



Town of Ajax Rain Gardens Retrofit

CASE STUDY



Featured practice:

- Rain gardens (aka bioretention areas)

Groups involved:

- Town of Ajax
- Aquafor Beech Ltd.
- Hawkins Contracting Services Ltd.
- Fern Ridge Landscaping and Eco-Consulting
- J. Jenkins and Sons
- Hermanns Contracting
- Imbrium

Budget:

\$375,000

Construction:

September 9, 2014 to
November 28, 2014

In the fall of 2014, the Town of Ajax completed the construction of three bioretention areas that blend function with aesthetics. Located within a well-established community adjacent to lake front access and trail systems, the rain gardens (also known as bioretention areas) were constructed in the Town's road allowance and the parking area south of Lake Driveway West that services the washroom facility. This follows the recommendations of the Town of Ajax Stormwater Management Retrofit Master Plan which aims to improve water quality for South Ajax. The rain gardens are designed to provide effective water quantity management and improve the water quality by intercepting and treating stormwater runoff, all while enhancing and complimenting the surrounding neighbourhood.

The Town of Ajax boasts approximately 7 km of shoreline along its southern border on Lake Ontario that is fully accessible to the public. Visitors come to enjoy a section of the Trans-Canada Trail and the open spaces for a multitude of recreational activities while others simply come to enjoy the incredible views. Unfortunately poor water quality in the area has caused some beach postings and reduced public enjoyment of the area. The Town of Ajax is committed to improving this great public space by improving water quality along contributing drainage areas to enhance the visitor experience.

The Ajax rain garden retrofit is a first step towards creating a signature "Green Street" for the area. The bioretentions will enhance the existing streetscape and improve the water quality of runoff entering Lake Ontario.



STUDY SITE

The rain gardens are a pilot project for the Town and are located on the south side of Lake Driveway West between Harwood Ave. and Anstead Crescent. Since it was a retrofit, the Town had to balance being a leader in environmental sustainability with the concerns of local residents. Maintaining open views to the waterfront was essential as was ensuring the work provided minimal disturbance.



Figure 1. Study site location

Project Objectives

- Reduce stormwater runoff and improve the quality of the stormwater being discharged to Lake Ontario through filtration/infiltration systems.
- Use rain garden area vegetation to improve neighbourhood, park, and community aesthetics.

PLANNING AND REGULATION

The Town of Ajax completed a Stormwater Retrofit Master Plan Class EA in 2011 which included stormwater management retrofit opportunities and new stormwater management practices. Broken into two phases this site follows a recommendation from the EA and the Town's Shoreline Improvement Strategy. These three rain gardens are the first phase and were completed in the fall of 2014. In 2013 the Town began the process of getting the bioretention areas constructed by distributing a Request for Proposals for the detailed design and specifications for the construction of the roadside rain gardens. Aquafor Beech Ltd. was selected for the job, and preliminary surveying was done in October 2013. A public Information Center meeting was held in March 2014 to review details of the project and address any concerns. The Town received positive feedback at the public meeting and the project has been well received by the community. Hawkins Contracting Services Ltd. was selected through the Request for Pre-Qualification for General Contractors and submitted its bid for the Request for Tender in July 2014. Hawkins Contracting Services Ltd. completed construction on the bioretention areas by late November, 2014. Aquafor Beech Ltd. is monitoring the site for two years and will supply a report with

recommendations on other potential projects of this nature. From the outset of this project, the Town intended for this site to serve as a local example of how to intergrate Low Impact Development (LID) into an existing built out area, while remaining sensitive to community concerns.

DESIGN

Designed by Aquafor Beech Ltd., the road retrofit consists of three rain gardens that treat and infiltrate road and parking lot runoff from the park property. The aim was to improve stormwater management. Aside from improved stormwater management, some of the top priorities were to complement the waterfront park, maintain open views and pedestrian connections, and keep existing trees as much as possible.

For specific information on individual LID practices please refer to the LID Stormwater Management Planning and Design Guide (TRCA and CVC, 2010).

Rain gardens

Three concepts were implemented based on the site considerations using native plant species. Sites 1 and 3 convey stormwater runoff from the road through grassed swales to the rain gardens, and can overflow to the conventional storm sewer system. Site 2 receives sheet flow from a small parking lot and has no connection to a stormsewer. Site 1 incorporates berm planting for improved aesthetics. A cross section of the rain garden design is shown in Figure 2. At each of the sites, 1 m of washed 20 mm clear stone was laid below the underdrain, followed by a 15 cm chocking layer of pea gravel, and then the bioretention media (hereafter biomedica). The biomedica used consists of sand, fines and leaf compost, but was incorporated in different ways at each of the sites;

- Site 1: 0.85 m of biomedica mixed with iron fillings (5% by wt.)
- Site 2: 0.85 m of biomedica
- Site 3: 0.5 m of biomedica mixed with Sorbtive media (5% by vol.)

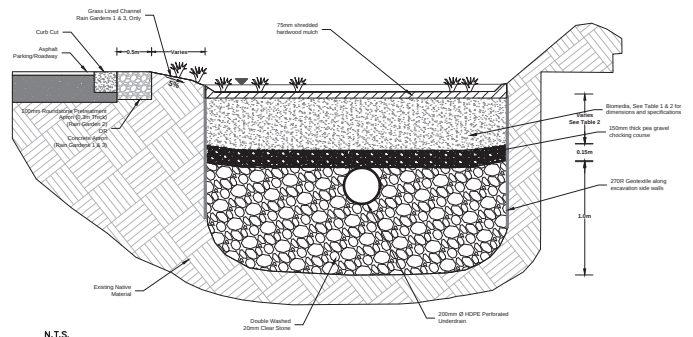


Figure 2. Rain garden design cross section (Image courtesy of Town of Ajax & Aquafor Beech Ltd.)



Figure 3. Construction progress at Site 1 (Pictures courtesy of Town of Ajax & Aquafor Beech Ltd.)

Native plantings

All three sites are planted with a mix of largely native perennials and shrubs designed to handle occasional flooding and intermittent droughts. The plants were also chosen in part to complement the Veterans Point Park and nearby residential gardens. Each rain garden is planted with over 200 species of healthy nursery stock conforming to the Canadian Nursery Landscape Associations' Standard. Blooming should occur from mid-April to October.



Figure 4. Native plants in Site 3



Figure 5. Interpretive signage is provided at Site 2 for passive public education (Picture courtesy of the Town of Ajax)

CONSTRUCTION AND COMMISSIONING

Construction was completed between September 9th, 2014 and November 28th, 2014. For rain gardens 1 and 3, the material excavated during their construction was reused to create berms around their perimeters. The design of rain garden 2 did not

require berming so the excavated material was removed, tested and disposed at an approved site nearby.

It is important during construction of LIDs that the drainage/storage layer does not become clogged with fines. Several measures were taken to prevent sediment from entering the drainage layer during this project. For example, geotextile socks were used around the perimeter to prevent fines from being drained into the installation. Further, geotextile fabric was used as a barrier between the bioretention area and the native soil, and temporary geotextile was also laid on top of the drainage layer before the biomedica was applied. During construction, one large American Sycamore tree (*Plantanus occidentalis*) was relocated.



Figure 6. Erosion and sediment control socks protecting Site 2

The biomedica was mixed at J. Jenkins yard and delivered to the site in slinger trucks. This reduced the potential for contamination in the soil. Plants were selected based on moisture tolerance as well as their water purification ability. A shredded hardwood mulch that consisted of long stringy strands was used due to its stability when flooded.

ECONOMICS

The approved Capital Budget was \$375,000 which covered Consulting Fees (\$57,000), construction (\$273,800 inclusive of all taxes) and expected operating costs and estimated labour costs for Town staff.

Since this was the first project of this kind undertaken by the Town

of Ajax, a 20% contingency was set aside to ensure sufficient funding was available to address issues that could be encountered during construction. The Town felt it was prudent to include a higher contingency than normal to account for unforeseen risks such as poor weather conditions and site conditions different than anticipated which could both cause delays.

OPERATION AND MAINTENANCE

Proper maintenance of LID practices is crucial for optimizing performance, cost effectiveness, and aesthetics, especially during the initial establishment of vegetation. It may be necessary to follow-up with the contractor to ensure that the activities specified within the maintenance agreement are taking place.

The Town of Ajax expects that maintenance will be low, with a simple plan to wait and cut down previous perennial growth as needed. The annual operating costs are estimated to be \$2000.

The bioretention area inlets were blocked during the first winter of operation to minimize contamination from fines and salt-laden melt water. This was necessary to protect the newly installed sod and plant material during early establishment.



Figure 7. Build of sediment in front of over-wintering blockage device

ACHIEVEMENTS

Aesthetic value. The plantings in the rain gardens increase the visual appeal in the neighbourhood by enhancing the streetscape, particularly during the blooming season between April and October.

REFERENCES

Credit Valley Conservation and Toronto and Region Conservation (CVC & TRCA) (2010) Low Impact Development Stormwater Management Planning and Design Guide. Version 1.0. Toronto, Ontario.
Toronto and Region Conservation (TRCA) (2016) Low Impact Development Stormwater Management Stormwater Practice Inspection and Maintenance Guide. Toronto, Ontario.

Functional use of open space land. The rain gardens were designed to fit in part of the neighborhood's existing open space which was previously unused.

Stormwater management benefits. Incorporation of LID principles results in more sustainable stormwater management.



Figure 8. Site 2 during rain event (Photo courtesy of the Town of Ajax)

LESSONS LEARNED

- Public consultation key to fulfilling resident expectations especially for LIDs implemented in “high profile” community areas.
- Inspection of the project during the first year is essential to ensuring the site is functioning as intended. Monitoring wells, installed in each of the rain gardens, allow for measurement of infiltration rates which may decline over time as the system reaches the point when it requires maintenance.
- Specify washed stone, not double washed. Double washed stone was not available.
- Buried electrical and communication conduits can be encountered during construction, potentially resulting in the need for full time third party inspection until the work is completed.
- Full time construction supervision by staff educated in LID principles and experienced contractors are key to implementation success.



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