Amenity in Sustainable Stormwater:  
A Preliminary Assessment of the Toronto Green Standard

By

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ABSTRACT

AMENITY IN SUSTAINABLE STORMWATER:
A PRELIMINARY ASSESSMENT OF THE TORONTO GREEN STANDARD

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Stormwater management systems reduce the impact of surface runoff in urban environments. The Toronto Green Standard (TGS) has been developed to further mitigate effects of urban runoff by mandating runoff control implementation in new developments at the site level. The intended effect of these measures is to reduce the quantity and improve the quality of water. Recent concepts of sustainable stormwater suggest that amenity is an equally important aspect of such a system. This study evaluated Best Management Practices suggested by the TGS for their performance and amenity characteristics. Design professionals selected for prior experience with the TGS were consulted to determine industry perceptions of the requirements, and how the standards could be altered to improve amenity value. Several concerns were identified which appear to impede the successful implementation of sustainable stormwater management solutions, to which recommendations are proposed which may help balance performance and amenity requirements in the TGS.

Keywords: runoff, rainfall, urban environment
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1.0 Introduction

New development in Ontario is a highly controlled process subject to provincial regulation of the type of development through the the Ontario Planning Act (OPA) of 1990, and the standards to which new construction must be built in the Ontario Building Code Act (OBCA) of 1992. The OPA mandates that municipalities have official plans which lay out their long term goals and plans for land use (OPA, 1992). These plans are enforced on a site specific level through local zoning bylaws. In order for development to occur, developers must seek site plan approval from the municipality in which they plan to build. In the City of Toronto, this process serves as a control measure by which the type of development is regulated, which in conjunction with the Ontario Building Code mandated by the OBCA, sets out standards that ensure that developments are appropriate to the location in the city, meet the long term goals of the municipality, and are built to a standard of quality that ensures safety for the eventual occupants.

Recently, secondary sets of standards focusing not on city planning, structural standards and occupant safety, but rather on “green” construction and environmental protection have begun to develop. Since the first versions of these standards, subsequent iterations have enhanced the requirements, made them easier to fulfill, and adapted them to local environmental and political conditions.

The Toronto Green Standard is one such local adaptation of multiple existing standards, including LEED, R-2000 for New Homes, and others. (Making a Sustainable City Happen, 2006) The development of this local standard began in 2006, eight years
after the early development of LEED. It is an attempt at a “home grown” green development standard that was designed to incorporate the concerns of the local building industry, climate and other factors which had thus far been seen as impediments to the implementation of LEED and other green standards. As of January 31, 2010, any application seeking Zoning By-law Amendment, Site Plan Control or Draft Plan of Subdivision is required to implement the Toronto Green Standard (TGS, 2010).

When looking at the scope of sustainable development, the area to be studied quickly becomes a broad topic, with social, environmental and economic factors required in order for any particular system to be considered sustainable (Baker, 2006). A green development standard by necessity must address these factors and how they are applied to the various elements in the environment that may be impacted by development, including local ecology, waste management, air quality, energy efficiency, and water runoff. The focus of this study will be the implementation of stormwater Management (SWM) systems in the Toronto Green Standard (TGS).

Included within the implementation of the TGS, many of the prescribed measures naturally serve as site amenities as well, in conjunction with whatever mechanical performance benefits they provide. For the purpose of this study, amenity is defined as “a desirable or useful feature or facility of a building or place” (Amenity, 2010).
Another way to define amenity as it will be used in this context is a feature that provides a “non-utility” function to the site (Seamans, 2008). The definition of amenity that this thesis adopts will be further explored in the literature review section. Further elaboration on the use of the term Amenity may be found in the literature review.

By this definition, many of the requirements that the TGS naturally serve both a functional and amenity role: trees provide shade, improve air quality, and enhance the appearance of public areas; bike racks reduce vehicle usage, decrease the need for surface parking, and encourage a healthy lifestyle; and green roofs reduce water runoff, reduce the quantity of hard surfaces on roof areas, and enhance the appearance of roof areas from above. The common element of each of these measures is that they are each specifically required by the standard, and their environmental performance may not be separated from their contribution to amenity.

One critical area, in which this dual purpose does not exist, is in the implementation of SWM systems. In this aspect, as with many others, the TGS mandates performance benchmarks that must be achieved, and suggests several methods that may be employed. However, unlike other areas of the Green Standard, it is possible to meet the prescribed requirements while not contributing amenity to a site.

1.1 Research Goals and Objectives

This goal of this thesis is to explore measures that the Toronto Green Standard recommends for stormwater management, how they may contribute to site amenity,
identify difficulties that are being encountered when implementing the TGS, and suggest improvements to the TGS, so that the effect of money invested in stormwater management is maximized.

Objectives to be used in achieving these goals are as follows:

- Examine the Toronto Green Standard and how the suggested Best Management Practices (BMPs) may contribute to amenity on a site.
- Examine the ability of the standards to encourage or discourage the implementation of the suggested BMPs.
- Suggest changes to the Toronto Green Standard so that SWM systems may also add amenity value to sites, in the same way that other measures do.
1.2 Research Design

This thesis is structured as follows, and is shown in the flow chart on the following page (Figure 1). A methodology section describes the steps taken throughout the course of the study. The first step, a literature review, was used to gain familiarity with the Toronto Green Standard and studies related to the merging of stormwater performance and amenity. The design of the key informant interviews, criteria for selecting interviewees, and the process by which the interview results were analyzed will also be found here, followed by a brief description of measures taken to ensure that the results are valid. The key informant interview results chapter provides summaries of the interviews, and the key points raised are compiled in a table to provide a visual reference of the salient points. This is followed by a discussion section, in which these points are then processed into six concern that became apparent as the interviews were carried out. The concerns are then interpreted in the Implications to Landscape Architecture section. Finally, the conclusion chapter explores limitations of the study and identifies areas that could be investigated further. A list of suggestions that could be applied to the future development of Green Standards is provided, followed by a summary of the research.
Figure 1 - General Methodology.

1. Preliminary Literature Review
   - Background on the TGS and other Green Development Standards

2. Formulate Research Question

3. Goals and Objectives

4. Literature Review

5. Definition of Amenity

6. Amenity in Sustainable Stormwater

7. Introduction to the Toronto Green Standards

8. Evaluate BMP techniques for potential amenity value

9. Key Informant Interviews

10. Results and Discussion

11. Conclusions and Recommendations
2.0 Methodology

2.1 Selection of Standards for Study

The Toronto Green Standards were selected for study for several factors. Previous experience with working with the TGS led to the identification of failings within the system during informal discussions in the workplace. An initial concept of comparing the Toronto Green Standard to the Sustainable Sites Initiative (SSI) was considered, though it was determined that such a comparison would not determine why the existing system was not providing for amenity in SWM systems. Furthermore, previous informal discussions with developers had resulted in a sense that the TGS was not seen as a motivation to combine the amenity features that are already being provided on sites with additional enhancements that could be achieved by integrating the amenity of SWM systems. Thus the decision was made to focus on the TGS and its implementation.

2.2 Literature Review

The literature review section of this thesis intends to demonstrate three concepts. First, the use of stormwater in a pure in an amenity context, without regard for meeting performance criteria is examined. This use of stormwater is then related to the larger concept of sustainable stormwater, and what must be achieved for a system to be considered sustainable. The third component of the literature review provides a summary of the Toronto Green Standards. This part examines the individual best management practices that are suggested in the Toronto Green Standard, and determines how they may be used to add amenity to a site. A summary of the TGS and
stormwater as an amenity examines how the suggested standards fit into the larger concept of a sustainable stormwater system.

2.3 **Key Informant Interviews**

During the Literature review process, it appeared that when not viewed in the context of the TGS, the suggested methods could easily be used to serve as a site amenity. The examination of the rainwater as a pure amenity feature, as in Artful Rainwater Design, proved this point by using those methods in an aesthetically pleasing way in the spaces in which they were implemented.

It was then theorized that there could be two possibilities why SWM systems were not be utilized to provide amenity to a site:

1. There is either some other factor at play which is precluding the possibility of gaining amenity from SWM systems as they are implemented.

   OR

2. That the examples that I had seen thus far in a practice environment were not representative of what is actually happening in the City of Toronto.

Through discussions with co-workers, including landscape architects with more than 20 years of experience who have worked with a variety of standards - both green and conventional, and informal conversations with other consultants working on TGS projects, a general sense developed that the lack of amenity in SWM systems was not a
phenomenon that was limited to our office. The interviews were therefore structured to explore what barriers exist to using SWM systems to add amenity, rather than to determine if the problem of a lack of amenity is a system-wide issue. Additional reasoning for this determination was that if there were factors at play that allowed for a lack of amenity, then it stood to reason that the entire system could be undermined by not requiring it.

2.4 Key Informant Selection Criteria

As with any other design process, designing a site to meet the Toronto Green Standard, is a collaborative effort, requiring co-ordination between various design professionals. Because of the multi-disciplinary nature of the process, the decision was made to select key informants from specific fields that are involved in the design process of stormwater management systems: a landscape architect and engineer, and one from both sides of the construction and approval process: a developer and a representative from the City of Toronto.

The input of a developer was sought to provide a perspective on the challenges faced when development costs and general development issues are taken into account, rather than the narrower focus that a particular specialist consultant in a field may have. Similarly, it was hoped that the views of the City could be obtained, in order to get a general sense of how the TGS are being adhered to.
Requirements for the selection or respondents were as follows:

- Minimum 4 years experience in their field, in order to ensure experience with both conventional and TGS applications.
- Must voluntarily participate in the interview without compensation.

Additionally, specific requirements were developed of city and non-city informants.

The additional requirements of the non-city informants were as follows:

- Have worked on projects required to meet the TGS since it became mandatory on January 30, 2010.
- Have not worked on TGS projects with the other respondents.

The requirements of the city informant were as follows:

- Have experience reviewing projects for compliance with the Green Standards checklist.
- Familiar with municipal stormwater management policies.

As a result of the selection criteria, three key informants were selected from professional contacts of the researcher. A fourth contact with the City of Toronto was not involved with stormwater management at the application level, and provided other contacts. However, those contacts were not available over the course of the study in order to be interviewed. Attempts to find other sources at the City of Toronto through the “3-1-1” help line, and other contact points also did not result in interview candidates, or led back to the initial contact person.
2.5 Interview Design

During the literature review phase of the research, it became apparent that there were barriers to gaining amenity from SWM systems that could not be explained through limitations in the systems available to designers. Catherine Marshall and Gretchen Rossman identify three methods of qualitative research commonly in use: Participant Observation, the review of existing documentation and interviews or surveys (Marshall, 2006). While participant observation in a sense was used to come up with the research problem to begin with, due to the limited number of projects built thus far that implement the TGS, and lack of time to observe the progression of those projects, this was deemed to be an inappropriate method to base the study on. The results of a review of existing documentation are discussed in the Literature Review, and contributed to the need for key informant interviews with people who are actively involved with developments that are required to implement the TGS.

The interview process was seen to provide the following benefits:

- Flexibility to pursue responses and underlying motives (Kvale, 1996; Robson, 2002).
- Allows the participant to describe a situation from how they view it, framing it in their own way (Marshall, 2006).
- Provide a large quantity of data quickly (Marshall, 2006).
Of the various interview formats found, a semi-structured type of interview was determined to be the most appropriate (Marshall, 2006). This format would not depend on a restrictive set of questions as a fully structured interview would, but would allow the interviewer to guide the conversation more than an unstructured interview would. The interview guide used for the interviews may be found in Appendix D.

2.6 Interview Administration

The semi-structured interviews took place on March 22 and 23, 2012, conducted in the office of the respondent. With the respondent’s permission, the interview was recorded on an iPhone 3GS. The interview was later transferred to a computer running Mac OSX 10.7.3 for playback. Interview recordings were then transcribed verbatim and reviewed while listening to the recording twice in order to ensure accuracy. The verbatim method of transcription was used to ensure that any important words or phrases were not omitted in the course of the transcription.

2.7 Response Analysis

Following the interviews, verbatim transcriptions were made, and reviewed while listening to the recording to verify them for accuracy (Kvale, 1996). Summaries were made of each transcript outlining important points the were raised during the interviews (Kvale, 1996). Key points that were raised in the interviews were then extracted and combined in a table for visual reference. This reference provided a visual indicator that the majority of the responses had similar responses, regardless of who the respondent
was. Common areas of concern that were identified by each respondent were extracted for further evaluation.

2.8 Reliability and Validity of Results

Kvale emphasizes the importance of reliability and validity in the results that are obtained. A reliable result is a consistent outcome, while a valid result investigates the subject matter that was intended to be investigated (Kvale, 2006). In order to ensure that the results obtained through the interview process were reliable and valid, the following steps were taken:

- A literature review was undertaken before formulating the interview questions.
- The same questions were used for each interview, though minor variation was allowed depending on whether the respondent was a design professional or developer.
- Interviews were recorded and transcribed verbatim.
- Transcriptions were made immediately after the interview took place.
- Each transcription was prepared by the interviewer.
3.0 Literature Review

This literature review begins by clarifying how “amenity” will be referred to throughout the course of the study. The is organized in two parts, with the goal of relating the contents of this study to existing work done in regards to amenity in stormwater management systems (Babbie, 2004). The first part explores the use of stormwater management as an amenity feature on a site. This will then be related to broader concepts of sustainable SWM systems. The second section is an examination of the Toronto Green Standards, and the Best Management Practices (BMPs) that it recommends.

3.1 Amenity Spaces, Amenity or Aesthetics

In the introduction section, “amenity” in the context of this research was defined as “a desirable or useful feature or facility of a building or place,” or a feature that provides a “non-utility” function to the site. It is important to note that in looking at gaining amenity value from SWM systems, this study does not seek ways in which to create amenity spaces. Amenity spaces are frequently referred to in as spaces that are designed for the recreational uses of the occupants of a building or development. Furthermore, this study does not seek to evaluate the aesthetic value that is gained by a SWM system providing amenity to a site. Consideration was given to explore aesthetics, but it was determined that such a course would lead to a study of how people perceive certain features on sites, rather than concentrating on the implementation of those features.
3.2 Amenity in Sustainable Stormwater

The exploration of stormwater management systems that provide amenity to a site begins with Stuart Echols and Eliza Pennypacker’s concept of Artful Rainwater Design (Echols & Pennypacker, 2008). Their article in *Landscape Journal* begins with an exploration of the recent evolution of the body of knowledge relating to amenity in stormwater management (Echols & Pennypacker, 2008). A reference to a document on Sustainable Urban Drainage Systems (SUDS) by the Construction Industry Research and Information Association (CIRIA) introduces a sustainable stormwater system as one that addresses water quality, quantity and amenity, rather than the traditional approach that saw water quantity as the only factor that needed to be controlled (Bray, Cooper & Wilson, 2004). This thesis uses this definition of sustainable stormwater.

An exploration of the SUDS concept reveals that in situations where a sustainable stormwater system is included in the initial site design phases, it is possible to implement a sustainable stormwater system even in small urban sites as may be found in the United Kingdom. Furthermore, in situations where these systems are incorporated, there is an observable increase in value known as a “pond premium” associated when homes and offices overlook a pond (CIRIA, 2004:p30). While the greatest increase in value had the tendency to occur on sites greater than one acre, the premium nonetheless does provide an incentive for a well designed and maintained water feature.
Exploration of sustainable stormwater trends reveals a variety of examples in municipalities of all sizes throughout North America that are promoting sustainable development. The Halsall report identified 100 cities whose green development standards were reviewed (Making a Sustainable City Happen, 2006). The following three example cities show a green standard development process that is occurring in another Canadian city, an example of green standard implementation in the United States, and an example where the sustainable stormwater approach is explicitly referenced.

The City of Vancouver provides guidelines for both large building developments and single family homes to improve their use of stormwater, both in retrofit applications and for new development, while ongoing studies are looking at how to create a streamlined process for requiring green development (Waterwise, 2009). The City of Chicago takes an incentive based approach, by offering expedited building permits to projects that meet minimum LEED certification, and rebate or eliminate review fees on projects that meet higher levels of LEED (Carter, 2009).

On a scale of a smaller town, the City of Fort Collins in Colorado recognizes the importance of the holistic approach to stormwater management, in their Landscape Design Standards and Guidelines for Stormwater and Detention Facilities, which addresses quantity, quality and amenity. This document, published in November of 2009, seeks to emphasize the ability of stormwater facilities to be designed and used in a way that provides both amenity and functionality: “Stormwater facilities should be
considered an opportunity for aesthetic interest and natural integration rather than solely necessary features of a development” (City of Fort Collins, 2009).

While the previous two documents serve to define amenity as a critical component to a sustainable stormwater system, the need to define what amenity a SWM system may provide remains. This brings us back to Echols and Pennypacker’s article *From Stormwater Management to Artful Rainwater Design (2008)*. In the Sustainable Sites Initiative stormwater management guidelines, this article is provided as a primary source of information on “adding amenity value to stormwater management techniques” (The Sustainable Sites Initiative, 2009).

In this article, amenity in regards to SWM is defined as a feature that contributes to one of the following aspects: convenience, education, recreation, safety, social interaction, public relations, and aesthetic richness (Echols, 2008). Taking into account these requirements, ARD aims to creates space that celebrate water and its use to enhance the experience of their occupants. It is important to note however that the implementation of ARD in this context is voluntary, and therefore not required to meet a specific set of standards. In the case studies described in ARD, the sponsors of the project are largely institutional facilities, rather than private sector developers.

Due to the publicly owned nature of the sites, there may be a bias to provide educational value about SWM systems and stormwater runoff that may not exist in a private development context. In the context of a municipal building by-law such as the
TGS, the definition of amenity may justifiably be broadened to any non-utility use of water, as described in the previous section. This open definition eliminates the restriction and potential discouragement of telling a builder that they must include all of the amenity factors mentioned in ARD, but that meeting any one, such as aesthetic richness or recreation, would satisfy an amenity requirement.
The Toronto Green Standard

In the previous section, the concepts of sustainable stormwater and Artful Rainwater Design were reviewed. This section looks at the Toronto Green Standard, and the measures it takes towards sustainable stormwater. Development of the TGS began as a combination of Toronto’s Environmental Plan, Official Plan and Wet Weather Flow Management Master Plan. In 2006, a study conducted by Halsall consultants identified the need for a “homegrown” standard, because LEED and other standards were seen as too stringent or inappropriate to the local climate and other factors (Making a Sustainable City Happen, 2006). To develop a locally based standard, 110 stakeholders were invited to a working group. Of the invited stakeholders, including developers, builders, owners, architects and engineers, 39 participated in workshops that would eventually develop a standard that would combine aspects of LEED, R-2000 for new homes and other emerging standards. Landscape architects were not explicitly noted in the list of invitees, though may have been a part of the 6 “Other” attendees that were not defined. The result of the working group was the Toronto Green Standard, a two tier system released in July of 2006, and revised in 2010.

As one of the potential future measures defined in the Halsall report, it was suggested that a cost-benefit study be conducted after the implementation of the TGS. Such a study was undertaken, and a report issued in 2008 (Kesik & Miller, 2008). While this report showed that there is an economic benefit associated with the implementation of the recommended measures, information on compliance and actual success of the program is not available.
The TGS is divided into five sections, with the goal of improving the sustainability of development projects in Toronto: 1 - Air Quality, 2 - Greenhouse Gas Emissions/Energy Efficiency, 3 - Water Quality, Quantity and Efficiency, 4 - Ecology, and 5 - Solid Waste. The “Water Quality, Quantity and Efficiency” section covers the stormwater management requirements that are applicable to this study. In the following table (Table 1), the requirements that must be met in order to comply with the Water Quality (WQ) section of the TGS are listed. WQ 1.1 falls outside of the scope of this thesis, because it is a measure to be taken during construction, rather than one based on a permanent SWM system on site. WQ 2.1 and 2.2 address quantity requirements, while WQ 3.1 and 3.2 address quality requirements. WQ 4.1, while related to planting that may serve as a site amenity, is targeted towards reducing potable water consumption, rather than the re-use of captured water, and therefore is also excluded from this research.
| WQ 1.1 | Follow the Erosion and Sediment Control Guidelines for Urban Construction (Greater Golden Horseshoe Conservation Authorities, December 2006) during construction and demolition activities. |
| WQ 2.1 | Retain stormwater on-site to the same level of annual volume of overland runoff allowable under pre-development conditions. |
| WQ 2.2 | Retain at least the first 5 mm from each rainfall through rainwater reuse, on-site infiltration, and evapotranspiration. **OR** Ensure that the maximum allowable annual runoff volume from the development site is no more than 50% of the total average annual rainfall depth. |
| WQ 3.1 | Remove 80% of total suspended solids (TSS) on an annual loading basis from all runoff leaving the site based on the post-development level of imperviousness. |
| WQ 3.2 | Control the amount of E. Coli directly entering Lake Ontario and waterfront areas as identified in the Wet Weather Flow Management Guidelines. |
| WQ 4.1 | Use water efficient plant material for at least 50% of landscaped area (including vegetated roofs and walls). |

As a result of the omission of an amenity requirement, it may be said that the current requirements of the TGS do not mandate a fully sustainable SWM regime, as it was defined in the first half of this literature review. A content analysis approach, in this case using latent content to identify the importance of amenity in both the TGS and sustainable stormwater (Babbie, 2004), reveals an omission of any importance being given to amenity in the TGS. However, the previous section demonstrated the value of implementing a sustainable stormwater system that includes quantity, quality and amenity. Under the assumption that a better system, and therefore final product, is
achieved if a sustainable SWM system is implemented, do the BMPs suggested by the TGS allow for amenity to be achieved by SWM systems that meet the TGS?

As a part of the TGS, seven BMPs are suggested that may be used in order to meet the requirements. While this is not an exhaustive list of all possible approaches to stormwater management, it does provide a basic “tool kit” that designers may use which if implemented properly would meet the TGS requirements. The following BMPs will be evaluated as to how they may be used to provide amenity value to a site, and their suitability for use in an urban context: rainwater harvesting, oil/grit separators and sediment traps, stormwater holding tanks, green roofs, permeable surfaces, rain gardens and absorbent landscaping, infiltration trenches and bioswales.

3.3.1 Rainwater Harvesting

Rainwater harvesting systems have long been associated with urban areas, dating back to Rome and earlier, when capturing rainwater was essential to survival for drinking and crop irrigation, domestic uses, and decorative features (Kinkade-Levario). The ability to capture rainwater is still of vital importance to the survival of communities worldwide, though centralized water treatment systems and stormwater removal systems have until now largely replaced the necessity of collecting and treating water where it lands. The drive to implement sustainable systems and awareness of the potentially destructive downstream effects of stormwater runoff has spurred a renaissance in systems that collect and hold stormwater on the site where it falls (Wet weather flow management guidelines, 2006). These systems may range from a low-
tech rain barrel connected to a downspout, to a more elaborate system including underground holding tanks or cisterns, filtration and circulation pumps. By necessity, in order to gain amenity value of any kind from stormwater, it must first be collected for use. Therefore, rainwater harvesting may be considered to add amenity value to a site

3.3.2 Oil/Grit separators and sediment traps

In the time preceding a rain event, oil from vehicles, dirt, salt and numerous other contaminants may accrue on hard surfaces. In the initial downpour of a rain even, a phenomenon known as the “first flush” picks up and carries these contaminants into the nearest catchment system, be it a storm drain, soft landscape area, river or lake (Wet weather flow management guidelines, 2006). The purpose of an oil/grit separator or sediment trap is to purify the water entering a rainwater harvesting system or stormwater holding tank to keep systems downstream performing optimally. In cases where harvested rainwater may be used for irrigation or a water feature, purifying the water may be a necessity in order to remove any toxins that may harm plant life or the users of the feature. While this type of BMP may not appear to provide amenity to a site directly, it is nonetheless an important component to our SWM tool kit, as it can provide necessary filtration that there may not be enough physical space for on site, or that natural measures may not successfully accomplish.

3.3.3 Stormwater Holding Tanks

When water has been harvested and treated for contaminants, it will most likely need to be stored somewhere prior to being used to serve an amenity purpose, even if
that purpose will only be irrigate a planting area in support of another amenity on site. In such a situation, the stormwater holding tank could be considered to add amenity to a site.

This particular system however, may also be implemented in ways that provide no contribution to amenity at all. Requirement WQ 2.2 requires the retention of water on site of the first 5mm of a rainfall event, and subsequent rainfall events up to 5mm from each rainfall within a 72 hour period. This condition requires the collected water be used within 28 days, through some combination of reuse, infiltration or evapotranspiration. An alternative to that requirement is given that the design must “ensure that the maximum allowable annual runoff volume from the development site is no more than 50% of the total average annual rainfall depth” (The Toronto Green Standard, 2010). The alternative option approved in various circumstances, allows for water to be held in a tank for 72 hours, and then released into the storm sewer system (Wet weather flow management guidelines, 2006). In this case, the stormwater holding tank provides no amenity value to the site at all, while increasing the cost to the builder.

3.3.4 Green Roofs

The matter of Green Roofs in the City of Toronto takes two forms. The green roof by-law dictates that any building with a gross floor area of 2000m² or more must implement a green roof for 20% of the available roof area (The Toronto Green Roof By-law, 2010). Typically, this would take the form of an intensive green roof system, which would not be accessible to the public (Cantor, 2008). In this form, it would not meet the
requirements of amenity under ARD, because it is not a usable area to the occupants. However, in the context of this thesis, the green roof may provide amenity value as a visible feature, in situations where the green roof is visible from above, such as on a lower lever of a building podium viewed from a tower, or an adjacent publicly accessible amenity area.

An interesting discrepancy lies in the implementation of extensive green roof systems which are accessible to the public for use (Cantor, 2008). The Toronto green roof bylaw excludes outdoor amenity spaces, to a maximum of 2m²/unit. This does not however, take into account amenity spaces that may be occupied by soft landscaping, which would have the same effect as the intensive system, but provide greater amenity value than an intensive green roof. By the definition of amenity in this thesis, both intensive and extensive systems provide some degree of amenity. There is however, no distinction in the value provided by each one, i.e. whether an amenity space that happens to be an extensive green roof is preferred, or whether an intensive green roof is preferred that simply provides amenity value.

3.3.5 Permeable Surfaces

The use of permeable surfaces is suggested for use in areas where hard surfacing is required, so that the effective hard surface area is reduced, allowing for greater infiltration of water where it lands, rather than being conveyed over land to a drain or other SWM facility. While the performance intent of using permeable paving surfaces is clear, the amenity value of such systems is limited to a visual feature.
Furthermore, the performance of this type of BMP relies heavily on proper maintenance to ensure that the permeable areas of the system do not get clogged, rendering it an expensive impermeable surface.

3.3.6 Rain Gardens/Absorbent Landscaping

The installation of a rain garden provides an opportunity for water to be absorbed from adjacent impervious areas. A typical situation could consist of planting in a curbed area with breaks in the curb allowing for water to enter and fill the rain garden, which would then absorb the water for infiltration into the soil and evapotranspiration through plant materials contained therein. This method of SWM may provide an excellent visual addition to a site while also fulfilling water quantity and quality aspects of a sustainable stormwater system.

3.3.7 Bioswales and Infiltration Trenches

Bioswales are effectively an organic analogue to the oil/grit separator and sediment traps. Rather than using mechanical means, the bioswale uses a conveyance channel containing plant materials and soils to filter and trap contaminants (Acomb & Clark, 2009). The implementation of a bioswale allows for a great deal of flexibility in the appearance and provides opportunities to visually enhance a site.

The infiltration trench is a downstream system that may follow in sequence after a bioswale. Once the water has been purified by passing through a bioswale, an infiltration trench consisting of larger stones and aggregate materials may be used for
the water to be held until it may be absorbed into the ground (Acomb & Clark, 2009). As with a bioswale, the layout and design provides opportunities to contribute aesthetically to the site.

3.4 Summary

Throughout the literature review, several important points have been raised. In order to have a sustainable SWM system, issues of quantity, quality and amenity must be addressed. The example of artful rainwater design provides us with a design style in which SWM systems are implemented for their amenity features, in a context where we may see the systems working independently of a prescribed system that mandates performance requirements.

A review of the Toronto Green Standards has led to the conclusion that the SWM requirements at this time do not mandate a truly sustainable SWM practice. TGS sections WQ 2.1 and 2.2 implement water quantity requirements, while WQ 3.1 and 3.2 address concerns of the quality of water leaving the site (The Toronto Green Standard, 2010). However, there is no requirement to implement the third component of sustainable stormwater: amenity. Despite this, the measures that are recommended in the TGS are appropriate to implementing a sustainable SWM system if implemented properly. The aim of the key informant interviews then, was to determine why systems that provide amenity to a site and would improve the experience of the user are not being implemented.
4.0 - Key Informant Interview Results

Through the literature review it became clear that the basic methods that are recommended in the TGS are not the limiting factors when it comes to using stormwater systems to provide for amenity value. As a result, the key informant interviews were structured to determine the impressions of developers and design professionals about the value and implementation of the TGS, and whether in their experience implementing the Green Standards served to produce a better outcome. Summaries of the interviews highlighting important points are presented in this section.

4.1 Interview #1: Developer

The respondent is a developer with more than 20 years of experience building urban residential developments of various scales. Several of their more recent projects have been required to meet the Toronto Green Standards. This individual, was interviewed because of his unique perspectives as both the owner of a development company, and detailed personal interest that he takes in his projects.

From his perspective, there seems to be a disconnect between the intent of the TGS, and the implementation. Several important points were brought up highlighting difficulties in implementation. The first of these is the size of sites and the design of developments. In the case that is mentioned in the interview, the building and its underground parking structure covers the entire area of the site, eliminating many suggested stormwater management techniques from possibility.
In such cases, infiltrating the water into the soil would be impossible, because while there is a “soft landscape” area on the site, it is in fact separated from the water table by the concrete structure below it. As Mark mentioned, “in an infill situation typically your building envelope goes from property line to property line to property line, and in most cases any surface parking, amenity areas and so on are sitting on a garage deck, so in actual fact the permeable paver requirement is an increase in cost to us, but the water is not draining into the soil.” The systems that remain available for use then would not contain enough water to use as a permanent source, and so only ends up being used as temporary storage prior to release, rather than in a capacity to serve an amenity value, such as irrigation for plantings. While this method aids in reducing peak runoff, the water system does not contribute amenity to the site.

The infill urban site further encounters problems in the frequent requirement that permeable paving systems be used. In this case again, the requested system is adding cost to the site, but because of the location on top of a garage deck, there is no potential for the collected water to reach the water table and so the end result will be no better than an area drain, but at increased cost.

Maintenance factors also come into play, because at this point the long term maintenance requirements are somewhat of an unknown. Some systems, such as the green roof, should result in less maintenance or the same as a conventional roof system, while others, like the oil and grit separators that are needed when capturing water from parking and driveway areas become an added expense. In one case, the
green roof at the very least provides a visual amenity in places where it may be seen, such as from an adjacent tower or publicly accessible amenity area. Oil and grit separators however, end up being an additional site maintenance item that provides no amenity value, because the water being collected will simply be discharged at a later time, or infiltrated into the ground from the overflow of the tank, never having been visible to the residents of the site.

The perceived value of the TGS was also discussed, and whether Tier Two of the TGS, has been attempted in any previous projects. It was mentioned that “the consensus in our industry is that to meet ‘Tier 2’, will actually cost you more than the rebate that you’re going to get back.” The effort required to reach that level carries with it several challenges on its own that were discussed. The greatest risk, was that the measures taken to reach ‘Tier 2’ would be evaluated after construction, and at that point it would be determined if they merited the incentive rebate or not.

With the costs to design and meet these systems, it was not deemed worth the effort to go to a higher level of the TGS. In relation to other Green standards such as LEED or the Sustainable Sites Initiative, those systems at least carry a kind of prestige for some consumers, such as for a company attempting to promote their “Green” image. The Toronto Green Standard however, does not seem to carry such a prestige.

An interesting insight was given into the way that condo buyers think, in that they seem to be of a short term mindset, with their interest in a unit extending only up to
about five years, and not considering the long term maintenance goals. Furthermore, the current market would most likely not care or place value in the fact that stormwater is being used to serve as an amenity, unless it were obvious, and even then it would not be a deciding factor in purchasing a unit.

The mention of making it obvious, such as a pond or similar water feature, again runs into the problem that on a small urban infill size lot, there would simply not be enough space on the site in order to install such a facility and still have enough space to make the development economically viable. In situations where the requirements absolutely can not be met, the City has allowed developers to submit cash in lieu, though this raises the question of where the money goes when it enters the city revenue pool, and there is no guarantee that it will actually be spent on a stormwater system that it is supposedly being used to substitute, but rather go into a general fund that may be used to pay for something completely different in another part of the city.

4.2 Interview #2: Professional Engineer

The interviewee is a Professional Engineer with over 35 years experience as a consulting engineer. This experience includes the creation of stormwater managment reports and design for a wide range of site sizes, from small private sites to large subdivisions. These developments have included both conventional stormwater system and more recently he has been involved in projects attempting to meet LEED certification and the Toronto Green Standards.
As with the previous respondent, John is supportive of the idea in principle, but suggests that the execution is lacking in multiple ways, with the result being that fulfilling the standards has become simply a requirement to gain approval, rather than a path by which to achieve a better result. The insights obtained from this interview bring to light themes of co-ordination and functional issues in what is being asked for, and what will be accepted to meet the standards.

Sensitivity to site context seems to play an important role, and be a determining factor in the types of systems that may be installed. As with the previous respondent, the size of sites that typically are addressed by the TGS is referred to, in that they limit the area which may be used to implement green stormwater systems. These limitations then tend to exclude the possibility of using the stormwater management systems to serve an amenity and functional role, with amenity being sacrificed in order to meet the functional requirements and gain approval.

In terms of weighing function versus amenity, it seems that function surpasses any amenity value, while amenity only comes into play when looking at ways to dispose of the stored water, such as through site irrigation. Even then, collecting rain water for irrigation is identified as a temporary solution because the size of the holding tanks would not provide enough capacity for extended dry periods, at which time a supplemental water source would be required.
The co-ordination required in order to gain amenity value from stormwater systems was another factor that came up in discussion. By this, reference was made to the co-ordination needed between different departments in the city in order to approve such systems. The co-ordination matter was further raised in regards to maintenance issues. While the TGS is effective at getting some form of stormwater management system implemented, once the building has been turned over to the condo board or whatever entity will be managing the property, there is no guarantee that the systems will be maintained properly in order to preserve their performance. In one instance, rain barrels were installed as an approved measure in a townhouse complex in order to meet the Standard. Once they were in and the project was completed however, there was no regulation that requires the systems to be preserved as built, and it would be a simple matter for the homeowners to remove the barrels to reclaim space on their properties. Similarly, in a condominium situation, it would fall to the condo corporation to maintain the systems. In such a circumstance, the system could be compromised by attempts to save money on maintenance and cutting the budget for maintaining the installed green systems, or hiring a maintenance company that does not use the proper techniques, thereby negating the benefits of the installed system.

Looking at other green development system, it was mentioned that in his experience, the engineer does not take the lead on the design, but rather takes the requirements from the landscape architect or irrigation consultant, and then designs to meet those requirements. While this sequence of events in the design process appears as if it could result in systems that provide some amenity, the reality is that the
restrictions that were previously discussed that limit the types of BMPs that may be employed still result in the same use of water, mainly providing for some irrigation, though requiring a permanent backup solution for when the storage tanks are empty.

On the design specification side of it, experience has shown that his clients typically want to do what needs to be done to gain approval and have the project built. A disconnect is again visible here in what the requirements dictate, what gets built, and then how it is maintained. The end result seems to be that while the design and approval process will get a system installed, once the development has been built there is no motivation to maintain those systems. It may be safe to say then, that because the systems do not provide a visible amenity or service to the site, they are actually less likely to be maintained in the long term, and only serve as an additional non-recuperated cost to the developer. This is in contrast to a situation that if a feature did provide amenity, its maintenance or lack thereof would be more visible, and thus more likely to receive the necessary funding and proper care.

4.3 Interview #3: Landscape Architect

The respondent, Senior Landscape Architect practicing with a firm in Toronto, Ontario. She is a member of the OALA, CSLA and ASLA, and has 8 years experience working on projects meeting conventional standards, LEED and the TGS.

Her view on the TGS is that at this point in time the TGS seems to be turning into a required step for approval, though by getting people thinking about ways to create
more sustainable sites the product could be improved. The TGS is, however, seen to be need improvement that could be achieved by seeking input from professionals who are required to implement the standards.

In general, the TGS may be seen to be providing some enhancement to the aesthetic characteristics of a site by mandating more tree planting and providing for better growing conditions. However, when focusing on stormwater, that contribution is absent. It was mentioned that “unlike LEED [the TGS] doesn’t ask you to re-use it, where as with the LEED requirements it asks you to take several steps beyond. So if they actually restructured it so you’re using the water to further benefit the end user or actually make a better site then it would be beneficial.”

This difference between the TGS and LEED comes up again when comparing to Tier 2 of the Green Standards. Previous project experience showed that if attempting to reach Tier 2 of the TGS, it would be more worthwhile to aim for some level of LEED accreditation, because while Tier 2 does not reach LEED silver, it does require extra effort to be put forth, while lacking the incentive of the ability to be used as a marketing feature.

Unlike LEED, the TGS has the benefit of being a somewhat less restrictive standard, though that also comes with its disadvantages. The ability to get around certain requirements by implementing less desirable systems undermines the effectiveness of the TGS, while other restrictive features actually undermine amenity
features to benefit the quantitative requirements of the standard. One case of this was given as an example, where amenity space was being reduced to meet the Green Roof area requirements. In this situation, the engineer was asking for more roof area to be devoted to the Green Roof system, which is governed by its own by-law in Toronto, which in turn reduced the area of amenity space available to residents. While in the context of this study both of those items would serve an amenity function, the amenity space available to residents would be a preferred option, as it provides more use to the residents. Interestingly enough, it does not seem that planting areas in amenity spaces count towards the green roof by-law, a discrepancy that would require co-ordination between the two requirements sets to be eliminated.

In her experience, developers have two approaches to the Green Standards. For some, the requirement is to meet the standard and move on. Others however, are becoming frustrated, because by meeting the requirements the results do not always “look pleasing to the eye.” In those cases, the client hopes to get a satisfying result, but is impeded by the standards which look only at quantifiable performance measures.

In the case of stormwater management practices, it seems that a general set of guidelines is not the proper solution, because of the range of site specific conditions that may be encountered. This could account for the measures that are being implemented in order to meet the requirements, but do not enhance the amenity value of the site. Maintenance factors are also seen to be lacking, because there is no requirement to
maintain the systems, even though the installed systems are highly dependent on proper maintenance to function as required.

Overall, it seems that greater flexibility in what performance measures are to be met, determined on a site by site basis, may in fact serve to provide for a better overall product. This would be in contrast to the current system of attempting to apply the same set of rules to every site, even though many of the possible BMPs that are suggested would not be suitable to the majority of infill type sites to which the TGS would apply.
4.4 Synthesis of results

Through transcribing and summarizing the interview, common elements became apparent, which were often mentioned without prompting by the interviewer. These elements are compiled in Table 2 on the following. This visual reference shows that concerns raised in each interview were typically shared among all three respondents. In cases where the responses were not similar or not mentioned, the lack or response or discrepancy may be attributed to the differences between professional fields of the respondents, or the scope of their involvement with the standards.
<table>
<thead>
<tr>
<th>Table 2 - Synthesis of results</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Requirements</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Required measures provide amenity value to the site</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Lack of co-ordination between TGS and Green Roof By-law leads to loss of amenity space</td>
<td>-</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Required measures contribute to the performance necessary to meet the standards.</td>
<td>✔</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Performance may be compromised by lack of account for site specific conditions</td>
<td>-</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Required measures take into account site specific conditions</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>System does not provide for feedback to help enhance the program</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Cash in lieu for not meeting performance measures is not known to go to supplementing the lacking requirements in other places</td>
<td>✔</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Perception</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incentives for attaining Tier 2 are effective</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>There is value in attaining Tier 2</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>The effort to required to attain Tier 2 could be better spent to meet a more recognized standard, such as LEED</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>SWM systems contributing to site amenity are not a priority for consumers/clients</td>
<td>✔</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>It is difficult to contact the City about concerns regarding the TGS</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td><strong>Maintenance Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are no requirements for long term maintenance of SWM systems to be maintained</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>The implemented systems will not function properly if not maintained</td>
<td>-</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Additional maintenance for installed systems adds an additional long term expense that could be seen as superfluous and thus ignored.</td>
<td>✔</td>
<td>✔</td>
<td>-</td>
</tr>
</tbody>
</table>

Legend:
✔: Respondent agrees mentioned this item. ✗: Respondent does not agree with this item.
-: Response was neutral on the matter. -: Respondent did not have a response relating to this item

**R1**: Respondent 1 - Developer.
**R2**: Respondent 2 - Engineer.
**R3**: Respondent 3 - Landscape Architect
5.0 Discussion

As a result of the interviews, several important concerns were identified in how design professionals and developers regard the TGS. The identified concerns and their importance are discussed below.

Concern #1: Lack of sensitivity to site conditions.

The first concern that appeared in each interview was a reference to difficulties encountered by the TGS not taking into account site specific conditions. The problem of small sites with underground parking structures extending to each property line, thus not leaving space for infiltrating water into ground, was the primary concern. This limiting factor to a large extent eliminates the possibility of infiltrating water into the soil. The result then is that an underground storage tank of some form is required in order to meet the water retention requirements.

While this water could then be used to some extent as an amenity on the site to irrigate planting areas, the reality is that the quantity of water collected is not sufficient to rely on as a permanent source. The system would therefore need to be supplemented with another permanent source of water, namely from the permanent water supply, negating the benefits of collecting the water to attempt to use it as an amenity in the first place.

On sites in which an underground parking structure is not present, there appears to be a problem with the area available to use for infiltration. A small townhouse
development that the second respondent mentioned was too small to allow for infiltration of water into the soil, because of distances that are required to be maintained from building foundations. The following table shows the effect on the BMP “tool kit” when taking into account the restrictions imposed by working with a small site that contains an underground parking structure to the extent of the property lines.

<table>
<thead>
<tr>
<th>Table 3 - BMP usefulness on small sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides amenity</td>
</tr>
<tr>
<td>Rainwater Harvesting</td>
</tr>
<tr>
<td>Oil/Grit Separator</td>
</tr>
<tr>
<td>Stormwater Holding tanks</td>
</tr>
<tr>
<td>Green Roofs</td>
</tr>
<tr>
<td>Permeable Surfaces</td>
</tr>
<tr>
<td>Rain Gardens/Absorbent Landscaping</td>
</tr>
<tr>
<td>Bioswales</td>
</tr>
<tr>
<td>Infiltration Trenches</td>
</tr>
</tbody>
</table>

* Indicates BMPs that alone do not provide amenity value, but may be components of other measures that do.

Concern #2: Requirements for non-enforceable or inappropriate measures.

This concern stems from the example given in Concern #1, where the site was too small to allow for infiltration without being too close to the building and potentially compromising the foundation. In that case, rain barrels were provided on the site to meet the storage requirements at each unit. The problem here lies in the ability to
enforce the requirements of the TGS. Once a project has obtained approval and been built, there is nothing to stop the home owner from removing the rain barrel in favour of using that space in their backyard for something more functional to their needs.

The second part of this concern is the suggestion that permeable paving be used, without regards for the type of development, whether it is above an underground parking structure. In a situation where there is no access to the water table from the surface, the benefit of installing of a permeable paving system serves only to increase costs, both for initial construction and maintenance. Ultimately, any water that is absorbed in the permeable paving system will go down to the same drain system that is installed on the garage deck, while bypassing the need to be collected in an area drain.

**Concern #3: Lack of Flexibility**

The lack of flexibility in applying the Standards appeared to be a common cause of frustration among designers. In some cases, the guidelines are rigid enough that measures which may not be effective in the long term are being taken in order to meet approval, only for those systems to fail shortly after construction. This rigidity however, comes at the cost of taking into account specific site conditions and styles of developments.

Potential for conflicts between green systems also has the potential to arise, with detrimental effects to site amenity. The third respondent’s example of a green roof being increased in area to meet one requirement, while simultaneously reducing the
size of the usable amenity area is one such example. Logically, this situation is contradictory, because the publicly accessible amenity area would typically include planting areas as well, which though they are not counted specifically as green roof, are a form of green roof and should be credited as such (Cantor, 2008).

Finally, in situations where SWM measures cannot be accommodated on site for whatever reason, there is the option to provide cash in lieu of the requirement. While the intent of such a program may be sound, in the eyes of developers it is questionable whether the result matches the intent, as the money seems to go into the general city revenue stream, and may be allocated to public works projects in a different part of the city. This type of outcome again demonstrates a separation between performance and amenity, where the performance is being paid for, but the developer and ultimately the residents of a development do not receive any amenity from the implemented measures.

Concern #4: Maintenance

The importance of proper maintenance in a Green SWM system was emphasized by the engineer. While this aspect plays a crucial role in preserving the functionality of most Green SWM systems, the importance of maintaining the systems is not accounted for in the TGS. This omission creates the risk that once these systems have been installed and passed on to the end user, they may fall into disrepair and function no better than conventional systems.
From the developer’s perspective, when developing the budget it is an additional budget line item that will be passed to the condo corporation for administration, and therefore an increase in cost. It is also left to the corporation to determine whether or not to continue to maintain the system. As there are no by-laws mandating that the systems be maintained in working order, it is possible that if expenses need to be reduced, that the maintenance of invisible SWM systems may be sacrificed in order to balance the budget.

It should be noted that the cost benefit study carried out in 2008 (Kesik, 2008) also reinforced that in order to derive the maximum benefit from the implemented systems, budget allocations have to be made for maintenance of the implemented systems. If the long term maintenance is not implemented, then the benefit is drastically decreased, with very little decrease in the cost, because the greatest expenditure is in the initial implementation cost (Kesik, 2008)

From the designer’s perspective, maintenance plays a large role in preserving the functionality of systems that have been implemented. Following the implementation of the specified systems, the engineer is required to provide manuals and documentation to the owner so that they are aware of what measures need to be taken in order to properly maintain the systems. In this case, there needs to be more awareness on the part of owners of buildings built to the TGS that they need to hire maintenance contractors who are aware of the specific system requirements in order to properly keep them functioning at their full potential.
Concern #5: No perceived public value

This concern was most obviously exposed through the developer interview, but was further enforced by the other two. At this point in time, the public does not see any value in the TGS, or the benefits that it provides. When comparing two properties, if all other things are equal, and the green building is more expensive, the buyer will go with the cheaper option. Furthermore, if a site amenity does employ the use of stormwater, the advertising of that fact will not influence the majority of the population to purchase in that development over another.

Concern #6: No communication between City and professionals.

The final concern that emerged from the interviews is that there does not seem to be a set method by which the city may seek input from design professionals, and for them to obtain feedback. Since the TGS is still in its early stages of development, it seems reasonable that input should be obtained in order to learn what measures are working and what designers are having problems with. Throughout this research and personal work experience, it has frequently been difficult and frustrating to attempt to have any contact with the City to discuss the requirements or obtain input as to what needs to be done, without going to the extend of submitting a project and waiting to obtain comments on what was submitted.
5.1 Implications for Landscape Architecture

The use of SWM systems to increase the amenity value of a site is uniquely suited to the skill of landscape architects, as they are often sought to bridge the gap between the natural and constructed environment (Taylor, 2006). In their role of coordinating this interface, landscape architects are able to interpret the requirements of the human occupants of the site, with the requirements of the environment so that both may find benefit in the constructed space.

This study identifies two areas in which this skill set may be applied: in the creation of environmental policies such as the TGS, and in the design of spaces that would conform to those standards. On the policy side, landscape architects could contribute a holistic view of the proposed measures, with expertise to specify fully sustainable stormwater systems, rather than simply mandating performance, which has been shown to not provide an optimal outcome.

On the design side, Landscape Architects involved with projects implementing the TGS and other similar standards systems are required to conform to the existing standards in order to get approval for the project to be built. However, it must be recognized that these are minimum requirements that must be met, not limits to what may be done. Even without the specific requirement that SWM systems provide amenity value to the site, doing so may be regarded as a value added service that the landscape architect brings to the project. This benefit could be advertised to potential clients by demonstrating that since investment in green SWM systems must be made to
meet the requirements, for marginally little extra expenditure the systems may also be
used to provide amenity value, which will increase the value of the site, and the
likelihood that they will be properly maintained so that they continue to provide the
amenity and performance benefits.
6.0 Conclusion

6.1 Limitations of Study

Thus far, extensive literature is available on the performance aspects of SWM systems. Consideration of the amenity value of such systems however, is still in its infancy, with specialized methods like Echols and Pennypacker’s *Artful Rainwater Design* (2008) taking the lead in advocating for the use of SWM systems in a way to maximize their amenity value. Because of the top down nature of regulation by the city, and response by developers, there is very little awareness of the possibilities that designing with the use of SWM as a site feature may bring. Because of this lack of awareness, bringing up the concept of integrating amenity value in SWM frequently became a discussion of the general limitations of the SWM requirements of the TGS, rather than a specific discussion of the amenity value of the proposed systems.

Due to the nature of the TGS, and its effects on various parties, professionals represented in the study were limited to one each of a developer, landscape architect, and engineer. The developer who was interviewed was an excellent candidate to respond, because of the level of personal involvement that he takes in the design process. Others who were contacted did not feel that they would be qualified to answer the questions because of their potential technical nature.

The lack of contact from the City of Toronto seems to make the study somewhat one-sided, in that due to the small sample size of other informants there may not be a broad representation of the concerns of the local building industry at large. To mitigate
this, the informants that were interviewed were selected to ensure that they have not worked on projects together. This measure at least ensured that three independent sets of views were returned.

The lack of contact with City of Toronto staff also precluded the original intention to identify completed projects and their designers that implement the TGS through the City. Since this information is not publicly available existing contacts had to be used to find key informants, as previously described.

6.2 Areas of Future Research

The development of green development standards is still a fairly new phenomenon. As such, it is expected that these standards will evolve and be refined so that the requirements that are mandated may become easier to implement. Further possible areas of research may include:

- The effectiveness of current standards to reduce site runoff.
- What is an appropriate scale for local stormwater management? Whether an individual urban site is the proper context in which to attempt to implement stormwater runoff reduction measures, or whether it should be taken to a larger neighbourhood scale, and what the size of such a neighbourhood stormwater system should be.
- A perception study of how stormwater amenity features improve the aesthetic values of a site.
- Market research on incentives that would stimulate increased adoption of sustainable stormwater practices, thus increasing consumer demand.

- Education programs to inform professionals and developers of possible measures that would meet green development standards and increase the market value of their properties.

- An examination of whether the effort needed to create and maintain a local green standard is worthwhile, or if larger national standards such as LEED would be more appropriate, with local conditions added as supplements to those systems.

- Would a point system similar to LEED in which criteria may be selected and met as appropriate to a site offer greater flexibility in a green development standard?
6.3 Recommendations for Improvements to the Toronto Green Standard

Throughout the course of this study, it was identified that several improvements could be made to the TGS so that the end result might better serve the purpose of environmental sustainability. The Fort Collins, Colorado Stormwater Standards and Guidelines aptly raises the question which should be addressed in during the process of developing standards, and when designing the systems that are required to conform to them: “How will the stormwater facilities be designed as an amenity rather than a necessary nuisance for this project?”

The following recommendations are therefore offered so that the TGS may progress toward the goal of providing sustainable SWM solutions in its next iteration.

- The City needs to seek input from the design community. A system should be developed by which input from design professionals and developers may be obtained to amend the TGS to address concerns and frustrations with the current system.

- The design community also requires a method by which to contact the City to receive clarification on site specific matters, rather than submitting a full set of drawings and waiting for comments.

- Provide an allowance for site specific restrictions. In cases where underground parking structures extend to the limits of the site, alternatives to specific on site
SWM development in the local area could be considered, either on City property in the boulevard, or improvements to a local park, rather than paying cash-in-lieu to work on an unknown project at a future time.

- A less easily bypassed requirement to re-use captured water on site would encourage more creative use of water, rather than the capture and release method that is common today. Requiring this use, rather than allowing an alternative as WQ 2.2 presently does would level the playing field by at least making everyone incur the same costs, rather than letting a designer choose a cheaper and less sustainable alternative. This would prevent the sacrifice of amenity value in order to meet performance targets.

- Long term maintenance issues need to be addressed. The nature of the systems that are being installed requires specialized measures to keep them operating at peak efficiency. Without that attention, they will quickly deteriorate to a point of performing like conventional systems.
6.4 Research Summary

The intent of this thesis was to explore the measures that the Toronto Green Standard recommends for stormwater management, how they may contribute to site amenity, the difficulties that are being encountered when implementing the TGS so that improvements could be suggested to further improve the TGS. Over the course of the study, it was discovered that the SWM requirements of the TGS at present do not mandate the currently accepted concept of sustainable SWM. While the standard itself does not mandate the implementation of amenity in the systems that are required to meet the TGS, the suggested methods that are offered for consideration by designers are all fully capable of being used in creative and artistic ways in order to create aesthetically pleasing spaces that serve the user. Interviews with design professionals indicated that there is a general sense of frustration with the implementation of the TGS, in that it at times seems to hinder good design, and instead focuses on meeting performance criteria that in the overall scheme of things only serve as an indicator of one factor in a larger system that must be considered as a whole. Fortunately, this communal frustration also indicates that design professionals and developers understand the situation that we face as a design community: that sustainable practices are required going forward. If the implementation of the TGS could be refined, the result would surely be a higher quality of development, both in stormwater management capacity and better user experience.
References


## WATER QUALITY, QUANTITY AND EFFICIENCY

For New Mid to High-Rise Residential and Industrial, Commercial and Institutional (ICI) Development

<table>
<thead>
<tr>
<th>Development Feature</th>
<th>Required Tier 1</th>
<th>Voluntary Tier 2</th>
<th>Specifications, Definitions and Resources</th>
<th>Potential Strategies</th>
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<tbody>
<tr>
<td>Construction Activity</td>
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<td></td>
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<td>Erosion and sediment control plan</td>
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<tr>
<td>Stormwater Retention (Water Balance)</td>
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<td>Green roofs</td>
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<tr>
<td>Minimize stormwater that leaves the site</td>
<td>WQ 2.1 Retain stormwater on-site to the same level of annual volume of overland runoff allowable under pre-development conditions.¹</td>
<td></td>
<td>1. See Wet Weather Flow Management (WWFM) Guidelines Table 1 for summary of required stormwater management targets: <a href="http://www.toronto.ca/water/protecting_quality/wwfm/docs/pdf/wwfm_guidelines_2006-11.pdf">www.toronto.ca/water/protecting_quality/wwfm/docs/pdf/wwfm_guidelines_2006-11.pdf</a>.</td>
<td>Rainwater harvesting</td>
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<td></td>
<td>WQ 2.2 Retain at least the first 5 mm from each rainfall through rainwater reuse, on-site infiltration, and evapotranspiration.¹ OR Ensure that the maximum allowable annual runoff volume from the development site is no more than 50% of the total average annual rainfall depth.</td>
<td>WQ 2.3 Retain 25 mm from a 24 hour rainfall event for rainwater reuse, on-site infiltration and/or evapotranspiration.³</td>
<td>2. Use tree and shrub planting, green roofs and other landscaping, to increase evapotranspiration from the site, and to increase the amount of permeable surfacing on site.</td>
<td>Permeable pavers, permeable asphalt, permeable concrete for hard surfaces</td>
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<td>3. The facility must be capable of retaining subsequent rainfall events up to 5 mm within 72 hours without overflow. The maximum resident time of the retained run-off must not exceed 28 days.</td>
<td>Greening of impervious areas such as alleys, fire lanes and parking lots using permeable paving materials, trees and vegetation</td>
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<td></td>
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<td>• These measures come from the WWFM Guidelines which provide stormwater practices so that source control is undertaken as a priority to the extent physical factors allow. When source control practices are exhausted, the WWFM Guidelines provide conveyance and end of pipe practices.</td>
<td>Downspout disconnection</td>
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<td>Infiltration trenches</td>
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<td></td>
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<td>Rain gardens/ absorbent landscaping</td>
</tr>
</tbody>
</table>

³ Goes beyond the WQ 1.1 requirement by increasing rainwater retention and reducing the volume of stormwater runoff.
## WATER QUALITY, QUANTITY AND EFFICIENCY

For New Mid to High-Rise Residential and Industrial, Commercial and Institutional (ICI) Development

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<td></td>
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<td></td>
<td>• These measures come from the Wet Weather Flow Management Guidelines. The guidelines provide stormwater practices so that source control is undertaken as a priority to the extent physical factors allow. When source control practices are exhausted, the WWFM Guidelines provide conveyance and end of pipe practices.</td>
<td>Mechanical or natural treatment systems such as: vegetated filter strips, bio-swales, sediment traps, oil/grit separators</td>
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# WATER QUALITY, QUANTITY AND EFFICIENCY

For New Mid to High-Rise Residential and Industrial, Commercial and Institutional (ICI) Development

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<th>Potential Strategies</th>
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<tbody>
<tr>
<td></td>
<td>WQ 4.1 Use water efficient plant material for at least 30% of landscaped area (including vegetated roofs and walls).</td>
<td>WQ 4.2 Install water fixtures and appliances that achieve at least a 30% reduction in potable water consumption for the building (not including irrigation) over the baseline water fixtures and appliances.</td>
<td>2. If potable water is not used for soft landscape irrigation, this target is not applicable.</td>
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<td>WQ 4.3 Where soft landscaping exists on the site, reduce potable water use for irrigation by 50 percent.</td>
<td>3. Excluding commercial dishwashers, clothes washers and icemakers.</td>
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<td>4. Calculations will be based on occupant usage and baseline fixtures including: toilets, urinals, faucets, shower heads. Baseline fixtures include the following: toilets (6.0L), urinals (3.6L) faucets (8.3 LPM), shower heads (93 LPM).</td>
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<td></td>
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<td>5. Methods to reduce potable water use for irrigation include: plant species appropriate to local conditions, high efficiency irrigation, use of captured rainwater and use of recycled wastewater.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Toronto Water’s Water Saver program assists major ICI sector water users to reduce water use <a href="http://www.toronto.ca/watereff/ici_water_saver.htm">www.toronto.ca/watereff/ici_water_saver.htm</a>.</td>
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<td>• High efficiency hot water fixtures and appliances reduce the amount of energy consumed for hot water heating. For more information on ENERGY STAR refer to: <a href="http://www.ese.nrcan.gc.ca/energy-star/index.html">http://www.ese.nrcan.gc.ca/energy-star/index.html</a>.</td>
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Appendix B: Certificate of Ethical Approval

<table>
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<tr>
<th>Certification of Ethical Acceptability of Research Involving Human Participants</th>
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<tbody>
<tr>
<td><strong>APPROVAL PERIOD:</strong> February 24, 2012 to February 24, 2013</td>
</tr>
<tr>
<td><strong>REB NUMBER:</strong> 12JA040</td>
</tr>
<tr>
<td><strong>TYPE OF REVIEW:</strong> Delegated Type 1</td>
</tr>
<tr>
<td><strong>RESPONSIBLE FACULTY:</strong> SEAN KELLY</td>
</tr>
<tr>
<td><strong>DEPARTMENT:</strong> School of Environmental Design &amp; Rural Development</td>
</tr>
<tr>
<td><strong>SPONSOR:</strong> N/A</td>
</tr>
<tr>
<td><strong>TITLE OF PROJECT:</strong> Performance or Amenity: Re-evaluating how the Toronto Green Standard mandates Stormwater management control and how they may be adapted to increase amenity</td>
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</table>

The members of the University of Guelph Research Ethics Board have examined the protocol which describes the participation of the human subjects in the above-named research project and considers the procedures, as described by the applicant, to conform to the University’s ethical standards and the Tri-Council Policy Statement.

The REB requires that you adhere to the protocol as last reviewed and approved by the REB. The REB must approve any modifications before they can be implemented. If you wish to modify your research project, please complete the Change Request Form. If there is a change in your source of funding, or a previously unfunded project receives funding, you must report this as a change to the protocol.

Adverse or unexpected events must be reported to the REB as soon as possible with an indication of how these events affect, in the view of the Responsible Faculty, the safety of the participants, and the continuation of the protocol.

If research participants are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and approvals of those facilities or institutions are obtained and filed with the REB prior to the initiation of any research protocols.

The Tri-council Policy Statement requires that ongoing research be monitored by, at a minimum, a final report and, if the approval period is longer than one year, annual reports. Continued approval is contingent on timely submission of reports.

**Membership of the Research Ethics Board:** B. Beresford, Ext.; F. Caldwell, Physician; K. Cooley, Alt. Health Care; J. Clark, PoliSci (alt); J. Devlin, OAC; J. Dwyer, FRAN; M. Dwyer, Legal; D. Dyck, CBS; D. Emslie, Physician (alt); H. Gilmour, Legal (alt); G. Holloway, CBS (alt); B. Ferguson, CME (alt); S. Henson, OAC (alt); D. Dyck, CBS; D. Emslie, Physician (alt); H. Gilmour, Legal (alt); G. Holloway, CBS (alt); B. Ferguson, CME (alt); S. Henson, OAC (alt); L. Kuczynski, Chair; J. Minogue, EHS; l. Newby-Clark, Psychology (alt); L. Niel, OVC (alt); A. Papadopoulos, OVC; B. Power, Ext.; L. Robinson, CBS; V. Shalla, SOAN (alt); L. Son Hing, Psychology; J. Srbely, CBS (alt); T. Turner, SOAN, E. van Duren, CME.

Approved: per

Chair, Research Ethics Board

Date: ____________________
Appendix C: Key Informant Interview Request Email

Interview Request - Professional and Developer

Good day,

I am a graduate student at the University of Guelph, working on my Master’s thesis in Landscape Architecture at the School of Environmental Design and Rural Development under the direction of Sean Kelly. I am hoping to obtain your input in my study on increasing the usefulness of stormwater management systems as site amenity in projects that implement the Toronto Green Standards.

My research is exploring the existing implementations of Stormwater management aspects of the Toronto Green Standard, in order to determine whether the measures which are being implemented are being designed to provide a value as a site amenity, or simply meet performance goals for the Green Standard Checklist. The intent of the study is to provide recommendations for future Green Standard developments in order to achieve increasingly beneficial results for both developers and regulators.

I hope to interview you, or a member of your staff that has experience in the following:
- Have worked on projects that have been required to complete the Toronto Green Standards Checklist
- Have experience with developments not required to meet the Toronto Green Standard, either in Toronto or other municipalities.
- Have some familiarity with what end users look for in their properties.
- Be willing to participate without compensation.

Thank you for reviewing this request. Please let me know if you require further information prior to agreeing to participate in this study.

Regards,

Eriks Kalvins, MLA Candidate, University of Guelph
Interview Request - City

Good day,

I am a graduate student at the University of Guelph, working on my Master’s thesis in Landscape Architecture at the School of Environmental Design and Rural Development under the direction of Sean Kelly. I am hoping to obtain your input in my study on increasing the usefulness of stormwater management systems as site amenity in projects that implement the Toronto Green Standards.

My research is exploring the existing implementations of Stormwater management aspects of the Toronto Green Standard, in order to determine whether the measures which are being implemented are being designed to provide a value as a site amenity, or simply meet performance goals for the Green Standard Checklist. The intent of the study is to provide recommendations for future Green Standard developments in order to achieve increasingly beneficial results for both developers and regulators.

I hope to interview a member of your staff that has experience in the following:
- Reviewing projects for compliance to the Green Standards checklist.
- Has experience reviewing projects prior to the development of the Toronto Green Standard.
- Familiar with municipal Stormwater management policies.
- Be willing to participate without compensation.

Thank you for reviewing this request. Please let me know if you require further information prior to agreeing to participate in this study.

Regards,

Eriks Kalvins, MLA Candidate, University of Guelph
Appendix D: Interview Guide

Developer

1. Could you describe your perceptions of the Toronto Green Standards? At this time do they appear to be a set of guidelines by which a better end product may be achieved, or just another step which has to be completed prior to gaining approval?

2. Does it seem that the required measures provide any value to the end user? Complement other site amenities that you would normally install?

3. In projects in which you have had to comply with the Toronto Green Standards, did you see any merit in attempting to reach Tier 2 of those standards?

3a. Was the additional effort to reach Tier 2 worth it for the discounts in development fees offered by the City of Toronto?

4. Have any of your past projects implemented any other form of Green Development Standards? (LEED, SSI, etc.) Were there any factors that motivated you, or would motivate you to choose one standard over another?

5. Is there any perceived value in complying with the Toronto Green Development standards, versus other systems (LEED, SSI). Do you think this should be more thoroughly advertised to the public to build their awareness?

6. If two systems with equivalent performance and similar cost were available that reduced Stormwater Runoff and thereby met the Toronto Green Standards, have you encountered any indication that a system which provides greater amenity value to the end user would provide a greater return on the investment rather than a system that is invisible to the users? Would it be worth paying a premium to implement a system that provided greater amenity to the end users?

7. Do long term maintenance factors play a part in deciding what stormwater management systems to implement in a new development?
Design Professional

1. Could you describe your perceptions of the Toronto Green Standards? At this time do they appear to be a set of guidelines by which a better end product may be achieved, or just another step which has to be completed prior to gaining approval?

2. Does it seem that the required measures provide any value to the end user? Complement other site amenities that you would normally install?

3. In projects in which you have had to comply with the Toronto Green Standards, did you see any merit in attempting to reach Tier 2 of those standards?

3a. Was the additional effort to reach Tier 2 worth it for the discounts in development fees offered by the City of Toronto?

4. Have any of your past projects implemented any other form of Green Development Standards? (LEED, SSI, etc.) If so, which ones?

4a. Did any of these standards reward greater amenity use of the Stormwater Management features?

5. In your experience, has conforming to the Toronto Green Standards provided an increased perception of value or prestige to the project, versus other systems? (LEED, SSI)

6. How do existing requirements motivate the use of Stormwater management solutions that are both effective and add amenity value to the site, if at all?

7. Has there been a demand from your clients to implement systems that add amenity value, or meeting the standard at the lowest cost possible the primary concern?

8. How do long term maintenance factors play a part in deciding what stormwater management systems to implement in a new development?
Appendix E: Interview Transcript #1

Time and date of interview: 10:00AM ET, March 22, 2012

Location: Etobicoke, Ontario

Interviewer (EK) Eriks Kalvins

Respondent (R)

EK: So what I’m looking at is how the Toronto Green Standards are implementing stormwater management, and how, if at all, it is providing amenity to the site as well. Using a definition of amenity as anything that can be a selling feature for the end user, so either a public space, using it as watering for plants, etc. Right now they’re asking us to collect water, but it’s not going anywhere. So I’ve got a few questions to go through, if you can answer, or even if you don’t know that’s an indication that they’re not teaching us as well. So, could you describe your impressions of the Toronto Green Standards? Do they seem to be a set of guidelines right now to deliver a better project or are they a step to getting the approvals process done?

R: Well, when you refer to the Green Standards when you’re talking about that, are we focusing just on the stormwater components of it? Because there so many things, solid waste, bird migration, a whole bunch of different things.

EK: Yeah, I’m looking more at the stormwater management part of it as related to the five things they want for water quality and quantity that they’re capturing on site.

R: Yeah, The reality is, in principle I get it. We want to capture or contain this water and then slowly discharge it into the system, because we’re not necessarily treating it on site. So they’re very different philosophies, because if we’re having the conversation about infill, which in most cases this is really what it is in the City of Toronto, you’re capturing or I should say in most cases you’re collecting water on a roof, a green roof or a live roof, and the sites typically have very limiting site areas, so you’re into sort of creative solutions to capture, very much what we did on Watermark, right, we built sort of an underground cistern to hold it and fire it out. What we’re finding is that the design parameters around calculating the flow of water, they’re forcing us to put in orifice plates to control the flow. We’re putting in all these measures in place, but we’re never going to retain any water, because the orifice plate will never be at 100% capacity, and the freeboard in that what we’re storing on site between the invert of the orifice plate and whatever we’re capturing in that area are small quantities of water. They’re not huge quantities. We’ve done a certain phase of the project where they’ve asked us to put in underground storage tanks that would allow infiltration into the soil, so if there’s a backup of water, water would back into these tanks,
splash around and then go through a granular bed and go into the soil, so they rely on the percolation rate of the soil to dissipate some of the water, so in that case you are treating some of that water. So, to answer your question, I think they are helping, to say here are some good things to do, but not recognizing that on a site by site basis they can’t be accomplished and become an obstacle, like a serious obstacle, because the guys reviewing the TGS are reviewing it and saying that you need to do this... well, we can’t because there are engineering limitations here that are impossible, and that creates a real delay, one more delay in that system of approvals. There are enough engineering challenges as it stands, but you throw that in to the mix and it becomes pretty problematic.

EK: And it’s not like its too broad that you’re actually not trying to get into a site specific thing, so you’re eventually trying to meet the checkmark.

R: That’s right. One common, funny requirement is that they ask for permeable pavers. Well, ok, in an infill situation typically your building envelope goes from property line to property line to property line, and in most cases any surface parking, amenity areas and so on are sitting on a garage deck, so in actual fact the permeable paver requirement is an increase in cost to us, but the water is not draining into the soil. Its going into a drainage layer and its going into the sewer, cistern storage tank and back into the sewer. So I think the intent is great, but the application has failed, like in how they’re actually imposing it on various developments, so I think if anything its a hindrance. Its an obstacle as opposed to being something good, and I’m all for it, don’t get me wrong. I’m all for the principle, but how it’s being applied is difficult.

EK: And it doesn’t seem that the measures that they’re asking for are giving anything to the end user.

R: No, absolutely zero, none. The storage on site, the gray water, the water on site that we’re collecting, there’s not enough of it to rely on it as a permanent source. So for example if I said well, the irrigation, of the landscaping irrigation I’m gonna rely on siphoning the storage tank, and the water being stored, I’m gonna use it for underground sprinklers, I can’t because there may only be a one day supply, and if we don’t hae any rainwater then what do we do? We need a system where if system A fails and you go to system B? It becomes very costly. So in principle its great, but in practical terms its difficult to implement.

EK: Have you done any projects that have tried to achieve Tier 2?

R: We haven’t. We’ve looked at the requirements for tier 2, and the consensus in our industry is that to meet tier 2, will actually cost you more than the rebate that you’re going to get back. So for example, if you say that we’re going to credit you 20% of your development charges back, if you meet tier 2, the problem with the way they’ve outlined that is they're basically saying, look meet tier 2, and once the building’s finished, and once the dust has settled and once we’ve had a
chance to evaluate it, maybe, maybe we’ll rebate you back the 20%. But the cost
to us as a line item in our budget to meet tier 2, or what we believe will meet tier
2, is huge. It actually will be equal or slightly more than what that rebate is, so
we sit back and look, that for example if we’re going to spend $200000 to meet
tier 2, and the saving is only $205000 or $210000 back on our DC charges, but is
subject to some sort of scrutiny at a later date two years after the project is
finished, why take that risk? Because you know that at that point the city may
change their policy, and say well, we’ve evaluated and this or that and whatever,
so we’ve committed up front to the cost, but you don’t have any certainty down
the line that you’ll get that money back.

EK: And you’ve put up the cost already...

R: That’s right, exactly, so that’s why it’s not as attractive, and we’ve looked at it, and
if we can achieve some of the elements fine, but there’s not a forced effort to
meet the criteria.

EK: Similarly, have you done any other Green Development standards like LEED or
Sustainable Sites?

R: We haven’t, we did some commercial stuff where they were free standing
buildings where we looked at the Green Standard as it was first coming out last
year and implemented some stuff in terms of reflective roofs and different thing,
but not necessarily. We’re finding that the end consumer is not acknowledging,
there’s no financial gain for them, and that’s what it boils down to. While there’s
some social responsibility to say “ok, this is the right thing to do.” We should be
buying in a building, if we put two buildings side by side one building has a green
roof, stormwater retention, recycled gray water and all this fun stuff, and the
building next to it didn’t, and there was a $10 per square foot or $10000 disparity
in price, they would opt to go to the cheaper building rather than the building that
had all the right stuff in it, and that’s the reality. Whether the consumer
behaviour, I don’t know, but that’s what’s happening on the street, so it makes it
difficult for us to inherit those additional costs to say that we did the right thing,
but in the end of the day it’s a business and I think its fair to say that someone will
not go into business to lose money.

EK: So there is no perceived value in the Green Standard?

R: No.

EK: If you did something like LEED it would have a bit of a kick saying that it’s a
LEED Platinum building?

R: The condo dwellers are short term thinkers, so they’re looking at one or two
years. And if you and I were having a discussion about a building, like an office
building that was owned by us that we were responsible long term for utility
consumption, I would say that the more efficient I make my building, the lower my costs, the more competitive I can be with the marketplace. That’s an edge as a landlord or building owner. As a condominium owner, unit owner, where they are one two hundred and ninetieth share of a building, their thinking is short sighted. They’re thinking “yeah so what? I can’t see that if it’s a LEED building that for example have certain energy efficient models and management systems, at the end of the day its proven that these systems that LEED allows you to implement, and whether its head recovery systems and so on, all that as a package it will save you money long term, but the end consumer, it doesn’t translate right back into their balance sheet. They don’t see that savings. So they see that they’re moving into a condo for a 1-5 year window, who cares what happens, I don’t, and in 3-5 years I’m outta here, and so be it. So they’re looking at it as a short term liability as opposed than a long term. And that’s why its my opinion that the LEED buildings, the consumer has zero value, or very small value.

EK: So its more of a corporate perception thing like for a commercial company moving into a building saying that our building is a LEED Platinum building is more of an image thing for them.

R: Thats right, a lot of the national tenants and a lot of national companies, the blue chip companies have said they’ve amended their code of ethics or their mission statements and they’ve penciled in that we want, for example we have Starbucks as one of our tenants, and they’ve written into their schedule that their stores must be LEED certified. Well, their stores are so small and the economic model doesn’t make any sense for us to go and LEED certify a store for them, but they want the ability to say corporately “hey we’re doing all the right stuff.” And so, if they’re prepared to pay for it great, is the end consumer buying their coffee prepared to pay more money for their coffee because they’re buying their coffee in a LEED certified building? I don’t think it translates that nicely. There’s a bit of fog on that issue.

EK: Ok, back a bit more to the stormwater, if you had two systems that had equivalent performance and similar cost for stormwater and met the green standards, do you think there’s any indication that the end user would pay more for that kind of thing?

R: The system would have to be obvious. For example, Watermark, we’re collecting rainwater on the roof, we’re treating some of it up there, we’re storing the balance at grade and basically releasing it. How do I explain it to the consumer as an advantage? I’m unaware of a program or a feature that could take storm water and make it a positive thing, outside of the fact if you have a pond as an example. So if you were saying to me, hey Mark, we’re going collect all this water and dump it into a decorative pond that creates an amenity space and creates a water feature, yeah ok, fine there’s some value there. Will the consumer say, hey, I’m going to buy here, or I like that specifically because the water in the pond is coming from the roof of the tower above. Maybe one out of
ten people will identify that as a positive, but how do you convert that into a positive or something tangible for the consumer or occupant to say this is a great thing and look what the stormwater’s doing.

EK: And on the other side you get the site is so small so you don’t have the space to do it anyways.

R: Exactly, yeah, and whatever you can do, the municipalities are looking to you to say “satisfy this requirement” you say you can’t, you demonstrate from an engineering perspective that you can’t, and they turn around and say we’re going to charge you a cash in lieu for that. So if you can’t meet the requirement give us money. Well, that’s great, but then where does that money go? Does that money go right into a coffer or purse for infrastructure improvements, maybe, but it could be in a completely different municipality. It could be at Yonge and Sheppard and meanwhile we’re doing a project in South Etobicoke, so they’re very different. It’s hard to understand where their head’s at, as to if we can’t meet it are we penalizing them by charging them a cash value, or is that the equivalent money we would need to otherwise treat the water off site?

EK: And you don’t know that that money’s going to treat the water off site, it could be something else completely.

R: That’s right, exactly.

EK: And then, do the longterm maintenance factors play a part in deciding what storm water management systems to implement, or is it just what can be done?

R: No, that’s a huge requirement, because what happens is that we have to build into our budgets line items for maintaining a green roof or a live roof. This will be the first one we’ve ever built [Watermark], does it require any maintenance long term? Maybe, I’m not sure, it shouldn’t, I think the intent there is that it maintains itself. But when you take for example oil and grit separators that help to treat the water and look at these storage retention tanks, long term they’ll require capital improvements and repairs, how does that translate to dollars? Well, over a ten year span it could affect, depending on how many people are contributing to this system, it will affect them cost wise long term. That would be an obvious concern, its one more system that they will have to maintain. Now, that may be sort of an odd statement to make, because you could say well, all you’re doing Mark, is you’re pushing it off site, so if you’re not dealing with it on site, you’re now pushing it into the public system and the public system’s dealing with it, so I guess at some point someone’s gonna pay for it.

EK: Well, that it for my questions, do you have anything else you’d like to add?

R: I mean its a very interesting topic, the municipalities have implemented this, they’ve said we’re now doing this and implemented this standard, but I think
admittedly that they haven’t consulted enough with the industry, especially now that now has been subjected to the standard, to say “tell me, give me some feedback where this thing short circuits”, because right now everyone’s digging their heels in saying no, you have to do this, but in some cases you physically can’t.

EK: Well, great, thanks for your help on this.
Appendix F: Interview Transcript #2

Time and date of interview: 1:00PM ET, March 22, 2012

Location: Markham, Ontario

Interviewer (EK) Eriks Kalvins

Respondent (R)

EK: Lets begin: Could you describe your perceptions of the Toronto Green Standards. At this time do they seem to be a set of guidelines by which a better product may be achieved, or are they something to be completed prior to getting approval?

R: More or less, I mean, the idea’s good, but now everyone is treating it as a way to get approval. You have to do it to get approval.

EK: So there’s no, um..

R: I’m not sure there’s a lot of follow-up from the city:

EK: And it’s come down to being great in concept but not looking for...

R: The practical functioning of it is questionable.

EK: Does it seem that any of the measures that they’re looking for are providing anything to the end user?

R: Yes, its does, I mean with respect to not necessarily greening but the fact that you’ve got to store storm water on site to control the hundred year to the two year. That’s gonna be done regardless, and that’s a physical thing, you put storage tanks in, pumps, orifices, reducing pipe sizes, that kind of thing, thats gonna happen, so there is going to be restricted flow going out into the storm sewers. There’s no follow up with that, so that’s in place, thats good

EK: And even then, thats only something that’s invisible, say for a townhouse complex, its known to the developer and they paid for it, but its not being used in a way that will actually support the people living there.

R: No, they don’t see any benefit unless when you’re storing the stormwater you use it for irrigation purposes or green roofs.

EK: Have you worked on any projects that had to meet Tier 2 of the Green Standards?
R: No, actually, no, not yet, just Tier 1. There was thought to go to one but then it got very restrictive with the amount of stormwater that we had to store that almost doubles I believe from 5mm for an area to 25, and that becomes tremendous amount.

EK: So it would be more of a goodwill thing that they’re trying to get rather than the benefit of getting the discounts on the development charges.

R: All we would see is that we have to build a bigger storage tank from our viewpoint for what we would have been involved in, so it comes down to cost.

EK: Have you worked on any other form of green development standards like LEED or SSI?

R: We’ve had a couple LEED projects, couple green roofs, one in Markham. We don’t do the design obviously, but the Landscape Architect designs them and there are irrigation consultants that will tell us what amount of water is needed to property irrigate the green roof and landscaping on site and we have to provide that amount of water as our base flow in our storage tank, on top of the 100 year flow.

EK: So those were actually using the water as an amenity to help with the site. And I guess that was required in the LEED?

R: It was a way of giving back, so yeah, Markham doesn’t really have the LEED program but would like you to meet a certain level of LEED.

EK: In your experience have you seen anything in the Green Standards that provides an increased value of prestige verses other programs, like the LEED, if you get a certain level like Platinum, where as the Toronto Green Standard, from what you’ve heard.

R: We only have a small part of it from Stormwater Management. Usually its big buildings that are built with underground garages from prop-line to prop-line, so we don’t have any opportunity to infiltrate like we would in townhouse sites. So when you’re working downtown, it depends on the project, so you have nowhere to do the water balance, so you have to figure out ways to deal with the water balance, which we’ve said irrigation. Ok instead of infiltrating, we’ll give back by using that water for irrigation purposes.

EK: And even then its still a temporary thing, because once its empty, its...

R: Yeah, if you have a drought, to replenish the tank is probably not gonna happen, so there’s water there for I think 24 hours and at that point it doesn’t happen, so the regular taps and hoses, sprinklers get turned on, so there are limitations how you can keep that going too, realistically.
EK: So existing requirements don’t really motivate any kind of use for that.

R: We had a townhouse site in North York, at Bathurst and 401, where again it was 11 townhouses fronting the street with an underground garage at the back. Again, it was a little plot of land that you could possibly infiltrate in. You can’t infiltrate too close to the unit, so with those requirements it just wasn’t a big enough space or far enough away from the houses. And the only water balance option that was available to us was to propose rainwater barrels. Well, ok, so we proposed that and it got approved. Wonderful. Then who implements it? Who makes sure at the building department that the water barrels get installed? And if they do get installed on the back patio, the homeowner’s probably gonna say “I’d rather have a barbecue there rather than a rain barrel”, so it’s gone. How do you control it? So that’s an example of doing it to get it approved.

EK: Have you seen any demand from clients for a kind of system that adds more to the site?

R: Our clients just want to get it approved. Just cut and dry. If that’s what you have to do, that’s what you have to do. That’s their attitude, most of them.

EK: So would you think that if there was a requirement for using the water as an amenity it would be kind of leveling the playing field?

R: It would, but that would take a lot of co-ordination between technical services, the building department and plumbing to actually make sure that it’s done within the city in the various districts, which I don’t see to date. So its kind of a hodge podge from there, we may get approved drawings, but I don’t know where it goes from there in the building process or if the building will ever see that an implement the rain barrels.

EK: And then, on the maintenance of these things, what kinds of maintenance factors do these implement?

R: Well, you’re supposed to submit manuals if you get a storm-ceptor or CVS, stormwater quality system, they give you a manual on the suggested cleaning schedule this kind of thing, and you retain their company to come out with the vacuum truck and clean it, and it becomes a cost thing too. If the builder, developer gets approval, gets the manuals, and gives it to the condo corp, a private corporation to actually implement it and do it every year, they see that as a cost and they may not, why would we do that?

EK: And there’s no ongoing requirement to do it because the builder’s out.

R: Yeah, you have the homeowner, so who’s going to implement that from the city. They’re cutting back on inspectors and staff and everything else. There’s no one
gonna be supervising this stuff. The same with permeable pavers, that's the catchy thing now, but all things I've heard about, they're great initially, but unless they're, apparently you've to almost get a street sweeper out almost once a year to make sure the crevices are cleaned out and not solidified, or else, if you don't it just becomes an impermeable surface and you don't get any infiltration, so you spend double the cost to install it and after a year it's not functioning,

EK: The same as the previous system...

R: Yeah, you might as well just pave it. But to pave it isn't providing the details and requirements of the city to get it approved, so there's a disconnect there too. So it does lead itself to propose something even though most people know that really it's not gonna function in a year or so, same as the storm-ceptors and CVS, unless they're pumped out once a year, if all the stuff gets to the bottom and not pumped out you're just gonna get the pipes flowing through and you have just act like a regular manhole.

EK: Right...

R: The city guys are complaining too. I've talked to guys in the Engineering department, they say that's the fallacy of the system, that after a year they're not gonna work, but we require them on every site.

EK: So that's the story?

R: Yeah, I mean it's kind of a dim story, but that's the reality. There's a disconnect between getting approvals and the grandiose theory of it, and the practicality.

EK: That's the end of my questions.

R: I don't want to be dark and grey about it, but that's probably what you thought.
Appendix G: Interview Transcript #3

Time and date of interview: 2:00PM ET, March 23, 2012

Location: North York, Ontario

Interviewer (EK): Eriks Kalvins

Respondent (R)

EK: So you know how I’m using the definition of amenity for anything that adds a feature to the end user of the site, so aiding to using it to planting irrigation or a visual feature, or anything like that. So I’m looking at how the stormwater aspects Toronto Green Standards implement that, if at all. Could you describe your perceptions of the Toronto Green Standards? At this time do they appear to be a set of guidelines to be used to get a better end product, or just another step that has to be completed prior to getting approval?

R: I’d say that it’s a little bit of both. Right now it feels more like a step or requirement for approval. I like it in the sense that it gets people thinking about ways to be more sustainable while creating more aesthetically pleasing spaces and more functional spaces, but at the same time I think it needs work and by getting feedback from professionals using it, it could be improved.

EK: Does it seem that any of the required measures that are being asked for give anything to the end user, or does is it more of a mechanical set of standards that is being asked to be met and not serving the end user as well?

R: I’d say that the balance goes to the latter right now, again with improvements it could be different and provide more benefits to the end user. Things that would actually provide benefit right now would be to actually get people to put more shade trees on sites, which sometimes goes beyond our control, and if it’s a requirement then people will find ways to incorporate that measure on site.

EK: Right, but that would be more for the Green Canopy where that helps, not necessarily stormwater management aspects of the standards where they’re not asking for anything particularly relating to stormwater like taking the water and using it for irrigation. Right now it asks us to capture the water, but it doesn’t say to specifically say use that water for irrigation purposes.

R: Right, unlike LEED it doesn’t ask you to re-use it, where as with the LEED requirements it asks you to take several steps beyond. So if they actually restructured it so you’re using the water to further benefit the end user or actually make a better site then it would be beneficial.
EK: In any of the projects that you’ve worked on have they required tier 2 of the standards?

R: One did, and then once we did tier 2 they wanted to use LEED.

EK: So they used that as a jumping off point and saw that, was it because they were putting that much effort in they might as well go for the LEED system?

R: Well, no, because tier 2 still doesn’t get you to the point where you would be at Silver LEED. I think it was just, it came from another party, and they thought, well, we need to do LEED, how do the Green Standards measure up to the LEED requirements, and which ones do we try to meet, and the Toronto Green Standards always fell short of the LEED requirements.

EK: Was there any perception of additional value versus LEED? Like if having to conform to the Toronto Green Standards on one side versus conforming to LEED, if having to choose between two systems would one of them have more market appeal, with LEED having the additional prestige of going for LEED Platinum you can say that it’s an internationally recognized standard, versus do the Toronto Green Standards have that kind of thing?

R: No, it doesn’t. LEED you could use as marketing, as you said. That’s one of the benefits and unfortunately one of the driving forces. People try to go for more points rather than the main goal of the idea to make a more sustainable site, while trying to achieve those goals, not to the detriment of the end user. But, with the Green Standard, its a Yin and a Yang. It’s easier to achieve the green standard than it is to achieve LEED. Just to back up a bit, in terms of the Green Standard versus that, I think because its not as clearly defined and not as rigid, that’s its failing as well as its benefit, because its not as rigid so you have ways to get around things, where as you’re more restrained by LEED.

EK: Ok, with the requirements that stormwater management is asking for, have you seen any way that they're providing or attempting to add amenity and performance to a site, or is it purely going for the performance aspects.

R: Performance, and I have the perfect example for that: I recently worked on a project where we kept losing the amenity space to Green Roof requirements. It wasn’t just a case that the engineer needed to satisfy city requirements in terms of the amount of stormwater retained, but he kept saying that he needed more and more area. There weren’t any ways that you could accommodate meeting the performance that they wanted while still maintaining the useful areas of the site for the residents, so I found that frustrating.

EK: And has there been any demand from clients to implement systems that would add amenity value, or is it becoming a function now of meeting the standards at
the lowest cost possible which is becoming the primary concern so they can check off the box and get the development done?

R:  I think I've experienced both. There are some developers that just want to meet the standard, check it off and move on, and then there are other clients as well as architects who are frustrated by the requirement because they've worked on developments where it was performance based and it doesn't look pleasing to the eye. It wasn't designed with a higher guideline in mind in terms of what it's going to do for the building occupants in the years to come. It was just to meet the numbers. Then you get that sort of conflict between what the client wants, and then what's required by the standards.

EK:  So those clients would be willing to do something more pleasing, but because they have to meet the numbers they're going to do something less pleasing but check off the box.

R:  Exactly. But if they made some modifications to the standards and allowed a little more latitude, um, really all of the stormwater requirements should be based on context as well. You can't just apply a set of guidelines carte blanche to every project. It should always be site appropriate and site sensitive. And so, if there was more leeway, the client would be free to have some differentiation in terms of how they use these treatments, while still meeting performance. You can meet performance, but I think it should be reflective of the building and the development.

EK:  How do you see longterm maintenance factors as playing a part in the systems that are being implemented on new developments. Has there been any reference to them in the standards or is that being left to the future to see what happens there?

R:  No, that's a good question. There hasn't been any sort of guideline on maintenance, and the value of the system is largely determined how its maintained over the years, and that is something that should be modified.

EK:  Well, that's the end of my questions. Thank you for your time!