving watercourse is required.
Low and medium traffic roads and parking lots, driveways, pedestrian plazas, walkways	Moderately clean water, contaminants may include low levels of sediment, de-icing salt constituents, hydrocarbons, metals and natural organic matter. Typically warm water.	- Infiltration after pretreatment; - Filtration after pre-treatment; - Harvesting with cisterns or permeable pavement reservoirs and use for outdoor non-potable purposes (*e.g.*, vehicle washing, irrigation) after pretreatment; - Attenuation and treatment in wet pond or wetland detention facility.	Runoff should be treated with a sedimentation and/or filtration practice prior to infiltration. Flow moderation (quantity control) prior to discharge to receiving watercourse is required. Water quality should be tested prior to use for non-potable purposes.
High traffic roads and parking lots	Potential for high levels of contamination with sediment, de-icing salt constituents hydrocarbons and metals. Typically warm water.	- Filtration after sedimentation pre-treatment; - Attenuation and treatment in wet pond or wetland detention facility; - Infiltration after pretreatment only where groundwater uses are limited.	Runoff should be treated with a sedimentation and/or filtration pretreatment practice prior to infiltration.
Pollution hot spots* such as vehicle fueling, servicing or demolition areas, outdoor storage and handling areas for hazardous materials, some heavy industry sites	Potential for high levels of contamination with sediment, de-icing salt constituents, hydrocarbons, metals, and other toxicants.	- Attenuation and treatment in wet pond, wetland or hybrid detention facility; - Potential requirement for sedimentation pretreatment; - Infiltration and harvesting practices not recommended.	Runoff from these sources should not be infiltrated or used for irrigation. Spill containment or mitigation devices recommended contingent on size of storage facilities.

LID Stormwater Management Practice	Depth to high water table or bedrock[1] (m)	Typical Ratio of Impervious Drainage Area to Treatment Facility Area	Native Soil Infiltration Rate (mm/hr)[3]	Head[4] (m)	Space[5] %	Slope[6] %	Pollution Hot Spots[7]	Set backs[8]
Rain barrel	Not applicable	[5 to 50 m_2][2]	Not applicable	1	0	NA	Yes	None
Cistern	1	[50 to 3000 m_2][2]	Not applicable	1 to 2	0 to 1	NA	Yes	U, T
Green roof	Not applicable	1:1	Not applicable	0	0	0	Yes	None
Roof downspout disconnection	Not applicable	[5 to 100 m_2][2]	Amend if < 15 mm/hr[9]	0.5	5 to 20	1 to 5	Yes	B
Soakaway, infiltration trench or chamber	1	5:1 to 20:1	Not a constraint	1 to 2	0 to 1	< 15%	No	B, U, T, W
Bioretention	1	5:1 to 15:1	Underdrain required if < 15 mm/hr	1 to 2	5 to 10	0 to 2	No	B, U, W
Biofilter (filtration only Bioretention design)	Not applicable	5:1	Not applicable	1 to 2	2 to 5	0 to 2	Yes	B, T
Vegetated filter strip	1	5:1	Amend if < 15 mm/hr[9]	0 to 1	15 to 20	1 to 5	No	None
Permeable pavement	1	1:1 to 1.2:1	Underdrain required if < 15 mm/hr	0.5 to 1	0	1 to 5	No	U, W
Enhanced grass swale	1	5:1 to 10:1	Not applicable	1 to 3	5 to 15	0.5 to 6	No	B, U
Dry swale	1	5:1 to 15:1	Underdrain required if < 15 mm/hr	1 to 3	5 to 10	0.5 to 6	No	B, U, W
Perforated pipe system	1	5:1 to 10:1	Not a constraint	1 to 3	0	< 15%	No	B, U, T, W

Notes:

1. Minimum depth between the base of the facility and the elevation of the seasonally high water table or top of bedrock.
2. Values for rain barrels, cisterns and roof downspout disconnection represent typical ranges for impervious drainage area treated.
3. Infiltration rate estimates based on measurements of hydraulic conductivity under field saturated conditions at the proposed location and depth of the practice.
4. Vertical distance between the inlet and outlet of the LID practice.
5. Percent of open pervious land on the site that is required for the LID practice.
6. Slope at the LID practice location.
7. Suitable in pollution hot spots or runoff source areas where land uses or activities have the potential to generate highly contaminated runoff (*e.g.*, vehicle fueling, servicing or demolition areas, outdoor storage or handling areas for hazardous materials and some heavy industry sites).
8. Setback codes: B = Building foundation; U = Underground utilities; T = Trees; W = drinking water wellhead protection areas.
9. Native soils should be tilled and amended with compost to improve infiltration rate, moisture retention capacity and fertility.

APPENDIX C

Additional Requirements for development in Flood Fringe Areas

The following Standards for development in Flood Fringe areas are in addition to or a variation of those outlined above. Wherever there is a discrepancy between Standards the more stringent will apply.

1. The Official plan shall be used to determine the forecasted land uses for tributary areas for storm sewer design for new developments. Specific stormwater management policies also apply to Development Area 1 as set out in the Sarnia Official Plan, Chapter 8: Secondary Plans; Section 4. Stormwater Management System and Section 5. Storm Sewer System (pages 174 to 175).
2. The permitted post development peak discharge from a development site in Flood Fringe Areas may require to be controlled to a predetermined level more stringent than those detailed above based on the capacity of downstream stormwater management facilities designed for future development within the designated areas.
3. For analysis of storm events having a return period greater than 1 in 10 years, the values of the Run Off coefficients used in modelling shall **increase** the listed values under Item 12 of these Standards by the following percentages up to a maximum value of C = 0.95

   For a 1 in 25 year storm event – add 10%
   For a 1 in 50 year storm event – add 20%
   For a 1 in 100 year storm event – add 25%

4. For Flood Fringe Areas the tables of modified rainfall data provided in Appendix ‘A’ must be used. The best fit formula provided with the modified IDF curves under Appendix ‘A’ shall not be used for analysis of rainfall events in these areas.