GREEN INFRASTRUCTURE

Managing Stormwater in Iowa

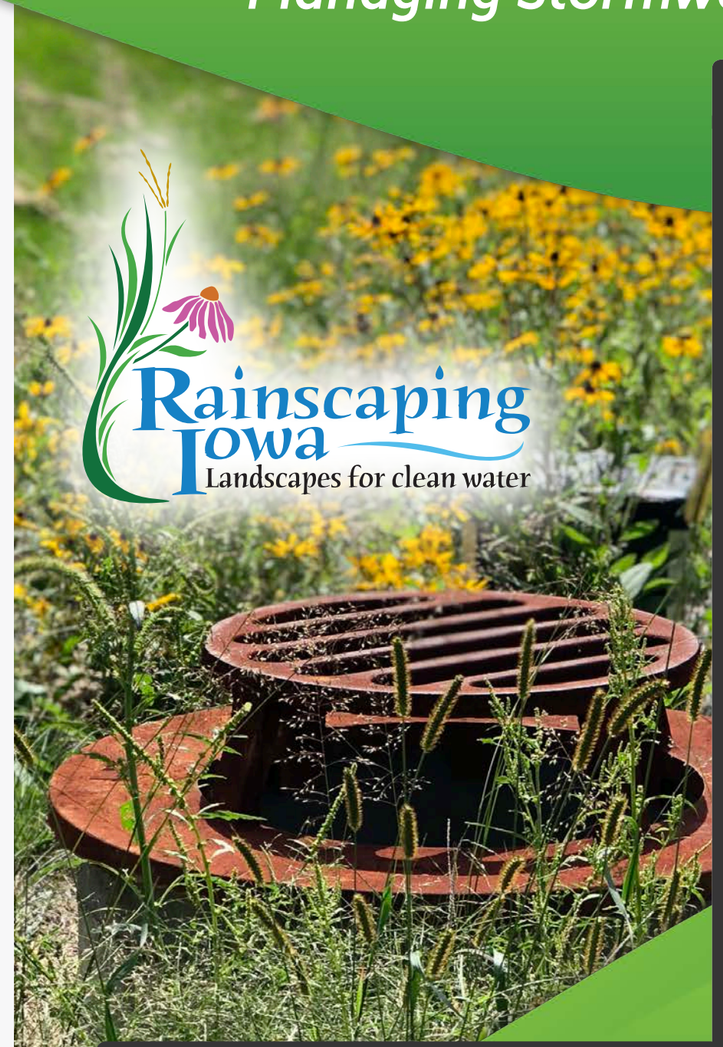
The Right Practice for the Right Place

Green Infrastructure	Potential Location	Storm Event(s)
Soil Quality Restoration	Residential, commercial, and municipal applications	WQv
Native Landscaping		
Green Roofs & Rainwater Harvesting		
Rain Gardens	Residential homes, small commercial properties	
Bioretention Cells	Medium to large commercial properties and municipal streetscapes	WQv CPv
Bioswales	Any size commercial properties, subdivision developments, municipal roadways	
Infiltration Trenches & Basins	Any size commercial properties with soils that have adequate drainage rates	
Filter Boxes	Medium to large commercial properties, municipal streetscapes	
Permeable Pavers	Residential driveways, patios, commercial parking lots, driveways, sidewalks, and municipal streets, sidewalks and driveways	WQv CPv Qp Qf
Retention Basins	Commercial properties and subdivision developments with large enough areas to accommodate the basins and wetlands	
Constructed Wetlands		
Detention Basins		Qp Qf

Water Quality Volume (WQv)
Channel Protection Volume (CPv)
Overbank Flood Protection (Qp)
Extreme Flood Protection (Qf)

Design & Engineering: The Unified Sizing Criteria

When planning and designing for post construction stormwater management, consideration should be given to both water quality and water quantity (flood control). The Unified Sizing Criteria in the Iowa Stormwater Management Manual (ISWMM) provides a comprehensive approach to managing stormwater, from the more frequent, smaller rainfall events to the less frequent flooding events (see inside of this brochure for more information on each design criteria). Design specifications for all storm events can be found in the ISWMM posted on the Iowa DNR website: http://www.iowadnr.gov/Environmental-Protection/Water-Quality/NPDES-Storm-Water/Storm-Water-Manual



GI practices, such as **bioretention cells**, are engineered to capture, infiltrate, and detain the rain. Other GI practices include soil quality restoration, native landscaping, rain gardens, permeable pavers, green roofs, extended retention basins, and wetlands.

Green versus Gray

Traditional stormwater management systems aim to drain the landscape as quickly as possible. Runoff flows into the street, along the curb, and into a gutter, where a system of underground pipes whisks it away to the nearest waterbody - regardless if it's a sprinkle or a major storm event.

Until recently, this was the only approach to stormwater management, which strictly relied on "gray" infrastructure to protect communities from flooding. However, this approach does not address all stormwater concerns, and with innovations in technology, other "green" methods have been developed to address these water quantity and quality issues.

Green Infrastructure is an approach to stormwater management which includes a wide variety of best management practices (BMPs) designed to ***capture***, ***infiltrate***, ***cleanse***, and ***detain rainfall*** as close to where it lands on the landscape.

There are many benefits to using green infrastructure in combination with traditional gray infrastructure. GI practices can save developers, cities, and homeowners money in the long-term. These practices also ensure less polluted drainage and stormwater runoff enter Iowa's waterways. Other benefits include fewer localized flooding events and a decrease in stream bank erosion.

Iowa Stormwater Education Partnership
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Soil Quality Restoration (SQR) is the process of improving soil health on new or existing lawns. The process uses tillage or aeration, and compost to increase infiltration and organic matter content. Soil quality restoration leads to healthier soils that can absorb more precipitation.

Used for both water quality and flood management, **Constructed Wetlands** provide a permanent pool of water which varies in depth. The wetland area provides temporary storage, removal of pollutants, and habitat for wetland plants and wildlife.

Permeable Pavers are used in place of traditional concrete or asphalt to decrease stormwater runoff. Unlike traditional surfaces, permeable pavers allow stormwater to seep through the joints in the pavers and enter the spaces in the gravel below. Water then moves to a subsurface pipe that is connected to the storm sewer system.

Visit IowaStormwater.org for more detail on these green infrastructure practices!

Native Landscaping is the strategic placement of native plants in the landscape to enhance infiltration of stormwater. Their extensive root systems hold soil, slow runoff, and improve infiltration. The plants also absorb nutrients and don't require fertilizer, pesticides, or supplemental water to survive after establishment.

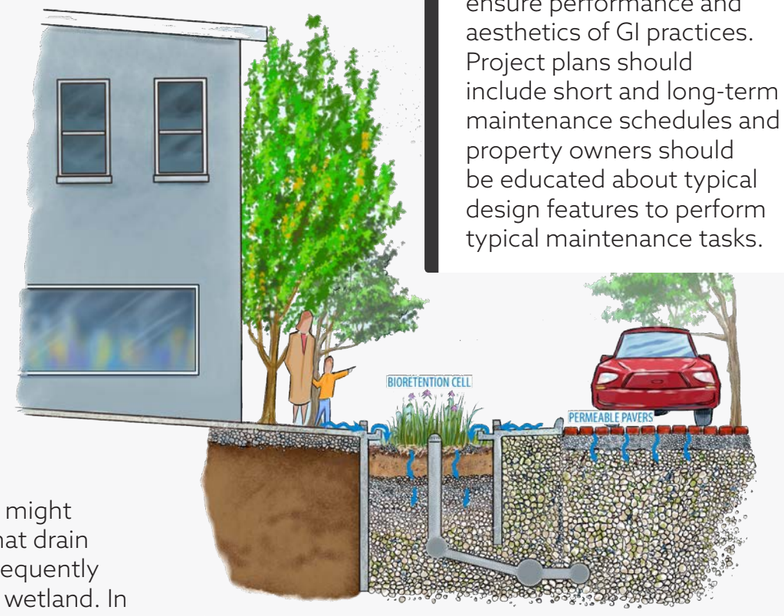
While the design of **Green Roofs** varies, all green roofs consist of a soil medium underlain by several liners, which provides an environment suitable for plant growth without damaging the underlying roof. This GI practice minimizes rooftop runoff.

Rain Gardens are shallow depressions planted with grasses and perennials, which capture runoff from impervious surfaces. The runoff is temporarily ponded before percolating into the natural soils. **Bioretention Cells** and **Bioswales** are vegetated, depressional landscaping features that are designed to filter pollutants through an engineered soil mix. They treat small storm flows, while large storms overflow to the storm sewer system. Bioswales are designed to convey larger storm events as well.

Stormwater Treatment Train

Site conditions and treatment goals dictate which green infrastructure practices are implemented in series since each method targets different rainfall events. Implementing a train has the potential to greatly reduce the quantity of discharge and pollutants leaving a site.

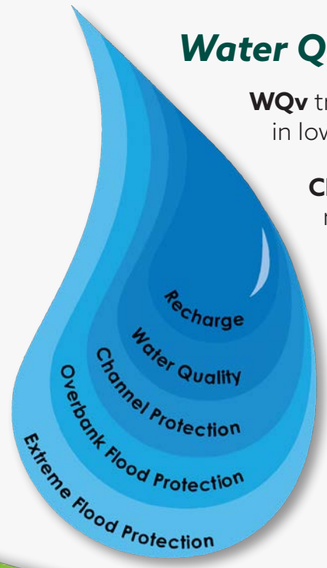
One example of a treatment train might include biocells in a subdivision that drain to a bioswale system, which subsequently discharges to a retention pond or wetland. In an ultra urban area, where space is at a premium, a treatment train could consist of a green roof, permeable pavers, and plant filter boxes that eventually discharge to an underground detention system for larger rainfall events.



Long-term inspection and maintenance is critical to ensure performance and aesthetics of GI practices. Project plans should include short and long-term maintenance schedules and property owners should be educated about typical design features to perform typical maintenance tasks.

Most communities in Iowa adequately manage the Qp and Qf. In order to improve Iowa's water quality and provide additional protection from flooding, further management of WQv and CPv is needed.

Water Quality Criteria



WQv treats runoff from the 1.25 inch or less rain, which is the most frequent rainfall in Iowa. Managing this size of event helps reduce the most pollution.

CPv manages the 1-year, 24-hour duration event. Managing this size of storm reduces bankfull flows and helps minimize downstream channel erosion.

Qp provides peak discharge control of the 5-year, 24-hour duration event. Managing this size of storm prevents downstream capacity issues and minimizes localized overbank flooding.

Qf manages the 100-year, 24-hour duration event. Managing this size of storm minimizes extreme flooding downstream. Flood management typically occurs through detention controls and/or floodplain management. Constructed wetlands and other GI practices can also be effective techniques.

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