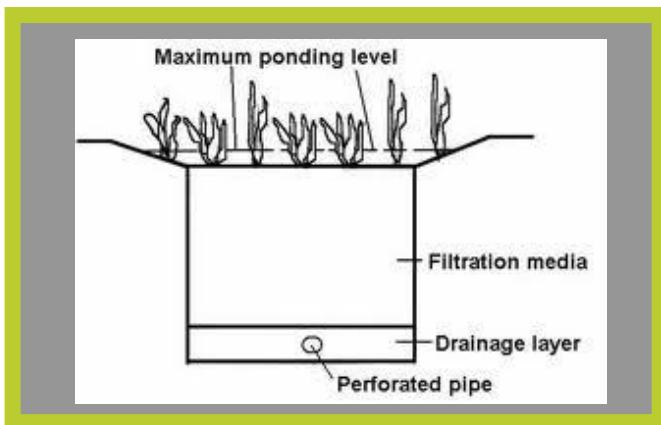


Tree Filters are engineered bioretention systems designed relative to the volume of the first flush of stormwater runoff from impermeable drainage areas. In normal rain events, these systems provide preliminary treatment and volume control before discharging to receiving water bodies.



Bioswales are vegetated ditches that are designed to capture and control the first flush of polluted surface runoff from impermeable drainage areas before discharging to surface water bodies.

Project Description

Stormwater discharge sampling at UT has indicated that levels of various contaminants including nutrients and suspended solids can be high and have significant temporal variation. As part of an ongoing effort to improve the condition of the Ottawa River, UT has received GLRI funding through the Ohio EPA to design and implement two stormwater demonstration sites on campus. These projects will incorporate low impact design (LID) principles through the installation of a tree filter and a bioswale addressing flows from parking lots 12W and Area 3C, respectively.

Low Impact Design Background

Related to stormwater infrastructure, LID attempts to incorporate natural systems in a built environment to replicate natural hydrologic cycles and reduce reliance on municipal and traditional grey stormwater systems.

Bioswale Systems Background

These systems are designed to retain (and treat) the first flush from contributing impermeable drainage areas. The first flush can contain suspended solids, nutrients, bacteria, and petroleum hydrocarbons, among other pollutants. The first flush can be calculated as a half inch of rainfall over the impermeable surface area.

Developing Project Goals

- Native species/plant selection (trees and low-lying vegetation/grasses).
- Engineered media composition.
- Flow dissipation.
- Maintenance scheduling.
- Performance monitoring.
- Educational signage/outreach.



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Proposed Tree Filter Details

November 26, 2013

Page 2 of 3



Tree Filter Location

The proposed tree filter will be located in the southwest corner of parking lot 12W of the UT law center. The existing 18" stormwater outfall is buried under construction debris and decaying vegetation.



Example Retrofit

The proposed tree filter will be integrated with the existing curb and stormwater infrastructure. The system will slow discharge velocities to the river, provide preliminary treatment and relieve peak flow events.

Tree Filter Site Details

The tree filter system considered in this project is a pre-engineered, pre-fabricated unit that allows for easy installation and evaluation. The unit also has an open bottom, allowing for increased bioretention and contaminant removal, essentially performing as an underground rain garden. The unit will be a retrofit to the existing stormwater infrastructure, tying directly into the outfall pipe at the existing edge of pavement, with flows discharging via a daylighted outfall, after the flows have been diverted through the tree filter.

Preliminary Design

Impermeable Drainage Area	0.8 acres
First Flush	1,270 ft³
10-yr Storm Flow	1.8 cfs
Media Filter	100 ft²
Frame Dimensions (LWH)	5' x 7' x 5'
Discharge/overflow pipe	8"

System Components

- Weir
- Overflow pipe
- Precast frame
- Engineered media
- Discharge pipe
- Sump basin
- Tree gate
- Mulch layer
- Gravel
- Rip-rap

Expected Benefits

- 95% reduction in total suspended solids
- 70-90% reduction of metals and petroleum hydrocarbons
- 40% reduction in dissolved inorganic nitrogen
- Elimination of coliform bacteria

Proposed Bioswale Details

November 26, 2013

Page 3 of 3

Bioswale Details

The proposed bioswale is an 85' vegetated rectangular channel that conveys stormwater to the existing inlet catch basin in the northeast corner of Parking Area 3C. The depth of the bioswale is 3', which provides sufficient retention time for infiltration, biological conversion and vegetative uptake to occur.

Preliminary Design

Impermeable Drainage Area	0.95 acres
First Flush	1,542 ft³
10-yr Storm Flow	2.44 cfs
Basin Dimensions (LWD)	85' x 9' x 3'
Basin Surface Area	765 ft²
Area Ratio (%)	2%

System Components

- Native plant species
- 15"-18" eng. media
- 3"- 6" pea gravel
- 12" gravel
- 8" underdrain pipe @ 1.5% Slope
- Media composition
 - Organic soil
 - Sand
 - Clay
- Flow dissipation

Contact Information

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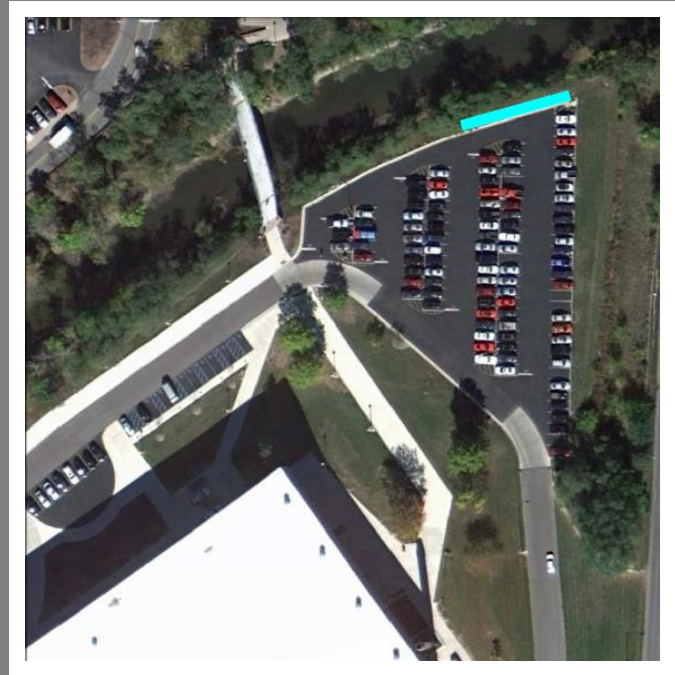
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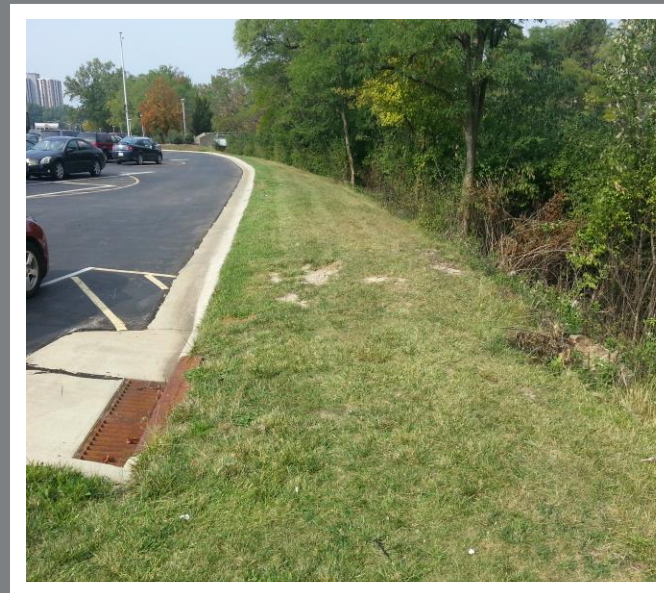
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Bioswale Location

The proposed bioswale will be located in the grassy area along the north edge of Parking Area 3C, near Savage Arena. An existing portion of the gutter pan will be removed to create additional space. The proposed location is denoted by the blue rectangle in the picture above.



Existing Site Conditions