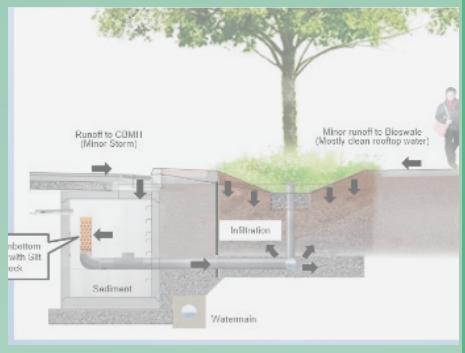
MARKHAM

Low Impact Development (LID) Guidelines






November 2018

CITY OF MARKHAM

LOW IMPACT DEVELOPMENT GUIDELINES

NOVEMBER 2018

REPORT PREPARED FOR

CITY OF MARKHAM
101 TOWN CENTRE BOULEVARD
MARKHAM ON L3R 9W3

REPORT PREPARED BY

THE MUNICIPAL INFRASTRUCTURE GROUP LTD.
8800 DUFFERIN STREET, SUITE 200
VAUGHAN, ON L4K 0C5
(905) 738-5700

TMIG PROJECT NUMBER 17139

REPORT PREPARED IN ASSOCIATION WITH

SCHOLLEN & COMPANY INC.
30 WERTHEIM COURT, UNIT 15
RICHMOND HILL, ON L4B 1B9

CONTENTS

APPENDICES

Disclaimer

The City of Markham Low Impact Development Guidelines (LID Guidelines) has been developed for use by applicants of development proposals within the City of Markham to assist with the planning of stormwater management controls within proposed public and private land use areas. It does not constitute a design guideline document. The LID Guidelines should be used in conjunction with up-to-date design guidelines and manuals published by relevant agencies (Conservation Authorities and Ministry of Environment, Conservation and Parks). The guidelines contained herein are based on input from the City of Markham and do not necessarily reflect the views of The Municipal Infrastructure Group Ltd. (TMIG) or Schollen & Company Inc. (Schollen). The mention of trade names or commercial products does not constitute endorsement or recommendation of those products.

1 INTRODUCTION

1.1 Background

The potential impacts of urban development on the natural hydrologic cycle have been well documented. When a vegetated or agricultural landscape is replaced with hard surfaces such as pavement and buildings, there tends to be reductions in evapotranspiration and infiltration, and increases in runoff volumes and pollutant loadings. Without proper mitigation, urbanization can lead to higher peak flow rates and flood levels, increased stream bed and bank erosion, impaired water quality and potentially reduced baseflow rates in receiving streams. Stormwater management is one of the major infrastructure challenges in urban areas and also has a crucial role in climate change mitigation and adaptation.

Stormwater management has evolved as our understanding of the impacts of urbanization has broadened. Historically, the objective of stormwater management was to drain the landscape as quickly as possible. To mitigate the impacts of this practice on downstream flooding, stormwater detention facilities were implemented to reduce peak flow rates from new development to pre-development levels. As the impacts of urban runoff on water quality and aquatic habitat became apparent, permanent pools were incorporated into the detention facilities to remove suspended solids and associated pollutants from storm runoff. To reduce erosion in the receiving watercourses, stormwater management facilities began to incorporate extended detention storage to capture the runoff from small storm events (typically up to 25 mm) and release it at a very slow rate over several days.

Modern end-of-pipe stormwater management facilities incorporating permanent pools, extended detention storage and peak flow attenuation storage have significantly reduced the impact of urban development on flooding, erosion and water quality in the receiving watercourses. However, recent research indicates that storage and attenuation of storm runoff may not fully mitigate the impacts of urbanization on in-stream erosion, particularly in smaller headwater streams. As stormwater management continues to evolve, there is increasing emphasis on the management of runoff *volumes* in addition to extended and peak discharge rates. Reducing runoff volumes through source and conveyance controls has the potential to better mitigate in-stream erosion, reduce pollutant loadings and enhance groundwater discharge to streams when infiltration is relied upon to reduce runoff. This will also augment groundwater recharge to support natural heritage features and sustain regional drinking water source quality and quantity. Managing runoff volume at the source also helps mitigate the impacts of climate change and create resilient communities.

The current policies and directions of the Province of Ontario, Toronto and Region Conservation Authority (TRCA), York Region, and Markham's Official Plan require a comprehensive approach and use of innovative best practices for stormwater management to treat rainwater as a resource and to reduce reliance on stormwater ponds. Some of these Best Management Practices (BMPs) are commonly referred to as Low Impact Development (LID) practices and Green Infrastructure (GI).

LID practices are an approach to stormwater management that seeks to manage rain and other precipitation as close as possible to where it falls to mitigate the impacts of increased runoff and stormwater pollution. It includes a set of design strategies and distributed, small-scale structural practices to mimic natural hydrology to the greatest extent possible by using infiltration, evapotranspiration, harvesting, filtration and detention of stormwater (Growth Plan for Greater Golden Horseshoe, 2017).

GI is defined as natural and human-made elements that provide ecological and hydrologic functions and processes, which can include components such as natural heritage features and systems, parklands, stormwater management systems, street trees, urban forests, natural channels, permeable surfaces, and green roofs (Provincial Policy Statement, 2014). For additional information and general design directions for GI, refer to Markham's Future Urban Area (FUA) Urban Design Guidelines (2017). There are many overlaps between LID and GI, and LIDs are considered as one form of human-made GI that provide ecological and hydrologic functions, especially the types with infiltration and evapotranspiration components.

The City of Markham encourages innovative methods to manage and to integrate stormwater as a resource through the use of LIDs and GI. LID practices should be applied throughout Markham to help achieve specific stormwater management goals and targets. The following are City and TRCA's existing SWM criteria that are applicable in Markham and will guide the implementation of LIDs. Other relevant SWM criteria by other approval agencies (e.g. MNRF) shall also be considered when implementing LIDs.

- The City and the TRCA Stormwater Management Criteria (August 2012) generally requires new development to maintain pre-development groundwater recharge. Additionally, in the absence of a detailed erosion analysis and/or water balance studies, the TRCA requires on-site retention of the first 5 mm of rainfall to mitigate impacts to downstream watercourses.
- SWM criteria established based on local subwatershed studies or relevant local studies – For example, the North Markham FUA Subwatershed Study (SWS) is being undertaken for the Rouge River sub-watersheds within FUA. Surface and groundwater modelling completed to date are recommending on-site infiltration of 2 mm to 10 mm, varying based on land use and sub-watershed characteristics. This will mitigate impacts to groundwater and surface water discharge and groundwater levels in the study area. The SWS proposed criteria was determined to be appropriate for site specific conditions found in areas of new development within the City. As such, this document references the North Markham FUA SWS for the required stormwater management criteria and infiltration targets.

The City is supportive of LID stormwater practices, but requires clear guidelines in order to standardize and efficiently operate and maintain LIDs to ensure that the intended protection of the source water and groundwater recharge are maintained. This guideline document provides screening level direction regarding the types of LIDs that would be acceptable for different land uses on both public and private properties. It does not, however, specify the SWM targets or criteria for LIDs in new development. For applicable SWM targets, refer to the relevant SWM criteria documents (e.g. TRCA, City of Markham, etc.) and /or local subwatershed or related studies.

It should be noted that the Ministry of the Environment, Conservation and Parks (MOECP) (formerly Ministry of the Environment and Climate Change (MOECC)) is currently developing a Low Impact Development Stormwater Management Guidance Manual (MOECC LID SWM Guidance Manual) in consultation with affected stakeholders, including industry groups represented by Markham staff. Since the Markham LID Guidelines will be a living document, it will be updated in the near future to comply with the MOECP/ MOECC LID SWM Guidance Manual when it is finalized and formally approved.

1.2 About This Document

This document addresses LIDs as components of an integrated stormwater management system. The application of LID options for stormwater management is an emerging practice. Many GTA municipalities have implemented LID stormwater infrastructure and other green infrastructure, but most municipalities are still determining how best to design, review, approve, implement, operate and maintain LIDs within public and private property. This guideline document aims to remove some uncertainty regarding the process to implement LIDs at the preliminary design, review and approval stages.

Section 2 provides some general principles that the City of Markham is adopting to establish the guidelines throughout this document. Amongst these principles is the separation of LID stormwater infrastructure on public versus private lands.

Through consultation for the North Markham FUA planning processes, the City of Markham prepared a matrix to indicate the range of LID stormwater management practices that can be accepted on various land use types within both public and private lands. The LID matrix has been further refined based on more recent internal consultation at the City of Markham. **Appendix A -LID Options Matrix** contains a wide range of LID practices that can potentially be accepted by the City.

The purpose of the LID Options Matrix is to provide guidance about the types of LIDs that would be acceptable for each land use category. The LID Options Matrix is intended for the high-level screening of LID types

available to meet the FUA SWS infiltration targets[1]. Although a LID type may be shown as acceptable, there are specific considerations for each type of LID within each land use category that need to be addressed before approval, as described in **Appendix B – LID Specific Considerations Table**.

LID types may also have reduced volume capture capacities over time compared to design specifications due operational uncertainties (such as maintenance), and other factors may influence the long term performance of certain LID types (e.g. clogging). These operational factors will be accounted for in water balance analyses in the forms of specific redundancy factors for each LID type, which are described in greater detail in **Section 2.4** and presented in **Appendix C – Redundancy Factors**.

In addition, general conditions, criteria, and requirements for LIDs are outlined for City-owned and private developments. These general conditions, found in **Sections 3** and **4** of this document, provide guidance on the requirements for each land use category when preparing Master Environmental Servicing Plans (MESPs), Functional Servicing Reports (FSRs), stormwater management reports, other preliminary engineering studies, or detailed design for new development within and beyond the North Markham FUA. These studies will be required to demonstrate how the applicable water balance and runoff reduction targets will be achieved using LID practices. Similarly, Environmental Assessments (EAs) and other preliminary engineering studies for City of Markham new infrastructure and infrastructure renewal projects may recommend LID stormwater practices to provide runoff volume reduction to meet erosion targets as established in the FUA and other goals.

City staff, engineering consultants, landowners and other stakeholders need assurance that the LIDs proposed at the preliminary design stages can be successfully implemented and achieve the intended runoff reduction targets. The objective of this guideline document is to provide clear direction and guidance for the successful implementation of LID measures proposed at the land use planning stage (draft plan of subdivision, site plan approval) and EA stages of development. This approach can avoid delays and complications that arise if the recommended LID practices are not accepted by the City and/or the TRCA at the detailed design or construction stages, or if there are no mechanisms in place to ensure that the proposed LIDs will be properly installed, operated, maintained, and replaced at the end of its serviceable life.

This guideline document focuses on the conditions and considerations under which LIDs can be accepted by the City, and specifies the supporting materials that must accompany any application that proposed LID practices on public or private property. This document is not intended to be a guideline for the design and construction of specific LID practices.

Section 5 provides recommendations for future studies to help establish more standardize protocols and tools useful in documenting the operation, maintenance and performance monitoring of LIDs. In addition, this guideline is intended to be a 'living document' where that will be reviewed periodically in consultation with stakeholders to assess new information, such as technological advancements, and will be updated where appropriate.

This document will be included in the City's recently updated SWM Guidelines.

1.3 Additional Resources

As noted in **Section 1.2**, this document is not intended to be a design guideline. There are a number of resources available to aid in the design, construction, operation and maintenance of LID stormwater practices, including but not limited to the following:

[1] For North Markham FUA infiltration targets, refer to the North Markham Future Urban Area Subwatershed Study Phase 2 Report, Table 4.2.3 Summary of Variable LID Capture Scenario (Scenario 4).

- Low Impact Development Stormwater Management Planning and Design Guide (CVC and TRCA, 2010). An update to this guide is underway, and will be made available on the Sustainable Technologies Evaluation Program (STEP) website.
- Low Impact Development Stormwater Management Practice Inspection and Maintenance Guide (TRCA, 2016).
- TRCA Stormwater Management Criteria Document (TRCA, 2012).

The STEP program website (http://www.sustainabletechnologies.ca) contains links to the above documents, as well as a number of case studies for a range of LID stormwater practices.

The City of Toronto Green Streets Technical Guidelines v1.0 (November 2017) contains specific guidance and standard details for the design, construction, O&M and performance monitoring of LIDs and is a useful reference.

The pending MOECC LID Stormwater Management Guidance Manual referenced in **Section 1.1** will contain additional guidance for the design and construction of LIDs, as well as a comprehensive Resource Directory with links to other relevant guidelines and design manuals.

2 GENERAL PRINCIPLES AND IMPLEMENTATION STRATEGY

2.1 LID Stormwater Infrastructure on Public versus Private Lands

Traditional end-of-pipe stormwater facilities receive runoff from large areas and have drainage areas that include both public and private lands, where the main treatment facility is located on public land and is the responsibility of the City. LID practices, by definition, are located near the sources of runoff and therefore the infrastructure is spread across public and private lands. As such, traditional policies and approvals processes for developing and managing stormwater infrastructure are not well suited to implementing LIDs and represents one of the greater challenges to incorporating LIDs in development projects. This document provides the City's policy approach, which adopts current development policies for the implementation of LIDs.

The key principle adopted in this guideline is the separation of public and private lands for the application of LIDs. In other words, LIDs located on public lands are intended to satisfy the water balance targets associated with public lands (e.g. public parks, pond blocks, road right-of-ways, institutional sites), and LIDs located on private lands are intended to satisfy the water balance targets associated with development on private property. Note that this does not prohibit some runoff from private lands from entering LIDs on public property, but the resulting infiltration and/or runoff reduction will be applied towards meeting the water balance requirements for public lands (e.g. Under certain special circumstances and in consultation with the City, the source of runoff may be from private lands and being directed to LIDs located on public property. However, LIDs located on public lands will only be used to meet water balance targets for public lands, regardless of the source of runoff.)

This is a standard practice and requirement for stormwater management infrastructure such as LIDs on private commercial, mixed use and condominium development, but is an emerging practice for stormwater LIDs on private residential development (i.e. single detached, semi-detached and freehold townhouse). It is necessary to streamline the operation, maintenance, inspection, replacement and compliance aspects of LID installations in the absence of established mechanisms to facilitate these processes. Under this system, LIDs located on public lands are the responsibility of the City, while private property owners are responsible for LID maintenance located on their lands, regardless of the source of runoff.

The following sections will further explain the approach to the approvals process for implementing LIDs on public and private lands. The principle is carried out throughout the guideline document and is reflected in conditions found in later sections.

2.2 LIDs on Public Lands

Operation, maintenance and replacement of LIDs in public lands will be the responsibility of the City of Markham once the infrastructure is conveyed to the City after construction. Refer to the LID Options Matrix to determine which LID types can be implemented for particular land uses on public property. Note that not all LID types are acceptable for every land use. In terms of locations:

- LIDs are generally not preferred in municipal road right-of-ways (ROWs) due to the numerous other utilities and limited space available for LIDs. However, some LIDs can still be considered in ROW as indicated in the LID Options Matrix and in consultation with City of Markham staff.
- The generally preferred locations for LIDs on public lands are parks, SWM blocks, buffers and public open spaces. With a wide range of LID options, it is necessary to provide an LID selection protocol to narrow down the types of LIDs on these public lands, which allows the City to streamline long-term operation, maintenance and replacement responsibilities.
- Assuming no site constraints, City-owned institutional development (e.g. community centres, libraries, fire stations, etc.) should implement LIDs within the site as the preferred option and not rely on LIDs public spaces downstream of and external to the site.

LIDs in Public Park, SWM Block, Buffer and Open Space

An LID selection protocol was developed by an inter-departmental committee at the City of Markham for implementing LIDs in parks, SWM pond blocks, buffers and open spaces. While the LID Options Matrix provides a range of LID types that the City will consider for implementation, the protocol is intended to provide guidance on the types of LIDs that will be the most suitable and preferred for park programming, while balancing the requirements of LID operation, maintenance, and replacement needs.

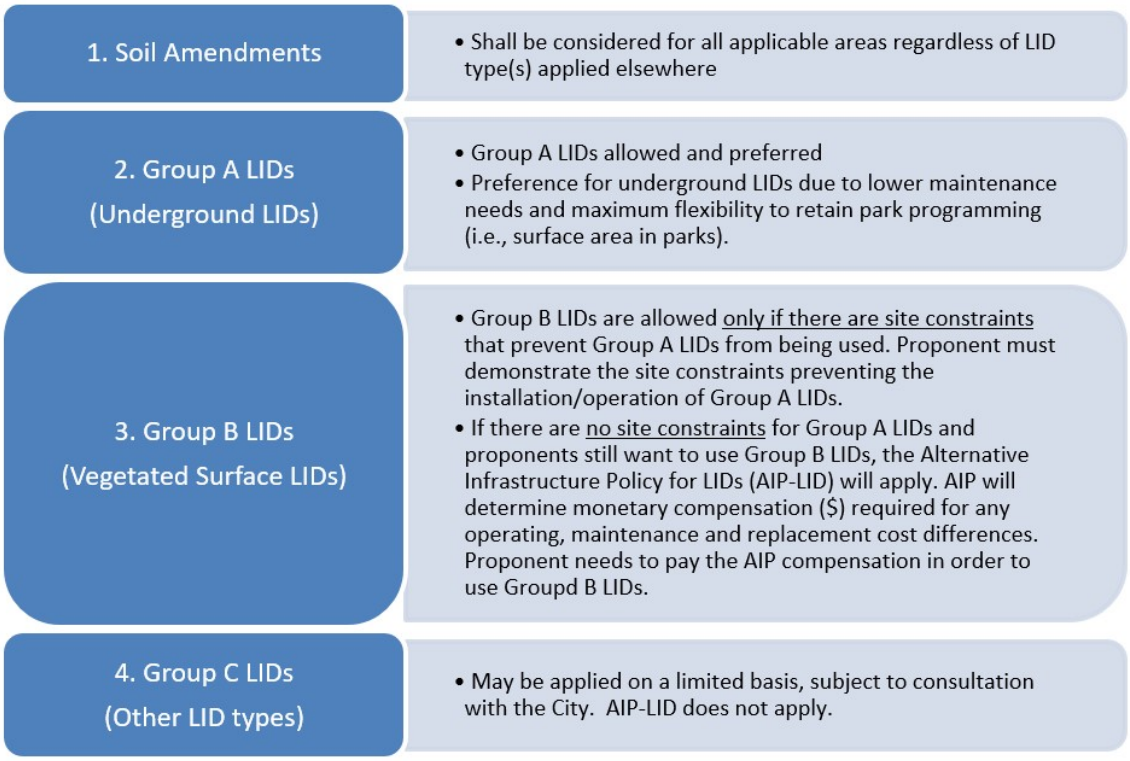
LID types were grouped into three general categories, determined by their effectiveness, ease of implementation, operation and maintenance requirements, and replacement needs based on the City's assessment of long-term costs upon assumption. In addition, application of soil amendments throughout the proposed development area is encouraged for all pervious surfaces, regardless of the type(s) of LID applied elsewhere. The grouped categories of LIDs are as follow and illustrated in the pictures below:

- **Group A**: Underground LIDs (infiltration gallery, infiltration trenches, soakaway pit)
- **Group B**: Vegetated Surface LIDs (bioretention rain garden, vegetated swale, stormwater planter, biofilter, filter strip)
- **Group C**: All other LID types accepted under the LID Options Matrix (rainwater harvesting, permeable pavement, green roof, urban tree root support system)

Note: LIDs in Groups A, B and C are listed in the **Appendix A - LID Options Matrix**

Figure 2-1 below shows the City's preferred hierarchy for LID types to be used in public parks, SWM blocks and open spaces.

Figure 2-1: Hierarchy of LID types in Public Parks, SWM Blocks and Open Space

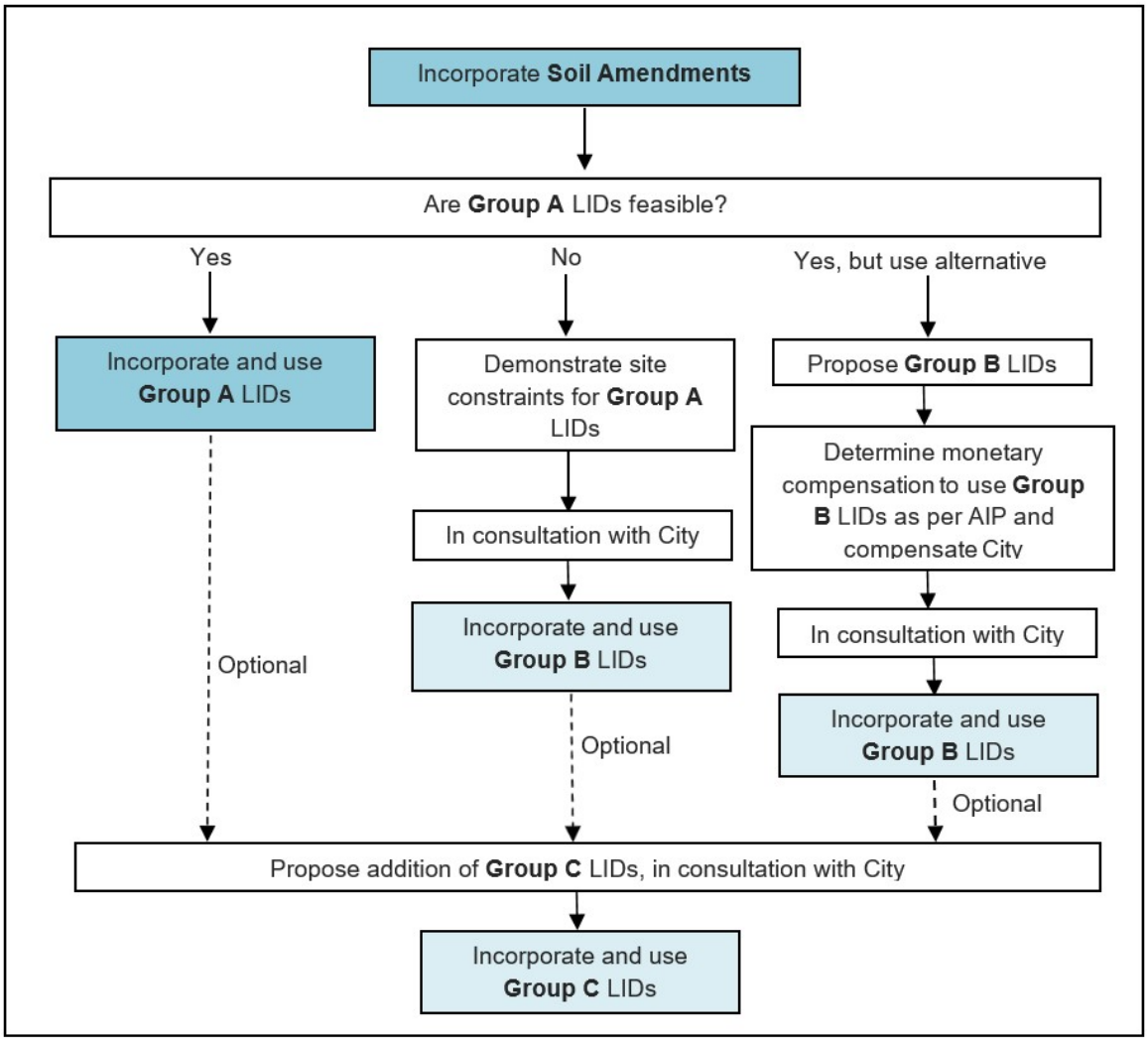


The inter-departmental committee at the City of Markham determined that Group A (underground) LIDs have a lower average annual life cycle cost (evaluated over a 50 year time horizon) relative to Group B (vegetated surface) LIDs. As illustrated in **Figure 2-1**, Group B LIDs will be accepted where physical constraints (i.e. groundwater, bedrock) prevent and limit the implementation of Group A LIDs.

However, proponents wanting to propose and implement Group B LIDs on public lands where Group A LIDs would be feasible (no physical constraints) will be subject to an Alternative Infrastructure Policy for LIDs (AIP for LIDs), similar to the City of Markham's Alternative Infrastructure Policy (AIP) for end-of-pipe SWM facilities. Refer to **Appendix E** for additional details of this AIP for LIDs. Under the AIP, the proponent is required to compensate the difference in costs to operate, maintain and replace a Group B LID relative to the a Group A LID. This will require compensating the City of Markham for the increased life cycle costs difference. Application of Group B LIDs in City parks will also require consultation with the City's Parks Department with respect to programming considerations.

Figure 2-2 presents a flow chart illustrating how the hierarchy of the LID types is applied in the City's public parks, SWM blocks and open spaces.

Figure 2-2: Selection Protocol Flowchart for LID types in Public Parks, SWM Blocks and Open Space



Potential Site Constraints in Public Lands such as Public Park, SWM Pond Block, Buffer and Open Space

If there are site constraints in public parks, SWM Pond Blocks, buffers, etc. which could limit runoff from reaching LIDs located in these public lands and/or the public site has physical constraints that discourages infiltration, then options for additional infrastructure can be considered. These may include:

- Option (A): A non-perforated third pipe system (e.g. for conveyance purpose only storm sewer). If the main storm sewer is designed at a depth close to the groundwater, options to install a third, shallower pipe system could be considered, to facilitate the collection of public runoff and be directed to the LIDs located in these public sites. The non-perforated third pipe system will not be allowed to exfiltrate within the ROW (e.g. non-perforated third pipe is for only conveyance purpose only).
- Option (B): Implementing LIDs in an additional SWM LID block at a desirable location (free of constraints).
- Option (C): A combination of Option (A) and Option (B).

Figure F-1 in **Appendix F** illustrates these options for additional infrastructure. Suggested options are subject to further discussion and consultation with affected City departments.

If there are special site constraints on public lands that limit water balance targets from being met by public LIDs and all feasible alternative options have been explored to the best extent possible, then LIDs on private lands may be considered for use, in consultation with the City and TRCA on a case-by-case basis, to meet water balance targets for public lands. In these cases, LIDs on private lands will be oversized to offset undersized LIDs on public lands, but will not involve the discharge of runoff from public lands to LIDs in private property. In this case, operation, maintenance and replacement of oversized LIDs located on private lands will remain the sole responsibility of the private property owners, as explained in Section 2.3.

2.3 LIDs on Private Lands

As noted in **Section 2.1**, the operation, maintenance and replacement of LIDs on private property will be the responsibility of the property owner. This is a standard practice and requirement for stormwater management infrastructure (e.g. LIDs) on private commercial, mixed use and condominium development, but is an emerging practice for stormwater LIDs on private residential development (i.e. single detached, semi-detached and freehold townhouse).

The responsibilities of private property owners for the operation, maintenance and replacement of LIDs on private residential lots shall be outlined in Subdivision Agreements. The presence and location of any LIDs and the associated obligations for their operation, maintenance and replacement and the end of their serviceable life shall also be included in purchase and sale agreements and registered on title.

If Environmental Compliance Approvals (ECAs) are required for private LID installations, owners shall apply directly to the MOECC and comply with all requirements. It is recognized that the ECA application for LIDs on private lots be separate from the ECA application for traditional stormwater management infrastructure proposed on lands that will eventually be conveyed to the City of Markham. The separate ECA applications are recommended to be coordinated and submitted at the same time. However, LIDs on private residential lots should have the owner of the land (i.e. the developer at the time of the ECA application) identified as the owner of the ECA application.

The owner (developer) will be responsible for operation and maintenance of LIDs on private lots until they are conveyed to the individual private owners, and will also be responsible for notifying MOECC when ownership of all private lots that incorporate LIDs has been transferred to the individual private owners.

The City may also consider exploring various tools that can help to minimize risk if some private LIDs are not adequately maintained or are removed. These may include but not limited to:

- Driveway by-law
- Building permit for sheds and ancillary structures
- Sewer use by-law

Potential Site Constraints in Private Lands

If there are site specific constraints on private properties that prevent private LIDs to be implemented and all feasible alternatives have been explored to the best extent possible, then the option to allow some of the private runoff to discharge to public LIDs may be considered, in consultation with the City and TRCA on a case-by-case basis, to meet water balance targets for private lands. However, the proponents must demonstrate there are sufficient site constraints that prevent them from adhering to the general guiding principle in Section 21 of separating public and private lands for the application of LIDs.

The proponents might be required to provide monetary compensation to the City for the operation, maintenance and replacement of their portion of LIDs usage located in public lands, similar to the Alternative Infrastructure policy (AIP).

2.4 Redundancy Factors

Redundancy factors are required for LIDs on both public and private lands to compensate for the potential functional deterioration of the LID over time. The City of Markham's approach is to apply redundancy factors to LID volumes, for example, a redundancy factor of 50% represents a design volume that is 1.5 times greater than the volume required to meet the runoff volume control criterion if the LID operates at full capacity. The full list of redundancy factors are provided in **Appendix C – LID Redundancy Factors**.

The redundancy factors were developed for individual LID types and land uses, which consider current research on the long-term effectiveness of LIDs and the use of similar factors in other jurisdictions. Redundancy factors consider the degree of maintenance and operation required for types of LIDs and the likelihood that it will be carried out. For instance, soil amendments require minimal maintenance, but there is some risk that some pervious surface may be converted to hard landscaping in the future. This will be captured in the redundancy factor, however, it will be relatively smaller than a redundancy factor for a Bioretention / rain garden, which requires a high level of regular maintenance and inspection to operate optimally. As another example, the performance of public LIDs managed by the City of Markham are likely to differ from the performance of LIDs managed by individual private property owners.

3 GENERAL CONDITIONS, CRITERIA AND REQUIREMENTS FOR LIDs ON PUBLIC RIGHTS-OF-WAY, PARKS AND OTHER CITY-OWNED PROPERTY

Stormwater LIDs may be applied on City road rights-of-way, parks, SWM pond blocks and open space, as well as on City-owned community facilities (e.g. libraries, community centres, and fire stations). The matrix of LID options for public lands are shown in **Appendix A – LID Options Matrix**. Although a LID type may be shown as acceptable, there are specific considerations for each type of LID within each land use category that need to be addressed before acceptance, as described in **Appendix B – LID Specific Considerations Table**. In all cases, the City of Markham will be responsible for the operation and maintenance of LIDs installed on City property. As described in Section 2.1, LIDs located within the City's rights-of-way and other City-owned property are to be designed to achieve the applicable water balance requirements exclusively for City-owned land. The following sections describe specific considerations for different public lands uses.

3.1 Road Rights-of-Way

LIDs within public road rights-of-way areas are intended to satisfy the water balance targets for City-owned land only. All LIDs proposed within road rights-of-way shall be designed with appropriate pre-treatment systems to minimize maintenance and maximize the lifespan of the LID measures. At this time, LIDs are generally not preferred and have limited application within typical municipal road right-of-ways due to the numerous other utilities and limited space available for LIDs. However, under special circumstances (e.g. constrained sites, or new innovative roadway design with additional space to accommodate LIDs), they may be considered in consultation with the City.

At the Plan of Subdivision stage, any Functional Servicing or Stormwater Management Report proposing LIDs on road rights-of-way shall include an LID Implementation Plan that contains the following information:

- A description of the LIDs (including pretreatment measures) proposed within road rights-of-way, including locations and preliminary design details. Pretreatment, if applicable, is to be used before runoff drains to the LIDs in the ROW.
- Preliminary calculations for the sizing of LIDs, supported by geotechnical and hydrogeological investigations, and include the application of Redundancy Factors (**Appendix C – LID Redundancy Factors**).
- Preliminary plans demonstrating that any at-grade LIDs are compatible with applicable streetscape and urban design guidelines.
- Preliminary plans demonstrating that the LIDs will avoid conflicts with standard utilities, including lot service connections, in general accordance with MOECC Procedure F-6-1 and other applicable standards.

At detailed design stage, an LID Implementation Plan should be provided with the following information:

- Detailed calculations for the performance of LIDs, supported by geotechnical and hydrogeological investigations. A Redundancy Factor may also be required in the design for specific LID types to account for long-term operational uncertainties of the LID, as presented in **Appendix C – LID Redundancy Factors**.
- Detailed plans demonstrating that any at-grade LIDs are compatible with applicable streetscape and urban design guidelines.
- Detailed Plans demonstrating that the LIDs will avoid conflicts with standard utilities, including lot service connections, in general accordance with MOECC Procedure F-6-1 and other applicable standards.

- Plans demonstrating that LIDs can be inspected with as minimal traffic disruption as possible.
- An Operations and Maintenance Manual, outlining:
  - All maintenance activities and recommended maintenance frequencies for each LID and any upstream pre-treatment measures in order to preserve the predicted performance. LIDs should be selected and designed based on maintenance considerations with a preference for LIDs types, layouts, and configurations that will result in simpler maintenance procedures.
  - A description of the equipment and materials required to complete the recommended maintenance (including specific requirements such as confined space entry), and recommendations for service delivery (i.e. completed by City staff or contracted to private service providers).
  - An estimate of the lifespan of each LID and construction methodologies for replacement. LIDs should be selected and designed to reflect the works necessary for their replacement (i.e. LIDs requiring full depth road reconstruction for their replacement should have a service life comparable to the roadway itself and be designed to be taken “off-line”, only if applicable and/or appropriate, during maintenance and replacement activities).
- Confirmation that failure of any LID will not pose a risk to people or property (i.e. emergency overflows)

3.2 City Parks

City parks represent an ideal opportunity to incorporate and integrate stormwater LIDs. Typically, a large portion of the park is greenspace with few, if any, utility installations.

LIDs proposed in City parks must be selected and designed so as to not constrain park programming, and to minimize the degree of disturbance to park facilities for maintenance of LIDs. Selection and siting of LIDs should be completed collaboratively with the landscape architect and Parks planning staff at the City to take full advantage of all opportunities to integrate LIDs with planting plan for the park.

LIDs within City Parks are intended to satisfy the water balance targets for City-owned land only. All LIDs proposed within City parks must include pre-treatment upstream of the LID where applicable. For example, storm runoff from public ROW must have pretreatment prior to draining into LIDs within City Parks. Furthermore, the pre-treatment devices should be located in the road right-of-way adjacent to parks, or designed in such a manner that they can be inspected and maintained without restricting use of, or access to, the park.

At the Plan of Subdivision stage, any Functional Servicing and/or Stormwater Management Report proposing LIDs on City parks shall include:

- A description of LIDs proposed within City parks, including general locations and preliminary design details.
- The percentage of park areas used for LIDs should be presented with calculations supporting the feasibility of meeting infiltration targets. For the North Markham FUA, up to 20% of the area of a Community Park, 15% of the area of a Neighbourhood Park and 10% of the area of a Parkette can be used for LIDs, provided they do not constrain park programming.
- Preliminary calculations for the sizing of LIDs, supported by geotechnical and hydrogeological investigations, and include the application of Redundancy Factors (**Appendix C – LID Redundancy Factors**).

The detailed design stage for subdivision shall include an LID Implementation Plan that contains the following information:

- A thorough description of LIDs proposed within City parks (including pretreatment).
- A landscape design for the park, demonstrating that the proposed LIDs are integrated and will not interfere with the planned programming for the park.
- Detailed calculations for the required size and performance of the LIDs, supported by geotechnical and hydrogeological investigations, and include the application of Redundancy Factors (**Appendix C – LID**

Redundancy Factors). Calculations for the fraction of the total area of the park constrained by LIDs are also required, and referenced against the City's guideline for the extent of park area that can be constrained by stormwater management infrastructure.

- An Operations and Maintenance Manual, outlining:
  - All maintenance activities and recommended maintenance frequencies for each LID and any upstream pre-treatment measures in order to preserve the predicted performance. LIDs should be selected and designed based on maintenance considerations with a preference for LIDs types, layouts, and configurations that will result in simpler maintenance procedures.
  - A description of the equipment and materials required to complete the recommended maintenance (including special requirements such as confined space entry), and recommendations for service delivery (i.e. completed by City staff or contracted to private service providers).
  - An estimate of the lifespan of each LID and construction methodologies for replacement. LIDs should be selected and designed to minimize the extent and duration of park closure required for their replacement.
- Confirmation that failure of any LID will not pose a risk to people or property (i.e. emergency overflows).
- Confirmation from the City's parks planning department acknowledging and accepting the proposed LIDs and associated maintenance obligations.

3.3 SWM Pond Blocks

Depending on the extent of source and conveyance measures to retain and infiltrate storm runoff, the amount of runoff reaching end-of-pipe stormwater management facilities may not be large or frequent enough to sustain and prevent stagnation of the permanent pool in a traditional wet detention facility. Where a traditional wet detention facility is not warranted, consideration should be given to dry end-of-pipe detention facilities designed to maximize infiltration through the base of the facility. As well, LIDs may also be applied within available space of SWM block to be used for public LIDs as explained in **Section 2.2**.

At the Plan of Subdivision stage, any Functional Servicing and/or Stormwater Management Report proposing LIDs within SWM pond blocks shall include:

- A description of LIDs proposed within SWM pond block, including general locations and preliminary design details.
- Preliminary calculations for the sizing of LIDs, supported by geotechnical and hydrogeological investigations, and include the application of Redundancy Factors (**Appendix C – LID Redundancy Factors**).

At detailed design stage, an LID Implementation Plan should be provided with the following information:

- A thorough description of the LIDs proposed within SWM pond blocks, including locations and design details.
- Detailed calculations for the sizing and performance of LIDs, supported by geotechnical and hydrogeological investigations. A Redundancy Factor may also be required in the design for specific LID types to account for long-term operational uncertainties of the LID, as presented in **Appendix C – LID Redundancy Factors**.
- An Operations and Maintenance Manual, either separate or integrated with the overall SWM Pond Operations and Maintenance Manual, outlining:
  - All maintenance activities and recommended maintenance frequencies for each LID and any upstream pre-treatment measures in order to preserve the predicted performance. LIDs should be selected and designed based on maintenance considerations with a preference for LIDs types, layouts, and configurations that will result in simpler maintenance procedures.
  - A description of the equipment and materials required to complete the recommended maintenance, and recommendations for service delivery (i.e. completed by City staff or contracted to private service providers).

- An estimate of the lifespan of each LID and construction methodologies for replacement. LIDs should be selected and designed to be replaced without taking the SWM pond out of service where possible.

- Confirmation that failure of any LID will not pose a risk to people or property, including the SWM pond itself.

3.4 City-Owned Institutional Development

City-owned institutional development includes, but is not limited to, community centres, libraries, and fire stations. The approach for implementing LIDs on this type of development is similar to that for private institutional development (**Section 4.5**), in that details of the planned City-owned institutional development will be determined subsequent to Draft Plan of Subdivision approval and finalization of the associated Functional Servicing Report.

Storm runoff from City-owned institutional development should only be directed to LIDs located within the site and not rely on LIDs in public spaces downstream of and external to the site. Any LIDs proposed within a City-owned institutional development are to only manage rainfall and runoff from the property on which they are located. Directing runoff from an external area to a LID on a City-owned institutional property will also not be accepted.

At the Plan of Subdivision stage, any Functional Servicing Report proposing LIDs on City-owned institutional development shall include the following information:

- The infiltration and/or runoff retention criteria to be achieved for these sites within the Draft Plan of Subdivision.
- A brief description of the LIDs recommended for these sites within the Draft Plan of Subdivision to achieve the assigned criteria.
- An assessment degree of use required for any recommended rainwater harvesting LIDs to be effective (i.e. irrigation demands for re-use for irrigation, water demands for greywater plumbing systems).
- Preliminary calculations for the sizing of LIDs, supported by geotechnical and hydrogeological investigations, and include the application of Redundancy Factors (**Appendix C – LID Redundancy Factors**).
- General operation and maintenance requirements and anticipated service life.

At the time of Site Plan Approval, it is expected that much more detailed information will be available regarding the proposed institutional development and associated stormwater management systems, including LID practices. Applications for Site Plan Approval should be accompanied by a Stormwater Management Design Brief, which will include details of the proposed on-site stormwater management systems. The Design Brief shall include:

- A detailed description of the LIDs proposed for the site.
- The preferred locations for LIDs based on anticipated development form (i.e. extent of permeable pavement for surface parking areas, location of cisterns for rainwater harvesting for car or truck washing).
- Calculations for the anticipated demand for rainwater harvesting LIDs (i.e. irrigation for planned landscaping, other greywater systems).
- Detailed calculations for the performance of any infiltration LIDs and confirmation that the water balance targets established for the site in the Functional Servicing Report will been achieved. These calculations are to be supported by site specific geotechnical and hydrogeological investigations and may require a Redundancy Factor for specific LID types to account for long-term operational uncertainties of the LID, as presented in **Appendix C – LID Redundancy Factors**.
- An Operations and Maintenance Manual, outlining:
  - All maintenance activities and recommended maintenance frequencies for each LID and any upstream pre-treatment measures in order to preserve the predicted performance of the LID.

- A description of the equipment and materials required to complete the recommended maintenance (including special requirements such as confined space entry), and recommendations for service delivery (i.e. completed by City staff or contracted to private service providers).
- An estimate of the lifespan of each LID and construction methodologies for replacement. LIDs should be selected and designed to minimize the extent and duration of any constraints on the facility operation required for their replacement.

- Confirmation that failure of any LID will not pose a risk to people or property (i.e. emergency overflows).

3.5 Buffers / Vegetation Protection Zones

Certain LIDs can be implemented in buffers or vegetation protection zones (VPZ), provided that the physical and functional integrity of the feature is protected or enhanced and stormwater management criteria are achieved.

Because LIDs proposed in buffers / VPZ are likely designed as part of an integrated stormwater management system on the adjacent property (either City-owned or private property), the requirements for LIDs in buffers / VPZ include those that are associated with the adjacent development (Sections 2 and 3), plus an Environmental Impact Study (EIS) that demonstrates achievement of the aforementioned criteria. The EIS is required with the Functional Servicing and/or Stormwater Management Report at the Plan of Subdivision or Plan of Condominium stage.

More specifically, buffers / VPZs have considerations that are associated with the type of natural feature they are adjacent to, namely, valleylands, woodlands, and wetlands. Each type of feature has specific LID considerations, such as the placement of LID components (e.g. outlet) within the buffer / VPZ at certain distances away from the natural heritage feature. Additional details are included in the Minutes of Settlement that were established through mediation of an appeal of the City's Official Plan at the Ontario Municipal Board (OMB). The final guidelines for locating SWM facilities, including LIDs, within the buffer or VPZ adjacent natural heritage features will be included as an Appendix to this guideline when formally approved by the OMB.

It should be noted that the proposed LIDs in buffers and VPZ areas also need to be accepted by the TRCA.

4 GENERAL CONDITIONS, CRITERIA AND REQUIREMENTS FOR LIDs WITHIN PRIVATE PROPERTY

Private property where LID can potentially be applied includes low rise residential (single detached homes and townhouses), mid and high rise residential, mixed use, commercial, employment and institutional types of development. Each of these land use types poses unique challenges and opportunities for the successful implementation of LID stormwater practices, but all share the same challenges to ensure that all LIDs within private property are properly operated and maintained over the life of the development.

The matrix of LID options for private lands are shown in **Appendix A – LID Options Matrix**. Although a LID type may be shown as acceptable, there are specific considerations for each type of LID within each land use category that need to be addressed before approval, as described in **Appendix B – LID Specific Considerations Table**.

In general, LIDs within private property are to only manage runoff from private lands, and any LID practice proposed on private property is to only manage rainfall and runoff from the property on which it is located. As noted in Section 2.1, excess runoff from private lands may be directed to LIDs on public lands, but the resulting treatment will be applied against the applicable water balance targets for City-owned land.

Where feasible, a private site should be designed to promote having minimal runoff for the amount up to the infiltration target by using a combination of LIDs to be applied at various locations throughout the site (refer to **Figure F-2** in **Appendix F**).

Where feasible, storm drainage systems from private development, with the exception of single detached and freehold townhouse residential development, should connect to the City's storm sewer system at a single location by means of a control manhole.

4.1 Residential Development – Single Detached and Freehold Townhouses

The matrix of approved LID options for private residential property includes the full range of LIDs as shown in **Appendix A – LID Options Matrix**. However, given the challenges to ensure that LIDs within private residential lots are properly operated and maintained, priority should be given to LIDs such as soil amendments and rain barrels.

At the Plan of Subdivision stage, any Functional Servicing and/or Stormwater Management Report proposing LIDs within private residential lots shall include:

- A description of LIDs proposed within the residential subdivision, including general locations and preliminary design details.
- The preferred locations for the LIDs based on lot coverage, setbacks from buildings and property lines (from zoning and building codes) and standard locations for service connections.
- Preliminary calculations for the sizing of LIDs, supported by geotechnical and hydrogeological investigations, and include the application of Redundancy Factors (**Appendix C – LID Redundancy Factors**).

At detailed design stage, an LID Implementation Plan as part of the Stormwater Management Design Brief should include the following information:

- A detail description of the LIDs proposed.
- The preferred locations for the LIDs based on lot coverage, setbacks from buildings and property lines (from zoning and building codes) and standard locations for service connections.

- Detailed calculations for the sizing of LIDs, supported by geotechnical and hydrogeological investigations. A Redundancy Factor may also be required in the design for specific LID types to account for long-term operational uncertainties of the LID, as presented in **Appendix C – LID Redundancy Factors**.
- An assessment of the degree of use/operation required by the private property owner for the LIDs to be effective (i.e. rain barrels require more active use relative to infiltration trenches or soak-away pits).
- All maintenance activities required by the private property owner for the LIDs to remain effective and the frequency of maintenance.
- A draft Private Property Owner Manual, describing the purpose, function, maintenance frequency and requirements for the LIDs proposed and templates for record keeping.
- Estimated lifespan of the LIDs and mechanisms to replace the LIDs at the end of their serviceable life.
- Confirmation that failure of any LID will not pose a risk to people or property (i.e. emergency overflow).

It should be noted that, while redevelopment / infill of single detached and freehold townhouses are subject to the general conditions described in Section 4.1 of this guideline document (e.g., simple LID measures such as rain barrels, soil amendments, etc. can be easily implemented), alteration / modification / alteration to existing single residential lot will not be mandatory to have LIDs.

4.2 Residential (Condominium) and Mixed-Use Development

It is expected that higher density forms of residential development, such as condominium townhouses and multi-storey residential and mixed-use buildings, will be better suited to more centralized, structural stormwater LID practices on its private property. As previously mentioned, LIDs within private property are to be designed to achieve the applicable water balance criteria on site, and cannot rely on downstream LIDs on public land to meet water balance requirements.

It is also expected that the type and form of LIDs proposed for these types of development will be refined at the time of Site Plan Approval. Regardless, any Functional Servicing and/or Stormwater Management Report recommending LIDs within these types of development must demonstrate that the infiltration targets established through the subwatershed studies can be reasonably achieved.

At the Plan of Subdivision stage, any Functional Servicing and/or Stormwater Management Report shall include the following information.

- The infiltration and/or runoff retention criteria to be achieved for these land uses within the Draft Plan of Subdivision.
- A brief description of the LIDs recommended for these land uses within the Draft Plan of Subdivision to achieve the assigned criteria.
- An assessment of the degree of use required for any recommended rainwater harvesting LIDs to be effective (i.e. irrigation demands for re-use for irrigation, water demands for greywater plumbing systems).
- Preliminary calculations for the sizing of LIDs, supported by geotechnical and hydrogeological investigations, and include the application of Redundancy Factors (**Appendix C – LID Redundancy Factors**).
- General operation and maintenance requirements and anticipated service life.

At the time of Site Plan Approval, it is expected that much more detailed information will be available regarding the proposed development and associated stormwater management systems, including LID practices. Applications for Site Plan Approval should be accompanied by an LID Implementation Plan as part of the Stormwater Management Design Brief, which will include details of the proposed on-site stormwater management systems. The LID Implementation Plan of the Stormwater Management Design Brief should include:

- A detailed description of the LIDs proposed for the site.

- The preferred locations for LIDs based on anticipated development form and applicable zoning (i.e. cisterns located within underground parking garages, stormwater planters in common outdoor amenity space).
- Calculations for the anticipated demand for rainwater harvesting LIDs (i.e. irrigation for planned landscaping, other greywater systems).
- Detailed calculations for the sizing and performance of any infiltration LIDs and confirmation that the water balance targets established for the site in the Functional Servicing Report will be achieved. These calculations are to be supported by site specific geotechnical and hydrogeological investigations, and include the application of Redundancy Factors (**Appendix C – LID Redundancy Factors**).
- A detailed operations and maintenance manual, outlining the type and frequency of inspections and maintenance, responsible parties for inspection and maintenance, and record keeping.
- Confirmation that failure of any LID will not pose a risk to people or property (i.e. emergency overflows).

4.3 Commercial and Employment Development

Commercial and employment development is typically characterized by site coverage with buildings and parking, with landscaping around the perimeter of the site. Surface parking lots offer considerable opportunities for runoff retention and infiltration, while flat roofs are good candidates for runoff capture, infiltration and re-use. As previously mentioned, LIDs within private property are to be designed to achieve the applicable water balance criteria on site, and cannot rely on downstream LIDs on public land to meet water balance requirements.

As with Residential and Mixed-Use development described in **Section 4.2**, it is expected that the Functional Servicing and/or Stormwater Management Report submitted in support of a Draft Plan of Subdivision will list targets for infiltration and/or runoff retention for commercial and employment sites, and a detailed plan to achieve the targets will be included with an application for Site Plan Approval.

As such, the same requirements for Functional Servicing Reports and Stormwater Management Design Briefs set out in **Section 4.2** also apply to LIDs proposed on commercial and employment development sites. Refer to **Section 4.2** for details.

4.4 Institutional Development – Elementary and Secondary Schools

Elementary and Secondary School sites are suitable for a wide range of stormwater LID practices. Elements such as sports fields, surface parking lots and flat building rooftops all provide opportunities to incorporate LID. As previously mentioned, LIDs within private property are to be designed to achieve the applicable water balance criteria on site, and cannot rely on downstream LIDs on public land to meet water balance requirements.

As with Residential Mixed-Use, Commercial and Employment uses, targets for infiltration and/or runoff retention and general recommendations for LIDs on school sites are to be recommended in a Functional Servicing and/or Stormwater Management Report in support of Draft Plan of Subdivision Approval. Details of all LID measures proposed to achieve the targets will be included with the application for Site Plan Approval.

In the case of schools, any LID measures on school sites will be constructed, operated and maintained by the respective school boards. These obligations must be clearly communicated to the school board such that any additional construction costs and ongoing maintenance costs are accounted for in the board's budget planning processes.

The requirements of Functional Servicing Reports and Stormwater Management Design Briefs set out in **Section 4.2** also apply to LIDs proposed on school sites. Refer to **Section 4.2** for details.

4.5 Private Institutional Development

Private institutional development could include places of worship, hospitals, long-term care facilities, private schools and post-secondary institutions. In many cases, the future owner and/or form of development may not be known at the Draft Plan of Subdivision stage. As previously mentioned, LIDs within private property are to be designed to achieve the applicable water balance criteria on site, and cannot rely on downstream LIDs on public land to meet water balance requirements.

Regardless, any LIDs proposed within private institutional development lands are expected to proceed on the same basis as residential mixed-use, commercial and employment development. As such, the same requirements of Functional Servicing Reports and Stormwater Management Design Briefs set out in **Section 4.2** also apply to LIDs proposed on private institutional lands. Refer to **Section 4.2** for details.

5 NEXT STEPS

5.1 Future Studies

As the application of LIDs within the City of Markham evolves from pilot projects to standard stormwater management infrastructure, there is a need to standardize many aspects of LID design, construction, operation and maintenance, particularly for those proposed within the public realm.

City of Markham will consider establishing the following:

- Detailed terms of reference for LID operations and maintenance manuals.
- Standard/typical detail drawings for LIDs.
- Detailed terms of reference for performance monitoring of LIDs within public lands. The performance monitoring specifications for LIDs on public lands should address monitoring and reporting prior to assumption by the City as well as long term monitoring by the City or the TRCA following assumption.

The City is currently reviewing, prioritizing, and discussing the recommendations above for the next steps. If produced, future relevant documents will be released when they become available.

Ongoing engagement to stay informed of new innovative LID ideas will continue in order to encourage continuous improvements to the various aspects of LID design, implementation and operation within the City of Markham. It is anticipated that this LID guideline be a “living document” and that it be reviewed every three (3) years, in consultation with stakeholders, and updated (if required) to incorporate potential new ideas and technology, as well as to ensure new or updated requirements in legislation and policies are reflected.

5.2 Other Tools

The City may consider exploring various tools that can help to minimize risk if certain private LIDs are not adequately maintained or are removed. These tools may include:

- Driveway by-law
- Building permit for sheds and ancillary structures
- Sewer use by-law

APPENDIX A

LID Options Matrix

APPENDIX A - LID Options Matrix

The purpose of the LID Options Matrix is to provide guidance about the types of LIDs that would be considered acceptable for each land use category. LIDs that are considered acceptable and may be considered for LID infiltration credits are shown in green. Non-applicable LIDs (not physically feasible) are shown in blue and LIDs that are not accepted by the City are shown in red.

The LID Options Matrix is intended for the high-level screening of LID types that can be considered for meeting the FUA subwatershed study infiltration targets. Although an LID type may be shown as acceptable (in green), there are specific considerations for each type of LID within each land use category that need to be addressed before approval. The Appendix B - LID Specific Considerations Table is included in this document.

	Land Use Categories		LID Options [1]													Considerations for Acceptance
			Applicable					Not Applicable				Not Acceptable				
	ID		A	B	C	D	E	F	G	H	I	J	K	L	M	
			Rainwater Harvesting (e.g. tanks/cisterns, etc.)	Green Roof [3]	Infiltration Gallery / Infiltration Trench	Perforated Third Pipe System [4] (e.g.Exfiltration System)	Soak Away Pit	Permeable Pavement	Bioretention Cell (e.g. Rain Garden)	Stormwater Planter	Biofilter [5]	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments [6]	
Public Ownership		**Open Spaces**														
	01	City-Wide Park														Refer to Page 1 and 2 of Appendix B - LID Specific Considerations Table
	02	Community Park (LID allowance: **20%** of park area)														
	03	Neighbourhood Park (LID allowance: **15%** of park area)														
	04	Urban Park														
	05	Public Strata Park														
	06	Parkette (LID allowance: **10%** of park area)														Refer to Page 3 and 4 of Appendix B - LID Specific Considerations Table
	07	Linear Park / Open Space Block														
	08	Stormwater Management Block														
	09	Buffers/VPZ														
	10	Valleyland														
		Roads/Rights-of-Way (R.O.W.)														
	11	Arterial														Refer to Page 5 and 6 of Appendix B - LID Specific Considerations Table
	12	Collector														
	13	Local														
	14	Lane														
	15	Single loaded local road														
	16	Transit Way														
	17	Parking lay-by (including bump-outs)														
		Utility Corridors [2]														
	18	District Energy														Refer to Page 7 and 8 of Appendix B - LID Specific Considerations Table
	19	Hydro One														
	20	Sewer/Drainage Easement														
		Institutional Uses														
	21	Community Centre														Refer to Page 9 and 10 of Appendix B -LID Specific Considerations Table
	22	Library														
	23	School														
	24	Other (Museum, Theatre, Art Gallery, Hospital, Fire Stations)														

[1] Other LID options including innovation designs will be subject to review and approval by the City and other approval agencies.

[2] Relevent utility agency's approval is required.

[3] Green roofs pertain to buildings only.

[4] Perforated third pipe system excludes Non-Perforated third pipe system and/or foundation drain collection system (FDC).

[5] Biofilter is a variation of bioretention, where there is an impermeable liner and underdrain pipe.

[6] Subject to further review of existing soil conditions (soil amendments must improve existing soil condition).

APPENDIX A - LID Options Matrix

The purpose of the LID Options Matrix is to provide guidance about the types of LIDs that would be considered acceptable for each land use category. LIDs that are considered acceptable and may be considered for LID infiltration credits are shown in green. Non-applicable LIDs (not physically feasible) are shown in blue and LIDs that are not accepted by the City are shown in red.

The LID Options Matrix is intended for the high-level screening of LID types that can be considered for meeting the FUA subwatershed study infiltration targets. Although an LID type may be shown as acceptable (in green), there are specific considerations for each type of LID within each land use category that need to be addressed before approval. The Appendix B - LID Specific Considerations Table is included in this document.

	Land Use Categories		LID Options [1]													Considerations for Acceptance
			Applicable					Not Applicable				Not Acceptable				
	ID		A	B	C	D	E	F	G	H	I	J	K	L	M	
			Rainwater Harvesting (e.g. tanks/cisterns, etc.)	Green Roof [3]	Infiltration Gallery / Infiltration Trench	Perforated Third Pipe System [4] (e.g.Exfiltration System)	Soak Away Pit	Permeable Pavement	Bioretention Cell (e.g. Rain Garden)	Stormwater Planter	Biofilter [5]	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments [6]	
Private Ownership		**Open Spaces**														
	25	Private Open Space														Refer to Page 11 and 12 of Appendix B - LID Specific Considerations Table
		Roads/Rights-of-Way (R.O.W.)														
	26	Private Roads														
		Residential														
	27	Single Detached														
	28	Townhouse - Freehold														
	29	Townhouse - Condominium														
	30	Mixed Use - Surface Parking														
	31	Mixed Use - Underground Parking														
		Employment														
	32	Office Campus - Surface Parking														Refer to Page 13 and 14 of Appendix B - LID Specific Considerations Table
	33	Office Campus - Underground Parking														
	34	Industrial - Warehouse														
	35	Industrial - Manufacturing														
		Commercial														
	36	Retail Main Street														Refer to Page 15 and 16 of Appendix B - LID Specific Considerations Table
	37	Large scale commercial														
	38	Small scale commercial														
	39	Gas Station/Mechanic														
		Institutional														
	40	Place of Worship														Refer to Page 17 and 18 of Appendix B - LID Specific Considerations Table
	41	Private School/College/University														
		Utility Corridors [2]														
	42	Transcanada Pipeline														
	43	Enbridge/Gas/Oil														

[1] Other LID options including innovation designs will be subject to review and approval by the City and other approval agencies.

[2] Relevent utility agency's approval is required.

[3] Green roofs pertain to buildings only.

[4] Perforated third pipe system excludes Non-Perforated third pipe system and/or foundation drain collection system (FDC).

[5] Biofilter is a variation of bioretention, where there is an impermeable liner and underdrain pipe.

[6] Subject to further review of existing soil conditions (soil amendments must improve existing soil condition).

APPENDIX B

LID Specific Considerations Table

Appendix B – LID Specific Considerations Table

Viewing of tables: The tables are intended to be viewed digitally (using the zoom-in function). If the tables are to be viewed on paper hard copies, they should be printed on larger size paper to ensure text is legible.

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

Public Open Spaces

	LID Applicable	LID Not Applicable	LID Not Acceptable

		Land Use Category	LID Specific Considerations for Acceptance					
	ID		A	B	C	D	E	F
			Rainwater Harvesting	Green Roof	Subsurface Infiltration - Infiltration Gallery / Infiltration Trenches	Subsurface Infiltration - Third Pipe System (Exfiltration)	Subsurface Infiltration - Soakaway Pit	Permeable Pavement
Public Ownership	01	City-Wide Park	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs located within the park • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4 m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr; native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required from areas external to the park; pretreatment device should be located within road ROW for maintenance access • Pretreatment is required for runoff from road or parking area. • Access to LID for operation and maintenance should be provided and should be accessible by vacuum trunk or other large equipment • Maintenance access cannot be located within fire and emergency access routes • Can accept external runoff from public ROW		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required from areas external to the park; pretreatment device should be located within road ROW for maintenance access • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and should be accessible by vacuum trunk or other large equipment • Maintenance access cannot be located within fire and emergency access routes • Can accept external runoff from public ROW	• No credits will be given to permeable pavement in area of high traffic that requires de-icing / sanding • The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from building foundation for the infiltraiton gallery component is 4 m. • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW
	02	Community Park *Total area constrained by LIDs cannot be more than 20% of the park area*	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs located within the park • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4 m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr; native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required from areas external to the park; pretreatment device should be located within road ROW for maintenance access • Pretreatment is required for runoff from road or parking area. • Access to LID for operation and maintenance should be provided and should be accessible by vacuum trunk or other large equipment • Maintenance access cannot be located within fire and emergency access routes • Can accept external runoff from public ROW		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required from areas external to the park; pretreatment device should be located within road ROW for maintenance access • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and should be accessible by vacuum trunk or other large equipment • Maintenance access cannot be located within fire and emergency access routes • Can accept external runoff from public ROW	• No credits will be given to permeable pavement in area of high traffic that requires de-icing / sanding • The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from building foundation for the infiltraiton gallery component is 4 m. • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW
	03	Neighbourhood Park *Total area constrained by LIDs cannot be more than 15% of the park area*	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs located within the park • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4 m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr; native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required from areas external to the park; pretreatment device should be located within road ROW for maintenance access • Pretreatment is required for runoff from road or parking area. • Access to LID for operation and maintenance should be provided and should be accessible by vacuum trunk or other large equipment • Maintenance access cannot be located within fire and emergency access routes • Can accept external runoff from public ROW		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required from areas external to the park; pretreatment device should be located within road ROW for maintenance access • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and should be accessible by vacuum trunk or other large equipment • Maintenance access cannot be located within fire and emergency access routes • Can accept external runoff from public ROW	• No credits will be given to permeable pavement in area of high traffic that requires de-icing / sanding • The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from building foundation for the infiltraiton gallery component is 4 m. • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW
	04	Urban Park	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs located within the park • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4 m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr; native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required from areas external to the park; pretreatment device should be located within road ROW for maintenance access • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and should be accessible by vacuum trunk or other large equipment • Maintenance access cannot be located within fire and emergency access routes • Can accept external runoff from public ROW		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr for infiltration galleries and soakaway pits • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required from areas external to the park; pretreatment device should be located within road OW for maintenance access • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and should be accessible by vacuum trunk or other large equipment • Maintenance access cannot be located within fire and emergency access routes • Can accept external runoff from public ROW	• No credits will be given to permeable pavement in area of high traffic that requires de-icing / sanding • The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement cannot accept drainage from areas external to the park • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from building foundation for the infiltraiton gallery component is 4 m. • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW • Cannot receive runoff from privately owned lands
	05	Strata Park						

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

Public Open Spaces

	LID Applicable	LID Not Applicable	LID Not Acceptable

	ID	Land Use Category	LID Specific Considerations for Acceptance						
			G	H	I	J	K	L	M
			Bioretention - Bioretention Cell / Rain Garden	Bioretention - Stormwater Planter	Bioretention - Biofilter	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
Public Ownership	01	City-Wide Park	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Soil amendments may be required for low infiltration subsurface soils • Can accept external runoff from public ROW	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Soil amendments may be required for low infiltration subsurface soils • Can accept external runoff from public ROW	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Can accept external runoff from public ROW	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, proprietary urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval. • Must be integrated into urban design • Can accept external runoff from public ROW	• If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Pretreatment is required from areas external to the park • Soil amendments are required for highly compacted native soils • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement • Can accept external runoff from public ROW
	02	Community Park *Total area constrained by LIDs cannot be more than 20% of the park area*	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Soil amendments may be required for low infiltration subsurface soils • Can accept external runoff from public ROW	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Soil amendments may be required for low infiltration subsurface soils • Can accept external runoff from public ROW	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Can accept external runoff from public ROW	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, proprietary urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval. • Must be integrated into urban design • Can accept external runoff from public ROW	• If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Pretreatment is required from areas external to the park • Soil amendments are required for highly compacted native soils • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement • Can accept external runoff from public ROW
	03	Neighbourhood Park *Total area constrained by LIDs cannot be more than 15% of the park area*	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Soil amendments may be required for low infiltration subsurface soils • Can accept external runoff from public ROW	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Soil amendments may be required for low infiltration subsurface soils • Can accept external runoff from public ROW	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Can accept external runoff from public ROW	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, proprietary urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval. • Must be integrated into urban design • Can accept external runoff from public ROW	• If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Pretreatment is required from areas external to the park • Soil amendments are required for highly compacted native soils • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement • Can accept external runoff from public ROW
	04	Urban Park	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Soil amendments may be required for low infiltration subsurface soils • Can accept external runoff from public ROW	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Soil amendments may be required for low infiltration subsurface soils • Can accept external runoff from public ROW	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Can accept external runoff from public ROW	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, proprietary urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval. • Must be integrated into urban design • Can accept external runoff from public ROW	• If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Pretreatment is required from areas external to the park • Soil amendments are required for highly compacted native soils • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement • Can accept external runoff from public ROW
	05	Strata Park					• If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • No runoff from external area allowed	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • No runoff from external area allowed	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement • No runoff from external area allowed

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

FUA LID Matrix - Public Open Spaces

			LID Applicable	LID Not Applicable	LID Not Acceptable
		Land Use Category	**LID Specific Considerations for Acceptance**		
	ID		A	B	C
			Rainwater Harvesting	Green Roof	Subsurface Infiltration - Infiltration Gallery
Public Ownership	06	Parkette *Total area constrained by LIDs cannot be more than 10% of the park area*	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs located within the park • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4 m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr; native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required from areas external to the park; pretreatment device should be located within road ROW for maintenance access • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and should be accessible by vacuum trunk or other large equipment • Maintenance access cannot be located within fire and emergency access routes • Can accept external runoff from public ROW
	07	Linear Park / Open Space Block	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs located within the park • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4 m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr; native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required from areas external to the park; pretreatment device should be located within road ROW for maintenance access • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and should be accessible by vacuum trunk or other large equipment • Maintenance access cannot be located within fire and emergency access routes • Can accept external runoff from public ROW
	08	Stormwater Management Block			• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr; native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance hydro / utilities trench is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required from areas external to the SWM block • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and should be accessible by vacuum trunk or other large equipment • Maintenance access cannot be located within fire and emergency access routes
	09	Buffers/VPZ			• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr; native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Infiltration facility and maintenance access cannot be located within 5 m of woodland limits, 10 m of valleyland limits, and 10 m of wetland limits, with the exception of overflow outlet • Pretreatment is required for runoff from area external to buffer/VPZ. • Access to LID for operation and maintenance should be provided and should be accessible by vacuum trunk or other large equipment
	10	Valleyland			

			D	E	F
	ID		D	E	F
			Subsurface Infiltration - Third Pipe System (Exfiltration)	Subsurface Infiltration - Soakaway Pit	Permeable Pavement
Public Ownership	06	Parkette *Total area constrained by LIDs cannot be more than 10% of the park area*		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required from areas external to the park; pretreatment device should be located within road ROW for maintenance access • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Maintenance access cannot be located within fire and emergency access routes • Can accept external runoff from public ROW	• No credits will be given to permeable pavement in area of high traffic that requires de-icing / sanding • The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from building foundation for the infiltraiton gallery component is 4 m. • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW
	07	Linear Park / Open Space Block		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required from areas external to the park; pretreatment device should be located within road ROW for maintenance access • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Maintenance access cannot be located within fire and emergency access routes • Can accept external runoff from public ROW	• No credits will be given to permeable pavement in area of high traffic that requires de-icing / sanding • The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from building foundation for the infiltraiton gallery component is 4 m. • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW
	08	Stormwater Management Block		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required from areas external to the SWM block • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Maintenance access cannot be located within fire and emergency access routes	
	09	Buffers/VPZ			
	10	Valleyland			

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

FUA LID Matrix - Public Open Spaces

LID Applicable	LID Not Applicable	LID Not Acceptable

		Land Use Category	LID Specific Considerations for Acceptance						
	ID		G	H	I	J	K	L	M
			Bioretention - Bioretention Cell / Raingarden	Bioretention - Stormwater Planter	Bioretention - Biofilter	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
Public Ownership	06	Parkette *Total area constrained by LIDs cannot be more than 10% of the park area*	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Soil amendments may be required for low infiltration subsurface soils • Can accept external runoff from public ROW	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Soil amendments may be required for low infiltration subsurface soils • Can accept external runoff from public ROW	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum clearance from hydro / utilities trench is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Can accept external runoff from public ROW	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval. • Must be integrated into urban design • Can accept external runoff from public ROW	• If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Pretreatment is required from areas external to the park • Soil amendments are required for highly compacted native soils • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement • Can accept external runoff from public ROW
	07	Linear Park / Open Space Block	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Soil amendments may be required for low infiltration subsurface soils • Can accept external runoff from public ROW	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Soil amendments may be required for low infiltration subsurface soils • Can accept external runoff from public ROW	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum clearance from hydro / utilities trench is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Pretreatment is required from areas external to the park • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Can accept external runoff from public ROW	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval. • Must be integrated into urban design • Can accept external runoff from public ROW • Cannot receive runoff from privately owned lands	• If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Pretreatment is required from areas external to the park • Soil amendments are required for highly compacted native soils • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Surface LIDs must be designed in consultation with and be approved by the City's Urban Design department to ensure integration with park features and programs are not disrupted • Can accept external runoff from public ROW	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement • Can accept external runoff from public ROW
	08	Stormwater Management Block	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required from areas external to the SWM block • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Soil amendments may be required for low infiltration subsurface soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required from areas external to the SWM block • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Soil amendments may be required for low infiltration subsurface soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum clearance from hydro / utilities trench is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required from areas external to the SWM block	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval. • Must be integrated into urban design	• If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Pretreatment is required from areas external to SWM block • Soil amendments are required for highly compacted native soils	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	09	Buffers/VPZ	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from area external to buffer/VPZ • Infiltration facility and maintenance access cannot be located within 5 m of woodland limits, 10 m of valleyland limits, and 10 m of wetland limits, with the exception of overflow outlet • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Bioretention/rain garden will be allowed in designated areas of the buffers/VPZ only. It must be designed in consultation with and be approved by the City • Soil amendments may be required for low infiltration subsurface soils • Can accept external runoff from public lands				• If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here • Vegetated swale cannot be located within 5 m of woodland limits, 10 m of valleyland limits, and 10 m of wetland limits, with the exception of overflow outlet • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Soil amendments may be required for low infiltration subsurface soils • Pretreatment is required for runoff from area external to buffer/VPZ • Can accept external runoff from public lands	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0m below ground surface • Filter strip cannot be located within 5 m of woodland limits, 10 m of valleyland limits, and 10m of wetland limits, with the exception of overflow outlet • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment • Can accept external runoff from public lands	
	10	Valleyland							

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

Public Roads/Rights-of-Way (R.O.W)

LID Applicable	LID Not Applicable	LID Not Acceptable

			LID Specific Considerations for Acceptance					
	ID		A	B	C	D	E	F
			Rainwater Harvesting	Green Roof	Subsurface Infiltration - Infiltration Gallery / Infiltration Trenches	Subsurface Infiltration - Third Pipe System (Exfiltration)	Subsurface Infiltration - Soakaway Pit	Permeable Pavement
Public Ownership	11	Arterial						
	12	Collector						
	13	Local						
	14	Lane						
	15	Single-loaded Local						
	16	Transit Way						
	17	Parking Lay-by						

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

Public Roads/Rights-of-Way (R.O.W)

	LID Applicable	LID Not Applicable	LID Not Acceptable

	ID	Land Use Category	LID Specific Considerations for Acceptance						
			G	H	I	J	K	L	M
			Bioretention - Bioretention Cell / Rain Garden	Bioretention - Stormwater Planter	Bioretention - Biofilter	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
Public Ownership	11	Arterial		• Stormwater planter must be integrated into roadway and urban design • Must meet transportation / road safety requirements • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention Stormwater Planter in soil with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be location on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundation is 4 m • The ratios of impervious drainage are to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermain 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Soil amendments may be required for low infiltration subsurface soil • Must ensure that design will not result in saturation of adjacent road sub-grade that would cause safety hazards (e.g. structural issues for the road)		• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system that can accommodate utility, watermains, and sewer crossings can be considered and is subject to City approval. • Must be integrated into roadway and urban design			• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	12	Collector		• Stormwater planter must be integrated into roadway and urban design • Must meet transportation / road safety requirements • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention Stormwater Planter in soil with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be location on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundation is 4 m • The ratios of impervious drainage are to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermain 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Soil amendments may be required for low infiltration subsurface soil • Must ensure that design will not result in saturation of adjacent road sub-grade that would cause safety hazards (e.g. structural issues for the road)		• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system that can accommodate utility, watermains, and sewer crossings can be considered and is subject to City approval. • Must be integrated into roadway and urban design			• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	13	Local		• Stormwater planter must be integrated into roadway and urban design • Must meet transportation / road safety requirements • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Must not interfere with community mail boxes • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention Stormwater Planter in soil with infiltration rates less than 1 5mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be location on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundation is 4 m • The ratios of impervious drainage are to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermain 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Soil amendments may be required for low infiltration subsurface soil • Must ensure that design will not result in saturation of adjacent road sub-grade that would cause safety hazards (e.g. structural issues for the road)					• Soil amendments shall only be applied to planted areas, including vegetated swales and filters strips that require soil amendments to enhance infiltration • Soil amendments cannot be applied to areas that are expected to support heavy loads or vehicular traffic • A plan required to ensure (a) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	14	Lane							• Soil amendments shall only be applied to planted areas, including vegetated swales and filters strips that require soil amendments to enhance infiltration • Soil amendments cannot be applied to areas that are expected to support heavy loads or vehicular traffic • A plan required to ensure (a) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	15	Single-loaded Local		• Stormwater planter must be integrated into roadway and urban design • Must meet transportation / road safety requirements • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Must not interfere with community mail boxes • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention Stormwater Planter in soil with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be location on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundation is 4 m • The ratios of impervious drainage are to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermain 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Soil amendments may be required for low infiltration subsurface soil • Must ensure that design will not result in saturation of adjacent road sub-grade that would cause safety hazards (e.g. structural issues for the road)					• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	16	Transit Way		• Stormwater planter must be integrated into transitway and urban design • Must meet transportation / road safety requirements • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention Stormwater Planter in soil with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be location on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundation is 4 m • The ratios of impervious drainage are to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermain 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Soil amendments may be required for low infiltration subsurface soil • Must ensure that design will not result in saturation of adjacent road sub-grade that would cause safety hazards (e.g. structural issues for the road)					• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	17	Parking Lay-by		• Stormwater planter must be integrated into transitway and urban design • Must meet transportation / road safety requirements • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Soil amendments may be required for low infiltration subsurface soils • Must ensure that design will not result in saturation of adjacent road rub-grade that would cause safety hazards (e.g. structural issues for the road)						

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

Public Utility Corridors

	LID Applicable	LID Not Applicable	LID Not Acceptable

		Land Use Category	LID Specific Considerations for Acceptance					
	ID		A	B	C	D	E	F
			Rainwater Harvesting	Green Roof	Subsurface Infiltration - Infiltration Gallery / Infiltration Trenches	Subsurface Infiltration - Third Pipe System (Exfiltration)	Subsurface Infiltration - Soakaway Pit	Permeable Pavement
Public Ownership	18	District Energy *Subject to approval from utility operator*						
	19	Hydro One *Subject to approval from utility operator*			• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Contact utility owner for permission and specific considerations • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large • Maintenance access cannot be located within fire and emergency access routes • Pretreatment is required if accepting runoff from road or parking area • Can accept external runoff from public lands, subject to approval of utility operator		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundation is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • No conflict with future maintenance for utility • Contact utility owner for permission and specific considerations • Maintenance access cannot be located within fire and emergency access routes • Pretreatment is required if accepting runoff from road or parking area • Can accept external runoff from public lands, subject to approval of utility operator	
	20	Sewer/Drainage Easement *Subject to approval from utility operator*						

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

Public Utility Corridors

LID Applicable | **LID Not Applicable** | **LID Not Acceptable**

		Land Use Category	LID Specific Considerations for Acceptance						
	ID		G	H	I	J	K	L	M
			Bioretention - Bioretention Cell / Rain Garden	Bioretention - Stormwater Planter	Bioretention - Biofilter	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
Public Ownership	18	District Energy *Subject to approval from utility operator*		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Contact utility owner for permission and specific considerations • Soil amendments may be required for highly compacted native soils • Can accept external runoff from public lands, subject to approval of utility operator					• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement • Contact utility owner for permission and specific considerations if accepted • Can accept external runoff from public lands, subject to approval of utility operator
	19	Hydro One *Subject to approval from utility operator*	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Contact utility owner for permission and specific considerations • Can accept external runoff from public lands, subject to approval of utility operator	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. • Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundation is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Contact utility owner for permission and specific considerations • Soil amendments may be required for highly compacted native soils • Can accept external runoff from public lands, subject to approval of utility operator	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by large equipment • Contact utility owner for permission and specific considerations • Can accept external runoff from public lands, subject to approval of utility operator	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval. • Must be integrated into urban design • Can accept external runoff from public lands, subject to approval of utility operator	• If vegetated swale also contain underground storage component, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils • Contact utility owner for permission and specific considerations if accepted • Can accept external runoff from public lands, subject to approval of utility operator	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Contact utility owner for permission and specific considerations if accepted • Can accept external runoff from public lands, subject to approval of utility operator	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement • Contact utility owner for permission and specific considerations if accepted • Can accept external runoff from public lands, subject to approval of utility operator
	20	Sewer/Drainage Easement *Subject to approval from utility operator*		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • No conflict with future maintenance for utility • Soil amendments may be required for highly compacted native soils • Can accept external runoff from public lands, subject to approval of utility operator					• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement • Contact utility owner for permission and specific considerations if accepted • Can accept external runoff from public lands, subject to approval of utility operator

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

Public Institutional

			LID Applicable	LID Not Applicable	LID Not Acceptable
		Land Use Category	LID Specific Considerations for Acceptance		
	ID		A	B	C	D	E	F
			Rainwater Harvesting	Green Roof	Subsurface Infiltration - Infiltration Gallery / Infiltration Trenches	Subsurface Infiltration - Third Pipe System (Exfiltration)	Subsurface Infiltration - Soakaway Pit	Permeable Pavement
Public Ownership	21	Community Centre	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment. Maintenance access must not be located along fire and emergency access routes • No runoff from external area allowed		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment. Maintenance access must not be located along fire and emergency access routes • No runoff from external area allowed	• No credits will be given to permeable pavement in area of high traffic that requires de-icing / sanding • The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from building foundation for the infiltraiton gallery component is 4 m. • No runoff from external area allowed
	22	Library	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment. Maintenance access must not be located along fire and emergency access routes • No runoff from external area allowed		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment. Maintenance access must not be located along fire and emergency access routes • No runoff from external area allowed	• No credits will be given to permeable pavement in area of high traffic that requires de-icing / sanding • The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from building foundation for the infiltraiton gallery component is 4 m. • No runoff from external area allowed
	23	School, College, or University	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment. Maintenance access must not be located along fire and emergency access routes • No runoff from external area allowed		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment. Maintenance access must not be located along fire and emergency access routes • No runoff from external area allowed	• No credits will be given to permeable pavement in area of high traffic that requires de-icing / sanding • The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from building foundation for the infiltraiton gallery component is 4 m. • No runoff from external area allowed
	24	Other (Museum, Theatre, Art Gallery, Hospital, Fire Stations)	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment. Maintenance access must not be located along fire and emergency access routes • No runoff from external area allowed		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment. Maintenance access must not be located along fire and emergency access routes • No runoff from external area allowed	• No credits will be given to permeable pavement in area of high traffic that requires de-icing / sanding • The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from building foundation for the infiltraiton gallery component is 4 m. • No runoff from external area allowed

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

Public Institutional

			LID Applicable	LID Not Applicable	LID Not Acceptable
		Land Use Category	LID Specific Considerations for Acceptance		
	ID		G	H	I
			Bioretention - Bioretention Cell / Rain Garden	Bioretention - Stormwater Planter	Bioretention - Biofilter
Public Ownership	21	Community Centre	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. • Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • No runoff from external area allowed • Soil amendments may be required for highly compacted native soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • No runoff from external area allowed • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • No runoff from external area allowed
	22	Library	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. • Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • No runoff from external area allowed • Soil amendments may be required for highly compacted native soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • No runoff from external area allowed • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • No runoff from external area allowed
	23	School, College, or University	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. • Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • No runoff from external area allowed • Soil amendments may be required for highly compacted native soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • No runoff from external area allowed • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • No runoff from external area allowed
	24	Other (Museum, Theatre, Art Gallery, Hospital, Fire Stations)	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. • Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils • No runoff from external area allowed	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils • No runoff from external area allowed	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • No runoff from external area allowed

			LID Applicable	LID Not Applicable	LID Not Acceptable
		Land Use Category	LID Specific Considerations for Acceptance		
	ID		J	K	L	M
			Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
Public Ownership	21	Community Centre	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval. • Must be integrated into urban design • No runoff from external area allowed	• If vegetated swale also contain underground storage componeent, considerations for biorentention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils • No runoff from external area allowed	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • No runoff from external area allowed	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement • No runoff from external area allowed
	22	Library	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval. • Must be integrated into urban design • No runoff from external area allowed	• If vegetated swale also contain underground storage componeent, considerations for biorentention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils • No runoff from external area allowed	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • No runoff from external area allowed	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement • No runoff from external area allowed
	23	School, College, or University	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval. • Must be integrated into urban design • No runoff from external area allowed	• If vegetated swale also contain underground storage componeent, considerations for biorentention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils • No runoff from external area allowed	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • No runoff from external area allowed	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement • No runoff from external area allowed
	24	Other (Museum, Theatre, Art Gallery, Hospital, Fire Stations)	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval. • Must be integrated into urban design • No runoff from external area allowed	• If vegetated swale also contain underground storage componeent, considerations for biorentention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils • No runoff from external area allowed	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • No runoff from external area allowed	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement • No runoff from external area allowed

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

Private Open Spaces, Roads/ROW, Residential

	LID Applicable	LID Not Applicable	LID Not Acceptable

	ID	Land Use Category	LID Specific Considerations for Acceptance					
			A	B	C	D	E	F
			Rainwater Harvesting	Green Roof	Subsurface Infiltration - Infiltration Gallery / Infiltration Trenches	Subsurface Infiltration - Third Pipe System (Exfiltration)	Subsurface Infiltration - Soakaway Pit	Permeable Pavement
Private Ownership		**Open Spaces**						
	25	Private Open Space	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required for runoff from road or parking area. • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Pretreatment is required for runoff from road or parking area. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of pervious pipe shall be below frost depth of 1.2m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area. • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area. • Access to LID for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment	• The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from building foundation for the infiltraitn gallery component is 4 m. • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment
		Roads/Rights-of-Way (R.O.W.)						
	26	Private Roads			• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area. • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Design of infiltration gallery must ensure that it would not result in saturation of adjacent road sub-grade that would cause safety hazards (e.g. structural issues for the road)	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of pervious pipe shall be below frost depth of 1.2m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area. • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Monitoring well at strategic locations must be provided for inspection and maintenance of the system • Design of pervious pipe (3rd pipe system) must ensure that it would not result in saturation of road sub-grade that would cause safety hazards (e.g. structural issues for the road)	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area. • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Design of infiltration LID must ensure that it would not result in saturation of adjacent road sub-grade that would cause safety hazards (e.g. structural issues for the road)	• No credits will be given to permeable pavement in area of high traffic that requires de-icing / sanding • The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment
		Residential						
	27	Single Detached	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground tanks and cisterns, a standard size manhole opening should be provided for maintenance purposes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system) • Underground tanks or cisterns must be located within the front yard and be accessible from the road ROW for maintenance; a standard size manhole opening should be provided for maintenance	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in site plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m	• The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from building foundation for the infiltraitn gallery component is 4 m.
	28	Townhouse - Freehold	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system) • Underground tanks or cisterns must be located within the front yard and be accessible from the road ROW for maintenance; a standard size manhole opening should be provided for maintenance	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m	• The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from building foundation for the infiltraitn gallery component is 4 m.
	29	Townhouse - Condominium	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area. • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area. • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment	• The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from building foundation for the infiltraitn gallery component is 4 m.
	30	Mixed Use - Surface Parking	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area. • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area. • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from building foundation for the infiltraitn gallery component is 4 m.
	31	Mixed Use - Underground Parking	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations and underground parking garages is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area. • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Subsurface infiltration LIDs cannot be installed below or within 4 m underground parking garages • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be		• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations and underground parking garages is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area. • Subsurface infiltration LIDs cannot be installed below or within 4 m underground parking garages • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Cannot be installed above underground parking garage • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from building foundation for the infiltraitn gallery component is 4 m.

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

Private Open Spaces, Roads/ROW, Residential

			LID Applicable	LID Not Applicable	LID Not Acceptable
		Land Use Category	**LID Specific Considerations for Acceptance**		
	ID		G	H	I
			Bioretention - Bioretention Cell / Rain Garden	Bioretention - Stormwater Planter	Bioretention - Biofilter
Private Ownership		**Open Spaces**			
	25	Private Open Space	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soil	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes
		Roads/Rights-of-Way (			
	26	Private Roads	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Soil amendments may be required for highly compacted native soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment
		Residential			
	27	Single Detached	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Soil amendments may be required for highly compacted native soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m
	28	Townhouse - Freehold	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Soil amendments may be required for highly compacted native soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m
	29	Townhouse - Condominium	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Soil amendments may be required for highly compacted native soils • Maintenance access shall be located in areas accessible by large equipment and must not be located along fire and emergency access routes	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Soil amendments may be required for highly compacted native soils • Maintenance access shall be located in areas accessible by large equipment and must not be located along fire and emergency access routes	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by large equipment and must not be located along fire and emergency access routes
	30	Mixed Use - Surface Parking	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes
	31	Mixed Use - Underground Parking	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations and underground parking garages is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Cannot be installed above underground parking garage • Soil amendments may be required for highly compacted native soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Cannot be installed above underground parking garage • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations and underground parking garages is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes

			LID Applicable	LID Not Applicable	LID Not Acceptable
		Land Use Category	**LID Specific Considerations for Acceptance**		
	ID		J	K	L	M
			Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
Private Ownership		**Open Spaces**				
	25	Private Open Space	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval.	• If vegetated swale also contain underground storage component, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
		Roads/Rights-of-Way (				
	26	Private Roads	An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval.	• If vegetated swale also contain underground storage component, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
		Residential				
	27	Single Detached	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval.	• If vegetated swale also contain underground storage component, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	28	Townhouse - Freehold	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m	• If vegetated swale also contain underground storage component, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	29	Townhouse - Condominium	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by large equipment and must not be located along fire and emergency access routes	• If vegetated swale also contain underground storage component, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	30	Mixed Use - Surface Parking	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval.	• If vegetated swale also contain underground storage component, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	31	Mixed Use - Underground Parking	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations and underground parking garages is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Cannot be installed above underground parking garage	• If vegetated swale also contain underground storage component, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils • Cannot be installed above underground parking garage	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

Private Employment

			LID Applicable	LID Not Applicable	LID Not Acceptable
		Land Use Category	LID Specific Considerations for Acceptance		
	ID		A	B	C	D	E	F
			Rainwater Harvesting	Green Roof	Subsurface Infiltration - Infiltration Gallery / Infiltration Trenches	Subsurface Infiltration - Third Pipe System (Exfiltration)	Subsurface Infiltration - Soakaway Pit	Permeable Pavement
Private Ownership		**Employment**						
	32	Office Campus - Surface Parking	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system •If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of pervious pipe shall be below frost depth of 1.2m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Must be located on privately owned road ROW or private lands	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from any building foundation is 4m
	33	Office Campus - Underground Parking	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system •If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations and underground parking garages is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations and underground parking garages is 4 m • Top of pervious pipe shall be below frost depth of 1.2m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Must be located on privately owned road ROW or private lands	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations and underground parking garages is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Must be located on privately owned road ROW or private lands • Subsurface infiltration LIDs cannot be installed below or within 4 m underground parking garages	• The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Cannot be installed above underground parking garage • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from any building foundation is 4m
	34	Industrial - Warehouse	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system •If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required for runoff from road or parking area • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of pervious pipe shall be below frost depth of 1.2m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Must be located on privately owned road ROW or private lands	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Can only accept runoff from roof and landscaped areas, or runoff not from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from any building foundation is 4m
	35	Industrial - Manufacturing	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system •If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required for runoff from road or parking area • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of pervious pipe shall be below frost depth of 1.2m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Must be located on privately owned road ROW or private lands	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • Can only accept runoff from roof and landscaped areas, or runoff not from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from any building foundation is 4m

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

Private Employment

	LID Applicable	LID Not Applicable	LID Not Acceptable

	ID	Land Use Category	LID Specific Considerations for Acceptance						
			G	H	I	J	K	L	M
			Bioretention - Bioretention Cell / Rain Garden	Bioretention - Stormwater Planter	Bioretention - Biofilter	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
Private Ownership		**Employment**							
	32	Office Campus - Surface Parking	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval.	• If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	33	Office Campus - Underground Parking	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations and underground parking garages is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Cannot be installed above underground parking garage • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations and underground parking garages is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Cannot be installed above underground parking garage • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations and underground parking garages is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Cannot be installed above underground parking garage • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval.	• If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils • Cannot be installed above underground parking garage	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	34	Industrial - Warehouse	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • Soil amendments may be required for highly compacted native soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval. • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site	• If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • Soil amendments are required for highly compacted native soils	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	35	Industrial - Manufacturing	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • Soil amendments may be required for highly compacted native soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval. • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site	• If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • Soil amendments are required for highly compacted native soils	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

Private Commercial

			LID Applicable	LID Not Applicable	LID Not Acceptable
		Land Use Category	**LID Specific Considerations for Acceptance**		
	ID		A	B	C
			Rainwater Harvesting	Green Roof	Subsurface Infiltration - Infiltration Gallery / Infiltration Trenches
Private Ownership		**Commercial**			
	36	Retail Main Street	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes
	37	Large-scale Commercial	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes
	38	Small-scale Commercial	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes
	39	Gas Station or Mechanic	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	

			D	E	F
	ID		D	E	F
			Subsurface Infiltration - Third Pipe System (Exfiltration)	Subsurface Infiltration - Soakaway Pit	Permeable Pavement
Private Ownership		**Commercial**			
	36	Retail Main Street	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of pervious pipe shall be below frost depth of 1.2m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Must be located on privately owned road ROW or private lands	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from any building foundation is 4m
	37	Large-scale Commercial	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of pervious pipe shall be below frost depth of 1.2m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Must be located on privately owned road ROW or private lands	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from any building foundation is 4m
	38	Small-scale Commercial	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of pervious pipe shall be below frost depth of 1.2m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Must be located on privately owned road ROW or private lands	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from any building foundation is 4m
	39	Gas Station or Mechanic			

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

Private Commercial

	LID Applicable	LID Not Applicable	LID Not Acceptable

	ID	Land Use Category	LID Specific Considerations for Acceptance						
			G	H	I	J	K	L	M
			Bioretention - Bioretention Cell / Rain Garden	Bioretention - Stormwater Planter	Bioretention - Biofilter	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
Private Ownership		**Commercial**							
	36	Retail Main Street	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval.	• If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	37	Large-scale Commercial	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval.	• If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	38	Small-scale Commercial	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval.	• If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	39	Gas Station or Mechanic							

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

Private Institutional and Utility Corridors

			LID Applicable	LID Not Applicable	LID Not Acceptable
		Land Use Category	**LID Specific Considerations for Acceptance**		
	ID		A	B	C
			Rainwater Harvesting	Green Roof	Subsurface Infiltration - Infiltration Gallery / Infiltration Trenches
Private Ownership		**Institutional**			
	40	Place of Worship	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes
	41	Private School, College, or University	• Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs • Rain barrels, tanks and cisterns shall be located in easily accessible areas for maintenance • For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. garage, basement) • Captured water is for non-potable uses only • Pre-treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system • If tanks and cisterns are buried underground and are located within 4m of building foundations, they must be water tight • An overflow system must be included, consisting of an overflow pipe to a pervious area • For underground cisterns, a standard size manhole opening should be provided for maintenance purposes • Maintenance access cannot be located within fire and emergency access routes • Re-use of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	• Cannot be used to receive or store runoff from surfaces other than the roof area itself • Green roofs shall consist of species suitable for harsh roof top conditions • Planting plans are to be included in Site Plan applications • Green roofs can be combined with rainwater harvesting to provide irrigation for vegetation • Applicable to flat roof only	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes
		Utility Corridors			
	42	TransCanada Pipeline *Subject to approval from utility operator*			
	43	Enbridge Gas *Subject to approval from utility operator*			

			LID Applicable	LID Not Applicable	LID Not Acceptable
		Land Use Category	**LID Specific Considerations for Acceptance**		
	ID		D	E	F
			Subsurface Infiltration - Third Pipe System (Exfiltration)	Subsurface Infiltration - Soakaway Pit	Permeable Pavement
Private Ownership		**Institutional**			
	40	Place of Worship	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of pervious pipe shall be below frost depth of 1.2m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Must be located on privately owned road ROW or private lands	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from any building foundation is 4m
	41	Private School, College, or University	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of pervious pipe shall be below frost depth of 1.2m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Must be located on privately owned road ROW or private lands	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Native soil infiltration rates will need to be verified at the proposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Pretreatment is required for runoff from road or parking area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water table • Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • Permeable pavement surface shall be at least 1% slope and no greater than 5% slope • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from any building foundation is 4m
		Utility Corridors			
	42	TransCanada Pipeline *Subject to approval from utility operator*			
	43	Enbridge Gas *Subject to approval from utility operator*			

APPENDIX B - LID SPECIFIC CONSIDERATIONS TABLE

Private Institutional and Utility Corridors

	LID Applicable	LID Not Applicable	LID Not Acceptable

	ID	Land Use Category	LID Specific Considerations for Acceptance						
			G	H	I	J	K	L	M
			Bioretention - Bioretention Cell / Rain Garden	Bioretention - Stormwater Planter	Bioretention - Biofilter	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
Private Ownership		**Institutional**							
	40	Place of Worship	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval.	• If vegetated swale also contain underground storage component, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
	41	Private School, College, or University	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required • Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes • Soil amendments may be required for highly compacted native soils	• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located along fire and emergency access routes	• An overflow outlet or bypass route is required to convey flow from major storm events • Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. • Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval.	• If vegetated swale also contain underground storage component, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface	• Soil amendments shall be applied to planted areas, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • All fill materials shall meet MOECC Reg 153/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement
		Utility Corridors							
	42	TransCanada Pipeline *Subject to approval from utility operator*			• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m • Contact utility owner for permission and specific considerations		• If vegetated swale also contain underground storage component, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils • Contact utility owner for permission and specific considerations if accepted	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Contact utility owner for permission and specific considerations if accepted	
	43	Enbridge Gas *Subject to approval from utility operator*			• An overflow outlet or bypass route is required to convey flow from major storm events • Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on natural slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5:1 to 15:1 • Minimum horizontal clearance from watermains 2.5 m • Minimum clearance from hydro / utilities trench is 1.2 m • Contact utility owner for permission and specific considerations if accepted		• If vegetated swale also contain underground storage component, considerations for bioretention rain garden also applicable here • Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted • Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% • Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m • Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m • Vegetated swales should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Soil amendments are required for highly compacted native soils • Contact utility owner for permission and specific considerations if accepted	• Flow path of at least 5 m is required • Maximum flow length from contributing impervious surface is 25 m with slopes no greater than 3% • Soil amendments are required for highly compacted native soils • Filter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface • Contact utility owner for permission and specific considerations if accepted	

APPENDIX C

LID Water Balance Redundancy Factor

Appendix C - LID Redundancy Factors

Schollen & Company Inc., in collaboration with The Municipal Infrastructure Group Ltd (TMIG), presents the summary of findings and recommendations for LID redundancy factors to guide the implementation of LIDs.

The findings of the research exercise are documented in the attached matrix entitled 'City of Markham – Low Impact Development (LID) Stormwater Management Guideline – Research Summary Matrix'.

This matrix documents the key findings of the review of research papers, journal articles and publications related to eight types of LID/SWMF options. The research exercise focused on two main factors:

a) The life span of the LID/SWMF installation.
b) The decline in functional performance of the LID/SWMF installation.

In the course of reviewing all of the publications, it was noted that the majority were founded on the basic assumption that required maintenance of the LID/SWMF, and its associated pre-treatment system, were being implemented on a routine basis throughout the duration of service life.

With respect to operational service life, the City of Markham has adopted 50 years as the standard design life cycle requirement for L.I.D./SWMF installations. With the exception of green roofs, permeable pavement and swales/filter strips, the service life of the L.I.D./SWMF options that were researched achieved or exceeded the 50-year threshold. For the L.I.D./SWMF options that have an average life span of less than 50 years, the calculation to determine the requirement for additional capacity incorporates a 'Life Cycle Conversion Factor' (50-year target life cycle/average L.I.D./SWMF lifespan).

Consequently, the requirement for additional capacity (safety buffer) in the design and construction of LID/SWMF options that are proposed to be implemented on private lands will be determined by the following factors:

1) **Requirement for Maintenance** – LID/SWMF systems that require frequent maintenance are more likely to be compromised in terms of functional performance over the length of their anticipated life span, whereas LID/SWMF systems that require a reduced level of maintenance are anticipated to retain their functional performance over time.
2) **Complexity of Operation** – LID/SWMF options that are more complex to operate are more likely to have their function compromised over time, whereas LID/SWMF options that require little or no operational effort are anticipated to better maintain their functional performance over time.
3) **Risk of Removal** – LID/SWMF options that are free-standing, such as rain barrels, are more likely to be removed or abandoned over time than LID/SWMF options that are integral with the site (underground tanks) or built form (underground cisterns).
4) **Life Cycle Conversion Factor** – L.I.D./SWMF systems that exhibited a life cycle of less than the 50-year threshold established by the City of Markham will require additional capacity to retain their functional performance over the 50-year duration.

With respect to permeable pavement driveways, the 'Risk of Removal' parameter can be reduced to 'Low' through the modification of the City of Markham's existing Driveway By-Law. The modification to the By-Law would stipulate that existing permeable pavement driveways must be replaced with permeable pavement with the appropriate sub-base and sub-drain system. As with the existing By-Law, the amended By-Law would stipulate that only contractors licensed by the City of Markham would qualify for the installation of replacement permeable pavement driveways.

Based upon the findings of the research and the evaluation of each LID/SWMF options in comparison to each of the parameters listed above, Redundancy Factors were determined based upon the following scoring system:

- High score for any parameter (Bullet Points 1), 2) and 3) above) = 3 points
- Medium score for any parameter (Bullet Points 1), 2) and 3) above) = 2 points
- Low score for any parameter (Bullet Points 1), 2) and 3) above) = 1 point

The total score assigned for all of the parameters combined yields the following redundancy factors:

- Score of 2 = 10% redundancy = 1.10
- Score of 3 = 25% redundancy = 1.25
- Score of 4 = 50% redundancy = 1.50
- Score of 5 = 75% redundancy = 1.75
- Score of 6 = 100% redundancy = 2.00
- Score of 7 = 125% redundancy = 2.25
- Score of 8 = 150% redundancy = 2.50
- Score of 9 = 175% redundancy = 2.75

Once the redundancy factors are defined through the application of parameters 1), 2), and 3) as demonstrated above, the Life Cycle Conversion Factor is applied to determine the required overall redundancy factor.

The following table sets out the recommended redundancy factors for each LID option.

TABLE 1 – Recommended Redundancy Factors – LIDs on Private Lands

LID Option	Redundancy Score	Average Life Span (max. 50 years)	Life Span Conversion Factor	Overall Redundancy Factor
Green Roof (SWM Function Only)	1.50	40	1.25	1.75
Rainwater Harvesting – Integral	1.75	50	1.00	1.75
Rainwater Harvesting – Freestanding	2.50	50	1.00	2.50
Infiltration System	1.50	50	1.50	1.50
Bioretention / Bio-filter	1.50	50	1.00	1.50
Soil Amendment – Single Detached	1.50	50	1.00	1.50
Soil Amendment – Townhouses	1.25	50	1.00	1.25
Swales / Filter Strips	1.50	35	1.42	1.92
Permeable Pavement (Driveway Bylaw Amendment)	1.50	24	2.08	2.58
Soil Cells / Stormwater Planters	1.25	50	1.00	1.25

The redundancy factors expressed above relate to the LID installations on private property. For LID/SWMF installations on public property, it has been assumed that the Requirement for Maintenance parameter would be nullified since it is assumed that the municipality will be diligent in implementing the long-term maintenance program and monitoring.

As a result, the following redundancy factors are recommended for LID installation within municipally-owned lands:

TABLE 2 – Recommended Redundancy Factors – LIDs on Public Lands

LID Option	Redundancy Score	Average Life Span (max. 50 years)	Life Span Conversion Factor	Overall Redundancy Factor
Green Roof (SWM Function Only)	1.10	40	1.25	1.35
Rainwater Harvesting – Integral	1.50	50	1.00	1.50
Rainwater Harvesting – Freestanding	2.00	50	1.00	2.00
Infiltration System	1.10	50	1.00	1.10
Bioretention / Bio-filter	1.10	50	1.00	1.10
Soil Amendment	1.25	50	1.00	1.25
Swales / Filter Strips	1.10	35	1.42	1.52
Permeable Pavement	1.10	24	2.08	2.18
Soil Cells / Stormwater Planters	1.10	50	1.00	1.10

The above recommended redundancy factors will serve to encourage the implementation of appropriate LID options while at the same time ensuring that functional performance requirements are achieved over the life span of the LID installation.

City of Markham – Low Impact Development (L.I.D.) Stormwater Management Guideline
Project No.: 17034

RESEARCH SUMMARY MATRIX

SCHOLLEN & Company Inc.
February 13, 2018

NOTES:
① Ranking relates only to components that perform SWM functions
② Risk of removal is low for underground systems and above ground systems that are integral with building/structure
③ Risk of removal is high for free standing rain barrels
④ Risk of removal is slightly higher for large lot detached homes due to potential for swimming pool installation
⑤ Modification to Markham's driveway by-law required to address need to replace permeable pavement driveways with permeable pavement only

L.I.D. / SWM Option	Lifespan (years)*1	Decline in Functional Performance (% / duration)	Literature Source / Citation	Requirement for Maintenance*2			Complexity of Operation			Risk of Removal			Life Cycle Conversion Factor = 50 Year Life Cycle / Average Lifespan
				H	M	L	H	M	L	H	M	L	
A. Green Roof													
	+40		Calculated by Fraunhofer Institute, Referenced by Zinco Green Roofs (http://www.zinco-greenroof.co.uk/faq/life_expectancy.php)									①	
	30-50		Green Roof Technology										
	40-50		Capital Region District – British Columbia										
		No significant loss / 17 years	'Comparisons of Extensive Green roof Media in southern Ontario', J. Hill, J. Drake, B. Sleep – University of Toronto										
		Increase in performance / 30+ years	'Vegetation Composition of old Extensive Green Roofs (From 1980s Germany)', C. Thuring – Ecological Processes										
	40		'Life Cycle Lost Assessment of Low Impact Development Practices' – STEP										
	50+		Kosareo and Ries, 2007 (As referenced in K. Flynn)										
	30		Operational life assumption per K. Flynn										
	25-50		'Evaluation of Green Infrastructure Practices Using Life Cycle Assessment', Kevin Martin Flynn (Thesis), Villanova University										
Average	36-44 (40)												1.25
B. Rainwater Harvesting													
	40-50		'Life Cycle Lost Assessment of Low Impact Development Practices' – STEP									②	
	20-50		Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-systems)								③		
Underground - Fiberglass	± 40		Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-systems)										
Underground - Polyethlene	± 30		Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-systems)										
Underground - Steel Reinforced Polyethlene (SRPE)	+75		Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-systems)										
Underground - Plastic Crates	<20		Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-systems)										
Underground - Concrete	± 40		Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-systems)										

*1 - Life span is based on the assumption that required maintenance is done on a routine basis throughout the duration of operation

*2 - High = Maintenance required seasonally, Medium = Maintenance required annually, Low = Minimal maintenance required

L.I.D. / SWM Option	Lifespan (years)	Decline in Functional Performance (% / duration)	Literature Source / Citation	Requirement for Maintenance			Complexity of Operation			Risk of Removal			Life Cycle Conversion Factor = 50 Year Life Cycle / Average Lifespan
				H	M	L	H	M	L	H	M	L	
Underground - Fabricated Steel	± 50		Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-systems)										
Underground - Waterproof Corrugated Metal	+75		Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-systems)										
Aboveground - Monolithic	+75		Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-systems)										
Aboveground - Plate Assembled On-site	+75		Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-systems)										
Average	**49-53**												1.0
C. Infiltration System													
	50+		'Life Cycle Lost Assessment of Low Impact Development Practices' – STEP										
Average	**50**												1.0
D. Biofilter / Bioretention System													
	95		'Long Term Use of Bioretention for Heavy Metal Removal' – Kestrel Design Group										
		0% / 7 years	'Does It Pay to be Mature? Evaluation of Bioretention Cell Performance Seven Years Postconstruction', L. L. Willard, et al – American Society of Civic Engineers, 2017										
		Not significant / 10 years	'The Pollution Removal and Stormwater Reduction Performance of Street-Side Bioretention Basins After Ten Years In Operation', Terry Lucke, Peter W.B. Nichols – University of the Sunshine Coast, Australia										
		No significant loss / 8 years	'Fines Accumulation and Distribution in a Stormwater Rain Garden Nine Years Post Construction', J. Gilbert Jenkins, et al – Journal of Irrigation and Drainage Engineering, December 2010										
		No significant loss / 10 years	'Long-Term Metal Retention Performance of Media Filter Drains for Stormwater Management', Agathe Thomas, et al – Washington State University										
	25*		'Life Cycle Cost Assessment of Low Impact Development Practices' – STEP										
	30		'Evaluation of Green Infrastructure Practices Using Life Cycle Assessment', Kevin Martin Flynn (Thesis), Villanova University										
Average	**50**												1.0
E. Soil Amendments													
			No Literature / Research Papers Found								④		
Average	**N/A**												

L.I.D. / SWM Option	Lifespan (years)	Decline in Functional Performance (% / duration)	Literature Source / Citation	Requirement for Maintenance			Complexity of Operation			Risk of Removal			Life Cycle Conversion Factor = 50 Year Life Cycle / Average Lifespan
				H	M	L	H	H	L	H	M	L	
F. Swales / Filter Strips													
	50+	Not significant	'Life Cycle Cost Assessment of Low Impact Development Practices' – STEP										
Grass swale / perforated pipe	20+	Not significant	'20 Year Performance Evaluation of Grass Swale and Perforated Pipe Drainage Systems', J.F. Sabourin and Associates Inc., July 2008										
Average	**35**												**1.42**
G. Permeable Pavement													
Porous Asphalt	17.5		U C Davis Research Paper									⑤	
Pervious Concrete	25		'Cost and Benefit Analysis of Permeable Pavements in Water Sustainability', Su-Lin Terhell, et al – 5/25/2015										
IPC Pavers	25-30		'Cost and Benefit Analysis of Permeable Pavements in Water Sustainability', Su-Lin Terhell, et al – 5/25/2015										
IPC Pavers	30		'Life Cycle Cost Analysis of Natural On-site Stormwater Management Methods', Canadian Nursery Landscape Association										
IPC Pavers		No significant loss / 10 years	'Effect of Age of Permeable Pavements on Their Infiltration Function', Floris Boogaard, et al – Clean Soil Air Water, July 26, 2013										
IPC Pavers	30		T. Van Seters, Toronto & Region conservation Authority – Email January 11, 2018										
Porous Asphalt	20		T. Van Seters, Toronto & Region conservation Authority – Email January 11, 2018										
Concrete Grid	10-20	10-25% decrease	Bongwardt, 2006										
IPC Pavers	30		'Life Cycle Cost Assessment of Low Impact Development Practices' – STEP										
Average	**23-25 (24)**												**2.08**
H. Soil Cells / SWM Planters													
	100		Letter of 10/23/12 from IEI Innova Engineering to Deep Root Partners, Re: Silva Cell Loading										
Average	**100**												**1.0**

APPENDIX D

LID Definitions

APPENDIX D - LID DEFINITIONS

The criteria for different types of development included in **Sections 3 and 4** provide general guidance for the selection and sizing of LIDs on private and public property. The following sections provide brief descriptions and some example illustrations that were included in **Appendix A – LID Options Matrix**. The City's LID specific considerations for acceptance are presented in a table in **Appendix B – LID Specific Considerations Table**, which provides guidance for applying LIDs on specific land uses within the City.

LID specific constraints and guidance for the design, construction, inspection and monitoring of LIDs can be found in the guideline documents listed in Section 1.3. Specifically, refer to Appendix A in the Low Impact Development Stormwater Management Planning and Design Guide (CVC and TRCA, 2010) for fact sheets on common LID types.

1. Rainwater Harvesting

Rainwater harvesting is used to capture and store rainfall for future non-potable water uses, such as irrigation and flushing toilets. Storage volumes can range from household rain barrels to large cisterns that capture runoff from large roof areas. The capture of rain water is used to reduce stormwater runoff volume and reduce demand on municipal treated water supplies. Rainwater harvesting generally captures rainfall, from and provides non-potable water for, individual buildings.

2. Green Roof

Green roofs comprise a thin layer of vegetation installed on top of a flat or sloped roof to improve water quality, water balance and peak flow control by storing rainfall in the growing medium and promoting evapotranspiration. Green roofs are also installed to improve energy efficiency, reduce urban heat island effects, provide greenspace for recreation, and aesthetic benefits. Green roofs are also known as living roofs or rooftop gardens.

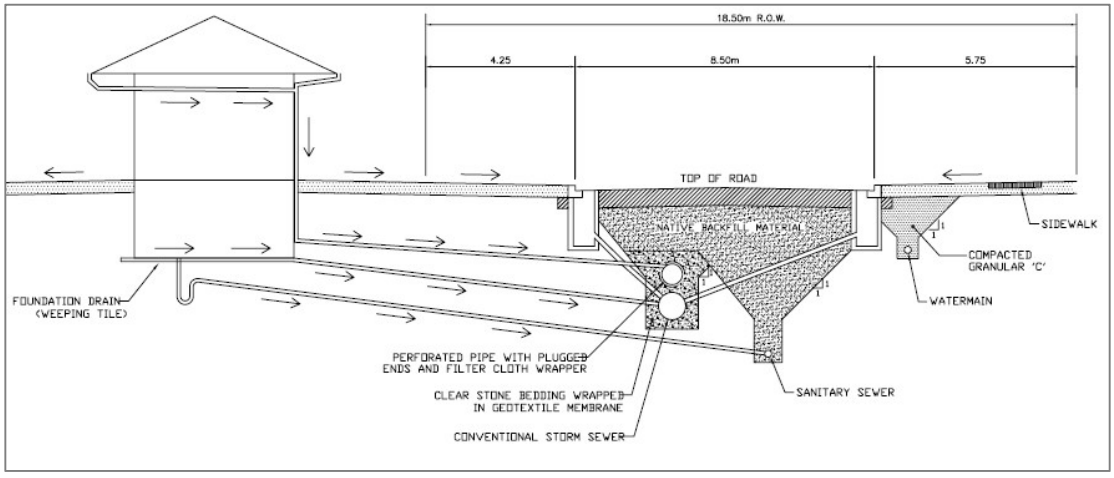
3. Infiltration Gallery / Infiltration Trench

Infiltration galleries are underground infiltration LIDs that generally take the form of sub-surface granular trenches or chambers lined with geotextile fabric, and are intended to store storm runoff and empty through infiltration between storm events. Infiltration galleries typically refer to larger applications and may take the form of long and narrow trenches along linear spaces between buildings and road ROWs, or wider rectangular configurations where space permits. A variation with open, prefabricated modular systems (also known as infiltration chambers) is also used to hold more runoff relative to granular trenches for infiltration. They can be used to receive runoff from roofs, walkways, parking lots, or other areas subject to implementation of appropriate pretreatment measures.

4. Perforated Third Pipe System / Exfiltration System

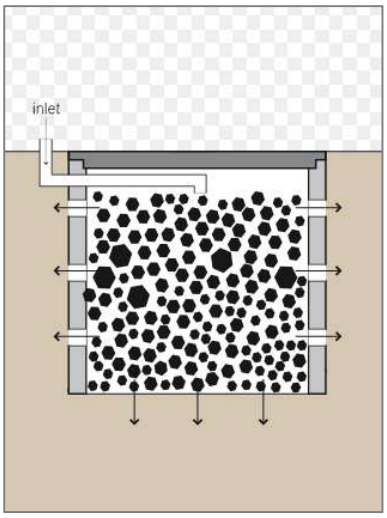
Perforated third pipe systems can be thought of perforated pipes in long infiltration trenches that are designed for both conveyance and infiltration of stormwater runoff and are commonly located in parallel with storm sewers. They may also be used in place of conventional storm sewer pipes where conditions are suitable. Third pipe systems are also known as perforated pipe systems, exfiltration pipe systems, clean water collector (CWC) systems and percolation drainage systems. In the case of a CWC system, only clean runoff (e.g. roof or pretreated runoff) is collected and directed to a pervious pipe for infiltration.

At this current time, as indicated in the LID Options Matrix of Appendix A, perforated third pipe system is not allowed in public lands such as public ROWs (but note that a non-perforated third pipe system used for only conveyance is allowed in public lands for conveyance purposes). However, perforated third pipe system is still allowed on private lands such as private residential laneways, etc. Refer to Appendix A for details.



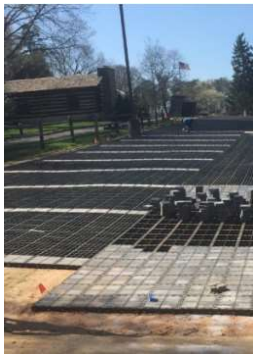
5. Soakway Pit

Soakaway pits function similarly to granular infiltration galleries, but are commonly small in size and are typically applied to individual residential lots to manage roof runoff. They are typically 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. They are also known as soakaways or dry wells.

6. Permeable Pavement

Permeable pavements are intended to allow stormwater to drain through the pavement surface into a granular stone reservoir where it is infiltrated into underlying native soil. The pavement types that are used for permeable pavement include permeable interlocking concrete pavers, plastic or concrete grid systems, pervious concrete and porous asphalt.




7. Bioretention Cell / Bioretention Rain Garden

Bioretention cells, also referred to as bioretention rain gardens, incorporate vegetation at surface for evapotranspiration and filtration, and sub-surface infrastructure to promote infiltration of storm runoff. They are typically located adjacent to walkways, parking areas, parks and roadway to receive surface runoff, and are designed to capture runoff small storm events.

8. Stormwater Planter

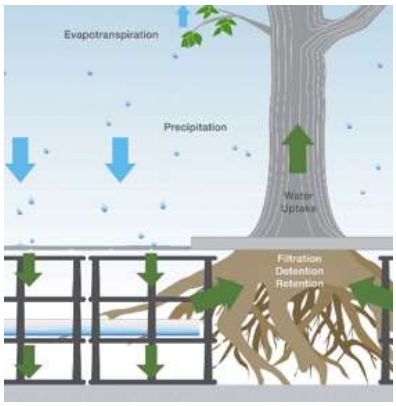
Stormwater planters function similarly to bioretention rain gardens, but typically have a smaller footprint and take the form of a planter box. They are integrated into landscaping and streetscapes along roadways, walkways and parking areas. For the purpose of this LID document, stormwater planters should be used to accept runoff from adjacent area (e.g. sidewalk, roadway) in order to be identified as an LID.

9. Biofilter

Biofilters are similar to bioretention rain gardens, but differ in that they are lined with an impermeable liner that does not allow infiltration to the underlying soils. Hence, biofilters provide filtration of sediment and/or other contaminants before runoff is conveyed to the storm sewer system through the underdrain, as well as evapotranspiration.

10. Urban Tree Root Support System

Urban tree root support systems receive runoff and promote infiltration into surrounding native soils. They can be non-structural (e.g. continuous topsoil trenches) or structural (e.g. proprietary product such as Silva Cells) with lightly compacted filter media or engineered soils and a structural support system that can provide runoff retention. These systems can retain storm runoff for infiltration and/or uptake by the tree root systems, and have the added benefit of providing subsurface rooting area and minimizing soil compaction to promote healthy trees in urban landscapes. Certain proprietary systems can be designed to control and treat specified design storm runoff in order to meet stormwater management goals.



11. Vegetated Swale

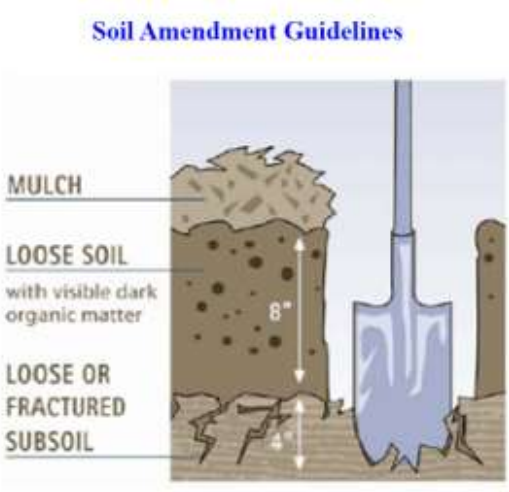
Vegetated swales, also known as dry swales, bio-swales or infiltration swales, are grassed or vegetated open channels that convey runoff while holding some runoff for sedimentation, infiltration, and evapotranspiration. They may incorporate an engineered filter media bed and can include an optional perforated pipe underdrain. They are suitable as part of a treatment train to provide pre-treatment for downstream infiltration LIDs to filter suspended solids, but can be applied as stand-alone LID measures.

12. Filter Strips

Filter strips, also known as vegetated filter strips, buffer strips, or grassed filter strips, are vegetated areas that slow runoff velocity, provide filtration for suspended soils and some infiltration from adjacent impervious areas such as parking lots and walkways. Similar to vegetated swales, they are suitable as part of a treatment train to provide pre-treatment for downstream infiltration LIDs to filter suspended solids, but can be applied as stand-alone LID measures.

13. Soil Amendments

Soil amendments include tilling and/or increased topsoil depth (typically to at least 300 mm depth) on grassed areas such as parks or residential yards to promote runoff infiltration. The purpose of soil amendments is to minimize development impacts on native soils by restoring their infiltration capacity and chemical characteristics. After soils have been amended, their improved physical, biological and hydrological characteristics will make them more effective agents of stormwater management.



APPENDIX E

Alternative Infrastructure Policy for LIDs (AIP-LID)

Appendix E

Alternative Infrastructure Policy for Low Impact Development (AIP for LID)

For use in Park / SWM block / open space / buffers (VPZ) on Public Lands Only

Three groups of LID infrastructure for use in public parks/ SWM block/ open space / buffers have been introduced in this guideline: Group A, Group B and Group C (refer to Figure 2-1). LID infrastructure Group A are generally allowed and preferred by the City for meeting water balance objectives. Group B LID infrastructure will be allowed without additional costs to proponents if they could demonstrate that physical site constraints prevent them from using Group A LID infrastructure. If the City is convinced that there are no physical site constraints preventing a proponent from using Group A LID infrastructure and a proponent is still seeking to use Group B LID infrastructure, the City may request payment of the cost differential between Group A LID infrastructure and Group B LID infrastructure, based on the cost for two (2) lifecycles to a maximum of 50 years.

Example: A proponent approaches the City to build Alternative Infrastructure for LID in a public park that has less operating and rehabilitation cost and/or a longer useful life, but is more expensive to repair or replace:

City's Preferred LID Infrastructure (Group A)	**Cost**	**Frequency**	**Annual Cost**
Operating and Maintenance Cost	$14	Annually	$14
Rehabilitation Cost	$100	Every 10 years	$10
Replacement Cost	$2800	Replace once at 50 years	$56
Total Cost per year			$80
Total Cost over 50 years			**$4000**

Alternative Infrastructure for LID (Group B)	Cost	Frequency	Annual Cost
Operating and Maintenance Cost	$90	Annually	$90
Rehabilitation Cost	$140	Every 10 years	$14
Replacement Cost	$400	Replace once every 25 years	$16
Total Cost per year			$120
Total Cost over 50 years			**$6000**

In this example, the developer would be required to pay $2,000 to the City, being the additional cost to the City over 50 years. The amount may be discounted if the Alternative Infrastructure provides additional benefits to the City beyond any engineering benefits. These benefits, if any, will be determined by staff, and the final determination of the amount of a discount, if any, will be made by the Chief Administrative Officer.

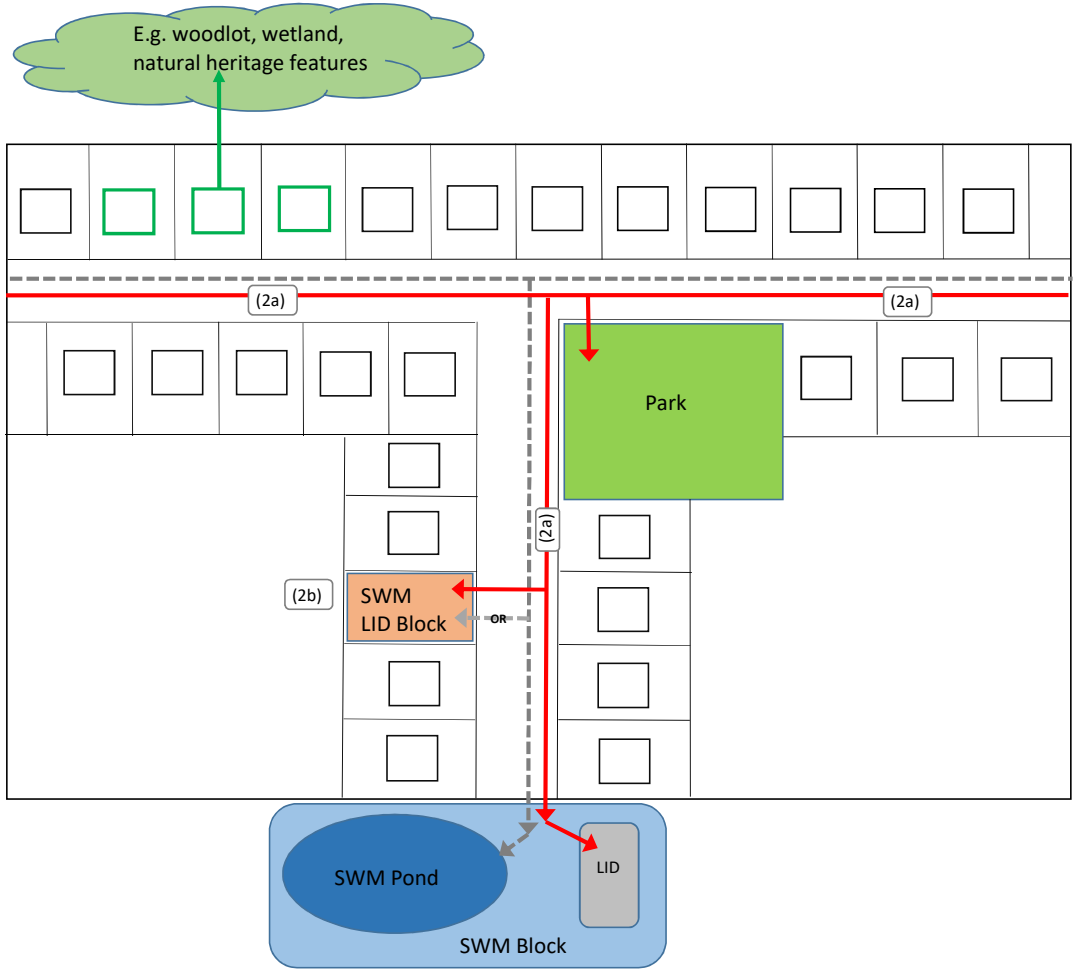
Group C LID infrastructure have limited applications for public parks / SWM blocks / buffers. Proponents are encouraged to consult with the City if they are seeking to use any of Group C LID infrastructure.

The City will endeavour to have developers construct assets using materials designed to minimize operating costs and maximize useful lives.

APPENDIX F

Schematic Examples

Figure F-1: Schematic Illustrating Alternative Options for Public LIDs with Site Constraints



General LID Strategy

(1) "Public on publie; Private on private"

If site constraints on public lands, (e.g. high groundwater or storm sewer too deep when reaching SWM block), then the City may allow for the following options:

Options:

(2a) 3rd pipe (at shallower depth) to collect road runoff ( ) (at select locations)

(2b) additional SWM LID block at desirable location (e.g. flexible location with ideal ground water conditions)

(2c) combination of (2a) & (2b)

Legend

- Storm Sewer
- 3rd pipe (at shallower depth)
- Roof
- LID in SWM block

*Suggested LID alternative options are subject to further discussion and consultation with affected City departments

Figure F-2: Schematic Example of a Residential Lot with LIDs

Example: Where feasible, a private lot shall be designed to promote having minimal runoff from the site (for the amount up to the infiltration target) by using a combination of LIDs. These LIDs can be applied at various locations throughout the lot. In the example shown here, the drainage going to the front of the site is intercepted by LIDs such as rain barrel, soil amendment, permeable pavement and rain garden. Some of the drainage travelling to the back of the lot is captured by infiltration trench / soakaway, soil amendment and rain barrel.