

GREEN STORMWATER INFRASTRUCTURE

INTRODUCTION

One of the most effective ways to improve water quality in our streams, reduce flooding and minimize erosion is to manage stormwater runoff from development and impervious surfaces, like roads and parking lots. Traditional stormwater infrastructure required catchments, pipes, and other “hard” infrastructure to quickly move stormwater runoff to the closest waterway. This resulted in a rush of stormwater into our streams during each rain event causing erosion, flooding, and the flushing of pollutants from the land and impervious surfaces directly into our waterways. Alternatively, implementing Green Stormwater Infrastructure (GSI) closely mimics natural systems to reduce flow, remove pollutants, and promote infiltration at the source.

Compared to highly engineered gray conveyance systems, GSI is cost-effective, resilient, and provides communities with enhanced aesthetics and natural resource benefits. In addition to effectively managing stormwater, GSI also helps filter air pollutants, regulates temperatures, sequesters carbon, provides habitat, and reduces energy and water demands.



*Lawn to meadow conversion
in West Bradford Township's
Broad Run Park.*

APPLICABILITY

Urban and Suburban Areas

- **Stormwater Management:** Reduces runoff volume and peak flows, urban flood prevention
- **Pollution Reduction:** Filters pollutants like oils, heavy metals, and nutrients before they reach water bodies
- **Heat Island Mitigation:** Adds vegetation to cities, reducing temperatures and improving microclimates

City Planning and Infrastructure Development

- **Zoning and Land Use Planning:** Incorporated into building codes, development requirements, or city design guidelines
- **Retrofit Opportunities:** Applied to existing urban areas to improve outdated grey infrastructure

Residential and Commercial Properties

- **On-Site Water Management:** Rain gardens, permeable pavements, and green roofs manage runoff at the source
- **Aesthetic and Property Value Benefits:** Adds greenery and enhances property attractiveness

Environmental and Ecosystem Restoration

- **Habitat Creation:** Supports urban biodiversity and green corridors
- **Water Quality Improvements:** Reduces pollutant loads entering streams, rivers, and lakes

Regulatory Compliance and Public Policy

- **Stormwater Permits:** Helps meet Clean Water Act requirements (e.g., MS4 permits)
- **Climate Resilience Plans:** Integrated into broader sustainability and climate adaptation strategies

Types of GSI

- Rain Gardens
- Bioswales
- Lawn to meadow conversions
- Bioretention
- Downspout planter
- Stormwater planter
- Stormwater curb bump out
- Cistern and rain barrels
- Permeable pavement
- Tree trenches and filter boxes
- Riparian buffer plantings
- Underground infiltration system
- Dry well
- Green roof
- Conservation design/reduced paved areas
- Constructed wetlands



Bioswale planting at Brandywine Red Clay Alliance's Myrick Conservation Center



Newly planted rain garden collecting stormwater at Avon Grove Library.

EXAMPLES

Rain Gardens

Rain gardens are shallow, landscaped areas planted with native vegetation that collect and filter runoff from impervious surfaces, allowing water to infiltrate the soil within 12 to 72 hours and are best suited for small sites near stormwater sources.

Bioswales

A bioswale is a narrow, vegetated channel that slows and filters stormwater runoff, often using drainage pipes to manage excess water, and can replace traditional stormwater infrastructure in limited spaces like roadsides and parking lots.

Lawn to Meadow Conversion

Converting mowed lawns to native wildflower and grass meadows reduces stormwater runoff, erosion, and pollution through deeper root systems and porous soils, while also benefiting wildlife and requiring less maintenance.

To learn more about Green Stormwater Infrastructure, please see the [Guide to Green Stormwater Infrastructure](#).



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