

# Green Infrastructure in Downtown Development

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# Agenda

- Stormwater 101
- Issues & Impairments
  - Green Infrastructure
- Low-Impact Development
- Best-Management Practices
  - Question & Answer

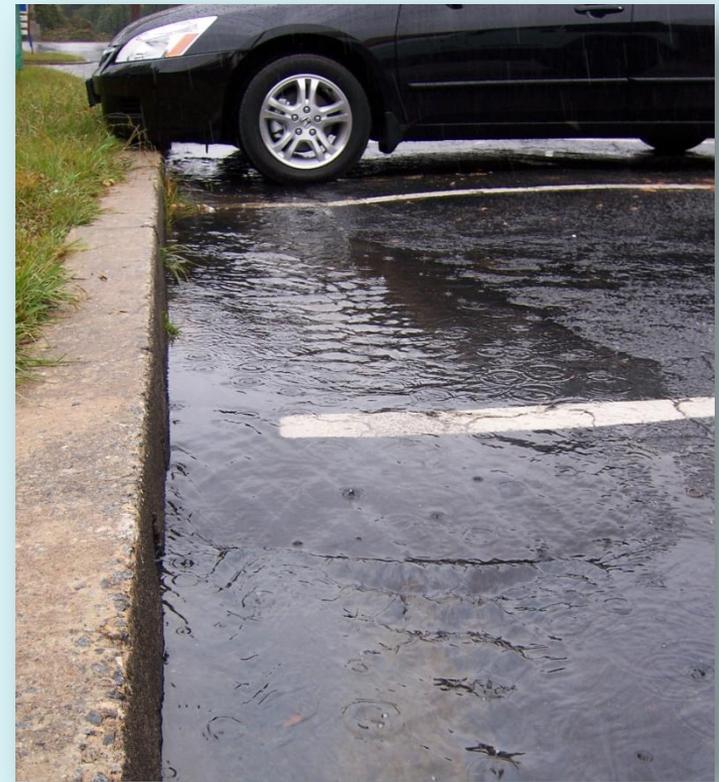
# Stormwater 101

## Impervious Surface –

- “[T]hose man-made surfaces, including, but not limited to, paved and unpaved roads, parking areas, roofs, driveways and walkways, from which precipitation runs off rather than infiltrates.”

## Stormwater Runoff –

- “[P]recipitation and snowmelt that does not infiltrate into the soil...”



[http://www.northgeorgiawater.com/images/stormwater\\_basics\\_1.jpg](http://www.northgeorgiawater.com/images/stormwater_basics_1.jpg)

# Issues Associated with Stormwater Runoff

1. Sediments
2. Nutrients
3. Bacteria
4. Trace Metals
5. Trash & Debris
6. Hydrocarbons
7. Chlorides
8. Flooding



# Green Infrastructure

Green Infrastructure is the interconnected network of waterways, wetlands, woodlands, wildlife habitats, and other natural areas: greenways, parks, and other conservation lands: working farms, ranches and forests: and wilderness and other open spaces that support native species, maintain natural ecological processes, sustain air and water resources and contribute to health and quality of life (Benedict and McMahon, 2002)



# Low-Impact Development and Associated Best Management Practices



<http://www.cooltownstudios.com/images/burlington-downtown2.jpg>



<http://pimadmissions.files.wordpress.com/2009/09/downtown-brattleboro.jpg>

# Low-Impact Development (LID)



LID is an approach to wet weather management that is cost-effective, sustainable, and environmentally friendly. LID best management approaches and technologies infiltrate, evapotranspire, capture and reuse stormwater to maintain or restore natural hydrologies.

# Best Management Practices (BMPs)

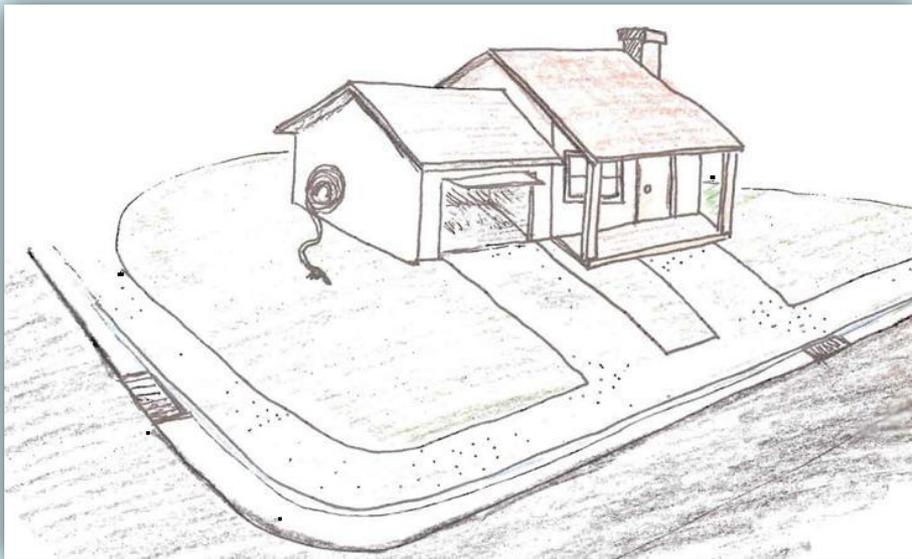
Techniques used to control stormwater runoff, sediment load, and soil stabilization, as well as management decisions to prevent or reduce nonpoint source pollution.

The EPA defines a stormwater BMP as a "technique, measure or structural control that is used for a given set of conditions to manage the quantity and improve the quality of stormwater runoff in the most cost-effective manner."

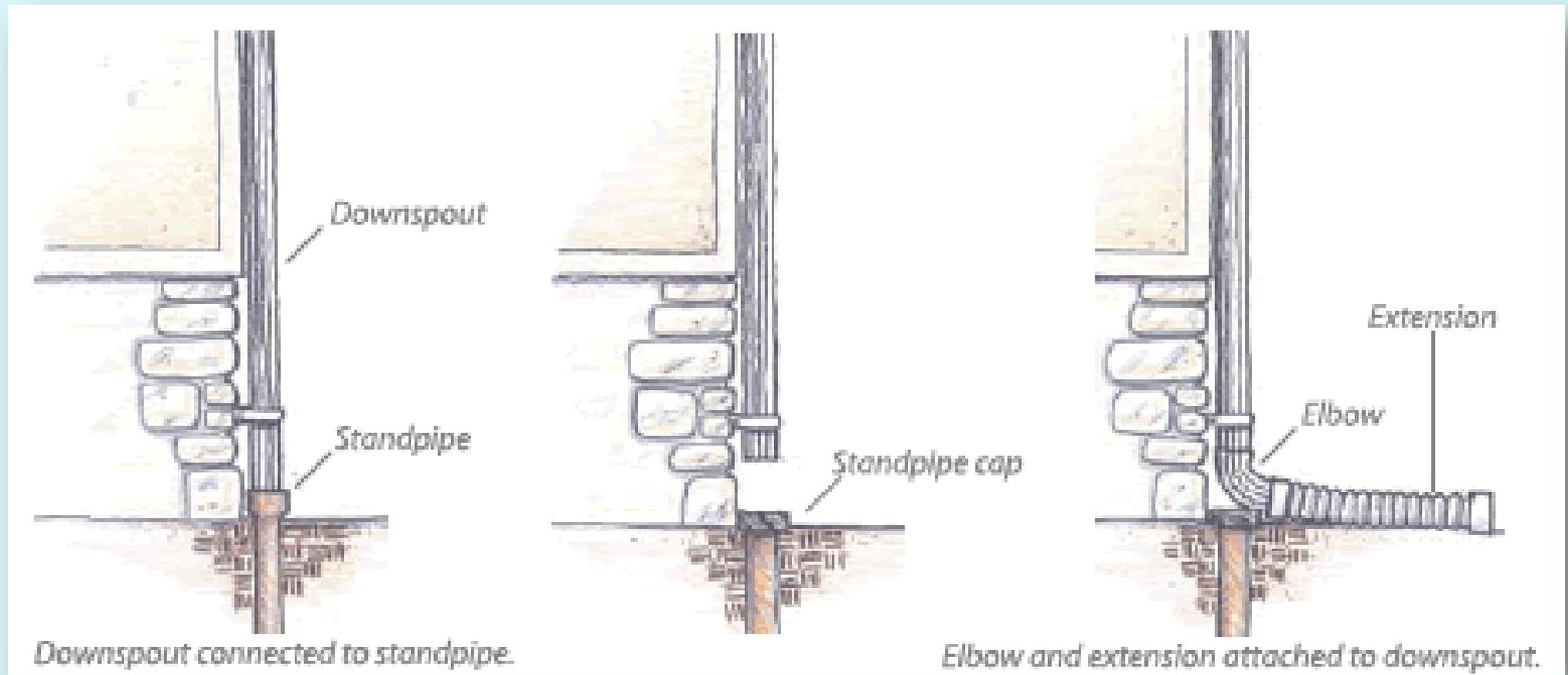
# Structural BMPs

A micro-scale and distributed management technique used to maintain predevelopment site hydrology.

Structural BMPs can be applied during initial development or “easily” retrofitted to an existing site.



# Stormwater / Rooftop Disconnection



# Capture & Use - Cisterns



# Capture & Use – Rain Barrels



<http://schaumburglibrarygreenside.files.wordpress.com/2010/04/rain-barrel.jpg>

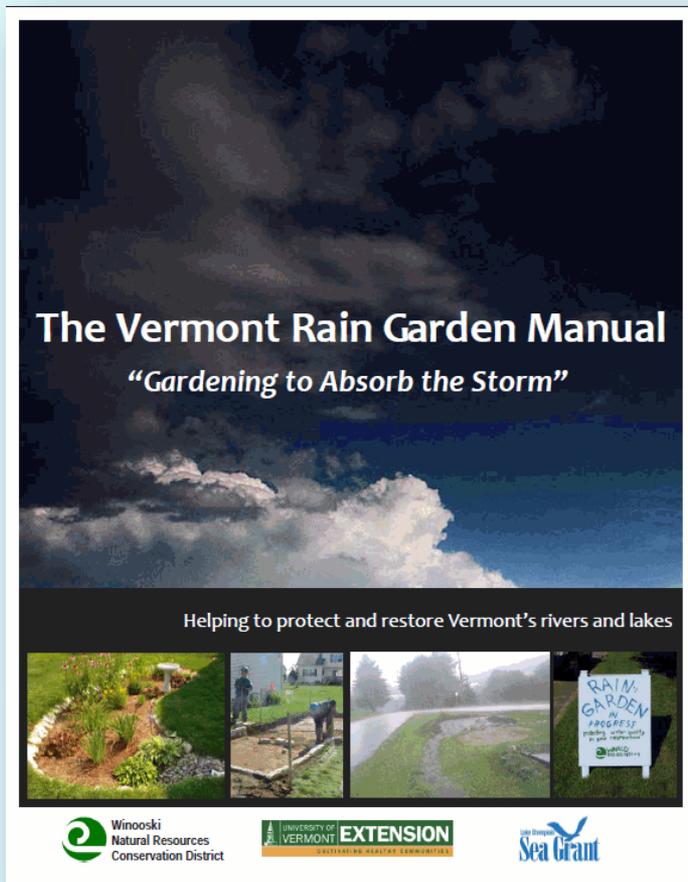


<http://houseofmercyug.org/wp-content/uploads/2010/06/rain.barrels.jpg>

# Rain Gardens



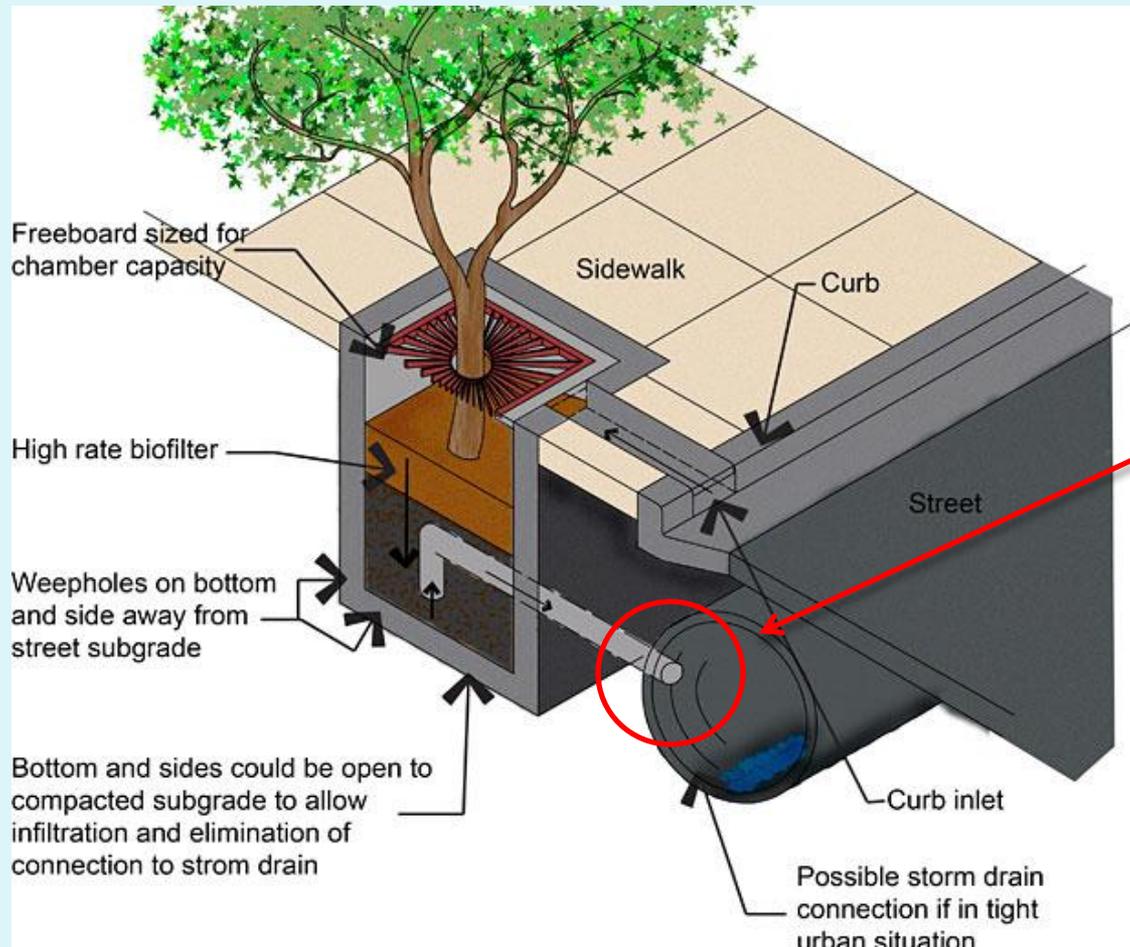
# WNRCDC – Rain Garden Manual



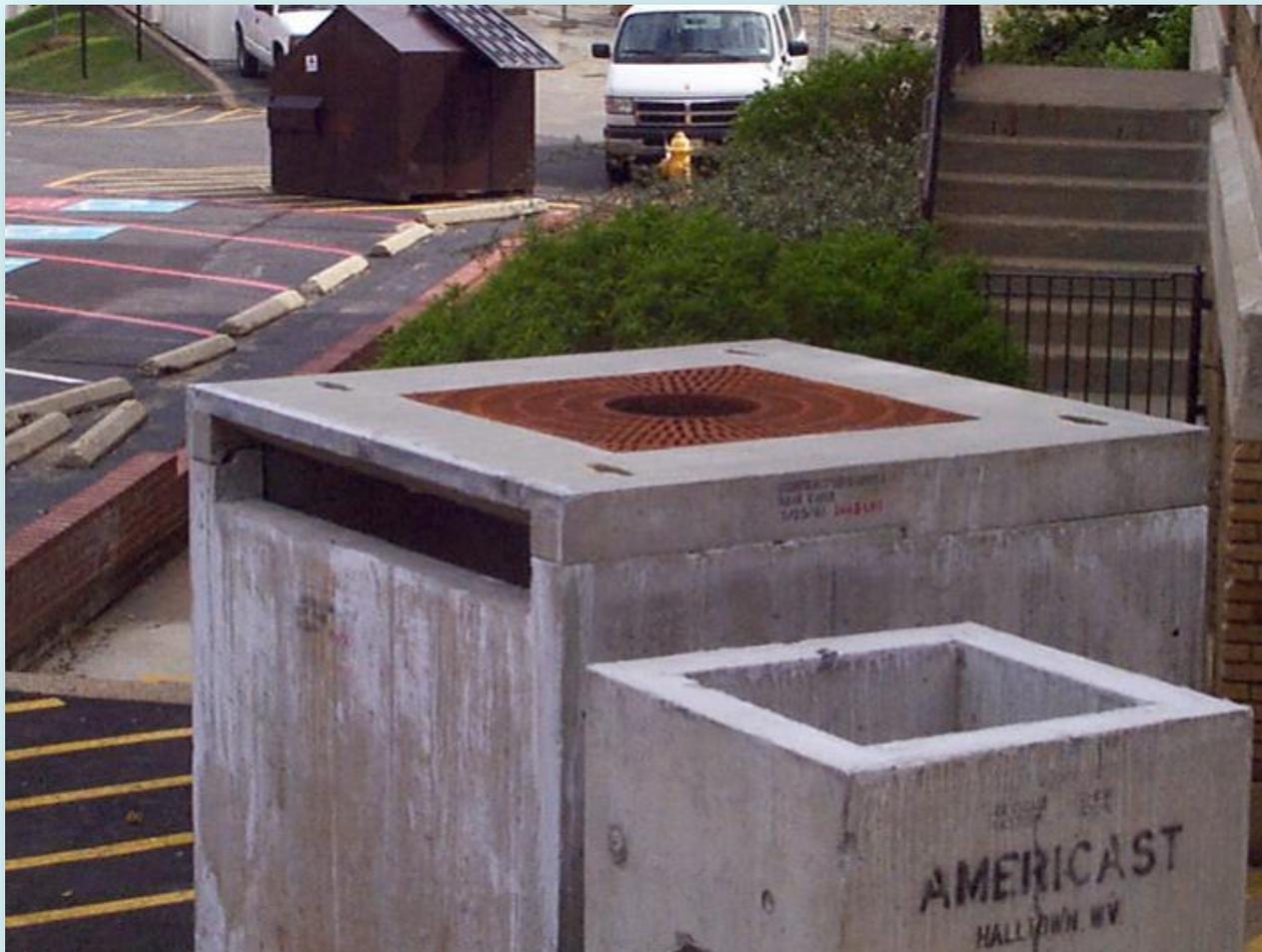
# Vegetated Swale



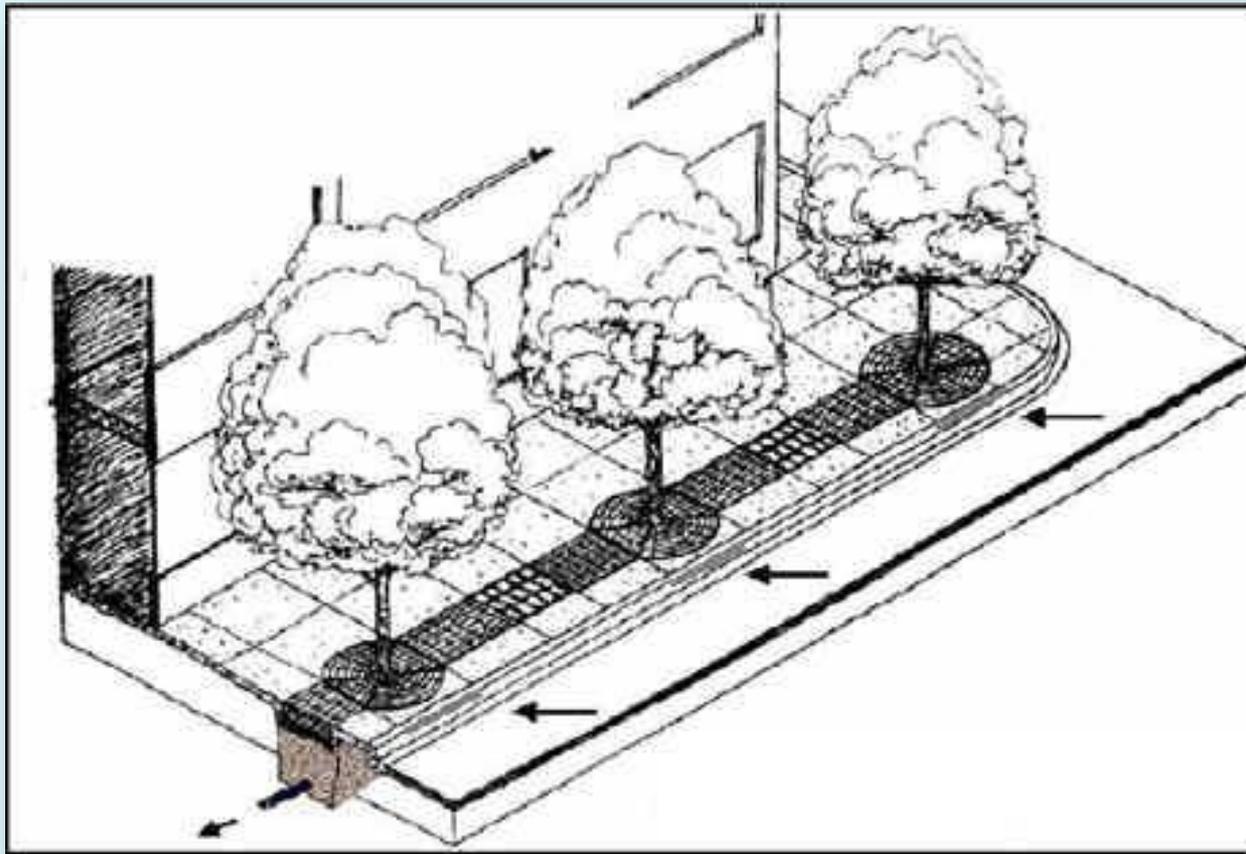
# Tree Boxes



# Tree Boxes



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# Tree Boxes



# Infiltration Trenches / Galleries



# Green Roofs



# Green Roofs



# Green Roofs



# Pervious Asphalt



Photo courtesy of the UNH Stormwater Center

# Permeable Pavers



# Porous Concrete



[http://southeast.construction.com/images/2009/06\\_F4\\_Concrete\\_1.jpg](http://southeast.construction.com/images/2009/06_F4_Concrete_1.jpg)



[http://sanjuanislandscd.org/Land\\_Use\\_Programs/EcoBuilding/EcoBuilding.html](http://sanjuanislandscd.org/Land_Use_Programs/EcoBuilding/EcoBuilding.html)



<http://www.dubuqueswcd.org/porconcrete.jpg>

# Constructed Wetlands



# Buffer Re-Vegetation



# Acknowledgements

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