

**SUSTAINABLE PRACTICES
FOR BUILDING OWNERS AND OCCUPANTS**

STORMWATER MANAGEMENT/ GREEN INFRASTRUCTURE

**POROUS PAVEMENTS
STORMWATER CAPTURE
GREEN ROOFS
RAIN GARDENS**

Porous Pavements



Background:

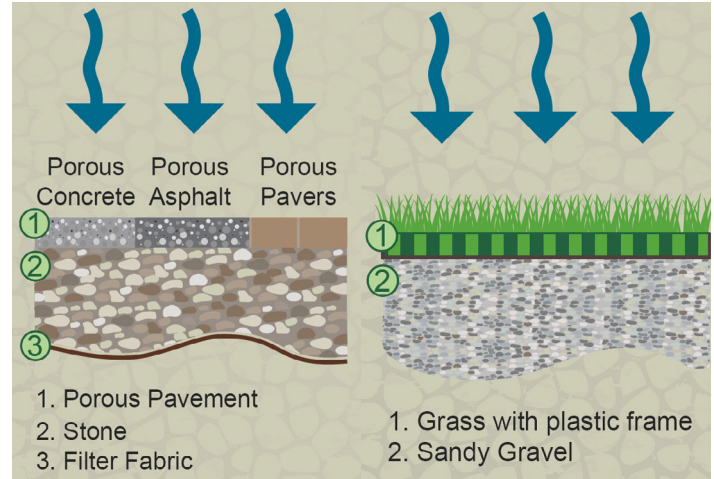
Typically, asphalt and concrete surfaces are largely impermeable to water infiltration. As a result, water runoff occurs on the surface and must be collected or is discharged to waterways with contaminants that may be on those surfaces.

Concept:

Porous pavements, which allow water to infiltrate into the ground, can range from porous asphalt, porous concrete, to grass pavers. The objective of all of these surfaces is the same: to reduce stormwater runoff from a site and increase infiltration into the ground.



Turning Point Park Porous Pavements



Turning Point Park Porous Pavements

Did you know?

The City of Rochester has installed permeable pavement in the parking lot at City Hall.

Did you know?

The City of Rochester has incorporated green infrastructure at Turning Point Park, and included signage for educational awareness. There are installations of porous asphalt, porous concrete, and porous pavement. Also included are rain gardens and biodetention areas.

TARGET GROUP

Developer, Landlord, Business Owners, Institutions, Homeowners



WHAT CAN I DO

- Consult the City of Rochester & Monroe County Green Infrastructure Retrofit Manual ([linked here](#)) and/or the New York State Stormwater Management Design Manual ([linked here](#)) for information on how to design porous pavement surfaces.
- Visit Turning Point Park and learn about porous pavements.

Sources: ¹<https://www.health.ny.gov/publications/7287/> (NY Dept of Health)
 Hyperlinks: <http://www.cityofrochester.gov/article.aspx?id=8589972332>
<http://www.dec.ny.gov/chemical/29072.html>

Stormwater Capture



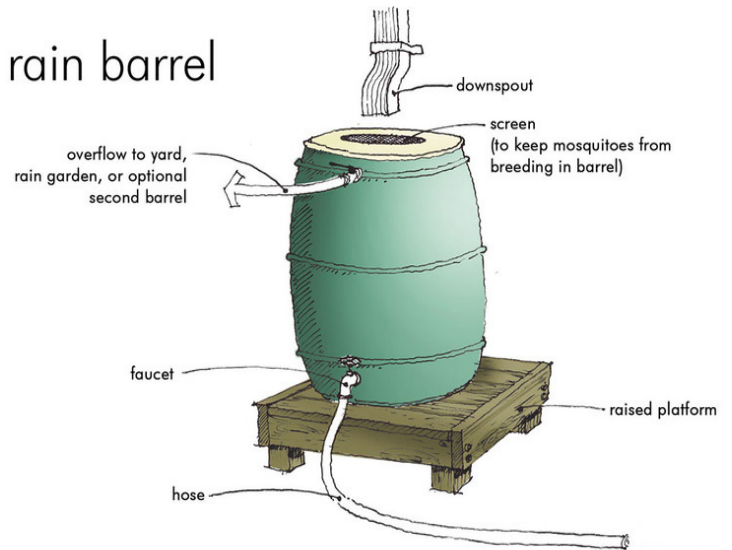
Background:

Stormwater capture is the process of preserving stormwater in order to use it for various purposes, such as gardening. Past standards of construction dictated that the stormwater downspouts of roofs connect to the combined sewer system. The combined sewer system is a system whereby sewers are designed to collect rainwater runoff, domestic sewage, and industrial wastewater in the same pipe. Most of the time, combined sewer systems transport all of their wastewater to a sewage treatment plant, where it is treated and then discharged to a water body (EPA).

Concept:

Water treatment plants have experienced an increase in inflows due to factors such as population growth, leading to greater water usage which have led to maximum capacity issues in water treatment plants. These plants have sought to encourage stormwater to be routed elsewhere other than the sewer system as stormwater typically does not need high levels of treatment. As a remedy, stormwater should be rerouted on-site and reused for non-potable needs.

rain barrel



Rain Barrel System Components

Did you know?

The Monroe County Crime Lab uses a 1,500 gallon rainwater storage tank for toilets and other non-potable uses.

Did you know?

Section 120-163 of the City Code permits rain barrels for residential and non-residential uses in the side or rear yards of a structure. Rooftop disconnects are also allowed as long as the stormwater is discharged in a manner that is not a public nuisance.

Sources: <https://www3.epa.gov/region1/eco/uep/cso.html>

Photo Credit: <http://www.watershedcouncil.org/uploads/7/2/5/1/7251350/633260.jpg?731>

Stormwater Capture



TARGET GROUP	WHAT CAN I DO
<p>Developer, Landlord, Business Owners, Institutions, Homeowners</p> <p>D L B I H</p>	<ul style="list-style-type: none">• Consult the City of Rochester & Monroe County Green Infrastructure Retrofit Manual (located here) and/or the New York State Stormwater Management Design Manual (located here) for information on how to design residential or commercial stormwater recapture systems.• Consider building a rain barrel system to capture some roof water runoff for non-potable purposes such as watering plants.

Sources: <http://www2.monroecounty.gov/des-stormwater-coalition>

Green Roofs



Background:

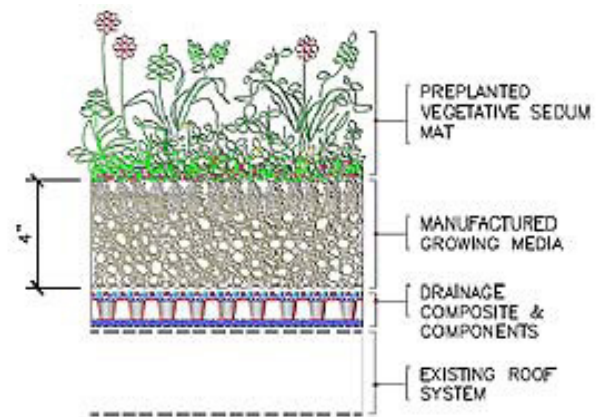
Stormwater runoff is rain water that is not absorbed in the ground due to impermeable surfaces, such as concrete and asphalt roads or parking lots.

Concept:

Many urban areas face difficulties with stormwater runoff because of the high percentage of impermeable surfaces. The New York State Department of Environmental Conservation (DEC) defines the main purpose of a green roof as a method to provide runoff capture by a layer of vegetation and soil installed on top of a conventional flat or sloped roof. The rooftop vegetation allows evaporation and evapotranspiration processes to reduce volume and discharge rate of runoff entering the conveyance system.



City Hall Green Roof



Green Roof Cross Section from DEC Stormwater Design

Did you know?

A green roof can increase a roof's useful life by about 20 years.

Benefits of installing green roofs:

- Helps to achieve stormwater management goals by reducing runoff volumes
- Provides insulation from heat and cold via the layers of soil and vegetation, helping moderate indoor temperatures
- Protects rooftop materials from ultraviolet radiation
- Helps filter and bind airborne dust, improving air quality
- Reduces heat island effect in urban areas

Considerations:

- Failure of waterproofing elements present a risk of water damage
- Extreme weather events can hinder plant survival
- More maintenance compared to traditional rooftops
- Additional water retention must be accounted for in determining the structural capacity required to install a green roof.

Did you know?


Green roofs have been a concept since the 1960s, starting with Northern Scandinavian sod roofs.

Sources: http://www.dec.ny.gov/docs/water_pdf/swdm2015entire.pdf
<http://www.cityofrochester.gov/greenroof/>

"The Value of Green Infrastructure: A Guide to Recognizing its Economic, Environmental, and Social Benefits"

Green Roofs



TARGET GROUP	WHAT CAN I DO
<p>Developer, Business Owners, Institutions</p> 	<ul style="list-style-type: none">• Consider installing a green roof on the building(s) as a way to reduce the runoff during large storm events, improve the surrounding air quality and extend the roof's useful life.

SAFETY MOMENT: Access to roofs can be dangerous. Make sure you provide proper and safe railings or parapets at the proper height around the entire roof perimeter. Consult the City of Rochester Building Department if you have any questions.

Rain Gardens



Background:

The DEC defines a rain garden as a method to manage and treat small volumes of stormwater runoff using a conditioned planting soil bed and planting materials to filter runoff stored within a shallow depression.

Requirements for an Effective Rain Garden System:

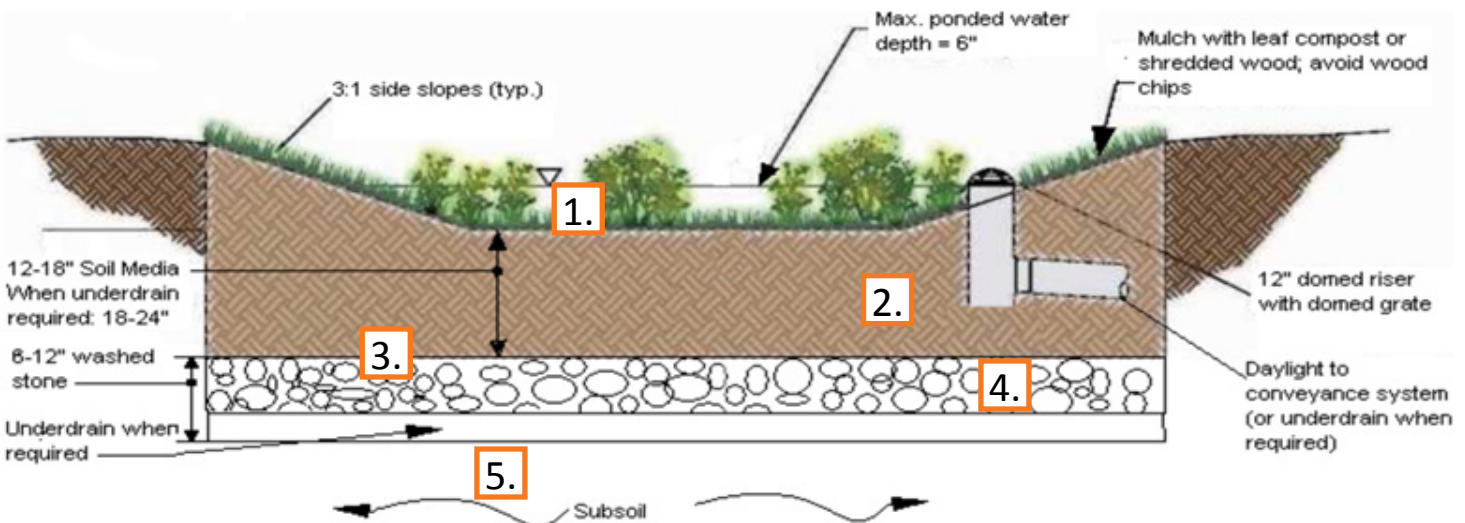
1. Plants tolerant of diverse weather conditions (i.e. drought, extreme temperatures)
2. Soil must be tested and remediated if necessary
3. Soil and reservoir stone must be separated by non woven geotextile fabric
4. Reservoir stone must be graded to provide maximum storage capacity
5. Native soil has a permeability high enough to allow for infiltration. If this condition is not met, an underdrain can be used.

Benefits:

- Pollutant treatment for residential rooftops and driveways
- Groundwater recharge augmentation
- Micro-scale habitat
- Aesthetic improvement to turfgrass or otherwise impermeable surfaces

Considerations:

- Fairly flat slopes required to effectively filter runoff through the system
- Appropriate materials required as compacted and clay sub soils are too dense to provide appropriate infiltration
- Must be situated in a manner that overflow can safely be conveyed to the formal drain system




Rain Garden Cross Section from DEC Stormwater Design Manual

Did you know?

The City of Rochester developed a “Green Infrastructure Retrofit Manual” . This manual outline how to effectively design and construct a rain garden system. [Click here](#) to read more.

Rain Gardens



TARGET GROUP	WHAT CAN I DO
<p data-bbox="103 464 500 533">All members of the Rochester Community</p> 	<ul data-bbox="630 464 1458 533" style="list-style-type: none">• Consider installing a rain garden to manage, utilize and treat small volumes of stormwater runoff.