

# Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act

December 2009

## Summary

Stormwater runoff in urban areas is one of the leading sources of water pollution in the United States. Under Section 438 of the Energy Independence and Security Act of 2007 (EISA), Congress requires federal agencies to provide national leadership to reduce water quality problems from stormwater runoff. Section 438 specifically calls for federal developments that exceed 5,000 square feet to maintain or restore pre-development hydrology. EPA, in close coordination with other federal agencies, has written Technical Guidance to help federal agencies in implementing EISA Section 438. The guidance focuses generally on retaining rainfall on-site through infiltration, evaporation/transpiration, and re-use to the same extent as occurred prior to development. The Technical Guidance provides background information, key definitions, case studies, and guidance on meeting the new requirements. Agencies have two options to demonstrate that they are maintaining pre-development hydrology: managing on-site the total volume of rainfall from the 95<sup>th</sup> percentile storm or managing on-site the total volume of rainfall based on a site-specific hydrologic analysis. Federal agencies can comply with Section 438 by using a variety of stormwater management practices often referred to as “green infrastructure” or “low impact development” practices, including, for example, reducing impervious surfaces, using vegetative practices, porous pavements, cisterns and green roofs.

## Background on Section 438

In December 2007, Congress enacted the Energy Independence and Security Act of 2007 (EISA). Section 438 of EISA establishes strict stormwater runoff requirements for federal development and redevelopment projects. Section 438 requires federal agencies to develop and redevelop facilities with a footprint that exceeds 5,000 square feet in a manner that maintains or restores the pre-development site hydrology to the maximum extent technically feasible.

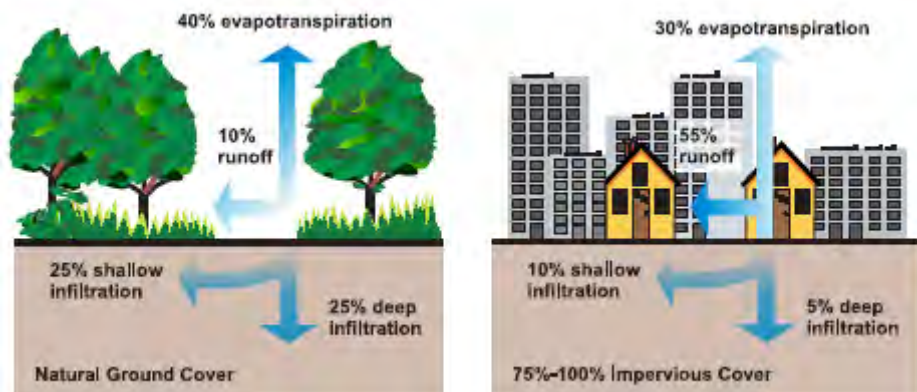
Executive Order (EO) 13514, Federal Leadership in Environmental, Energy, and Economic Performance (October 5, 2009) sets a policy that federal agencies “conserve and protect water resources through efficiency, reuse, and stormwater management.” Section 14 of EO 13514 required EPA to issue guidance on the implementation of Section 438 by December 5, 2009.

## Background on Stormwater Runoff

In a natural, undisturbed environment rain that falls is quickly absorbed by trees, other vegetation, and the ground. Traditional urban areas typically

include large areas of impervious surfaces such as roads, sidewalks and buildings. These impervious surfaces prevent rainwater from infiltrating into the ground, and as a result, stormwater runs off the site at rates and volumes that are much higher than would naturally occur. These higher stormwater rates and volumes can cause increased flooding and stream channel erosion, larger pollutant loadings to surface waters, and increased temperature of runoff, among other impacts.

Stormwater impacts from developed sites can be reduced by using stormwater management practices often referred to as “green infrastructure” or “low impact development” practices that retain water



Stormwater runoff rates from natural ground cover versus a largely developed site.

on-site and mimic the natural hydrology. Site designers can use practices that 1) infiltrate and recharge stormwater into the ground, 2) promote evapotranspiration through increased vegetation, and/or 3) harvest and use precipitation near to where it falls to earth.

## Tools to Implement the Requirements of Section 438

The Section 438 Technical Guidance provides two options for meeting the performance objective of preserving or restoring the hydrology of a site:

**Option 1 (retaining the 95<sup>th</sup> percentile rainfall event)** calls upon site designers to design, construct, and maintain stormwater management practices that manage rainfall on-site, and prevent the off-site discharge of stormwater from all rainfall events less than or equal to the 95<sup>th</sup> percentile rainfall event.

**Option 2 (site-specific hydrologic analysis)** provides site designers with a process to design, construct, and maintain stormwater management practices using a site-specific hydrologic analysis to determine pre-development runoff conditions instead of using the estimated volume approach of Option 1. Under Option 2, pre-development hydrology would be determined based on site-specific conditions and local meteorology by using continuous simulation modeling techniques, published data, studies, or other established tools.

Option 1 (retaining the 95<sup>th</sup> percentile rainfall event) is a performance-based, simplified approach that site designers can use to meet Section 438, while Option 2 (site-based hydrologic analysis) allows the site designer to conduct a hydrologic analysis of the site based on site-specific conditions.



**Parking lot bioswales and permeable pavers can help reduce the volume of stormwater runoff.**

## Design Practices

Federal agencies have many alternatives for meeting the requirements of Section 438. Agencies will likely use green infrastructure or low impact development management approaches and technologies that enhance or mimic the natural hydrologic cycle processes of infiltration, evapotranspiration, and use. Federal agencies can also use footprint-reduction practices (e.g., building up instead of out) to reduce their stormwater impact. Some of the practices that agencies can use to meet Section 438, include but are not limited to the following practices (Go to [www.epa.gov/greeninfrastructure](http://www.epa.gov/greeninfrastructure) and select “Technologies and Approaches” for additional information on these practices or visit [www.epa.gov/nps/lid](http://www.epa.gov/nps/lid)):

- **Rain gardens, bioretention, and infiltration planters** promote infiltration of stormwater, and allow for evapotranspiration to occur.
- **Porous pavements** allow stormwater to infiltrate where traditional impervious pavements would otherwise be used
- **Vegetated swales and bioswales** treat stormwater runoff as it flows through these channels.
- **Green roofs** absorb and store rainfall, thereby reducing runoff volume. Green roofs also help reduce energy costs.
- **Trees and tree boxes** help break up the landscape of impervious surfaces and absorb stormwater runoff.
- **Pocket wetlands** are small wetland systems designed to treat stormwater.
- **Reforestation/revegetation** practices help restore areas to more natural vegetative cover, which promote infiltration.
- **Protection and enhancement of riparian buffers and floodplains** ensures that streams are protected and shaded, improving water quality.
- **Rainwater harvesting** (e.g., irrigation, air conditioning cooling water, non-potable indoor uses such as watering plants) uses cisterns and rain barrels to capture and use stormwater.

**For additional information on Section 438 and for a copy of the Technical Guidance, go to:**

<http://www.epa.gov/owow/nps/lid/section438>