Environmental Protection

Green Infrastructure Grant Program

2014 Stormwater Calculations Workshop

What is Green Infrastructure?

Techniques that detain or retain stormwater runoff from impervious surfaces (parking lots, rooftops, walkways) by infiltration, vegetative uptake and evapotranspiration, and/or storage for reuse or controlled release.

Green Roofs

Blue Roofs

Rain Garden

Constructed Wetland

Subsurface Detention

Permeable Pavers

Minimum Requirement

All proposed green infrastructure systems must manage a 1” volume of stormwater runoff from the contributing impervious tributary area.

- This requirement is meant to encourage cost-effective projects given that 90% of storms in NYC are 1.2” or less.
- Projects that propose to manage 3x, 4x, and 5x that amount may not necessarily be more competitive.

The Stormwater Calculations Template verifies that this minimum requirement is being met by:

1. Calculating the total impervious tributary area for the proposed project
2. Calculating the 1” stormwater volume over this impervious tributary area
3. Verifying that the proposed project will manage this 1” volume

Calculating Impervious Tributary Area

An impervious surface is any hard surface that prevents water from absorbing into the ground which generates stormwater runoff

Examples of impervious surfaces include:

Asphalt

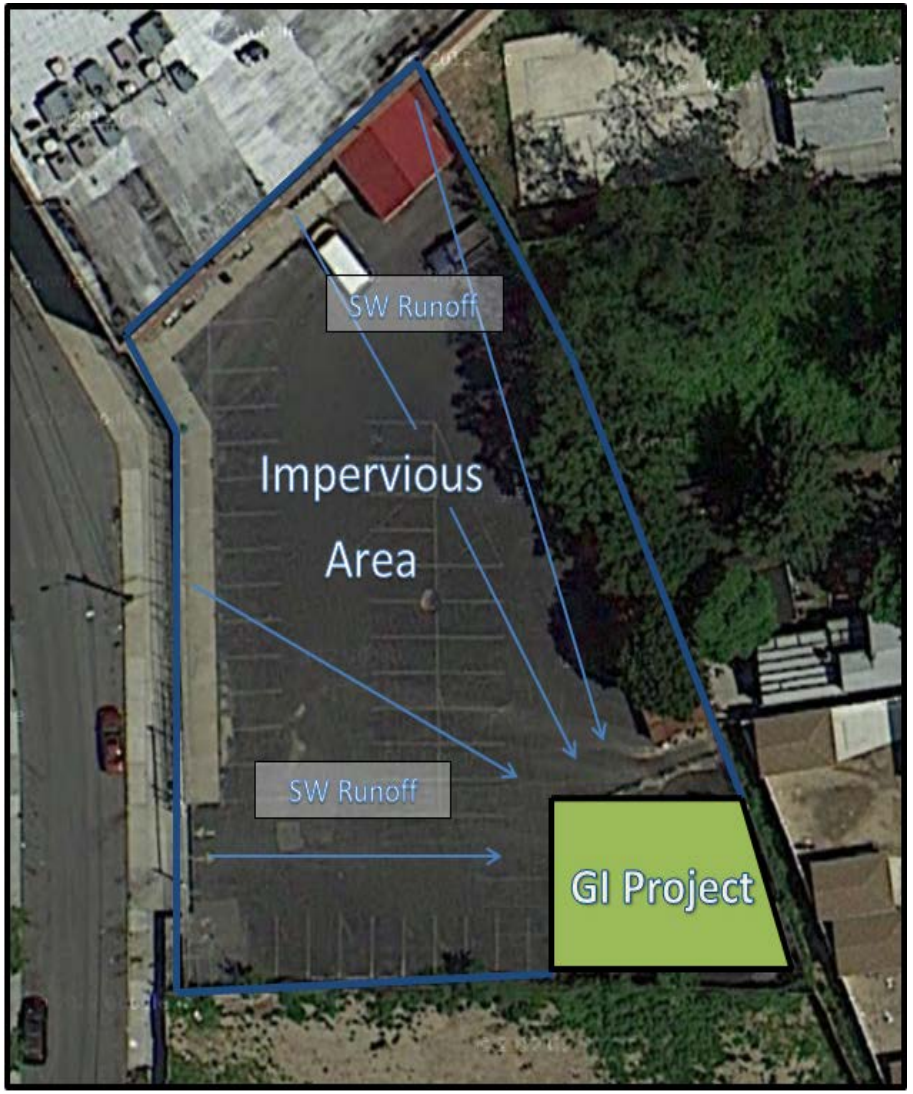
Concrete

Roof

Impervious tributary area is the total square footage of impervious surfaces contributing stormwater runoff to the green infrastructure project.

Calculating 1-Inch Volume

- All proposed green infrastructure projects must manage at least the 1-inch stormwater volume from the impervious tributary area.
- This 1-inch volume (in cubic feet) is calculated by multiplying the impervious tributary area by a stormwater depth of 1” (or 0.083 feet).
- Convert cubic feet to gallons by multiplying the ratio of 7.48 gallons / cubic foot
- **The spreadsheet calculates the 1” volume automatically after entering the impervious tributary area.**



Calculating Volume Managed

Volume managed is the sum of the infiltration volume (if applicable) and storage volume of all components of the proposed green infrastructure project.

Infiltration volume is the volume of water absorbed into the ground in a eight-hour period. This is a function of the infiltration rate of the existing soil. **Use 0.2 in/hr if unknown.**

Storage volume is the total volume of void space in media layer/aggregate or detention system available to accommodate stormwater storage.

Void space is the porosity (aka percent of voids) of the media/aggregate multiplied by its total volume (in cubic feet); for detention systems it is the manufacturer's capacity of the system

Soil Layers

Stone Layers

Drainage Layers

Porous Pavement

Typical Porosities of Media/Aggregate

Media/Aggregate	Typical Porosity Ranges
Soil	15-25%
Broken Stone	33-50%
Pervious Concrete	33-50%
Green Roof (Growing Media)	See Manufacturer's Specs.
Drainage Layer	See Manufacturer's Specs.

The above values are for preliminary estimation only. You must verify the porosity of each layer if Grant Application is accepted.

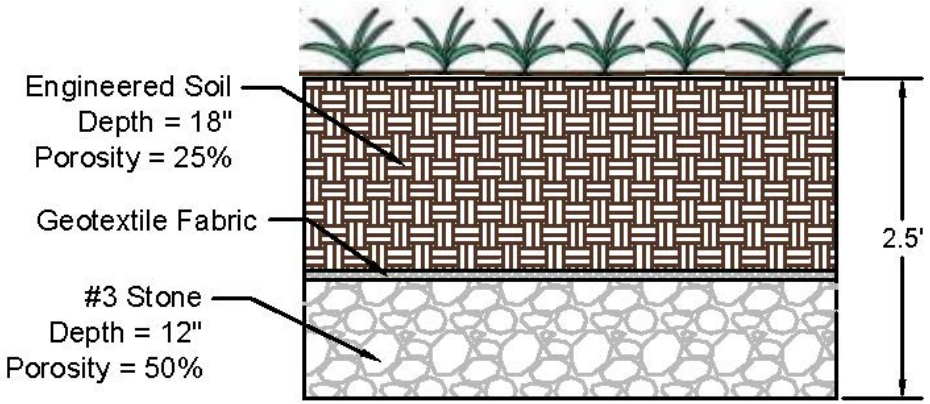
Example Projects

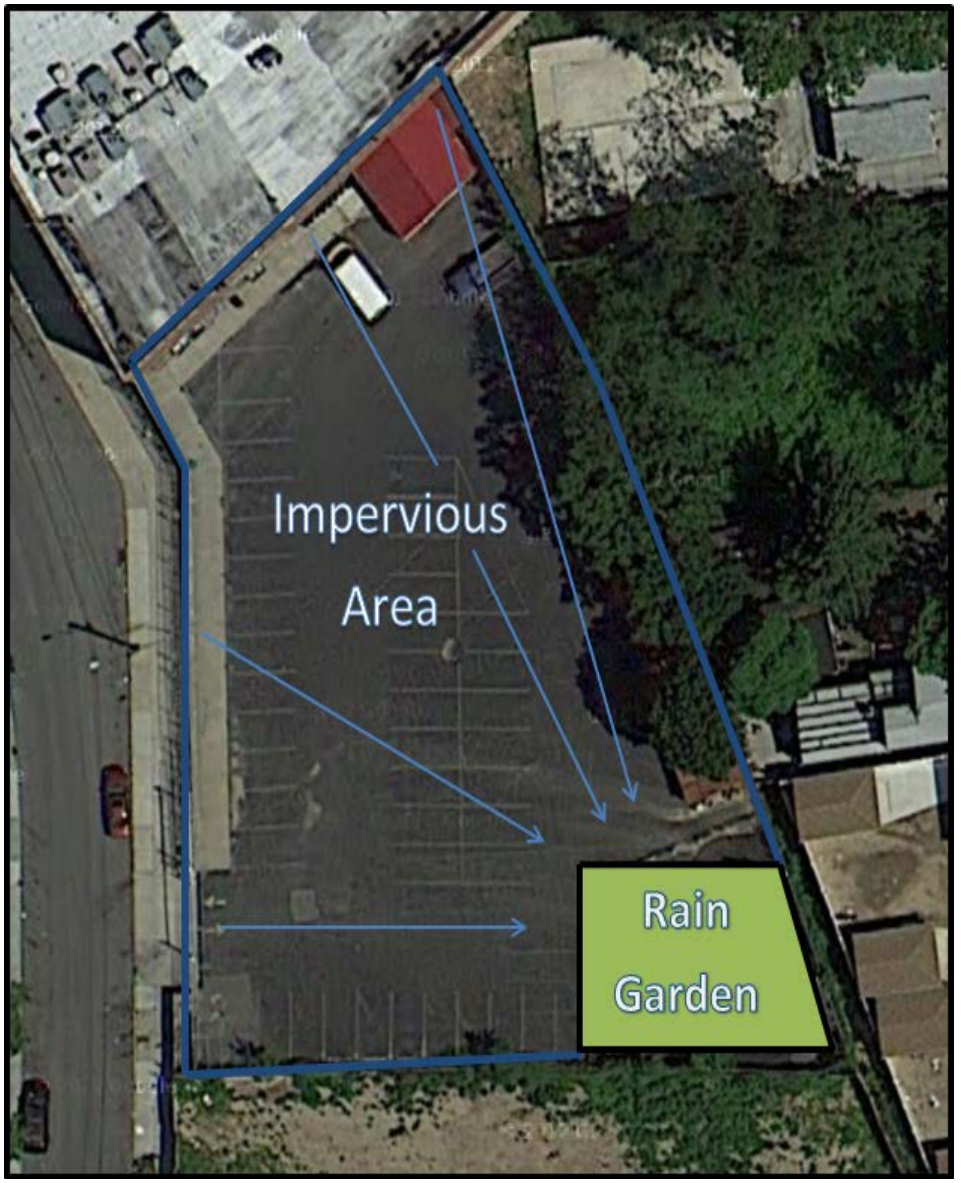
Example: Proposed Rain Garden

Impervious Tributary Area = 24,000 ft^2

Rain Garden Footprint Area = 2,000 ft^2

Proposed Rain Garden Cross-Section:





Stormwater Calculations

Volume Managed the sum of the infiltration volume (if applicable) and the storage volume of all components of the proposed vegetated or infiltration system

Step 1 IMPERVIOUS TRIBUTARY AREA: Enter the total square feet for impervious tributary area for Vegetated and/ Infiltration Systems ONLY

Impervious Tributary Area (SF)	24,000	*Amount carried to Summary Table on the 'Instructions' tab*

Step 2 1-INCH STORMWATER VOLUME: Determine the minimum volume of stormwater to be managed by the system

Impervious Tributary Area (SF)	24,000	*From Step 1*
1-Inch Stormwater depth (in feet)	0.08	
1-Inch Stormwater Volume (CF)	2,000	*Minimum volume of stormwater to be managed by the system*
1-Inch Stormwater Volume (Gal)	14,960	*Amount carried to Summary Table on the 'Instructions' tab*

Step 3 STORMWATER VOLUME MANAGED: Estimate the total volume managed for the proposed installation. Calculate the void space volume in soils, gravel, or other storag

Installation Geometry

Installation Volume (CF)	5000	*Enter the total volume of all media in the proposed system in cubic feet*
Installation Footprint Area (SF)	2000	*Enter the area of the bottom of installation in square feet*

Infiltration Data

Infiltration Design Rate (in/hr.)	0.2	*Enter infiltration rate of existing soil (use 0.2 in/hr. if unknown)*
Infiltration Period (hr.)	8	
Estimate Infiltration Volume (CF)	266.67	*Stormwater volume managed by infiltration*

Soil Layer

Volume of Soil (CF)	3000	*Enter the volume of the planting soils*
Porosity of Soil (%)	25%	*Enter the porosity as the ratio of void space volume to total volume. "if using DEP specification for soil, the porosity is 25%"*
Storage Volume of Planting Soil (CF)	750	*Available void space of planting soil*

Storage Layer

Volume of Storage Layer (CF)	2000	*Enter the volume of the drainage layers*
Porosity of Storage Layer (%)	50%	*Enter the porosity from selected drainage layer specification*
Storage Volume of Drainage Layer (CF)	1000	*Available void space of drainage layer*

Additional Layer(s) (if necessary)

Volume of Additional Layer(s) (CF)		*Enter the volume of the additional layer*
Porosity of Additional Layer(s) (%)		*Enter the void space as a percentage of the additional layer volume*
Storage volume of Additional Layer(s) (CF)	0	*Available void space of additional layer*
		Enter description of additional layer(s)

Additional Storage Volume

All Other Additional Storage or Void Space (CF)		*Storage volume of all other storage units and void spaces*
		Enter description of storage units and/or void spaces

Stormwater Volume Managed

Estimated Volume Managed (CF)	2016.7	*Sum of infiltration volume and all storage volumes. Must be greater than or equal to 1-inch volume from Step 2.*
Estimated Volume Managed (Gal)*	15,085	*Amount carried to Summary Table on the 'Instructions' tab*

Input Data to Grant Application

Green Infrastructure Grant Program

Stormwater Calculations Template

Instructions:

There are three tabs in this spreadsheet to assist stormwater professionals in calculating the stormwater volume to be managed for each type of green infrastructure proposed. If your project contains multiple types of green infrastructure systems, you must complete the relevant tab for each type. The spreadsheet will also assist in calculating the total volume managed for the entire project.

Review the list of tabs and examples below to select the tab most applicable to your project type. Note that there is a separate tab for green roof projects.

The summary table below will automatically compile the data from each of the three tabs. Enter the yellow cell values in the Summary Table into the Project Proposal Summary of the online application.

Tab 1: Vegetated and/or Infiltration Systems

Examples include:

- Rain Gardens
- Porous Paving
- Vegetated Swales
- Open bottom subsurface detention systems

Tab 2: Green Roofs

Examples include:

- Vegetated Roof Systems

Tab 3: Detention Systems

Examples include:

- Blue Roofs
- Cisterns
- Rainwater Harvesting / Reuse systems

Input these values into Grant Application

Summary Table

	Impervious Tributary Area	1-Inch Stormwater Volume over Impervious	Proposed Volume Managed	
Vegetated or Infiltration Proje	24,000	14,960	15,085	*From Tab 1*
Green Roof Projects	0	0	0	*From Tab 2*
Detention Systems	0	0	0	*From Tab 3*
Total	24,000	14,960	15,085	*Sum of Tabs 1, 2, and 3. Enter these values into the online application.*

Tips:

Detention projects should refer to the manufacturer and/or design specifications and enter them into the spreadsheet. Include the cut sheets/specification from the product supplier or manufacturer in the online application.

For vegetated/infiltration systems, enter the porosity for each type of material. Add additional fields if necessary.

Blue roof projects should ensure that the slope is less than 2% to allow for adequate storage across the whole roof. Please refer to the DEP's Guidelines for the Design and Construction of Stormwater Management Systems for more information on designing a blue roof.

Green roof slopes should be less than 4%.

For green roofs, be sure to review the prospective growing media supplier's specification for their products. Enter the proposed growing media porosity rates into the table provided.

Include all of green roof system layers with retentive qualities in the table provided. Reference the manufacturer specifications for the maximum storage capacity for each layer.

Questions?

- Visit www.nyc.gov/dep/grantprogram to access the online application, review eligibility criteria and grantee requirements

- Visit www.nyc.gov/dep/greeninfrastructure to
  - Download FAQs
  - Download Workshop Presentation
  - Review Press Releases with previous winner information
  - Find out about upcoming workshops

- Email gigrantprogram@dep.nyc.gov with questions