

Low Impact Development (LID) Guidelines

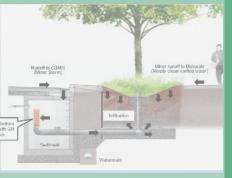




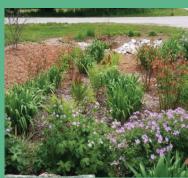












CITY OF MARKHAM

LOW IMPACT DEVELOPMENT **GUIDELINES**

NOVEMBER 2018

REPORT PREPARED FOR



CITY OF MARKHAM

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REPORT PREPARED BY



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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 subwatersheds within FUA. Surface and groundwater modelling completed to date are recommending onsite 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 targets¹. 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

1. Soil Amendments

- Shall be considered for all applicable areas regardless of LID type(s) applied elsewhere
- 2. Group A LIDs (Underground LIDs)
- Group A LIDs allowed and preferred
- Preference for underground LIDs due to lower maintenance needs and maximum flexibility to retain park programming (i.e., surface area in parks).

3. Group B LIDs (Vegetated Surface LIDs)

- Group B LIDs are allowed <u>only if there are site constraints</u> that prevent Group A LIDs from being used. Proponent must demonstrate the site constraints preventing the installation/operation of Group A LIDs.
- If there are <u>no site constraints</u> for Group A LIDs and proponents still want to use Group B LIDs, the Alternative Infrastructure Policy for LIDs (AIP-LID) will apply. AIP will determine monetary compensation (\$) required for any operating, maintenance and replacement cost differences. Proponent needs to pay the AIP compensation in order to use Groupd B LIDs.

4. Group C LIDs (Other LID types)

• May be applied on a limited basis, subject to consultation with the City. AIP-LID does not apply.

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.



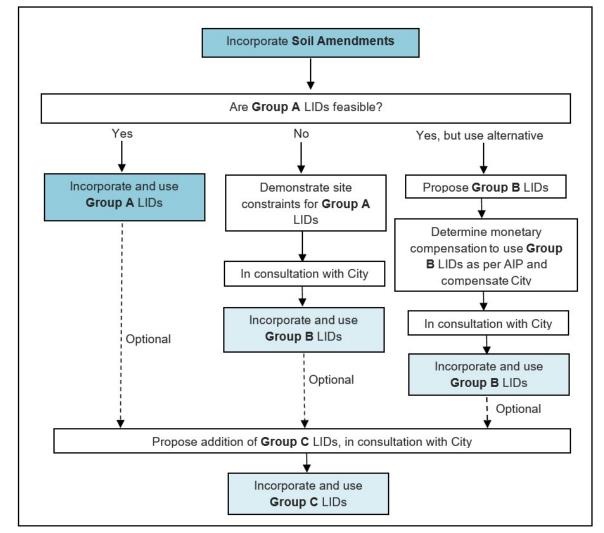


Figure 2-2: Selection Protocol Flowchart for LID types in Public Parks, SWM Blocks and Open Space

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

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 <u>non-perforated</u> 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.



GENERAL CONDITIONS, CRITERIA AND REQUIREMENTS FOR LIDs ON PUBLIC RIGHTSOF-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

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 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
		Appli	cable				Not A	pplicable			No	ot Acceptab	ble		
	ID	A	В	С	D	Е	F	G	Н	ı	J	К	L	М	
		Rainwater Harvesting (e.g. tanks/cisterns, etc.)	Green Roof ³	Infiltration Gallery / Infiltration Trench	erforated Third Pipe System e.g.Exfiltration System)	Soak Away Pit	Permeable Pavement	Bioretention Cell (e.g. Rain Garden)	Stormwater Planter	Biofilter ⁵	System	Vegetated Swale	Filter Strips	Soil Amendments ⁶	
		Ra (e	์ (5	드드	e e	ν. Σ	P.	Bi (e	<u>ل</u> کز	<u></u>	5 Ø	>	正	Š	
	Open Spaces O1 City-Wide Park														
	Community Park (LID allowance: 20% of park area) Neighbourhood Park (LID allowance: 15% of park area) Urban Park Public Strata Park														Refer to <u>Page 1 and 2</u> of Appendix B - LID Specific Considerations Table
	Parkette (LID allowance: 10% of park area) Linear Park / Open Space Block Stormwater Management Block Buffers/VPZ Valleyland														Refer to <u>Page 3 and 4</u> of Appendix B - LID Specific Considerations Table
	Roads/Rights-of-Way (R.O.W.)											,			
Public Owne	Arterial 12 Collector 13 Local 14 Lane 15 Single loaded local road 16 Transit Way Parking lay-by (including bump-outs)														Refer to <u>Page 5 and 6</u> of Appendix B - LID Specific Considerations Table
	Utility Corridors ²														
	18 District Energy 19 Hydro One 20 Sewer/Drainage Easement Institutional Uses														Refer to <u>Page 7 and 8</u> of Appendix B - LID Specific Considerations Table
	221 Community Centre 22 Library 23 School 24 Other (Museum, Theatre, Art Gallery, Hospital, Fire Stations)														Refer to <u>Page 9 and 10</u> of Appendix B -LID Specific Considerations Table

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

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	Land Use Categories						LID	Options	s ¹						Considerations for Acceptance
		Арр	Applicable Not Applicable Not Acceptable								1	Not Accepta	ible		
ID		A	В	С	D	E	F	G	Н	1	J	К	L	М	
		Rainwater Harvesting (e.g. tanks/cisterns, etc.)	Green Roof ³	Infiltration Gallery /	Perforated Third Pipe System (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	
	Open Spaces														
25	Private Open Space														
	Roads/Rights-of-Way (R.O.W.)		•				-								
26	Private Roads														
	Residential														
27	Single Detached														Refer to Page 11 and 12 of Appendix B - LID Specific Considerations Table
28															
29	Townhouse - Condominium														
30	Mixed Use - Surface Parking														
31	Mixed Use - Underground Parking														
di	Employment														
Private Ownership	Office Campus - Surface Parking														
× 33	Office Campus - Underground Parking														Refer to <u>Page 13 and 14</u> of Appendix B - LID Specific Considerations Table
O 34	Industrial - Warehouse														Refer to <u>rage 13 and 14</u> or Appendix 6 - Lib specific considerations rable
35 <u>×</u>	Industrial - Manufacturing														
P	Commercial														
36	Retail Main Street														
37	Large scale commercial														Refer to <u>Page 15 and 16</u> of Appendix B - LID Specific Considerations Table
38	Small scale commercial														refer to <u>rage 13 and 10</u> or Appendix p - LiD specific considerations rable
39															
	Institutional														
40	Place of Worship														
	Private School/College/University														
	Utility Corridors ²														Refer to <u>Page 17 and 18</u> of Appendix B - LID Specific Considerations Table
42															
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 of 2

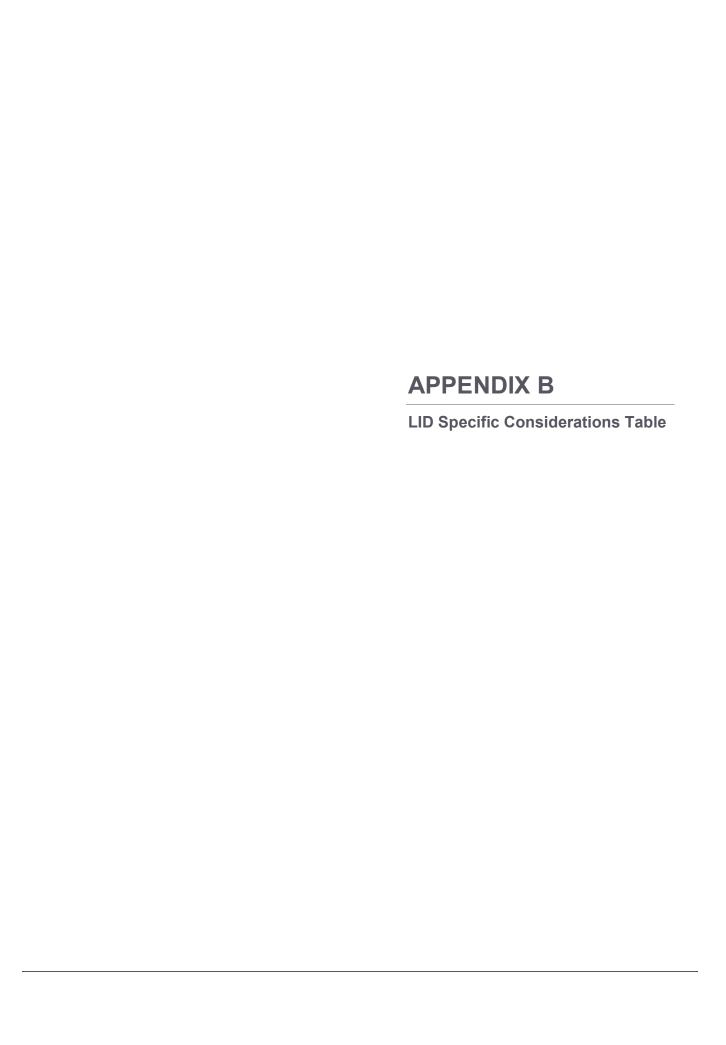
² Relevent utility agency's approval is required.

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

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.

	Public Open Spaces			LID Applicable	LID Not Applicable	LID Not Acceptable
Land Use Category			LID Specific Consideration	ns for Acceptance		
	A	В	С	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
. City-Wide Park	Rainwater harvesting (rain barrels, tanks, cisterms) 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 firost 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 manifole opening should be provided for maintenance purposes Maintenance access cannot be located within fire and emergency access routes Reuse 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 sol types for infiltration facilities are hydrologic soil group A or 8 soils; soil infiltration rate testing at proposed locations are required Inderdrains 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 should be vertically separated by at least 10 m from the seasonally high water table The bottom of the facility should be vertically separated by at least 10 m from the seasonally high water table An overflow outlet or bypass route is required to convey flow from major storm events Minimum betack from building boundations is 4 m To go if infiltration trench shall be below frost depth of 1.2 m The standard from building boundations is 4 m The standard from building from buildi		Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required where infiltration rates are less than 15 mm/hr Nathes 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 verifically separated by at least 10 m from the seasonally high water table An overflow outlet or bypass route is required to convey flow from major storm events Minimum settack from building foundations is 4 m Top or 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 broizontal 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 Pretreatments required from a resis external to the part, pretreatment device should be located within road ROW for maintenance access Pretreatments is required for unoff from road or parking area Access to 1.0 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	
Community Park 2 Total area constrained by LIDs cannot be more than 20% of the park area	Rainwater harvesting (rain barrels, tanks, disterns) 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 roy-var-cound use, the conveyance system should be buried at a depth no less than the maximum first 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 light the system An overflow system must be included, consisting of an overflow pipe to a pervious area For underground cisterns, a standard size manifole opening should be provided for maintenance purposes Waintenance access cannot be located within fire and emergency access routes Reserved have setted fainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water re-use within buildings to avoid cross commination 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 Indirectains 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 should be vertically separated by at least 10 m from the seasonally high water table The bottom of the facility should be vertically separated by at least 10 m from the seasonally high water table An overflow outlet or bypass route is required to convey flow from major storm events Minimum betableck from building boundations is 4 m a Top of infiltration trench shall be below frost depth of 1.2 m Maximum dianage area to treatment facility area of 10.1 for parking lots and roads; 20.1 for other surfaces Minimum brotrontal clearance from watermains 2.5 m Minimum brotrontal clearance from hydro / utilities trench is 1.2 m Moreover and the strength of the properties of the strength of		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 as the proposed location The bottom of the facility cannot be located on natural slopes greater than 15% The bottom of the facility should be verifically separated by at least 10 m from the seasonally high water table An overflow outlet or bypass route is required to convey flow from major storm events Minimum setsick from building foundations is 4 m Top or 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 brotrontal clearance from watermains 2.5 m Minimum brotrontal 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 Petrestaments required from a seas external to the part, pretrestament device should be located within road ROW for maintenance access composed for runoff from road or parking area A occess to 10 for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment Waterman representation of the representation of the provided and the should be accessible by vacuum trunk or other large equipment Waterman representation of the representation of	Design department to ensure integration with park features and programs ar disrupted Can accept external runoff from public ROW
Neighbourhood Park Total area constrained by LIDs cannot be more than 15% of the park area	Rainwater harvesting (rain barrels, tanks, cistems) is only for the capture of clean runoff from building roofs located within the park Rain barrels, tanks and cistems shall be located in easily accessible areas for maintenance For tanks and cistems designed for year-round use, the conveyance system should be buried at a depth no less than the maximum first depth of 1.2 m, or be located in a heated indoor environment Captured water is for non-potable uses only Fre-treatment is required to remove debris, dost, leaves, etc. that may accumulate on roofs to prevent clogging within the system If tanks and cistems are buried underground and are located within 4 m of building foundations, they An overflow system must be included, consisting of an overflow pipe to a pervious area For underground cistems, a standard size manhole opening should be provided for maintenance curposes Maintenance access cannot be located within fire and emergency access routes Re-use of harvested ninwater 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 Indicated 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 biphass route is required to convey flow from major storm events Minimum sortex for biphass pouts a required to convey flow from major storm events Minimum boritoth or basial be beloc highly served 10.1.2 m Minimum horitothal cleanance from watermains 2.5 m Minimum horitothal cleanance from watermains 2.5 m Minimum horitothal cleanance from watermains 2.5 m Watermain / Utility trench / santary sweer crossings shall be placed with a minimum of vertical cleanance 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 rarea setemal to the park; pretreatment device should be located within from 8 down from maintenance of 10 m 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 verifically 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 souther from Building foundations as fine of 1.2 m Will compare the storm of 1.2 m foundations are foundations as fine of 1.2 m Will compare the storm of 1.2 m foundations are foundations as fine of 1.2 m Will compare the storm of 1.2 m foundations are foundations as fine of 1.2 m Will compare the storm of 1.2 m foundations are foundations are foundationally as foundations are foundations. Preference foundations are highly as foundations are foundations as foundations are foundations. Preference foundations are highly as foundations are foundations. An accompared foundation are foundations are highly as foundations. An accompared foundation are foundations are foundations. An accompared foundation are foundations. An accompared foundation are foundations are foundations. An	
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5 Strata Park						

		Public Open Spaces				LID Applicable	LID Not Applicable	LID Not Acceptable
	Land Use Category			LID Specific	Considerations for Acceptance			
	ID	G	н	I	J	К	L	М
		Bioretention - Bioretention Cell / Rain Garden	Bioretention - Stormwater Planter	Bioretention - Biofilter	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
	01 City-Wide Park	ast proposed locations are required Silocretention in sols 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 dyose greater than 15% The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water rable An overflow outlet or bypass route is required to convey flow from major storm events Minimum setback from building boundations is 4 m The ratios of imprevious drainage are to facility area range from 5:1 to 15:1 Minimum horizontal clearance from watermains 2.5 m Minimum horizontal clearance from hydro / fulfilties 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 IUs 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 *Cacces to UI for operation and maintenance should be provided and it should be accessible by vacuum	Preferred soil types for infiltration facilities are hydrologic soil group A or B soils, soil infiltration rate testing at proposed locations are required Silocetestion is nois 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. **Pile 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 **All the state of the facility should be vertically separated by at least 1.0 m from the seasonally high water table **All the state of the state o	Pretreatment is required from areas external to the park Access to LID for operation and maintenance should be provided and it should be accessible	and is subject to City approval. * Minimum horizontal clearance from hydro/utillities 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 of the considered and is subject to City approval.	bioretention rain garden also applicable here Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted	greater than 3%. Soil amendments are required for highly compacted native soils. Fifter strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface. Surface UDs must be designed in consultation with and be approved by the City's Univan Design department to ensure integration with park features and programs are	A plan required to ensure (1) verification of topsoil depths on proposed areas a (2) post-construction inspection and repair of potential areas of excessive or
	Community Park 02 Condition and by LIDs connot be more than 20% of the park area	air proposed locations are required 8 Gioretention in sols 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. 8 The bottom of the facility cannot be located on natural slopes greater than 15% 8 The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table 8 An overflow outlet or bypass route is required to convey flow from major storm events 8 Minimum setacts from building floundations is 4 m 9 The ratios of impervious drainage area to facility area range from 5:1 to 15:1 8 Minimum horizontal clearance from watermains 2.5 m 9 Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m 9 Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m 9 Sufface IUDs 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 9 Fertreatment is required from areas external to the park external to the game.	Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required Silocretention in sols; 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 anothe to 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 sever 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 mast 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 **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 **Tester testing in the required for fow infiltration subsurface soils **Can accept external runoff from public ROW **Tester testing in 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 **Tester testing in the required for low infiltration subsurface soils		• Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Slake 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 subject to City approval. • Must be integrated into urban design is subject to City approval.	number of culverts are not permitted Longitudinal slopes of between 0.5 and 6% are required; Check dams are required for		A plan required to ensure (1) verification of topsoil depths on proposed areas a
Public Ownership	Neighbourhood Park Total area constrained by LIDs cannot be more than 15% of the park area	air proposed locations are required 8 Gioretention in sols with infiltration rates less than 15 mm/hr will require an underdrain. 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Native soil infiltration rates with 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 **The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table **The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table **All insum setback from building foundations is 4 m **Hieration of imprevious drainage and to facility are range from 5:1 to 15:1 **Minimum horizontal clearance from watermains 2.5 m **Minimum horizontal clearance from hydror judilities 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 **Suffice LiDis must be designed in consultation with and be approved by the City's Urban Beign department to ensure integration with park features and programs are not disrupted **Pertextented is required from areas external to the pare **Pertextented is required from areas external to the pare **Pertextented is required for a locate secternal to the pare **Pertextented is required for a locate secternal to the pare **Pertextented is required for a locate secternal to the pare **Pertextented is required for a locate secternal to the pare **Pertextented is required for a locate secternal to the pare **Pertextented is required for a locate secternal to the pare **Pertextented is required for a locate secternal to the pare **Pertextented is required for a locate secternal to the pare **Pertextented is required for a locate secternal to the pare **Pertextented is required fo	Minimum setback from building foundations is 4 m The bottom of the facility cannot be located on natural slopes greater than 15%. 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However, propriety urban tree root support system (e.g. Sika 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. Sika cell) that can accommodate watermain crossings can be considered and is subject to City approval. • Minimum horizontal clearance from hydron/utilities trench and sanitary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Sika Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval. • Must be integrated into urban designed in subject to City approval.	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	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 10 m below ground surface.	A plan required to ensure (1) verification of topsoil depths on proposed areas a (2) post-construction inspection and repair of potential areas of excessive or
	04 Urban Park	air proposed locations are required 8 Grotenton in oals 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. 8 The bottom of the facility cannot be located on natural slopes greater than 15% 8 The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table 8 An overflow outlet or bypass route is required to convey flow from major storm events 8 Minimum setacts from building floundations is 4 m 9 The ratios of impervious drainage area to facility area range from 5:1 to 15:1 8 Minimum horizontal clearance from watermains 2.5 m 9 Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m 9 Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m 9 Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m 9 Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m 9 Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m 9 Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m 9 Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m 9 Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m 9 Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m 9 Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m 9 Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m 9 Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m 9 Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m 9 Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m 9 Minimum horizontal clearance from hydro / utilities trench and sanitary sewer is 1.2 m 9 Minimu	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 wrifted at the proposed location. • The bottom of the facility cannot be located on natural slopes greater than 15% • The bottom of the facility cannot be vertically separated by at least 10 m from the seasonally high water table • An overflow outlet or bypass route is required to convey flow from major storm events • 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 51 to 15:1 • The action of impervious drainage area to facility area range from 51 to 15:1 • Minimum horizontal clearance from watermains 25 m • Minimum horizontal clearance from watermains 30 m • Minimum horizontal clearance from watermains 30 m • Minimum horizontal clearance from watermains shall be placed with a minimum of vertical clearance of 0.5 m • Surface 105 m to disrupted • Surface 105 m to disrupted • Access to 105 for operation and maltermanic to the park • Access to 105 for operation and maltermanic 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	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 ID for operation and maintenance should be provided and it should be accessible.	• Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Silax 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. Silax 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. Silax Cell) that can accommodate utility/sewer crossings can be considered and subject to City approval. • Must be integrated into urban design is subject to City approval.	 Locations where flow paths will have multiple driveway crossings requiring a large number of culters 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 an nimium horizontal clearance of 1.2 m. 	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 if liter strips should only be used in areas where the seasonally high water table is at least 10 m below ground surface.	amendments can also include area surrounding the planted areas that are not subject to heavy loads or welvilular 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 a C2 post-construction inspection and repair of potential areas of excessive or
	05 Strata Park					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%	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 if little strips should only be used in areas where the seasonally high water table is at least 1.0 m below ground surface in the same strips should not be supported to the same strips of the same strips should not be supported by the City's Univan Design department to ensure integration with park features and programs are	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 (2) post-construction inspection and repair of potential areas of excessive or

		FUA LID Matrix - Public Open Spaces			LID Applicable	LID Not Applicable	LID Not Acceptable
	Land Use Category			LID Specific Consideration	ns for Acceptance		
ID		A	В	С	D	E	F
		Rainwater Harvesting	Green Roof	Subsurface Infiltration - Infiltration Gallery	Subsurface Infiltration - Third Pipe System (Exfiltration)	Subsurface Infiltration - Soakaway Pit	Permeable Pavement
06	Parkette Total area constrained by LIDs cannot be more than 10% of the park area	Raimenter harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building torbol 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-rundu 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 *Pret-restment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent cogging within the system *It 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 *Reuse 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 sol types for infitration facilities are hydrologic soil group A or B soils, soil infitration rate testing at proposed locations 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 verifully 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. * All inimium exhatisch from building foundations is 4 m. * Top of infiltration trench shall be below frost depth of 1.2 m. * Makimum drainage area to treatment facility area of 10.1 for parking lots and roads; 20.1 for other surfaces. * Milnimum horizontal clearance from watermains 2.5 m. * Milnimum horizontal clearance from hydro / utilities trench is 1.2 m. * Watermain / utility trench / sanitary sewer crossings shall be placed with a milnimum of vertical clearance of 0.5 m. * Preferentment is required for nunoff from road or parking area. * Preferentment is required for nunoff from road or parking area. * Preferentment is required for nunoff from road or parking area. * Preferentment is required for nunoff from road or parking area. * Access to 10 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.		Preferred and types for infiltration facilities are hydrologic soil group A or B soils, soil infiltration rate testing at proposed locations are required where infiltration rates are less than 15 mm/hr and the soil of the	
07	Linear Park / Open Space Block	Rainwater harvesting (rain barreb, tanks, cisterns) is only for the capture of clean runoff from building roofs located within the park *Rain barreb, stanks and cisterns shall be located in easily accessible areas for maintenance *Rain barreb, stanks and cisterns shall be located in easily accessible areas for maintenance *Captured water is for non-potable uses only *Captured water is for non-potable uses only *Per-trantament is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system *It sharks and cisterns are buried underground and are located within an of building foundations, they must be water tight *An overflow system must be included, consisting of an overflow pipe to a previous area *For underground cisterns, a standard size manhable 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 8 soils, soil infiltration rate testing at proposed locations are required where infiltration rates are less than 15 mm/hr; native soil infiltration rates will need to be verified at the production 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 n from the seasonally high water table. The bottom of the facility should be vertically separated by at least 1.0 n from the seasonally high water table. An overflow outlet or hypass route is enquier to corney flow from major storm events. *Minimum setback from building foundations is 4 m. **100 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 watermains 2.5 m. *Minimum horizontal clearance from hydro / utilities trench is 1.2 m. *Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system of Pertearatent is required from raneas external to the park; pretreatment device should be located within road ROW for maintenance access. *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 focated 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 where infiltration rates are less than 15 mm/hr Underdrains are required where infiltration rates are less than 15 mm/hr I have been a soil of the facility annual mend to be verified at the proposed location I be bottom of the facility annual be located in natural slopes greater than 15% The bottom of the facility annual be located in natural slopes greater than 15% The bottom of the facility annual is required to convey flow from major storm events Minimum setback from building foundations is 4 m Top of infiltration trench shall be below float depth of 1.2 m Maximum drainage are to treatment facility area of 10.1 for parking lots and roads; 20.1 for other surfaces Minimum boritontal clearance from watermains 2.5 m Minimum boritontal clearance from hydro / utilities trench and sanitary sewer (size) and watermain volutily trench / sanitary sewer costs pash the 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 10 for operation and maintenance should be provided and it should be accessible by vacuum trunk or othe large equipment Maintenance access cannot be located within fire and emergency access routes Can accept external runoff from public ROW	
Public Ownership	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 overiflow united or bypass route is required to convery flow from major storm events Minimum setback from building foundations is 4 m To pol 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 waternains 2.5 m Minimum horizontal clearance from waternains 1.5 m Minimum horizontal clearance hydro / utilities trench is 1.2 m Capped vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system Pertearament is required from rases external to the SVM block Pretreatment is required for runoff from road or parking area Access to IID 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		Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations 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 should be becated on natural slopes greater than 15% The bottom of the facility should be vertically separated by a least 1.0 m from the seasonally high water table An overflow outlet or typass routle is required to convey flow from major storm events Minimum setback from building foundations is 4 m Top or infiltration trench shall be below flost 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 broizontal clearance from watermains 2.5 m Minimum broizontal 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 unifor from ond or parking area Access to 1.0 for operation and maintenance should be provided and it should be accessible by vacuum trunk or othe 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 where infiltration rates are less than 15 mm/hr; native soil infiltration rates will need to be verified at the proposed location I he 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 hypass route is required to convey flow from major storme vents To polintification trends half be below frost depth of 1.2 m Maximum horizontal clearance from watermans 2.5 m Minimum horizontal clearance from yater outlets 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 hiele and outlet pipes must be provided for inspection and maintenance of the system sinitiration facility and maintenance access cannot be located within 5 m of woodland limits, 10 m of valleyland limits, and 10 m of wettand limits, with the exception of overflow outlet Pretrestment is required for runoff from area external to buffer/PV2. Access to ILD for operation and maintenance should be provided and should be accessible by vacuum trunk or other large equipment			
10	Valleyland						

		FUA LID Matrix - Public Open Spaces				LID Applicable	LID Not Applicable	LID Not Acceptable
	Land Use Category			LID Specific	Considerations for Acceptance			
	ID	G	н	I	J	К	L	М
		Bioretention - Bioretention Cell / Raingarden	Bioretention - Stormwater Planter	Bioretention - Biofilter	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
	Parkette Total area constrained by LIDs cannot be more than 10% of the park area	at proposed locations are required is Grotention in sols 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 **An overflow outlet or bypass route is required to convey flow from major storm events **An interval of the storm 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 sever is 1.2 m **Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of **O S m **Surface IUIs 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 **Perteatment is required from areas external to the park external to the part of the programs are not disrupted	Proferred soil types for infilization facilities are hydrologic soil group A or 8 soils, soil infilization rate testing at proposed locations are required proposed sociation. The profession of the infilization rates less than 15 mm/hr will require an underdrain. Native soil infilization 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 verifically separated by at least 10 m from the seasonally high water table. An overflow outlet or bypass route is required to convey flow from major storm events. All more than the facility should be verifically separated by at least 10 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 which was a seasonally represented to the seasonal programs are not discusted. Watermain / utility trench / salantsy sever crossings hall be placed with a minimum of vertical clearance of 0.5 m easured in the part of the control of the con	An overflow outlier or bypass note is required to convey flow from major storm events withiniums restact from building foundations is 4 m. Hinteriums restact from building foundations is 4 m. The bottom risk of the production of the state	Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Sika 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. Sika cell) that can accommodate watermain crossings can be considered and is subject to City approval. Minimum horizontal clearance from hydro/utilities trench and santary sewer is 1.2 m. However, propriety urban tree root support system (e.g. Sika Cell) that can accommodate utility/sewer crossings can be considered and is subject to City approval. Whus to be integrated into ruch and esign Can accept external runoff from public ROW	bioretention rain garden also applicable here i Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted i Longitudnal silopses of between 0.5 and 6% are required; Check dams are required for slopes greater than 3% i Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m i Watermain / ultily trench / sanisher, sewer crossings shall be placed with a minimum	Flow path of at least 5 m is required Maximum flow length from contributing impervious surface is 25 m with slopes no with slopes no with surface is 25 m with slopes no with slopes	Soil amendments shall be applied to planted a rear, including vegetated swales and filter strips that require soil amendments to enhance infiltration. Soil strips that require soil amendments to enhance infiltration. Soil strips that are not subject to heavy loads or vehicular traffic. All fill materials shall meet MOECC Reg 153/04 soil standards A plant required to ensure (1) evinication 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	at proposed locations are required Silocretention in sols 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 verifically separated by at least 10 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 imprevious drainage area to facility area range from 5:1 to 15:1. Minimum horizontal clearance from watermains 2.5 m. Minimum horizontal clearance from horizor y the properties of the p	Preferred soil types for infiltration facilities are hydrologic soil group A or 8 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 verifically 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 An overflow outlet or bypass route is required to convey flow from major storm events Winimums hosticath from building foundations is 4 m The ratios of Impervious drainage area to facility area range from 5:1 to 15:1 Winimum horizontal clearance from watermains 2.5 m Minimum horizontal clearance from watermains 2.5 m Winimum horizontal clearance from survey area of the facility trench shanking viewer crossings what the placed with a minimum of vertical clearance of 0.5 m Surface IUIs must be designed in consultation with an de approved by the City's Urban Design department to ensure integration with part features and programs are not disrupted Pretreatment is required from areas external to the park Access to ID 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	Pretreatment is required from areas external to the park Maintenance access shall be located in areas accessible by vacuum truck or other large	Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, propriety urban tree root support system (e.g. Slav Cell that can accommodate utility crossings can be considered and is subject to City approval. Minimum brotinotal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Slav 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. Slav 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	number of cuberts are not permitted to 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.	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% Soli amendments are required for highly compacted native soils Filter strips should only be used in areas where the seasonally high water table is at its 11.0 m below ground surface Surface IUS must be designed in consultation with and be approved by the City's Hutan Design department to ensure integration with park features and programs are not disrupted Can accept external runoff from public ROW	amendment can also include area surrounding the planted areas that are not subject to heavy loads or wehicular traffic. All fill materials shall meet MOECC Reg 153/04 soil standards A plan required to ensure (2) werlikation of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or
Public Ownership	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 rate 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 verifically 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 **Minimum horboratal clearance from watermains 2.5 m **Minimum horboratal clearance from watermains 2.5 m **Minimum horboratal 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 **Pertereatment is required from areas external to the SWM block **One of the large equipment **Soil amendments may be required for low infiltration subsurface soils	Preferred soil types for infiltration facilities are hydrologic soil group A or 8 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 verifically 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 An overflow outlet or bypass route is required to convey flow from major storm events Winimum shotsket from building foundations is 4 m The ratios of impervious drainage area to facility area range from 5:1 to 15:1 Winimum horizontal clearance from watermains 2.5 m Minimum horizontal clearance from watermains 2.5 m Withermain yullity trench's sharins yeaver crossings shall be placed with a minimum of vertical clearance of 0.5 m Pretrearment is required from areas external to the SVM block Access to 10 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 imprevious drainage area to facility area range from 5:1 to 15:1 Minimum horizontal clearance from watermains 2.5 m Minimum clearance from Mydro / 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	 Cannot be placed above infiltration galleries, pervious pipes or any other utility. However, 	if vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here **Longitudinal slopes of between 0.5 and 68 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 an initimum 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 blow ground surface **Pretreatment is required from areas external to SWM block **Soil amendments are required for highly compacted native soils	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	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. A 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 Biltrectention is oils 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 should be vertically separated by at least 1.0 in from the seasonally high water table The bottom of the facility should be vertically separated by at least 1.0 in 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 5.11 0.51.1 Millimum horizontal clearance from watermains 2.5 in Willimum horizontal clearance from hydro/ utilities trench and sanitary sewer is 1.2 in Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m Pretrestament is required for runoff from area external to buffer/P/PZ Infiltration facility and maintenance access cannot be located within 5 m of woodland limits, 10 m of valleyland limits, and 10 m of wettand limits, with the exception of overflow outlet Access to 10 for operation and maintenance should be provided and it should be accessible by vacuum Access to 10 for operation and maintenance should be provided and it should be accessible by vacuum Borretenton/rain garden will be allowed in designated areas of the buffers/PVZ only. It must be designed in consultation with and be approved by the Cty Soil amendments may be required for low infiltration subsurface soils Can accept external runoff from public lands				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 Perteratment is required for runoff from area external to buffer/VPZ Can accept external runoff from public lands	Maximum flow length from contributing impervious surface is 25 m with slopes no	
	10 Valleyland							

		Public Roads/Rights-of-Way (R.	O.W)		LID Applicable	LID Not Applicable	LID Not Acceptable
	Land Use Category			LID Specific Considera	tions for Acceptance		
	ID	A	В	С	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
	11 Arterial						
	12 Collector						
nership							
lic Owr	14 Lane						
Pub	15 Single-loaded Local						
	16 Transit Way						
	17 Parking Lay-by						

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	Public Roads/Rights-of-Way (R.O.	w)			LID Applicable	LID Not Applicable	LID Not Acceptable
Land Use Category			LID Specific Co	nsiderations for Acceptance			
ID	G	н	I	ı	К	L	М
	Bioretention - Bioretention Cell / Rain Garden	Bioretention - Stormwater Planter	Bioretention - Biofilter	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
11 Arterial		Stormwater planter must be integrated into roadway and urban design Note mater Europaration / nate adalyte requirements National testing and the storm of the		An overflow outlier or bypass route is required to convey flow from major storm events. Cannot be placed above infiltration algeries, proviso jobs or any other utility, However, popperly urban tree root support system that can accommodate utility, watermains, and sever crossings can be considered and subject to City approval. Must be integrated into roadway and urban design.			 Soil amendments shall be applied to planted areas, including wepstated swales and sufficient arisis that requires coll amendments to enhance inflitation. Soil amendments also in oldude area surrounding the planted areas that are not subject to heavy loads or well-called areas that are not subject to heavy loads or well-called areas that are not subject to heavy loads or well-called areas that are not subject to heavy loads or well-called areas that are not subject to heavy loads or well-called areas of subject to heavy loads or subject to heavy
12 Collector		Normwater planter must be integrated into roadway and urban design Notin meet transportation / road callyr equilements Notines access shall be located in a reas accessible by vacuum truck or other large equipment Preferred so they see for intification facilities are hydrologic soil group An or 8 soils; soil infiltration rate testing at proposed locations are required Notine the soil to the soil soil soil to the soil soil soil group An or 8 soils; soil infiltration rate testing at proposed locations are required. Notine the soil of the soil soil soil soils soil soil soils soil soil		An overflow outlet or bypass route is required to convey flow from major storm events. Cannot be placed above infiltration algeries, pervious piece 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 road-way and urban design.			 Soil amendments shall be applied to planted areas, including vegetated sweets and filter strips that requires coll amendments to enhance inflation. Soil amendments calso include area surrounding the planted areas that are not subject to heavy loads or verbicular traffic. All fill materials shall meet MOECC Reg. 153/04 Soil standards. A plan required to ensure (1) verification of toppial depths on proposed areas and (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 Nuts meet transportation / road safety requirements Natirement access shall be located in area accessible by vacuum truck or other large equipment Nuts not interfere with community mail boos Preferred so theyer for intitional notities are hydrologic soil group A or B soils; soil inflitration rate testing at proposed locations are required Increase the proposed to the soil some soil in the soil in the soil in the soil inflitration 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 outlied or bipass over its required to convery flow from major storm events Niminum setback from building foundation is a m The atoms of imprevious drainage are to facility are range from 5:1 to 15:1 Niminum brotrootal clearance from watermain 2.5 m Niminum brotrootal clearance from hydrolytilisties trench and sanitary sever is 1.2 m Vistermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 0.5 m Soil amendments may be required for low inflitration substrates soil Nutre two the 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 swale 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 toppoil depths on proposed areas and 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 swale and filters strips that require soil amendments to enhance infiltration. Soil amendments come to explore to a rease that are expected to support heavy loads or vehicular traffic. • A plan required to ensure (a) verification of topsoil depths on proposed areas and (post-construction inspection and repair of potential areas of excessive or uneven settlement.
15 Single-loaded Local		Sommuster planter must be integrated into roadway and urban design Nutra meet transportation / road addry requirements Advantered transportation / road addry requirements Advantered access shall be located in a exex accessible by vacuum truck or other large equipment Advantered access shall be located in a exex accessible by vacuum truck or other large equipment Advantered in the control types for inflitration facilities are hydrologic soil group A or 8 soils; soil inflitration rate testing at proposed locations are recorded and the control types for inflitration facilities are hydrologic soil group A or 8 soils; soil inflitration rate testing at proposed location are recorded and the soil of the soil inflitration rates will need to be verified at the proposed location. The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally high water table An overflow outlier or bipass cross it required to convey flow from major storm events Animismum setback from building foundation is a m The ratios of imprevious drainage are to facility area range from 5.1 to 15.1 A Minimum broizontal clearance from watermain 2.5 m A Minimum broizontal clearance from whytolyutilities trench and sanitary sever is 1.2 m Vistermain / unlity trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 0.5 m 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 swels and filter strips that requires cell amendments to enhance inflitation. Soil amendments also include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. A filt off materials shall meet MOECC Reg 153/04 soil standards A plan requires for ensured 10 verification of topoid opphic on proposed areas and post-construction inspection and repair of potential areas of excessive or uneven patterned.
16 Transit Way		Stormwater planter must be integrated into transitiway and urban design Must meet transportation / road safety requirements Maintenance access shall be located in areas accessable by vacuum truck or other large equipment Preferred soil types for infiltration facilities are hydrologic soil group A or 8 soils; soil infiltration rate testing at proposed locations are required Greater of the soil types for infiltration facilities are hydrologic soil group A or 8 soils; soil infiltration rate testing at proposed location are required Consideration for the facility should be vertically separated by at least 1.5 mm will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. The bottom of the facility should be vertically separated by at least 1.0 m from the sasonally high water table An overflow outlet or bypass route is required to convey flow from major storm events Infilmitum statistic from bidding foundation is 4 mm. The ratios of impervious drainage are to facility area range from 5:1 to 15:1 Ninfilmium broizontal clearance from watermain 2.5 mm Minfilmium broizontal clearance from bytefucilities trench and sanitary sever is 1.2 mm Minfilmium broizontal clearance from bytefucilities trench and sanitary sever is 1.2 mm Minfilmium broizontal clearance from bytefucilities trench and sanitary sever is 1.2 mm Minfilmium broizontal clearance from bytefucilities trench and sanitary sever is 1.2 mm Minfilmium broizontal clearance from bytefucilities trench and sanitary sever is 1.2 mm Minfilmium broizontal clearance from bytefucilities trench and sanitary sever is 1.2 mm Minfilmium broizontal clearance from bytefucilities trench and sanitary sever is 1.2 mm Minfilmium broizontal clearance from bytefucilities trench and sanitary sever is 1.2 mm Minfilmium broizontal clearance from bytefucilities trench and sanit					Soil amendments shall be applied to planted areas, including vegetated swales an filter strips that require soil amendments to enhance infiltration. Soil amendments also include areas mortunding the planted areas that are not subject to heavy loads evelscular traffic. A lift ill materials shall meet MOECC Reg 153/O4 soil standards A plan required to ensure (1) verification of topsoil depths on proposed areas and post-construction inspection and repair of potential areas of excessive or uneven settlement
17 Parking Lay-by		Stormwater planter must be integrated into transitivary and urban design Nuts meet transportation / read safety requirements Natirement access shall be located in areas accessible by vacuum truck or other large equipment Preferred soft types for inflitation facilities are hydrologic soil group. A or 8 soils, soil inflitation rate testing at proposed locations are required. In the control in soils with inflitation rates less than 15 mm/hr will require an underdain. Native soil inflitation rates will need to be verified at the proposed location. The bottom of the facility should be vertically separated by at less 1.0 m from the seasonally high water table An overflow outlier or bipass rosts is required to convey flow from major storm events Niminum setback from building foundations is 4 m The ratios of imprevious drainage are to facility area range from 5.1 to 15:1 Niminum borizontal clearance from water mining 2.5 m In this international clearance from whyter / utilities trench and sanitary severe is 1.2 m Outlies of the soil of the so					

		Public Utility Corridors			LID Applicable	LID Not Applicable	LID Not Acceptable
Land Us	Jse Category			LID Spec	cific Considerations for Acceptance		
ID		Α	В	С	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
18 District 1 of subject to an operator	Energy approval from utility						
digustana 19 Subject to an operator	One approval from utility			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 Underdrains are required where infiltration rates are less than 15 mm/hr Hatove soil infiltration rates will need to be verified at the proposed location He bottom of the facility annual be located on natural slopes greater than 15% He bottom of the facility should be vertically separated by at least 1.0 in from the seasonally high water table Whitman selected from building foundations is 4 m Op of infiltration trench shall be below frost depth of 1.2 m Waterium danage area to treatment facility area of 10.1 for parking lots and roads; 20.1 for other surfaces Minimum brotontal clearance from watermains 2.5 m Winnimum brotontal clearance from watermains 2.5 m Winnimum brotontal 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 Occupated vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system Occupated vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system Occupated vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system Occupated vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system Occupated vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenance of the system Occupated vertical monitoring wells connected to the inlet and outlet pipes must be provided for inspection and maintenanc		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 cannot be located on natural slopes greater than 15% The bottom of the facility and be vertically separated by at least 1.0 in from the seasonally high water table An overflow under to hypass route in required to convey flow from major storm events An overflow under to hypass route in required to convey flow from major storm events An overflow under to hypass route in required to convey flow from major storm events A major of infiltration trench that be below from the depth of 1.2 m Maximum richanal care area to reatment facility area of 10.1 for parking lots and roads; 20.1 for other surfaces Minimum horizontal clearance from hydrofutilities trench and sanitary sewer is 1.2 m Minimum horizontal clearance from hydrofutilities trench and sanitary sewer is 1.2 m Watermain, Juffly trench, Sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m Minimum and control of the control of the parking area in the control of the parking area in the parking a	
20 Easemer	Drainage ent approvel from utility						

		Public Utility Corridors				LID Applicable	LID Not Applicable	LID Not Acceptable
	Land Use Category				LID Specific Considerations for Acceptance			
	D	G	Н	1	1	К	L	М
		Bioretention - Bioretention Cell / Rain Garden	Bioretention - Stormwater Planter	Bioretention - Biofilter	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
	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 a proposed facations 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 focation. **The bottom or take will need to be verified at the proposed focation. **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 bettack from building foundations is 4 m **The ratios of impensious 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 snainary sever is 1.2 m **Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 0.5 m **Maintenance access shall be located in areas accessible by wacum 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					Sol amendments shall be applied to planted areas, including vegetated swales and filter strips that require oal amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicula rollic. A fill ill materials shall meet VIORCE Reg 153/04 soil standards A plan required to ensure (1) entertained not reposel depths on proposed areas and (2) pto construction inspection and repair of potential areas of excessive or uneven settlement Contact utility owner for permission and specific condientations if accepting Contact utility owner for permission and specific condientations if accepting the contact of the proposal
Public Ownership	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 should be verifically sparable by at least 10 m from the teacosonally high water table The bottom of the facility should be verifically sparable by at least 10 m from the teacosonally high water table. An overflow outlet or bypas route is required to convey flow from major storm events An overflow outlet or bypas route is required to convey flow from major storm events Williams in the content of the conte	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/futilities trench and sanitary sewer is 1.2 m Minimum horizontal clearance from hydro/futilities trench and sanitary sewer is 1.2 m Minimum horizontal clearance for 5 m hydro/futilities trench and sanitary sewer is 1.2 m Minimum horizontal clearance for 5 m hydro/futilities trench and sanitary sewer is 1.2 m Minimum horizontal clearance for 50 m hydrofities trench and sanitary sewer is 1.2 m Minimum horizontal clearance for 50 m hydrofities trench and sanitary sewer is 1.2 m Minimum horizontal clearance for 50 m hydrofities trench and sanitary sewer is 1.2 m Minimum horizontal clearance for 50 m hydrofities trench and sanitary sewer is 1.2 m Minimum horizontal clearance for 50 m hydrofities trench and sanitary sewer is 1.2 m Minimum horizontal clearance for 50 m hydrofities trench and sanitary sewer is 1.2 m Minimum horizontal clearance for 50 m hydrofities trench and sanitary sewer is 1.2 m Minimum horizontal clearance for 50 m hydrofities trench and sanitary sewer is 1.2 m Minimum horizontal clearance for 50 m hydrofities trench and sanitary sewer is 1.2 m Minimum horizontal clearance for 50 m hydrofities trench and sanitary sewer is 1.2 m Minimum horizontal clearance for 50 m hydrofities trench and sanitary sewer is 1.2 m Minimum horizontal clearance for 50 m hydrofities trench and sanitary sewer is 1.2 m Minimum horizontal clearance for 50 m Min	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 drianage area to facility area range from 5:1 to 15:1 Minimum horizontal clearance from watermains 2.5 m Minimum brointal clearance from hydro / utilities trench and sanitary sever is 1.2 m Minimum horizontal clearance from hydro / utilities trench and sanitary sever is 1.2 m Maintenance arcses 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	root support system (e.g. Silva Cell) that can accommodate watermain crossings can be	Dioretention rain garden also applicable here a Locations where flow paths will have multiple driveway crossings requiring a large numbe 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 willies must be offset from the centreline of the vegetated swale, with a minimum borotonal clearance of 1.2 m	I han 3% Sol 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 in 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 er strips that require soil amendments to enhance infiltration. Soil amendments can also include areas surrounding the planted areas that are not subject to heavy loads or vehicular traffic. All fill materials hall meet MOECC Reg 153/04 soil standards A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) por 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
	Sewer/Drainage Easement Subject to opproval from utility operator		Preferred soil types for infiltration facilities are hydrologic soil group A or B soils, soil infiltration ratitesting 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 though 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 myter of 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 Minimum horitontal clearance from the control of					Soil amendments shall be applied to planted areas, including vegetated swales and filter trips that require soil amendments to enhance infiltration. Soil amendments can also include areas 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) vehiculant of topoid depths on proposed areas and (2) por 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

	Public Institutional			LID Applicable	LID Not Applicable	LID Not Acceptable
Land Use Category			LID Specific Consider	ations for Acceptance		
ID ,	A	В	с	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
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 center of the conveyance system should be buried at a depth no center of the conveyance system should be buried at a depth no center of the conveyance system should be buried at a depth no center of the conveyance of t	Green roofs shall consist of species suitable for harsh roof top conditions Planting plans are to be included in Site Plan applications	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 annot be located on natural slopes greater than 15% The bottom of the facility should be vertically separated by at least 1.0 in from the seasonally high water table An overflow outlet or bypass route is required to convey flow from major storm events An overflow outlet or bypass route is required to convey flow from major storm events An overflow outlet from budding foundations is 4 m Top of altification trends all the below frost of 12.2 m Top of altification trends all the below frost of 12.2 m Minimum horizontat clearance from watermains 2.5 m Minimum horizontat clearance from watermains 2.5 m Minimum horizontat clearance from hydrolydillities 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 links and outlet pipes must be provided for inspection and maintenance of the system from road or parking area Access to LD 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 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 in from the seasonally high water stable The bottom of the facility should be vertically separated by at least 1.0 in from the seasonally high water stable An overflow outlet or bypass route is required to convey flow from major storm events Minimum setback from building foundations is 4 in or 1.2 in 10 of infiltration trans as his member of 1.2 in 10 of infiltration trans as his member of 5.1 in 10 of 1.2 in 10 of infiltration trans as his member of facility area of 10.1 for parking lots and roads; 20:1 for other surfaces Minimum horizonal clearance from hydro/utilities trench and sanitary sewer is 1.2 in 10 of 5. in 10 of 1	The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m for seasonally high water table Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate to a proposed focations are required Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rate need to be verified at the proposed location. Permeable pavement surface shall be at least 11/s slope and no greater than 5% slope If permeable pavement also incroprotes additional infiltration gallery storage beneath it, the minim setback from building foundation for the infiltration gallery component is 4 m. No runoff from external area allowed
22 Library	• For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no	Green roofs shall consist of species suitable for harsh roof top conditions	Prefered 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 annot be located on natural slopes greater than 15% The bottom of the facility annot 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 Minimum frainage area to 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/fullities 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 Pretveatment is required for runoff from road or parking area Access to to 10 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 8 soils; soil infiltration rate testing at proposed locations 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 annot 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 watermisin 2.5 m Minimum horizontal clearance from hydrolutilities trench and sanitary sever is 1.2m Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 10.5 m Pretreatment is required for runoff from road or parking area Access to Unifor operation and maintereance 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 rousts No runoff from external area allowed	The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from seasonally high water table Preferred soil types for infiltration facilities are hydrologic soil group A or 8 soils, soil infiltration rate tes alt proposed locations are required Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates vined to be verified at the proposed location. Permeable pavement surface shall be at least 1½ slope and no greater than 5% slope if permeable pavement also incorporates additional infiltration gallery strage beneath it, the minimun setback from building foundation for the infiltration gallery component is 4 m. No runoff from external area allowed
23 School, College, or University	• For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no	Green roofs shall consist of species suitable for harsh roof top conditions	Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required Independent of the facility and where infiltration rates are less than 15 mm/hr. Nathes soil infiltration rates will need to be verified at the proposed location The bottom of the facility amont be located on natural slopes greater than 15% Bottom of the facility amont be located on natural slopes greater than 15% Minimum facility and sold be vertically separated by at least 1.0 m from the seasonally high water All need from outlied to hypass 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 horizontal clearance from watermains 2.5 m Minimum horizontal clearance from watermains 2.5 m		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 annot 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 rotel is required to convey flow from major storm events Minimum setback from building foundations is 4 m Top or 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 brotomatal elearnce from watermains 2.5 m Minimum brotomatal elearnce from hydrofullities trench and sanitary sewer is 1.2 m Matermain fullly trench'. Sanitars 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 1.0 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	 The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from seasonally high water table Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate test at proposed locations are required Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates vest the ned 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 settack from building foundation for the infiltration gallery component is 4 m.
Other (Museum, 24 Theatre, Art Gallery, Hospital, Fire Stations)	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,	Green roofs shall consist of species suitable for harsh roof top conditions Planting plans are to be included in Site Plan applications	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 in 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 deepth of 1.2 m Maximum oflanique area to treatment facility area of 10.1 for parking lots and roads; 20.1 for other surfaces Minimum horizontal clearance from whytermain 2.5 m Minimum horizontal clearance from whytermain 2.5 m Minimum in the control of the contr		Preferred soil types for infiltration facilities are hydrologic soil group A or 8 soils; soil infiltration rate testing at proposed locations are required Underdrains are required where infiltration rates are less than 15 mm/hr. Mative soil infiltration rates will need to be verified at the proposed location The bottom of the facility sonato be located on natural slopes greater than 15% The bottom of the facility sonate we vertically separated by at least 1.0 m from the seasonally high water table 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 To por infiltration teneth 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 brotinotal clearance from watermains 2.5 m	The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m for seasonally high water table Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate te al roposed locations are required Soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates need to be verified at the proposed location. Permeable pavement surface shall be at least 1½ slope and no greater than 5% slope if permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimus steback from building foundation for the infiltration gallery component is 4 m. No runoff from external area allowed

		Public Institutional				LID Applicable	LID Not Applicable	LID Not Acceptable
	Land Use Category				LID Specific Considerations for Acceptance			
ID		G	н	I	J	К	L	М
		Bioretention - Bioretention Cell / Rain Garden	Bioretention - Stormwater Planter	Bioretention - Biofilter	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
21	Community Centre	equipment and must not be located along fire and emergency access routes No runoff from external area allowed	Perferred soil types for infiltration facilities are hydrologic soil group A or B soils, soil initiration rate testing at proposed locations are required. Bioretention in soils with infiltration rates lies sha 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 10 m from the isasonally 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 imperious drainage area to facility area range from 5:1 to 15:1. Minimum horitomtal clearance from watermains 2.5 m. Willimum horitomtal clearance from hydro/fulfilles trench and sanitary sever is 1.2m. Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 0.5 m. Alaintenance 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 eMinimum setslast from building foundations is 4 m The bottom of the facility cannot be located on natural slopes greater than 15%. The ratios of impervious criange area for facility area range from 5:1 to 15:1 Minimum horizontal clearance from watermains 2.5 m Minimum horizontal clearance from hydro/fulfillets trench and santary sever is 1.2m Watermain / utility trench / santary sever crossings shall be placed with a minimum of vertical clearance of 0.5 m Maintenance access shall be located in a reas 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	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 Ceill) that can accommodate watermain crossings can be considered and is subject to City approval.	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%	Row path of at least 5 m is required Maximum flow length from contributing impervious surface is 25 m with slopes no greate than 3% Soli amendments are required for highly compacted native soils Rillers strips should only be used in areas, where the seasonally high water table is at least On the long ground surface No runoff from external area allowed	Sold amendments shall be applied to planted areas, including vegetated swales and fill strips that require sol amendments to enhance infiltration. Soil amendments can also include area surrounding the planted areas that are not subject to heavy loads or vehicutraffic. All fill materials shall meet MOECC Reg 153/04 soil standards. A plan required to ensure (1) verification of topical depths on proposed areas and (2) construction inspection and repair of potential areas of excessive or uneven settlement. No runoff from external area allowed.
22	Library	Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m	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 cannot be vertically separated by at least 10 m from the seasonally high water table. • An overfice water that so the state of the state of the seasonally high water table. • The ratios of impendious dianage area to facility area range from 5:1 to 15:1 • Minimum brottomat clearance from hydro/fullities trench and santhary sewer is 1.2m • Minimum brottomat clearance from hydro/fullities trench and santhary sewer is 1.2m • Watermain / unity trench / santhary sewer crossings shall be placed with an minimum of vertical clearance of 0.5 m • Perteatment is required for runoff from road or parting area • Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located long 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 ratio of impervious crianage area to facility area range from 5:10 15:1 Minimum horizontal clearance from watermains 2.5 m Minimum horizontal clearance from hydrojculities trench and sanitary severs is 1.2m Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical flearance for our of the sanitary severs of	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.	bioretention rain garden also applicable here Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted		Soil amendments shall be applied to planted areas, including vegetated swales and filtr strips that require soil amendments to enhance infiltration. Soil amendments can also include areas surrounding the planted areas that are not subject to heavy loads or vehicul 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) p construction inspection and repair of potential areas of excessive or uneven settlement No runoff from external area allowed
23	School, College, or University	Preferred soil types for infitration facilities are hydrologic soil group A or B soils; soil infilitation rate testing at proposed locations are required Bioteretention is oils with infilitation trate less than 155 mm/hr will require an underdrain. Native soil infilitation rates will need to be verified at the proposed location. The bottom of the facility annot be located on natural slopes greater than 15%. The bottom of the facility should be vertically separated by at lesst 1.0 m from the isosonally high water table. An overflow outlet or bypass route is required to convey flow from major storm events. Milmimum storiation clearance from the storm of the sto	Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required Bioretention is oils 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 annot be located on natural obege 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 Willimum horitomtal clearance from hydro/fullities trench and sanitary sewer is 1.2m Willimum horitomtal clearance from hydro/fullities trench and sanitary sewer is 1.2m Watermain / fully trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance for 6.5 m Watermain / sulfiy trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance from the control of the sanitary sewer is 1.2m Watermain / sulfiy trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance from the control of the sanitary sewer is 1.2m Watermain / sulfiy trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance from the sanitary sewer shall be control of the sanitary sewer shall be control of the sanitary sewer shall be control of the sanitary sewer shall be sanitar	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/fultilets trench and sanitary sever is 1.2m Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 0.5 m	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.	bioretention rain garden also applicable here Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted	Row path of at least 5 m is required Maximum flow length from contributing impervious surface is 25 m with slopes no greate than 3% Soll amendments are required for highly compacted native solls 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	include area surrounding the planted areas that are not subject to heavy loads or vehicul traffic.
24	Other (Museum, Theatre, Art Gallery, Hospital, Fire Stations)	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 isasonally high water table. All overflow outlet or bypass route is required to convey flow from major storm events. Minimum setback from building bundations is 4 m. The ratios of improvisio drainage are to facility area range from 5:1 to 15:1. Minimum horizontal clearance from watermains 2.5 m. Minimum horizontal clearance from hydro/fulfilles trench and sanitary sewer is 1.2m. Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 10.5 m.	Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required Biotectention is oils 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 anone be located on natural losge greater than 15%. The bottom of the facility should be vertically separated by at least 10 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 horitontal clearance from hydro/utilities trench and sanitary sever is 1.2m. Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 0.5 m. All diaman that the clearance of 0.5 m. All the control of th	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/bittlibus 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 placed above infiltration galleries, pervious pipes or any other utility, However, propriety urban there not support system (e.g. Sliva Cell) hat can accommodate utility crossings can be considered and is subject to City approval. Minimum horizontal clerance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Sliva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. 	bioreterition 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 brotontal clearance of 1.2 m	Soll 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	include area surrounding the planted areas that are not subject to heavy loads or vehic traffic.

			Directs Over Course Bands (BOW Besidentia			LID Applicable	LID Not Applicable	LID Not Acceptable
			Private Open Spaces, Roads/ROW, Residentia		up.c. #. c.			
		Land Use Category				derations for Acceptance	_	-
	ID		A Rainwater Harvesting	B Green Roof	C Subsurface Infiltration - Infiltration Gallery / Infiltration Trenches	D Subsurface Infiltration - Third Pipe System (Exfiltration)	E Subsurface Infiltration - Soakaway Pit	F Permeable Pavement
		Open Spaces						
	25	Private Open Space	 Rainwater harvestring (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs Rain barrels, tanks and cisterns shall be located in earbig 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 Per-teratement is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system If anks 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 manhaloe gening should be provided for maintenance purposes Maintenance access cannot be located within fire and emergency access routes Resues of havested rainwater incide buildings must adhere to building code (e.g., dual plumbing is required for grey water resuse within buildings to avoid cross contamination with potable water supply system) 	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 8 soils; soil infiltration rate testing at proposed locations are required where infiltration rates are less than 15 mm/hr. • 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 • Ninimum setaback from building foundations is 4 m • Top of infiltration trench shall be below frost depth of 1.2 m • Nasimum drainage area to treatment facility area of 10.1 for parking lots and roads; 20.1 for other surfaces • Ninimum horizontal clearance from watermains 2.5 m • Ninimum horizontal clearance from hydro/fultilles 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 inter and outlet pipes must be provided for inspection and maintenance of the system • 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 inhitration bacilities are hydrologic soil group A or B soils; soil inhitration rate testing at proposed locations are required Pretreatment is required for runoff from road or parking area. 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 Stop 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 Mydro/fullities trench and sanitary sewer is 1.2m Watermain / fully trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 n Pretreatment is required for runoff from road or parking area. Access to LIO for operation and maintenance should be provided and it should be accessible by vacuum trunk or other large equipment	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 budding foundations is 4 m To por infiltration trench shall be below forst 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/fullities trench and sanitary sever is 1.2m Maximum drains described the sever cossings 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 of 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 rate 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 galley storage beneath it, the minimum setback from building foundation for the infiltration galley 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 8 soils; soil infiltration rate testing at proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • 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 10 m from the seasonally high water table • An overflow outsite or bypass route is required to convey flow from major storm events • Infiltration trench shall be below frost depth of 1.2 m • Top of militration trench shall be below frost depth of 1.2 m • Top of militration trench shall be below frost depth of 1.2 m • Valumman formulae are a to treatment facility are a 0.10.1 for parking lots and roads; 20.1 for other surfaces • Minimum bortoontal clearance from watermank 2.5 m • Minimum horizontal clearance from watermank 2.5 m • Minimum and the standard of the st	Preferred soil types for infiltration facilities are hydrologic soil group A or 8 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 An overflow outlet or bypass route is required to convey flow from major storm events Nimnium setsiatek from building foundations is 4 m Top of pervious pipe shall be below frost depth of 1.2 m Naximum diving are act to treatment facility area of 10.1 for parking lots and roads; 20.1 for other surfaces Nimnium horizontal clearance from watermains 2.5 m Nimnium horizontal clearance from hydrolyutillates trench and sanitary sewer is 1.2 m Nimnium horizontal clearance from hydrolyutillates trench and sanitary sewer is 1.2 m Nimnium horizontal clearance from hydrolyutillates trench and sanitary sewer is 1.2 m Nimnium horizontal clearance from hydrolyutillates trench and sanitary sewer is 1.2 m Nimnium horizontal clearance from hydrolyutillates trench and sanitary sewer is 1.2 m Nimnium horizontal clearance from hydrolyutillates trench and sanitary sewer is 1.2 m Nimnium horizontal clearance from hydrolyutillates trench and sanitary sewer is 1.2 m Nimnium horizontal clearance from hydrolyutillates Nimnium horizontal clearance from h	An overflow outlet or bypass route is required to convey flow from major storm events Minimum settleck from building foundations is 4 m Top of inflittation trench shall be below frost depth of 1.2 m Maximum drainage area to treatment facility area of 1013 for parking lots and roads; 20.1 for other surfaces Minimum brotroottal clearance from watermains 2.5 m Minimum brotroottal clearance from hydro/fulfilles trench and sanitary sewer is 1.2m Watermain / fulfilly french / sanitary sewer cossings shall be placed with a minimum of vertical clearance of 0.5 m Petretament in required for runolf from road or parking area.	No credits will be given to permeable pawern in area of high traffic that requires de-king if sanding. The bottom of the permeable pawern structure should be vertically separed by at least 10 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 rate less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. Permeable pawernet surface shall be at least 15 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 fall be located in early accessible ears 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-t-restment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system For the started of the starter of 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	• Preferred soil types for infiltration facilities are hydrologic soil group A or 8 soils; soil infiltration rate testing at proposed locations are required where infiltration rates are less than 15 mm/hr. • 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 10 m from the seasonally high water table • An overflow costlet or bypass route is required to convey flow from major storm events • An overflow costlet or bypass route is required to convey flow from major storm events • An overflow costlet or bypass route is required to convey flow flom major storm events • An overflow costlet or bypass route is required to convey flow flom major storm events • A post mumber of the storm events • A post mumber of the storm		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 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 propose locations are required • Soils with infiltration rates less than 1.5 mm/hr will require an underdrain. Native soil infiltration rates with red to be verified at the proposed location. • Normeable pavement surface shall be at least 1.5 mm/hr will require an underdrain. Native soil infiltration rates with red to be verified at the proposed location. • Normeable pavement surface shall be at least 1.5 mm/hr with red to present than 9% slope • Normeable pavement surface shall be at least 1.5 mm/hr with the shall be shall be at least 1.5 mm/hr with the shall be with shall be at least 1.5 mm/hr with the shall be at least 1
Private Ownership	28	Townhouse - Freehold	 Rainwater harvesting (rain barrels, tanks, cisterna) is only for the capture of clean runoff from building roofs Rain barrels, tanks and cisterns dalle be located in a least day accessible areas for maintenance For tanks and cisterns designed for year-cound use, the conveyance system should be builded at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. gazage, basement) Captured water is for non-potable uses only Per-teratement is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system If anks 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 Por underground cisterns, a stradards see manhole opening should be provided for maintenance purposes Reuse of harvested rainwater inside buildings must adhere to building code (e.g. dual plumbing is required for grey water reuse with building 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 traindrad size manhole opening should be provided for maintenance. 	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 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 less 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 hydro/utilities trench and sanitary sever is 1.2m Minimum horizontal clearance from hydro/utilities trench and sanitary sever is 1.2m Maximum horizontal clearance from tydro/utilities trench and sanitary sever 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 minimenance of the system		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 annot 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 first depth of 1.2 m	• The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from the seasonally high water false • Preferred soil types for infiltration facilities are hydrologic soil group A or 8 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 order large equipment • If permeable pavement also incorporates additional infiltration gallery storage beneath it, the minimum setback from building foundation for the infiltration gallery component is 4 m.
		Townhouse - Condominium	Rainwater harvesting (rain barrets, tanks, cisterns) is only for the capture of clean runoff from building roofs Rain barreis, tanks and cisterns shall be located in easily accessible areas for maintenance For tranks and cisterns designed for year-round use, the conveyance system should be burled at a depth no less than the maximum frost depth of 1.2 m, or be located in a heated indoor environment (e.g. parage, basement) Pre-treatment is for non-potable uses only Pre-treatment is required to remove debris, dost, leaves, etc. that may accumulate on roofs to prevent clogging within the system I make and cisterns are burled 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 previous area For underground cisterns, a standard size manifole opening should be provided for maintenance purposes. On the provided of the provided of the purposes of the control of the provided for maintenance purposes. The control of the purpose of the purpose of the provided for maintenance purposes. The control of the purpose of	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. I had to soil infiltration rates will need to be verified at the proposed location. I he bottom of the facility cannot be located on natural slopes greater than 15%. I he 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. I however, the proposed storm that the storm of the seasonally high water table. I however, the proposed storm that the seasonally high water table. I have the storm of the seasonally high water table. I have the same the same table. I have the same		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 forst depth of 1.2 m	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 eutler or bypass route is required to convey flow from major storm events Preferred soil types for infiltration facilities are hydrologic soil group A or 8 soils, soil infiltration rate testing at proposed locations are required. Soils with infiltration rates less than 1.5 mm/m² will require an underdrain. Native soil infiltration rates with need to be verified at the proposed location. Premeable pavement surface shall be at least 1.85 to 30pe and no greater than 5% slope Adianterance access shall be located in areas accessible by vacuum truck or other large equipment If permeable pavement alon incorporates additional infiltration gallery stonge beneath it, the minimum setback from building foundation for the infiltration gallery component is 4 m.
		Mixed Use - Surface Parking	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	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 where infiltration rates are less than 15 mm/hr. Native soil infiltration rates will need to be verified at the proposed location I he bottom of the facility annot be located on natural slopes greater than 15% The bottom of the facility should be vertically separated by at less 1.0 m from the seasonally high water table An overflow outloor to phass soute is required to convey flow from major storm events Minimum setback from building floundations is 4 m Top of infiltration trents shall be below flost 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 hydro/utilities trents and sanitary sever is 1.2m Minimum horizontal clearance from watermains 2.5 m Natermania / Sulfy trents/ sharaling-sever 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 monotroing wells connected to the interior and outlet pipes must be provided for inspection and maintenance of the system Abantenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be		proposed locations are required • Underdrains are required where infiltration rates are less than 15 mm/hr. • Nathes soil infiltration rates will need to be verified at the proposed location • The bottom of the facility annot 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 forst depth of 1.2 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 yes 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 1.5 mm/hr will require an underdrain. Native soil infiltration rates will need to be werfield 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 of permeable pavement abor corporates additional infiltration gallety toge beneath it, the minimum setback from building foundation for the infiltration gallety component is 4 m.
		Mixed Use - Underground Parking	Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of clean runoff from building roofs Rain barrels, stanks and cisterns shall be located in easily accessible areas for maintenance For tranks and cisterns designed for year-round use, the conveyance system should be builded 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) - Ratured water is for non-potable uses only - Pre-treatment is required to remove debrs, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system - It also and cisterns are burled underground and are located within 4m of building foundations, they must be water fight - An overflow system must be included, consisting of an overflow pipe to a pervious area - For underground cisterns, a standard size manihole opening should be provided for maintenance purposes - For underground cisterns, a standard size manihole opening should be provided for maintenance purposes - For underground cisterns, a standard size manihole opening should be provided for maintenance purposes - For underground cisterns, a standard size manihole opening should be provided for maintenance purposes - For underground cisterns, a standard size manihole opening should be provided for maintenance purposes - For underground cisterns, a standard size manihole opening should be provided for maintenance purposes - For underground cisterns, a standard size manihole opening should be provided for maintenance purposes - For underground cisterns, a standard size manihole opening should be provided for maintenance purposes - For underground cisterns, a standard size manihole opening should be provided for maintenance purposes - For underground cisterns, a standard size manihole opening should be provided for maintenance purposes - For underground cisterns, a standard size manihole opening should be provided for maintenance purposes - For underground cisterns, a standard size manihole opening	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	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 annot 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 physis soute is required to convey flow from major sortime wents **Minimum setback from building foundations and underground parking garages is 4 m **Opp of infiltration trench shall be below frost eighth of 12 or parking lots and roads; 20.1 for other surfaces **Maximum drainage area to treatment facility area of 10.1 for parking lots and roads; 20.1 for other surfaces **Watermain / vitility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance from hydrodiffilits trench and sanitary sever is 1.2 m **Vatermain / vitility trench / sanitary sewer crossings shall be glaced with a minimum of vertical clearance of 0.5 m **Perteatments 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 **Subsurface infiltration LIDs cannot be installed below or within 4 m underground parking garages		proposed locations are required • Underfedina 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 annot 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 parting garages is 4 m • Top of infiltration trench shall be below forst depth of 1.2 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 8 soils; soil infiltration rate testing at proposed locations are required. Soils with infiltration rates less than 1.5 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 component is 4 m.

			Private Open Spaces, Roads/ROW, Resident	ial			LID Applicable	LID Not Applicable	LID Not Acceptable
		Land Use Category			LID Specific Consideratio	ns for Acceptance			
	ID		G	н	I	J	К	L	М
			Bioretention - Bioretention Cell / Rain Garden	Bioretention - Stormwater Planter	Bioretention - Biofilter	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
_		Open Spaces Private Open Space	ocations 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 less 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 teating 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. Ninimum setback from building foundations is 4 m. The ratos of impervious drainage area to facility area range from 5:1 to 15:1. Ninimum horizontal clearance from watermains 2.5 m. Ninimum horizontal clearance from watermains 2.5 m. Ninimum horizontal clearance from tystero/custing shall be placed with a minimum of vertical clearance of 0.5 m. Natientanance 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.	Minimum setback from building foundations is 4 m	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	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 centrelline of the vegetated swale, with a minimum horizontal clearance of 1.2 m		• 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. 4 • All fill materials shall meet MOECC Reg 135/04 soil standards • A plan required to ensured 1) venification 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 (Soil amendments may be required for highly compacted native soil	 Soil amendments may be required for highly compacted native soils 					
		Private Roads	ocations 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 less 1.0 m from the seasonally high water table. An overflow outlet or phass route is required to convey flow from major storm events. Minimum setback from building foundation is 4 m. The ratios of imprevious drainage are to facility are arrange from 5:1 to 15:1. Minimum horizontal clearance from watermains 2.5 m. Minimum horizontal clearance from Methydrukfilles trench and sanitary sewer is 1.2m.	Preferred soil types for infiltration facilities are hydrologic soil group A or B soils, soil infiltration rate teating at proposed locations are required Isorderinton 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. In 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 rates of impervious dianages area to facility area range from 5:1 to 15:1 Whitman horizontal clearance from watermains 2.5 m Minimum horizontal clearance from watermains 2.5 m Minimum horizontal clearance from watermains 2.5 m Minimum horizontal clearance from year over consisting 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	Minimum setback from building foundations is 4 m	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. 5liva Cell) that can accommodate watermain crossings can be considered and is subject to City approval. Minimum horizontal clearance from hydro/utilist trench and sanitary sewer is	considerations for bioretention rain garden also applicable here a 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.	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 to also include areas surrounding the planted areas that are not subject to heavy loads or vehicular traffic. A fill materials shall meet MDCCC Reg 153/04 soil standards A fill materials shall meet MDCCC 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							
		Single Detached	ocations 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	Preferred soil types for infiltration facilities are hydrologic soil group A or B soils, soil infiltration rate testing at proposed locations are required locations are required liberation 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. Whe bottom of the facility cannot be closely separated by a location and the facility cannot be closely separated by a least 10 m from the seasonally high water table An overflow outlet or bypass route is required to convey flow from major storm events Whimmum estabent from building toundations is 4 m The ratios of impervious drainage area to facility area range from 5:1 to 15:1 Whimmum horizontal clearance from watermains 2.5 m Minimum horizontal clearance from watermains 2.5 m Minimum horizontal clearance from tystory. In the control of th	Minimum setback from building foundations is 4 m	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/utilist trench and sanitary sewer is	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 0.2.	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 areas surrounding the planted areas that are not subject to heavy loads or vehicular traffic. All of mittends also limited the soil and the strip of the soil standards. All timitends also limited the Soil Soil standards and the strip of the soil strip of the
Private Ownership	28	Townhouse - Freehold	ocations are required Bioretatroin 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%.	Preferred soil types for infiltration facilities are hydrologic soil group A or B soils, soil infiltration rate testing at proposed locations are required Bioretention is obits 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 outloor of phass route is required to convey flow from major storm events. Minimum setback from building foundations is 4 m. The ratio of imprevious 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/fullities 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.	Minimum setback from building foundations is 4 m	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 2.m. However, propriety urban tree root support system (e.g. Silva Cell) that	large number of culverts are not permitted i tongitudinal 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	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 and solicitude area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. • A fill ill materials shall meet MDECE (egg 1350/8 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
-	79 1	Townhouse - Condominium	Ocations are required Bioretartion in sois 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 less 11 0 m from the seasonally high water table An overflow outlet or physiss rute is required to convey flow from major storm events Minimum setback from building foundations is 4 m The ratios of imprevious drainage are at to facility area range from 5:1 to 15:1 Minimum horizontal clearance from watermains 2.5 m Minimum horizontal clearance from Mydro/Lytillies trench and sanitary sewer is 1.2m	**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 **Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates will need **The bottom of the facility cannot be located on satural 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 **Morimma setback from building brundations is 4 m **Die rates of in generous drainage are to facility area range from 5:1 to 15:1 **Morimma hotroortal clearance from watermains 2.5 m **Morimma hotroortal clearance from watermains 2.5 m **Watermain / utility trench / sanitary sewer cossings shall be placed with a minimum of vertical clearance of 0.5 m **Soil amendments may be required for highly compacted analyse only and moritor and must not be located along fire and emergency access routes	• Minimum setback from building foundations is 4 m • The bottom of the facility cannot be located on antual slopes greater than 15% • The ratios of impervious drainage area to facility area range from 5.2 to 15:1 • Minimum horizontal clearance from watermains 2.5 • Minimum horizontal clearance from hydro/utilities trench and sanitary sever is 1.2m • Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 0.5 m • Watermain / utility trench / sanitary sever 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	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.	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 0.2.	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. A fill materials shall meet MOZCC Reg ESJ/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
		Mixed Use - Surface Parking	Ocations 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 settock 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 bytdro/utilities trench and saintary sewer is 1.2m Minimum horizontal clearance from bytdro/utilities trench and saintary sewer is 1.2m Watermain / utility trench / saintary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m	Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required Biotectention is obis 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 sanote be located on natural slopes greater than 15% The bottom of the facility should be vertically separated by at least 10 m from the seasonally high water table An overflow outloor of phass route is required to convey flow from major storm events Ninimum setback from building foundations is 4 m The rates of Impervious drainage area to facility area range from 5:1 to 15:1 Ninimum horizontal clearance from watermains 2.5 m Ninimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m *Watermain / utility trench / sanitary sewer cossings shall be placed with a minimum of vertical clearance of 0.5 m *Naintenance 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	Minimum setback from building foundations is 4 m	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. - Millimum 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. - Millimum 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	large number of culverts are not permitted i conglutional sologo of between 0.5 and 6% are required; check dams are required for slopes greater than 3% a Parallel underground utilities must be offset from the centreline of the vegetated swale, with a minimum horizontal clearance of 1.2 m i Wattermain / utility trench / santant y sewer crossings shall be placed with a	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 and solicitude area surrounding the planted areas that are not subject to heavy loads or vehicular traffic. ♣ A fill materials stall meet MDEC Eq. 135/04 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	ocations 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 cannot be located on natural slopes greater than 15% The bottom of the facility should be vertically separated by at less 11 0 m from the seasonally high water table A no veriflow outlet or typass; 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 imprevious drainage are set to facility are an ange from 5:1 to 15:1 Minimum borizontal clearance from watermains 2.5 m Minimum borizontal clearance from hydro/utilities trench and sanktary sewer is 1.2m	The bottom of the facility cannot be located on natural slopes greater than 15%	Minimum setback from building foundations and underground parking garages is 4 m	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 also also to Carl approval. - Minimum horizontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate watermain rossings can be considered and is subject to City approval. - Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 2. m. However, propriety urban tree root support system (e.g. Silva Cell) that	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 centrelline of the vegetated swale, with a minimum horizontal clearance of 1.2 m	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. A fill fill materials shall meet MOECC Reg 133/05 soil standards. A plan required to ensured 1) venfiction of topsoil depths on proposed areas and (2) post-construction inspection and repair of potential areas of excessive or uneven settlement.

		Private Employment			LID Applicable	LID Not Applicable	LID Not Acceptable
	Land Use Category			LID Specific Conside	erations for Acceptance		
ID		А	В	С	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
	Employment						
32	Office Campus - Surface Parking	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 colterns 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	Green roofs shall consist of species suitable for harsh roof top conditions	proposed locations are required Underdrains are required where infiltration rates are less than 15 mm/hr. Natives oil infiltration rates will need to be verified at the proposed location The bottom of the facility can	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 1.2 m Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces Minimum borizontal clearance from watermains 2.5 m Minimum borizontal clearance from hydro/utilities trench and sanitary sever is 1.2 m Watermain / utility trench / sanitary sewer cossings 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 Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must	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 santary sewer is 1.2 m **Watermain/ utility trench/ santary sewer crossings shall be placed with a minimum of vertical clearance of	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 8 sols; soil infiltration rate testing at proposed locations are required Solls 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
wnership 33	Office Campus - Underground Parking	Rainwater harvesting (rain barreis, tanks, cisterns) is only for the capture of clean runoff from building roofs * Rain barreis, 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 sets than the maximum forst depth of 12. my or be located in a heated indoor environment (e.g. garage, basement) * Captured water is for non-potable uses only * Treatment is required to remove debris, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system *It 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 * Yor underground cisterns, as standard size mainfole opening should be provided for maintenance purposes * Maintenance access cannot be located within the and emergency access roustes * Was the content of animous the included buildings must alware to building code (a, dual plumbing is required for grey water re-use within buildings to avoid cross contamination with potable water supply system)	Green roofs shall consist of species suitable for harsh roof top conditions	Preferred soil types for infiltration facilities are hydrologic soil group A or 8 soils; soil infiltration rate testing a 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 verifically separated by at least 10 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 floundations and underground parking ganges is 4 m • Top of infiltration trench shall be below frost depth of 12 m • Maximum drainage area to treatment facility area of 10.1 for parking jots and roads; 20:1 for other surfaces • Minimum horizontal clearance from watermains 25 m • Minimum horizontal clearance from watermains 25 m • Minimum horizontal clearance from watermains 25 m • Manimum horizontal clearance from hydrolities trench and sanitary sewer is 1.2m • Waterman / Unity trench / Janialny sewer crossings shall be placed with a minimum of vertical clearance of the services of the proper services of the proper services of the services of t	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 be 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 under ground parking ganages is 4 m To prior previous pipe shall be below frost depth of 1.2m Maximum charinge area to treatment facility area of 10.1 for parking lots and roads; 20.1 for other surfaces Minimum shortback cleanance from water mains 2.5 m Minimum shortback cleanance from water mains 2.5 m Minimum hortback deanance from water mains 2.5 m Parter stamment 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 do nobe located along fre 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 verified at the proposed location. • The bottom of the facility should be verified by a least 10 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 floundations and underground parking garages is 4 m. • Top of infiltration trent shall be below fort depth of 12 m² m² mg lots and roads; 20:1 for orther surfaces. • Minimum horizontal clearance from watermains 2.5 m. • Minimum horizontal clearance from watermains 2.5 m. • Minimum horizontal clearance from hydro/tollities trench and sanitary seever is 1.2m. • Manimum horizontal clearance from hydro/tollities trench and sanitary seever is 1.2m. • Pretreaman is required for runoff from road or parking area. • Pretreament is required for runoff from road or parking area. • Pretreament is required for runoff from road or parking area. • Subsurface infiltration LIDs cannot be installed below or within 4 m underground parking garages	reasonally high water table Preferred soil types for infiltration facilities are hydrologic soil group A or 8 soils; soil infiltration rate testing at proposed locations are required Soils with infiltration rates less than 1.5 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. Permeable passment 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 jarage If permeable passment also incorporates additional infiltration gallery storage beneath it, the minimum setback from any building foundation is 4m
Private O	Industrial - Warehouse	**Rainwater harvesting (rain barrels, tanks, cisterns) is only for the capture of dean 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 debrix, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system *#I 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 **Baintenance access cannot be located within fire and emergency access routes **Baintenance access cannot be located within fire and emergency access routes **Baintenance access cannot be located within fire and emergency access routes **Baintenance access cannot be located within fire and emergency access routes **Baintenance access cannot be located within fire and emergency access routes **Baintenance access cannot be located within fire and emergency access routes **Baintenance access cannot be located within fire and emergency access routes **Baintenance access cannot be located within fire and emergency access routes **Baintenance access cannot be located within fire and emergency access routes **Baintenance access cannot be located within fire and emergency access routes **Baintenance access cannot be located within fire and emergency access routes **Baintenance access cannot be located within fire and emergency access routes **Baintenance access cannot be located within fire and emergency access rout	Green roofs shall consist of species suitable for harsh roof top conditions	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%	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 1.2 m Maximum drainage area to treatment facility area of 10:1 for parking lots and roads; 20:1 for other surfaces Minimum borizontal clearance from watermains 2.5 m Minimum borizontal clearance from hydro/utilities trench and sanitary sewer is 1.2m Watermain / utility trench / sanitary sewer cossings shall be placed with a minimum of vertical clearance of 0.5 m Pretreatment is required for runoff from conations and cannot be located within flow path of surface and	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 santary sewer is 1.2 m Watermain / Lulity trench / santary sewer crossings shall be placed with a minimum of vertical clearance of 0.5 m Perterstiment is required for runoff from road or parking area	reasonally 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 1.5 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. Premeable 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 nor from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site
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 use sonly a prevention of the provided of th	Green roofs shall consist of species suitable for harsh roof top conditions Planting plans are to be included in Site Plan applications	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%	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 be 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 1.2 m Maximum drainage area to treatment facility area of 10.1 for parking lots and roads; 20.1 for other surfaces Minimum borizontal clearance from where facility area of 10.1 for parking lots and roads; 20.1 for other surfaces Minimum borizontal clearance from hydrod/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 one of the surface of t	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 santary sewer is 1.2 m Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of U.5 m Perterstament is required for runoff from road or parting area	reasonally 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 histinction rates less than 1.5 mm/hr will require an underdrain. Native soil infiltration rates will need to be welffied at the proposed location. Permeable paements surface that 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 runof for from contaminated area, and cannot be located within flow path of surface and subsurface contaminants from site If permeable pawement also incorporates additional infiltration gallery storage beneath it, the minimum setback from any building foundation is 4m

	F	Private Employment				LID Applicable	LID Not Applicable	LID Not Acceptable
Land Use	e Category				LID Specific Considerations for Acceptance			
ID		G	н	1	J	К	L	М
		Bioretention - Bioretention Cell / Rain Garden	Bioretention - Stormwater Planter	Bioretention - Biofilter	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
Employme	ment							
32 Office Camparking	mpus - Surface	gh water table An overflow outlet or bypass route is required to conveyflow 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 vatermains 2.5 m	Preferred soil types for inflitration facilities are hydrologic soil group A or B soils; soil inflitration rate testing at proposed locations are required. Biotectention in sois with inflitration rates less than 15 mm/hr will require an underdrain. Native soil inflitration 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 lesst 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 setsists from building foundations is 4 m. The ratios of impervious drainage area to facility area range from 5:1 to 15:1 Winimum horizontal clearance from watermains 2.5 m. Minimum brotizontal clearance from hydro/fullities trench and sanitary sever is 1.2 m. Watermain / fully trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 0.5 m. Watermain fully trench / sanitary sever crossings shall be placed with a minimum of vertical clearance caces shall be located in areas accessible by vacuum truck or other large equipment and must not be located in areas accessible by vacuum truck or other large equipment and must not be located in fight of the place of	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 brorontal clearance from watermants 2.7 Minimum brorontal clearance from hydro/citillies trench and sanitary sewer is 1.2m Minimum brorontal clearance from hydro/citillies trench and sanitary sewer is 1.2m Minimum brorontal clearance from hydro/citillies trench and sanitary sewer is 1.2m Minimum brorontal clearance from hydro/citillies trench and until the control of the cont	 An overflow outlet or bypass route is required to convey flow from major storm events Cannot be placed above infiltration galleties, pervious pipes or any other utility. However, propriety urban free root support system (e.g., Silva Cell) that can accommodate utility crossings can be considered and is subject to City approval. Minimum brontonal clearance from watermains 25 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 brontontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. Minimum brontontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. Minimum brontontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. Minimum brontontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. Minimum brontontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. Minimum brontontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. Minimum brontontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. 	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, wit a minimum horizontal clearance of 1.2 m Watermain / utility trench / sanitary sever 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	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 filstrips that require soil amendments to enhance infiltration. Soil amendments can also areas surrounding the planted areas that are not subject to heavy loads or whichilar traff a All fill materials shall meet MOECC Reg 153/04 soil standards 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) construction inspection and repair of potential areas of excessive or uneven settlement
33 Office Cam Undergroun	mpus - bund Parking	Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil filtration rate testing at proposed locations are required Biotreethon in soils with infiltration rates less than 15 mm/hr will require an underdrain, atties soil infiltration rates will need to be verified at the proposed location. The bottom of the facility cannot be located on natural slosse greater than 15%. The bottom of the facility should be vertically separated by at least 1.0 m from the seasonally ph water table. An overflow outlet or bypass routle is required to convey flow from major storm events Minimum sebasts from building floundations 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 hydro/fulfildies trench and sanitary sewer is 1.2 m. Minimum horizontal clearance from hydro/fulfildies trench and sanitary sewer is 1.2 m. Watermain / 10! htt yetnich/ sanitary sewer crossings shall be placed with a minimum of retical 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 quipment and must not be located all one free and emergency access routes. Soil a mendments 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 osis 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. Native soil infiltration rates will need to be extended as the proposed rate of the facility annote be located on natural slopes greater than 15%. The bottom of the facility annote located on short slopes greater than 15%. The bottom of the facility annote is required to convey flow from major storm events. An overflow outlet or bypass route is required to convey flow from major storm events. An overflow outlet or bypass route is required to convey flow from salor storm events. The ratios of imprevious drainage area to facility area range from 5:1 to 15:1 Minimum horitontal clearance from hydrolycitilities trench and sanitary sever is 1.2m Wattermian / tulty trench / sanitary sever crossings shall be placed with a minimum of vertical clearance for on hydrolycitilities trench and sanitary sever is 1.2m Wattermian / tulty trench / sanitary sever crossings shall be placed with a minimum of vertical clearance areas 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 broitontal clearance from watermains 2.5 Minimum broitontal clearance from hydro/utilities trench and santary sewer is 1.2m Watermain / utility trench / santary 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 there root support system (e.g. Silve Gell) that can accommodate utility crossings can be considered and is subject to City approval. Minimum broitontal clearance from watermains 2.5 m. However, propriety urban tree root support system (e.g. Silve Cell) that can accommodate watermain crossings can be considered and is subject to City approval. Minimum broitontal clearance from hydro/utilities trench and saintary 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 I ocations where flow paths will have multiple driveway crossings requiring a large number or culverts are not permitted Longitudinal slopes of between 0.5 and 6% are required; Check dams are required rologing relater than 3%. Parallel underground utilities must be offset from the centreline of the vegetated swale, wit a minimum horizontal clearance of 1.2 m. Watermain Julily 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.	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 filte strips that require soil amendments to enhance infiltration. Soil amendments can also invariance area surrounding the planted areas that are not subject to beavy loads or vehicular trafficion. All fill materials shall meet MOECC Reg 153/04 soil standards A plan required to ensure (1) verification of topical depots no proposed areas and (2) pot construction inspection and repair of potential areas of excessive or uneven settlement
34 Industrial -	N. N	Preferred soil types for infiltration facilities are hydrologic soil group A or 8 soils; soil iffiltration rate testing at proposed locations are required Bioretention in soils with infiltration rates less than 15 mm/hr will require an underdrain. atteve 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 sould be vertically separated by a test 10 m from the seasonally gh 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 horizo	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. Nathve soil infiltration rates will not 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 verifically separated by at least 10 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 imprevious drainage area to facility area range from 5:1 to 15:1 Minimum horitontal clearance from hydro/fultillates 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 Minimum horitontal clearance from the control of the control	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 are to facility are range from 51 to 15:1 Minimum broizontal clearance from watermains 2.5 m Wintermain / 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 rossings can be considered and is subject to City approval. Minimum brotzontal 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 brotzontal clearance from hydro/utilities trench and sanitary sever is 1.2 m. However, propriety urban tree root support system (e.g. Silva Cell) that can accommodate utility/sever 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	greater than 3%	Flow path of at least 5 m is required Maximum flow length from contributing impervious surface is 25 m with slopes no greater f than 3% Soli amendments are required for highly compacted native soils is anot 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	area surrounding the planted areas that are not subject to heavy loads or vehicular traff • All fill materials shall meet MOECC Reg. 133/04 soil standards • A plan required to ensure (1) verification of topsoil depths on proposed areas and (2) construction inspection and repair of potential areas of excessive or uneven settlement
35 Industrial - Manufactu	Na high	filtration rate testing at proposed locations are required Bioteretinon in solid with filtration rates lies than 15 mm/hr will require an underdrain. atties soil infiltration rates will need to be verified at the proposed location. The bottom of the facility amont 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 give water table. An overflow outlet or bypass route is required to convey flow from major storm events Winimum setback from building foundations is 4 m the ratios of impervious diamage area to facility area range from 5:1 to 15:1 Minimum hortoottal clearance from watermains 2.5 m Minimum hortoottal clearance from watermains 2.5 m Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of tritical clearance of 5.5 m	Preferred soil types for infiltration facilities are hydrologic soil group A or 8 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. Nathes soil infiltration rates will not 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 verifically 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 arrange from 5:1 to 15:1. Minimum horizontal clearance from watermains 2.5 m. Minimum horizontal clearance from hydro/calities trench and sanitary sewer is 1.2m. Watermain utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance or 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 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 solators of 1.5 m Cannot accept runoff from contaminated area, and cannot be located within flow path of surface and solators shall be located in area 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 the 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		Soil amendments are required for highly compacted native soils	area surrounding the planted areas that are not subject to heavy loads or vehicular traf • 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) construction inspection and repair of potential areas of excessive or uneven settlement

	Private Commercial			LID Applicable	LID Not Applicable	LID Not Acceptable
Land Use Category			LID Specific Consider	rations for Acceptance		
ID	А	В	С	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
Commercial						
36 Retail Main Street	• For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no	Green roofs shall consist of species suitable for harsh roof top conditions	• Preferred soil types for inflication facilities are hydrologic soil group A or 8 soils, soil inflication rate testing at proposed locations are required where inflitration rates are less than 15 mm/hr. • Indirectrains are required where inflitration rates are less than 15 mm/hr. • Native soil inflitration rates will need to be verified at the prosposed location • The bottom of the facility cannot be located on natural slopes greater than 15% • 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 inflitration 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 hydrol/cultilities trench and sanitary sever is 1.2 m • Matermani / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 5.5 m • Minimum horizontal clearance from hydrol/cultilities trench and sanitary sever is 1.2 m • Vatermani / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 5.5 m • Minimum horizontal clearance from hydrol/cultilities trench and animatry sever is 1.2 m • Matermani / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 5.5 m • Minimum horizontal clearance from hydrol/cultilities trench and animatry sever is 1.2 m • Matermani / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 5.5 m • Minimum horisontal clearance from hydrol/cultilities trench and animatry sever is 1.2 m • Matermani / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 5.5 m • Minimum horizontal clea	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. An overflow outlet or bypass route is required to convey flow from major storm events. Minimum settack from building foundations is 4 m. Top of pervious pipe shall be below frost depth of 1.2 m. Natamum dinange 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 watermains 2.5 m. Minimum horizontal clearance from watermains 2.5 m. Minimum horizontal clearance from the hydrofulfillies trench and sanitary sever is 1.2 m. Watermain horizontal clearance from the hydrofulfillies trench and sanitary sever is 1.2 m. The properties of the hydrofulfillies of the hydrofulfillies trench and sanitary sever is 1.2 m. Minimum horizontal clearance from from coad or parking area Maintenance access hall be located in areas accessible by vacuum truck or other large equipment and mus not be located along fire and emergency access routes Must be located on privately owned road 80W or private lands	Preferred soit types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed facilities are required where infiltration rates are less than 15 mm/hr. **Natives oil infiltration rates will need to be verified at the proposed location **The bottom of the facility cannot be located on antural 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 or 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 watermains 2.5 m **Winimum horizontal clearance from hydrolyutilities trench and sanitary sever is 1.2m **Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 10.5 m **Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 10.5 m **Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 10.5 m **Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 10.5 m **Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 10.5 m **Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 10.5 m **Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 10.5 m **Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 10.5 m **Watermain / utility trench / sanitary sever crossings shall be placed with a min	seasonally high water table Preferered soft upes for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testin 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 paeement surface shill 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 paeement asio incorporates additional infiltration gallery storage beneath it, the minimum setback from any building foundation is 4m
37 Large-scale Commercial	• For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no	Green roofs shall consist of species suitable for harsh roof top conditions	Preferred soil types for infiltration facilities are hydrologic soil group. A or 8 soils; soil infiltration rate testing at proposed locations are required where infiltration rates are less than 15 mm/hr. Native soil infiltration rates will need to be verified at the prosposed location. The bottom of the facility cannot be located on natural sispes greater than 15%. The bottom of the facility and be located on natural sispes greater than 15%. The bottom of the facility and be located on natural sispes greater than 15%. The bottom of the facility cannot be located on natural sispes greater than 15%. The bottom of the facility cannot be located on natural sispes greater than 15%. The bottom of the facility cannot be located on six of the located by a least 1.0 m from the seasonally high water table. A noverflow outlet or bypass route is required to convey flow from major storm events. Niminum backet from building foundations is 4 m Top of infiltration trench shall be below frost depth of 1.2 m National manage area to treatment facility area of 10.1 for parking lots and roads; 20.1 for other surfaces. Niminum bortontal clearance from watermains 3.5 m	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 1.2 m. National manages are to treatment facility are 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 watermains 2.5 m. Minimum horizontal clearance from the properties of the properties o	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 sever is 1.2m Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of	seasonally high water table Preferred soll types for infiltration facilities are hydrologic soll group A or B solls; soll infiltration rate testin at proposed locations are required Solls with infiltration rates isses than 15 mm/hr will require an underdrain. Native soil infiltration rates will need to be verified at the proposed location. Permeable pawement surface shill be at least 184 slope and no greater than 5% slope Maintenance access shall be located in areas accessible by vacuum truck or other large equipment If permeable pawement asso incorporates additional infiltration gallery storage beneath it, the minimum setback from any building foundation is 4m
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 cistems shall be located in easily accessible areas for maintenance For tanks and cistems designed for year-round use, the conveyance system should be buried at a depth no tests than the maximum frost depth of 12 m, or be located in a heated indoor environment (e.g., garage, basement) Pre-treatment is required to remove debrin, dust, leaves, etc. that may accumulate on roofs to prevent clogging within the system If it and the system will be system the system of the system	Green roofs shall consist of species suitable for harsh roof top conditions	Preferred soil types for infiltration facilities are hydrologic soil group A or 8 sols; soil infiltration rate testing at proposed locations are required Infiltration are selected 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 should be verifically separated by at least 10 m from the seasonally high water table The bottom of the facility should be verifically separated by at least 10 m from the seasonally high water table An overflow outlet or bypass route is required to convey flow from major storm events An overflow outlet or bypass route is required to convey flow from major storm events International teachers for below fixed begin of 1.2 m One of militration trench shall be below fixed begin of 1.2 m Waterman facility from waterman 2.2 m Waterman facility from the samitary sever cossings 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 Preferenties in required for runoff from road or parking area Preferenties are seed and preference of the system Preferenties are seed and preference of the system Preferenties is required for runoff from road or parking area Preferenties are seed and the system of the system	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 settack from building foundations is 4 m. Top of pervious pipe shall be below frost depth of 1.2m. Maximum draininge area to treatment facility area of 10.1 for parking lots and roads; 20.1 for other surfaces. Minimum horizontal cleanance from watermains 2.5 m. Maximum horizontal cleanance from watermains 2.5 m. Waterman's / utility trench / sanitary sever crossings shall be placed with a minimum of vertical cleanance of 0.5 m. Perterstament 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 mus not be located along fire and emergency access routes. Must be located on privately owned road ROW or private lands.	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 hydroultities trench and sanitary sever is 1.2m Watermain / Lulity trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of	seasonally high water table Preferend soll types for infiltration facilities are hydrologic soil group A or 8 soils; soil infiltration rate testin 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 pawement surface shall be at least 11% slope and no greater than 5% slope Maintenance access shall be located in areas accessible by vacuum truck or other large equipment If permeable pawement also incorporates additional infiltration gallery storage beneath it, the minimum setback from any building foundation is 4m
39 Gas Station or Mechanic	 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, 	Green roofs shall consist of species suitable for harsh roof top conditions Planting plans are to be included in Site Plan applications				

		Private Commercial				LID Applicable	LID Not Applicable	LID Not Acceptable
	Land Use Category				LID Specific Considerations for Acceptance			
ID		G	н	1	J	К	L	М
		Bioretention - Bioretention Cell / Rain Garden	Bioretention - Stormwater Planter	Bioretention - Biofilter	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
	Commercial							
36	Retail Main Street	Perferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing a troppeed cloations are required Biorretention in soils with infiltration rates lies sthan 15 mm/hr will require an underdrain. Native soil infiltration rates will need be 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 shoulde be vertified at the proposed location. The tottom of the facility shoulde be vertified at perspect to the seasonally high water table. Sansonally high water table. An overflow outlet or hypass route is required to convey flow from major storm events. Minimum setback from building foundations is 4 or The ratios of improvious drainage are to facility area range from 5:1 to 15:1 Minimum horizontal clearance from hydrolytillates trench and saintary sever is 1.2m Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance for off 5. m Maintenance access shall be located in areas accessible by vacuum truck or other large equipment and must not be located long 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 8 soils; soil infiltration rate testing at proposed focations are required. Bioretention in soils with infiltration rates lies than 15 mm/hr will require an underdain. Native soil infiltration rates will need to be verified at the proposed location. *The bottom of the facility dannot be located on natural slopes greater than 15% *The bottom of the facility should be verified at yeaprated by at least 1.0 m from the seasonally high water table *An overflow outlet or bippass route is required to convey flow from major storm events *Minimum setback from building foundations is 4 m *The ratios of imprevious drainage area to facility were arrange from 5:1 to 15:1 *Minimum horizontal clearance from watermains 2.5 m *Minimum horizontal clearance from hydro/fulfillies tench and sanitary sewer is 1.2m *Watermain'/ utility trench', sanitary sewer crossings shall be placed with a minimum of vertical clearance of 5.5 m *Maintenance access shall be located in areas accessible by vacuum track or other large requirement and man to de located dang file 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 imperious drainage area to facility area range from 5:1 to 15:1. Minimum broizontal clearance from watermains 2.5 m Minimum broizontal clearance from watermains 2.5 m Minimum broizontal clearance from watermains 2.5 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 and must not be located along fire and emergency access routes	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 culvents 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	Maximum flow length from contributing impenvious 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.	include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic.
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 ■ Bioteretention is solis with infiltration trate 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 abould be vertically separated by at lesst 10 m from the issounally high world trailer. ■ An overflow outlet ob plass route is required to convey flow from major storm events ■ An overflow outlet ob plass route is required to convey flow from major storm events ■ Alminium brotion from budding floundations is 4 ms. range from 5:1 to 15:1 ■ Minimum horizontal clearance from watermains 2.5 m ■ Minimum horizontal clearance from hydrolytillates trench and sanitary sever is 1.2m ■ Watermain / utility trench / sanitary sever crossings shall be placed with a minimum of vertical clearance of 5.5 m ■ Maintenance access shall be located in areas accessible by vacuum track or other large equipment and must not be located in greas accessible by vacuum track or other large equipment and must not be located in greas accessible by vacuum track or other large equipment and must not be located in greas accessible by vacuum track or other large equipment and must not be located in greas accessible by vacuum track or other large equipment and must not be located in greas accessible by vacuum track or other large equipment and must not be located in greas accessible by vacuum track or other large equipment and must not be located in greas accessible by vacuum track or other large equipment and must not be located in greas accessible by vacuum track or other large equipment and must not be located in greas accessible by vacuum track or other large equipment and must not be located in greas accessible by vacuum track or other large equipment and must not be located in greas accessible by vacuum	Preferred soil types for infiltration facilities are hydrologic soil group A or 8 soils; soil infiltration rate testing at proposed locations are required Bioretention in sois 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 amont be located on natural stopes greater than 15%. The bottom of the facility should be vertically separated by at less 1.0 m from the seasonally high water table. An overflow outlet or bypass route is required to convey flow from major storm events. Alminium setsleth from building floundations is 4 m. Minimum setsleth from building floundations is 4 m. Minimum britished known building floundations is 4 m. Minimum horizontal clearance from watermains 2.5 m. Minimum horizontal clearance from hydrolytillities trench and sanitary sewer is 1.2m. Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of 5.5 m. Minimum horizontal clearance from long for an emergency access routes. Soil amendments may be required for highly compacted native soils.	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	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. Silvs cell) that can accommodate utility crossings can be considered and is subject to City approval. Minimum brotroutal clearance from watermains 25.8 m. However, propriety urban tree root support system (e.g. Silvs Cell) that can accommodate watermain crossings can be considered and subject to City approval. Minimum brotroutal clearance from hydro-utilities trench and sanitary sever is 1.2 m. However, propriety urban tree root support system (e.g. Silvs Cell) that can accommodate utility/sever crossings can be considered and is subject to City approval.	Locations where flow paths will have multiple driveway crossings requiring a large number of culverts are not permitted	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.	include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic.
Private Owner	Small-scale Commercial	Preferred soil types for infitration facilities are hydrologic soil group A or B soils; soil infilitation rate testing at proposed locations are required Biotectention in soils with infilitation rate less than 15 mm/hr will require an underdrain. Native soil infilitation rates will need to be verified at the proposed location. The bottom of the facility annot be located on natural slopes greater than 15%. The bottom of the facility should be vertically separated by at lesst 1.0 m from the issonably high water table. An overflow outlet or bypass route is required to convey flow from major storm events. Milmium schots from building foundations is 4 m. The ratios of impervious drainage area to facility area range from 5:1 to 15:1. Milmium horizontal clearance from hydro/utilities trench and sanitary sever is 1.2m. Watermain / Lulty trench / sanitary sever crossings shall be placed with a minimum or vertical clearance of 0.5 m. Watermain / Lulty trench / sanitary sever crossings shall be placed with a minimum of vertical clearance from the several control of the seve	Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required Biortention in sois 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 amond be located on natural slopes greater than 15%. The bottom of the facility should be vertically separated by at less1 1.0 m from the seasonally high water table. An overflow outlet or bypass route is required to convey flow from major storm events. An overflow outlet or bypass route is required to convey flow from major storm events. Alminimum horizontal clearance from watermains 2.5 m. The ratios of impervious drainage area to facility area range from 5:1 to 15:1. Minimum horizontal clearance from hydro/fullities trench and saintary sewer is 1.2m. Watermain / fully trench / saintary sewer crossings shall be placed with a minimum of vertical clearance for 0.5 m. Watermain / fully trench / saintary sewer crossings shall be placed with a minimum of vertical clearance for 0.5 m. Watermain / fully trench / saintary sewer crossings shall be placed with a minimum of vertical clearance for 0.5 m. Watermain / fully trench / saintary sewer crossings shall be placed with a minimum of vertical clearance for 0.5 m. Watermain / fully trench / saintary sewer crossings shall be placed with a minimum of vertical clearance for 0.5 m. Watermain / fully trench / saintary sewer crossings shall be placed with a minimum of vertical clearance for 0.5 m. Watermain / fully trench / saintary sewer crossings shall be placed with a minimum of vertical clearance for 0.5 m. Watermain / fully trench / saintary sewer crossings shall be placed with a minimum of vertical clearance for 0.5 m. Watermain / fully trench / saintary sewer crossings shall be placed with a minimum of vertical clearance for 0.5 m. Watermain / fully trench / saintary sewer crossings shall be placed with a minimum of	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 broisontal clearance from maternains 2.5 m Minimum broisontal clearance from mydro/fulfiles 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 anot 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 brotontal 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 brotontal clearance from hydro/utilities trench and santiary 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 to 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 / saintary 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	Maximum flow length from contributing impenvious 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.	include area surrounding the planted areas that are not subject to heavy loads or vehicular traffic.
39	Gas Station or Mechanic							

		Private Institutional and Utility Corrido	rs		LID Applicable	LID Not Applicable	LID Not Acceptable
	Land Use Category			LID Specific Consider	ations for Acceptance		
ID		А	В	С	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
	Institutional						
40	Place of Worship	Rainwater harvesting (rain barreix, tanks, cisterns) is only for the capture of clean runoff from building roofs Rain barreis, 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 *Per-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 mainfolic opening should be provided for maintenance purposes *Aliantenance socs cannod be located within fire and emergency access roots area *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)	Green roofs shall consist of species suitable for harsh roof top conditions Planting plans are to be included in Site Plan applications	at proposed locations are required • Underdrains are required were 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 rout e 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 • Masimum 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 watermains 2.5 m	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 Nimimum setaker from building foundations is 4 m Top of pervious pipe shall be below frost depth of 1.2 m Assummum drainage area to treatment facility area of 10.1 for parking lots and roads; 20.1 for other surfaces Nimimum horizontal clearance from watermains 2.5 m Nimimum horizontal clearance from thydro/billities 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	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	■ The bottom of the permeable pavement structure should be vertically separated by at least 1.0 m from seasonally high water table Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate test at proposed locations are required • Soils with infiltration rates less than 1.5 mm/hr will require an underdrain. Native soil infiltration rates ess 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 ablo incorporates additional infiltration gallery storage beneath it, the minimum setback from any building foundation is 4m
41	Private School, College, or University	For tanks and cisterns designed for year-round use, the conveyance system should be buried at a depth no	Green roofs shall consist of species suitable for harsh roof top conditions	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	at proposed locations are required The bottom of the facility cannot be located on natural slopes greater than 15%. The bottom of the facility and the evertically separated by at least 1.0 m from the seasonally high water stable An overflow outlet or bypass route is required to convey flow from major storm events Nimimum setaks from building foundations is 4 m Top of pervious pipe shall be below frost depth of 1.2 m Top of pervious pipe shall be below frost depth of 1.2 m Natimum horizontal clearance from watermains 2.5 m Nimimum horizontal clearance from yelvo/fulfillet strench 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 road or parking area **Natimum cannot can be seen that it is required for runoff from road or parking area **Natimum cannot canno	An overflow outlet or bypass route is required to convey flow from major storm events Minimum setslands from building foundations is 4 m Top of infiltration trench shall be below frost depth of 1.2 m Maximum drainage are a to treatment facility area of 10.1 for parking lots and roads; 20.1 for other surfaces Minimum horizontal clearance from watermails 2.5 m Minimum horizontal clearance from hydro/fullities trench and sanitary sewer is 1.2m Watermain / Unity trench / sanitary sewer crossings shall be placed with a minimum of vertical clearance of	is assonally high water table Perferred soll types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate test at proposed locations are required Solls with infiltration rates less than 15 mm/hr will require an underdrain. Native soil infiltration rates we need to be verified at the proposed location. Permeable puement 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 powernet 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						

		Private Institutional and Utility Co	orridors			LID Applicable	LID Not Applicable	LID Not Acceptable
	Land Use Category				LID Specific Considerations for Acceptance			
ID		G	Н	I	1	К	L	М
		Bioretention - Bioretention Cell / Rain Garden	Bioretention - Stormwater Planter	Bioretention - Biofilter	Urban Tree Root Support System	Vegetated Swale	Filter Strips	Soil Amendments
	Institutional							
		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 should be verifically separated by at less 11 on from the seasonally	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 sepanted by at least 1,0 m from the seasonal	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 horitontal clearance from watermains 2.5 m Whilmium horitontal clearance from hydro/fullities trench and sanitary sewer is 1.2 m Whilmium horitontal clearance from hydro/fullities trench and sanitary sewer is 1.2 m	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) lick can accommodate watermain rossings can be considered.	If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here Contains where flow paths will have multiple driveway crossings requiring a large number cu	f than 3% • Soil amendments are required for highly compacted native soils	Soil amendments shall be applied to planted areas, including vegetated swales a strips that require soil amendments to enhance infiltration. Soil amendments can area surrounding the planted areas that are not subject to heavy loads or vehicula with limitation and shall make MCCC Reg 153/04 soil strandards A plan required to ensure (1) verification of topsoil depths on proposed areas an construction inseption and repair of potential areas of excessive or uneven settle
40	D Place of Worship	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 imprevious 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 santary sewer is 1.2m Watermain / utility rench / sanitary sewer crossings shall be placed with a minimum of vertracl 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	high water table An overflow outlet or bypass mute is required to convey flow from major storm events Minimum setback from building foundations is 4 m The ratisor of improvious 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/fulfilles 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 sols	• Watermain / utility trench / saintary 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	and is subject to City approval. Minimum horizontal clearance from hydro/utilities trench and sanitary sewer is 1.2 m. thowever, 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.	Parallel underground utilities must be offset from the centreline of the vegetated swale, wis a minimum broitontal clearance of 1.2 m Watermain / utility trench / sanitary sewer crossings shall be placed with a minimum of wertical 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	h -	
41	Private School, College, or University	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	Preferred soil types for infiltration facilities are hydrologic soil group A or B soils; soil infiltration rate testing at proposed locations are required Bioretenton 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 should be everifiedly separated by at least 10 m from the seasonal high water table. The bottom of the facility should be everifiedly separated by at least 10 m from the seasonal high water table. White the state of the	An overflow outlet or bypass route is required to convey flow from major storm events. Ninimum 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 51; to 15:1 Minimum horizontal clearance from watermains 2.5 m Whitemum horizontal clearance from myeloryfullities trench and sanitary sewer is 1.2 m Whatermaniar / utility trench / sanitary sewer crossings shall be placed with a minimum of whitemum of the control of th	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 systems (e.g. Silva Cell) that can accommodate watermain cossings can be considered and subject to City approval. Nowever, propriety urban tree root support systems (e.g. Silva Cell) that can accommodate utility/sever crossings can be considered and is subject to City approval.	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 slope.		Soil amendments shall be applied to planted areas, including vegetated swales as strips that require soil amendments to enhance infiltration. Soil amendments can area surrounding the planted areas that are not subject to heavy loads or vehicular All fill materials shall met MOECE (pg. \$15,0)4 so il mandards A plan required to ensure (1) verification of topsoil depits on proposed areas an construction inspection and repair of potential areas of excessive or uneven settler
	Utility Corridors							
42	TransCanada Pipeline 2 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 1 he bottom of the facility cannot be located on natural slopes greater than 15% 1 he ratios of impervious drainage area to facility area range from 5:1 to 15:1 Minimum horitoratic cleanage from watermains 25 m Minimum horitoratic cleanage from watermains 25 m Contact utility owner for permission and specific considerations		If vegetated swale also contain underground storage componeent, considerations for bioretention rain garden also applicable here of Locations where flow paths will have multiple driveway crossings requiring a large number of such extra are not permitted or Longitudinal dispose of between 0.5 and 6% are required; Check dams are required for slope greater than 3%. Parallel underground utilities must be offset from the centreline of the vegetated swale, wit a minimum horizontal clearance of 1.2 m. Valentamin, United Training and Check and Check and Check are such as 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 if than 3% Soil amendments are required for highly compacted native soils Filter strips could 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 Alnimum setback from building boundations 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 Alnimum brotroutal clearance from watermains 25 m Minimum brotroutal clearance from watermains 25 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 componeent, considerations for bioreteration rain garden also applicable here of Locations where flow paths will have multiple driveway crossings requiring a large number of Locations where flow paths will have multiple driveway crossings requiring a large number of culters are not permitted of Longitudinal dispose of between 0.5 and 6% are required; Check dams are required for slope greater than 3%. • Parallel underground utilities must be offset from the centreline of the vegetated swale, wit a minimum horizontal clearance of 1.2 m. • Watermain / Utility trench / sandary 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 from 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 pretreatment 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:

- 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	for		for			nent Complexity of Operation			k of noval	Life Cycle Conversion Factor = 50 Year Life
				Н	М	L	Н	1 L	Н	M L	Cycle / Average Lifespan		
A. Green Roof													
A. dieen nooi	+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										
	10 00	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													
<u>_</u>	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

Decline in Literature Solution (years) Lifespan (years) Functional Performance (% / duration)		iterature Source / Citation	Requirement for Maintenance			of			Risk o	Conversion Factor = 50 Year Life
			Н	М	L	Н	М	L H	М	Cycle / Average L Lifespan
± 50		Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-systems)								
+75		Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-								
+75		Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-								
+75		Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-								
49-53										1.0
50+		'Life Cycle Lost Assessment of Low Impact Development Practices' — STEP								
50										1.0
95	0% / 7 years	'Long Term Use of Bioretention for Heavy Metal Removal' — Kestrel Design Group '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								
		Washington State University								
50										1.0
NI/A		No Literature / Research Papers Found							(4)	
N/A										
	± 50 +75 +75 +75 49-53 50+ 50 95	Performance (% / duration) ± 50 +75 +75 +75 49-53 50+ 50 Not significant / 10 years No significant loss / 8 years No significant loss / 10 years 25* 30 50	Performance (% / duration) Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-systems) 49-53 Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-systems) 10-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	Performance (% / duration) ### Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-systems) ### Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-series/cistern-designs-large-rainwater-harvesting-series/cistern-designs-large-rainwater-harvesting-series/cistern-designs-large-rainwater-harvesting-series/cistern-designs-large-rainwater-harvesting-series/cistern-designs-large-rainwater-harvesting-series/cistern-designs-large-rainwater-harvesting-series/cistern-designs-large-rainwater-harvesting-series/cistern-designs-large-rainwater-harvesting-	Performance (% / duration) ## M ## 50 ## Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-systems) ## Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/	Performance (% / duration) H M L ± 50 Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistem-designs-large-rainwater-harvesting-systems) +75 Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistem-designs-large-rainwater-harvesting-systems) 49-53 Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistem-designs-large-rainwater-harvesting-systems) 50+ 'Life Cycle Lost Assessment of Low Impact Development Practices' - STEP 95 'Ling Term Use of Bioretention for Heavy Metal Removal' - Kestrel Design Group 96 'Long Term Use of Bioretention of Heavy Metal Removal' - Kestrel Design Group 97 'Long Term Use of Bioretention for Heavy Metal Removal' - Kestrel Design Group 98 'Long Term Use of Bioretention of Heavy Metal Removal' - Kestrel Design Group 99 'Long Term Use of Bioretention for Heavy Metal Removal' - Kestrel Design Group 90 'Long Term Use of Bioretention of Performance of Steel-Side Bioretention Basins After Ten Years In Operation', The Pollution Removal and Stomwater Reduction Performance of Steel-Side Bioretention Basins After Ten Years In Operation', Terry Locke, Peter WB. Hickols - University of the Sunshine Coast, Australia No significant Incomplete After Design Completed Coast Assessment in a Stommwater Rain Garden New Years Post Construction', J. Gilbert Jenkins, et al – Journal of Inrigation and Distribution in a Stommwater Rain Garden New Years Post Construction', Agathe Thomas, et al – University Vashington State University Vashington	Performance (% / duration) ## M ## L ## H ## M L ## H ## H	Performance (% / duration) Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-systems) 49-53 Contech Engineered Solutions (http://www.conteches.com/knowledge-center/pdh-article-series/cistern-designs-large-rainwater-harvesting-systems) 49-53 Viife Cycle Lost Assessment of Low Impact Development Practices' – STEP 50 Viife Cycle Lost Assessment of Low Impact Development Practices' – STEP 95 Victor Time Use of Bioretention for Heavy Metal Removal' – Kestrel Design Group Ones If Pay to be Mature? Evaluation of Bioretention Cell Performance Seven Years Postconstruction', L. L. Willard, et al – American Society of Divice Engineers, 2017 Not significant in Performance of Street-Side Bioretention Basins After Ten Years In Operation', Teny Lucke, Peter WB. Nichols – University of the Sunshine Coast Australia No significant loss / 8 years No significant Cong-Term Metal Retention Performance of Media Filter Divins Years Post Construction', J. Gilbert Jenkins, et al – Journal of Irrigation and Distribution in a Stormwiser Rain Garden Nine Years Post Construction', J. Gilbert Jenkins, et al – Journal of Irrigation and Distribution in a Stormwiser Rain Garden Nine Years Post Construction', J. Gilbert Jenkins, et al – Journal of Irrigation and Distribution in a Stormwiser Rain Garden Nine Years Post Construction', J. Gilbert Tomas, et al – Journal of Irrigation and	Performance (% / duration) ## M L H M L H ## M ## M L H ## M ## L H ## M ## L ## M ## L ## M ## M ## L ## M ## L ## M ## L ## M ## M ## L ## L ## M ## M ## L ##	Performance (% / duration) ## Mill Link Mill

L.I.D. / SWM Option	Lifespan (years)	Decline in Functional Performance (% / duration)	Literature Source / Citation	for		Requirement C for Maintenance			of			isk of emoval	Life Cycle Conversion Factor = 50 Year Life
				Н	М	L	Н	H L	. Н	M L	Cycle / Average Lifespan		
F. Swales / Filter Strips													
1. Owards / 1 inter ourps	50+	Not significant	'Life Cycle Cost Assessment of Low Impact Development Practices' – STEP										
Grass swale / perforated pipe	20+		'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

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.

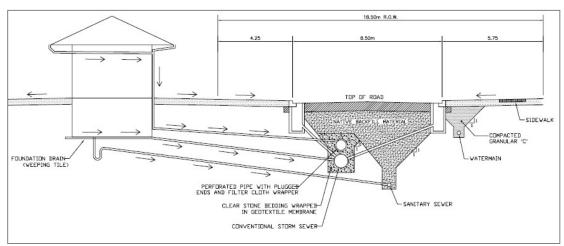




4. Perforated Third Pipe System / Exfiltration System

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.



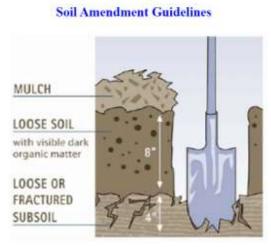
12. Filter Strips

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.

<u>Example</u>: 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

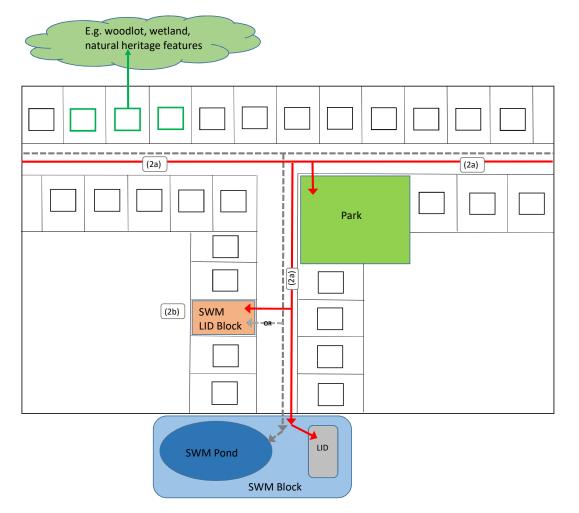
In this example, the developer would be required to pay \$2,000 to the City, being the additional cost to the City over 50 years. The amount may be discounted if the Alternative Infrastructure provides additional benefits to the City beyond any engineering benefits. These benefits, if any, will be determined 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.



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:

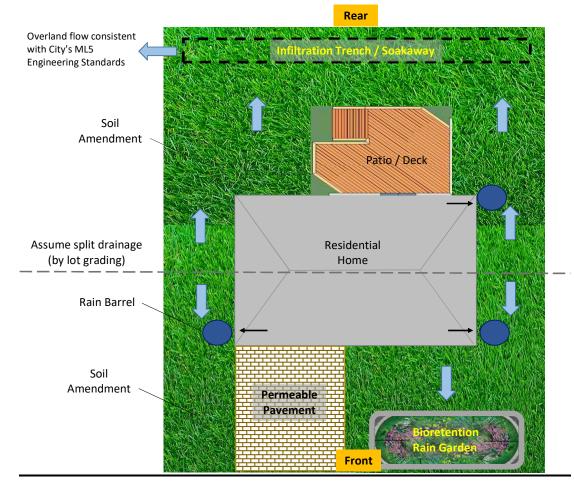
- (2a) 3rd pipe (at shallower depth) to collect road runoff (———) (at select locations)
- (2b) additional SWM LID block at desirable location (e.g. flexible location with ideal ground water conditions)
- (2c) combination of (2a) & (2b)



^{*}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.



Legend

Roof top drainage
Overland flow
Rain barrel

*Schematic not to scale

Public ROW