



Green Infrastructure Implementation

10 Points 15 Points 20 Points

New Action February 2018

Green infrastructure is a cost-effective and sustainable approach to stormwater management that can reduce nuisance flooding and offer other important environmental, social, and economic benefits. Green infrastructure techniques capture, filter, absorb, and reuse stormwater to maintain or mimic natural hydrologic systems and to treat runoff as a resource. When used as components of a stormwater management system, green infrastructure practices, such as bioretention basins, green roofs, porous pavement, rain gardens, and vegetated swales, can produce a variety of environmental, social and economic benefits.

This action provides guidelines for implementing green infrastructure projects that will reduce your community's impervious coverage and stormwater runoff. Municipalities can earn up to 20 points for three levels of green infrastructure implementation, including:

- **Tier 1 Implement Green Infrastructure Demonstration Projects.** Complete two green infrastructure demonstration projects and/or implement one green infrastructure policy. Green infrastructure projects include one or more of the green infrastructure practices shown in the [Green Infrastructure Guidance Manual for New Jersey](#): Rain Gardens, Bioswales, Downspout Planters, Stormwater Planters, Cisterns, Permeable Pavements, Tree Filter Boxes, and Green Roofs. Tier 1 replaces both the previous Green Roofs and Rain Gardens Actions in the Innovation & Demonstration Projects category. **[10 points]**
- **Tier 2 Implement Green Infrastructure Action Plan.** Complete as many green infrastructure projects as is necessary to achieve 50% of the short-term impervious cover management goal identified in the community's Green Infrastructure Action Plan (see the Green Infrastructure Planning Action). **[15 points]**
- **Tier 3 Implement Green Infrastructure Strategic Plan.** Complete as many green infrastructure projects and policy changes as is necessary to achieve 50% of the long-term impervious cover management goal identified in municipality's Green Infrastructure Strategic Plan (see the Green Infrastructure Planning Action). **[20 points]**

Municipalities can achieve either 10 points for Tier 1, 15 points for Tier 2, or 20 points for Tier 3 (points are not cumulative).

In order to earn points for Tiers 2 and 3, the municipality must have also completed the Green Infrastructure Planning Action by preparing a Green Infrastructure Action Plan (Tier 2), or a Green Infrastructure Strategic Plan (Tier 3).

Why is it important?

Green infrastructure is part of the solution to several water resources problems in New Jersey. Many communities experience flooding, even during small rainfall events. New Jersey streams are polluted and some are not fishable or swimmable. Stream banks are eroding, and stream channels are downcutting. These problems can result in property and infrastructure damages, public health issues, and ecological concerns. As New Jersey's landscape is developed and redeveloped, these problems intensify. The changing climate will cause more frequent and intense storm events, adding to the state's water resources problems.

The primary cause of these problems is that stormwater runs rapidly off impervious surfaces into storm sewers or combined sewer systems and local waterways. Impervious surfaces are any ground cover that cannot infiltrate stormwater, including paved roadways, parking areas, sidewalks, and building roofs. To intercept stormwater runoff from going directly to local waterways, green infrastructure can capture and treat it for infiltration, reuse, or slow release - all in a cost-effective manner. By managing stormwater runoff from impervious surfaces, communities can reduce flooding and improve the quality of New Jersey's water resources.

[The Green Infrastructure Guidance for Reducing the Impacts of Impervious Cover on Water Quality](#) and the [Green Infrastructure Guidance Manual for New Jersey](#) provide guidance on green infrastructure projects and an overview of the urban water cycle and its effect in Combined Sewer System (CSS) and Municipal Separate Stormwater Sewer System (MS4) Communities. It explains what green infrastructure is, and provides details on the following green infrastructure practices, as well as the planning and design process, community engagement and education, technical construction details, and resources.

According to the United States Environmental Protection Agency, in addition to effectively retaining and infiltrating rainfall, green infrastructure technologies can simultaneously help filter air pollutants, reduce energy demands, mitigate urban heat islands, and sequester carbon, while also providing communities with aesthetic and natural resource benefits.

Green infrastructure in streets is also important because it helps create healthy environments for multiple users in numerous ways, including the provision of adequate vegetation/ tree cover to act as a carbon sink for pollutants from vehicles; green corridor linkages that support an urban bio-diversity habitat; and reduced storm water runoff and flooding from impervious roads.

Implementation of green infrastructure practices will help the municipality convert impervious surfaces to pervious surfaces, and disconnect impervious surfaces from flowing directly into waterways by managing runoff from impervious surfaces through a combination of immediate green infrastructure demonstration projects, short-term green infrastructure projects, and long-term policy measures to encourage the use of green infrastructure.

Who should lead and be involved with this action?

Responsible entities depend upon the type and location of the green infrastructure project, and could include parks departments, public works (municipal groundskeepers), property owner(s), non-profit organizations, utilities, and/or municipal utilities authorities. The property owners for green infrastructure project sites, as well as any tenants, should be consulted during all phases of design, construction, operations and maintenance. In all projects, the municipal government must be significantly involved in the implementation of each project, and the installation must be completed. (Note: If a municipality completed a Green Infrastructure Action Plan and/or Green Infrastructure Strategic Plan under the Green Infrastructure Planning Action, those documents should identify the responsible entities to lead each specific green infrastructure project.)

Typically, the design and construction phases of green infrastructure projects are overseen by the municipal or authority engineer, though projects implemented by non-profit organizations or private landowners will use their own engineering consultants. Services of a professional design team will also be required for green infrastructure design, possibly including a licensed professional engineer (PE), certified landscape architect (CLA), and permitting specialist (usually a scientist or engineer) with experience in green infrastructure design engineering.

Permitting agencies, including but not limited to the New Jersey Department of Environmental Protection, the Soil Conservation District, and local authorities (e.g., construction code officials, zoning officer, Planning Board, Zoning Board), should be involved, as applicable.

The services of a licensed and insured contractor (ideally with experience in construction of green infrastructure measures) may also be required for construction. Local parks or public works department and grounds maintenance staff may possess all necessary skills and tools for constructing small scale projects (e.g., one rain garden); larger or more complicated projects may require hiring contractors.

Operations and maintenance of green infrastructure can be provided by a variety of means, such as by local non-profit organizations, schools, or municipal action teams; departments of public works; maintenance contractors; or an

agreement with a private property owner.

Environmental commissions, master gardeners, municipal action teams, green teams or municipal sustainability committees, schools and non-profit organizations or community groups may offer volunteer labor for the green infrastructure demonstration projects.

Some municipalities may choose to form a municipal action team to bring together local governments, utility authorities, residents, and community organizations that work to achieve shared green infrastructure goals (e.g., [Camden SMART](#), [Newark DIG](#), [Perth Amboy SWIM](#), etc.). Municipal action teams are not required for this action, but should be involved if they have been established.

Timeframe

Design, permitting, and construction schedules will vary on a project basis. Up to three months of planning may be necessary to conduct a site assessment and to order materials. Additional lead time may be necessary if the project requires significant permits or includes complementary infrastructure improvements, such as updates to curbing or storm drains. Small scale projects such as an individual rain garden or downspout planter can be completed in days or weeks, while large scale detention/retention/infiltration facilities may take years.

Although the timeframe for projects will vary, Tier 1 should take between six months and one year to implement two green infrastructure demonstration projects. Tier 2 should take up to two years to implement three green infrastructure projects recommended in the municipality's Green Infrastructure Action Plan. Tier 3 may take up to five years to complete four long-term green infrastructure projects and/or policy recommendations identified in municipality's Green Infrastructure Strategic Plan.

After construction, maintenance and education will be ongoing. Depending on the specific green infrastructure practices, regular maintenance and watering will likely be necessary during the first few months, and seasonal weeding, mulching, and pruning will likely be required after plants have been established. The maintenance and education phase will last for the lifespan of each green infrastructure project, which will also vary depending on the type(s) of green infrastructure practices utilized.

Project Costs and Resource Needs

Costs to implement site-specific green infrastructure projects will include soft costs (i.e., engineering design and permitting), hard costs (i.e., capital costs), and operations and maintenance costs. Costs will vary on a project basis. If a municipality has prepared a Green Infrastructure Action Plan or Strategic Plan under the Green Infrastructure Planning Action, these plans will have green infrastructure information sheets for each project with estimated costs.

What to do, and how to do it

This section provides guidance and recommendations for implementing the action.

Tier 1 Implement Green Infrastructure Demonstration Projects. [10 points]

To earn points for Tier 1 of this action, the municipality must construct and maintain at least two green infrastructure demonstration projects and/or implement one green infrastructure policy from the Green Infrastructure Planning action. Green Infrastructure Practices, as noted in the [Green Infrastructure Guidance Manual for New Jersey](#), include rain gardens, bioswales, downspout planters, stormwater planters, cistern, permeable pavements, tree filter boxes, and green roofs. Tier 1 replaces the previous Green Roofs and Rain Gardens Actions in the Innovation & Demonstration Projects category.

As long as the green infrastructure projects are currently in use for the year in which the municipality is applying for certification, the projects may have been completed at any time to be eligible for points.

Further information regarding how to implement green infrastructure projects is included in the subsection below titled "Guidance for Implementation of Green Infrastructure Projects (applies to all Tiers)."

Tier 2 Implement Green Infrastructure Action Plan. [15 points]

To earn points for Tier 2 of this action, the municipality must construct and maintain as many green infrastructure projects as is necessary to achieve 50% of the short-term impervious cover management goal identified in the community's Green Infrastructure Action Plan. [15 points] Priority for green infrastructure projects should be given to those sites for which concept plans and green infrastructure information sheets were developed in the Green Infrastructure Action Plan. However, should an unforeseen obstacle prevent the municipality from implementing demonstration projects on those sites, other sites can be chosen from the list of potential sites for green infrastructure implementation included in the Green Infrastructure Action Plan.

As long as the green infrastructure projects are currently in use for the year in which the municipality is applying for certification, the projects may have been completed at any time to be eligible for points.

Further information regarding how to implement green infrastructure projects is included in the subsection below titled "Guidance for Implementation of Green Infrastructure Projects (applies to all Tiers)."

Tier 3 Implement Green Infrastructure Strategic Plan. [20 points]

To earn points for Tier 3 of this action, the municipality must construct and maintain as many green infrastructure projects and implement as many policy changes as is necessary to achieve 50% of the long-term impervious cover management goal identified in municipality's Green Infrastructure Strategic Plan.

Further information regarding how to implement green infrastructure projects is included in the subsection below titled "Guidance for Implementation of Green Infrastructure Projects (applies to all Tiers), and further information regarding how to implement green infrastructure policy recommendations is included in the subsection below titled "Guidance for Implementation of Green Infrastructure Policy Recommendations (applies to Tier 3 only)."

Guidance for Implementation of Green Infrastructure Projects (applies to all Tiers)

Green infrastructure projects include one or more of the green infrastructure practices shown in the [Green Infrastructure Guidance Manual for New Jersey](#): rain gardens, bioswales, downspout planters, stormwater planters, cisterns, permeable pavements, tree filter boxes, and green roofs. As technology evolves, additional green infrastructure practices may be developed and would also apply. Projects are defined by site, meaning that one project could have multiple green infrastructure practices.

Four steps will be required to implement each green infrastructure project:

1. Design (including survey and field testing, if needed) and Permitting
2. Construction
3. Maintenance and Monitoring
4. Education/Outreach

These four steps to implement a green infrastructure project will be the same regardless of which Tier of this Green Infrastructure Implementation Action applies to the municipality. The guidance and recommendations below should assist a municipality to implement green infrastructure projects. However, green Infrastructure practices should be designed with the guidance of a professional engineer and/or licensed landscape architect.

1. Design and Permitting

Successful projects will require that multiple site constraints and opportunities be carefully considered and integrated into a final design. [Rutgers Water Resources](#) provides Technical Details for specific Green Infrastructure Practices and Chapter 3 of the [Green Infrastructure Guidance Manual for New Jersey](#) provides design professionals with a basic understanding of the design approach needed to successfully plan a green infrastructure project in New Jersey. Design guidance is summarized here, but municipalities and design professionals should consult the manual for full details.

Green infrastructure practices should be designed to manage the 2-year design storm (3.3 inches of rainwater over 24-hours). The following guidelines are applicable to all green infrastructure designing regardless of which practice is recommended for the site:

- Conduct a site survey to determine surface elevations, flow direction, and drainage area. This should be done by a professional, regardless if topography data is available.
- Use a hydrologic modeling software to simulate the green infrastructure practice during a 2-year design storm to determine the appropriate size for the green infrastructure practice to manage the selected drainage area and account for the approximate runoff volume to manage the 2-year design storm.
- Use a drafting software to design the green infrastructure practice and produce construction documents including construction specification and details (this should be done by a licensed engineer or landscaped architect). A **Green Infrastructure Guidance Manual for New Jersey** has been developed by the Rutgers Cooperative Extension Water Resources Program, includes guidance and construction specifications for green infrastructure design professionals.
- Review **municipal ordinances** to determine whether the project site requires permits for the project installation. If a municipality has prepared a Green Infrastructure Action Plan or Strategic Plan under the Green Infrastructure Planning Action, these plans will have green infrastructure information sheets for each project with information on existing site conditions and issues, proposed green infrastructure solutions (concept plan), anticipated benefits, stormwater capture rates per green infrastructure practice, potential funding sources and partners, and estimated costs.

2. Construction

Installation for each green infrastructure demonstration project should be completed following the engineering plans and construction documents. Depending on the scale of the project, a professional contractor may be needed to install the project for large scale project such as stormwater planters along sidewalks. Small scale projects, such as a rainwater harvesting system or residential rain garden/bioretenion system can be installed by community residents.

3. Maintenance and Monitoring

Maintenance and monitoring should be compliant with NJDEP requirements for maintenance of stormwater systems (as defined in the municipal stormwater management ordinance adopted pursuant to its NJPDES MS4 stormwater permit), involving period observation and cleaning, including after each rainfall even of greater than one inch. A green infrastructure maintenance agreement shall be put into place with the site owner or other entity identified to maintain the practice. A maintenance log will be kept and will require inspection, at a minimum, once a month and within 48 hours after a storm greater than 1.25 inches.

4. Education/Outreach

A variety of educational programming options can take advantage of the green infrastructure demonstration projects. Some examples are:

- Educational signage at the site(s).
- Integrating the demonstration project with local school curricula.
- Tours, lectures, or training workshops at the site(s).
- Hands-on volunteer opportunities for green infrastructure maintenance.
- A website with project profile and green infrastructure resources.
- Educational brochures for homeowners or businesses.
- Training workshops for residents, landscapers, and design professionals regarding how to install and maintain green infrastructure.
- Project profile in newsletter for residents.
- Outreach partnerships with local nurseries and landscapers.

Guidance for Implementation of Green Infrastructure Policy Recommendations (applies to Tier 3 only)

In order to implement a green Infrastructure policy recommended in its Green Infrastructure Strategic Plan, the municipality should amend or adopt a policy(ies) by resolution or ordinance, as applicable. Each Green Infrastructure

Strategic Plan will recommend different policies, such as performance zoning, an amendment to a stormwater management ordinance to incorporate green infrastructure, a policy to incentivize green infrastructure on private property, etc. Sample ordinances are provided in the resources section. Municipalities are not required to use these samples as long as their policy implements a recommendation of the Green Infrastructure Strategic Plan developed under the Green Infrastructure Planning Action.

What to submit to earn points for this action

In order to earn points for this action, the following documentation must be submitted as part of the online certification application in order to verify that the action requirements have been met.

For 10 points:

Tier 1 Implement Green Infrastructure Demonstration Projects

In order to earn points for Tier 1 of this action, your submission must meet the following standards:

- The municipality must construct at least two green infrastructure demonstration projects and/or implement one green infrastructure policy.
- As long as the green infrastructure demonstration projects are currently in use for the year in which you are applying for certification, the two installations may have been completed at any time to be eligible for points.
- The municipal government must have been significantly involved in the implementation of the two demonstration projects, and the installations must be completed.
- Maintenance of the green infrastructure practices must be performed seasonally.
- Education/outreach must be performed either perpetually (e.g., signage, web-site information) or at least annually to educate the community about the projects.

Submit the following documentation to verify the action was completed to the above standards. In the Description of Implementation box on the action submission page, please provide a short narrative to summarize what was accomplished and the general steps taken to accomplish it. For each demonstration project, include a project profile and the following steps, if applicable: design, permitting, construction, maintenance, and education/outreach.

- Upload: Documentation that includes photos of each completed demonstration infrastructure project, and either project scopes, design plans, paid contracts, planting lists and/or any other descriptive evidence of the project.
- Upload: Documentation of an education/outreach initiative that was conducted, including any signage.
- Upload: Narrative of proposed seasonal maintenance activities, including specific maintenance activities, parties responsible for maintenance, and maintenance schedule.

For 15 points:

Tier 2 Implement Green Infrastructure Action Plan

In order to earn points for Tier 2 of this action, your submission must meet the following standards:

- The municipality must construct as many green infrastructure projects as is necessary to achieve 50% of the short-term impervious cover management goal identified in the community's Green Infrastructure Action Plan. As long as the green infrastructure projects are currently in use for the year in which you are applying for certification, the three installations may have been completed at any time to be eligible for points.
- As long as the green infrastructure projects are currently in use for the year in which you are applying for certification, the installations may have been completed at any time to be eligible for points. The projects should also be recommended in the Action Plan.

- The policy may have been passed at any time to be eligible for points. The policy must be active in the year in which you are applying for certification. Any resolution must be dated and signed/certified true. The policy should be published on the municipal website, and publicized through other education/outreach efforts.
- The municipal government must have been significantly involved in the implementation of the green infrastructure projects, and the installations must be completed.
- Maintenance of the green infrastructure projects must be performed seasonally.
- Education/outreach must be performed either perpetually (e.g., signage, web-site information) or at least annually to educate the community about the projects.

Submit the following documentation to verify the action was completed to the above standards. In the Description of Implementation box on the action submission page, please provide a short narrative to summarize what was accomplished and the general steps taken to accomplish it. Specifically summarize how what was accomplished implements the Green Infrastructure Action Plan.

- Upload: Documentation (calculations) of the total percentage of existing impervious cover (%) or area (acres) of impervious surfaces that has been converted to pervious surfaces and/or where runoff from impervious surfaces will be managed using green infrastructure measures. The percentage or area should meet at least 50% of the short-term impervious cover management goal of the Green Infrastructure Action Plan.
- Upload: Project documentation that includes photos of each completed green infrastructure project, and may also include project scopes, design documents, and paid contracts.
- Upload: Narrative of proposed seasonal maintenance activities, including specific maintenance activities, parties responsible for maintenance, and maintenance schedule.
- Upload: Documentation of an education/outreach initiative that was conducted, including any signage.

For 20 points:

Tier 3 Implement Green Infrastructure Strategic Plan

In order to earn points for Tier 3 of this action, your submission must meet the following standards:

- The municipality must construct as many green infrastructure projects and implement as many policy changes as is necessary to achieve 50% of the long-term impervious cover management goal identified in municipality's Green Infrastructure Strategic Plan.
- As long as the green infrastructure projects are currently in use for the year in which you are applying for certification, the installations may have been completed at any time to be eligible for points. The projects should have also been recommended in the Strategic Plan.
- As long as the policy was recommended in the Green Infrastructure Strategic Plan, the policy may have been passed at any time to be eligible for points. The policy must be active in the year in which you are applying for certification. Any resolution must be dated and signed/certified true. The policy should be published on the municipal website, and publicized through other education/outreach efforts.
- The municipal government must have been significantly involved in the implementation of the green infrastructure projects/policies, and the installations must be completed.
- Maintenance of the green infrastructure projects must be performed seasonally.
- Education/outreach must be performed either perpetually (e.g., signage, web-site information) or at least annually to educate the community about the projects.

Submit the following documentation to verify the action was completed to the above standards. In the Description of

Implementation box on the action submission page, please provide a short narrative to summarize what was accomplished and the general steps taken to accomplish it. Specifically summarize how what was accomplished implements the Green Infrastructure Strategic Plan.

- Upload: Documentation (calculations) of the total percentage of existing impervious cover (%) or area (acres) of impervious surfaces that has been converted to pervious surfaces and/or where runoff from impervious surfaces will be managed using green infrastructure measures. The percentage or area should meet at least 50% of the long-term impervious cover management goal of the Green Infrastructure Strategic Plan.
- Upload: Project documentation that includes photos of each completed green infrastructure project, and may also include project scopes, design documents, and paid contracts.
- Upload: Narrative of proposed seasonal maintenance activities, including specific maintenance activities, parties responsible for maintenance, and maintenance schedule.
- Upload: Documentation of an education/outreach initiative that was conducted, including any signage.
- Upload: A description of the policy (ies) implemented and a copy of the resolution(s) or ordinance(s).

Approved Action Expiration Date

Approved actions will be set to expire 5 years from the date the project or plan was completed.

IMPORTANT NOTES:

There is a limit of six uploaded documents per action and individual files must not exceed 30 MB. Excerpts of relevant information from large documents are recommended.

All action documentation is available for public viewing after an action is approved. Action submissions should not include any information or documents that are not intended to be viewed by the public.

Spotlight: What NJ towns are doing

Camden SMART has completed [49 green infrastructure projects](#), which capture over 60 million gallons of stormwater each year. The City of Hoboken has been implementing its Green Infrastructure Strategic Plan through projects such as the [Southwest Park](#), [Washington Street Redesign](#), First Street Streetscape Revitalization, and Park at 7th and Jackson, which all include green infrastructure and together will capture greater than 500,000 gallons of stormwater each year.

Resources

The Rutgers Water Resources Program is available to assist communities in green infrastructure design and implementation. Engineering/environmental consulting firms throughout New Jersey can provide support through professional services contracts.

Green Infrastructure Project Resources:

- [New Jersey Green Infrastructure Guidance Manual](#)
- [Jersey Water Works Green Infrastructure Design Recommendations](#)
- [New Jersey Rain Garden Manual](#)
- [Rutgers Water Resources Introduction to Green Infrastructure](#)
- [Rutgers Water Resources Green Infrastructure Fact Sheets](#)
- [US EPA Green Infrastructure Information and Green Infrastructure Design and Implementation Website](#)
- [NJDEP Green Infrastructure Information](#)
- [New Jersey Stormwater Best Management Practices Manual](#)
- [New York City Green Infrastructure Standards and Specifications](#)

Green Infrastructure Policy Resources:

- [US EPA Green Infrastructure Policy Guides](#)
- [Green Infrastructure Exchange](#)
- [Green Infrastructure Toolkit](#)
- [New Jersey Future Mainstreaming Green Infrastructure Project](#)

Green Infrastructure Funding Resources:

Grant, low-interest loan, and foundation funding sources for green infrastructure are rapidly evolving. Previous green infrastructure planning documents have been funded by a variety of sources, such as:

- [New Jersey Environmental Infrastructure Trust \(NJEIT\)](#)
- [Federal Grants](#)
- [NJDEP](#)
- [NJ Sea Grant Consortium](#)

It is important to note that green infrastructure can often be an added benefit for other capital projects. Funding sources traditionally used for roadway and other transportation projects (i.e., green streets), ecological and habitat restoration projects, and flood mitigation projects, can often provide funding toward green infrastructure.

Green Streets

- [Green Streets: A Conceptual Guide to Effect Green Streets Design Solutions Residential Streets, Commercial Streets, Arterial Streets, Alleys](#)
- [National Association of City Transportation Officials Urban Street Stormwater Guide](#)
- [Philadelphia Water Department Green Streets Design Manual](#)
- [EPA's Learn About Green Streets webpage](#)