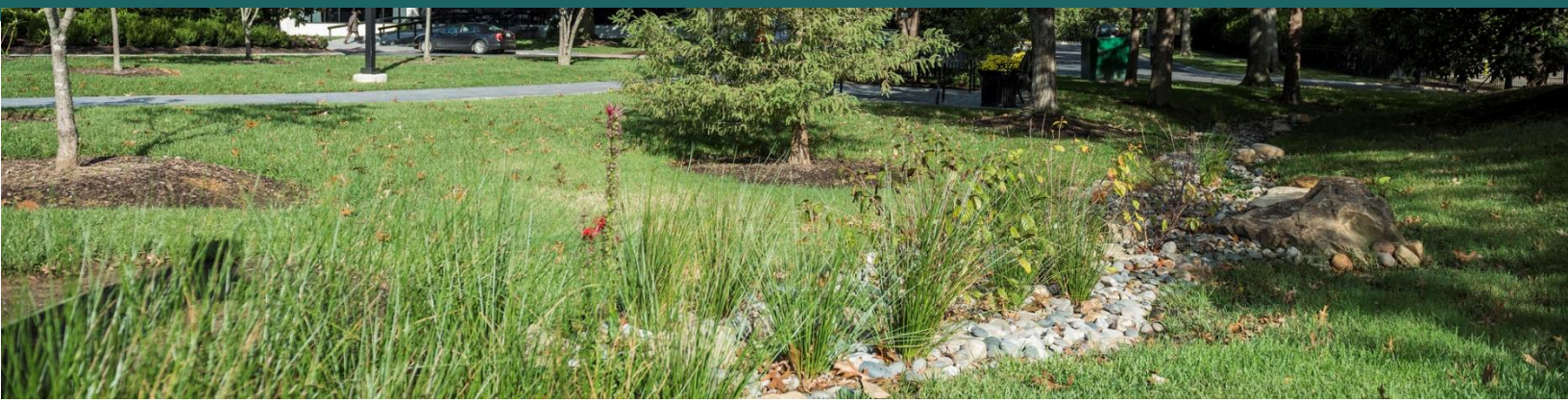
Urban Stormwater & Runoff Management

A DOI Nature-Based Solutions Roadmap Fact Sheet



Urban stormwater & runoff management is a set of techniques to promote water retention, infiltration, and evapotranspiration in urban areas. Urban areas have large expanses of impervious surfaces that cause water to run off during storms, creating issues with stormwater flooding and, in some cities, potential for combined sewer overflows following rainfall. The urban stormwater and runoff management techniques described below use vegetation and permeable surfaces to reduce runoff and associated issues[1].

TECHNICAL APPROACH

There are many urban stormwater techniques that may be suitable in different contexts:

- Rain garden: Vegetated depression that collects rainwater from streets, driveways, roofs, etc. and promotes infiltration[2].
- Bioswale: Vegetated ditch; similar to a rain garden but designed to capture larger volumes or runoff[3].
- Tree trench: Trench with trees planted in depressions so they can take up stormwater runoff[4].
- Stormwater park: Recreational area designed to flood during storms to reduce downstream peak flows; often includes built wetlands[5].
- Permeable pavement: Alternative pavement materials that allow water to infiltrate[6].
- Rainwater harvesting: System to collect rainwater from roofs in a storage tank for later use[7].

BENEFITS

Climate Threat Reduction

- Reduced flooding
- Drought mitigation
- Carbon storage & sequestration (all except rainwater harvesting and permeable pavement)
- Heat mitigation (all except rainwater harvesting and permeable pavement)

Social and Economic

- Reduced erosion
- Increased property values *(all except rainwater harvesting and permeable pavement)*
- Aesthetics *(all except rainwater harvesting and permeable pavement)*
- Aquifer recharge *(all except rainwater harvesting)*
- Recreational opportunities *(stormwater parks only)*
- Reduced energy use *(rainwater harvesting only)*

Ecological

- Reduced runoff
- Improved water quality *(all except rainwater harvesting)*
- Supports wildlife *(all except rainwater harvesting and permeable pavement)*
- Supports native plants *(all except rainwater harvesting and permeable pavement)*

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SITE SUITABILITY FACTORS

All except permeable pavement & rainwater harvest:

- ✓ Low tree cover
- ✓ Extensive existing development
- ✓ Public view or access
- ✗ Steep slope

Permeable pavement:

- ✓ Highly urbanized areas
- ✓ Low traffic
- ✗ Shallow water table
- ✗ High pollutant loading

Rainwater harvest:

- ✓ Adequate rainfall
- ✓ Large, shallow roof

KEY RESOURCES

Title and Link	Site Suitability	Design and Construction	Monitoring Guidance	Example Projects
Minnesota Stormwater Manual (MN Pollution Control Agency)	✓	✓	✓	✓
Bioretention Illustrated (Chesapeake Stormwater Network)	–	✓	✓	–

EXAMPLE PROJECT

The Metropolitan Water Reclamation District of Greater Chicago is building a stormwater park including a constructed wetland, rain garden, and bioswales to reduce overbank flooding from Midlothian Creek and protect property and infrastructure in Robbins, Illinois.[8] Much of the town is built on top of historical wetlands, leading to frequent flooding and water pollution issues that this project will address.

Concept drawing of stormwater park in Robbins, IL. Image credit: Metropolitan Water Reclamation District of Greater Chicago.

LEARN MORE

Visit the DOI Nature-Based Solutions Roadmap for more information on urban stormwater management, other nature-based solutions, and principles and considerations broadly relevant for nature-based solutions projects. The urban stormwater management summary includes additional details on each section included in this fact sheet, plus information on operations and maintenance, common barriers, and more resources and example projects.

Explore the Roadmap

Full Roadmap Document

Urban Stormwater Section

www.nicholasinstitute.duke.edu/roadmap

REFERENCES

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CITATION

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