Appendix B
USEPA WATER QUALITY SCORECARD

Incorporating Green Infrastructure Practices at the Municipal, Neighborhood, and Site Scales
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1 Executive Summary

Many communities across the United States face the challenge of balancing water quality protection with the desire to accommodate new growth and development. These cities and counties are finding that a review of local ordinances beyond just stormwater regulations is necessary to remove barriers and ensure coordination across all development codes for better stormwater management and watershed protection. Local policies, such as landscaping and parking requirements or street design criteria, should complement strong stormwater standards and make it easier for developers to meet multiple requirements simultaneously.

EPA’s Water Quality Scorecard was developed to help local governments identify opportunities to remove barriers, and revise and create codes, ordinances, and incentives for better water quality protection. It guides municipal staff through a review of relevant local codes and ordinances, across multiple municipal departments and at the three scales within the jurisdiction of a local government (municipality, neighborhood, and site),1 to ensure that these codes work together to protect water quality goals. The two main goals of this tool are to: (1) help communities protect water quality by identifying ways to reduce the amount of stormwater flows in a community and (2) educate stakeholders on the wide range of policies and regulations that have water quality implications.

The scorecard is for municipalities of various sizes in rural, suburban, and urban settings, including those that have combined sewers, municipal separate storm sewers, and those with limited or no existing stormwater infrastructure. It can help municipal staff, stormwater managers, planners, and other stakeholders to understand better where a municipality’s land development regulations and other ordinances may present barriers or opportunities to implementing a comprehensive water quality protection approach. The scorecard provides policy options, resources, and case studies to help communities develop a comprehensive water quality program.

2 Background

Growth and development expand communities’ opportunities by bringing in new residents, businesses, and investments. Growth can give a community the resources to revitalize a downtown, refurbish a main street, build new schools, and develop vibrant places to live, work, shop, and play. The environmental impacts of development, however, can make it more difficult for communities to protect their natural resources. The U.S. Census Bureau projects that the U.S. population will reach 400 million people by about 2040, which will add continued development pressure on local communities and the environment. Many communities are asking where and how they can accommodate this growth while maintaining and improving their water resources.

Land development directly affects watershed functions. When development occurs in previously undeveloped areas, the resulting alterations to the land can dramatically change the transportation and storage of water. Residential and commercial development creates impervious surfaces and compacted soils that filter less water, which increases surface runoff and decreases groundwater infiltration. These changes can increase the volume and velocity of runoff, the frequency and severity of flooding, and peak storm flows.

1 While the watershed scale is the best scale at which to look regionally at water quality protection strategies, it can be difficult to align policies, incentives, and regulations across political boundaries. For purposes of implementation, the largest scale the scorecard uses is the municipality.

2 The term “municipality” as used by the International City/County Management Association (ICMA) refers to local government at both the city and county levels.
Many communities are already struggling with degraded water bodies and failing infrastructure. For example, EPA’s National Water Quality Inventory: 1996 Report to Congress indicated that 36 percent of total river miles assessed were impaired. Further, a report by the National Academy of Sciences found urban stormwater is estimated to be the primary source of impairment for 13 percent of assessed rivers, 18 percent of lakes, and 32 percent of estuaries—significant numbers given that urban areas cover only 3 percent of the land mass of the United States.

Urban runoff also affects existing wastewater and drinking water systems. EPA estimates that between 23,000 and 75,000 sanitary sewer overflows occur each year in the United States, releasing between 3 and 10 billion gallons of sewage annually. Many of these overflow problems stem from poor stormwater management. Many municipalities—both large and small—must address the impact of existing impervious areas, such as parking lots, buildings, and streets and roads, that have limited or no stormwater management while at the same time trying to find effective and appropriate solutions for new development.

These water quality impairments exist, in part, because historically stormwater management—and indeed stormwater regulation—has focused primarily at the site level. The reasoning was sound: manage stormwater well at the site, and water bodies in the community will be protected. However, as the findings of EPA’s National Water Quality Inventory demonstrated, this strategy has not been effective for two main reasons.

First, the site-level approach does not take into account the amount of off-site impervious surfaces. During the development boom from 1995-2005, rain-absorbing landscapes, such as forests, wetlands, and meadows, were transformed into large areas of houses, roads, office buildings, and retail centers. This development created vast areas of impervious cover, which generated significant increases in stormwater runoff. However, the amount of development in the watershed is not simply the sum of the sites within it. Rather, total impervious area in a watershed is the sum of sites developed plus the impervious surface of associated infrastructure supporting those sites, such as roads and parking lots.

Second, federal stormwater regulations focus on reducing pollutants in the runoff—the sediments from roads, fertilizers from lawns, etc.—and not on the amount of stormwater coming from a site. Nevertheless, the increased volume of runoff coming into a municipality’s water bodies scour streams, damps sediments, and pushes existing infrastructure past its capacity limits. Failure to consider the cumulative impact—this loss of natural land, increased imperviousness, and resulting stormwater runoff volumes—on regional water quality and watershed health has led communities to seek stormwater solutions that look beyond site-level approaches.

Communities are recognizing the importance of managing water quality impacts of development at a variety of scales, including the municipal, the neighborhood, and site levels. A range of planning and development strategies at the municipal and neighborhood scales is necessary to address stormwater management comprehensively and systematically. At the same time that stormwater management is moving beyond the site level, it is also evolving beyond hard-surfaced, engineered solutions, such as basins and curb-and-gutter conveyance, to an approach that manages stormwater through natural processes.

A green infrastructure approach provides a solution to thinking at all three scales as well as addresses the need to change the specific types of practices used on the site. Green infrastructure is a comprehensive approach to water quality protection defined by a range of natural and built systems that can occur at the regional, community, and site scales. At the larger regional or watershed scale, green infrastructure is the interconnected network of preserved or restored natural lands and waters that provide essential environmental functions. Large-scale green infrastructure may include habitat corridors and water resource protection. At the community and neighborhood scale, green infrastructure incorporates planning and design approaches such as compact, mixed-use development, parking reductions strategies and urban forestry that reduces impervious surfaces and creates walkable, attractive communities. At the site scale, green infrastructure mimics natural systems by absorbing stormwater back into the ground (infiltration), using trees and other natural vegetation to convert it to water vapor (evapotranspiration), and using rain barrels or cisterns to capture and reuse stormwater. These natural processes manage stormwater runoff in a way that maintains or restores the site’s natural hydrology.

At the municipal scale, decisions about where and how our towns, cities, and regions grow are the first, and perhaps most important, development decisions related to water quality. Preserving and restoring natural landscape features (such as forests, floodplains, and wetlands) are critical components of green infrastructure. By choosing not to develop on and thereby protecting these ecologically sensitive areas, communities can improve water quality while providing wildlife habitat and opportunities for outdoor recreation. In addition, using land more efficiently reduces and better manages stormwater runoff by reducing total impervious areas. Perhaps the single most effective strategy for efficient land use is redevelopment of already degraded sites, such as abandoned shopping centers or underused parking lots, rather than paving greenfield sites.

At the intermediate or neighborhood scale, green infrastructure includes planning and design approaches such as compact, mixed-use development, narrowing streets and roads, parking reduction strategies, and urban forestry that reduce impervious surfaces and better integrate the natural and the built environment.

At the site scale, green infrastructure practices include rain gardens, porous pavements, green roofs, infiltration planters, trees and tree boxes, and rainwater harvesting for non-potable uses such as toilet flushing and landscape irrigation.

These processes represent a new approach to stormwater management that is not only sustainable and environmentally friendly, but cost-effective as well. Municipalities are realizing that green infrastructure can be a solution to the many and increasing water-related challenges facing municipalities, including flood control, combined sewer overflows, Clean Water Act requirements, and basic asset management of publicly owned treatment systems. Communities need new solutions and strategies to ensure that they can continue to grow while maintaining and improving their water resources. This Water Quality Scorecard seeks to provide the policy tools, resources, and case studies to both accommodate growth and protect water resources.

3 THE WATER QUALITY SCORECARD

EPA worked with numerous water quality experts, local government staff, developers, urban designers, and others working on land use and water quality issues to develop this Water Quality Scorecard. The purpose of the scorecard is to address water quality protection across multiple scales (municipality, neighborhood, and site) and across multiple municipal departments. This scorecard can help municipal staff, stormwater managers, planners, and other stakeholders to understand better where a municipality’s land development regulations and other ordinances may present barriers or opportunities to implementing a comprehensive green infrastructure approach. The tool’s two main goals are to: (1) help communities protect water quality by identifying ways to reduce the amount of stormwater flows in a community and (2) educate stakeholders on the wide range of policies and regulations that have water quality implications.

Communities throughout the U.S. are implementing stormwater regulations that require or encourage the use of green infrastructure for managing stormwater on site. These cities and counties are finding that, to better manage stormwater and protect watersheds, green infrastructure policies require a review of many other local ordinances to remove barriers and ensure coordination across all development codes. Local policies, such as landscaping and parking requirements or street design criteria, should complement strong stormwater standards and make it easier for developers to meet multiple requirements simultaneously. At the same time, if these policies support water quality goals, they can independently reduce and better manage stormwater runoff.
How to Use the Scorecard

This scorecard is a locally controlled self-assessment and guide for better incorporating green infrastructure practices at the municipal, neighborhood, and site scales. While one department or agency could complete the tool, the effectiveness of this tool will increase if an interagency process is established to review all local codes and policies that might affect water quality.

Completing the Water Quality Scorecard requires different documents, plans, codes, and guidance manuals. While the legal structure for stormwater management and land development regulation varies among municipalities, the following list contains the most common and relevant documents to complete this scorecard and describes how they can create impervious cover.

• **Zoning ordinances** specify the type and intensity of land uses allowed on a given parcel. A zoning ordinance can dictate single-use low-density zoning, which spreads development throughout the watershed, creating considerable excess impervious surface.

• **Subdivision codes** or ordinances specify development elements for a parcel: housing footprint minimums, distance from the house to the road, the width of the road, street configuration, open space requirements, and lot size—all of which can lead to excess impervious cover.

• **Street standards or road design guidelines** dictate the width of the road, turning radius, street connectivity, and intersection design requirements. Often in new subdivisions, roads tend to be too wide, which creates excess impervious cover.

• **Parking requirements** generally set the minimum, not the maximum, number of parking spaces required for retail and office parking. Setting minimums leads to parking lots designed for peak demand periods, such as the day after Thanksgiving, which can create acres of unused pavement during the rest of the year.

• **Setbacks** define the distance between a building and the right-of-way or lot line and can spread development out by leading to longer driveways and larger lots. Establishing maximum setback lines for residential and retail development will bring buildings closer to the street, reducing impervious cover associated with long driveways, walkways, and parking lots.

• **Height limitations** limit the number of floors in a building. Limiting height can spread development out if square footage is unmet by vertical density.

• **Open space or natural resource plans** detail land parcels that are or will be set aside for recreation, habitat corridors, or preservation. These plans help communities prioritize their conservation, parks, and recreation goals.

• **Comprehensive plans** may be required by state law, and many cities, towns, and counties prepare comprehensive plans to support zoning codes. Most comprehensive plans include elements addressing land use, open space, natural resource protection, transportation, economic development, and housing, all of which are important to watershed protection. Increasingly, local governments are defining existing green infrastructure and outlining opportunities to add new green infrastructure throughout the community.

An initial step in using this tool is to convene appropriate staff to review various sections of the tool and coordinate to both identify opportunities for change and address the potential inconsistencies between policies. The approaches described in this scorecard may be under the control of a number of different local government agencies, including:

• Parks and Recreation
• Public Works
• Planning
• Environmental Protection
• Utilities
• Transportation

The scorecard’s review of land use and development policies provides guidance for implementing a range of regulatory and non-regulatory approaches, including land use planning elements, land acquisition efforts, and capital investment policies that can help various municipal agencies integrate green infrastructure into their programs. Internal agency policies and practices, such as maintenance protocols or plan review processes, may be potential barriers as well.

Each policy or approach is described in the context of its potential for providing water quality benefits, although most of the policies have many additional benefits for community livability, human health, air quality, energy use, wildlife habitat, and more. This tool does not provide model ordinance...
language. It emphasizes best practices and helps municipalities understand the incremental steps for changing specific policies and internal agency practices. The scorecard divides the tools and policies into four categories:

1. Adopt plans/Educate
2. Remove barriers
3. Adopt incentives
4. Enact regulations

These four categories provide greater structure to the compiled tools by organizing the policies or approaches as incremental changes and updates. These categories may help municipal staff prioritize which tools to work on based on local factors like resources, time, and political support. For example, an appropriate first step in the process of updating local regulations may be to remove a barrier rather than enacting a new regulation. Most policy options avoid specific performance guidance so that the tool is useful to a range of municipalities in different contexts. However, the case studies and resources provide locally appropriate performance measures where possible.

To highlight the diverse nature of green infrastructure approaches, as well as the fact that oversight over these policies resides in various municipal agencies, the scorecard has five sections:

1. Protect Natural Resources (Including Trees) and Open Space
2. Promote Efficient, Compact Development Patterns and Infill
3. Design Complete, Smart Streets that Reduce Overall Imperviousness
4. Encourage Efficient Provision of Parking

The five sections organize green infrastructure approaches based on drivers of impervious cover at the municipal, neighborhood, and site scales. Yet all three scales may be in any single section. For example, the parking section will have questions that address the municipal, neighborhood and site level considerations.

The scorecard describes alternative policy or ordinance information that, when implemented, would support a comprehensive green infrastructure approach, and will allow the municipality to determine where, in the broad spectrum of policy implementation, their policies fall.

A Note about the Point System

The tool includes a point system to make it easier to evaluate and improve local programs. The municipality can decide whether to use the point system at all. If the point system is used, municipalities can set locally appropriate thresholds and goals.

Governments could choose to use the point system in many different ways, including:

• State governments could require municipalities to complete the Water Quality Scorecard and establish measures for improvement over different permit cycles. For example, a municipality might have to improve its score by some number of points before the next permit cycle.

• Local governments could determine a score based on existing programs and policies and then set goals from this baseline. Local targets may include incremental yearly improvements or achieving additional points in a particular section, such as “Encourage Efficient Parking Supply” or “Protect Natural Resources and Open Space.”

• Stakeholders such as watershed groups or environmental organizations could complete the scorecard and then provide feedback and information assistance to the local government about sections within the scorecard that received few points and might be an area for improvement.

• The total score or scores in certain sections could educate elected officials, decision makers, and others about the importance of these issues and the role of local policies in addressing them.

• A lack of points in one section may alert a municipality that a certain area, such as parking, lacks local ordinances that support green infrastructure and may be ripe for improvement.

• Variation in the number of points achieved across the five sections may help a municipality to better assess local sources of impervious cover and potential for the introduction of green infrastructure.

Because the scorecard is intended for use by a range of community types and sizes in locations throughout the U.S., please note that no single municipality will be able to receive every point. Some questions and points may only be
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available to urban municipalities while others may only be available to those in a suburban or rural setting.

**Tips for Building Relationships Between Stormwater Managers, Land Use Planners, and Other Local Officials**

Effective stormwater management requires coordination and collaboration across many different municipal departments and processes. Below are some ideas for incorporating stormwater management in traditional planning processes and programs.

- Include both land use planners and stormwater managers in pre-concept and/or pre-application meetings for potential development projects.

- Use local government sites (e.g., schools, regional parks, office buildings, public works yards) as demonstration projects for innovative land use strategies and stormwater management. Form a team that includes land use planners, stormwater managers, parks and school officials, etc. to work out the details.

- Include stormwater managers in the comprehensive plan process to incorporate overall watershed and stormwater goals.

- Make sure that both land use planners and stormwater managers are involved in utility and transportation master planning.

- Allow stormwater managers to be involved in economic development planning, especially for enterprise zones, Main Street projects, and other projects that involve infill and redevelopment. Encourage stormwater managers to develop efficient watershed-based solutions for these plans.

- Develop cross training and joint activities that allow land use planners, stormwater managers, and transportation, utility, and capital projects planners to explore the improved integration of various land use and stormwater processes.

- Hold staff trainings with speakers that are knowledgeable about smart growth and stormwater management. Alternately, encourage land use planners, stormwater managers, and other local officials to attend trainings on this topic as a team.
### Table 1: Water Quality Scorecard Quick Reference Guide

**Incorporating Green Infrastructure Practices at the Municipal, Neighborhood, and Site Scales (SUMMARY)**

<table>
<thead>
<tr>
<th>Policy Question</th>
<th>Goal</th>
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</thead>
<tbody>
<tr>
<td><strong>PROTECT NATURAL RESOURCES (INCLUDING TREES) AND OPEN SPACE</strong></td>
<td></td>
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<tr>
<td>1A. NATURAL RESOURCE PROTECTION</td>
<td></td>
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<tr>
<td>Are development policies, regulations, and incentives in place to protect natural resource areas and critical habitat?</td>
<td>Protect natural resource areas (e.g., forests, prairies) and critical habitat (e.g., conservation corridors, buffer zones, wildlife preserves) from future development.</td>
</tr>
<tr>
<td>Are no-development buffer zones and other protective tools in place around wetlands, riparian areas, and floodplains to improve/protect water quality?</td>
<td>Protect critical areas such as wetlands, floodplains, lakes, rivers, and estuaries with a mandatory no-development buffer.</td>
</tr>
<tr>
<td>Does the community have protection measures for source water protection areas through land use controls and stewardship activities?</td>
<td>Protect source water areas from current or potential sources of contamination.</td>
</tr>
<tr>
<td>1B. OPEN SPACE PROTECTION</td>
<td></td>
</tr>
<tr>
<td>Does the jurisdiction have adequate open space in both developed and greenfield areas of the community?</td>
<td>Create open networks throughout a community that serve a dual function of providing recreational areas and assisting in management of stormwater runoff.</td>
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<tr>
<td>1C. TREE PRESERVATION</td>
<td></td>
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<tr>
<td>Does the local government have a comprehensive public urban forestry program?</td>
<td>Protect and maintain trees on public property and rights-of-way and plant additional trees to enhance the urban tree canopy.</td>
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<tr>
<td>Has the community taken steps to protect trees on private property?</td>
<td>Preserve trees on private property and require replacement when trees are removed or damaged during development.</td>
</tr>
<tr>
<td>Do local codes encourage or require street trees as part of road and public right-of-way capital improvement projects?</td>
<td>Leverage existing capital funds to plant more street trees and add multiple benefits to the public right-of-way.</td>
</tr>
<tr>
<td><strong>PROMOTE EFFICIENT, COMPACT DEVELOPMENT PATTERNS AND INFILL</strong></td>
<td></td>
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<tr>
<td>2A. INFILL AND REDEVELOPMENT</td>
<td>Municipalities implement a range of policies and tools to direct development to specific areas.</td>
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<tr>
<td>Are policy incentives in place to direct development to previously developed areas?</td>
<td></td>
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<tr>
<td>2B. DEVELOPMENT IN AREAS WITH EXISTING INFRASTRUCTURE</td>
<td>Adopt policies, incentives, and regulations to direct new development to areas that have infrastructure, such as water and sewer.</td>
</tr>
<tr>
<td>Is the jurisdiction directing growth to areas with existing infrastructure, such as sewer, water, and roads?</td>
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<tr>
<td>2C. MIXED-USE DEVELOPMENT</td>
<td>Revise codes and ordinances to allow for the “by right” building of mixed-use and transit-oriented developments.</td>
</tr>
<tr>
<td>Are mixed-use and transit-oriented developments allowed or encouraged?</td>
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</tbody>
</table>
Incorporating Green Infrastructure Practices at the Municipal, Neighborhood, and Site Scales (SUMMARY) continued

<table>
<thead>
<tr>
<th>Policy Question</th>
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<tr>
<td><strong>DESIGN COMPLETE, SMART STREETS THAT REDUCE OVERALL IMPERVIOUSNESS</strong></td>
<td></td>
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<tr>
<td><strong>3A. STREET DESIGN</strong></td>
<td></td>
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<tr>
<td>Do local street design standards and engineering practices encourage streets to be no wider than is necessary to move traffic effectively? Do policies allow narrow neighborhood streets designed to slow traffic and create safer conditions for pedestrians and bicyclists?</td>
<td>Appropriate street widths allow narrower lanes for certain street types, thereby reducing overall imperviousness.</td>
</tr>
<tr>
<td>Are shared driveways, reduced driveway widths, two-track driveways, and rear garages and alleys encouraged for all single-family developments?</td>
<td>Encourage alternative forms and decreased dimensions of residential driveways and parking areas.</td>
</tr>
<tr>
<td><strong>3B. GREEN INFRASTRUCTURE ELEMENTS AND STREET DESIGN</strong></td>
<td></td>
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<tr>
<td>Are major street projects required to integrate green infrastructure practices as a standard part of construction, maintenance, and improvement plans?</td>
<td>Formally integrate green infrastructure into standard roadway construction and retrofit practice.</td>
</tr>
<tr>
<td>Do regulations and policies promote use of pervious materials for all paving areas, including alleys, streets, sidewalks, crosswalks, driveways, and parking lots?</td>
<td>Build and retrofit these surfaces with pervious materials to reduce stormwater runoff and its negative impacts.</td>
</tr>
<tr>
<td><strong>ENCOURAGE EFFICIENT PROVISION OF PARKING</strong></td>
<td></td>
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<tr>
<td><strong>4A. REDUCED PARKING REQUIREMENTS</strong></td>
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<tr>
<td>Does your local government provide flexibility regarding alternative parking requirements (e.g., shared stormwater, off-site parking) and discourage over-parking of developments? Do parking requirements vary by zone to reflect places where more trips are on foot or by transit?</td>
<td>Match parking requirements to the level of demand and allow flexible arrangements to meet parking standards.</td>
</tr>
<tr>
<td><strong>4B. TRANSPORTATION DEMAND MANAGEMENT ALTERNATIVES</strong></td>
<td></td>
</tr>
<tr>
<td>Does the municipality allow developers to use alternative measures such as transportation demand management or in-lieu payments to reduce required parking?</td>
<td>Provide flexibility to reduce parking in exchange for specific actions that reduce parking demands on site.</td>
</tr>
<tr>
<td><strong>4C. MINIMIZING STORMWATER FROM PARKING LOTS</strong></td>
<td></td>
</tr>
<tr>
<td>Are there requirements for landscaping designed to minimize stormwater in parking lots?</td>
<td>Require substantial landscaping to help reduce runoff.</td>
</tr>
<tr>
<td><strong>ADOPT GREEN INFRASTRUCTURE STORMWATER MANAGEMENT PROVISIONS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>5A. GREEN INFRASTRUCTURE PRACTICES</strong></td>
<td></td>
</tr>
<tr>
<td>Are green infrastructure practices encouraged as legal and preferred for managing stormwater runoff?</td>
<td>Make all types of green infrastructure allowed and legal and remove all impediments to using green infrastructure (including for stormwater requirements), such as limits on infiltration in rights-of-way, permit challenges for green roofs, safety issues with permeable pavements, restrictions on the use of cisterns and rain barrels, and other such unnecessary barriers.</td>
</tr>
<tr>
<td>Do stormwater management plan reviews take place early in the development review process?</td>
<td>Incorporate stormwater plan comments and review into the early stages of development review/site plan review and approval, preferably at pre-application meetings with developers.</td>
</tr>
</tbody>
</table>

Incorporating Green Infrastructure Practices at the Municipal, Neighborhood, and Site Scales (SUMMARY) continued

<table>
<thead>
<tr>
<th>Policy Question</th>
<th>Goal</th>
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</thead>
<tbody>
<tr>
<td><strong>5B. MAINTENANCE/ENFORCEMENT</strong></td>
<td></td>
</tr>
<tr>
<td>Does your stormwater ordinance include monitoring, tracking, and maintenance requirements for stormwater management practices?</td>
<td>Incorporate monitoring, tracking, and maintenance requirements for stormwater management practices into your municipal stormwater ordinance.</td>
</tr>
</tbody>
</table>