

City of Shelbyville



Annual Stormwater Report

July 1st, 2019 through June 30th, 2020



Tennessee Department of Environment and Conservation
Division of Water Resources
William R. Snodgrass Tennessee Tower,
312 Rosa L. Parks Avenue, 11th Floor, Nashville, Tennessee 37243
1-888-891-8332 (TDEC)

Phase II Small Municipal Separate Storm Sewer System (MS4) Annual Report

1. MS4 Information

Name of MS4: City of Shelbyville		MS4 Permit Number: TNS075531
Contact Person: Buck Vallad		Email Address: buck.vallad@shelbyvilletn.org
Telephone: (931) 684-2644		MS4 Program Web Address: http://www.shelbyvilletn.org/stormwater14.htm
Mailing Address: 201 North Spring Street		
City: Shelbyville	State: TN	ZIP code: 37160

What is the current population of your MS4? 22,101 per 2019 estimate by US Census Bureau

What is the reporting period for this annual report? July 1 2019 to June 30 2020

2. Discharges to Waterbodies with Unavailable Parameters or Exceptional Tennessee Waters (Section 3.1)

- A. Does your MS4 discharge into waters with unavailable parameters (previously referred to as impaired) for pathogens, nutrients, siltation or other parameters related to stormwater runoff from urbanized areas as listed on TN's most current 303(d) list and/or according to the on-line state GIS mapping tool (tdeconline.tn.gov/dwr/)? If yes, attach a list. ☒ Yes ☐ No
- B. Are there established and approved TMDLs (<http://www.tn.gov/environment/article/wr-ws-tennessees-total-maximum-daily-load-tmdl-program>) with waste load allocations for MS4 discharges in your jurisdiction? If yes, attach a list. ☐ Yes ☒ No
- C. Does your MS4 discharge to any Exceptional Tennessee Waters (ETWs - http://environment-online.tn.gov:8080/pls/enf_reports/f?p=9034:34304:4880790061142)? If yes, attach a list. ☒ Yes ☐ No
- D. Are you implementing specific Best Management Practices (BMPs) to control pollutant discharges to waterbodies with unavailable parameters or ETWs? If yes, describe the specific practices: Proposed developments are required to evaluate discharge points and the effect of the development on said discharge points. Any Federal, State, or local permits that are necessary as a result of those effects are required to be obtained prior to commencement of the project. Illicit discharges from properly permitted and existing developments are also monitored for any potential pollutant discharges to waterbodies with unavailable parameters or ETWs. ☒ Yes ☐ No

3. Public Education/Outreach and Involvement/Participation (Sections 4.2.1 and 4.2.2)

- A. Have you developed a Public Information and Education plan (PIE)? ☒ Yes ☐ No
- B. Is your public education program targeting specific pollutants and sources, such as Hot Spots? If yes, describe the specific pollutants and/or sources targeted by your public education program: Specific areas of known concerns and historical challenges such as automotive shops, quarries, industrial areas, and construction sites to help promote proper storage and disposal of oils and other potential contaminants located on the site. The City provides an oil disposal area at the Public Works facility and also provide informational literature. ☒ Yes ☐ No

Phase II Small Municipal Separate Storm Sewer System (MS4) Annual Report

- C. Do you have a webpage dedicated to your stormwater program? If yes, provide a link/URL: <http://www.shelbyvilletn.org/stormwater14.htm> ☒ Yes ☐ No
- D. Summarize how you advertise and publicize your public education, outreach, involvement and participation opportunities: Website, Social Media, and Local Newspaper
- E. Summarize the public education, outreach, involvement and participation activities you completed during this reporting period: City works with camp attendees at the City's Rec Center by walking the grounds of the Rec Center picking up litter, debris and cleaning storm drain inlets. We regularly visit with decision makers and front line individuals at Industrial facilities as well as grading contractors to keep them informed of current stormwater requirements.
- F. Summarize any specific successful outcome(s) (e.g., citizen involvement, pollutant reduction, water quality improvement, etc.) fully or partially attributable to your public education and participation program during this reporting period: Overall litter debris within the City appears to continue to decline as well as discovery of willful or negligent illicit discharges.

4. Illicit Discharge Detection and Elimination (Section 4.2.3)

- A. Have you developed and do you continue to update a storm sewer system map that shows the location of system outfalls where the municipal storm sewer system discharges into waters of the state or conveyances owned or operated by another MS4? ☒ Yes ☐ No
- B. If yes, does the map include inputs into the storm sewer collection system, such as the inlets, catch basins, drop structures or other defined contributing points to the sewershed of that outfall, and general direction of stormwater flow? ☒ Yes ☐ No
- C. How many outfalls have you identified in your storm sewer system? 14
- D. Do you have an ordinance, or other regulatory mechanism, that prohibits non-stormwater discharges into your storm sewer system? ☒ Yes ☐ No
- E. Have you implemented a plan to detect, identify and eliminate non-stormwater discharges, including illegal disposal, throughout the storm sewer system? If yes, provide a summary: City staff are trained to observe storm drains during dry weather periods and watch for illegal disposals as they run routes (i.e. solid waste collection, mowing activities, etc.) throughout the City. ☒ Yes ☐ No
- F. How many illicit discharge related complaints were received this reporting period? 2
- G. How many illicit discharge investigations were performed this reporting period? 2
- H. Of those investigations performed, how many resulted in valid illicit discharges that were addressed and/or eliminated? 1

5. Construction Site Stormwater Runoff Pollutant Control (Section 4.2.4)

- A. Do you have an ordinance or other regulatory mechanism requiring:
Construction site operators to implement appropriate erosion prevention and sediment control BMPs consistent with those described in the TDEC EPSC Handbook? ☒ Yes ☐ No
- Construction site operators to control wastes such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste? ☒ Yes ☐ No

Phase II Small Municipal Separate Storm Sewer System (MS4) Annual Report

Design storm and special conditions for unavailable parameters waters or Exceptional Tennessee Waters consistent with those of the current Tennessee Construction General Permit (TNR100000)? ☒ Yes ☐ No

B. Do you have specific procedures for construction site plan (including erosion prevention and sediment BMPs) review and approval? ☒ Yes ☐ No

C. Do you have sanctions to enforce compliance? ☒ Yes ☐ No

D. Do you hold pre-construction meetings with operators of priority construction activities and inspect priority construction sites at least monthly? ☒ Yes ☐ No

E. How many construction sites disturbing at least one acre or greater were active in your jurisdiction this reporting period? 10

F. How many active priority and non-priority construction sites were inspected this reporting period? 153

G. How many construction related complaints were received this reporting period? 3

6. Permanent Stormwater Management at New Development and Redevelopment Projects (Section 4.2.5)

A. Do you have a regulatory mechanism (e.g. ordinance) requiring permanent stormwater pollutant removal for development and redevelopment projects? If no, have you submitted an Implementation Plan to the Division? ☒ Yes ☐ No
☐ Yes ☐ No

B. Do you have an ordinance or other regulatory mechanism requiring:
Site plan review and approval of new and re-development projects? ☒ Yes ☐ No

A process to ensure stormwater control measures (SCMs) are properly installed and maintained? ☒ Yes ☐ No

Permanent water quality riparian buffers? If yes, specify requirements: Current TDEC buffer requirements have been adopted by the City ☒ Yes ☐ No

C. What is the threshold for development and redevelopment project plans plan review (e.g., all projects, projects disturbing greater than one acre, etc.)? We review all projects requiring any grading permit, building permit, or Planning Commission approval.

D. How many development and redevelopment project plans were reviewed for this reporting period? 32

E. How many development and redevelopment project plans were approved? 29

F. How many permanent stormwater related complaints were received this reporting period? 0

G. How many enforcement actions were taken to address improper installation or maintenance? 0

H. Do you have a system to inventory and track the status of all public and private SCMs installed on development and redevelopment projects? ☒ Yes ☐ No

I. Does your program include an off-site stormwater mitigation or payment into public stormwater fund? If yes, specify. _____ ☐ Yes ☒ No

7. Stormwater Management for Municipal Operations (Section 4.2.6)

A. As applicable, have stormwater related operation and maintenance plans that include information related to maintenance activities, schedules and the proper disposal of waste from structural and non-structural stormwater controls been developed and implemented at the following municipal operations:

Streets, roads, highways? ☒ Yes ☐ No

Phase II Small Municipal Separate Storm Sewer System (MS4) Annual Report

- | | | |
|---|---|-----------------------------|
| Municipal parking lots? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| Maintenance and storage yards? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| Fleet or maintenance shops with outdoor storage areas? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| Salt and storage locations? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| Snow disposal areas? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| Waste disposal, storage, and transfer stations? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| | | |
| B. Do you have a training program for employees responsible for municipal operations at facilities within the jurisdiction that handle, generate and/or store materials which constitute a potential pollutant of concern for MS4s? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |
| | | |
| If yes, are new applicable employees trained within six months, and existing applicable employees trained and/or retrained within the permit term? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |

8. Reviewing and Updating Stormwater Management Programs (Section 4.4)

- A. Describe any revisions to your program implemented during this reporting period including but not limited to:
- Modifications or replacement of an ineffective activity/control measure. NA
- Changes to the program as required by the division to satisfy permit requirements. The program received a routine Compliance Evaluation Inspection on July 28, 2020 from TDEC personnel. As a result of that evaluation, the following revisions are being proposed to the City's Stormwater Management Manual (SMM):
- 1) Revise the review checklist for construction plans to include the current CGP technical standards:
- 2) Revise the requirements for waste materials controls on construction sites:
- 3) Revise to clearly define Priority Construction Sites and the frequency of inspections.
- Information (e.g. additional acreage, outfalls, BMPs) on newly annexed areas and any resulting updates to your program. No new outfalls from any annexed areas.
- B. In preparation for this annual report, have you performed an overall assessment of your stormwater management program effectiveness? If yes, summarize the assessment results, and any modifications and improvements scheduled to be implemented in the next reporting period. The overall effectiveness of the program has proven to be successful as there are limited occurrences of complaints, necessary enforcement actions, and violations. As such, there is always room for improvements and the revisions to the SMM listed in item A above will seek to further improve the City's program effectiveness.

☒ Yes ☐ No

9. Enforcement Response Plan (Section 4.5)

- A. Have you implemented an enforcement response plan that includes progressive enforcement actions to address non-compliance, and allows the maximum penalties specified in TCA 68-221-1106? If no, explain. _____ ☒ Yes ☐ No
- B. As applicable, identify which of the following types of enforcement actions (or their equivalent) were used during this reporting period; indicate the number of actions, the minimum measure (e.g., construction, illicit discharge, permanent stormwater management), and note those for which you do not have authority:

<u>Action</u>	<u>Construction</u>	<u>Permanent Stormwater</u>	<u>Illicit Discharge</u>	<u>In Your ERP?</u>	
Verbal warnings	# <u>10</u>	# <u>0</u>	# <u>1</u>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Written notices	# <u>0</u>	# <u>0</u>	# <u>1</u>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Citations with administrative penalties	# <u>0</u>	# <u>0</u>	# <u>0</u>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Stop work orders	# <u>0</u>	# <u>0</u>	# <u>1</u>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Withholding of plan approvals or other authorizations	# <u>0</u>	# <u>0</u>	# <u>0</u>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Additional Measures	# <u>0</u>	# <u>0</u>	# <u>0</u>	Describe: _____	

- C. Do you track instances of non-compliance and related enforcement documentation? ☒ Yes ☐ No
- D. What were the most common types of non-compliance instances documented during this reporting period?
Tracking sediment from construction sites onto adjacent public ROW and installed EPSC measures needing repair or replacement.

10. Monitoring, Recordkeeping and reporting (Section 5)

- A. Summarize any analytical monitoring activities (e.g., planning, collection, evaluation of results) performed during this reporting period. No analytical monitoring activities were performed during this period
- B. Summarize any non-analytical monitoring activities (e.g., planning, collection, evaluation of results) performed during this reporting period. Non-analytical activities have included regular observations and monitoring of stream channels and tributaries for discoloration, cloudiness resulting from excessive sediment loads, and irregular changes/patterns of stream bank vegetation or aquatic life.
- C. If applicable, are monitoring records for activities performed during this reporting period submitted with this report. ☒ Yes ☐ No

11. Certification

Phase II Small Municipal Separate Storm Sewer System (MS4) Annual Report

This report must be signed by a ranking elected official or by a duly authorized representative of that person. See signatory requirements in sub-part 6.7.2 of the permit.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Shanna Boyette City Manager Shanna Boyette
Printed Name and Title Signature

9-30-20
Date

Annual reports must be submitted by September 30 of each calendar year (Section 5.4) to the appropriate Environmental Field Office (EFO), identified in the table below:

EFO	Street Address	City	Zip Code	Telephone
Chattanooga	1301 Riverfront Pkwy, Suite 206	Chattanooga	37402	(423) 634-5745
Columbia	1421 Hampshire Pike	Columbia	38401	(931) 380-3371
Cookeville	1221 South Willow Ave.	Cookeville	38506	(931) 520-6688
Jackson	1625 Hollywood Drive	Jackson	38305	(731) 512-1300
Johnson City	2305 Silverdale Road	Johnson City	37601	(423) 854-5400
Knoxville	3711 Middlebrook Pike	Knoxville	37921	(865) 594-6035
Memphis	8383 Wolf Lake Drive	Bartlett	38133	(901) 371-3000
Nashville	711 R S Gass Boulevard	Nashville	37216	(615) 687-7000

GRADING PERMIT PROCEDURE

1. Address and scope of work
2. Person responsible (point of contact)
3. Copy of NOC & SWPPP (if required)
4. Inspection of site
5. Approval or disapproval
6. Fill out checklist & issue permit

Date:

CITY OF SHELBYVILLE
GRADING PERMIT

City Use Only

Depart	Initials
Public Works	_____
Zoning	_____
Codes	_____
City Engineer	_____

RE-SUBMITTAL ? ☐ No

☐ Yes: Grading Permit # 0047

Providing Re-submittal information will allow for quicker review. Not providing re-submittal information may delay its review.

ONLY Fill items modified since last submission.

Project Information

Building Permit # _____ Building App # _____ PRD # _____

TDEC General Const. NOC # _____

Check all that apply to project:

☐ Detention Pond Required ☐ Subdivision ☐ In Flood Plain

Name: _____
Description: _____
Address: _____
City: _____ Zip: _____

Owner

Company: _____
Last Name: _____ First Name: _____
Address: _____
City: _____ State: _____ Zip: _____
Phone: _____ Fax: _____ Cell: _____

Variance ☐ Requested

Description: _____

Engineer

Company: _____
Last Name: _____ First Name: _____
Address: _____
City: _____ State: _____ Zip: _____
Phone: _____ Fax: _____ Cell: _____

Operator/Contractor (if known)

Company: _____
Last Name: _____ First Name: _____
Address: _____
City: _____ State: _____ Zip: _____
Phone: _____ Fax: _____ Cell: _____

WATERQUALITY SCORECARD

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

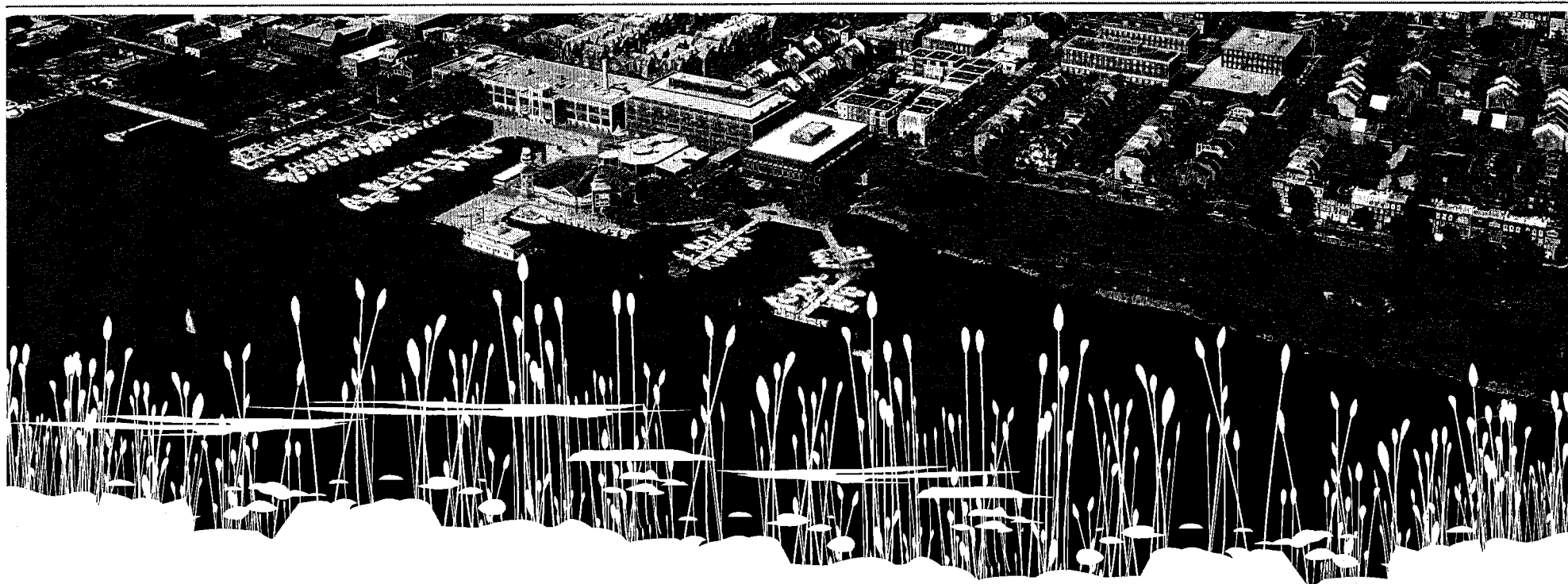


TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	1
BACKGROUND.....	1
THE WATER QUALITY SCORECARD.....	3
<i>How to Use the Scorecard</i>	3
<i>A Note about the Point System</i>	5
<i>Tips for Building Relationships Between Stormwater Managers, Land Use Planners, and Other Local Officials</i>	5
<i>Table 1: Water Quality Scorecard Quick Reference Guide</i>	7
GETTING STARTED.....	10
SECTION 1: PROTECT NATURAL RESOURCES (INCLUDING TREES) AND OPEN SPACE	11
<i>Resources</i>	21
<i>Case Studies</i>	21
SECTION 2: PROMOTE EFFICIENT, COMPACT DEVELOPMENT PATTERNS AND INFILL	23
<i>Resources</i>	28
<i>Case Studies</i>	28
SECTION 3: DESIGN COMPLETE, SMART STREETS THAT REDUCE OVERALL IMPERVIOUSNESS.....	29
<i>Resources</i>	34
<i>Case Studies</i>	34
SECTION 4: ENCOURAGE EFFICIENT PARKING	36
<i>Resources</i>	41
<i>Case Studies</i>	41
SECTION 5: ADOPT GREEN INFRASTRUCTURE STORMWATER MANAGEMENT PROVISIONS	43
<i>Resources</i>	50
<i>Case Studies</i>	50
ACKNOWLEDGMENTS.....	52

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's² 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.

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.

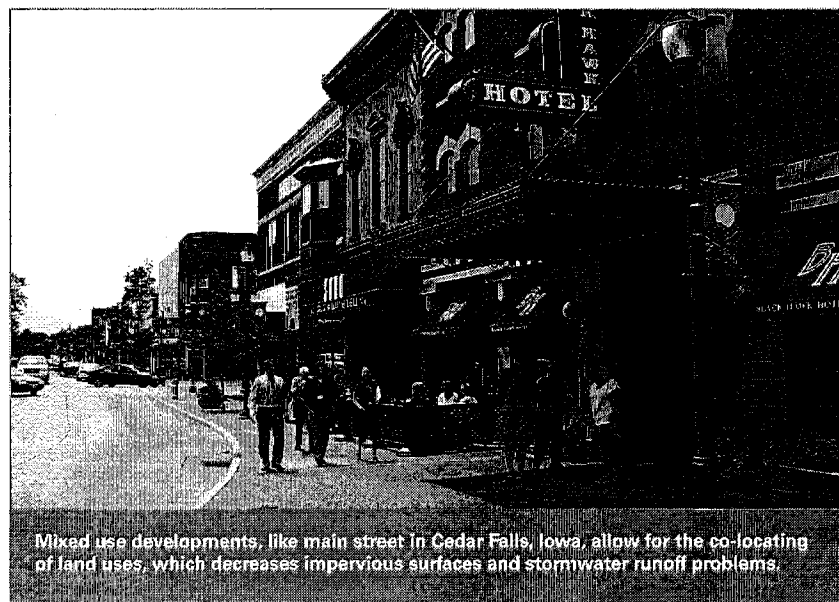
² The term "municipality" as used by the International City/County Management Association (ICMA) refers to local government at both the city and county levels.

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.



Mixed use developments, like main street in Cedar Falls, Iowa, allow for the co-locating of land uses, which decreases impervious surfaces and stormwater runoff problems.

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.³ In EPA's 2004 Report to Congress, that percentage increased to 44 percent.⁴ 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.⁵

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.⁶ 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 scours streams, dumps 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 hardscaped, 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.

3 U.S. EPA National Water Quality Inventory: 1996 Report to Congress: <http://www.epa.gov/305b/96report/index.html>

4 U.S. EPA National Water Quality Inventory: 2004 Report to Congress: <http://www.epa.gov/owow/305b/2004report/>

5 *Urban Stormwater Management in the United States*, National Research Council of the National Academy of Sciences, 2008: http://dels.nas.edu/dels/rpt_briefs/stormwater_discharge_final.pdf

6 U.S. EPA National Water Quality Inventory: 2004 Report to Congress: <http://www.epa.gov/owow/305b/2004report/>

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.



Smart retrofits can integrate green infrastructure, like this permeable area along Sandy Boulevard in Portland, Oregon, into standard roadway maintenance and upgrades.

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
5. Adopt Green Infrastructure Stormwater Management Provisions

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.

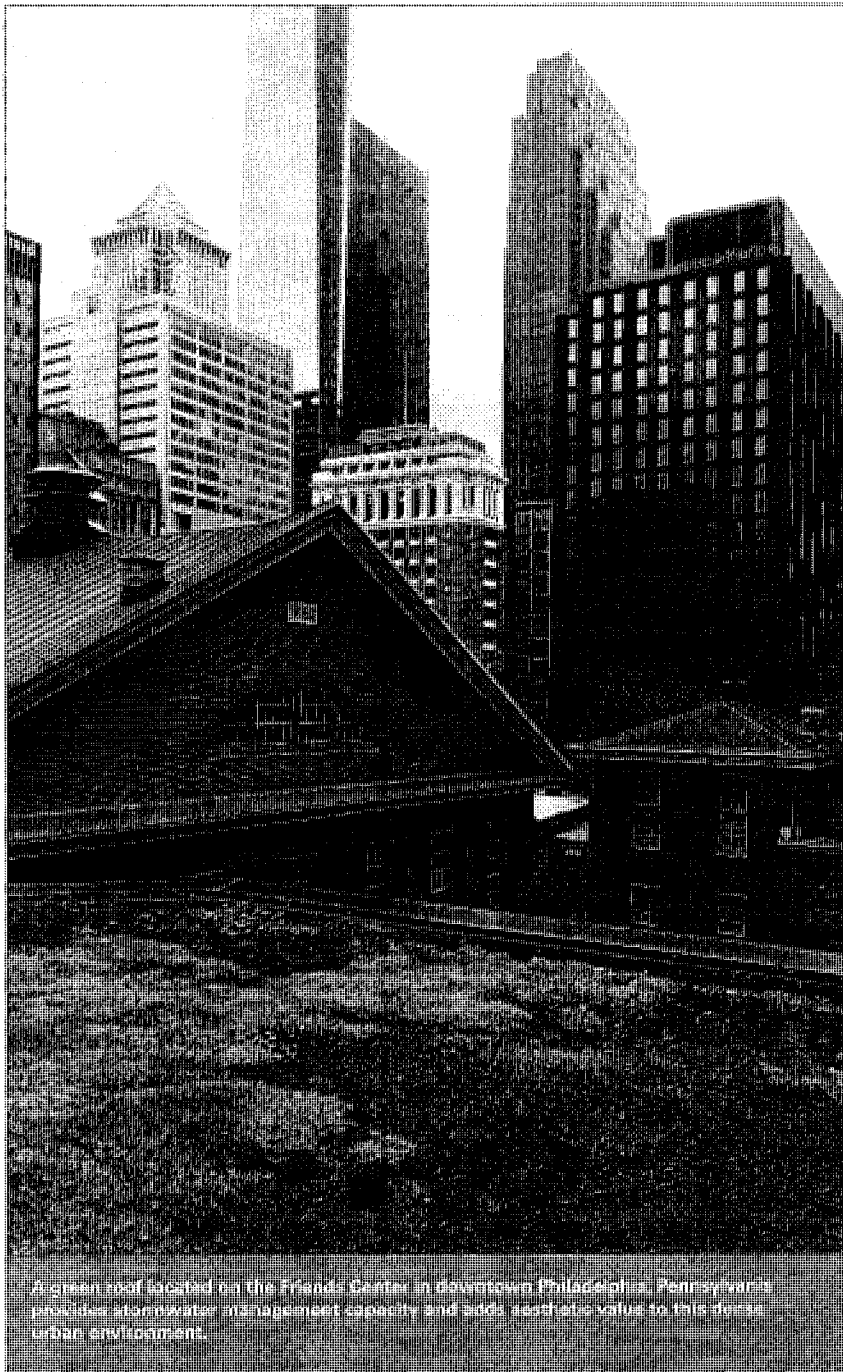
A Note about the Point System

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



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)

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

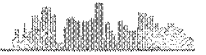
Incorporating Green Infrastructure Practices at the Municipal, Neighborhood, and Site Scales (SUMMARY) continued

Policy Question		Goal
DESIGN COMPLETE, SMART STREETS THAT REDUCE OVERALL IMPERVIOUSNESS		
3A. STREET DESIGN		
	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?	Appropriate street widths allow narrower lanes for certain street types, thereby reducing overall imperviousness.
	Are shared driveways, reduced driveway widths, two-track driveways, and rear garages and alleys encouraged for all single-family developments?	Encourage alternative forms and decreased dimensions of residential driveways and parking areas.
3B. GREEN INFRASTRUCTURE ELEMENTS AND STREET DESIGN		
	Are major street projects required to integrate green infrastructure practices as a standard part of construction, maintenance, and improvement plans?	Formally integrate green infrastructure into standard roadway construction and retrofit practice.
	Do regulations and policies promote use of pervious materials for all paving areas, including alleys, streets, sidewalks, crosswalks, driveways, and parking lots?	Build and retrofit these surfaces with pervious materials to reduce stormwater runoff and its negative impacts.
ENCOURAGE EFFICIENT PROVISION OF PARKING		
4A. REDUCED PARKING REQUIREMENTS		
	Does your local government provide flexibility regarding alternative parking requirements (e.g., shared parking, 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?	Match parking requirements to the level of demand and allow flexible arrangements to meet parking standards.
4B. TRANSPORTATION DEMAND MANAGEMENT ALTERNATIVES		
	Does the municipality allow developers to use alternative measures such as transportation demand management or in-lieu payments to reduce required parking?	Provide flexibility to reduce parking in exchange for specific actions that reduce parking demands on site.
4C. MINIMIZING STORMWATER FROM PARKING LOTS		
	Are there requirements for landscaping designed to minimize stormwater in parking lots?	Require substantial landscaping to help reduce runoff.
ADOPT GREEN INFRASTRUCTURE STORMWATER MANAGEMENT PROVISIONS		
5A. GREEN INFRASTRUCTURE PRACTICES		
	Are green infrastructure practices encouraged as legal and preferred for managing stormwater runoff?	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.
	Do stormwater management plan reviews take place early in the development review process?	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.

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

Policy Question		Goal
	Do local building and plumbing codes allow harvested rainwater use for exterior uses such as irrigation and non-potable interior uses such as toilet flushing?	Ensure that the municipality allows and encourages stormwater reuse for non-potable uses.
	Are provisions available to meet stormwater requirements in other ways, such as off-site management within the same sewershed or "payment in lieu" of programs, to the extent that on-site alternatives are not technically feasible?	Allow off-site management of runoff while still holding developers responsible for meeting stormwater management goals.
5B.	MAINTENANCE/ENFORCEMENT	
	Does your stormwater ordinance include monitoring, tracking, and maintenance requirements for stormwater management practices?	Incorporate monitoring, tracking, and maintenance requirements for stormwater management practices into your municipal stormwater ordinance.

GETTING STARTED



Below are suggested steps to help complete the Water Quality Scorecard:

Step 1. Review the scorecard to identify which agencies, departments, or personnel will be required to complete each section.

Step 2. Convene appropriate staff to review various sections of the tool, and work together to ensure that updates and changes to codes, policies, and internal processes align well with other agency changes.

Step 3. Collect existing ordinances and policies that will be necessary references to complete the scorecard.

Step 4. Coordinate between appropriate agencies or departments to complete the scorecard.

Please indicate by your signature that you have reviewed the tool with all co-signees of this document (name, department, and date):

Step 5: Identify sections of the scorecard and/or specific policy questions that should be prioritized for immediate revision or update.

Step 6: Identify short-, medium-, and long-term goals and strategies for revising local policies to better support green infrastructure.

1 PROTECT NATURAL RESOURCES (INCLUDING TREES) AND OPEN SPACE

Sensitive Natural Lands/Critical Area Protection

QUESTION: Are development policies, regulations, and incentives in place to protect natural resource areas and critical habitat?

GOAL: Protect natural resource areas (e.g., forests, prairies) and critical habitat (e.g., conservation corridors, buffer zones, wildlife preserves) from future development.

WHY: Protection of significant tracts of critical lands and wildlife habitat will aid in protecting and improving water quality by increasing infiltration and groundwater recharge, preventing erosion and contamination of ground water and surface water resources, and protecting sources of drinking water.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Identify and map critical natural resource areas (e.g., steep slopes, wildlife habitat, forests, drinking water source areas).	1		
The local comprehensive plan contains a natural resource protection element with goals calling for preservation of identified critical natural resource areas.	1	1	
Identify key natural resource areas for protection in jurisdiction's parks and open space plan.	1	1	
Assist landowners in identifying sensitive natural areas and laying out developments to avoid such areas.	1	1	
Local plans establish and enforce areas which are available for development and which lands are a priority for preservation.	1	1	
REMOVE BARRIERS:			
Protection of sensitive natural areas and wildlife habitat qualifies for credit towards local open space dedication and set-aside requirements.	1		
ADOPT INCENTIVES:			
Provide financial support to or collaborate with land trusts to acquire critical natural areas.	1		
Establish a dedicated source of funding for open space acquisition and management (e.g., bond proceeds, sales tax).	2		
Adopt a transferable developments rights program to provide an incentive for landowners to preserve sensitive natural lands and wildlife habitat.	1		
		4	
		PAGE TOTAL	◀ CARRY THIS SUBTOTAL TO NEXT PAGE = 4

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
Land use regulations provide for the creation of cluster and conservation subdivision on the periphery of urban growth areas to encourage preservation of intact blocks of sensitive natural areas.	1	1	
ENACT REGULATIONS:			
Adopt regulations to protect steep slope, hillsides, and other sensitive natural lands (e.g., by limiting development on slopes > 30% or requiring larger lot sizes in sensitive areas).	2	2	
Adopt wildlife habitat protection regulations aimed at preserving large contiguous blocks of habitat areas.	2		
Create agriculture/natural resource zoning districts (e.g., minimum lot size of 80 acres and larger) to preserve agricultural areas and forests.	2		
	3 PAGE TOTAL	SUBTOTAL FROM PREVIOUS PAGE ▼ CARRY THIS SUBTOTAL TO NEXT PAGE + 4 = 7	

Protection Of Water Bodies/Aquifers

QUESTION: Are no-development buffer zones and other protective tools in place around wetlands, riparian areas, and floodplains that improve/protect water quality?

GOAL: Protect critical areas such as wetlands, floodplains, lakes, rivers, and estuaries with a mandatory no-development buffer.

WHY: The use of these practices will reduce pollutant loads and hydrologic alterations to water bodies.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Identify and map critical water resource areas.	1	1	
The local comprehensive plan contains a water quality protection element with goals calling for protection of identified water bodies and other water resource areas such as wetlands.	1	1	
Identify key critical water resource areas for protection in jurisdiction's parks and open space plan.	1	1	
Cooperate in developing regional approaches to watershed protection and stormwater management.	1	1	
REMOVE BARRIERS:			
Wetlands and other water bodies and buffer areas qualify for credit against local open space dedication/set-aside regulations.	1		
ADOPT INCENTIVES:			
Protected water bodies and buffer areas qualify for twice the credit (or more) against open space requirements set by the municipality.	1		
Restoration of degraded riparian/wetland areas qualifies for additional open space credit within the local municipal system.	1		
Transfer of density from protected riparian areas/buffers to upland portions of development sites.	1		
ENACT REGULATIONS:			
Riparian and wetland buffer areas required by local land use regulations · Buffer is at least 50 feet (as measured from the top of bank) = 1 point · Buffer is at least 100 feet (as measured from the top of bank) = 2 points · Buffer is greater than 100 feet (as measured from the top of bank) = 3 points	1 to 3		
Critical water resource areas cannot be counted in calculating allowable density on a site (e.g., on a 200-acre site with 50 acres of wetlands, only 150 acres can be used to calculate density under zone district regulations, and only those 150 acres may be developed).	1		
		4 PAGE TOTAL	SUBTOTAL FROM PREVIOUS PAGE ▼ CARRY THIS SUBTOTAL TO NEXT PAGE = 11

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
Development in floodplains is prohibited or must demonstrate no adverse impacts upstream and downstream (See resources below for details on "no adverse impact" approach to floodplain management).	2	2	
Stormwater quality and quantity performance standards exist for development sites (e.g., restrictions on sedimentation levels, pre/post development flows).	1	1	
Local regulations require restoration of degraded riparian/wetland areas on a development site.	1	1	
Compensation for damage to riparian/wetland areas must be on a minimum 2:1 basis on- or off-site.	1		
Performance standards exist and are well enforced for stormwater discharges to wetlands that protect the hydrologic regimes and limit pollutant loads.	1	1	
	5		
	PAGE TOTAL	5	SUBTOTAL FROM PREVIOUS PAGE ▼ CARRY THIS SUBTOTAL TO NEXT PAGE + 11 = 16

1.A.2b

Protection Of Water Bodies/Aquifers

QUESTION: Does the community have protection measures for source water protection areas through land use controls and stewardship activities?

GOAL: Protect source water areas from current or potential sources of contamination.

WHY: These practices will help safeguard community health, reduce the risk of water supply contamination, and potentially reduce water treatment costs.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Local land use plans identify aquifer recharge/source water areas and recommend protective measures.	1		
Require that all stormwater inlets carry a notice regarding discharge to receiving waters.	1	1	
Map and publish wellhead and aquifer recharge areas to alert developers to potential restrictions.	1		
ADOPT INCENTIVES:			
Identification of drinking water source protection and aquifer recharge areas with a dedicated funding source in place to purchase and protect such areas.	1		
Protection of critical water source areas qualifies for additional credit towards local open space requirements.	1		
ENACT REGULATIONS:			
Adopt well-head protection regulations/zones to prevent incompatible development and uses.	1		
Adopt aquifer protection regulations/zones to prevent incompatible development and uses.	2		
		1	
		PAGE TOTAL	
		SUBTOTAL FROM PREVIOUS PAGE	▼ CARRY THIS SUBTOTAL TO NEXT PAGE
		+ 16	= 17

1.B OPEN SPACE PROTECTION

1.B.1

QUESTION: Does the jurisdiction have adequate open space in both developed and greenfield areas of the community?

GOAL: Create open space networks throughout a community that serve a dual function of providing recreational areas and assisting in the management of stormwater runoff.

WHY: In addition to providing open space throughout a community as an amenity, such a network can provide large areas that contribute little to stormwater loads and can provide large areas for the infiltration and purification of stormwater.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Adopt a community-wide open space and parks plan.	1	1	
The local comprehensive plan contains an open space/parks element that recognizes the role of open space in sustainable stormwater management.	1	1	
REMOVE BARRIERS:			
Green infrastructure practices count towards local open space set aside requirements up to 50% of total.	1		
Allow and encourage retrofits of abandoned or underutilized public lands to serve as permanent or temporary open space and green infrastructure sites.	1	1	
ADOPT INCENTIVES:			
Additional open space credits are eligible for green stormwater management facilities improved/created for public recreational purposes.	1		
Provide credit against open space impact fees for green roofs.	1		
ENACT REGULATIONS:			
Adopt neighborhood policies and ordinances that work to create neighborhood—not development site—open space amenities that are within ¼ to ½ mile walking distance from every residence.	1	1	
Adopt an open space impact fee to purchase passive open space that can assist in stormwater management.	1		
Adopt open space dedication and/or set aside requirements based on the demand generated by the development. As a baseline, use the average open space requirements adopted by the National Recreation and Park Assn. (e.g., 10 acres of community and neighborhood parks for every 1,000 persons in a development or fraction thereof).	1		
		4	
		PAGE TOTAL	
		SUBTOTAL FROM PREVIOUS PAGE ▼ CARRY THIS SUBTOTAL TO NEXT PAGE + 17 = 21	

1.C TREE PROTECTION

1.C.1

QUESTION: Does the local government have a comprehensive public urban forestry program?

GOAL: Protect and maintain trees on public property and rights-of-way and plant additional trees to enhance the urban tree canopy.

WHY: Mature trees provide multiple community benefits, reduce overall stormwater runoff, and improve stormwater quality.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Survey and inventory existing trees on public lands and street rights-of-way. Document the characteristics and location of street trees and urban tree canopy to inform public tree planting, adoption, and maintenance programs.	1		
Select tree species based on known performance for managing stormwater runoff. Publish list and make widely available for homeowners/others that plant street trees.	1	1	
Conduct education and outreach about tree protection, proper maintenance, and replanting opportunities through printed materials, workshops, events, and signage.	1	1	
Adopt a policy to protect existing trees on local government development sites (e.g., municipal parking lots, municipal buildings).	1		
Maintain an active tree maintenance program for public trees, including pest control, pruning, watering, and similar measures.	1	1	
REMOVE BARRIERS:			
Acknowledge trees as part of community infrastructure and develop a coordinated design for locating public utilities to provide enough space for mature tree canopy and root development.	1	1	
ADOPT INCENTIVES:			
Provide free or reduced-price trees to homeowners to be used as street trees.	1		
ENACT REGULATIONS:			
Require any public trees removed or damaged during construction associated with private development to be replaced on- or off-site with an equivalent amount of tree caliper (e.g., remove a 24-inch diameter tree/replace with 6 four-inch diameter trees).	1		
Adopt construction protection rules for all public trees (e.g., fencing, no storage of hazardous materials, avoid cutting into root zones).	1		

3

PAGE TOTAL

SUBTOTAL FROM PREVIOUS PAGE

▼ CARRY THIS SUBTOTAL TO NEXT PAGE

+ 21 = 24

QUESTION: Has the community taken steps to protect trees on private property?

GOAL: Preserve trees on private property and require replacement when trees are removed or damaged during development.

WHY: Mature trees provide multiple environmental, economic, and community benefits, including improved water and air quality, reduced heat island effects, lowered energy costs, and improved community aesthetics.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Community plans specifically include tree preservation and replacement as community goals.	1	1	
Conduct educational sessions for builders and developers regarding appropriate tree protection techniques and/or publish a technical tree protection manual.	1		
Follow maintenance and inspection timelines and meet canopy goals and milestones by ensuring old trees survive, replacing dead or diseased trees, and planting new trees.	1		
REMOVE BARRIERS:			
Set up maintenance and inspection agreements for private properties meeting stormwater requirements or receiving stormwater fee credit for trees.	1		
Set up long-term maintenance and inspection schedules for trees on public lands.	1		
ADOPT INCENTIVES:			
Support local non-profits that plant trees and provide educational services.	1	1	
Provide financial incentives for tree purchases and planting.	1		
A tree fund has been established to receive in-lieu payments when trees must be removed from a development site to accommodate permitted projects.	1		
Trees of a specified minimum size count towards a percentage of stormwater management requirements (e.g., partial credit given for each mature tree exceeding a specified height or canopy size).	1		
Trees over a specified minimum size (e.g., 3-inch caliper) protected during development are credited towards landscaping requirements. · meeting the established landscape requirement = 1 point · exceeding the established landscape requirement = 2 points	1 to 2		
		2 PAGE TOTAL	SUBTOTAL FROM PREVIOUS PAGE 24 ▼ CARRY THIS SUBTOTAL TO NEXT PAGE 26

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ENACT REGULATIONS:			
Require permits before removing trees on proposed development or redevelopment sites. Provide fines and/or stop-work authority for permit violations.	1		
Set minimum tree preservation standards for new development sites.	1		
Require site plans or stormwater plans to include tree preservation.	1		
Require/allow tree replacement off-site for infill sites.	1		
		<div>0</div> <div>PAGE TOTAL</div>	<div>SUBTOTAL FROM PREVIOUS PAGE</div> <div>▼ CARRY THIS SUBTOTAL TO NEXT PAGE</div>
		+	26
		=	26

1.C.3

QUESTION: Are street trees encouraged or required as part of road and public right-of-way capital improvement projects?

GOAL: Leverage existing capital funds to plant more street trees and add multiple benefits to the public right-of-way.

WHY: Street trees can help manage and reduce stormwater runoff while providing multiple public and environmental benefits.

Implementation Tools and Policies	Pts. Avail.	Pts. Rep. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Local comprehensive and transportation plans support the planting of street trees by all private and public development projects.	1	1	
Capital improvement plans include tree planning as part of project budgets.	1	1	
ADOPT INCENTIVES:			
Offer incentives, such as reduced setbacks or increased building densities, in exchange for additional tree preservation beyond ordinance requirements.	1		
ENACT REGULATIONS:			
All private and public developments are required to plant street trees in accordance with size, spacing, and other local government requirements.	1		
New street designs and redesigns of existing streets take into account space for tree development and require necessary surface area and volume of soil dependent on type of tree species selected (this includes lateral root growth as well as direct downward growth to accommodate mature tree canopy and roots without adversely affecting other utilities).	1		
Street specifications require permeable paving for sidewalks and other surfaces to reduce stormwater runoff and allow street trees to benefit from the available water.	1		
	2		
	PAGE TOTAL		
		SUBTOTAL FROM PREVIOUS PAGE	
		26	
		+	
		28	
		=	
			(TOTAL POINTS AVAILABLE: 82)

▼ Total score for SECTION 1: PROTECT
NATURAL RESOURCES (INCLUDING TREES)
AND OPEN SPACE

This section has been reviewed and scored by

Department name

Boek Valler
Public Works

Signee

B. A. Walker

Resources

- Planner's Guide to Wetland Buffers for Local Governments, Environmental Law Institute: http://www.elistore.org/reports_detail.asp?ID=11272
- Mertes, James D. and James R. Hall. Park, Recreation, Open Space and Greenway Guidelines. National Recreation and Park Association, 1996.
- Center for Watershed Protection guidance on aquatic buffers: http://www.cwp.org/Resource_Library/Restoration_and_Watershed_Stewardship/perviousarea.htm
- "Protecting Stream and River Corridors: Creating Effective Local Riparian Buffer Ordinances," Carl Vinson Institute of Government, The University of Georgia: http://www.rivercenter.uga.edu/publications/pdf/riparian_buffer_guidebook.pdf
- No Adverse Impact Floodplain Management, Association of State Floodplain Managers: <http://www.floods.org/index.asp?menuID=349&firstlevelmenuID=187&siteID=1>
- Riparian Toolbox: Model Regulations and Legal Issues, Long Island Sound Study: <http://www.longislandsoundstudy.net/riparian/legal.htm>
- Model Ordinances to Protect Local Resources: Aquatic Buffers, U.S. EPA: <http://www.epa.gov/owow/nps/ordinance/osm1.htm>
- Duerksen, Christopher and Cara Snyder. Nature-Friendly Communities: Habitat Protection and Land Use Planning. Island Press, 2005.
- City Trees: Sustainability Guidelines and Best Practices: <http://www.treetrust.org/pdf/community-forestry-city-trees-bonestroo.pdf>
- Guide to Setting Urban Tree Canopy Goals, American Forests: <http://www.americanforests.org/resources/urbanforests/treedeficit.php>
- Urban Forestry Manual, Center for Watershed Protection: <http://www.cwp.org/forestry/part3forestrymanual.pdf> (pg. 69))
- Duerksen, Christopher and Suzanne Richman, "Tree Conservation Ordinances." American Planning Association. 1993: Planning Advisory Service Report No. 446.
- Duerksen, Christopher, Mowery, M. and McGlynn M. "Tree Preservation." Zoning Practice. July 2006: American Planning Association, Volume 23 Number 7.
- "Trees for green streets: An illustrated guide," Portland Metro: <http://www.metro-region.org/index.cfm/go/by.web/id=26337>

- Tree Preservation Information Guide, Portland, Oregon: <http://www.sustainableportland.org/shared/cfm/image.cfm?id=72545>
- Storm Water Pollution Prevention Plan (SWPPP) Guide, U.S. EPA: <http://cfpub.epa.gov/npdes/stormwater/swppp.cfm>
- Center for Urban Forest Research, U.S. Forest Service: <http://www.fs.fed.us/psw/programs/cufr/>
- Urban Forest Policy and Management, U.S. Forest Service: <http://www.fs.fed.us/psw/programs/cufr/research/studies.php?TopicID=1>
- Plants for Stormwater Design Volume II, Great River Greening: http://www.greatrivergreening.org/_downloads/PSD%20II%20Sample.PDF

Case Studies

- Alachua County, Florida's land conservation and acquisition program, *Alachua County Forever*, has conserved over 17,000 acres of environmentally sensitive land: <http://www.alachuacounty.us/government/depts/epd/land/filesforms.aspx>
- Baltimore County, Maryland's Master Plan 2010 designates land management areas that include agricultural preservation areas and resource preservation areas: <http://www.baltimorecountymd.gov/Agencies/planning/masterplanning/smartgrowth.html>
- King County, Washington's Greenprint Project is an open space and resource conservation strategy that focuses on land acquisition, restoration projects, regulatory changes and protection within the urban growth boundary: <http://dnr.metrokc.gov/wlr/greenprint/about.htm>
- The Pennsylvania Horticultural Society's *Philadelphia Green* program revitalizes and maintains abandoned land and public spaces by partnering with government, businesses and the community: <http://www.pennsylvaniahorticulturalsociety.org/phlgreen/about.html>
- Chicago, Illinois's Open Space Impact Fee Ordinance charges a fee associated with residential development building permits and spends the funds on acquisition of neighborhood open space in the same area where development occurs: http://egov.cityofchicago.org/city/webportal/portalContentItemAction.do?blockName=Buildings%2FContent&deptMainCategoryOID=536901233&entityName=Buildings&topChannelName=Dept&contentOID=536988877&contentTypeName=COC_EDITORIAL
- Lenexa, Kansas's Watershed Management Plan includes erosion and sediment control, stream buffers, subwatershed protection and

improvement, and design standards for the city's uniform development code: <https://www.ci.lenexa.ks.us/Planning/compplan/Overview/>

- The Maryland Cooperative Extension Service provides a fact sheet on how to design, plant and maintain a riparian forest buffer: <http://www.riparianbuffers.umd.edu/fact/FS725.html>
- Vermont's Department of Environmental Conservation offers grants to conservation organizations to purchase or receive donated river corridor easements on private property within priority stretches of river: http://www.anr.state.vt.us/dec/waterq/rivers/docs/rv_RiverCorridorEasementGuide.pdf
- The U.S. Department of Agriculture's Natural Resources Conservation Service provides guidance on riparian buffers through the Ohio Lake Erie Buffer Program: http://www.oh.nrcs.usda.gov/programs/Lake_Erie_Buffer/riparian.html
- Davidson, North Carolina requires a public park within a five minute walk of all housing units, providing multifunctional neighborhood open space: <http://www.ci.davidson.nc.us/index.aspx?NID=576>
- San Jose, California gives post-construction stormwater treatment credit for new and existing trees in close proximity to impervious areas: http://www.sanjoseca.gov/planning/stormwater/Policy_6-29_Memo_Revisions.pdf
- Portland, Oregon gives a stormwater fee discount for trees over 15 feet tall: <http://www.portlandonline.com/bes/index.cfm?c=43444&#types>
- Portland, Oregon also gives a tree credit for meeting local stormwater requirements: <http://www.portlandonline.com/shared/cfm/image.cfm?id=93075>
- Portland, Oregon Parks and Recreation and Bureau of Development Services regulate tree cutting on private property and public property: <http://www.portlandonline.com/parks/index.cfm?c=39712>
- New York City requires street tree planting for a range of developments and zoning increases: http://www.nyc.gov/html/dcp/html/street_tree_planting/index.shtml
- Charlottesville, North Carolina has set goals for achieving a 40% minimum urban tree canopy: <http://www.charlottesville.org/Index.aspx?page=1745> (Chapter 8, pgs. 184-187)

2 PROMOTE EFFICIENT, COMPACT DEVELOPMENT PATTERNS AND INFILL

2.A SUPPORT INFILL AND REDEVELOPMENT

2.A.1

QUESTION: Are policy incentives in place to direct development to previously developed areas?

GOAL: Municipalities implement a range of policies and tools to direct development to specific areas.

WHY: Municipalities can realize a significant reduction in regional runoff if they take advantage of underused properties, such as infill, brownfield, or greyfield sites. Redeveloping already degraded sites such as abandoned shopping centers or underutilized parking lots rather than paving greenfield sites for new development can dramatically reduce total impervious area while allowing communities to experience the benefits and opportunities associated with growth.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Local plans identify potential brownfield and greyfield sites, and support their redevelopment.	1		
Capital improvement plans include infrastructure improvements (water, sewer, road, sidewalk, etc. upgrades) for identified brownfield and greyfield sites.	1	1	
Educate lending and financial institutions about benefits and local priorities of directing development to existing areas.	1		
Conduct outreach to the community to ensure support for local forms and patterns of development.	1	1	
REMOVE BARRIERS:			
Establish a brownfields program to remove uncertainty regarding cleanup and liability issues.	1		
ADOPT INCENTIVES:			
Provide incentives such as density bonuses and accelerated permitting for brownfield and greyfield sites.	1		
Adopt funding mechanisms for remediating/redeveloping brownfield and greyfield sites.	1		
Streamline permitting procedures to facilitate infill and brownfield redevelopment plan review.	1		
Establish tax increment financing (TIF) districts to encourage redevelopment.	1		
ENACT REGULATIONS:			
In local codes, ordinances, and policies, the municipality differentiates between greenfield and infill development.	1	1	
		3	
		PAGE TOTAL	◀ CARRY THIS SUBTOTAL TO NEXT PAGE = 3

2.B.1

QUESTION: Does the municipality direct growth to areas with existing infrastructure, such as sewer, water, and roads?

GOAL: Adopt policies, incentives, and regulations to direct new development to areas that have infrastructure, such as water and sewer. However, in situations where development is in areas with no sewer infrastructure, permitting alternative treatment options that can allow for higher density development or clustering of houses will reduce the overall water quality impact.

WHY: Sewer and water authorities can play a major role in directing a region's growth by determining when and where new infrastructure investment will occur. Well-drafted facility planning areas can direct growth by providing sewer service in areas least likely to impact water resources.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Local plans recommend/establish urban growth areas and urban growth boundaries. Development is encouraged within urban growth boundaries and discouraged outside of them.	1	1	
Analyze which areas within the jurisdiction are appropriate for higher density development based on existing infrastructure capacity, cost of providing new services, and access.	2	2	
Capital improvement plans for public infrastructure (roads, water, sewer, etc.) target funding inside urban growth boundary.	2	2	
Local sewer/water authority capital improvement plans follow development policies established in local comprehensive plans and target areas with existing development/infrastructure.	1	1	
REMOVE BARRIERS:			
Development standards addressing landscaping, buffering, parking, and open space are tailored for infill areas to avoid creating unnecessary hurdles to development (e.g., imposing suburban parking requirements in high-density infill areas).	2	2	
Remove prohibitions on accessory dwelling units in infill areas to increase density of development.	2	2	
Off-site, regional water retention/detention encouraged/allowed to avoid costly on-site retention in densely developed infill areas and to provide benefit to priority retrofit sites, such as schools.	2	2	
Package plants and other wastewater treatment trains are encouraged for development in limited circumstance areas where growth is appropriate but sewers/treatment capacity does not exist.	1		
		12	
		PAGE TOTAL	
		SUBTOTAL FROM PREVIOUS PAGE	▼ CARRY THIS SUBTOTAL TO NEXT PAGE
		+ 3	= 15

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
Technical information and analysis on the effectiveness of various treatment systems are readily available to developers. Local governments have determined which systems work best for their soil conditions and topography and have made this information available to the development community.	1	1	
Allow a wide variety of housing types and sizes within infill areas and reduced minimum lot sizes.	1	1	
ADOPT INCENTIVES:			
Increase development densities and allowable height in infill areas.	1	1	
Reduce impact fees for infill development based on less demand for new infrastructure.	1		
Create development incentives for green roofs (e.g., increased floor area ratio [FAR] bonus, additional building height).	1		
Include provision in stormwater management requirement that reduces on-site management requirements for projects that decrease total imperviousness on previously developed sites.	1	1	
ENACT REGULATIONS:			
Zoning and land development regulations implement urban service areas/urban growth boundary policies by restricting development in outlying areas.	1	1	
Adopt adequate public facility and concurrency ordinances that require adequate public infrastructure to be available when development comes on line (e.g., water, sewer, roads).	1	1	
Adopt large-lot/agricultural zoning (e.g., 1 unit/160 acres) on fringe of city to restrict inappropriate greenfield development.	1	1	
Enact transitional compatibility standards to ensure that new denser infill development is compatible with existing neighborhoods/adjacent development.	1	1	
		8 PAGE TOTAL	SUBTOTAL FROM PREVIOUS PAGE ▼ CARRY THIS SUBTOTAL TO NEXT PAGE + 15 = 23

2.C ENCOURAGE MIXED-USE DEVELOPMENTS

2.C.1

QUESTION: Are mixed-use and transit-oriented developments allowed or encouraged?

GOAL: Revise codes and ordinances to allow for the "by right" building of mixed-use and transit-oriented developments.

WHY: Mixed-use developments allow for the co-locating of land uses, which decreases impervious surfaces associated with parking and decreases vehicle miles traveled—resulting in a reduction of hydrocarbons left on roadways and reduced air deposition.

Transit-oriented development (TOD) produces water quality benefits by reducing: (1) land consumption due to smaller site footprints; (2) parking spaces and the impervious cover associated with them; and (3) average vehicle miles traveled, which, in turn, reduces deposition of air pollution into water bodies.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Comprehensive plans identify appropriate areas for higher-density mixed-use developments (e.g., at transit stops) and recommend policies to encourage their development.	1	1	
Local capital improvement plans and funding are targeted to areas appropriate for mixed-use development.	2	2	
REMOVE BARRIERS:			
Zoning ordinances can create by-right mixed-use and transit-oriented development districts or overlays through amendments.	1	1	
Initiate map amendments to designate mixed-use and transit-oriented development areas, eliminating the need for developers to secure zoning amendments.	1		
ADOPT INCENTIVES:			
Parking requirements are reduced to reflect decreased automobile use.	1	1	
Credit given for adjacent on-street parking, which can count for local parking requirements.	1	1	
Shared parking and alternative parking arrangements encouraged.	1	1	
Mixed-use districts/areas feature increased densities and height.	1	1	
Accessory parking structures are not counted against maximum floor area ratio (FAR) on a site.	1	1	
		9	
		PAGE TOTAL	
		SUBTOTAL FROM PREVIOUS PAGE	▼ CARRY THIS SUBTOTAL TO NEXT PAGE
		+ 23	= 32

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ENACT REGULATIONS:			
Zoning code requires a minimum mix of uses and minimum density in designated mixed-use and transit-oriented development areas.	1	1	
Auto-oriented uses and drive-throughs are restricted or prohibited in mixed-use and transit-oriented development areas.	1		

1
PAGE TOTAL

SUBTOTAL FROM PREVIOUS PAGE

+ 32

▼ Total score for SECTION 2: PROMOTE EFFICIENT, COMPACT DEVELOPMENT PATTERNS AND INFILL

= 33 (TOTAL POINTS AVAILABLE: 45)

This section has been reviewed and scored by

Buck Vallad
Department name Public Works

Signee Buck Vallad

Resources

- “Protecting Water Resources with Higher-Density Development,” U.S. EPA Development, Community and Environment Division: http://www.epa.gov/dced/water_density.htm
- “Infill Development: Completing the Community Fabric,” Municipal Research and Services Center of Washington: <http://www.mrsc.org/Subjects/Planning/infilldev.aspx>
- Smart Growth Priority Funding Areas Act of 1997, Maryland Department of Planning: <http://www.mdp.state.md.us/fundingact.htm>
- Metro Regional Government Urban Growth Boundary, Portland Metro: <http://www.metro-region.org/index.cfm/go/by.web/id/277>
- Smart Growth Toolkit, Smart Growth Leadership Institute: <http://www.smartgrowthtoolkit.net/main-content/the-smart-growth-implementation-tools.html>
- “Water and Growth: Toward a Stronger Connection Between Water Supply and Land Use in Southeastern Pennsylvania,” 10,000 Friends of Pennsylvania: <http://10000friends.org/water-and-growth>
- “Connecting Smart Growth and Brownfields Redevelopment,” Center for Environmental Policy and Management, University of Louisville: http://cepm.louisville.edu/publications/PDF_docs/smart%20growth%20and%20brownfields%20for%20website.pdf
- “Strategies for Successful Infill Development,” Northeast Midwest Institute: <http://www.nemw.org/infillbook.htm>
- “Smart Infill,” Greenbelt Alliance: <http://www.greenbelt.org/resources/reports/smartinfill/index.html>
- Infill Incentives, Policy Link: <http://www.ci.phoenix.az.us/BUSINESS/infilpgm.html>

Case Studies

- Wisconsin Department of Natural Resources is responsible for helping municipalities establish Sewer Service Area Planning to protect water quality and guide growth within public sewer systems: <http://dnr.wi.gov/org/water/wm/GLWSP/SSAPlan/>
- Dane County, Wisconsin’s BUILD program offers incentives for infill development and removes barriers to redevelopment in order to preserve farmland and prevent greenfield development: <http://www.countyofdane.com/plandev/Community/build/about.asp>

- U.S. EPA and Land-of-Sky Regional Council in Asheville, North Carolina developed a report outlining market, policy, and regulatory changes that can help overcome the barriers to infill and brownfield redevelopment: http://www.epa.gov/dced/pdf/losrc_brownfields.pdf
- The Oregon Transportation and Growth Management Program prepared a Model Infill Ordinance to clarify legal and policy-related questions about local infill incentives: http://www.dca.state.ga.us/intra_nonpub/Toolkit/ModelOrdinances/ModOrdInfl.pdf
- The City of Sacramento, California’s Infill Strategies includes a Water Development Fee Waiver, Reduced Entitlement Fees, and Sewer Facility Fee Reductions: <http://www.cityofsacramento.org/planning/infill/>
- Phoenix, Arizona’s Infill Housing Program provides incentives to encourage single-family housing on vacant and underutilized land and offers high density development standards: <http://www.ci.phoenix.az.us/BUSINESS/infilpgm.html>
- Portland, Oregon’s Infill Design website provides design strategies for integrating infill development into medium-density neighborhoods: <http://www.portlandonline.com/bps/index.cfm?c=34024>
- Portland, Oregon’s Ecoroof Floor Area Ratio (FAR) Bonus allows developers to increase a building’s footprint or floor area by adding an ecoroof: <http://www.portlandonline.com/bes/index.cfm?a=236916&c=48725>
- The Georgia Quality Growth Partnership’s Infill Development Program outlines a comprehensive infill strategy that includes incentives, improvements to public facilities, streamlined regulations, and guidelines for the design, density, and location of infill projects: <http://www.georgiaqualitygrowth.com/ToolDetail.asp?GetTool=32>
- Santa Cruz, California’s Accessory Dwelling Unit Development Program encourages well-designed rental housing in the developed core of the City while being careful to discourage poorly-constructed illegal residential additions: <http://www.ci.santa-cruz.ca.us/pl/hcd/ADU/adu.html>
- Clark County, Washington’s Infill Development Incentives include a waiver of all stormwater requirements for infill projects that create less than 5,000 square feet of new impervious surface: <http://www.clark.wa.gov/commdev/documents/devservices/handouts/46-infill.pdf>
- San Diego, California offers expedited permitting for eligible affordable/infill housing projects: <http://www.sandiego.gov/development-services/industry/pdf/infobulletin/ib538.pdf>

3 DESIGN COMPLETE, SMART STREETS THAT REDUCE OVERALL IMPERVIOUSNESS

3.A STREET DESIGN

3.A.1 QUESTION: Do local street design standards and engineering practices encourage streets to be no wider than necessary to move traffic effectively?

Do street designs vary according to:

- **street type** (arterial streets, collector streets, neighborhood streets) and
- **urban context** (urban core, transit station area, suburban center, general suburban, rural)?

Do policies allow narrow neighborhood streets designed to slow traffic and create safer conditions for pedestrians and bicyclists?

GOAL: Appropriate street widths allow narrower lanes for certain street types, thereby reducing overall imperviousness.

WHY: The width of travel lanes, parking lanes and sidewalks should be tailored to the urban setting. Where appropriate, narrowing travel lane width to 10-11 feet, rather than the standard 12-13 feet, can significantly reduce the total amount of impervious surfaces. Such streets can also substantially improve conditions for walking, biking, and using transit, which reduces automobile use and overall demand for parking spaces.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Comprehensive plan/transportation plan emphasizes alternative modes of transportation (walking, biking, and transit) to reduce vehicle miles traveled and width and prominence of roads/streets.	1	1	
Comprehensive/transportation plan calls for distributing traffic across several parallel streets, reducing the need for high capacity streets with wide rights-of-way.	1	1	
Comprehensive/transportation planning process brings emergency response and other local government departments (e.g., public works, utilities) to the table early in the process to discuss street design.	1	1	
Adopt formal bicycle/pedestrian master plan.	1	1	
Create "safe routes to school" programs or other pedestrian/bike safety initiatives.	1	1	
Make consistent improvements to walking/biking conditions or develop a formal bicycle/pedestrian master plan.	1	1	
REMOVE BARRIERS:			
Comprehensive plan endorses context-sensitive street design with narrower streets in appropriate locations.	1	1	
Improve pedestrian crossing at intersections to encourage walking.	1	1	
Consolidate utilities in street right-of-way to improve sidewalk design and function.	1		

8

PAGE TOTAL

◀ CARRY THIS SUBTOTAL TO NEXT PAGE

=

8

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
Negotiate with state department of transportation or county transportation department to allow different design standards for regional roads passing through downtowns or other key areas.	1		
Promote street standards for fire safety that include attributes of narrow streets (20 feet widths) while identifying factors relevant to local government departments involved with streets such as public works, engineering, and utilities.	2	2	
Take formal control of state or county roads within city boundaries to ensure power over design and operations.	2	2	
ADOPT INCENTIVES:			
Developments that provide comprehensive pedestrian/bicycle circulation systems allowed reducing number of vehicle parking spaces. (See parking section below for greater detail.)	1		
Developments with approved comprehensive mobility/transportation plans allowed building narrower, less costly streets and alleys.	1		
ENACT REGULATIONS:			
Revamp local government technical street specifications to allow context-sensitive, innovative street design with narrower travel lanes, without curb and gutter, etc., in appropriate circumstances (See Institute of Transportation Engineers Recommended Practice document below).	2	2	
Emergency response professionals and other local government departments involved with streets (e.g. public works, engineering, utilities) have endorsed or adopted design standards for narrower neighborhood streets.	1		
Development review process involves emergency response early on to reach consensus on appropriate project street design and access.	1	1	
Development review process requires submittal of project pedestrian/bicycle circulation plans with safe street routes and other pedestrian/bicycle-friendly features in addition to traffic circulation plans for larger developments.	1		
Apply formal connectivity index ⁷ or other measures to ensure adequate internal street and pedestrian/bicycle connections.	2	2	
Zoning/subdivision regulations require minimum number of connections between new project and surrounding developments and neighborhoods.	2	2	
		11 PAGE TOTAL	SUBTOTAL FROM PREVIOUS PAGE ▼ CARRY THIS SUBTOTAL TO NEXT PAGE + 8 = 19

⁷ Connectivity index refers to the directness of links and the density of connections in path or road network. A well-connected road or path network has many short links, numerous intersections, and minimal dead-ends (cul-de-sacs). As connectivity increases, travel distances decrease and route options increase, allowing more direct travel between destinations, and creating a more *Accessible* and *Resilient* system. Source: Online Travel Demand Management Encyclopedia, <http://www.vtpi.org/tdm/tdm116.htm>

3.A.2	QUESTION: Are shared driveways, reduced driveway widths, two-track driveways, and rear garages and alleys encouraged for all single-family developments?		
	GOAL: Encourage alternative forms and decreased dimensions of residential driveways and parking areas.		
	WHY: Off-street parking and driveways contribute significantly to the impervious areas on a residential lot. Reducing such dimensions can minimize the amount of stormwater runoff from a site.		
REMOVE BARRIERS:			
Allow developments that utilize shared driveways and rear-loaded garages to permit overnight parking in driveways and on-street.	1	1	
Development code prohibits homeowner covenants forbidding overnight parking in driveways, on-street overnight parking, and shared driveways.	1	1	
ADOPT INCENTIVES:			
Allow developments with narrow driveways and rear-loaded garages to reduce number of parking spaces for guests.	1		
Zoning/subdivision regulations require minimum number of connections between new project and surrounding developments and neighborhoods.	1	1	
ENACT REGULATIONS:			
Shared driveways are permitted or required for single-family residential developments.	1	1	
Minimum widths for single-family driveways reduced to 9 feet.	1		
Two-track driveways are allowed by technical street/subdivision specifications.	1	1	
Single-family residential developments encouraged/required to be designed with minimum percentage of alley-accessible, rear-loading garages. · Alleys/garages encouraged = 1 points · Alleys/garages required = 2 points	1 to 2	1	
		4 PAGE TOTAL	SUBTOTAL FROM PREVIOUS PAGE + 19 = 23

GREEN INFRASTRUCTURE ELEMENTS AND STREET DESIGN

QUESTION: Are major street projects required to integrate green infrastructure practices as a standard part of construction, maintenance, and improvement plans?

GOAL: Formally integrate green infrastructure into standard roadway construction and retrofit practice.

WHY: Consistent projects to improve or repair streets provide opportunities to include green infrastructure retrofits as part of larger project budget, design, and construction.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Comprehensive/transportation plans promote green infrastructure practices in street design.	1	1	
Street project cost estimates include green infrastructure designs and assess cost savings from reduced hard infrastructure.	1		
REMOVE BARRIERS:			
Technical street specifications allow/require integration of green infrastructure elements into street project construction.	1	1	
Allow street-side swales to replace conventional curb and gutter for managing stormwater and for separating sidewalks from street traffic in appropriate circumstances.	1	1	
ADOPT INCENTIVES:			
Undertake consistent effort to secure state and federal funds (e.g., transportation enhancements) to pay for green infrastructure elements.	1	1	
Streets with green infrastructure count towards stormwater requirements.	1	1	
ENACT REGULATIONS:			
Adopt green infrastructure retrofit standards for major street projects.	1		
Adopt technical specifications and design templates for green infrastructure in private and public rights-of-way.	1		
All local road projects required to allocate a minimum amount of the total project cost to green infrastructure elements.	1		
		5	
		PAGE TOTAL	
		SUBTOTAL FROM PREVIOUS PAGE ▼ CARRY THIS SUBTOTAL TO NEXT PAGE + 23 = 28	

QUESTION: Do regulations and policies promote use of pervious materials for all paving areas, including alleys, streets, sidewalks, crosswalks, driveways, and parking lots?

GOAL: Build and retrofit these surfaces with pervious materials to reduce stormwater runoff and its negative impacts.

NOTE: While eliminating sidewalks or placing sidewalks on only one side of the road can reduce impervious cover, this strategy is typically most appropriate for rural areas. However, other effective strategies can achieve the same runoff reductions that will not limit residents' options for recreation and transportation.

WHY: Streets, sidewalks, and other hard surfaces contribute a large portion to a municipality's total imperviousness. Making these impervious surfaces more permeable protects water quality, reduces flooding, and can recharge groundwater.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Sponsor/approve pilot programs to determine appropriate pervious materials for different paving areas (e.g., permeable concrete for sidewalks, permeable pavers for driveways), as well as process for installation and maintenance.	1		
Pilot project results incorporated into standard practice for all new paved areas and retrofits of existing paved surfaces.	1		
Adopt policy to replace impervious materials with pervious materials where practical.	1		
REMOVE BARRIERS:			
Technical street specifications allow pervious paving materials in appropriate circumstances (e.g., not allowed over aquifer recharge areas).	1	1	
ADOPT INCENTIVES:			
Create formal program offering incentives (e.g., cost sharing, reduction in street widths/parking requirements, assistance with maintenance) to property owners who utilize pervious pavement elements.	1		
ENACT REGULATIONS:			
Adopt requirement that some percentage of parking lots, alleys, or roads in a development utilize pervious materials.	1		
Development approvals that allow/require use of pervious materials include requirements for continuing maintenance/cleaning of pervious surfaces.	1	1	

2
PAGE TOTAL

SUBTOTAL FROM PREVIOUS PAGE

+ 28

▼ **Total score for SECTION 3: DESIGN COMPLETE, SMART STREETS THAT REDUCE OVERALL IMPERVIOUSNESS**

= 30 (TOTAL POINTS AVAILABLE: 50)

This section has been reviewed and scored by

Buck Vallar
Department name Public Works

Signee Buck Vallar

Resources

- Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities, Institute of Transportation Engineers: <http://www.ite.org/css/> (Ch. 6, pages. 65-87)
- “Neighborhood Street Design Guidelines: An Oregon Guide for Reducing Street Widths,” Oregon Department of Transportation and Department of Land Conservation and Development: <http://www.oregon.gov/LCD/docs/publications/neighborstreet.pdf>
- University of California, Davis Sustainable Transportation Center Sustainable Streets Project: <http://stc.ucdavis.edu/outreach/ssp.php>
- New York High Performance Infrastructure Guidelines: http://www.designtrust.org/pubs/05_HPIG.pdf
- Stormwater Guidelines for Green, Dense Redevelopment: Stormwater Quality Solutions for the City of Emeryville: http://www.ci.emeryville.ca.us/planning/pdf/stormwater_guidelines.pdf
- “Sustainable Green Streets and Parking Lots Design Guidebook,” San Mateo County, California Water Pollution Prevention Program: http://www.flowstobay.org/ms_sustainable_streets.php
- Green Streets: Innovative Solutions for Stormwater and Stream Crossings, Portland Metro: <http://www.oregonmetro.gov/index.cfm/go/by.web/id=26335>
- Green Highways Partnership between U.S. EPA, U.S. Federal Highway Administration and Maryland State Highway Administration: <http://www.greenhighways.org/>
- Protecting Water Quality with Smart Growth Strategies and Natural Stormwater Management in Sussex County, Delaware: http://www.epa.gov/smartgrowth/pdf/2009_0106_sussex_county.pdf
- Promoting Sustainable Transportation Through Site Design: An Institute of Transportation Engineers Proposed Recommended Practice: http://www.cite7.org/Technical_Projects/Final%20Proposed%20Recommended%20Practice%20RP-035.pdf
- Transportation is about Places, Project for Public Spaces: <http://www.pps.org/transportation/>

Case Studies

- The Road Ecology Center at the University of California, Davis conducts research and develops policies to design transportation systems that minimize the impacts of roads on landscapes and communities: <http://roadeecology.ucdavis.edu/>
- Houston, Texas’s Urban Corridor Planning changes development regulations and infrastructure standards to support transit ridership and walkability in key corridors: http://www.houstontx.gov/planning/Urban/urban_cor.html
- San Francisco, California’s Better Streets Plan created a common set of standards and guidelines for designing, building and maintaining more pedestrian friendly sidewalks, crosswalks, and roadways, including extensive greening: <http://www.sfbetterstreets.org>
- Portland, Oregon’s Green Streets Program includes design specifications for swales, planters and curb extensions, creative funding for projects that treat runoff from public rights-of-way, case studies, tours, and videos of public and private green street projects: <http://www.portlandonline.com/BES/index.cfm?c=44407>
- Seattle, Washington’s Right-of-Way Improvements Manual outlines the requirements and permitting process for right-of-way improvements, as well as provides specific design criteria and model templates for submitting street design concepts: <http://www.seattle.gov/transportation/rowmanual/>
- Florida Department of Transportation developed Model Regulations and Plan Amendments for Multimodal Transportation Districts, including regulation changes related to traffic calming, parking, sidewalks and pedestrian and bicycle facilities, and incentives for developments located in multimodal transportation districts: <http://www.dot.state.fl.us/planning/systems/sm/los/pdfs/MMTDregs.pdf>
- New York Department of Transportation’s Sustainable Streets Strategic Plan includes an initiative to retrofit underused roads into public plazas, streamlining design review for capital projects, and goals to connect tree pits for better surface drainage, among other stormwater management improvements: <http://www.nyc.gov/html/dot/html/about/stratplan.shtml>
- Chicago, Illinois’s Green Alley Program retrofits existing alleys with permeable pavement for better stormwater management, localized flood mitigation, heat reduction, material recycling, and energy conservation: http://egov.cityofchicago.org/webportal/COCWebPortal/COC_EDITORIAL/GreenAlleyHandbook.pdf

- North Carolina Department of Environment and Natural Resources offers guidance to developers on eliminating curbs and gutters, including siting and design considerations, maintenance concerns, effectiveness and cost considerations: <http://www.p2pays.org/ref/41/40403.pdf>
- New York City requires street trees for every 25 feet of street frontage of a zoning lot: http://www.nyc.gov/html/dcp/pdf/street_tree_planting/tree_adopted_cc_043008.pdf, page 8.
- Seattle Public Utilities' Natural Drainage System projects redesign residential streets to include vegetated drainage systems that use swales, wetlands, trees and other natural features to treat pollutants and minimize the speed and volume of road runoff: http://www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/Natural_Drainage_Systems/

4 ENCOURAGE EFFICIENT PARKING

4.A REDUCED PARKING REQUIREMENTS

4.A.1

QUESTION: Does your local government provide flexibility regarding alternative parking requirements (e.g., shared parking, 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?

GOAL: Match parking requirements to the level of demand and allow flexible arrangements to meet parking standards.

WHY: Inflexible parking requirements that do not allow for alternative approaches, as well as standards that require too much parking for specific uses increase the amount of impervious surface in a development. Over-parking a development also encourages greater vehicle use and detracts from the overall pedestrian environment.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
The comprehensive plan recognizes the advantages to reduced parking requirements generally and specifically for mixed-use and transit-oriented developments.	1	1	
The comprehensive plan recommends alternative, flexible approaches to meeting parking demands (e.g., shared parking, counting on-street spaces towards site parking requirements).	1	1	
Comprehensive/bicycle plans recommend provision of bicycle parking spaces/storage lockers and concomitant reduction in vehicle parking space requirements.	1		
REMOVE BARRIERS:			
Allow flexibility in meeting parking space requirements through shared parking, off-site parking, and similar approaches.	1	1	
Permit businesses with different peak demand periods to share their required parking spaces.	1	1	
ADOPT INCENTIVES:			
Permit reduction in vehicle parking spaces through the provision of a minimum number of bicycle parking spaces.	1		
Allow by-right reduction in required parking spaces (e.g., 25%) in mixed-use and transit-oriented developments and districts.	1		
Permit developers to undertake parking studies to establish that specific developments (e.g., senior housing, affordable housing) require fewer parking spaces than typical projects.	1	1	
		5	
	PAGE TOTAL	5	◀ CARRY THIS SUBTOTAL TO NEXT PAGE = 5

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
Create parking districts to finance/construct centralized parking lots/structures as shared parking facilities to reduce on-site parking.	1		
ENACT REGULATIONS:			
Revise parking regulations to reduce minimums below standard ITE (Institute of Transportation Engineers) requirements based on analysis of local developments and actual parking demand/experience.	2		
Charge developers for every space beyond parking minimums to offset environmental impacts.	1		
Enact parking standards that allow credit for adjacent on-street parking.	1	1	
Create zones with reduced parking requirements (e.g., transit overlay districts, mixed-use activity centers, multi-modal districts).	1		
Waive all parking minimums in downtown and other locations that are pedestrian-oriented and/or have good transit access.	1		
Adopt parking standards that reduce requirements based on sliding scale tied to degree of walkability/transit access locations (20% reduction in areas well served by bus, 30% reduction in areas served by rail stations).	1		
Require shared parking agreements where appropriate complementary uses exist.	1	1	
Adopt maximum parking caps (e.g., 125% above minimum) for multi-family and commercial developments.	2		
Reduce minimum parking space size based on analysis of average vehicle size in jurisdiction.	1		
	2 PAGE TOTAL		SUBTOTAL FROM PREVIOUS PAGE + 5 = 7 ▼ CARRY THIS SUBTOTAL TO NEXT PAGE

4.B TRANSPORTATION DEMAND MANAGEMENT ALTERNATIVES

4.B.1

QUESTION: Can developers use alternative measures such as transportation demand management or in-lieu payments to reduce required parking?

GOAL: Provide flexibility to reduce parking in exchange for specific actions that reduce parking demands on site.

WHY: Incentives such as transit passes, vanpool arrangements, flexible work schedules, market-priced facilities, and separate leasing for spaces in apartments and condominiums have quantifiable impacts on parking demand. Incorporating them into parking requirements creates the opportunity to meet demand with less impervious cover.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Comprehensive/transportation plans recognize transportation demand management as an approach to reducing vehicle miles traveled and parking requirements.	1		
REMOVE BARRIERS:			
Rather than include parking spaces with an apartment lease, allow tenants to opt-out by treating parking as a separate optional lease agreement.	1		
ADOPT INCENTIVES:			
Allow businesses that offer employee transit passes, provide vans for employee commuting, allow flexible working arrangements, or charge market rates for parking to 1) provide fewer parking spaces or 2) pay less into a parking district fund for required parking spaces.	2		
Allow developers to make in-lieu fee payments for parking. Fees utilized by local government/parking authority to provide off-site parking lots/structures.	1		
Provide mechanisms for car sharing in transit-oriented development. Where done, area parking requirements are reduced.	1		
ENACT REGULATIONS:			
Create a parking district and allow/require businesses to support public garages rather than provide their own on-site parking.	1		
Require large developments to adopt transportation demand management techniques to lower vehicle use and parking demand.	1		
		0	
		PAGE TOTAL	
		SUBTOTAL FROM PREVIOUS PAGE + 7 = 7	
		▼ CARRY THIS SUBTOTAL TO NEXT PAGE	

4.C MINIMIZE STORMWATER FROM PARKING LOTS

4.C.1

QUESTION: Are there requirements for landscaping designed to minimize stormwater in parking lots?

GOAL: Require substantial landscaping to help reduce runoff.

WHY: Parking lots generate a large amount of impervious cover. Requiring landscaping reduces the environmental impact of parking and can provide additional community benefits by providing shade and, if appropriately placed, creating natural barriers between pedestrians and cars.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Comprehensive plan calls for landscaping in parking lots to help reduce stormwater runoff.	1	1	
REMOVE BARRIERS:			
Allow alternative or innovative landscaping solutions that provide stormwater management functions to count towards perimeter or other landscaping requirements.	1	1	
ADOPT INCENTIVES:			
Parking lot landscaping and green roofs on parking structures credited towards meeting local stormwater management requirements.	1	1	
Give additional landscaping credit for preservation of large, mature trees within parking lots.	1		
Do not count parking structures with green roofs against the allowable floor area ratio of a site.	1	1	
ENACT REGULATIONS:			
Adopt parking lot landscape regulations that require provision of trees, minimum percent of parking lot interior area to be landscaped (e.g., 10%), and minimum sized landscaping areas (e.g., minimum of 25 square feet for island planting areas).	1		
In parking lot landscaping regulations, specify the types and sizes of shrubs and trees most appropriate for controlling/reducing stormwater runoff.	1		
Adopt standards requiring a minimum area of the parking lot to drain into landscaped areas.	1		
Require the management of runoff from parking lots through green infrastructure practices, including trees, vegetated islands, swales, rain gardens, or other approaches.	1	1	
		5 PAGE TOTAL	SUBTOTAL FROM PREVIOUS PAGE ▼ CARRY THIS SUBTOTAL TO NEXT PAGE = 12

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
Enact specific alternative landscaping and parking regulations to support infill development (parking requirements, parking lot landscaping options that focus on perimeter landscaping to encourage smaller lots, etc.).	2		
Require parking structures to incorporate green roofs to reduce stormwater runoff.	1		
Reduce drive aisle widths in parking lots to decrease the amount of pervious surface. For multi-family developments, drive aisles can be shared. In commercial developments, typical drive aisles can be reduced 5–10%.	1		

0
PAGE TOTAL

SUBTOTAL FROM PREVIOUS PAGE

+ 12

= 12

(TOTAL POINTS AVAILABLE: 41)

▼ Total score for SECTION 4: ENCOURAGE EFFICIENT PARKING

This section has been reviewed and scored by

Bruce Vallan

Department name

Public Works

Signee

Bruce Vallan

Resources

- “Parking Spaces/Community Places: Finding the Balance through Smart Growth Solutions” (pg. 14, 18-19, 21), U.S. EPA Development, Community and Environment Division: <http://www.epa.gov/piedpage/pdf/EPAParkingSpaces06.pdf>
- “Shared Parking, Second Edition,” Urban Land Institute: www.uli.org/bookstore/
- “Developing Parking Policies to Support Smart Growth in Local Jurisdictions: Best Practices,” Metropolitan Transportation Commission: http://www.mtc.ca.gov/planning/smart_growth/parking_study/April07/bestpractice_042307.pdf
- “Driving Urban Environments: Smart Growth Parking Best Practices,” Maryland Governor’s Office of Smart Growth: <http://www.smartgrowth.state.md.us/pdf/Final%20Parking%20Paper.pdf>
- “Design Principles for Parking Lots,” Tennessee Valley Authority Economic Development: <http://www.tvaed.com/sustainable/parking.htm>
- Efficient Parking Strategies, Centralina Council of Governments and Catawba Regional Council of Governments: http://www.epa.gov/region4/airqualitytoolkit/9_CaseStudies/SEQL%20-%20Efficient%20Parking%20Strategies.pdf
- “Parking Management: Strategies, Evaluation and Planning,” Victoria Transport Policy Institute: http://www.vtpi.org/park_man.pdf
- “Smart Growth Alternatives to Minimum Parking Requirements,” *Proceedings from the 2nd Urban Street Symposium*, July 28-30, 2003: http://transtoolkit.mapc.org/Parking/Referenced_pdfs/Forinash_SmartGrowthParkingAlternatives.pdf
- “Flexible Parking Standards,” Georgia Quality Growth Partnership: <http://www.dca.state.ga.us/toolkit/ToolDetail.asp?GetTool=17>
- “Multifunctional Landscaping: Putting Your Parking Lot Design Requirements to Work for Water Quality,” University of Illinois Extension: <http://urbanext.illinois.edu/lcr/LGIEN2002-0017.html>
- “Low-Impact Parking Lot Design Reduces Runoff and Pollutant Loads,” *Journal of Water Resources Planning and Management*, 2001: <http://cedb.asce.org/cgi/WWWdisplay.cgi?0101775>
- “Managing Stormwater for Urban Sustainability Using Trees and Structural Soils,” Virginia Polytechnic Institute and State University:

<http://www.cnr.vt.edu/urbanforestry/stormwater/Resources/TreesAndStructuralSoilsManual.pdf>

Case Studies

- San Mateo County, California’s “Sustainable Green Streets and Parking Lots Design Guidebook” provides policy guidance and design and construction details, including site layout strategies, green infrastructure design guidelines and case studies for both streets and parking lots: http://www.flowstobay.org/ms_sustainable_streets.php
- Minneapolis, Minnesota’s zoning code includes regulations to support pedestrian-oriented off-street parking, including parking maximums, shared parking allowances, pedestrian-overlay districts with reduced parking requirements, replacing off-street parking spaces with bicycle racks, and more: <http://www.ci.minneapolis.mn.us/Irtrezoning/tod-haiwatha-09.asp>
- Boston Metropolitan Area Planning Council gives detailed guidance for reducing parking demand and developing parking requirements based on local factors such as access to transit, expected demographics, auto ownership rates and access to destinations and transit service: <http://transtoolkit.mapc.org/Parking/Strategies/flexiblerequirements.htm>
- San Diego, California’s Community Parking District Program helps older commercial districts collect revenue and implement parking plans to construct public parking facilities, make public transit enhancements, and maximize off-street parking inventory: <http://www.sandiego.gov/economic-development/business-assistance/small-business/pmd.shtml>
- Placer County, California enacted an In-Lieu Parking Fee that allows developments within specific parking districts to pay a fee in lieu of complying with off-street parking standards. The collected fees are then used to construct new public parking spaces within the same parking district: <http://www.placer.ca.gov/Departments/Works/TahPkngStudy/DraftParkingFeeOrdinance.aspx>
- Minnesota’s Urban Small Sites Best Management Practice Manual provides drawings, design guidelines and plant lists for impervious surface reduction in parking lot design: http://km.fuo.org/uploads/media/Impervious_surface_reduction_parking_lot_desing.pdf
- The retrofit of Our Lady Gate of Heaven Parish parking lot in Chicago, Illinois included a large swale that absorbs 100,000 gallons of runoff per year, reducing flooding in the parking lot and in nearby streets and properties. This U.S. EPA-funded project continues to be monitored for

performance data: <http://www.cnt.org/natural-resources/demonstration-projects/olgh-case-study>

- The Florida Aquarium Parking Lot and Queuing Garden in Tampa, Florida maximizes existing site vegetation for stormwater management and provides education to Aquarium visitors. This website includes construction cost information, lessons learned, monitoring results and maintenance protocols: <http://www.sustainablesites.org/cases/show.php?id=16>
- Several parking lot demonstration sites in Blacksburg, VA, Ithaca, NY and Davis, CA provide details about newly constructed parking lots and retrofitted lots that include trees, structural soils and pervious pavements for managing stormwater: <http://www.cnr.vt.edu/urbanforestry/stormwater/DemonstrationSites.html>

5 ADOPT GREEN INFRASTRUCTURE STORMWATER MANAGEMENT PROVISIONS

5.A GREEN INFRASTRUCTURE PRACTICES

5.A.1 QUESTION: Are green infrastructure practices encouraged as legal and preferred for managing stormwater runoff?

GOAL: 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.

WHY: Green infrastructure approaches are more effective and cost efficient than conventional stormwater management practices in many instances, and provide other substantial community benefits.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Inform the public, through education and outreach programs, that green infrastructure practices can manage stormwater runoff on their property.	1	1	
Create a green infrastructure workshop or training program for internal and external reviewers to ensure that the stakeholders who use this tool will have the ability to understand and use it effectively.	1	1	
REMOVE BARRIERS:			
Development and other codes encourage and allow property owners to adopt home-based green infrastructure practices, such as rain gardens, rain barrels, and other rainwater harvesting practices.	1	1	
Review and change, where necessary, building codes or other local regulations to ensure that all local government departments/agencies have coordinated with one another to ensure that green infrastructure implementation is legal, e.g. remove restrictions on downspout disconnection.	1	1	
ADOPT INCENTIVES:			
Credit green infrastructure practices towards required controls for stormwater runoff.	1	1	
Establish a "Green Tape" expedited review program for applications that include green infrastructure practices.	1		
Reduce stormwater utility rates based on the use of green infrastructure practices.	1		
		5	
		PAGE TOTAL	◀ CARRY THIS SUBTOTAL TO NEXT PAGE = 5

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ENACT REGULATIONS:			
Zoning and subdivision regulations specifically permit green infrastructure facilities, including but not limited to: (1 point for each technique to a maximum of 4 points) <ul style="list-style-type: none"> • Green roofs; • Infiltration approaches, such as rain gardens, curb extensions, planter gardens, permeable and porous pavements, and other designs where the intent is to capture and manage stormwater using soils and plants; • Water harvesting devices, such as rain barrels and cisterns; and • Downspout disconnection. 	1 to 4	4	
Developers are required to meet stormwater requirements using green infrastructure practices where site conditions allow. Developers must provide documentation for sites that do not allow on-site infiltration, reuse, or evapotranspiration to meet locally determined performance stormwater management standards.	1 to 2	2	
		6 PAGE TOTAL	SUBTOTAL FROM PREVIOUS PAGE ▼ CARRY THIS SUBTOTAL TO NEXT PAGE + 5 = 11

5.A.2

QUESTION: Do stormwater management plan reviews take place early in the development review process?

GOAL: 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.

WHY: Pre-site plan review is an effective tool for discussing with developers alternative approaches for meeting stormwater requirements. This will incorporate green infrastructure techniques into new projects at early design stages, well before construction begins.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Encourage/require a pre-site plan meeting with developers to discuss stormwater management and green infrastructure approaches. · Voluntary = 1 point · Mandatory = 2 points	1 to 2	1	
Include landscape architects in design and review of stormwater management plans.	1		
ADOPT INCENTIVES:			
Provide accelerated review of projects where developer attended a pre-application meeting.	1	1	
ENACT REGULATIONS:			
Preliminary stormwater plan review occurs contemporaneously with preliminary site plan review and before any development approvals.	1	1	
Development applications must include preliminary/conceptual stormwater management plans that incorporate green infrastructure elements and describe how stormwater management standards will be met.	1	1	
	4		
	PAGE TOTAL	+	SUBTOTAL FROM PREVIOUS PAGE 11 = 15

5.A.3

QUESTION: Do local building and plumbing codes allow harvested rainwater for exterior uses, such as irrigation, and non-potable interior uses, such as toilet flushing?

GOAL: Ensure that the municipality allows and encourages stormwater reuse for non-potable uses.

WHY: Stormwater reuse is important for dense, urban areas with limited spaces for vegetated green infrastructure practices.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Local government provides information brochures/manual for homeowners describing acceptable rainwater harvesting techniques.	1	1	
REMOVE BARRIERS:			
Local development, building, and plumbing codes updated to allow reuse of stormwater for non-potable purposes.	1	1	
ADOPT INCENTIVES:			
Reduce stormwater management facility requirements for developments employing comprehensive rainwater harvesting.	1		
Reduce stormwater utility rates based on the use of harvest and reuse techniques.	1		
ENACT REGULATIONS:			
Require developments to adopt rainwater harvesting techniques as elements of stormwater management plans.	1		
		2 PAGE TOTAL	SUBTOTAL FROM PREVIOUS PAGE + 15 = 17

5.A.4

QUESTION: Are provisions available to meet stormwater requirements in other ways, such as off-site management within the same sewershed or "payment in lieu" of programs, to the extent that on-site alternatives are not technically feasible?

GOAL: Allow off-site management of runoff while still holding developers responsible for meeting stormwater management goals.

WHY: In some cases, it is impracticable or infeasible to treat all or even some of the stormwater runoff on site. In such instances, alternative means should be provided through contribution to off-site mitigation projects or off-site stormwater management facilities (preferably green infrastructure facilities).

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	
For infill and redevelopment areas, off-site green stormwater management plans should be developed in cooperation between local government and landowners/developers. Allowing off-site management of stormwater runoff requires sewershed designation within the local government to ensure that true mitigation is possible and realize the equal stormwater management and water quality benefits through off-site management.	2		
Retrofit projects that will utilize green infrastructure stormwater management techniques should be identified and prioritized within the sewershed.	1		
Amend stormwater management regulations and development codes as necessary to allow off-site stormwater management, especially for infill and redevelopment areas.	1	1	
Establish system that allows/requires payment-in-lieu fees for off-site stormwater management facilities. Fees should be set sufficiently high as to cover the true cost of off-site management. Consider limitations on amount of off-site management allowed (more for infill areas, less for greenfield sites).	1		
	1 PAGE TOTAL		SUBTOTAL FROM PREVIOUS PAGE + 17 = 18 ▼ CARRY THIS SUBTOTAL TO NEXT PAGE

5.B.1

QUESTION: Does your stormwater ordinance include monitoring, tracking, and maintenance requirements for stormwater management practices?

GOAL: Incorporate monitoring, tracking, and maintenance requirements for stormwater management practices into your municipal stormwater ordinance.

WHY: These measures will help ensure that the successful tracking and monitoring of green infrastructure practices remain in proper working condition to provide the performance required by the stormwater ordinance.

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
ADOPT PLANS/EDUCATE:			
Develop a system to monitor and track stormwater management practices deployed at greenfield and redevelopment sites. Tracking of management practices should begin during the plan review and approval process with a database or geographic information system (GIS). The database should include both public and private projects.	1		
Provide model checklist for maintenance protocols for ease of inspection, tracking, and enforcement.	1	1	
Sponsor demonstration projects for green infrastructure management best practices.	1	1	
REMOVE BARRIERS:			
Ensure that proper local agencies have authority to enforce maintenance requirements.	1	1	
ADOPT INCENTIVES:			
Create self-inspection maintenance certification program that allows developers/landowners to train/retain private inspectors to certify compliance with stormwater management plans and long-term maintenance.	1		
ENACT REGULATIONS:			
Require long-term maintenance agreements that allow for public inspections of the management practices and account for transfer of responsibility in leases and/or deed transfers.	1	1	
Conduct inspections every 3 to 5 years, prioritizing properties that pose the highest risk to water quality, inspecting at least 20% of approved facilities annually.	1	1	
Develop a plan approval and post-construction verification process to ensure compliance with stormwater standards, including enforceable procedures for bringing noncompliant projects into compliance.	1	1	
	6 PAGE TOTAL		SUBTOTAL FROM PREVIOUS PAGE + 18 = 24 ▼ CARRY THIS SUBTOTAL TO NEXT PAGE

Implementation Tools and Policies	Pts. Avail.	Pts. Rec. or N/A	Notes and Local References
Inspections of construction sites occur at for at least 25% of permitted projects to ensure proper installation of approved practices.	1	1	
Require conservation/green infrastructure bond/escrow in zoning/subdivision ordinances to ensure installation/maintenance of green infrastructure storm water management facilities.	1		
	1		
	PAGE TOTAL		<p>▼ Total score for SECTION 5: GREEN INFRASTRUCTURE STORMWATER MANAGEMENT PROVISIONS</p> <p>SUBTOTAL FROM PREVIOUS PAGE + 24 = 25 (TOTAL POINTS AVAILABLE: 39)</p>

This section has been reviewed and scored by

Buck Vallad

Department name

Public Works

Signee

[Signature]

Resources

- Green Infrastructure Municipal Handbook, U.S. EPA Green Infrastructure website: <http://cfpub.epa.gov/npdes/greeninfrastructure/munichandbook.cfm>
- *A Catalyst for Community Land Use Change*, National NEMO Network 2008 Progress Report with local regulations for water quality protection: http://nemonet.uconn.edu/about_network/publications/2008_report.htm
- Public Entity Environmental Management System Resource Center: <http://peercenter.net/>
- Environmental Management System, U.S. EPA: <http://epa.gov/ems/>
- “The Economics of Low-Impact Development: A Literature Review,” *EcoNorthwest*: http://www.econw.com/reports/ECONorthwest_Low-Impact-Development-Economics-Literature-Review.pdf
- “Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices,” U.S. EPA Office of Water: <http://www.epa.gov/owow/nps/lid/costs07/>
- New York City’s PlaNYC for Water: <http://www.nyc.gov/html/planyc2030/html/plan/water.shtml>
- Puget Sound Partnership Low Impact Development Local Regulation Assistance Project: http://www.psparchives.com/our_work/stormwater/lid/lid_regs.htm
- Massachusetts Low Impact Development Toolkit: http://www.mapc.org/regional_planning/LID/PDFs/LID%20Local%20Codes%20Checklist.pdf
- Plan Review checklist and flow chart, Office of Watersheds, Philadelphia Water Department: http://www.phillyriverinfo.org/WICLibrary/DevelopmentProcess_Final.pdf
- General Factors that Influence the Selection of Stormwater Management Facilities, Portland Bureau of Environmental Services: <http://www.portlandonline.com/shared/cfm/image.cfm?id=129055>
- Operations and Maintenance of Treatment Best Management Practices, Santa Clara Valley Urban Pollution Prevention Program: http://www.scvurppp-w2k.com/om_workproduct_links.htm
- Stormwater Center Maintenance Agreements Guidance and Case Studies: http://www.stormwatercenter.net/Manual_Builder/Maintenance_Manual/4Maintenance_Agreements/Maintenance%20Agreements%20Introduction.htm

Case Studies

- Alachua County, Florida’s stormwater regulation requires that developers reduce impervious surfaces via vertical construction and alternative parking surfaces and use site contours and minimize disturbance to existing natural features: http://growth-management.alachua.fl.us/complanning/amended_docs/ORDstormCPA-06-01final.pdf
- Philadelphia, Pennsylvania’s stormwater regulation requires that projects infiltrate/manage the first 1” of rainfall from all directly connected impervious surfaces and exempts redevelopment projects from flood control and channel protection requirements: <http://www.phillyriverinfo.org/Programs/SubprogramMuin.aspx?Id=Regulations>
- Portland, Oregon’s stormwater requirement uses a mandatory hierarchy that requires on-site infiltration with surface vegetation above all other practices <http://www.portlandonline.com/bes/index.cfm?c=35122> (Chapter 1, page 1-18)
- Emeryville, California’s stormwater guidelines for dense green redevelopment provide guidance on using green infrastructure in high density, infill sites: <http://ca-emeryville.civicplus.com/DocumentView.asp?DID=144>
- Portland, Oregon’s Ecoroof Floor Area Ratio (FAR) Bonus allows developers to increase a building’s footprint or floor area for projects that include an ecoroof: <http://www.portlandonline.com/bes/index.cfm?a=236916&c=48725>
- Chicago Department of Construction and Permits has a Green Permit Program that offers expedited permits and waived permit review fees for projects that meet a series of green building requirements, including exceptional water management and green roof criteria: http://egov.cityofchicago.org/webportal/COCWebPortal/COC_EDITORIAL/GreenPermitBrochure1.pdf
- Tucson, Arizona’s Water Harvesting Guidance Manual describes how the City’s code requirements for water harvesting help to meet several other local codes, such as for landscaping, floodplain and erosion hazard management, and stormwater management: <http://dot.tucsonaz.gov/stormwater/education/waterharvest.php> (page 26)
- San Francisco, California’s Public Utilities, Department of Building Inspection and Department of Public Health partnered to allow the use of rainwater for irrigation and toilet flushing without requiring treatment to potable standards: http://sfwater.org/mto_main.cfm/MC_ID/14/MSC_ID/361/MTO_ID/559

- Seattle, Washington's Green Factor is an amended landscape requirement that property owners meet via a scoring system that encourages green features such as large plants, permeable pavement, green roofs, vegetated walls and tree preservation: <http://www.seattle.gov/dpd/permits/greenfactor/Overview/>
- San Jose, California's stormwater regulation requires that projects with 10,000 square feet or more of impervious surface area use landscape-based treatment and trees to meet quantity and quality standards: http://www.sanjoseca.gov/planning/stormwater/Policy_6-29_Memo_Revisions.pdf
- Santa Monica, California's stormwater code requires that new development projects maximize permeable areas, maximize runoff to permeable areas, reuse stormwater, and reduce parking lot pollution: http://www.smgov.net/uploadedFiles/Departments/OSE/Categories/Urban_Runoff/UR_Brochure.pdf
- Chicago, Illinois's stormwater regulation requires that new developments manage 0.5" runoff from all impervious surfaces or reduce imperviousness by 15%: http://egov.cityofchicago.org/webportal/COCWebPortal/COC_EDITORIAL/StormwaterManagementOrdinance1206.pdf
- Lenexa, Kansas's stormwater regulation requires new developments to manage 1.37" for water quality using a natural system treatment train approach and also charges a fee for water quantity management which pays for watershed-scale public projects managed by the City: <http://www.ci.lenexa.ks.us/LenexaCode/viewXRef.asp?Index=2927>
- Fauquier County, Virginia's stormwater maintenance agreements state that if maintenance is neglected the County has the authority to perform the work and recover costs from the property owner: <http://www.fauquiercounty.gov/documents/departments/commdev/pdf/SWMOrdinance.pdf> (pages 12-13)
- Philadelphia, Pennsylvania's Stormwater Management Guidance Manual provides maintenance guidelines and schedules for a range of green infrastructure practices, from green roofs to pervious pavements and subsurface infiltration: <http://www.phillyriverinfo.org/Programs/SubprogramMain.aspx?Id=StormwaterManual>

ACKNOWLEDGMENTS

U.S. Environmental Protection Agency's Development, Community and Environment Division (EPA's Smart Growth Program) prepared this scorecard in cooperation with the Office of Wetlands, Oceans and Watersheds.

PRINCIPAL AUTHORS:

Abby Hall and Lynn Richards

CONTRIBUTORS AND REVIEWERS:

U.S. EPA Development, Community and Environment Division

- Matthew Dalbey
- Lynn Desautels
- Kevin Nelson
- Megan Susman
- John Thomas
- Clark Wilson

U.S. EPA Office of Wetlands, Oceans and Watersheds

- Rebecca Dils
- Robert Goo
- Lisa Hair
- Dov Weitman

U.S. EPA Office of Wastewater Management

- Jennifer Molloy

U.S. EPA Office of Ground Water and Drinking Water

- Sylvia Malm

U.S. EPA Regions

- Paula Estornell
- Gregory Voigt

External Reviewers

- Glen Abrams, *Philadelphia Water Department*
- Michael Beezhold, *Watershed Manager, Lenexa, Kansas*
- Michael Berkshire, *Chicago Department of Planning and Development*
- Stephen Hofstetter, *Environmental Protection Department, Alachua County, Florida*
- Jessica Cogan Millman, *Executive Director, National Association of Local Government Environmental Professionals*
- Chris Duerksen, *Clarion Associates*
- Frank Gray, *Director of Community and Economic Development, Salt Lake City, Utah*
- Greg McPherson, *USDA Forest Service*
- Lisa Nisenson, *Nisenson Consulting*
- Jeffrey Seltzer, *District of Columbia Department of Transportation*
- Nancy Stoner, *Natural Resources Defense Council Clean Water Program*



City of Shelbyville

Public Works Department

714 Industrial Parkway Shelbyville, TN 37160
Phone 931.684.2644 Fax 931.684.8993

STORMWATER DETENTION AGREEMENT

File/Permit Number: _____ Map and Parcel Number: _____

Project Name: _____

THIS AGREEMENT, is made and entered into this _____ day of _____, of the year _____, by and between others of record (hereinafter "Landowner"), and the City of Shelbyville (hereinafter "City").

WHEREAS, under the authority of Shelbyville Municipal Code section 8-804 the Director of Public Works has the authority to inspect private systems within City of Shelbyville, and to order such corrective actions to said private stormwater management systems as are necessary to maintain properly the major and minor stormwater management systems within the City; and,

WHEREAS, the City has adopted and approved certain technical guidelines relating to policy on detention of stormwater in City of Shelbyville; and,

WHEREAS, in said technical guidelines it is provided that detention facilities located in industrial, commercial, institutional, apartment developments, and rental townhouses must be maintained by the property owner, and a maintenance agreement must be executed before the development plan is approved; and,

WHEREAS, the Landowner is the owner of certain real property, more particularly described as, as recorded by deed in the land records of Bedford County in Deed Book, at page (hereinafter the "Property"); and

WHEREAS, the Landowner is proceeding to build on and develop the property; and,

WHEREAS, Site Plan/Subdivision Plan was approved, prepared by, as approved by the City and on file at the Planning and Community Development Department (hereinafter, the "Plan"), and expressly made a part hereof, provides for detention of stormwater within the confines of the Property; and,



City of Shelbyville

Public Works Department

714 Industrial Parkway Shelbyville, TN 37160
Phone 931.684.2644 Fax 931.684.8993

WHEREAS, the City and the Landowner agree that the health, safety, and general welfare of the residents of Shelbyville require that onsite stormwater detention facilities be constructed and maintained on the property; and,

WHEREAS, the City requires that onsite stormwater facilities as shown on the Plan be constructed and adequately maintained by the Landowner;

NOW, THEREFORE, in consideration of the foregoing premises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The on-site stormwater detention facilities shall be constructed by the Landowner in accordance with the plans and specifications identified in the Plan.
2. The Landowner shall maintain the stormwater detention facilities as shown on the Plan in good working order acceptable to the City.
3. The Landowner hereby grants permission to the City, its authorized agents, and employees to enter the property and to inspect the stormwater detention facilities whenever it deems necessary. Whenever possible, the City shall notify the Landowner prior to entering the property.
4. In the event the Landowner fails to maintain stormwater detention facilities as shown on the Plan in good working order acceptable to the City, the City may enter the property and take whatever steps it deems necessary to maintain said stormwater detention facilities. This provision shall not be construed to allow the City to erect any structure of a permanent nature on the land of the Landowner without first obtaining written approval of the Landowner. It is expressly understood and agreed that the City is under no obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the City.
5. In the event the City, pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner shall reimburse the City upon demand, within ten (10) days of receipt thereof for all costs incurred by the City hereunder.
6. It is the intent of this Agreement to insure the proper maintenance of onsite stormwater detention facilities by the Landowner; provided, however, that this



City of Shelbyville

Public Works Department

714 Industrial Parkway Shelbyville, TN 37160
Phone 931.684.2644 Fax 931.684.8993

party for damage alleged to result from or be caused by stormwater management.

7. The Landowner, its executors, administrators, assigns, and any other successors in interest, shall indemnify and hold the City and its agents and employees harmless for any and all damages, accidents, casualties, occurrences, or claims which might arise or be asserted against the City from the construction, presence, existence, or maintenance of the stormwater detention facilities by the Landowner or the City.

In the event a claim is asserted against the City, its agents, or employees, the City shall notify the Landowner and the Landowner shall defend at his own expense any suit based on such claim. If any judgment or claims against the City, its agents, or employees shall be allowed, the Landowner shall pay all costs and expenses in connection therewith.

8. This Agreement shall be recorded among the land records of Bedford County and shall constitute a covenant running with the land, and shall be binding on the Landowner, its administrators, executors, assigns, heirs, and any other successors in interest.

WITNESS the following signatures and seals:
THE CITY OF SHELBYVILLE LANDOWNER

By _____
Date _____

By _____
Date _____

ATTEST

Shelbyville Stormwater Regulations
Appendix C



City of Shelbyville Public Works Department

714 Industrial Parkway Shelbyville, TN 37160
Phone 931.684.2644 Fax 931.684.8993

Long Term Maintenance Plan (LTMP) and Agreement

For:

Project Name, Phase, and Location

City of Shelbyville
Bedford County, Tennessee

Date

Prepared by/Contact Info



City of Shelbyville

Public Works Department

714 Industrial Parkway Shelbyville, TN 37160
Phone 931.684.2644 Fax 931.684.8993

Site Information

1) Project Information

Project Name: _____

Section/Phase: _____

Location: _____

Tax Map/Parcel# _____

2) Owners Contact Information Responsible for Maintenance

Name: _____

Phone Number: _____

Address: _____

Name: _____

Phone Number: _____

Address: _____

*Annual Inspection reports are to be submitted by the owner to the City of Shelbyville Public Works Engineering Dept. no later than July 1st of each year.

3) Stormwater System Features Located Onsite (check features)

☐ Urban Floretention/Rain Gardens

☐ Infiltration Trenches

☐ Dry Ponds

☐ Water Quality Swales

☐ Grass Swales

☐ Wet Ponds

☐ Oil Grit Separator/Water Quality Unit

☐ Riparian Buffers

☐ Wetland

☐ Permeable Pavers/Concrete

☐ Green Roof

☐ Storm Sewer



City of Shelbyville

Public Works Department

714 Industrial Parkway Shelbyville, TN 37160
Phone 931.684.2644 Fax 931.684.8993

- 4) Check that all the following documents have been attached and included with this submittal form.

___ Location Map

___ Stormwater Features Location Sheet (Description and locations of stormwater systems to be inspected; include detailed exhibits of the BMP's and a site map showing the location of all BMP's and stream buffers)

___ Oil Grit Separator/Water Quality Unit 2 year maintenance agreement

___ BMP inspection and maintenance form for each MBP located on site

- 5) As-builts

Upon Completion of the site construction, as -built drawings of the stormwater controls will be provided to the City of Shelbyville Public Works Department for verification.

- 6) Maintenance Agreement

A copy of the Inspection and Maintenance Agreement of Private Stormwater Management Facilities that has been completed, notarized and recorded with the City of Shelbyville, Tennessee will be kept with the document.

- 7) Access

As agreed to with the Inspection and Maintenance Agreement, the owner shall grant to the City of Shelbyville or its agent or contractor the right of entry at reasonable times and in a reasonable manner for the purpose of inspecting, operation, installing, constructing, reconstructing, maintain or repairing the facility.

- 8) Waste disposal

Trash and debris collected from the stormwater sewer system shall be properly disposed with a licensed sanitation company. All sediment and debris shall be disposed at a licensed landfill in accordance with all local, state, and federal laws. If any sediment is believed to be contaminate, the Tennessee Department of Environment and Conservation (TDEC)-Division of Water Pollution Control should be contacted at 931-380-3371.

- 9) Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed _____ Printed: _____



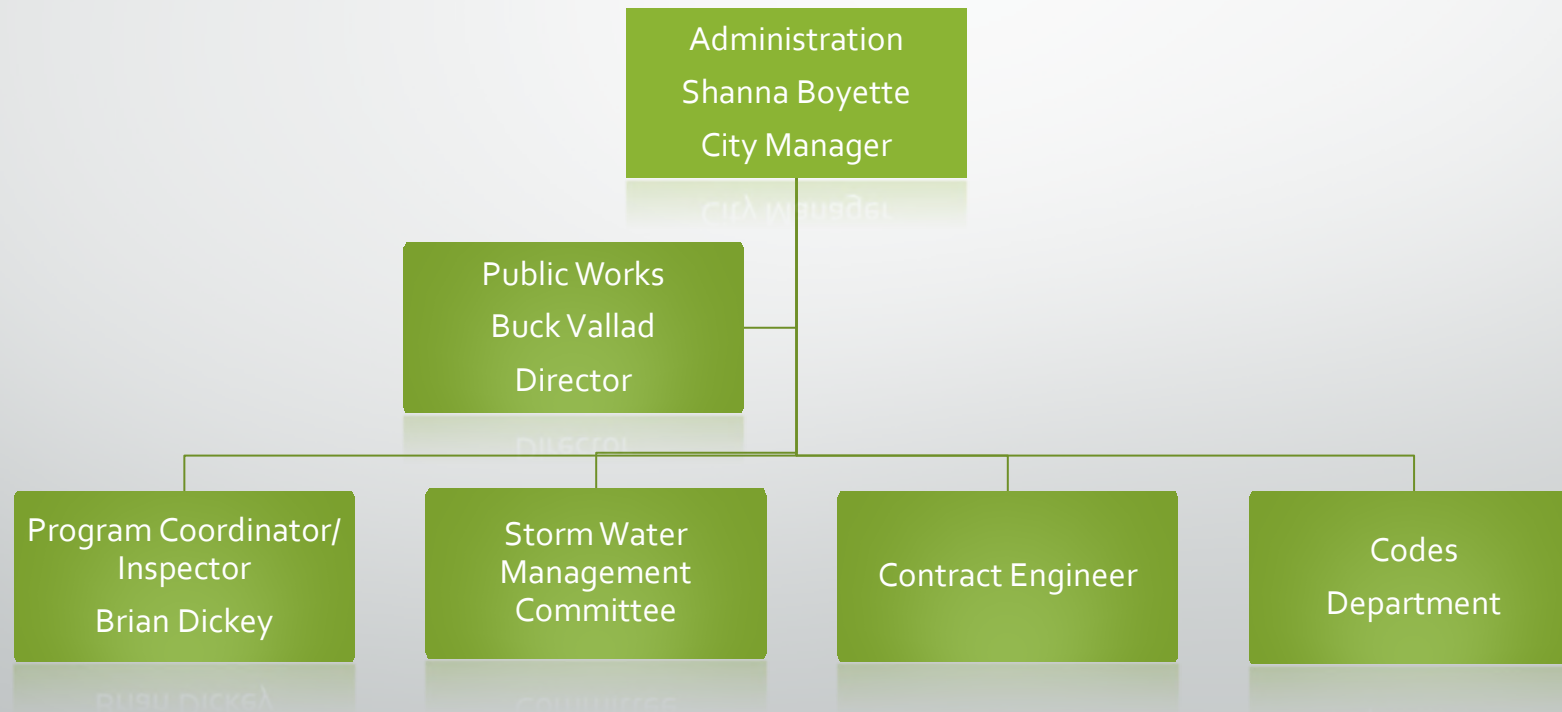
City of Shelbyville

Public Works Department

714 Industrial Parkway Shelbyville, TN 37160
Phone 931.684.2644 Fax 931.684.8993

Date _____

City of Shelbyville Storm Water Management Organizational Structure



110-43500-230
E2P

Invoice

Invoice #MMBR_Shelbyville

June 1, 2019



City of Shelbyville
201 N. Spring St.
Shelbyville, TN 37162

MEMBERSHIP DUES:	\$300
SOCIAL MEDIA CAMPAIGN (optional):	\$400
TOTAL PAID:	\$ <u>300</u>

DUE: AUGUST 31, 2019

And remit payment to the Tennessee Stormwater Association or visit
www.tnstormwater.org to pay online with credit card.

TNSA
P.O. Box 6550
Maryville, TN 37802

Thank you for your support and participation.

Charlene DeSha
charlene@tnstormwater.org
865-386-6917

June 1, 2019

City of Shelbyville
201 N. Spring St.
Shelbyville, TN 37162



Thank you for your interest in and support of the Tennessee Stormwater Association (TNSA). Our mission is to provide opportunities for stormwater professionals in Tennessee to network and to exchange information and services in order to achieve permit compliance and to protect water quality.

Please consider an annual membership with TNSA. The membership dues for a small MS4 are \$300.00 for the 2019-2020 fiscal year (July 1, 2019 – June 30, 2020).

Thank you very much for your support and consideration.

Charlene DeSha

Executive Director
Tennessee Stormwater Association
charlene@tnstormwater.org
865-386-6917

RESOLUTION NO. 19-18

A RESOLUTION OF THE MAYOR AND CITY COUNCIL OF SHELBYVILLE, TENNESSEE AMENDING STORM WATER GRADING PERMIT FEES

WHEREAS, the City of Shelbyville has an established Storm Water Grading Permit fee for the City of Shelbyville; and

WHEREAS, the established fee for both residential and commercial Storm Water Grading Permits is currently \$100.00; and

WHEREAS, a recent study of Storm Water Grading Permit fees was conducted by City Staff that included surrounding jurisdiction permit fees and structures; and

WHEREAS, the City of Shelbyville desires that Storm Water Grading Permit fees be distinguished between residential and commercial; and

WHEREAS, the City of Shelbyville further wishes to establish a fee structure based on disturbed acres for fee assessment.

NOW THEREFORE BE IT RESOLVED BY THE MAYOR AND CITY COUNCIL AS FOLLOWS

1. That the following fee scheduled be adopted:

Less than one acre residential-\$100 (required if moving more than 100 cubic yards of material)

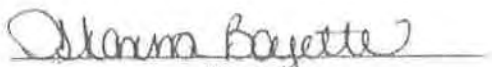
Less than one acre commercial-\$100 (required if moving more than 100 cubic yards of material)

- 1-4.99 acres residential-\$150.00
 - 1-4.99 acres commercial-\$350.00
 - 5-14.99 acres residential-\$250.00
 - 5-14.99 acres commercial-\$500.00
 - 15-30 acres residential-\$750.00
 - 15-30 acres commercial-\$1500.00
2. That any Ordinance, Resolution, or part of an Ordinance or Resolution in conflict herewith be repealed;
 3. That said Resolution becomes effective immediately upon passage by the Shelbyville City Council.

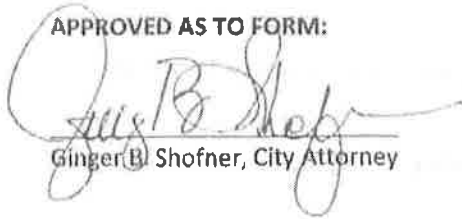
APPROVED:


Wallace Cartwright, Mayor

ATTEST:


Pro-Tempore City Recorder Shanna Boyette

APPROVED AS TO FORM:



Ginger B. Shofner, City Attorney

**City of Shelbyville
Phase II MS4 Permit TNS075531**

Standard Operating Procedures

**Pollution Prevention/Good
Housekeeping for
Municipal Operations**



May 2014

OBJECTIVES OF THE STANDARD OPERATING PROCEDURES

The specific objective of this standard operating procedure (SOP) is:

- Provide a commonly-accepted set of technical standards and guidance on storm water management measures that will control the quantity and quality of storm water produced by municipal activities;
- Assist the City of Shelbyville (City) in meeting storm water Phase II municipal separate storm sewer system (MS4) permit (permit) requirements;
- Encourage the use of targeted best management practices (BMPs) within the City's permitted limits with the long-term goal of consistent application by all entities covered under the City's permit;
- Encourage cost-savings for the City through proper and timely maintenance of storm water systems; and
- Promote behavior that will improve water quality in the City.

City Phase II MS4 Permit Requirements for Pollution Prevention/Good Housekeeping for Municipal Operations

The MS4 must develop and implement an operation and maintenance program that has the ultimate goal of preventing or reducing pollutant runoff from municipal operations.

The program must include employee training to prevent and reduce storm water pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance.

The MS4 must consider the following in developing the program: maintenance activities, maintenance schedules, and long-term inspection procedures for structural and non-structural stormwater controls to reduce floatable and other pollutants discharged from the MS4's separate storm sewers; controls for reducing or eliminating the discharge of pollutants from streets, roads, highways, municipal parking lots, maintenance and storage yards, fleet or maintenance shops with outdoor storage areas, salt/sand storage locations and snow disposal areas operated by the MS4, and waste transfer stations; procedures for properly disposing of waste removed from the separate storm sewers and areas listed above (such as dredge spoil, accumulated sediments, floatable, and other debris); and ways to ensure that new flood management projects assess the impacts on water quality and examine existing projects for Small MS4 General NPDES Permit incorporating additional water quality protection devices or practices. Operation and maintenance must be an integral component of all Storm Water Management Programs.

This SOP also addresses development of procedures for properly disposing of waste removed from the separate storm sewer system, which is a suggested component of the Pollution Prevention/Good Housekeeping minimum control measure. The TDEC General Permit does not specify what the procedures should include. Therefore, the

City has developed its own program according to the City's needs and available resources.

The City's municipal operations generally consist of:

- Waste transfer station (no exposure to precipitation);
- Burn facility;
- Public Works;
- Road maintenance;
- Street sweeping;
- Utility easement maintenance;
- Animal control;
- Waste transfer station;
- Fire Halls; and
- Parks and recreation center.

These facilities are currently inspected on an annual or as needed basis. Inspection reports are maintained at the Public Works facility.

Standard Operating Procedures

Catch Basin Cleaning

Standard Operating Procedure	
Catch Basin Cleaning	
Purpose of SOP	To protect storm water runoff by maintaining ability of catch basins to trap sediments, organic matter, and litter. This reduces clogging in the storm drain system as well as the transport of sediments and pollutants into receiving streams.

Always:

- Inspect catch basins for structural integrity and evidence of illicit discharges during cleaning;
- Conduct a chemical analysis if sediment is suspected of contamination to determine if the recovered materials meet criteria for hazardous waste; and
- Dispose of catch basin residues properly.

Whenever Possible:

- Inspect each catch basin at least annually, during catch basin cleaning;
- Create a checklist for catch basins to help classify which catch basins require maintenance and how often;
- Perform street sweeping on an appropriate schedule to reduce the amount of sediment, debris and organic matter entering the catch basins, which in turn, reduces the frequency with which they will need to be cleaned; and
- Discharge fluids collected during catch basin cleaning to the sanitary system.

Catch Basin Repair

Standard Operating Procedure	
Catch Basin Repair	
Purpose of SOP	To protect storm water runoff by inspecting, testing, and replacing or repairing equipment on a regular basis to prevent failure of storm water structures.

Always:

- Practice preventive maintenance and inspect on a regular schedule for cracks, leaks, and other conditions that could cause breakdowns in the system (this can be done during the cleaning process);
- Repair defective equipment or structures identified during an inspection as soon as possible;
- Document inspections and repairs and maintain complete records in a record-keeping system; and
- Educate personnel on preventive maintenance inspections.

Whenever Possible:

Research and implement new technology that will improve the overall performance of the catch basin.

Never:

Never allow defective equipment or structures to go unrepaired.

Outfall Repair

Standard Operating Procedure	
Outfall Repair	
Purpose of SOP	To protect storm water runoff by inspecting, testing, and replacing or repairing outfalls on a regular basis to prevent failure of the structures.

Always:

- Locate all City owned and maintained outfalls and create an inspection schedule for the outfalls;
- Add new City outfalls when construction is finished to the inspection schedule;
- Practice preventive maintenance and inspect each outfall at least one time per year for cracks, leaks, and other conditions that could cause breakdowns in the system;
- Repair defective structures or equipment identified during an inspection as soon as possible;
- Document inspections and repairs and maintain complete records in a record-keeping system; and
- Educate City personnel on preventive maintenance inspections.

Whenever Possible:

Research and implement new technology that will improve overall performance of the outfall.

Never:

Never allow defective equipment or structures to go unrepaired.

Storm Sewer System Repair

Standard Operating Procedure	
Storm Sewer System Repair	
Purpose of SOP	To protect storm water runoff by inspecting, testing, and replacing or repairing system on a regular basis to prevent failure of the storm sewer system.

Always:

- Create an inspection and cleaning schedule for the storm sewer system, including storm water detention ponds, energy dissipaters, and associated structures;
- Practice preventive maintenance and inspect system at least one time per year for cracks, leaks, and other conditions that could cause breakdowns in the system;
- Repair defective structures or equipment identified during an inspection as soon as possible;
- Dispose of collected materials (debris/floatables, etc.) according to state, regional and local regulations to avoid negative environmental impacts;
- Document inspections, cleanings and repairs and maintain complete records in a record- keeping system; and
- Use appropriate erosion and sediment control practices when performing repairs.

Whenever Possible:

- Research and implement new technology that will improve the overall performance of the storm sewer system; and
- Perform street sweeping on a regular basis to reduce the amount of sediment, debris and organic matter entering the storm sewer system, which in turn reduces the frequency with which the system will need to be cleaned.

Never:

Never allow defective equipment or structures to go unrepaired.

Erosion and Sediment Control

City Projects

Standard Operating Procedure		
Erosion and Sediment Control		
Purpose of SOP	To protect storm water runoff from City projects causing pollution by reducing or eliminating pollutant loading from land disturbing activities.	

Always:

- Use erosion control techniques or devices to stabilize disturbed areas.
- Use effective site planning to avoid sensitive areas.
- Keep land disturbance to a minimum.
- Inspect and maintain erosion control devices.
- Install erosion control devices properly.
- Install erosion control blankets when seeding drainage ways.

Whenever Possible:

- Protect disturbed areas from storm water runoff by using stabilizers such as mulch.
- Limit construction activities during months with higher runoff rates.
- Assign responsibility for maintaining erosion control devices.
- Reduce the velocity of storm water runoff.
- Divert clean water away from the disturbed area during construction activities.
- Protect vegetative buffers or create new ones.
- Stabilize soils by mulching and/or seeding when soils are exposed for more than one week during the dry season, and two days during the rainy season.

Never:

Never divert runoff into a sensitive area or impaired stream.

Standard Operating Procedure		
Landscape Design and Management		
Purpose of SOP	To protect storm water runoff by designing and managing landscaping in ways that minimizes storm water pollution.	

Always:

Design landscaping by taking into account soil types, light, drainage, desired maintenance level, and budget.

Whenever Possible:

- Minimize erosion prone slopes by using techniques such as terracing.
- Use native plants that are pest resistant.
- Plant the right plant in the right area.
- Manage storm water runoff by rerouting gutters away from storm drains and maintaining groundcovers between developed areas and waterways (ditches, swales, shorelines).
- Reduce or eliminate mowing the lawn in unused areas.
- Convert unused turf to meadow or forest.
- Establish set back distances from pavement, storm drains, and streams. Allow these areas to serve as buffers with disease-resistant plants and minimal mowing.

Never:

Never develop a landscape design without assessing its impact on storm water quality.

Standard Operating Procedure		
Fertilizer and Pesticide Storage and Disposal		
Purpose of SOP	To protect storm water runoff by properly storing and disposing of fertilizers and pesticides. Because the storm drain water system is not part of a wastewater treatment system, discharge of these chemicals flows untreated into ponds, lakes, rivers, and streams.	

Always:

- Store fertilizers and pesticides in high, dry locations, according to manufacturer's specifications and applicable regulations.
- Clean up spills and leaks of pesticides and fertilizers to prevent the chemicals from reaching the storm drain system.
- Clearly label secondary containers.
- Properly dispose of fertilizers and pesticides according to manufacturer's specifications and applicable regulations.
- Regularly inspect fertilizer and pesticide storage areas for leaks or spills.

Whenever Possible:

- Store pesticides in enclosed areas or in covered impervious containment, preferably in a locked cabinet.
- Order fertilizers and pesticides for delivery as close to time of use as possible to reduce amount stored at facility.
- Order only the amount needed to minimize excess or obsolete materials requiring storage and disposal.
- Use ALL herbicides or pesticides appropriately to minimize the amount of chemicals requiring disposal.
- Dispose of old, unusable or "obsolete" pesticides as in accordance with applicable regulations.

Never:

- Never dispose of fertilizers or pesticides in storm drains.
- Never leave unlabeled or unstable chemicals in uncontrolled locations.

**Applying Fertilizer
City Projects**

Standard Operating Procedure		
Applying Fertilizer		
Purpose of SOP	To protect storm water runoff by properly storing, applying, and disposing of fertilizers and maintaining vegetative health to reduce diseases.	

Always:

- Apply fertilizers based soil type, turf function, and assessment by qualified personnel.
- Store, use, and dispose of all fertilizers and contaminated wastes according to manufacturer's specifications and applicable regulations.
- Choose seed based on soil types, intended use of area, latest variety research, and assessment of past site performance.

Whenever Possible:

- Avoid fertilizing during a drought or when the soil is dry.
- Apply fertilizers during periods of maximum plant uptake (usually fall and spring).
- Avoid combined products such as weed and feed, which do not necessarily target specific problems at the appropriate time.
- Calibrate application equipment to ensure proper application.
- If phosphorus fertilizer is used when re-seeding, mix phosphorus into root-zone.
- Use natural compost and organic fertilizers instead of synthetic fertilizers.
- Aerate grassed areas to improve drainage and bring more oxygen to the soil.

Never:

- Never fertilize before a heavy rainfall.
- Never apply phosphorus fertilizer on soil surface.
- Never deposit fertilizer in water, on street or into storm drains.
- Never apply fertilizer to frozen ground.

Standard Operating Procedure	
Weed and Pest Control	
Purpose of SOP	To protect storm water runoff by properly storing, applying, and disposing of herbicides and pesticides.

Always:

- Ensure that pesticides are only applied by personnel certified to do so.
- Use, store, and dispose of all chemicals and waste products according to manufacturer's specifications and local requirements.
- Clean up any spilled chemicals.
- Store pesticide and herbicide-contaminated waste materials in a labeled, designated, covered, and contained area.
- Use pesticides and herbicides only when necessary.
- Rinse equipment only when necessary and use rinse water to dilute next mix as long as application rates are not exceeded.

Whenever Possible:

- Use alternative methods to control weeds and pests such as Integrated Pest Management strategies, bio-rational insecticides (natural soaps and oils) or biological controls.
- Mix/load pesticides in an area where spills can be contained.
- Pull weeds by hand or mechanically.
- Spot treat affected areas only instead of entire location.
- Apply pest control at the life stage when the pest is most vulnerable.
- Choose the least toxic pesticides and herbicides that still achieve results.
- Tolerate low levels of weeds.
- Allow grass to grow 2.5 to 3 inches high, reduce thatch build up and aerate soils.
- Reduce seed release of weeds by timing cutting at seed set.
- Establish setback distances from pavement, storm drains, and streams; allow these areas to serve as buffers with disease-resistant plants and minimal mowing.

Never:

- Never mix or prepare pesticides or herbicides near storm drains.

- Never apply controlled pesticides or herbicides unless certified to do so.
- Never apply herbicides or pesticides before a heavy rainfall.
- Never discharge rinse water or excess chemicals to storm drain, sewer, or ground surface in excess of labeled rates.

Mowing and Watering City Property

Standard Operating Procedure	
Mowing and Watering	
Purpose of SOP	To protect storm water runoff by using proper mowing and watering techniques. Proper mowing and watering techniques will reduce organic matter and other pollutants from entering the storm drain system and streams.

Always:

- Mow only as low as needed for the area's intended use.
- Vary mowing pattern.
- Base watering amounts on monitoring for moisture content.
- Water at appropriate times (when no rain is forecasted).
- Manage leaves, clippings, and compost so that runoff does not enter storm drain system or streams.

Whenever Possible:

- Allow appropriate areas to go to meadow or field and mow once or twice per year rather than every week.
- Keep mower blades sharpened to avoid damaging grass leaf tissue.
- Mow when the grass is dry to prevent spread of turf diseases.
- Sweep lawn clippings and debris instead of using water.
- Mulch grass clippings using a mulching mower.
- Fill gas tanks in a controlled location.

Never:

- Mow an area just because it always has been mowed.
- Water based on schedules instead of monitoring for moisture content.
- Never dump gas, wastes or contaminated water down storm drains.
- Never refuel or change the mower oil near storm drains.
- Leave mower running in one location.

**Vehicle and Equipment Storage
 City Vehicles**

Standard Operating Procedure

Vehicle and Equipment Storage	
Purpose of SOP	To protect storm water runoff from petroleum products that may drip or leak from vehicles and equipment being stored or from dirt and sediment that accumulate in storage areas.

Always:

- Inspect parking areas for staining/leaks on a regular schedule established by appropriate personnel.
- Use drip pans for vehicles that drip a lot (provide labeled location to empty and store drip pans).
- Address a known leak or drip as soon as possible.

Whenever Possible:

- Store vehicles inside.
- Store vehicles on paved areas if you can street sweep regularly to remove drips/leaks/dirt.
- Perform street sweeping of paved areas on a schedule established by appropriate personnel, and dispose of street sweepings properly.
- Maintain vehicles to prevent leaks from occurring.
- Perform a pre-trip inspection of vehicle.

Never:

Never store leaking vehicles over a storm drain.

**Vehicle and Equipment Washing
City Vehicles**

Standard Operating Procedure	
-------------------------------------	--

Vehicle and Equipment Washing	
Purpose of SOP	To protect storm water using proper vehicle and equipment washing techniques, proper washing locations, and proper disposal of wash water.

Always:

- Wash vehicles and equipment in a designated area.
- Discharge all wash water containing degreasers, acids, bases, and/or metal brighteners to an on-site treatment facility, sanitary sewer in accordance with the treatment plant standards, or an approved holding tank. If these are not available, discharge to a vegetated buffer.

Whenever Possible:

- Use a biodegradable, phosphate free soap.
- Use a commercial car wash for light duty vehicles.
- Wash cars on gravel, grass, or other permeable surfaces.
- Educate personnel on proper washing practices.
- Maintain vehicles and equipment to prevent leaks/drips, which would more easily enter wash water.
- Obtain and use drain guards (filter inserts) to catch sediments, petroleum products, etc. that might enter the storm drains as a result of vehicle washing.
- Minimize water and soap use when rinsing or washing vehicles.

Never:

- Never perform engine washing outside or over a storm drain.
- Never wash vehicles over a storm drain.

Vehicle and Equipment Fueling

Standard Operating Procedure

Vehicle and Equipment Fueling	
Purpose of SOP	To prevent storm water runoff contamination originating from vehicle and equipment fueling areas.

Always:

- Fuel carefully to minimize drips to the ground surface.
- Maintain clean fuel dispensing areas using dry cleanup methods.
- Utilize fueling safeguards.
- Clearly label and tag all valves to reduce human error.
- Train employees on proper fueling methods and spill cleanup techniques.
- Maintain fuel storage tanks in accordance with local, state and federal laws.
- Have absorbent spill cleanup kits and materials available at fueling areas.
- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.

Whenever Possible:

- Install a canopy or roof over above ground storage tanks and fueling operations.
- Regularly inspect fueling equipment for corrosion and structural failure, cracks in foundations, and physical damage to container systems.
- Use designated fueling areas built upon a level impervious surface (hard cement is best). If paved with asphalt, add a protective coating to create an impervious surface.
- Design fueling areas to minimize storm water exposure.
- Prevent run-on and ponding of water, and use secondary containment systems.
- Protect storm drains from fueling areas using berms and dikes.
- Use drip pans or absorbent pads during fueling to collect leaks.
- Add automatic shutoff mechanisms and vapor recovery nozzles to fueling equipment.
- Install protective guards around fueling equipment, tanks, and piping to prevent collisions.

Never:

- "Top off" fuel tanks.
- Hose down or bury a fuel spill.

**Spill Cleanup
City Properties**

Standard Operating Procedure	
Spill Cleanup	

Purpose of SOP	To protect storm water runoff by educating employees on proper spill cleanup procedures, state reporting requirements and preventative actions.
-----------------------	---

Always:

- Stop source of the spill.
- Contain any liquids.
- Contact the storm water coordinator and/or Public Works Director to report any size spill.
- Cover the spill with absorbent material such as kitty litter, sawdust, or oil absorbent pads. Do not use straw. Dispose of used absorbent material properly.
- Use water only when necessary and minimize use.
- Develop and maintain a Spill Prevention, Control, and Countermeasure (SPCC) Plan if the facility stores more than 1,320 gallons of petroleum.
- Fit petroleum and chemical storage containers with secondary containment structures.
- Keep spill kit in areas where petroleum or hazardous materials are stored.
- Train employees in spill response procedures and equipment.
- Deploy containment booms if spill could potentially reach a storm drain or stream.
- Position mats to contain drips from equipment or vehicles until they can be repaired.

Whenever Possible:

- Seal the floor with paint to prevent absorption of fluids into concrete.
- Install low-level or low-pressure alarms and/or cut-off systems on hydraulic equipment.

Never:

- Never wash a spill into the storm drain or a water body.
- Never leave a spill without cleaning it up.

**Parts Cleaning
City Operations**

Parts Cleaning	
Purpose of SOP	To protect storm water runoff by practicing proper parts cleaning techniques and disposing of waste cleaners properly.

Always:

- Perform all cleaning in a designated area to minimize the potential for spills.
- Store waste cleaners in properly labeled containers in accordance with regulations.
- Dispose of all waste cleaners properly with a licensed contractor.

Whenever Possible:

- The variety of cleaners should be minimized to make recycling and disposal simpler.
- Use citrus-based cleaners and dispose of properly.
- Use steam cleaning and pressure washing instead of solvents; however wastewater must be discharged to an oil/water separator and waste water treatment plant notified.

Never:

Never dispose of spent cleaners down the floor drains, sinks or storm drain inlets.

**Spare Parts Storage
City Operations**

Standard Operating Procedure

Spare Parts Storage	
Purpose of SOP	To protect storm water runoff by properly storing spare parts. Improper storage of materials can result in pollutants and toxic materials entering ground and surface water supplies.

Always:

- Store spare parts in a designated area.
- Use drip pans for any parts that are dripping.

Whenever Possible:

- Store spare parts inside or under cover.
- Monitor storage areas for staining/leaks on a schedule decided by the appropriate personnel.
- Clean the majority of petroleum products from the parts that are to be stored.

**Spare Parts Storage
City Operations**

Standard Operating Procedure	
------------------------------	--

Spare Parts Storage	
Purpose of SOP	To protect storm water runoff by properly storing spare parts. Improper storage of materials can result in pollutants and toxic materials entering ground and surface water supplies.

Always:

- Store spare parts in a designated area.
- Use drip pans for any parts that are dripping.

Whenever Possible:

- Store spare parts inside or under cover.
- Monitor storage areas for staining/leaks on a schedule decided by appropriate personnel.
- Clean the majority of petroleum products from the parts that are to be stored.

**Alternative Products Use/Storage/Disposal
City Operations**

Standard Operating Procedure

Alternative Products Use/Storage/Disposal	
Purpose of SOP	To protect storm water runoff by using alternative products in an effort to decrease the presence of toxic products in storm water.

Always:

Use, store, and dispose of alternative products according to manufacturer's specifications.

Whenever Possible:

- Use alternative products when deemed appropriate:
- Instead of solvent-based parts cleaners use citrus-based cleaners or steam/pressure wash to an oil/water separator.
- Instead of herbicides use bark mulch.
- Instead of fertilizer use compost or manure.
- Instead of pesticides plant marigolds, onion, or garlic as deterrents; release or attract beneficial insects.
- Train employees on benefits of using alternative products.
- Minimize waste by purchasing recyclable products that have minimal packaging.
- Use less harmful deicers such as calcium magnesium acetate, potassium acetate, or organic deicers such as Magic Salt™.
- Use a "pre-mix" of 4 to 1 sodium chloride and calcium chloride, which is the most cost- effective alternative to straight salt.
- Substitute synthetic fertilizers with natural compost and organic fertilizers to improve soil pH, texture and fertility, and cause less leaching to groundwater.
- Use no-phosphorus lawn fertilizer (phosphorus is rarely lacking in Maine soils).
- Use natural or certified organic fertilizers with low phosphorus levels (8-2-4, 6-2-4, 9-1-1, 6-1-1).
- Use slow-release nitrogen fertilizers.
- Reduce or eliminate mown lawn in areas that are not actively used.
- Consider converting unused turf to meadow or forest.

**Petroleum and Chemical Disposal
City Operations**

Petroleum and Chemical Disposal	
Purpose of SOP	To protect storm water runoff from petroleum and chemical products due to improper disposal practices.

Always:

- Dispose of petroleum/chemicals according to manufacturer's specifications and state and federal regulations.
- Maintain tracking of chemicals and petroleum products being disposed off-site.
- Store waste petroleum/chemical products in a designated area labeled as such.
- Label each waste container with its contents.
- Transport used petroleum and chemical products with a licensed transporter and maintain records for three years.
- Train employees on proper disposal practices.
- Drain used oil filters for 24-hours before disposal (disposal in regular trash allowed).
- Inspect waste storage areas for staining/leaks on a regular basis.

Whenever Possible:

- Minimize the number of solvents used to reduce the variety of waste generated and to make recycling easier.
- Use safer alternatives.

Never:

- Never place hazardous waste in solid waste dumpsters.
- Never pour liquid waste down floor drains, sinks or outdoor storm drain inlets.
- Never mix petroleum waste and chemical waste.
- Never dispose of any gasoline-contaminated waste in the regular trash. Dispose of it only as a hazardous waste.

**Petroleum and Chemical Handling
City Operations**

Standard Operating Procedure

Petroleum and Chemical Handling	
Purpose of SOP	To protect storm water runoff by properly managing petroleum products and chemicals used by the City.

Always:

- Train employees in hazardous material handling, safety, spill cleanup, and reporting on an annual basis.
- Handle petroleum products and chemicals according to manufacturer's specifications.
- Conduct oil changes indoors for equipment that fits indoors.
- Use proper protective equipment.
- Maintain Material Safety Data Sheets (MSDS) for all chemicals used.
- Make MSDS sheets available for materials that require special handling, storage and/or disposal.
- Create a sign-off sheet for employees stating that they know the location of the MSDS(s).

Whenever Possible:

- Assess hazardous material needs to minimize the amount and variety of hazardous material in storage.
- Transfer materials from one container to another indoors in a well ventilated area. Properly label containers.
- Train new employees within six months of hire.

Never:

- Never treat or dispose of hazardous materials unless licensed to do so.
- Never mix petroleum or chemicals unless directed by manufacturer's instructions.

**Petroleum and Chemical Storage
City Operations**

Standard Operating Procedure

Petroleum and Chemical Storage	
Purpose of SOP	To protect storm water runoff from pollution by properly storing petroleum products or chemicals.

Always:

- Store materials away from high traffic areas.
- Store materials according to manufacturer's specifications (e.g. in a flammable materials storage cabinet).
- Dispose of unused or waste materials properly.
- Train employees on proper storage procedures for petroleum and chemical products.
- Store materials in their original containers to maintain appropriate labeling.
- Be prepared for spills by having a spill kit nearby.
- Frequently inspect storage areas for leaks or spills.
- Conduct annual employee training to reinforce proper storage techniques for petroleum and chemical products.

Never:

Never store petroleum or chemical products near a floor drain or storm water inlet.

Standard Operating Procedure	
Garbage Storage	
Purpose of SOP	To protect storm water runoff from contamination by properly storing garbage. Garbage and leachate can be transported by storm water and enter the storm drain system and receiving streams.

Always:

- Dispose of hazardous materials according to manufacturer's specifications and applicable regulations.
- Cover rubbish bins to keep rubbish and leachate in and wind and rain out.

Whenever Possible:

- Store garbage containers beneath a covered structure or inside to prevent contact with storm water.
- Install berms, curbing or vegetation strips around storage areas to control water entering/leaving storage areas.
- Locate dumpsters on a flat, concrete surface that does not slope or drain directly into the storm drain system.
- Locate dumpsters and trash cans in convenient, easily observable areas.
- Provide properly-labeled recycling bins to reduce the amount of garbage disposed.
- Inspect garbage bins for leaks regularly, and have repairs made immediately by responsible party.
- Keep bins free of improperly discarded trash.
- Provide training to employees to prevent improper disposal of general trash.
- Minimize waste by purchasing recyclable products that have minimal packaging.
- Request/use dumpsters without drain holes.

Never:

Never place hazardous wastes in a dumpster or trash bin.

General City Facility Housekeeping

Standard Operating Procedure		
General City Facility Housekeeping		
Purpose of SOP	To protect storm water runoff by maintaining a clean, organized facility.	

Always:

- Keep a tidy facility.
- Store hazardous materials as specified by the manufacturer.

Whenever Possible:

- Store materials and wastes inside or under cover if outside.
- Substitute less or non-toxic materials for toxic ones.
- Perform a routine cleaning of the facility.
- Inspect facility (interiors, exterior, parking areas, etc.) for stains.
- Conduct regular employee training and public education to reinforce proper housekeeping.

Standard Operating Procedure		
Floor Drains		
Purpose of SOP	To protect storm water runoff from pollution caused by discharges of hazardous materials to the subsurface, ground surface, stream or storm sewer through floor drains.	

Always:

- Keep a spill kit in the vicinity of floor drains.
- Obtain and use drain mats to cover floor drains in the event of spills.
- Use floor drains that are connected to a holding tank or to the sanitary sewer via an oil/water separator.

Whenever Possible:

Minimize water use or run a dry shop.

Never:

- Never dump hazardous materials down floor drains.
- Never store leaking vehicles over floor drains.
- Never store hazardous or petroleum products in the vicinity of floor drains.
- Never use floor drains if you are unsure of their discharge location.

Standard Operating Procedure	
Road Maintenance – Sand and Salt Storage	
Purpose of SOP	To protect storm water runoff by properly storing deicing materials. Sand, salt and other deicing materials used during winter can be transported by runoff into the storm drain system and eventually into streams if not stored properly.

Always:

Cover sand/salt and salt piles that are situated on impervious surfaces if possible.

Whenever Possible:

- Contain wash water from trucks used for salting and sanding in a holding tank for disposal or discharge into sanitary sewers.
- Place salt piles in areas not subject to flooding.
- Cover sand/salt and salt piles with a tarp (polyethylene) during non-freezing spring and summer months when storage facilities are not available.
- Contain storm water runoff from areas where salt is stored by using buffers to diffuse runoff before entering streams.
- Use diversion berms to minimize run-on to storage areas.
- Cleanup “track out” after storm events.

Never:

Never dispose of wash water from sanding and salting trucks into the storm drain system, streams or septic system drain fields.

**Road Maintenance
Salt Application**

Standard Operating Procedure

Road Maintenance – Salt Application	
Purpose of SOP	To protect storm water runoff by improving application techniques of salt, sand, and other deicing materials.

Always:

Calibrate sand/salt trucks so application rate is accurate and known.

Whenever Possible:

- Use the minimum amount of salt and sand and other deicing materials needed to get the job done.
- Use coarse, clean sand, which is free of fine particles and dust and easier to clean in the spring.
- Train drivers to improve application techniques and reduce losses.
- Establish "low salt and/or sand areas" near sensitive environments. Sand may be detrimental in areas sensitive to sedimentation, such as streams, and salt can impact ground water and water supply wells.
- Remove snow manually from driveways and sidewalks.
- Limit toxic metals in specifications for deicers.
- Cleanup road grit as soon as possible.
- Use less harmful deicers such as calcium magnesium acetate, potassium acetate, or organic deicers such as Magic Salt™.
- Consider road temperatures when determining volume of salt to apply.
- Control the rate of spreading by equipping trucks with ground-speed sensors.

Street Sweeping

Standard Operating Procedure	
Street Sweeping	

Purpose of SOP	To remove sediment, debris and other pollutants from streets, parking areas, and paved surfaces through regular, properly timed sweeping schedules.
-----------------------	---

Always:

- Dispose of sweeping residual properly (reuse is unrestricted if evidence of litter and visual petroleum contamination is absent).
- Sweep in a pattern that prevents materials from being pushed into storm drains/catch basin inlets.
- Sweep all publicly accepted paved streets and parking lots at least once per year as soon as possible after snowmelt.

Whenever Possible:

- Perform additional sweeping on a seasonal schedule.
- Sweep in locations that generate debris, such as construction entrances, sand/salt loading areas, vehicle fueling areas, and sweep on an as needed basis.
- Sweep streets before a major precipitation event.
- Use dry vacuum assisted street sweepers (most effective).
- Maintain street sweeping equipment for maximum effectiveness.
- Locate storage and disposal areas and manage street sweeping waste so that wastes cannot be transported into storm drain systems, streams or wetlands.

Never:

Never store street sweeping residuals in areas where storm water could transport fines to the storm drain system or stream.

Purdy Court - Rec Center

7/16/19 – 9:00 – 11:00

We had a Public Works / Stormwater outreach event at Purdy Court for the City of Shelbyville Recreational Center. There were seven children. We talked about the importance of keeping our city clean. The children asked a lot of questions pertaining to Stormwater and our Public Works Department. I showed them several pictures of a couple of Stormwater projects that the city had been working on. I also gave them t-shirts and comic books.







P.W. PAWS RAIN-^{OF} TERROR!

STEELE
WRITER
&
BAILEY
ARTIST

Discover the Waters of Tennessee

illustrations by Peter Grosshauser

TENNESSEE
WATERSHEDS

TENNESSEE WATERS
ARE SPECIAL FOR
WILDLIFE

TENNESSEE RIVERS
THROUGH TIME

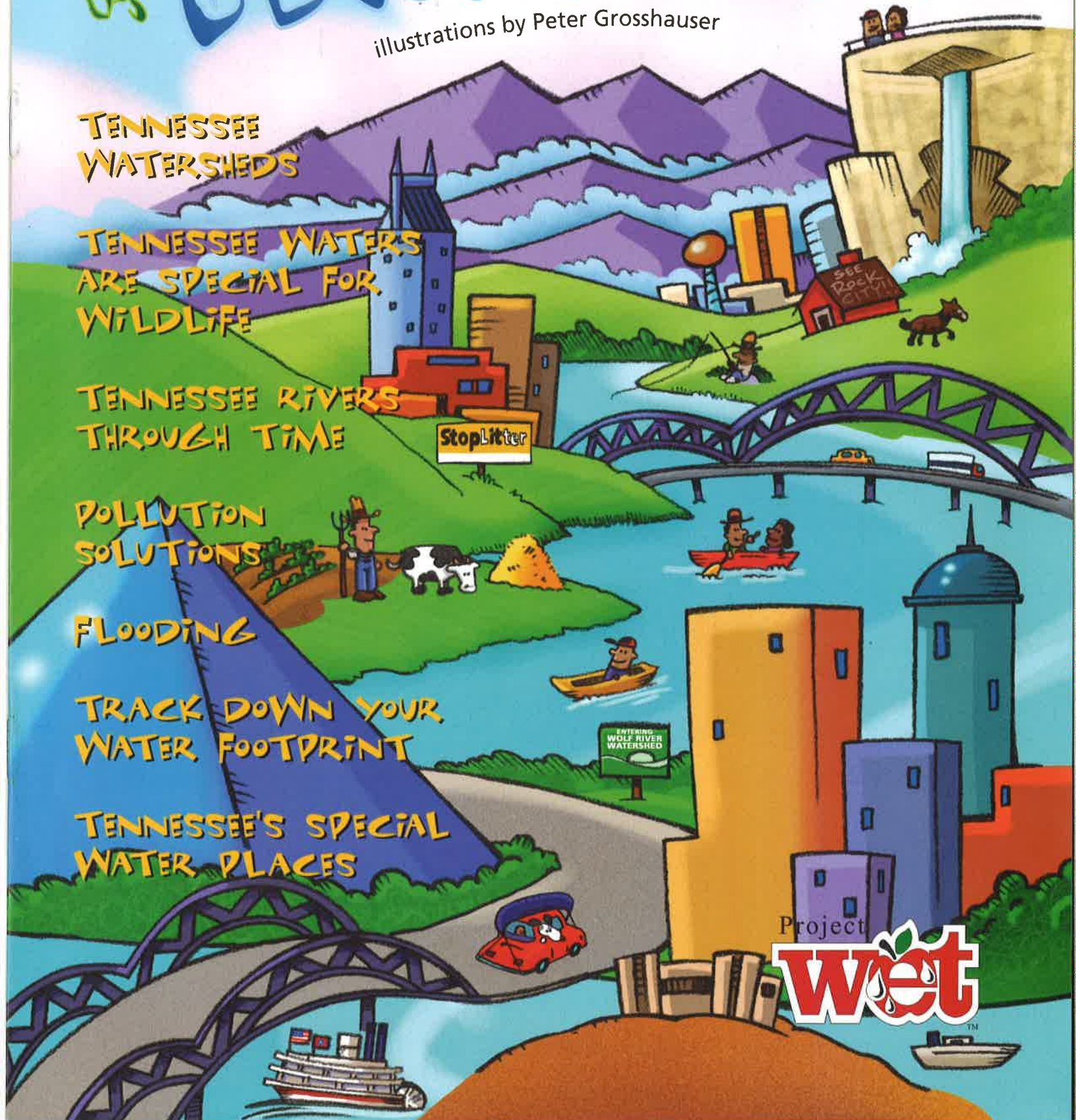
POLLUTION
SOLUTIONS

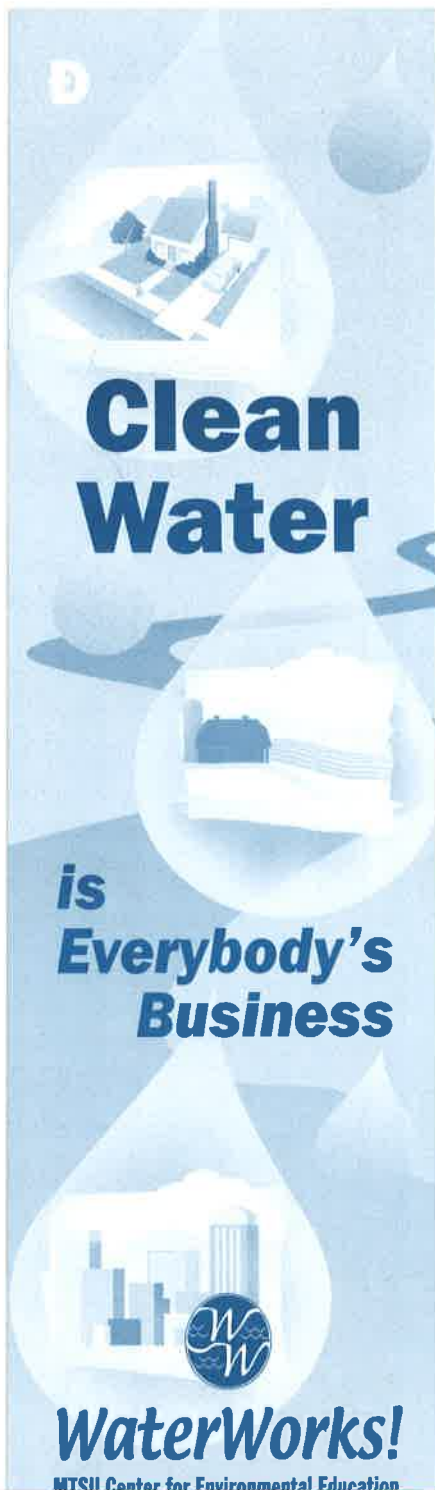
FLOODING

TRACK DOWN YOUR
WATER FOOTPRINT

TENNESSEE'S SPECIAL
WATER PLACES

Project
wet





United States Department of Agriculture

Natural Resources Conservation Service

PA-420 • September 2011

What is a Watershed?



