

Recommendations to NJDEP on the Stormwater BMP Manual Provisions for Green Infrastructure Techniques¹

PURPOSE: The NJDEP is in the process of revising its Stormwater BMP Manual, both to add new sections for green infrastructure (GI) techniques (including blue and green roofs, rain barrels and cisterns) and to reformat and expand existing sections. We offer these recommendations for enhancing those additions and revisions, in order to facilitate greater use of green infrastructure techniques. Specifically, we recommend the provision of design methodologies and templates that will educate and guide practitioners, convey NJDEP expectations, and reduce lifecycle costs. (Note that engineers will still be needed to assess individual sites and customize designs for those sites.)

DEFINITION OF GREEN INFRASTRUCTURE: These recommendations are intended to apply to green infrastructure techniques consistent with the NJDEP definition of green infrastructure found on its [website](#). The website lists the following techniques: rain gardens/bioretention basins, grass swales, green roofs, pervious pavement, street tree trenches, constructed gravel wetlands, cisterns and rain barrels. Per the NJDEP, these practices “are generally considered as part of development design, but most GI practices can also be used as a retrofit option once a site has already been developed depending on the site conditions.”

RECOMMENDED DESIGN PROTOCOLS: The BMP manual should include the information needed for engineers to design GI installations that will manage stormwater from a defined area, in the same way that it does for more traditional stormwater management approaches. *(Note that it is assumed that engineers will need to assess the specific site and customize designs for that site.)*

The manual should establish protocols that address the following:

- a) **Provide design parameters for different project design objectives.** GI projects are designed with consideration of the following objectives:
 - i) To improve water quality
 - ii) To reduce peak flow rates To reduce flooding
 - iii) To achieve climate resiliency
 - iv) To restore natural systems and build ecologically and socially healthy communities

The NJDEP BMP manual should establish a design parameter, in the form of a minimum rain event, for each type of design objective. Implementers may exceed those thresholds if site conditions allow.

Note that rain events can be described in the traditional form of a design storm (like the water quality design storm) or call for a “continuous simulation,” which allows designing for potential storm conditions, such as is done by the US EPA stormwater calculator.

- b) **For each type of GI BMP, provide a generic design methodology to guide engineers.**

¹ Developed by New Jersey Future with input from Donna Drewes, Chris Obropta, Elizabeth Fassman-Beck, and members of the Urban Water Working Group green infrastructure committee, including Jennifer Gonzalez, Christopher Brown, Helen Feynk, Ashwani Vassisth, Ed Clerico, Scott Dvorak and Michael Hornsby.

- i. Include procedures for site assessment, including initial site selection, in-situ soil borings, hydraulic conductivity testing, etc.
- ii. Calculation method and matrix of design parameters to determine the size of the installation needed to accomplish the design objective.
 - a) For example, for a rain garden, what are the equations and assumptions you would use to determine the footprint needed to capture the desired amount of stormwater runoff? (Factors might include, among others, fill media water holding capacity [moisture storage capacity], fill media hydraulic conductivity, and in-situ soil infiltration capacity.) *Note that it is assumed that engineers will conduct a site assessment to determine the specific features of the site.*
 - b) For example, for a green roof, what are the assumptions you would need to determine the depth of the growing media? (Need to include a matrix of assumptions, including the water-holding characteristics of the media.)
- iii. Customizing the design to fit the site.

RECOMMENDED SCOPE: The BMP Manual should address all common GI techniques and how they can be installed in all common settings. They should:

1. Address the common GI techniques listed on the NJDEP GI website: rain gardens/bioretention basins, grass swales, green roofs, pervious pavement, street tree trenches, constructed gravel wetlands, cisterns and rain barrels. Clarify where streetscape bioswales are addressed.
2. Address GI in both new development projects and redevelopment retrofit settings.
3. To encourage “green streets” implementation, work with the NJDOT to include references to their technical design manuals and other guidance.
4. Address lifecycle costs in project design and methods to employ cost-benefit analysis to evaluate project techniques.

Stormwater BMP Manual Comparisons, 4-12-15 DVA

Stormwater Technique	NJ Stormwater BMP Manual or The Standards for Soil Erosion and Sediment Control In New Jersey*	Philadelphia 2008 Stormwater Management Guidance Manual Version 2.0	NYC 2010 Guidelines for the Design & Construction of Stormwater Management Systems	NY State Stormwater Management Design Manual (2015)	PADEP 2010? Stormwater BMP Manual
Basins – Extended Detention	Y	Y		Y	Y
Basins – Infiltration	Y			Y	Y
Basins – Retention, Ponds & Wet Basins	Y	PA Stormwater BMP Manual		Y	Y
Berms and Retentive Grading	15*, 19*, 26*	Y			Y
Bioinfiltration / Bioretention	Y	Y		Y	Y
Dry Wells	Y	In Rain Barrels and Cisterns		Y	Y
Filter Strips	Y	Y		Y	Y
Filters/Sand Filters	Y	Y		Y	Y
Green Roofs/Blue Roofs	Under Development	Y – Green	Y - both	Blue	Y – both
Inlet and Outlet Controls	11*, 12*, 13*, 14*, 15*, 17*, 18*, 20*, 21*, 22*, 23*, 24*, 29*, 32*	Y			Level spreaders
Infiltration Trenches	Y-Dry well design			Y	Y
Porous Pavement	Y	Y			Y
Pre-fabricated and Proprietary Designs	Y	PA Stormwater BMP Manual			Y
Rain Barrels and Cisterns	Under Development	Y			
Recycling of Stormwater	Cistern - Under Development		Y		
Rooftop Disconnect	Y-Chapter 5 & 2				Y
Soil amendments	1*, 3*, 4*, 7*, 8*				Y
Subsurface Infiltration	Y – Infiltration Basins	Y	Y	Y	Y
Subsurface Vaults	Y – Extended Detention Basin	Y	Y	Y	
Swales	Y – Grass Swales also see 18* & 20*	Y		Y	Y
Wetlands – Constructed	Y	PA Stormwater BMP Manual		Y	Y
Wetlands – Subsurface Gravel	Y			?	