

GREEN STORMWATER INFRASTRUCTURE ELEMENT OF THE PASSAIC COUNTY MASTER PLAN

PASSAIC COUNTY

**FINAL PLAN
JUNE 2018**

Prepared by:
Passaic County Department of Planning and Economic Development
with assistance from
AKRF, McCormick Taylor, and Mercer Planning Associates



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Miles

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2018

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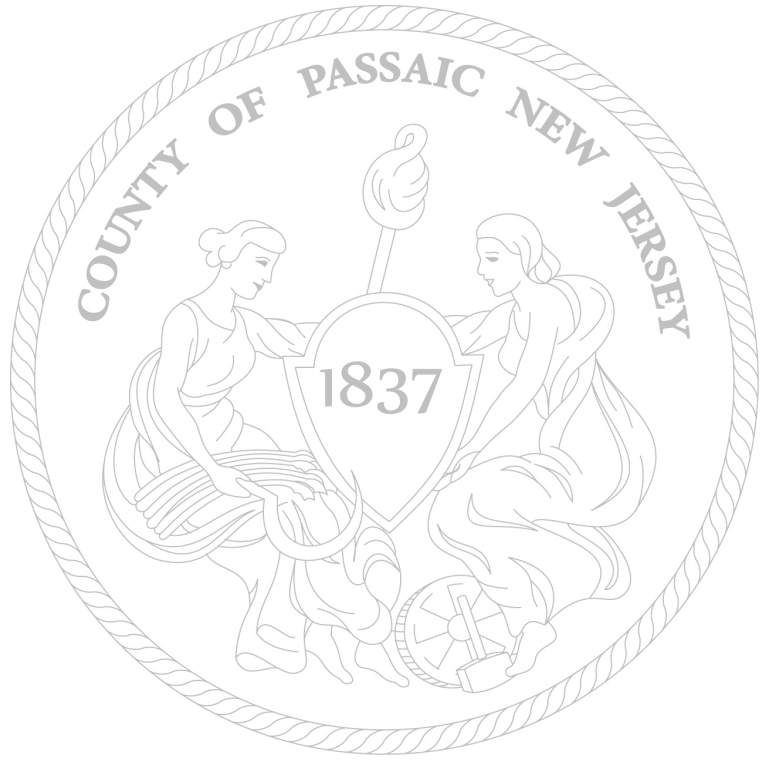
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I. EXECUTIVE SUMMARY

This Green Stormwater Infrastructure Element of the Passaic County Master Plan (the Green Stormwater Infrastructure Element), funded by a North Jersey Transportation Planning Authority (NJTPA) Subregional Study grant, is designed to enable the County to implement a comprehensive strategy for stormwater management based on widespread application of Green Stormwater Infrastructure (GSI) and Low Impact Development (LID) strategies. The Green Stormwater Infrastructure Element provides the following:

1. strategies to implement LID/GSI throughout the County,
2. standardized technical guidance to support County-wide implementation on public capital improvement and private sector land development projects,
3. recommendations to incorporate green stormwater infrastructure requirements into an update of the County’s Site Plan and Subdivision Resolutions, and
4. resources for municipalities to facilitate the implementation at the local level.

Over the long term, County-wide implementation of LID and GSI is intended to

- reduce flood-related damage and repetitive loss from localized flooding caused by smaller, more frequent storms.
- reduce negative impacts from stormwater runoff to improve water quality.

- enable groundwater recharge where feasible.
- enhance transportation safety and mobility.
- protect environmentally sensitive areas.
- provide quality of life/aesthetic improvements and social value.

A. KEY RECOMMENDATIONS

A number of early actions are recommended to begin widespread implementation of LID and GSI. These include

- Collecting and analyzing mapping and other data to identify opportunity areas for County-wide GSI implementation,
- Adopting an update to the County’s Site Plan and Subdivision Resolutions to specify LID/GSI requirements for land development projects,
- Identifying funding opportunities and mechanisms for GSI implementation within the County capital improvement budget.
- Adopting formal internal policies to ensure GSI implementation occurs in a coordinated, cross-departmental process, and
- Developing a training program for County staff involved in regulatory reviews and inspections on how to use the Passaic County Stormwater Management Guidance Manual and Green Streets Guidelines.

STORMWATER MANAGEMENT TERMS	
Stormwater Best Management Practice (BMP)	A strategy or technique to prevent or mitigate the impacts of stormwater runoff. BMPs may be nonstructural or structural.
Nonstructural BMP	A strategy or technique to prevent the creation of stormwater runoff through site planning and design. Examples of strategies include protecting natural resources, minimizing the amount of site disturbance during construction, reducing the amount of impervious area proposed, and clustering uses. Nonstructural BMPs typically apply to an entire site and are not fixed or specific to one location.
Structural BMP	An engineered, constructed practice to mitigate the impacts of runoff from a development site. For example, a detention basin and underground storage tank are structural BMPs.
Low Impact Development (LID)	Ecologically sensitive planning and design strategies and techniques that preserve and/or closely mimic natural or pre-development hydrologic processes. LID may include both nonstructural and structural stormwater BMPs, such as clustering uses to minimize the amount of impervious area and installing green roofs on buildings. LID usually operates at a scale larger than an individual BMP and may include an entire development site or even a watershed. At the watershed scale, LID can include protection and restoration of riparian corridors and floodplains.
Green Stormwater Infrastructure (GSI)	Often used interchangeably with LID, in the Green Stormwater Infrastructure Element, GSI refers to engineered (i.e., structural) small-scale practices dispersed throughout a development site to store, infiltrate, and/or treat runoff close to its source, such as rain gardens and stormwater planters. Plants and soil are key components in most GSI systems. GSI can be viewed as specific constructed techniques to achieve low impact development. A key difference between GSI and conventional structural BMPs is that GSI often provides important co-benefits such as improved community aesthetics, quality of life and habitat for wildlife.

RECOMMENDED PRIORITY STRATEGIES AND ACTIONS (SHORT TERM)	
STRATEGY	PRIORITY ACTION
Data Collection, Analysis and Management	<ul style="list-style-type: none"> Identify rights-of-way and other County-controlled properties with the potential to support GSI practices. Apply the siting considerations presented in the Stormwater Management Guidance Manual and Green Streets Guidelines to screen potential locations. Perform a County-wide, field-based inventory of drainage infrastructure. Incorporate inventory into a GIS database for mapping and tracking infrastructure assets. Map storm event data to identify patterns and trends. For example, correlate storm events with (1) public works records describing where and when infrastructure damage occurs and associated cost for repairs; and (2) complaints about localized flooding.
Regulations and Standards	<ul style="list-style-type: none"> Adopt an update to the County’s Site Plan and Subdivision Resolutions to incorporate LID/GSI requirements. Distribute information about changes to regulations, standards, and policies to key stakeholders, developers, stormwater professionals, and the public. Obtain feedback from County staff and developers about their experience with the new regulations and guidance documents to determine the need for revisions and/or clarifications. Refine County standards using data collected from existing and completed projects to determine the greatest impact as it relates to the stormwater goals of the County and member municipalities.
Appropriations and Funding	<ul style="list-style-type: none"> Identify funding opportunities and mechanisms for GSI implementation within the County Capital Improvement Budget. Identify projects in partnership with municipalities that would qualify for the NJ Environmental Infrastructure Trust (EIT) Program.
Agency/Departmental Communication and Collaboration	<ul style="list-style-type: none"> Adopt formal internal policies to ensure GSI implementation occurs in a coordinated, cross-departmental process. Form an LID/GSI committee or working group with representatives from applicable County departments that meets regularly and prepares an annual progress report with milestones for GSI implementation. Identify and prioritize opportunities to integrate GSI into water, sewer, and roadway upgrades.
Guidance and Training	<ul style="list-style-type: none"> Develop a training program for County staff involved in regulatory reviews and inspections on how to use the Passaic County Stormwater Management Guidance Manual and Green Streets Guidelines. Increase County planning and engineering technical capacity to plan, site, design, and monitor the performance of GSI.
Site-Scale Implementation	<ul style="list-style-type: none"> Develop a list of potential pilot projects; include community stakeholders to ensure that projects address community priorities and provide improvements for under-represented populations.
Education and Public Engagement	<ul style="list-style-type: none"> Build on pilot projects to increase implementation capacity for GSI, and to increase the awareness of County residents of the value and benefit to neighborhoods. Develop a program to engage the business community to show how GSI facilities can enhance and improve the business environment. Develop materials and portions of the county website to make the public and policy makers aware of the projects that have been completed and their impact on stormwater management goals.

Recommended priority strategies and actions to implement the Green Stormwater Infrastructure Element are shown in the table above. Priority action items are considered feasible in a short-term (<2 year) timeframe. Medium- and long-term action items are presented in Section IV of this report.

B. GUIDANCE DOCUMENTS AND RESOURCES

The Green Stormwater Infrastructure Element includes three guidance documents that highlight best practices for incorporating Green Stormwater Infrastructure into Passaic County’s planning and project review and development processes. Additionally,

the documents can be used by municipalities as the basis for adoption of regulations or guidelines for use at the local level.

1) Passaic County Stormwater Management Guidance Manual

The Guidance Manual provides detailed information on the use of stormwater best management practices (BMPs), with an emphasis on GSI such as rain gardens/bioretention systems, pervious paving, and green roofs. Each BMP chapter describes regulatory requirements, typical components, performance standards, and design considerations, as well as operations and maintenance guidance. Typical construction details are

EXAMPLES OF STRUCTURAL LID-BMPS (GSI)



Photo Credit: My Green Montgomery

Rain Garden/Bioswale



Photo Credit: Philadelphia Water Department

Stormwater ROW Bumpout

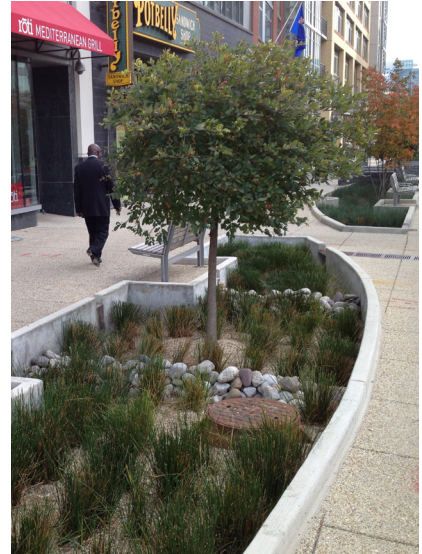


Photo Credit: DDOT

Stormwater Planter



Photo Credit: USDA Forest Service

Stormwater Tree Trench



Photo Credit: EPA

Pervious Paving



Photo Credit: Landscape Architecture Foundation

Subsurface System

also provided. The Guidance Manual is a tool for developers to use when selecting approaches to stormwater management that comply with the County’s requirements for land development activities. It is also a resource for County staff members who review land development applications, as well as plan and implement County capital improvement and other projects.

The selected BMPs provide options for urban, suburban, and rural land development types. For example, small bioretention systems can be used for constrained urban sites and constructed wetlands and ponds are applicable for suburban or rural areas with more available land.

2) Passaic County Green Streets Guidelines

The Green Streets Guidelines present detailed information about siting and design considerations in the public right-of-way. The document complements Moving Passaic County – The Transportation Element Update of the Passaic County Master Plan (Complete Streets Guidelines Appendix), adopted October 18, 2012. The Green Street Guidelines identify applicable practice types and diagram appropriate linear and spot applications for each of the road typologies and streetscape zones in the County’s Complete Streets Guidelines.

3) Passaic County Land Development Regulations – Summary of Recommendations

A summary of recommendations for an update of the County’s Site Plan and Subdivision Resolutions are provided in Appendix A - Resource Documents. A key recommendation is to prioritize the use of LID/GSI on land development projects unless an applicant can demonstrate that this is not feasible. These recommendations also serve as the basis for potential revisions to municipal ordinances to increase implementation of GSI at the municipal level and for land development applications that are not reviewed by the County.

C. PLAN DEVELOPMENT PROCESS

The two advisory bodies — the Technical Advisory Committee (TAC) and the Interagency Team (IT)—met on multiple occasions. Both were formed at the outset of the project to provide guidance and input throughout the planning process. The TAC included County and NJTPA staff, public officials, representatives of nonprofit organizations and community leaders. Three TAC meetings were held during the planning process. Five meetings were held with the IT, which included County, NJTPA and municipal staff, as well as key State agency representatives and others with technical expertise from nongovernmental organizations.

Key individual and organizational stakeholders, identified with the assistance of the TAC and IT, provided detailed information on specific stormwater problem areas. Stakeholders included community and faith-based organizations; members of local

planning boards, environmental commissions, and shade tree commissions; municipal floodplain administrators; and engineers working for municipalities or developers. Stakeholders participated in either a focus group meeting or an interview to share their knowledge and experience.

A comprehensive public outreach program was a significant component of the planning process. Key elements included the following:

- The creation of a Public Outreach Plan to help gain clear understanding of localized stormwater management and flooding issues throughout Passaic County, and to solicit stakeholder and community feedback that would be used to identify relevant practices. The plan also included mapping of Limited English Proficiency and Environmental Justice communities to identify traditionally disadvantaged populations for whom additional targeted outreach activities were needed.
- Two public meetings to inform and engage members of the public about the project and to solicit feedback regarding local issues, concerns and opportunities. A Spanish translator was available at the first public meeting. Meeting announcements for both meetings were provided in English and Spanish.
- A project website that provided updates, meeting announcements, and opportunity for public comment.
- Use of social media to distribute project information via Passaic County, NJTPA, partner agencies, and stakeholders’ respective social media platforms.

The planning process was also informed by a review of existing plans, policies, and technical documents prepared by government and nonprofit entities across the New York, New Jersey, and Pennsylvania region. Refer to Appendix B, Project Development Documents for meeting notes and other associated materials created during the development of the Green Stormwater Infrastructure Element.

II. INTRODUCTION AND PROJECT OVERVIEW

A. PROJECT GOALS

This Green Stormwater Infrastructure Element of the Passaic County Master Plan (the Green Stormwater Infrastructure Element), funded by a North Jersey Transportation Planning Authority (NJTPA) Subregional Study grant, is designed to enable the County to implement a comprehensive strategy for stormwater management based on widespread application of Green Stormwater Infrastructure (GSI) and Low Impact Development (LID) strategies. Overall, the recommendations and technical guidance provided by the Green Stormwater Infrastructure Element are meant to foster myriad environmental, social and economic benefits and achieve the following goals:

- Develop strategies to implement LID/GSI throughout the County.
- Provide standardized technical guidance to support County-wide implementation on public capital improvement and private sector land development projects. Technical guidance includes a Stormwater Management Guidance Manual and Green Streets Guidelines.
- Provide recommendations to incorporate Green Stormwater Infrastructure requirements into an update of the County's Site Plan and Subdivision Resolutions.
- Provide resources for municipalities to facilitate implementation at the local level. (The regulatory and

technical guidance materials developed for the County can be adapted by municipalities to adopt their own regulations or guidelines for use in local planning and development review processes.)

The intended users of the Green Stormwater Infrastructure Element include

- The Passaic County Planning Board and other County departments involved in land development activities. County staff will be able to apply the guidance provided to the review of land development applications, as well as to the planning, design, and implementation of capital projects.
- Municipalities, who will derive guidance for local implementation of LID/GSI, such as recommendations for strengthening ordinances to control stormwater management.
- Community stakeholders, who will find information that supports their efforts to advance more sustainable local approaches to stormwater management.
- Developers and consulting design professionals, who will be able to select from stormwater management options that are consistent with County and State requirements.

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B. THE NEED FOR A COUNTY-WIDE GREEN STORMWATER INFRASTRUCTURE PLAN

The County's need for the Green Stormwater Infrastructure Element derives from several key factors:

Flooding

The County has a history of small and large flood events. Parts of Passaic County are susceptible to severe and repetitive flooding that causes property damage, interruptions to business activities, and disruption of the transportation network. According to a 2011 Report by the Passaic River Basin Flood Advisory Commission, the Passaic River Basin has an extremely high number of Severe Repetitive Loss (SRL) and Repetitive Loss (RL) properties compared with the rest of New Jersey and the country. For such properties insured through the National Flood Insurance Program, FEMA provides funds to reduce future flood losses through buyouts of at-risk structures and conversion of the property to open space; elevation of existing structures; or dry flood proofing of historic properties.

Recent extreme weather events have further highlighted the problem of flooding. According to the New Jersey 2014 Hazard Mitigation Plan, the number of National Flood Insurance Program (NFIP) policies in Passaic County increased from 4,377 to 5,038 between 2011 and 2013. At the same time, the number of claims increased from 10,749 to 13,501, with 400 additional RL properties, and 161 additional SRL Properties. The Mitigation Plan also notes that there were 82 communities in the state participating in the Community Rating System (CRS), 3 of which are in Passaic County – Little Falls, Pompton Lakes, and Wayne. (The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed NFIP requirements.) These municipalities will be able to benefit from incentives through the CRS by adopting green infrastructure standards and best management practices developed in the Green Stormwater Infrastructure Element.

In the more urban parts of the County, such as the cities of Paterson and Passaic, disadvantaged communities are disproportionately impacted by flooding because they are located at the downstream end of the watershed in built-out areas with a high proportion of impervious area (see Appendix B-3, Public Outreach Plan for a mapping analysis of Environmental Justice areas in the County, which is the intersection of Communities of Concern with areas of Environmental Concern).

Water Quality

Stormwater runoff is a significant cause of degraded water quality in streams and other receiving waterbodies, especially

in areas with a combined sewer system such as Paterson. For example, according to NJDEP Water Monitoring & Standards data (2007), 48% of the County's streams (about 223 miles) failed to meet recreational water quality standards.

Safe Drinking Water Supplies

Much of the northern part of the County lies in the Highlands Preservation Area, which serves as the groundwater recharge and water supply area for more than four million New Jersey residents. Land development activities and associated stormwater runoff have the potential to negatively impact groundwater supplies for a substantial number of people.

Capital Costs of Public Infrastructure

Passaic County infrastructure operations include 247 miles of roadway, 338 bridges and culverts, and County drainage systems. This infrastructure is aging and requires repair and replacement. Concurrently, County drainage systems are increasingly unable to manage the quantity of stormwater runoff generated by additional impervious surfaces associated with land development activities. LID/GSI approaches — which typically target the capture and infiltration of runoff associated with 90% of storm events that occur annually — represent an opportunity to simultaneously address flooding, water quality, and infrastructure operations and maintenance issues while providing other benefits such as streetscape enhancements and wildlife habitat.

This GSI Element follows several targeted efforts by the County to implement LID/GSI as part of its water quality management planning efforts over the past decade. These efforts include the following:

- **Molly Ann Brook Watershed Management Plan.** Developed with funding from a NJDEP Nonpoint Source Pollution Control Grants (319h) program, the plan identifies stormwater BMPs that can reduce runoff and nonpoint source pollution in this highly urbanized watershed, which includes North Haledon and Haledon and parts of Wayne, Wykoff, Prospect Park, Totowa, Franklin Lakes, and Paterson. The goal of the plan is to restore the surface water quality of the Molly Ann Brook, which was identified as not meeting State Surface Water Quality Standards (listed as impaired for aquatic life).
- **Molly Ann Brook Rain Barrel and Rain Garden Initiatives.** After NJDEP approval of the Molly Ann Brook Watershed Management Plan in 2008, the County received 319(h) funding to buy and distribute free rain barrels to residents in the watershed (North Haledon, Haledon, Prospect Park, and Paterson). Over 600 rain barrels were distributed in



Plant layout for a rain garden in North Haledon as part of the Molly Ann Brook Watershed Management Plan.

2010, and their locations are mapped in the County’s GIS database for ongoing monitoring. The project also included the installation of seven rain gardens on municipal public property.

- Haledon Avenue Green Street Demonstration Project.** Located along Haledon Avenue from North 2nd Street to the North Straight Street Bridge in Paterson, this NJDEP 319(h) funded project includes several Green Streets modifications such as street trees with tree pits, pervious paving bike lane/shoulder, and bioretention systems. This concept was added as an amendment to the Molly Ann Brook Watershed Management Plan in 2013 and was completed in the summer of 2018.
- Highlands Element of the Passaic County Master Plan.** The County adopted the Highlands Element of the Passaic County Master Plan in 2011, which “embraces the concept of Low Impact Development (LID) and seeks to ensure its maximum use in land development activities throughout the Highlands.” The Element directs the County to incorporate



Image credit: Passaic County

Rain gardens at Passaic County Courthouse Plaza

LID standards into its land development practices and to assist municipalities in promoting the use of LID in local development projects.

C. DEVELOPING A COUNTY-WIDE PLAN

The development of a County-wide plan has intrinsic challenges, given the County’s considerable variation in physiography (soils, geology, hydrology, topography, vegetation, and so on), land use and development patterns. The northern part of the County is predominantly rural, with large areas of protected natural resources and significant limits on development (the Highlands Preservation Area), whereas the southern part is dominated by suburban and older urban development. Consequently, there is need for a selection of stormwater management practices that are applicable for specific community circumstances, such as areas that are impacted by repetitive flooding; watershed areas that prioritize water quality and recharge; and combined sewer overflow (CSO) areas in Paterson. The resource documents developed for the Green Stormwater Infrastructure Element address this range of needs and conditions across the urban–suburban–rural spectrum.



Image credit: Passaic County

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III. PLAN DEVELOPMENT PROCESS

The development process for the Green Stormwater Infrastructure Element combined extensive public outreach and stakeholder engagement with research and analysis of related planning, policy, and technical guidance documents and included the following activities:

- A. Technical Advisory Committee (TAC) and Interagency Team (IT) meetings
- B. Stakeholder focus group meetings and interviews
- C. Public engagement
- D. Review of existing plans and policies
- E. Determination of LID and GSI goals and applicable stormwater BMPs
- F. Development of draft implementation strategies
- G. Development of resource materials

A summary of activities is provided below. Refer to the Passaic County Website for more detailed information, including meeting notes and presentations.

A. TECHNICAL ADVISORY COMMITTEE AND INTERAGENCY TEAM MEETINGS

A Technical Advisory Committee (TAC) was established at the outset of the project as an advisory body to provide guidance throughout the planning process. The TAC included County and NJTPA staff, public officials, representatives of nonprofit organizations and community leaders. Three TAC meetings were held at Passaic County Offices in Totowa, NJ on March 6, 2017; September 12, 2017; and May 10, 2018. The meetings provided an opportunity to determine goals and strategies, identify sources for existing data and documentation, and develop a public outreach plan with a focus on traditionally underserved communities, i.e., Environmental Justice (EJ) and Limited English Proficiency (LEP) communities. As the project developed, the TAC provided review and feedback on draft documents.

An Interagency Team (IT) was formed to serve as an expanded technical resource. The IT provided advice about existing documentation and existing conditions, recommendations about the public outreach strategy, and feedback about desired outcomes for the project and on the implications of draft recommendations. The IT included County, NJTPA and municipal staff, as well as key State agency representatives and others with technical expertise from nongovernmental organizations.

The IT met five times during the planning process at Passaic County Offices (March 6, 2017; September 12, 2017; December 11, 2017; May 20, 2018; and June 25, 2018).

B. STAKEHOLDER FOCUS GROUP MEETINGS AND INTERVIEWS

Key individual and organizational stakeholders identified by the TAC and IT provided detailed information on specific stormwater problem areas. Stakeholders included community and faith-based organizations; chairpersons (or their designee) of local planning boards, environmental commissions, green teams, and shade tree commissions as well as municipal floodplain administrators; municipal and developer engineers; and representatives from EJ populations (i.e., low-income and minority populations), as well as LEP populations. Stakeholder engagement comprised three focus group meetings and five interviews. The key points from each are summarized below.

- The Community Focus Group meeting was held April 24, 2017 at the New Jersey Community Development Corporation in Paterson and included community groups and faith-based organizations representing impacted EJ and LEP communities. The group discussed how traditionally disadvantaged populations in the community may be disproportionately affected by stormwater runoff and flood events (all of the water ends up below the Falls, disproportionately impacting people that live in this area); common barriers to GSI (a lack of understanding, perceived high cost, perception that developers like things to be streamlined); and how the Green Infrastructure Plan could best help communities (bring awareness of the problems of stormwater, particularly combined sewer overflows).
- The Municipal Focus Group Meeting took place April 24, 2017 at the Passaic County Offices with representatives from the municipalities within Passaic County, including floodplain administrators, and members of each municipality's Planning Board, Environmental Commission, Green Team, and/or Shade Tree Commission. The meeting was an open house format. Feedback from attendees included the need for municipalities to work together to find a solution to stormwater problems, requiring property owners higher in the watershed to do their part to minimize problems downstream, and doing more public outreach.
- The Engineers Focus Group was held December 11, 2017 at the Passaic County Offices with design and engineering

professionals to discuss their experience with the design, permitting, implementation, and maintenance of GSI. The discussion focused on creating a straightforward, low-cost approval process.

Five phone interviews were conducted with individual or small groups of stakeholders:

- *Passaic Valley Sewerage Commission (PVSC)*, August 1, 2017 — Dave Kysniak and Marcus Eley, of PVSC, and Sheldon Lipke, of FJL Consultants, described PVSC's role in promoting GSI and other types of stormwater management. PVSC is part of the New Jersey Combined Sewer Overflow (NJCSO) group for communities and entities with CSO permits. The group is pooling its resources and working together on its new CSO permit. It is evaluating GSI as part of its long-term control plan. PVSC is not responsible for stormwater management; it is a regional sewage authority that owns interceptors and wastewater treatment systems but does not own the collection systems. Additionally, PVSC assists municipalities in setting up the framework for GSI in their communities. As part of its permit, PVSC and the NJCSO group are developing a guidance manual to assist with long-term control.
- *Hudson County Division of Planning*, August 4, 2017 — Kevin Force, Assistant Planner, described policy, guidance, and regulations that Hudson County uses to encourage the use of Green Stormwater Infrastructure. In addition to new land development regulations, Hudson County updated its Master Plan. Hudson County also has a checklist for developers called the LID checklist, which is required with submission of land development applications.
- *City of Newark*, August 10, 2017 — Robert Thomas, Chief of Energy and Environment, described the City of Newark's need for more effective stormwater management solutions. The City is looking to implement GSI and support it through its Master Plan. Because Newark is a CSO community, it is working to enhance operations and provide support for administration and the water/sewer departments to implement GSI. The City received funding from NJTPA to identify areas to implement GSI projects.
- *Camden County Municipal Utilities Authority (CCMUA)*, August 22, 2017 — Andrew Kricun, Executive Director of CCMUA, described policy, guidance, and regulations that Camden County uses to encourage the use of GSI in areas with CSOs. The County helped the City of Camden to develop a Sustainability Ordinance that requires consideration of GSI when reviewing land developments to minimize stormwater

impacts. The ordinance was adopted but it is not enforced. The CCMUA is also considering instituting a stormwater utility fee.

- *NJDEP Bureau Nonpoint Source Pollution*, September 7, 2017 — Corey Anen, Gabriel Mahon, and Jim Murphy described the State's efforts to promote GSI. The State is updating its stormwater management regulations for developers as well as its BMP manual to specifically include GSI. The State also performs outreach about GSI for townships and developers, grants CSO permits to permittees, works with municipal actions teams to get GSI on the ground, and provides funding through low interest loans and 319 grants.

C. PUBLIC OUTREACH

A comprehensive public outreach program was a significant component of the planning process and consisted of the following elements:

- *Public Outreach Plan* — This plan was developed to provide understanding of localized stormwater management and flooding issues throughout Passaic County and to solicit stakeholder and community feedback that would be used to identify relevant GSI and LID practices. To ensure adequate participation by typically under-represented communities, the Public Engagement Plan included mapping of LEP/EJ communities to identify traditionally disadvantaged populations and to determine the need for language translation services at public meetings and for production of community outreach materials.

LO INVITAMOS A UNA JORNADA DE PUERTA ABIERTA PUBLICA

LO INVITAMOS A APRENDER SOBRE LA INFRAESTRUCTURA DE ESPACIOS VERDES

CUANDO: Miércoles, Mayo 24
6:30 PM - 8:30 PM
DONDE: El Museo Paterson
2 Market Street
Paterson, New Jersey
07602

Niños Bienvenidos!

Muchos de estos problemas pueden ser corregidos a través de sistemas naturales. El condado de Passaic está explorando la infraestructura de espacios verdes - maneras naturales de administrar el agua de lluvia y embellecer a la comunidad.

Visítenos entre las 6:30 PM y las 8:30 PM para:

- ✓ Hablar con el Condado y el Equipo de Planificación para informarse más sobre los esfuerzos para resolver los problemas creados por las aguas pluviales en el Condado.
- ✓ Aprender cómo instalar la infraestructura de espacios verdes para manejar y aprovechar las aguas pluviales.
- ✓ Participar en actividades familiares interactivas.
- ✓ Poder compartir información sobre cómo y dónde lo impacta más el agua de lluvia.

Plan de Infraestructura de Espacios Verdes de Passaic
El Condado de Passaic, con el apoyo de la Autoridad de Planificación de Transporte de North Jersey, ha iniciado un estudio de planificación para producir un Plan de Infraestructura de Espacios Verdes a través de todo el condado. El Plan presentará estrategias específicas para mejorar implementar una infraestructura de espacios verdes y un diseño de bajo impacto ambiental a través de todos los procesos del Condado, al igual que servir como un recurso para los municipios locales.
Para cualquier detalle adicional:
www.passaiccountynj.gov/infrastructure

Sus comentarios y aportes nos ayudarán:
Visítate nuestro mapa de ayuda para identificar problemas de inundación y oportunidades para infraestructura verde en Passaic County!
<http://bit.ly/PassaicMap>

NJTPA
New Jersey
Transportation Planning
Authority

Spanish translation version of the flyer for Public Meeting 1



Interactive station at Public Meeting 1

- **Public Meetings** — Two Public Meetings were held to inform and engage members of the public about the project and to solicit feedback regarding local issues, concerns and opportunities. The meeting materials included display boards, live presentations, sign-in sheets, agendas, fact sheets and other information. The Project Team provided Spanish translations of written materials to encourage participation by LEP community members.

The first Public Meeting, on Wednesday, May 24, 2017 at the Paterson Museum, was a Public Open House format that provided an opportunity for the public to learn about stormwater, green infrastructure, and the County’s planning study, as well as share information about challenges and opportunities in their own communities.

The second Public Meeting, on June 11, 2018 at the Pompton Lakes Municipal Building, included a presentation on the status of the draft documents and the subsequent steps the County would take upon completion of the project. Attendees were generally supportive of the plan, and were interested in issues such as training contractors to install

GSI, maintenance, and performance of pervious paving in the winter and over time.

- **Project Website** — The Passaic County Green Infrastructure Plan project website (<http://www.passaiccountynj.org/greeninfrastructure>) provided Plan updates, meeting announcements, and opportunity for public comment. It also included a link to an interactive map that was used in concert with public outreach efforts to identify specific stormwater problem and opportunity areas based on local knowledge. The map link also included a brief survey for users to provide information about their general knowledge of green infrastructure techniques and the severity of flooding and stormwater in their home municipality. A chance to win a raffle prize was offered for completing the survey.
- **Social Media** — Project information was distributed via Passaic County’s social media platforms. NJTPA, partner agencies, and stakeholders also supported the County’s efforts by sharing information on their respective social media platforms.

D. REVIEW OF EXISTING PLANS, POLICIES AND TECHNICAL DOCUMENTS

The planning process was informed by a review of existing plans, policies, and technical documents prepared by government and nonprofit entities across the New York, New Jersey, and Pennsylvania region. The results of this review are compiled in the LID/GSI Reference Document Review (see Appendix B). The document review was a starting point for discussions with the TAC, IT, and Passaic County staff as to how the County could implement LID/GSI and provided the the following:

- an understanding of where and how LID/GSI is already addressed in County planning documents and regulatory policies;
- insights from the implementation of LID/GSI across the broader region, with applicability for Passaic County; and
- representative stormwater best management practice guidance documents, design requirements and other standards from communities already implementing LID/GSI. These practices were considered for inclusion in the County’s Green Stormwater Infrastructure Implementation Element.

E. DETERMINATION OF GOALS AND APPLICABLE STORMWATER MANAGEMENT PRACTICES

The various outreach and engagement activities as well as documentation reviews conducted during the planning process led to the determination of County goals for what the implementation of LID and GSI would ultimately accomplish:

- reduction of flood-related damage and repetitive loss from localized flooding caused by smaller, more frequent storms,
- reduction of negative impacts from stormwater runoff to improve water quality,
- enabling groundwater recharge where feasible,
- enhancing transportation safety, mobility, and reliability,
- protection of environmentally sensitive areas, and
- providing quality of life/aesthetic improvements and social value.

Several draft matrices were created to examine the relationships between these goals, land development context, and applicable types of BMPs, which were selected based on stakeholder feedback, research and document review, Project Team experience, and cross-referencing with regulatory documents. The matrices were discussed at the second TAC and IT meetings. The information compiled in these matrix documents formed the basis for the guidance documents provided in Appendix A, Resources.

F. DEVELOPMENT OF DRAFT IMPLEMENTATION STRATEGIES

During the planning process, preliminary strategies for implementation were developed and organized in several broad categories:

1. Data Collection, Analysis and Management
2. Regulations and Standards
3. Appropriations and Funding
4. Agency/Departmental Communication and Collaboration
5. Guidance and Training
6. Site-Scale Implementation
7. Education and Public Engagement

For each category, specific strategies were identified and then matched to potential implementation tools and techniques. This information was incorporated into recommendations for implementation.

G. REVIEW OF STORMWATER REGULATIONS

As part of the development of the resource documents, the County's Site Plan and Subdivision Resolutions were reviewed to ensure consistency between regulatory requirements and technical guidelines. Each County resolution has drainage requirements designed to prevent an "adverse impact" to the County's roadway infrastructure as a consequence of stormwater runoff from either a 25- or 100-year storm. Neither resolution includes the necessary requirements to achieve the County's LID/GSI goals for stormwater management that were identified during the planning process, which are related to management of smaller storm events. For example, the County resolutions do not address water quality requirements and the Water Quality Storm, defined by the State as 1.25" of rainfall in 2 hours. Working with County Planning staff, recommendations were developed to make the regulations consistent with the Green Stormwater Infrastructure Element goals.

The review included a comparison of stormwater management resolutions in other New Jersey counties. Hudson County was of particular interest because it was comprehensively revised in 2016 and includes requirements for GSI. A search for precedent regulations to apply stormwater management requirements to small project development was also conducted. The following examples provided guidance:

- Lancaster, Pennsylvania requires stormwater systems for small projects [defined as projects that create 1 – 4,999 square feet (SF) of new impervious surface] to infiltrate the first inch of runoff within a 24-hour period. The requirements are applicable only to projects in areas of the City served by combined sewer overflow systems and include storage sheds, building additions, walkways, and patios for residential projects.
- Mount Joy, Pennsylvania defines small projects as activities that, measured on a cumulative basis from April 7, 2014, create from 1 to less than 5,000 SF of new impervious area, or cause less than 5,000 SF of earth disturbance, and that do not involve the alteration of stormwater facilities or watercourses. Small projects, which include residential properties, are required to comply with the municipality's Stormwater Management Ordinance.
- Buckingham Township, Pennsylvania requires site plans for residential projects proposing less than or equal to 5,000 SF of impervious surface and less than one acre of disturbance to meet the requirements of the Township's Stormwater Management Ordinance.

- The City of Port Angeles, Washington applies requirements for onsite stormwater management to small residential projects, defined as the creation of more than 2,000 but less than 5,000 SF of new impervious area plus replaced hard surface, or earth disturbance greater than 7,000 SF but less than one acre.
- Seattle, Washington applies onsite stormwater management requirements to parcel-based projects that result in 1,500 SF of new or replaced impervious area or 7,000 SF of earth disturbance. For single-family residences, the earth disturbance threshold does not apply.

In addition, the County's database of site plan and subdivision applications was analyzed to determine a feasible regulatory threshold for development projects below that of the State's major development category (see Appendix B2, Analysis of County Site Plan and Subdivision Applications). The intention was to set a threshold that would mitigate the runoff from new impervious area in a county already heavily impacted by flooding, while minimizing the impact to smaller projects that would make green infrastructure installations economically infeasible. The added consideration in setting the threshold was to impact a percentage of projects that would make oversight by County Planning staff achievable. Historic applications were sorted based on property size, and the total additional impervious area (IA). Hypothetical regulatory thresholds (e.g., 500 SF, 1,000 SF) were then applied to determine the implications for additional IA managed. Analysis of the various scenarios showed marginal increase in benefit at 500 SF versus 1,000 SF and slightly more

benefit at 1,000 SF than 2,500 SF. However, after consultation with the County, given the considerations cited above, 2,500 SF of new impervious area was determined to be an acceptable regulatory threshold to implement stormwater controls for water quality on smaller development projects.

H. DEVELOPMENT OF RESOURCE MATERIALS

The final task in the planning process was the synthesis of activities into the regulatory and technical guidance documents described below. Refer to Appendix A, Resources for the complete documents.

1) Passaic County Stormwater Management Guidance Manual

The Passaic County Stormwater Management Guidance Manual provides detailed information on the use of stormwater BMPs, with emphasis on GSI techniques (see Appendix A1). The Guidance Manual is a tool for developers to use when selecting approaches to stormwater management that comply with the County's requirements for land development activities. It is also a resource for County staff in the review of land development applications, as well as design and implementation of County capital improvement and other projects. The Manual is included by reference in the County's revised land development regulations and is cross-referenced to the Green Streets Guidelines.

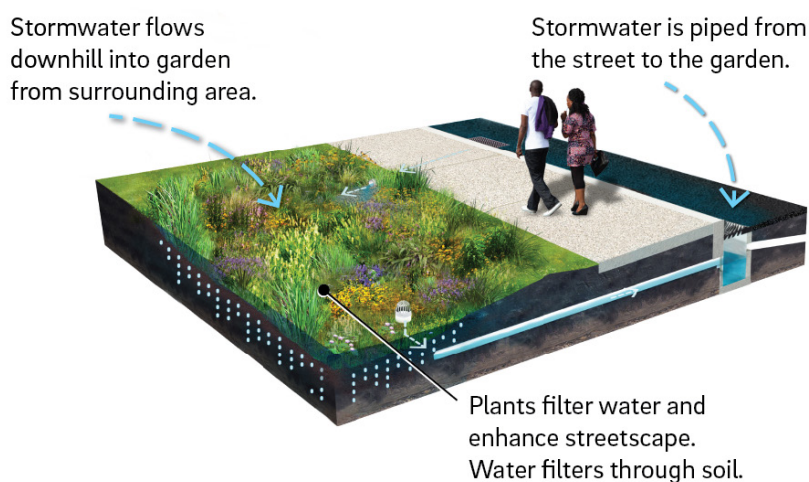


Figure from Stormwater Management Guidance Manual showing a biowale system.

Image credit: Philadelphia Water Department

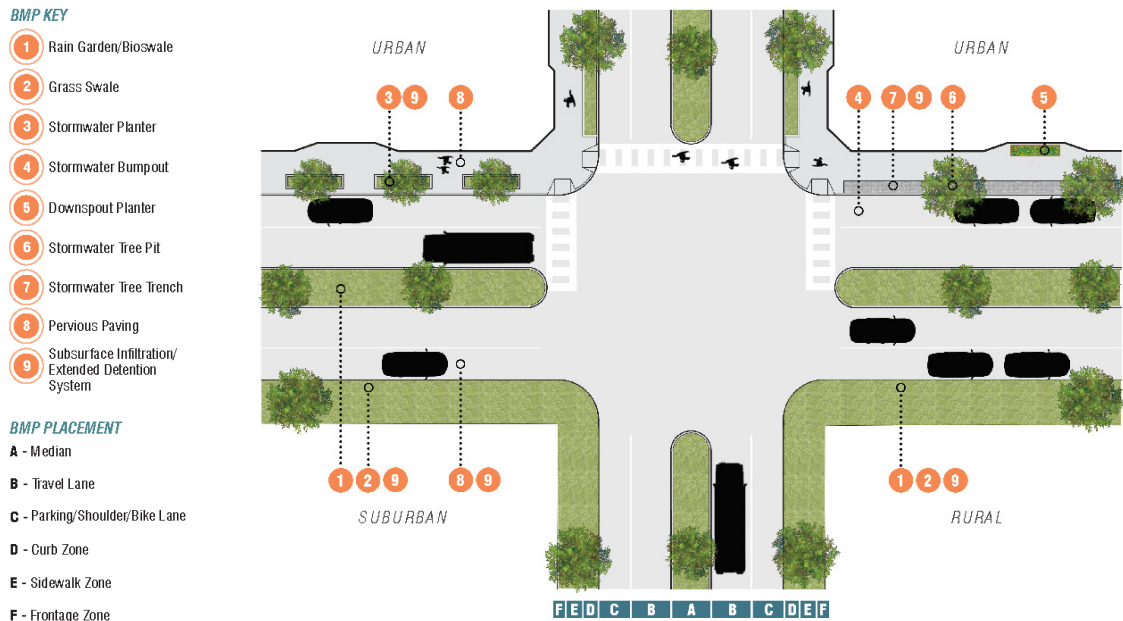


Figure from the Green Streets Guidelines showing applicable BMPs and potential placement on one of four street typologies.

2) Passaic County Green Streets Guidelines

The Passaic County Green Streets Guidelines (see Appendix A2) were developed as a complementary resource to Moving Passaic County – The Transportation Element Update of the Passaic County Master Plan (Complete Streets Guidelines Appendix), adopted October 18, 2012. The Green Streets Guidelines present detailed information about siting and design considerations for GSI, as well as applicable practices and diagrams of potential BMP locations in the County right-of-way, based on the road typologies in the Complete Streets Guidelines. Each green street typology provides multiple opportunities for GSI in urban, suburban, and rural contexts. The guidelines do not provide design and engineering information and are intended to be used with the BMP Manual.

3) Passaic County Land Development Regulations – Summary of Recommendations

A Summary of Recommendations was developed to identify definitions and design standards that can be incorporated into the County’s Site Plan and Subdivision Resolutions to prioritize the implementation of LID/GSI (see Appendix A-3). Both resolutions currently have drainage requirements to prevent a site plan or subdivision development project from causing an “adverse impact” to the County’s roadway infrastructure. The focus is on flooding from major events as a consequence of stormwater runoff from 25-year and 100-year storms. Neither resolution

includes the requirements to achieve the County’s water quality, environmental, and other goals for stormwater management using LID/GSI that were identified during the planning process. The Summary of Recommendations was prepared to make the regulations consistent with the County’s goals.

4) Municipal Ordinance – Summary of Recommendations

A Summary of Recommendations was developed to identify definitions and design standards that can be incorporated into municipal stormwater management ordinances (see Appendix A4). These recommendations are based on similar recommendations for Passaic County land development regulations. The NJDEP Stormwater Best Management Practices Manual provides a Model Stormwater Control Ordinance for Municipalities that has been widely adopted throughout the County. Although flood control, groundwater recharge, and pollutant reduction through nonstructural or LID techniques are required to be explored before relying on structural BMPs, neither the state nor municipal ordinances provide definitions of, or specific quantitative requirements for the use of GSI. Moreover, these ordinances are applicable only to Major Development, as defined by the Stormwater Management Rules at N.J.A.C. 7:8-1.2, leaving any additional impervious area from smaller land development projects unmanaged. Cumulatively, these small projects also contribute to impaired water quality in streams, localized flooding, and other negative impacts from stormwater runoff. The summary was developed to increase implementation of GSI at the municipal level.

IV. RECOMMENDATIONS FOR IMPLEMENTATION

The preliminary implementation strategies developed during the planning process have been further refined and compiled in the table of recommended implementation strategies and actions, provided below. Strategies and actions are identified as priority, short term or medium to long term with respect to feasible timeframe for implementation, contingent upon availability of resources and other considerations. Priority, short-term strategies and actions are those that are likely achievable within several months to less than two years. These provide the foundation for actions that have a longer horizon to accomplish. Medium- and long-term strategies and actions may be in the range of two to five years and five to ten years, respectively.

A. DATA COLLECTION, ANALYSIS AND MANAGEMENT

Data collection, analysis and management are integral to all phases of GSI project implementation. While the current study identified the County's program goals and provides technical guidance for site-specific applications, higher level analysis is needed to identify and prioritize potential implementation sites. In broad terms, the following questions should be addressed:

- Where is it feasible to implement GSI?
- Where are the opportunities to implement GSI?
- Where is the greatest need for GSI?
- What locations will provide the most benefit for implementing GSI in terms of meeting County goals for stormwater management, as well as other considerations such as costs?

Strategies for answering these questions are both top down (e.g., desktop analysis using GIS data) and bottom up (e.g., site-specific investigation to provide more detailed information).

B. REGULATIONS AND STANDARDS

The focal point of the Green Stormwater Infrastructure Element in terms of regulations and standards is revision of the County's land development regulations to incorporate LID/GSI. Implementation of the technical guidance documents depends on the regulatory authority conveyed through the resolutions, otherwise the guidance manuals are simply recommendations and not requirements (see Appendix A3 Passaic County Land Development Regulations – Summary of Recommendations).

C. APPROPRIATIONS AND FUNDING

Appropriations for GSI implementation are applicable across multiple departments and should be clearly identified in the County Capital Planning Budget. Funding for GSI implementation may also come from sources other than the County's Capital Planning Budget (see Appendix A5 Potential Funding Sources for Stormwater Infrastructure for potential federal and state grants as well as low-interest loans). It is important to keep in mind that grants are highly competitive and may not be available every year; therefore, they do not constitute a reliable, ongoing funding stream. Also, a match either in funds or in-kind services by the applicant is typically required; the percentage of the total allocation varies. Grant applicants also need to consider grant timelines in relation to project design, construction, community engagement, and other factors. Lastly, federal and state grants and loans cannot be used for ongoing maintenance.

D. AGENCY/DEPARTMENTAL COMMUNICATION AND COLLABORATION

Many County projects have the potential to incorporate LID/GSI; therefore, the implementation of the GSI Element will depend on broad engagement and support throughout County government. A successful outcome requires well-planned, coordinated and funded cross-departmental/agency protocols and actions.

E. GUIDANCE AND TRAINING

Successful implementation requires that County staff, the land development community, and contractors have sufficient understanding of regulatory requirements as well as relevant technical knowledge. Training programs that address the needs of different audiences who plan, design, build, and maintain stormwater infrastructure will need to be developed.

F. SITE-SCALE IMPLEMENTATION

Implementation of recommended actions for data collection, appropriations and funding, and cross-departmental communication and collaboration will yield an inventory of potential sites and capital projects for the development of site-scale stormwater practices. These include new installations in the County right-of-way as part of a pilot Green Streets project, as well as retrofitting GSI practices at suitable locations where no major capital project is planned for the typical budget timeframe (e.g., five years or more).

G. EDUCATION AND PUBLIC ENGAGEMENT

Community support, including that of the local business community, is essential for driving policies, budget appropriations, and project implementation. At the same time, knowledge and understanding of the importance of LID and GSI for stormwater management provide the foundation for public support. Education and public engagement can include the production and distribution of general educational/outreach materials about the benefits of GSI; hosting workshops (e.g., raingarden workshops for homeowners, educational workshops for children); pilot projects for Green Streets with community partners; installation of public art and interpretive features (signage, displays, “drains to river” stencil projects); and development of curriculum materials for schools.



Image credit: Rutgers University Extension

The cistern at Paterson School #5 combines art, education and public outreach with stormwater management.

RECOMMENDED IMPLEMENTATION STRATEGIES & ACTIONS

IMPLEMENTATION STRATEGY CATEGORY	PRIORITY, SHORT-TERM ACTIONS (<2-YEAR TIME FRAME)	MEDIUM-TERM ACTIONS (2- TO 5-YEAR TIME FRAME)	LONG-TERM ACTIONS (5- TO 10-YEAR TIME FRAME)
<p>Data Collection, Analysis and Management</p>	<ul style="list-style-type: none"> Identify rights-of-way and other County-controlled properties with the potential to support GSI practices. Apply the siting considerations presented in the Stormwater Management Manual and Green Streets Guidelines to screen potential locations. Perform a County-wide, field-based inventory of drainage infrastructure. Include photographs; ratings for level of function; size, dimensions, and materials of structures; and qualitative observations about site context and other relevant information. Incorporate inventory into a GIS database for mapping and tracking infrastructure assets. Map storm event data to identify patterns and trends, e.g., public works records describing where and when infrastructure damage occurs and associated cost for repairs; complaints about localized flooding. 	<ul style="list-style-type: none"> Map County streets and planned road construction projects to identify GSI opportunities in the ROW. Conduct field assessments of potential sites to identify site-specific considerations and determine appropriate practices. Adopt standardized monitoring, reporting and data-sharing protocols to increase collective learning about system design, installation and performance. A County-wide clearinghouse for GSI data collected from County and municipal sources would facilitate technology transfer and foster innovation. Map GSI/LID implementation projects with links to project details. Make the information available to the public. Develop a GIS-based asset management program for BMPs and Green Streets constructed by the County to track as-built construction information, operations and maintenance and plan for future capital improvements. Work with municipalities to determine data needs to map existing and potential GSI implementation areas at the local level. Publish and distribute annual reports on lessons learned. 	<ul style="list-style-type: none"> Conduct long-term monitoring to measure outcomes from GSI implementation, e.g., reduced flood damage, volume of stormwater managed, and how well BMPs meet the required performance standards. Feed information back into planning, design, and management activities. Develop and implement protocols to collect and analyze watershed-level data about the cumulative impacts of distributed GSI.

RECOMMENDED IMPLEMENTATION STRATEGIES & ACTIONS (CONTINUED)			
IMPLEMENTATION STRATEGY CATEGORY	PRIORITY, SHORT-TERM ACTIONS (<2-YEAR TIME FRAME)	MEDIUM-TERM ACTIONS (2- TO 5-YEAR TIME FRAME)	LONG-TERM ACTIONS (5- TO 10-YEAR TIME FRAME)
Regulations and Standards	<ul style="list-style-type: none"> Adopt an update to the County's Site Plan and Subdivision Resolutions to incorporate LID/GSI requirements. For private land development projects, a revised land development resolution is critical because, as noted previously, the current County regulations do not include the necessary requirements to achieve the County's LID/GSI goals. Distribute information about changes to regulations, standards, and policies to key stakeholders, developers, stormwater professionals, and the public. Obtain feedback from County staff and developers about their experience with the new regulations and guidance documents to determine the need for revisions and/or clarifications. Refine County standards using data collected from existing and completed projects to determine the greatest impact as it relates to the stormwater goals of the County and member municipalities. 	<ul style="list-style-type: none"> Adopt a County policy whereby all County-funded development, redevelopment or enhancement projects that meet the threshold for stormwater management in the land development resolution must incorporate GSI and Green Streets practices. Work with municipalities to update their land use regulations to include specific GSI requirements. Use data collection and analysis to assess the effectiveness of the regulations and guidance documents in achieving County LID/GSI goals. 	
Appropriations and Funding	<ul style="list-style-type: none"> Identify funding opportunities and mechanisms for GSI implementation within the County Capital Improvement Budget. Identify projects in partnership with municipalities that would qualify for the NJ Environmental Infrastructure Trust (EIT) Program. 	<ul style="list-style-type: none"> Integrate funding for GSI planning, design, and construction into all capital projects that require stormwater management. Promote cross-departmental projects that aggregate funding sources and achieve multiple objectives. For example, adopt a policy of "Dig Once" to install GSI concurrently with other infrastructure improvements. 	<ul style="list-style-type: none"> Implement a stormwater utility fee to provide a stable, long-term, dedicated revenue source for GSI implementation. A bill introduced in the NJ Legislature in 2018 would authorize municipalities, counties, and certain authorities to establish stormwater utilities.

RECOMMENDED IMPLEMENTATION STRATEGIES & ACTIONS (CONTINUED)

IMPLEMENTATION STRATEGY CATEGORY	PRIORITY, SHORT-TERM ACTIONS (<2-YEAR TIMEFRAME)	MEDIUM-TERM ACTIONS (2- TO 5-YEAR TIMEFRAME)	LONG-TERM ACTIONS (5- TO 10-YEAR TIMEFRAME)
<p>Agency/Departmental Communication and Collaboration</p>	<ul style="list-style-type: none"> Adopt formal internal policies to ensure GSI implementation occurs in a coordinated, cross-departmental process. Form an LID/GSI committee or working group with representatives from applicable County departments, e.g., Planning and Economic Development, Engineering, Finance, Health, Improvement Authority, Parks and Recreation, Roads, and Workforce Development, that meets regularly and prepares an annual progress report with milestones for GSI implementation. This group should establish protocols to achieve consistency across projects and share common resources to improve efficiency. Identify and prioritize opportunities to integrate GSI into water, sewer, and roadway upgrades. 	<ul style="list-style-type: none"> Develop a portfolio of GSI projects to be integrated in the County Capital Improvement Budget. Review all current and near-term planned projects for inclusion of LID/GSI. Develop a prioritized list of pilot projects for Green Streets implementation for each typology identified in the Green Streets Guidelines. Conduct a review of practices and policies to determine efficacy of communication and collaboration. Make necessary revisions. 	
<p>Guidance and Training</p>	<ul style="list-style-type: none"> Develop a training program for County staff involved in regulatory reviews and inspections on how to use the Stormwater BMP Manual and Green Streets Guidelines. Increase County planning and engineering technical capacity to plan, site, design, and monitor the performance of GSI. 	<ul style="list-style-type: none"> Provide training about GSI/LID applications, design and specifications (as appropriate) to County and municipal staff responsible for budgeting and appropriations and facilities management. Provide training about GSI/LID applications to local stormwater management committees, environmental commissions, Green Teams, and flood advisory boards. Provide education and training to contractors who construct and maintain transportation projects that incorporate GSI. Local contractors may lack the technical knowledge about GSI and Green Streets that is critical to proper installation and maintenance of facilities. 	
<p>Site-Scale Implementation</p>	<ul style="list-style-type: none"> Develop a list of potential pilot projects; include community stakeholders to ensure that projects address community priorities and provide improvements for under-represented populations. 	<ul style="list-style-type: none"> Develop protocols to use pilot projects to evaluate street design and traffic operations with added green stormwater infrastructure, including pedestrian walking patterns, bicycles, and traffic flow. 	

RECOMMENDED IMPLEMENTATION STRATEGIES & ACTIONS (CONTINUED)			
IMPLEMENTATION STRATEGY CATEGORY	PRIORITY, SHORT-TERM ACTIONS (<2-YEAR TIMEFRAME)	MEDIUM-TERM ACTIONS (2- TO 5-YEAR TIMEFRAME)	LONG-TERM ACTIONS (5- TO 10-YEAR TIMEFRAME)
Education and Public Engagement	<ul style="list-style-type: none"> Build on pilot projects to increase implementation capacity for GSI, and to increase the awareness of County residents of the value and benefit to neighborhoods. Develop a program to engage the business community to show how GSI facilities can enhance and improve the business environment. Develop materials and portions of the County website that make the public and policy makers aware of the projects that have been complete and their impact on stormwater goals. 	<ul style="list-style-type: none"> Work with schools to identify opportunities to integrate LID/GSI into curriculum and activities. Establish a program to encourage voluntary implementation of GSI retrofits on private property. Provide public recognition/affirmation for municipalities, developers and others who may implement GSI projects. Conduct on-going community engagement efforts. Cultivate leaders in the business community to promote/sponsor demonstration projects. 	

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