Green Infrastructure Recommendations
For Parks and Public Spaces

Issued by the Jersey Water Works Green Infrastructure Committee
And Prepared by

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This document recommends ways to integrate green infrastructure into parks and public spaces. Green Infrastructure[1] (GI) is a nature-based solution that intercepts stormwater, infiltrates a portion of it into the ground, evaporates a portion of it into the air, and/or captures and stores it, in some cases for reuse or watering and in some cases to release a portion of it slowly back into the sewer system. GI can provide triple-bottom line benefits including additional environmental, social, and economic benefits.

Throughout New Jersey, new parks are using nature-based solutions such as green infrastructure techniques to manage on-site and off-site stormwater. The NJDEP Green Acres regulations that govern *existing* parks traditionally have been interpreted to not allow park modifications that include stormwater management projects, including green infrastructure. The Jersey Water Works Green Infrastructure Committee is providing recommendations to the New Jersey Department of Environmental Protection (NJDEP) to allow for park modifications that incorporate green stormwater management under certain conditions.

The following recommendations are for new parks and public spaces and include recommendations for park design. These recommendations can be applied to redeveloped or modified parks, pending future support from NJDEP. Landowners and land managers should also consider opportunities for parks to provide additional stormwater management for larger surrounding areas.

This guidance starts from the premise that parks should always be "parks first" and not merely a place for stormwater management. The primary functions of the park and the needs of the park users should always be considered first, and land managers should identify and integrate stormwater opportunities within the framework of the park master plan and program. Stormwater management should not be "force fit" into a park in any way that diminishes the value of the park for its users.

[1] Additional educational materials and resources on green infrastructure can be found on the websites of the NJ DEP, US EPA, and Rutgers Water Resources Program.

Green Infrastructure Recommendations for Parks and Public Spaces

The following recommendations can serve to guide the planning, design and management of green infrastructure for parks and public spaces:

- **Stormwater Management**: Capture and retain (with no discharge) the Stormwater Quality Design Volume from all directly connected impervious areas within the Limit of Disturbance of the project. The Stormwater Quality Design Volume is defined as the runoff from the first 1.25 inches of all rainfall events[2]. Projects are encouraged to provide additional stormwater management if feasible, and the first 1.25 inches is the minimum baseline volume.
    - Where pavement is required, use pervious pavers or other pervious pavement material to the greatest extent possible and as appropriate to the project.
    - Encourage the use of green roofs on all structures.
    - Ideally, exclude areas of pervious pavement[3] and green roof from peak rate calculations (this might require coordination with DEP and municipal regulations and depends upon minimum design standards, which are suggested for pervious pavement in a footnote below).
    - Prioritize vegetated GI systems over sub-surface systems.
    - Prioritize infiltration or reuse systems as the preferred volume reduction methods over slow-release systems. Only allow slow release systems where infiltration is not feasible.
    - Identify all depaving opportunities and impervious reduction opportunities.
    - Disconnect impervious surfaces to discharge onto pervious surfaces. Impervious disconnection design guidelines can be found in the Maryland Stormwater Manual or Philadelphia Stormwater Manual.
    - Evaluate potential stormwater reuse opportunities, including toilet flushing and irrigation. Reuse should focus on “clean” runoff sources, such as roof areas, for potential runoff capture and reuse.
    - If full retention of the Stormwater Quality Design Volume cannot be achieved, slow release is acceptable at a rate to be determined in coordination with the municipality, especially in CSO areas.

[2] The 1.25-inch volume criteria is recommended for consistency with the current New Jersey Stormwater Best Management Practice Manual Water Quality Design Storm, and to represent a rainfall depth that would include and manage a significant percentage of the storm events each year.

[3] Pervious pavement must include a minimum stone storage subbase of 8-inch depth (clean washed AASHTO No 3 or similar) that is not under-drained, and a minimum infiltration rate of 0.1 in/hour. The pavement must only manage direct rainfall onto the pavement surface to be excluded. If additional runoff is directed to the pavement, it must be treated as a separate BMP.

- **Environmental**
    - Do not use any plants listed on state or federal lists of invasive species. Wherever possible, use native species that are appropriate for the soil, climate, and level of available care for each site. Seek local lists from municipal officials for trees and plants.
    - Provide trees with sufficient soil capacity, nutrients, and water for survival to achieve the desired canopy and provide full stormwater benefits, as well as urban heat island reduction, improved air quality, and noise reduction benefits.
    - Create absorbent landscapes by minimizing areas of mowed lawn in favor of meadows and planting areas, while meeting public uses and needs.
    - Encourage habitat creation and food/water sources for desired wildlife (e.g., migrating birds, beneficial insects), especially in coordination with GI components.
    - Use GI components to provide different water depths in areas of water (i.e. ephemeral pools, micro-topography).
    - Use sustainable and locally sourced materials to the greatest extent possible.
    - Increase the ability of soils to absorb and retain rainfall, especially in urban areas by minimizing soil disturbance and compaction, prioritizing reuse of site soils. Where necessary, incorporate organic and natural additives (i.e. compost, compost tea, biochar, etc.) to accelerate healthy soil biology.

- **Social**
    - Engage the public or community in stormwater discussion and design.
    - Integrate stormwater management into recreational improvements (e.g. under playfields, plazas, basketball courts), circulation elements, and display areas where applicable.
- **Maintenance**
    - Maintenance of green infrastructure will likely entail additional effort and might require specialized skills and equipment.
    - Develop an estimate of annual maintenance needs, staffing requirements, equipment needs, and annual costs as a component of cost estimating during the design documentation phase.
    - Include a Maintenance Plan for park staff with clear direction, schedules, budget needs, and checklists (to maintain aesthetic and functional benefits of GI). Consider the need for a cooperative agreement or other mechanism to define roles and responsibilities of all involved parties.

- Consider the quality and longevity of materials for long-term performance of GI components and landscape.

- **Educational**
  - Increase public access to or interaction with water (e.g., visual, sound).
  - Provide interpretive signage and information regarding GI.
  - Create a narrative of stormwater.
  - Express historic water conditions in design components (i.e., buried streams).
  - Include a variety of GI systems or variety of planting types.
  - Design trails and pathways to connect users to stormwater features.

Off-site Stormwater

Stormwater GI practices within parks often have the capacity to capture and manage runoff from a much larger drainage area than the project area within the park. For example, an 8-inch stone stormwater storage base beneath a pervious pavement area can manage more water than the first 1.25 inches of direct rainfall onto the pavement. Additionally, a stormwater BMP can be made slightly larger or deeper to receive additional runoff from areas upstream of the project. Additional runoff from upstream areas outside of the park can be piped or directed onto the project site and managed within the project stormwater components to increase GI benefits. Parks are often ideal locations for management of off-site stormwater. GI components within parks should be evaluated to determine if there is potential capacity to capture the 1.25-inch Stormwater Quality Design Volume or more from areas beyond the park. As discussed in the introduction, this guidance starts from the premise that parks should always be "parks first" and not merely a place for stormwater management. The primary functions of the park and the needs of the park users should always be considered first, and land managers should identify and integrate stormwater opportunities within the framework of the park program. Stormwater management should not be "force fit" into a park in any way that diminishes the value of the park for its users.

- Evaluate opportunities within the park to capture stormwater generated off-site for management within the park.
  - Delineate drainage areas of upstream and nearby streets, sidewalks, and buildings that could be conveyed (by gravity) to a stormwater feature within the park. Evaluate whether the proposed GI components within the park can be enlarged or additional GI measures added to manage some or all of this additional runoff. Topography will determine opportunities.
  - Off-site stormwater can be conveyed via pipe or surface system or a combination of both.

    - Where existing street inlets and sewers convey water to a combined or separate storm sewer system, new inlets and shallow sewers can be installed immediately upstream of existing inlets to convey the Stormwater Quality Design Volume to GI components within the park. Existing inlets can remain in place to safely convey the larger storms and storm events of high rainfall intensity in the conventional storm or combined sewer system.
    - Large athletic facilities, such as playfields and basketball courts, and large level areas, such as parking lots and paved playground areas, are often well suited for sub-surface stormwater management beds. Evaluate the opportunities to combine recreational needs with additional stormwater management.
- When directing stormwater runoff from off-site areas into a park, consider the following:
    - Strive to first identify and incorporate stormwater practices that provide park benefits additional to stormwater management, such as improving play fields, increasing tree canopy, and creating habitat. Stormwater practices in parks should strive to meet the goals of the park while also providing stormwater management.
    - When designing sub-surface stormwater systems, consider both current construction requirements and future repair impacts that the stormwater system may have on park assets. Consider the potential current and future damage to trees and structures, and future maintenance and repair requirements. Consider how maintenance trucks and equipment may access the stormwater system, and plan accordingly.
    - Provide opportunities for water to be visible at the surface if possible, but avoid creating erosive discharge conditions.
    - Consider the source of stormwater runoff and the type of pretreatment required. Street runoff can contain high levels of sediment, trash, and other pollutants and will require pretreatment before infiltration. Roof runoff is generally cleaner. First flush systems can help divert pollutants.