

**WEST VIRGINIA'S  
MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4)  
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM  
PERMIT PROGRAM**

**Cooperative Agreement Number:**

CP-973368-01

**Submitted to:**

Environmental Protection Agency Region 3  
Office of Water

**Submitted by:**

West Virginia Water Research Institute

**In collaboration with:**

Downstream Strategies, LLC  
West Virginia University Political Science Department

**Compiled by:**

Evan Hansen, Alyse Schrecongost, Susan Hunter, Richard Herd,  
Mariya Schilz, Fritz Boettner, and Dave Bassage

February 2008

## EXECUTIVE SUMMARY

Thirty communities across West Virginia operate under a general Municipal Separate Storm Sewer System (MS4) permit for small communities, which is designed to reduce the amount of sediment, bacteria, nutrients, trash, and metals in stormwater runoff. Many practices used to implement MS4 permits also provide protection from downstream flooding and stream channel erosion. This is because one of the most effective ways to reduce pollutant loadings from stormwater is to reduce the volume of stormwater flows from developed sites, thereby improving water quality while reducing fast flushes of stormwater into local streams and rivers.

This report evaluates the implementation of MS4 permits across the state. Permit file research, a survey of MS4s, interviews with West Virginia Department of Environmental Protection (WVDEP) staff, and discussions with municipal MS4 staff were all used to help identify what is working well with the program, as well as areas that merit some creative attention. Recommendations are made to municipal MS4 staff to more efficiently and effectively implement their local programs. Recommendations are also provided for WVDEP and for local community members and organizations (Section 6).

West Virginia's regulated MS4 municipalities are largely traditional communities with just three non-traditional permittees (a federal correctional institution and two state road agencies). All 30 MS4s are small and only received permits under Phase II. Some permitted municipalities are losing population. In some cases, land beyond the MS4 boundaries is being developed rapidly without restriction.

Many factors have contributed to a generally slow start of the West Virginia MS4 program: newness of the program, newness of the idea of urban stormwater quality management in some communities, flexibility of program compliance strategies, and the lack of statewide rules and guidelines on stormwater management. But momentum is building with experience.

Survey results (Section 5) indicate that many local MS4 program staff members believe their program is worthwhile, and has already or will soon produce water quality benefits for the community. Local staff are also proud of their MS4 accomplishments. This positive attitude underscores the importance of addressing the areas that local program managers have identified as obstacles to program implementation. Lack of time and funds, buy-in and support from the public and locally elected officials, and the need for a technical stormwater management guide or manual came up again and again in our survey and interviews.

These issues are addressed in our recommendations (Section 6). For example, a standard and electronic annual reporting form for all MS4s would facilitate WVDEP program staff's ability to evaluate MS4 efforts and areas where they face obstacles more efficiently. This would both clarify WVDEP's expectations for the permittees and improve its ability to offer targeted technical assistance and support to communities facing obstacles.

WVDEP could also help existing MS4 communities overcome obstacles and increase MS4 program coverage to areas facing development pressures by expanding coverage. Including fast growing counties and non-traditional facilities under the MS4 program is warranted under the guidance from the United States Environmental Protection Agency (USEPA). This would also help smaller MS4 communities work within a larger network of resources and expertise, and would reduce what is sometimes perceived to be an imbalanced burden among existing MS4s.

Communities can reduce some of their own obstacles with creative funding mechanisms (See Section 6), by collaborating on program development efforts with other MS4s, and by increasing public awareness. Increased public acceptance would ideally decrease opposition found in some communities. High profile projects like rain gardens or pervious pavers in public areas with educational signage could help. Increasing public awareness about stormwater issues through schools and public space can be a significant time and money saver for communities in the medium and long run.

As WVDEP staff draft the new MS4 general permit, they are working with USEPA to integrate innovative low impact development practices and green infrastructure planning that are more financially and environmentally sustainable for communities to implement. Promotion of such concepts is particularly important for West Virginia's MS4s in the Chesapeake Bay watershed, which are growing fast and which sit atop a vulnerable geology. Communities across the state with shrinking tax bases, and which face infrastructure renewal costs, would likely also benefit from these approaches. Communities experiencing new development have the opportunity to avoid expensive retrofits by designing sites and developments sustainably at the outset. Selected easy-to-understand reports that describe the financial and economic savings to builders and communities from adoption of pollution-prevention practices in sustainable building and land use management are described in Appendix E.

These observations and recommendations are among those on a more comprehensive list of recommendations for MS4s, WVDEP, and community members and organizations.

#### **For MS4s**

1. Use public education and outreach efforts not just to teach people about stormwater, but also to develop understanding and support for the MS4 program as a whole
2. Establish a consistent and transparent funding mechanism
3. Consider stormwater fees that include incentives for behavior change, prevention, and increased local benefits
4. Request the use of Supplemental Environmental Project funds for high profile, educational stormwater management projects
5. Find ways to link the MS4 program to other community benefits and other programs
6. Look for opportunities to align the MS4 program with the need to preserve and improve aging infrastructure
7. Consider integrating county stormwater management requirements with MS4s
8. Coordinate regulation and enforcement with other elements of the WVDEP stormwater program
9. Request that WVDEP consider permitting or co-permitting non-traditional MS4s within your jurisdiction
10. Request combined CSO and MS4 program oversight if the community is subject to both programs

#### **For WVDEP**

1. Fund promotional efforts to increase buy-in and demonstrate creative practices
2. Standardize the SWMP and annual reporting forms
3. Use non-threatening program evaluation meetings to strengthen local MS4 programs and provide targeted technical assistance
4. Send clear signals to MS4 communities that flexible programming is not synonymous with voluntary programming, and that permits can and will be enforced
5. Permit non-traditional facilities, and regulate them as co-permittees

6. Ensure more developed and developing land is covered under MS4 permits or other effective stormwater controls
7. Provide more specific technical support to communities
8. Continue and expand workshops for MS4s
9. Find a way to help MS4s collect fees within their watersheds, but outside of city limits
10. Clarify linkages between MS4 program and reduction of pollution in impaired waters
11. Develop progressive, evolving goals when permits are reissued

#### **For community members and organizations**

1. Get involved
2. Get educated
3. Know your stormwater and water quality rights
4. Help spur creative community projects
5. Support local stormwater programs with your pen

The West Virginia MS4 program is, overall, off to a positive start and permittees are struggling through many of the same start-up issues as participants in surrounding states. By capitalizing on the overall positive opinion and building on successes, the MS4 program can become a model for promoting effective stormwater management at the local level.

# TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>II</b>
<b>1. INTRODUCTION.....</b>	<b>1</b>
<b>2. THE MS4 PERMIT .....</b>	<b>3</b>
2.1    DEFINING MS4s .....	3
2.2    COVERAGE UNDER NPDES PERMITS .....	4
2.3    THE WEST VIRGINIA MS4 PROGRAM .....	5
2.4    NON-TRADITIONAL MS4s .....	6
2.5    CO-PERMITTEES .....	7
2.6    WVDEP EVALUATION AND ENFORCEMENT .....	7
2.7    USEPA INVOLVEMENT .....	8
2.8    NEW APPROACHES FOR IMPLEMENTING THE MS4 PERMIT .....	8
<b>3. STORMWATER ISSUES AND MS4S .....</b>	<b>11</b>
3.1    MS4s AND IMPERVIOUS AREAS .....	11
3.2    MS4s AND CHANGING POPULATIONS .....	13
3.3    LINKS BETWEEN CONSTRUCTION SITES AND MS4s .....	15
3.4    EASTERN PANHANDLE, KARST GEOLOGY, AND THE CHESAPEAKE BAY .....	15
3.5    WEST VIRGINIA STORMWATER UTILITIES AND THE PUBLIC SERVICE COMMISSION.....	17
3.6    COUNTY STORMWATER ORDINANCES.....	17
3.7    WATER QUALITY IMPROVEMENT DISTRICTS .....	18
3.8    MS4s AND CSOS .....	18
<b>4. RESEARCH METHODS.....</b>	<b>20</b>
4.1    PERMIT FILE RESEARCH.....	20
4.2    INTERVIEWS .....	20
4.3    SURVEY METHODOLOGY .....	21
<b>5. RESULTS .....</b>	<b>22</b>
5.1    AMBITIONNESS.....	25
5.2    ATTITUDES.....	26
5.3    FUNDING .....	27
5.4    TRAINING .....	30
5.5    IMPLEMENTATION .....	31
5.6    PROGRAM EVALUATION AND ENFORCEMENT .....	33
5.7    PARTNERSHIPS .....	34
5.8    JURISDICTIONAL ISSUES .....	36
<b>6. RECOMMENDATIONS.....</b>	<b>37</b>
6.1    FOR MS4s.....	37
6.2    FOR WVDEP .....	39
6.3    FOR COMMUNITY MEMBERS AND ORGANIZATIONS.....	41
<b>REFERENCES .....</b>	<b>43</b>
<b>APPENDIX A: THE SURVEY INSTRUMENT.....</b>	<b>47</b>
<b>APPENDIX B: RESPONSES TO OPEN-ENDED QUESTIONS .....</b>	<b>55</b>
<b>APPENDIX C: COMMUNITIES REMOVED FROM MS4 PROGRAM.....</b>	<b>63</b>
<b>APPENDIX D: SUGGESTED FORMAT FOR ANNUAL REPORTS .....</b>	<b>64</b>
<b>APPENDIX E: BENEFITS OF BETTER SITE DESIGN.....</b>	<b>66</b>

## TABLE OF TABLES

Table 1: The six minimum controls for MS4s, and typical best management practices .....	1
Table 2: Status of the 30 West Virginia MS4s .....	6
Table 3: Percent impervious surface in West Virginia MS4s.....	12
Table 4: Recent population changes in MS4s and counties (2000-2006) .....	14
Table 5: The nine minimum controls for CSOs .....	18
Table 6: Purpose of the state MS4 program .....	22
Table 7: Local MS4 program goals .....	22
Table 8: Stormwater management before MS4s were established.....	23
Table 9: Entities that developed MS4 programs .....	23
Table 10: Entities that implement MS4 programs.....	23
Table 11: Difficult aspects of implementing MS4 programs .....	24
Table 12: Obstacles to implementing MS4 programs .....	24
Table 13: Frustrations with implementing MS4 programs.....	24
Table 14: Easy aspects of implementing MS4 programs .....	25
Table 15: Proud aspects of implementing MS4 programs .....	25
Table 16: Funding mechanisms for MS4 programs .....	28
Table 17: Plans to implement the MS4 program through a stormwater utility .....	28
Table 18: Status of ordinances to establish a stormwater utility .....	28
Table 19: Resources used to develop ordinances to establish a stormwater utility.....	29
Table 20: Types of workshops attended.....	31
Table 21: Found WVDEP workshops useful .....	31
Table 22: Interesting structural practices .....	31
Table 23: Interesting outreach practices.....	32
Table 24: Expectations for water quality improvements.....	32
Table 25: Other benefits from implementing MS4 programs .....	33
Table 26: Information sharing among MS4s.....	35
Table 27: Willingness to work with outside groups .....	36
Table 28: Communities removed from the West Virginia MS4 program.....	63
Table 29: Benefits of better site design in Virginia from the Center for Watershed Protection ...	66

## TABLE OF FIGURES

Figure 1: West Virginia MS4s.....	2
Figure 2: Process for permittees to implement the MS4 permit.....	5
Figure 3: Population change and impervious surfaces in counties with MS4s .....	13
Figure 4: Ambitiousness of West Virginia MS4s.....	26

## ABBREVIATIONS

BMP	best management practice
CSO	combined sewer overflow
ESD	environmental site design
GI	green infrastructure
LID	low impact development
MCM	minimum control measure
MS4	municipal separate storm sewer system
NPDES	National Pollutant Discharge Elimination System
POTW	publicly owned treatment works
SPSS	Statistical Package for the Social Sciences
SWMP	stormwater management program
USEPA	United States Environmental Protection Agency
WVDEP	West Virginia Department of Environmental Protection

## ACKNOWLEDGMENTS

The authors would like to thank the United States Environmental Protection Agency Region 3 Office of Water for funding this project through cooperative agreement CP-973368-01. We would also like to thank MS4 Coordinator Sherry Wilkins and other staff at the West Virginia Department of Environmental Protection for their assistance and suggestions. This report could not have been completed without the local MS4 leaders and staff who completing the surveys and provided useful information in interviews. We would also like to thank Brian Clevenger, Joseph Hankins, Jennifer Molloy, Tom Schueler, and Tim Stranko for their assistance.

# 1. INTRODUCTION

When it rains on West Virginia’s small cities and towns—like any urban areas across the country—the rainfall washes pollutants into storm sewers, which direct this stormwater into nearby streams and rivers. Thirty communities across the state now operate under a general Municipal Separate Storm Sewer System (MS4) permit, which is designed to reduce the amount of sediment, bacteria, nutrients, trash, and metals in this stormwater runoff. A secondary benefit of many practices used to implement MS4 permits is protection from downstream flooding and erosion.

The West Virginia Department of Environmental Protection’s (WVDEP’s) first National Pollutant Discharge Elimination System (NPDES) general permit for small MS4s was issued on March 7, 2003, and most MS4 communities registered under this permit in the same year.<sup>1</sup>

As shown in Figure 1, most permitted MS4s are small cities and towns, but one county, a federal correctional institution, and two agencies that administer state roads are also covered under the permit. The 27 permittees shown in blue have had their stormwater management programs (SWMPs) approved by WVDEP and are now implementing these programs. SWMPs detail the best management practices (BMPs) and other actions that MS4 communities will implement to reduce stormwater pollution for each of the six minimum control measures (MCMs) shown in Table 1. The three permittees shown in green, however, have not submitted SWMPs to WVDEP for approval and are not in compliance.

**Table 1: The six minimum controls for MS4s, and typical best management practices**

Minimum control measure	Typical best management practices
Public education and outreach	Forming partnerships, using educational materials and strategies, and reaching diverse audiences.
Public participation/Involvement	Public meetings, volunteer opportunities, storm drain programs, community clean-ups, and citizen watch groups.
Illicit discharge detection and elimination	Storm sewer system map, prohibition and appropriate enforcement, plan to detect, and public education.
Construction site runoff control	Regulatory mechanisms in place, review of construction site plans, inspections and penalties, and consideration of public inquiries.
Post-construction runoff control	Planning procedures, site-based assessments, retention/detention ponds, infiltration basins, and vegetative runoff control measures.
Pollution prevention/Good housekeeping	Maintenance activities, long-term inspection procedures, controls for reducing/eliminating pollutant discharges, and coordination with flood control managers.

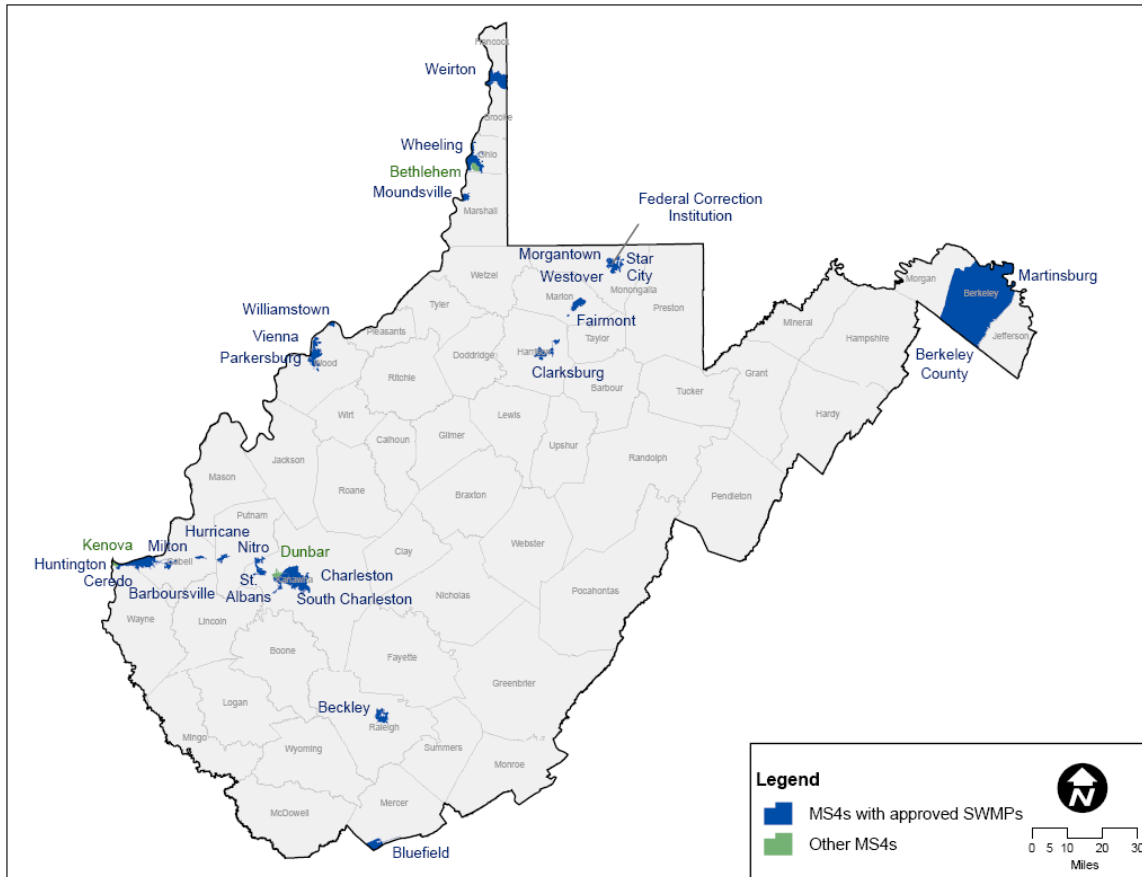
This report evaluates the implementation of MS4 permits across the state at a time when most West Virginia MS4 communities are entering their second five-year permit cycle. Permit file research, a survey of MS4s, interviews with WVDEP staff, and discussions with municipal MS4 staff were all used to help identify what is working well, and what can be improved. The primary goal is to provide recommendations to MS4 staff to more efficiently and effectively implement their local programs. Recommendations are also provided for WVDEP and for local community members and organizations.

Section 2 provides details on the MS4 permit. In Section 3, the state’s MS4 program is placed in the context of broader stormwater issues in West Virginia. The MS4 survey conducted for this report is then presented in Sections 4 and 5: first the research methods, and next the research results. Section 6 provides conclusions and recommendations.

<sup>1</sup> The general permit, WV0116025, applies to all MS4s that register under it. Registrations are assigned unique permit identification numbers that begin with “WVR03.” For example, Morgantown’s MS4 is registered under permit WVR030030 and Beckley’s MS4 is registered under permit WVR030009.



**Figure 1: West Virginia MS4s**



Note: MS4 communities are mapped based on city boundaries, which do not always correspond exactly to MS4 watershed boundaries. In addition to the MS4s shown, the West Virginia Division of Highways and the West Virginia Turnpike also hold MS4 permits.

## 2. THE MS4 PERMIT

### 2.1 Defining MS4s

Urban areas with separate storm sewer systems have always delivered water and pollutants directly to streams; however, in recent decades many of these areas were formally defined as MS4s and began to be regulated as point sources. As point sources, MS4s cannot discharge pollutants without NPDES permits. This clarification occurred in 1987, when Section 402(p) of the Clean Water Act was enacted to address stormwater. According to this section, permits for discharges from municipal storm sewers “shall require controls to reduce the discharge of pollutants to the maximum extent practicable...”<sup>2</sup> This phrase—“maximum extent practicable”—is the basis for the MS4 program.

Because of this definition, the MS4 permit does not set fixed numeric targets, and this lack of fixed targets has implications for measuring compliance and using enforcement tools at the federal, state, and local levels. These issues are discussed later in this document.

MS4s are defined in federal regulations, as shown in the following box. This definition is important regarding MS4 implementation in West Virginia. As defined in Paragraph (i), these systems can be operated by a wide variety of public entities, including school districts, universities, federal buildings, and public parks. West Virginia MS4s include not just towns, villages, and one county, but also two agencies and a federal correctional institution.

**Definition of MS4**

“Municipal separate storm sewer means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

- (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law)...including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act that discharges into waters of the United States.
- (ii) Designed or used for collecting or conveying stormwater;
- (iii) Which is not a combined sewer; and
- (iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.”<sup>3</sup>

Paragraphs (ii) and (iii) clarify that MS4s must collect or convey stormwater only. Combined sewer systems—where stormwater is mixed with wastewater—are not MS4s, although some municipalities are MS4 permittees *and* manage a combined sewer overflow (CSO) program when both types of systems are found within their boundaries. Communities with both MS4 and CSO programs are discussed in Section 3.8.

---

<sup>2</sup> Clean Water Act Section 402(p)(3)(B)(iii).

<sup>3</sup> 40 CFR 122.26(b)(8).

Finally, as stated in Paragraph (iv), if stormwater conveyances are part of a POTW, then these conveyances are not part of the MS4 system. In summary, the definition of MS4 clarifies that, to be an MS4, the system must convey stormwater, the stormwater must not be combined with wastewater, and the system must not convey the stormwater to a POTW.

## **2.2 Coverage under NPDES permits**

USEPA implemented the new MS4 NPDES program in phases. Under Phase I, established in 1990, NPDES permits are required for all medium and large MS4s: those in areas with populations over 100,000. West Virginia is largely a rural state: Of the state population of 1.8 million, 45% live in rural areas (United States Department of Agriculture, 2007). Because West Virginia cities all have populations under 100,000, Phase I did not affect the state.

West Virginia's MS4 program began with the implementation of Phase II in 1999. Phase II extends coverage to small MS4s, which become regulated through the NPDES program one of two ways: automatic nationwide designation or case-by-case designation by WVDEP.

### **2.2.1 Automatic nationwide designation**

If an MS4 is located within the boundaries of an "urbanized area" based on the latest decennial census, it automatically requires an NPDES MS4 permit. Once designated as a regulated municipality, it remains an MS4 permittee unless it meets certain criteria for a waiver.

An urbanized area is defined as:

"a land area comprising one or more places—central place(s)—and the adjacent densely settled surrounding area—urban fringe—that together have a residential population of at least 50,000 and an overall population density of at least 1,000 people per square mile."(USEPA, 2005, p. 2)

### **2.2.2 Case-by-case designations and non-traditional MS4s**

In addition to automatic designations, USEPA requires states to consider other systems for inclusion in the program. Case-by-case designation criteria are required to be applied, at a minimum, to all small communities with separate sewer and storm systems located outside of an urbanized area but serving a jurisdiction with a population of at least 10,000 and a population density of at least 1,000 people per square mile (USEPA, 2005).

The following factors are to be considered:

- discharge to sensitive waters,
- high population density,
- high growth or growth potential,
- contiguity to an urbanized area,
- significant contributor of pollutants to waters of the United States, and
- ineffective protection of water quality concerns by other programs.

Permitting authorities such as WVDEP are also encouraged to issue permits to non-traditional MS4s if separate storm sewer systems are publicly owned and operated and if they are located in urbanized areas or discharge directly to another regulated MS4 (Molloy, 2007). These non-traditional MS4s are considered to be unincorporated "municipalities" by USEPA's definition and include, for example, universities, post offices, and park systems.

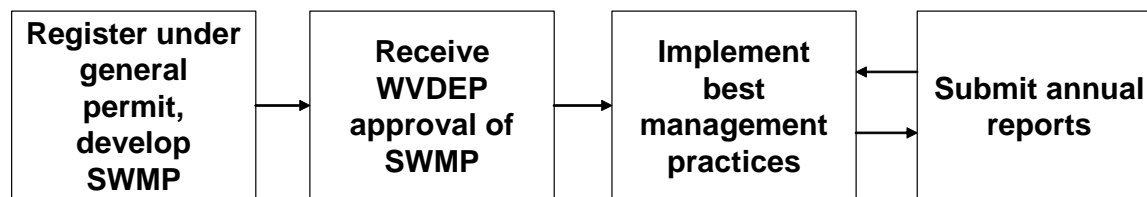
### 2.3 The West Virginia MS4 program

The West Virginia MS4 program is administered by the WVDEP Stormwater Team within the Division of Water and Waste Management. WVDEP uses three NPDES permits to manage stormwater-related pollution: the MS4, construction stormwater,<sup>4</sup> and multi-sector industrial stormwater<sup>5</sup> permits.

The MS4 program is primarily managed and implemented by one staff person who is responsible for writing permits, approving SWMPs, and evaluating and providing technical assistance to the local programs across the state. At the time of this report, WVDEP enforcement staff have not yet been trained to enforce this permit.

West Virginia's MS4 permit was first issued in 2003, and WVDEP is working to revise it for reissuance in 2008. The earliest designated MS4 communities registered under the general permit in 2003 and would have submitted SWMPs to WVDEP for approval shortly thereafter. They would then have started implementing the BMPs specified in their MCMs and started submitting annual reports. This process is illustrated in Figure 2.

**Figure 2: Process for permittees to implement the MS4 permit**



Note: Permit modification and reissuance is not captured in this figure.

WVDEP regulates 30 MS4s in West Virginia, listed in Table 2. Of these, 27 have had their SWMPs approved by WVDEP and are now implementing their MS4 program. The remaining three are noncompliant, and two of these are under Administrative Orders. The survey described in Sections 4 and 5 was sent to all 30 MS4s.

While some MS4s have moved through the steps in Figure 2 in a timely manner, others have not. As shown in Table 2, ten MS4s had not yet submitted any annual reports to WVDEP as of October 2007. At that time, eight MS4s had submitted a single annual report, and 11 had submitted two. Only one MS4—the City of Parkersburg—had submitted three annual reports.

These reports provide critical information about permit implementation and compliance. When they are missing, it is difficult if not impossible for WVDEP to evaluate an MS4's implementation of its SWMP and its compliance with the permit.

<sup>4</sup> The construction stormwater permit requires that a stormwater pollution prevention plan be developed for all earth-disturbing activities of one acre or more, and that best management practices be used to control erosion on the construction site and control sediment at discharge points during construction. This permit was revised and reissued in 2007; the new permit no longer requires post-construction stormwater management.

<sup>5</sup> The multi-sector industrial stormwater permit is issued to industrial sites where there is a risk that stormwater flowing over or accumulating on site may pick up contaminants from the permitted site.

**Table 2: Status of the 30 West Virginia MS4s**

<b>Name</b>	<b>Status</b>	<b>Date of SWMP approval</b>	<b>No. annual reports submitted</b>
Barboursville, Village of	SWMP approved	March 14, 2005	2
Beckley, City of	SWMP approved	October 5, 2004	2
Berkeley County	SWMP approved	June 8, 2007	0
Bethlehem, Village of	Waiver request denied by WVDEP. Awaiting site registration application.	Not approved	0
Bluefield, City of	SWMP approved	January 6, 2005	2
Ceredo, Town of	SWMP approved	September 6, 2007	0
Charleston, City of	SWMP approved	October 10, 2004	2
Clarksburg, City of	SWMP approved	December 10, 2004	2
Dunbar, City of	Awaiting application	Not approved	0
Fairmont, City of	SWMP approved	October 29, 2004	2
Federal Correctional Institution	SWMP approved	May 2, 2005	1
Huntington, City of	SWMP approved	June 23, 2005	2
Hurricane, City of	SWMP approved	January 26, 2006	1
Kenova, City of	Administrative Order sent by WVDEP	Not approved	0
Martinsburg, City of	SWMP approved	June 23, 2005	1
Milton, City of	SWMP approved	March 8, 2007	0
Morgantown, City of	SWMP approved	November 8, 2004	2
Moundsville, City of	SWMP approved	June 7, 2006	1
Nitro, City of	SWMP approved	February 13, 2006	1
Parkersburg, City of	SWMP approved	October 14, 2004	3
South Charleston, City of	SWMP approved	December 5, 2005	1
St. Albans, City of	SWMP approved	March 28, 2005	2
Star City, Town of	SWMP approved	March 14, 2005	2
Vienna, City of	SWMP approved	March 17, 2005	0
Weirton, City of	SWMP approved	February 14, 2006	1
Westover, City of	SWMP approved	June 3, 2005	2
Wheeling, City of	SWMP approved	March 14, 2005	1
Williamstown, City of	SWMP approved	March 8, 2007	0
W.Va. Dept. of Transportation	SWMP approved	September 8, 2006	0
W.Va. Turnpike Authority	SWMP approved	September 2007	0

Source: Status and date of SWMP approval for most MS4s from Wilkins (2007), but Berkeley County, Ceredo, and W.Va. Turnpike Authority were approved more recently. Number of annual reports from permit file research.

## **2.4 Non-traditional MS4s**

Almost all MS4 permits in West Virginia are issued to a local government entity: a city, town, village, or county. But three MS4s permittees are considered to be non-traditional MS4s: the West Virginia Department of Transportation, the West Virginia Turnpike Authority, and the Federal Correctional Institution in Morgantown.

The West Virginia Department of Transportation and West Virginia Turnpike Authority MS4 permits are defined similarly and include the agencies' rights-of-way that lie within or drain to any of the permitted MS4s.

Non-traditional permittees require unique evaluation and enforcement consideration because they may not have the taxing, implementation, and enforcement powers or the same types of geographic boundaries and public constituencies as municipalities. The West Virginia MS4 program has not taken advantage of the opportunity to name additional non-traditional MS4s at the state or local levels, or to establish co-

permittees, as discussed in the following section. Besides the three non-traditional MS4s already named, public colleges and universities with separate storm sewer systems can be permitted as MS4s, and many other states include them as a rule. Also, state and federal parks, large hospitals, and military compounds are among the entities that the USEPA recommends that states consider for MS4 regulation. Ensuring that state and federal facilities are held to the same standards as small communities is important for public relations, and it makes environmental and fiscal sense.

Many other states design a similar but slightly altered general MS4 permit for these non-traditional MS4s to account for differences between them and incorporated municipalities. For example, adjustments account for their centralized planning and decision making capacity and their lack of taxing and regulating capacity. New Jersey is one such state, which has a separate MS4 permit for its Department of Transportation (New Jersey Department of Environmental Protection, 2005).

#### **Non-traditional MS4s in Maryland**

The state of Maryland has permitted military bases, federal buildings, and public universities as non-traditional MS4s. Because these facilities are significantly different than towns and cities, Maryland designed a separate MS4 general permit with MCMs that are more appropriate for facilities with centralized planning and decision making capacity (Maryland Department of the Environment, 2004).

## **2.5 Co-permittees**

WVDEP has the option to designate two or more regulated MS4s as co-permittees to facilitate improved coordination. Permittees may also request this status. Co-permittees could be a city and a non-traditional MS4 within the city, or they could be multiple cities in an area acting cooperatively to implement a joint MS4 program.

By establishing co-permittees that include traditional and non-traditional MS4s, incorporated municipalities could collaborate with road agencies, major hospitals, large universities, or other public facilities within their jurisdictions on what is often a joint problem. Morgantown, Huntington, and Fairmont are just a few of the larger permitted MS4 communities that could collaborate, for example, with a major university or college. All of the traditional MS4s could be co-permittees with the Department of Transportation; this arrangement might facilitate a more productive and collaborative relationship than seems to exist between the agency and the municipalities.

Other examples of co-permittees might be two or more cities near or adjacent to one another. Communities that are permitted separately, but that discharge into the same impaired streams, may find significant benefits by coordinating their planning and implementation efforts as co-permittees, or unofficially by sharing resources and engaging in joint planning meetings.

## **2.6 WVDEP evaluation and enforcement**

The purpose of evaluation and enforcement is to improve the effectiveness of local MS4 programs. A program's effectiveness should be based on how activities move that community toward its goal of minimizing water quality problems related to stormwater runoff. An appropriate evaluation should be interactive and can help the state MS4 coordinator identify where additional technical or institutional

support is needed in a community, and when and where enforcement measures are necessary to help a community advance toward its goals.<sup>6</sup>

As of the date of this report, the WVDEP MS4 coordinator had not initiated any formal program evaluations, and WVDEP enforcement staff had not yet been trained on approaches for enforcing MS4 permit compliance. Enforcing the MS4 permit will require a different approach than other permits, due to the MS4 permit's largely flexible, qualitative, and individualized design. Enforcement has not been a priority for WVDEP during the first five-year permit cycle, as MS4 communities have been learning about and starting to implement this new program (Wilkins, 2008).

The key to effective enforcement of MS4 programs is effective program evaluation so that the WVDEP MS4 coordinator can clearly understand specific local goals and how MS4 programs are advancing toward these goals. Without this understanding, it would be impossible to identify specific support measures needed or to suggest enforcement actions. Formal evaluations would require WVDEP staff to compare annual reports against approved SWMPs and water quality goals. The first evaluations in an MS4 community could help the local MS4 leaders identify quantitative and qualitative deliverables, understand WVDEP's determination of compliance status, and convey the MS4's assessment of pollutants of concern. Evaluations could also help local MS4 leaders provide technical assistance to their staff.

Should WVDEP decide to more systematically evaluate and enforce MS4 permits, a clear, concise, and uniform annual reporting form with prompts for the response style desired may be useful. A suggested general template for such a form is included in Appendix D.

## **2.7 USEPA involvement**

To help implement MS4 permits, USEPA provides states and local communities with extensive support materials and trainings. Templates, examples, and guidance are provided for state program leaders who must design, evaluate, and enforce the permits. These state offices are also charged with providing technical support to communities to empower them to implement effective MS4 programs on the ground.

Toward this goal, USEPA provides an online "National Menu of Stormwater Best Management Practices" that communities can use for implementing each MCM. This assistance includes everything from specifics on how to write ordinances to educational materials for school children. These materials are designed to reduce costs of program development and implementation at the community level (USEPA, 2008a).

USEPA also provides state offices with additional feedback and support. This support includes attending workshops, providing trainings, and speaking at state and regional events across the country upon request. WVDEP has taken advantage of these services on multiple occasions: USEPA hosted a series of workshops for MS4 community leaders and interested parties, and the Agency participated in the first West Virginia Smart Growth Conference in Martinsburg in 2007.

## **2.8 New approaches for implementing the MS4 permit**

With nearly eight years of experience implementing the Phase II MS4 program, USEPA is discovering weaknesses in the program as well as ways to strengthen it. Federal and state efforts are moving the

---

<sup>6</sup> Enforcement actions cannot be taken without detailed evaluations that communicate to enforcement staff where a municipality falls short of permit compliance. A search of WVDEP Administrative Orders issued from 2005 to 2007 confirms that such enforcement actions have not been taken against MS4 communities (WVDEP, 2007d).

program toward an equally flexible, but more outcome-oriented program that, in the end, emphasizes more integrated water resource management principles.

A recent finding related to urban stormwater contamination problems in the Chesapeake Bay defines some of the weaknesses of the MS4 program.

“Some of the attributes of MS4 permits that may limit their effectiveness in achieving Bay restoration goals include lack of numerical water-quality goals, implementation that does not evolve with each 5-year permit cycle, no requirements to retrofit stormwater systems to achieve greater environmental protection, and their reliance on technology-based rather than water quality-based approaches. In addition, some of the actions taken address problems other than nutrient and sediment loads, such as reducing flooding risks, and are relatively inefficient at removing nutrients. Further, not all developed and developing lands are covered by MS4 permits.” (USEPA, 2007b, p. 13)

The problems listed here are issues that should be addressed in the reissuance of the West Virginia MS4 permit in 2008. Recommendations for addressing these issues and others are provided in Section 6.

USEPA is also encouraging an increasingly holistic approach to urban water and weather problems, promoting low impact development (LID), green infrastructure (GI) planning, environmental site design (ESD), and smart growth as environmentally preferable approaches to stormwater management (See box on the following page). For example, the agency has committed to provide technical assistance to states to formally promote the integration of GI planning by cities and wastewater treatment plants as a prominent component of their CSO, sanitary sewer overflow, and MS4 programs. USEPA is providing draft permit language to West Virginia’s MS4 program to help facilitate implementation of practices and approaches that protect and utilize GI in MS4 communities to manage stormwater quantity and quality (USEPA, 2007c). LID practices that work with GI can be integrated into comprehensive planning and can lower overall built infrastructure capital and operation and maintenance costs for site, community and/or county budgets (See Appendix E for estimated savings from four cities in Virginia).

In addition, USEPA launched its GI effort as related to stormwater management in spring 2007 with an inter-office, inter-organizational partner agreement on GI (USEPA, 2007d).

USEPA is clearly promoting a new approach:

“Through green infrastructure techniques, stormwater and its pollutants are managed using natural systems to help absorb, infiltrate, evaporate or reuse excess stormwater instead of using traditional infrastructure that collects, stores, and transports water through large, buried sewer systems. Rain barrels and cisterns, roofs that are covered with vegetation and plantings, tree boxes, rain gardens, and pocket wetlands are just a few examples of common green infrastructure approaches. Water is treated (and can be used) as an important resource rather than a waste product.” (USEPA, 2007e)

The objective of the partnership is to reduce runoff volumes and sewer overflow events through the widespread use of GI management practices. The overarching goal of the initiative is to use GI and smart growth designs to not only reduce stormwater runoff and overflow events, but also to protect drinking water supplies, public health, and the environment by reducing pollutant discharges when it rains.



## Stormwater Management: Concepts and Lingo

As people learn more about stormwater management, their understanding of the problems and solutions changes. Over time, new terminologies and acronyms attempt to capture changing concepts. LID, GI, ESD, and smart growth are just a few among the many terms that have overlapping, or even changing definitions with respect to stormwater.

To protect water quality and stream stability, stormwater must be managed on the site scale, the development scale, and the watershed scale. Moreover, stormwater management has important implications for other issues such as the protection of source water, preservation of habitat quality and contiguity, flood control, and built infrastructure costs. Rules to reduce stormwater impacts on specific sites can, if improperly designed, create incentives for increased lot sizes and sprawl, thereby increasing built infrastructure costs per capita, fragmenting important habitats, and consuming open space. For these reasons, the various levels and approaches to stormwater management should be considered in concert with one another.

Below are just a few terminologies and definitions that attempt to address these interdependencies across scales and issues.

**Low impact development.** LID is a strategy and a set of practices that reduce stormwater runoff and pollutant loadings to receiving streams from development activities. LID practices are designed to replicate the predevelopment hydrology of a site by holding back fast flushes of stormwater that would be created by new impervious surfaces. LID practices can be divided into categories: conservation design, infiltration practices, runoff storage practices, runoff conveyance practices, filtration practices, and low impact landscaping. Typically, multiple practices are used together (USEPA, 2007h). See [www.epa.gov/nps/lid](http://www.epa.gov/nps/lid).

**Environmental site design.** ESD, sometimes called better site design, emphasizes efforts to deal with runoff early in the planning and design process. Practices include protecting open areas, significantly reducing impervious surfaces, and promoting infiltration. ESD focuses on site and development design with consideration for larger watershed conditions and characteristics. The underlying principle is that reducing runoff is the best way to reduce runoff pollution. The Maryland stormwater manual has adopted the ESD principles and related practices, emphasizing runoff control strategies that mimic "existing hydrology through total site design." It calls for a "philosophical change" from relying on large structural devices such as stormwater ponds to using smaller, less obtrusive practices that promote stormwater infiltration (Blankenship, 2007). See [www.stormwaterpartners.org/PDF/CorePrinciplesSept07.pdf](http://www.stormwaterpartners.org/PDF/CorePrinciplesSept07.pdf) and [www.cwp.org/bfb\\_better\\_site\\_design.htm](http://www.cwp.org/bfb_better_site_design.htm).

**Green Infrastructure.** According to the Green Infrastructure Center (2008), "Green infrastructure includes the interconnected natural systems and ecological processes that provide clean water, air quality, and wildlife habitat. GI sustains a community's social, economic, and environmental health." GI **planning** jointly considers management of wastewater, drinking water, and ground and surface water resources together with management of natural and built land features like contours, forests, and floodplains as well as roads, park systems, and building and zoning regulations that reduce sprawl and stormwater runoff (Schueler, 2008). Using a statewide Virginia GI assessment, counties and regions are now working with agencies to integrate GI use and protection into their local comprehensive planning efforts with the intention of reducing long term financial and environmental costs while also facilitating compliance with various state and federal environmental requirements (Virginia Department of Conservation & Recreation, 2008.) LID and ESD practices facilitate the protection and use of GI in comprehensive planning. See [http://cfpub.epa.gov/npdes/home.cfm?program\\_id=298](http://cfpub.epa.gov/npdes/home.cfm?program_id=298).

**Smart growth.** Smart growth also deals with issues that encompass but are much broader than stormwater. In addition to preserving open space, farmland, natural beauty, and critical environmental areas, smart growth includes principles such as mixing land uses and creating walkable neighborhoods (USEPA, 2008b). Smart growth should consider the integration of GI into land management and development planning. Some smart growth practices reduce the amount of paved surfaces and can allow natural lands to filter rainwater and runoff (USEPA, 2008c). See [www.epa.gov/dced](http://www.epa.gov/dced).

### **3. STORMWATER ISSUES AND MS4S**

The MS4 program does not operate in a vacuum. In fact, even though the MS4 permit has only been in force since 2003, management of stormwater runoff and related land-use practices in West Virginia has been of serious concern for decades. In particular, agencies have been concerned with public safety and property damage from flooding, damage to stream beds from high flows, and water pollution carried by stormwater.

The objective of the MS4 program, like any NPDES permit program, is to ensure that dischargers do not cause or contribute to violations of water quality standards. All but two of West Virginia's 30 MS4 communities discharge into streams listed as impaired by WVDEP, based on information provided in the MS4 permit applications. While these streams are included on the state 303(d) list for at least one pollutant, most are listed for at least four pollutants, and almost all of these receiving streams could be improved with better stormwater management (WVDEP, 2007a).

This link between stormwater management and flooding has been formally acknowledged in a statewide flood protection plan (West Virginia Flood Protection Task Force, 2004). This document describes the state's natural tendency for flash flooding due to its steeply sloping topography and narrow valleys, and underscores the explicit link between land use practices and changes in stormwater quality, frequency, and intensity.

Similarly, a report on the implementation of the state Water Resources Protection Act<sup>7</sup> addresses the relationship between land use patterns and the adequacy and sanitation of groundwater recharge, particularly in the Eastern Panhandle (WVDEP, 2006a).

The WVDEP Stormwater Team website, which provides information on the three state stormwater permits, discusses the link between activities on land and stormwater pollution (WVDEP, 2007c).

In terms of its effect on water quality, WVDEP considers sediment to be the number one water pollutant in West Virginia. The fact sheet that accompanied the recent NPDES permit for construction stormwater notes that 70% of West Virginia streams are moderately to severely affected by sedimentation; a primary source is construction stormwater (WVDEP, 2007b). Pollution from construction sites within MS4 boundaries are regulated and reinforced not just by the construction stormwater permit, but by the MS4 permit as well.

#### **3.1 MS4s and impervious areas**

MS4 implementation can be more challenging if municipalities have more impervious area. Impervious areas wash stormwater directly into storm sewers and receiving streams; therefore, the more impervious area, the larger effort is required to prevent pollution discharges.

Impervious areas also prevent groundwater from being replenished. USEPA, citing American Rivers (2002), highlights links among poor land use practices and planning, mismanaged stormwater in development, and drinking water quality and supply:

“The 20 regions in the country that developed the most land over the period 1982 to 1997 now lose between 300 and 690 billion gallons of water annually that would otherwise have filtered through the earth and been captured as groundwater.” (USEPA, 2007a, p. 2).

---

<sup>7</sup> W.Va. Code §§22-26-1 et seq.

Urban areas with high percentages of impervious surface can already be seen in high growth areas of West Virginia. Morgantown’s rapid growth and development is one example: Rapid construction and paving projects related to growth at West Virginia University consistently cause more intense and more frequent flooding of the downstream neighborhood homes of Suncrest, a community well above what was formerly considered to be any small floodplain related to Poponoe Run. (Morgantown Utility Board, 2007).

As shown in Table 3, impervious areas of West Virginia MS4s vary between 17% and 36% for municipalities. The municipalities with the greatest percentage of impervious surfaces—Martinsburg, Star City, Parkersburg, Huntington, Beckley, and St. Albans—likely face the greatest challenges in terms of reducing fast flushes of stormwater into local streams and rivers.

Even municipalities with smaller percentages of impervious area likely face challenges, because research shows that stream degradation occurs when imperviousness reaches about 10% (Schueler, 2000).<sup>8</sup> All West Virginia municipal MS4s have impervious percentages that exceed this rule of thumb.

The only county MS4, Berkeley County, has a much smaller percentage of impervious surface because it includes both urban and rural areas.

**Table 3: Percent impervious surface in West Virginia MS4s**

<b>MS4</b>	<b>Percent impervious</b>
Barboursville	26%
Beckley	32%
Berkeley County	3%
Bluefield	23%
Ceredo	17%
Charleston	17%
Clarksburg	23%
Fairmont	23%
Huntington	32%
Hurricane	27%
Martinsburg	36%
Milton	29%
Morgantown	26%
Moundsville	29%
Nitro	19%
Parkersburg	32%
South Charleston	26%
St. Albans	31%
Star City	35%
Vienna	29%
Weirton	21%
Westover	27%
Wheeling	21%
Williamstown	20%

Note: Percent impervious is based on imperviousness from United States Geologic Survey (2003) within MS4 communities. Communities are mapped based on city boundaries, which do not always correspond to MS4 watershed boundaries

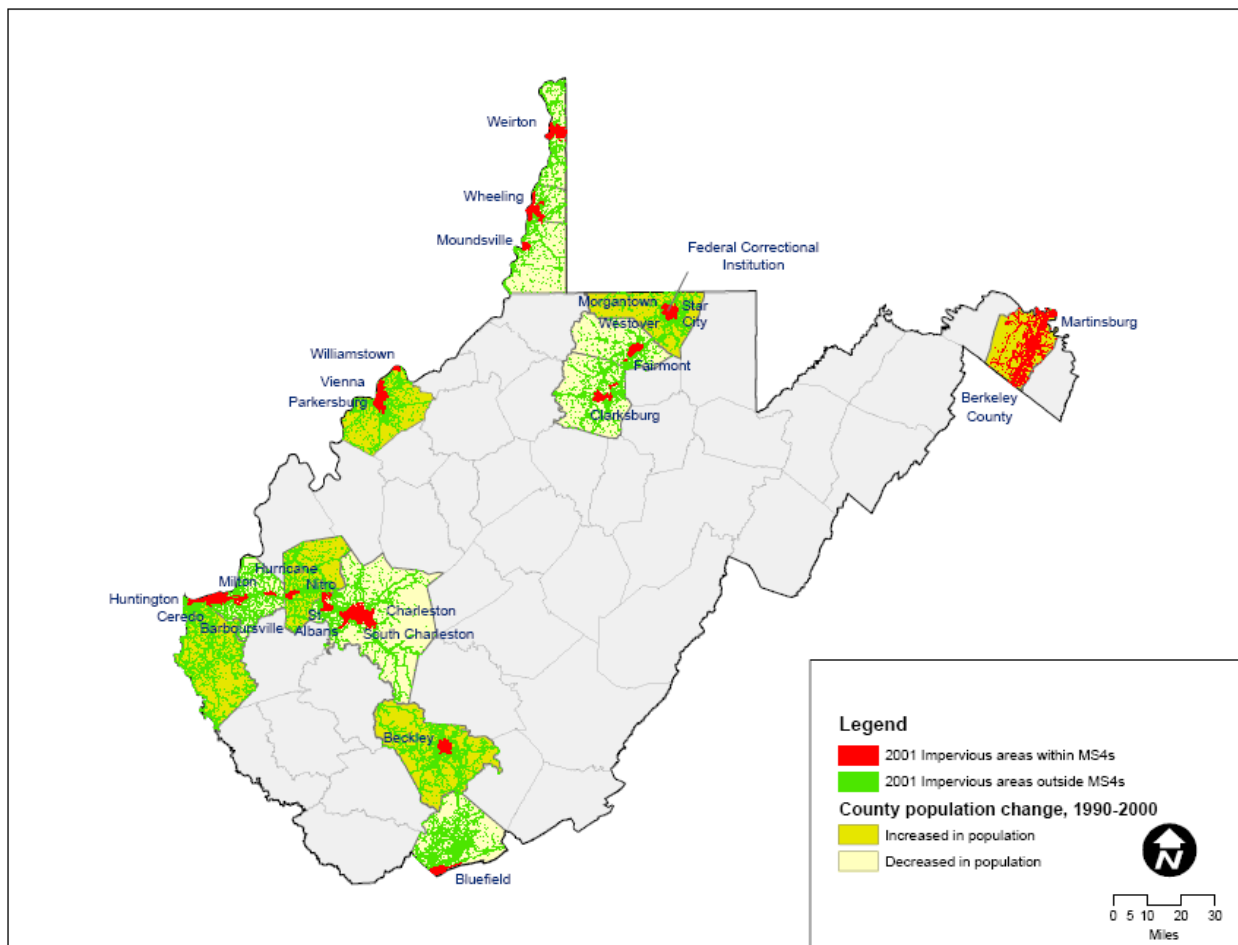
<sup>8</sup> The total impervious area is different from the effective impervious area, which includes only the portion that is directly connected to the drainage collection system (Sutherland, 2000).

### 3.2 MS4s and changing populations

MS4s that are losing population may face difficulties maintaining and improving stormwater infrastructure. When populations are increasing outside of MS4 municipal boundaries—particularly in counties other than Berkeley County, which is covered under an MS4 permit—this development can cause further stormwater discharges and pollution.

As shown in Figure 3, West Virginia’s MS4s are located in only 14 counties. Of these 14 counties, six increased in population between 1990 and 2000. In these growing counties, MS4s could play a particularly important role in ensuring that further development does not necessarily cause water quality degradation. Unfortunately, the stormwater problems and financial benefits of growth, where it is occurring, are not necessarily linked by the MS4 programs. Eight counties with MS4s are losing population; counties such as these typically face shrinking tax bases from which to fund infrastructure improvements and MS4 programs.

**Figure 3: Population change and impervious surfaces in counties with MS4s**



Note: MS4 communities are mapped based on city boundaries, which do not always correspond to MS4 watershed boundaries. Mapped impervious areas are those with >25% imperviousness, from United States Geologic Survey (2003). Populations from United States Census Bureau (2007a).

While the map in Figure 3 shows population changes from 1990 through 2000, more recent population changes are also important. As shown in Table 4, 18 of the 24 approved traditional MS4s shrank in population between 2000 and 2006. These MS4s are marked with an asterisk in the “MS4 shrinking”

column. MS4s with shrinking populations may face difficulties in raising sufficient funds to finance the maintenance and improvement of stormwater infrastructure.

Of these 18 MS4s with shrinking populations, four are located in counties in which the county population outside of the MS4 is increasing. These include Beckley (Raleigh County), Clarksburg (Harrison County), Fairmont (Marion County), and Westover (Monongalia County). In Raleigh, Harrison, and Marion Counties, where the MS4 municipalities are the largest population centers, county population growth is rural and exurban and stormwater quality is not being managed by any state or local program. This situation raises particular challenges regarding the management of stormwater and, potentially, the collection of sufficient fees for stormwater infrastructure and management.

**Table 4: Recent population changes in MS4s and counties (2000-2006)**

MS4	County	MS4 pop. change	County pop. change (outside MS4)	MS4 shrinking	MS4 shrinking, county increasing
Barboursville	Cabell	-1%	-3%	*	
Beckley	Raleigh	-2%	1%	*	*
Berkeley County	Berkeley	28%	N/A		
Bluefield	Mercer	-3%	-2%	*	
Ceredo	Wayne	-3%	-3%	*	
Charleston	Kanawha	-5%	-3%	*	
Clarksburg	Harrison	-2%	1%	*	*
Fairmont	Marion	-1%	1%	*	*
Huntington	Cabell	-5%	0%	*	
Hurricane	Putnam	14%	5%		
Martinsburg	Berkeley	10%	32%		
Milton	Cabell	7%	-3%		
Morgantown	Monongalia	7%	2%		
Moundsville	Marshall	-5%	-4%	*	
Nitro	Kanawha	-2%	-4%	*	
Parkersburg	Wood	-4%	-9%	*	
South Charleston	Kanawha	-6%	-3%	*	
St. Albans	Kanawha	-4%	-4%	*	
Star City	Monongalia	3%	4%		
Vienna	Wood	0%	-7%	*	
Weirton	Hancock	-6%	-5%	*	
Westover	Monongalia	0%	4%	*	*
Wheeling	Ohio	-7%	-4%	*	
Williamstown	Wood	-1%	-2%	*	

Note: Population data from United States Census Bureau (2007b). County population changes are the changes outside of the particular MS4; therefore, a county with more than one MS4 may show different population changes in different rows.

Putnam County is another interesting example. While population in the City of Hurricane is growing rapidly, population in Putnam County outside of Hurricane is also growing. Much of this growth is occurring in the unincorporated area of Teays Valley, which does not currently fall within the MS4 program.<sup>9</sup> Much of the development-driven economic wealth in Putnam County brings with it new stormwater quality problems and costs, but these developments are not required to contribute to solutions or to implement preventative measures, which are often the most cost-effective approaches to stormwater problems.

One approach that other states have taken is to address the problem at larger jurisdictional scales: at the county and state levels. For example, many of Maryland's MS4 permits are issued at the county level,

<sup>9</sup> West Virginia counties do not own and operate storm sewers, making it difficult to require coverage under MS4 permits unless requested by the county.

with municipalities having separate permits that they can implement independently (Maryland Department of the Environment, 2007a). This allows for better coordination among governmental agencies that can more accurately reflect problems arising from development patterns. As well, this coordination can allow each permittee to reduce costs by acting cooperatively to implement various BMPs.

Also in Maryland, the State Stormwater Management Act of 2007 mandates a suite of LID practices for all development occurring in the state (Maryland Department of the Environment, 2007b). As a result, many smaller MS4 communities face reduced individual costs because the “burden” of stormwater management is more evenly distributed across the state.

For the MCMs related to pre- and post-development and construction stormwater management, MS4 Phase II communities can simply state that they are helping to enforce state laws (Clevenger, 2007). Due to this regulatory certainty, many of the development and construction firms that are active in both Maryland and West Virginia tend to implement different practices depending on where they develop: LID in Maryland, and conventional practices in West Virginia (Hankins, 2007).

Commercial, industrial, and residential development often occurs on larger lots with extensive yards and parking areas outside of city limits. MS4 communities that face reduced tax revenues and aging infrastructures are therefore challenged to implement their MS4 programs while new developments fall largely outside of the MS4 watershed. While regulated MS4 entities can assess stormwater fees on properties outside of the municipal limits that drain into the municipality, establishing an effective system to assess and collect these fees can be costly and challenging to implement.

Urban sprawl exacerbates communities’ existing challenges to renew and replace aging water infrastructure. Reducing the strain on that infrastructure and planning comprehensively across stormwater-related challenges is an approach suggested by USEPA through watershed-based permitting and the Green Infrastructure Partnership (USEPA, 2007d), and one that West Virginia communities and the WVDEP MS4 program may want to consider adopting.

### **3.3 Links between construction sites and MS4s**

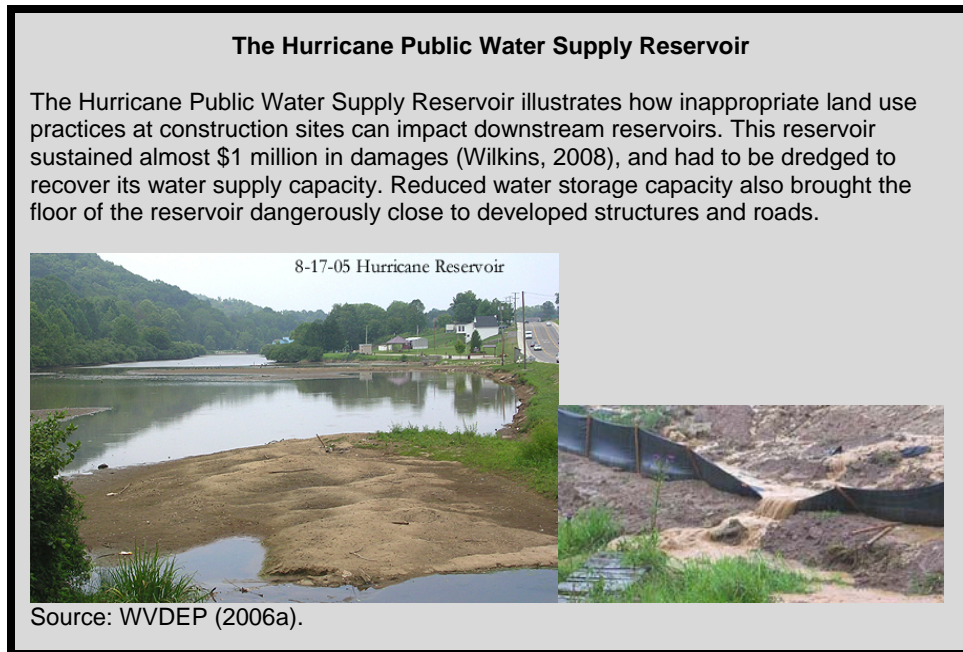
The Hurricane Public Water Supply Reservoir is a graphic illustration of the potential link between construction sites and downstream impacts. In Putnam County, where this reservoir is located, a special enforcement sweep upstream and throughout the county resulted in 119 notices of violation at 33 of the 41 inspected sites (WVDEP, 2006a).

The construction stormwater permit requires the installation and maintenance of BMPs on construction sites. When these sites are located within MS4 watersheds, water quality protections are reinforced under the MS4 permit. This additional layer of regulation should also help reduce flooding and its associated environmental effects.

### **3.4 Eastern Panhandle, karst geology, and the Chesapeake Bay**

In regions of West Virginia such as the Eastern Panhandle where limestone or “karst” geology is prevalent, stormwater can be an exceptional threat to public health, property, and the environment. The land development rates in Eastern Panhandle counties also pose increasing problems for residents and sustainable water management efforts. Furthermore, when the TMDL is written for the Chesapeake Bay watershed, the area will be mandated to control sediment and nutrient loads from stormwater runoff.

Developing *proactive* stormwater reduction and pollution prevention measures now is clearly the most cost-effective approach to managing this situation.



West Virginia MS4s in the Eastern Panhandle currently include Martinsburg and Berkeley County, although additional areas are likely to be permitted after the next census.

In karst areas, bedrock is soluble and networks of underground streams and connected aquifers already exist and interact unpredictably with surface water. According to a Pennsylvania report on stormwater in karst terrain, lack of stormwater management can cause:

“ground subsidence with minor or trivial impacts upon structures to catastrophic soil/bedrock collapse and failure of foundations and slabs, roadways, impoundments and other engineered structures, and occasionally, degradation of local groundwater supply quality and/or quality.” (Ralston and Oweis, 1999)

Eastern Panhandle citizens have already experienced many of these issues firsthand as a result of development-related stormwater that is not managed appropriately for the physical landscape. Berkeley County has responded by developing a Source Water Assessment and Protection Plan:

“The majority of Berkeley County’s drinking water supply—from private wells and from the public water system—comes from groundwater within this karst system. Stormwater runoff that carries petrochemicals, domestic and industrial chemicals, trash, fertilizers, pesticides, herbicides, animal decay products, as well as sewage disposal, provide substantial risk of contamination to the groundwater. In high-growth communities like Berkeley County, construction activities can destabilize the delicate equilibrium between the surface and underground components of karst, causing altered drainage patterns and sinkhole collapse. The clearing and stabilization of land for buildings and roads is a particularly serious threat to groundwater.” (Berkeley County Source Water Assessment and Protection Team, 2004, p. 3)

In adjoining Jefferson County, the County Commission and local stakeholders collaborated to form a Water Advisory Committee, compile a GI assessment with special focus on source water quality and quantity vulnerabilities related to land use, and are working on a comprehensive plan in coordination with those efforts. (The Conservation Fund, Freshwater Institute, 2006).

Many counties in the region have or are developing stormwater management ordinances, but will need the support of technical tools such as a West Virginia stormwater manual for them to be as effective as possible. Throughout the state, special protections are afforded to properties with sinkholes and other sensitive characteristics through the Wellhead Protection Program (West Virginia Department of Health and Human Resources, 1999).

### **3.5 West Virginia stormwater utilities and the Public Service Commission**

Funding local MS4s is a challenge, and one promising funding approach is to establish a stormwater utility. Stormwater utilities generate funds for MS4 programs outside of line items in annual municipal budgets. One approach is to set rates for households and businesses based on each site's impervious area.

In 2001, the West Virginia Legislature authorized MS4 municipalities to manage urban stormwater and surface water discharges. The state's MS4 municipal corporations also clarified their rights to regulate and charge service fees for stormwater discharges within city limits and areas outside the city limits that drain into municipal corporations. Since then, the West Virginia Public Service Commission has denied itself jurisdiction over stormwater rates and practices (Stranko, 2007).<sup>10</sup> However, the Public Service Commission did not cede this authority to entities other than municipalities, and has developed a Stormwater Task Force that is developing proposed rules for stormwater utilities that are still regulated by the Public Service Commission. These currently include only non-municipal corporation entities (Blair, 2007). Public Service Commission involvement in stormwater regulations may be an issue in the future as more areas face high growth rates outside of MS4 watersheds.

### **3.6 County stormwater ordinances**

West Virginia State Code allows county governments to enact subdivision and land development ordinances that include, among other things, standards for stormwater management.<sup>11</sup> Many West Virginia counties have enacted stormwater ordinances; however, county stormwater management standards address water quantity, not quality.

The statewide flood protection plan, described above, recommends county stormwater ordinances that address both quantity and quality:

“The Task Force recommends that all counties implement a stormwater ordinance to control the quantity and quality of stormwater and to guide the development and implementation of a stormwater management plan. It is recommended that a State agency inspect stormwater facilities and serve as a back up for local inspection and enforcement of regulations on design, installation, operation and maintenance of these facilities. It is also recommended that special stormwater regulations be prepared for karst areas in West Virginia.” (West Virginia Flood Protection Task Force, 2004, p. 6)

---

<sup>10</sup> Compared with the State of West Virginia, USEPA defines municipalities more broadly for the purposes of the MS4 permit and includes entities such as hospitals, universities, and road systems.

<sup>11</sup> West Virginia State Code § 8A-4-2(a)(5).



The same plan also provides a model county stormwater ordinance (West Virginia Flood Protection Task Force, 2004).

Integrating county stormwater management standards with MS4 permits is one possible way to address both quantity and quality in stormwater discharges. Berkeley County, the only county MS4, is taking the lead on this, but other counties with rapid growth outside of MS4 boundaries could benefit from such an approach.

### **3.7 Water Quality Improvement Districts**

In areas with rapid growth outside of MS4 boundaries, another creative solution would be to consider establishing Water Quality Improvement Districts. The West Virginia Department of Agriculture, through the Conservation Districts, can allow Watershed Improvement Districts to be established with taxing authority for the purposes of taking water quality improvement measures specifically in areas where there is no local authority to manage such issues. A percentage or minimum absolute number of local residents must agree to the establishment of such an entity in coordination with the local Conservation District.<sup>12</sup>

### **3.8 MS4s and CSOs**

Many West Virginia communities with older infrastructure convey both wastewater and stormwater through the same sewer system to wastewater treatment facilities. In the event of high stormwater flows due to large storms, inappropriate land use management, or leaky sewer pipes, the volume of this combined flow can exceed the conveyance capacity of pipes and overflow directly to streams, untreated, through CSOs.

According to their NPDES permits for their wastewater treatment plants and collection systems, communities with CSOs must meet nine MCMs (Table 5), develop a long-term control plan, and implement a modeling and monitoring program. Often, communities with CSOs also have separate storm sewer systems in newer areas. These communities, therefore, must meet the MCMs for the CSO program, as well as the MCMs for the MS4 program.

**Table 5: The nine minimum controls for CSOs**

<b>Minimum control</b>
1. Proper operation and regular maintenance programs for the sewer system and CSOs
2. Maximize use of collection system for storage
3. Review and modification of pretreatment requirements to ensure that CSO impacts are minimized
4. Maximization of flow to secondary treatment plant for treatment
5. Elimination of CSOs during dry weather
6. Control of solid and floatable materials in CSOs
7. Pollution prevention programs to reduce contaminants in CSOs
8. Public notification program to ensure that public receives adequate notice of CSO events and impacts
9. Monitoring to effectively characterize CSO impacts and the efficacy of CSO controls

Source: USEPA (1995a).

MS4s are defined so as not to include CSOs. In fact, at least six West Virginia communities had their MS4 permit requirements waived because they were already entirely covered under a CSO permit (See Appendix C). According to the MS4 permit application forms submitted, however, thirteen MS4

<sup>12</sup> West Virginia State Code §19-21B provides for the establishment of Watershed Improvement Districts. West Virginia State Code §29-1F-1 established the Wheeling Creek Watershed Protection and Flood Prevention District.

communities have combined sewer systems in addition to separate storm sewer systems. This situation arises when one portion of the sewer system carries stormwater only, while a different portion carries combined stormwater and wastewater.

CSO communities must reduce the number of overflow events and improve water quality during those events. Several practices that could be used to implement the MS4 and CSO MCMs are identical. For example, public education and implementation of LID, GI planning, and land use management can help reduce stormwater discharges from MS4s, while also reducing the number of CSO events.

USEPA's new watershed-based NPDES permit guidance suggests that communities facing multiple permits to manage stormwater (e.g., stormwater, CSOs, sanitary sewer overflows, peak excess flows at POTWs, nonpoint sources) may consider requesting a single integrated permit, a practice known as wet-weather integration:

“Municipal wet-weather discharges are currently addressed through various USEPA and state regulatory and policy frameworks that reflect different statutory and policy mandates. Wet-weather integration is an approach to addressing wet-weather discharges in a holistic manner to provide for greater efficiency, more comprehensive planning, less redundancy among permitting requirements, and, most importantly, better water quality outcomes.” (USEPA, 2007f, p. 30).

USEPA provides guidance for writing such permits, setting appropriate goals and requirements, and evaluating (USEPA, 2007f). The first step toward such cooperative permit planning and implementation has already been taken at the state level as noted by the fact that the various stormwater permits are managed within the single West Virginia Stormwater Permit Team.

This watershed-based approach to wet weather permits complements USEPA's new partnership to promote smart growth and GI.

## 4. RESEARCH METHODS

This report evaluates the implementation of MS4 permits across West Virginia using permit file research, interviews with the state MS4 coordinator, and a survey of local MS4 program supervisors across the state. Evaluations of program implementation often require a multifaceted approach, which includes qualitative methods, analysis of records, and quantitative data collection (Worthen et al., 1997).

### 4.1 Permit file research

To set the stage for the interviews and survey, two authors reviewed applications, SWMPs, and any associated annual reports or letters of enforcement for all West Virginia MS4 communities. We independently reviewed each application and SWMP and scored it for ambitiousness on a 1-10 scale. They then compared their scores, discussed them, and agreed upon a common score.<sup>13</sup> This score is called the ambitiousness of the proposed program. Next, we scored the ambitiousness of each MS4 based on what was actually implemented, using the same materials plus annual reports (or the absence of annual reports). This second score is called the ambitiousness of the implemented program.

Evaluating ambitiousness was a challenge with just the paperwork filed for each community. While the permit application format was uniform, the SWMPs submitted—if there was a SWMP separate from the application—were significantly different across communities in terms of the detail and format.

Similarly, annual reports submitted and accepted by WVDEP ranged from a page or two to entire tomes of information and maps. Originally, project staff also attempted to score each MCM and BMP to determine if the community was implementing the plan as proposed. The intent was to use the milestones established in each community's plans and/or applications and compare them with the community's annual reports. The absence of many overdue reports and diversity in reporting approaches of those on file made it difficult to impossible, in most cases, to evaluate if communities were indeed implementing their approved SWMPs.

Adding to the ambiguity about which SWMPs are actually better or more ambitious than others was the fact that at least ten permittees appear to have used the same standardized SWMP. The MS4s shared the cost of hiring a contractor to develop this template. Most of these were individualized to some degree by either the MS4 permittee or the contractor. These template-based plans were generally well-written, but do not consistently indicate corresponding quality of implementation efforts by the MS4s.

Contextual data were compiled to help explain, but not alter the scores given to each community. Population data, for example, were collected with the expectation that it might explain some of the ambitiousness; larger communities were expected to have more ambitious programs. It was also expected that ambitiousness might depend on whether the MS4 community was gaining or losing population.

### 4.2 Interviews

Interviews were conducted with representatives of five MS4 programs across the state as a part of the survey design and pre-testing. Interviews were conducted with both larger and smaller communities. Comments and suggestions were integrated into the final survey form.

---

<sup>13</sup> Reports received later in the process were reviewed by only one project staff member. Some scores that had been evaluated jointly were reevaluated near the end of 2007, if one or more annual reports were significantly overdue or had been submitted since the first evaluation in early 2007.

After survey responses were received, several follow-up interviews were conducted for clarification or elaboration on issues of special interest with MS4 staff members at the local and state levels. Some surveys were collected through phone interviews, if the local MS4 staff expressed that preference. A series of interviews were conducted with the state MS4 coordinator at various stages of the project. All interviews were administered by at least two project staff members, when possible, to help ensure more objective reporting of interview findings.

### **4.3 Survey methodology**

The survey is included as Appendix A. The survey targeted the 30 local MS4 program supervisors. A mail questionnaire was selected as the most appropriate format, for several reasons. The sampling frame provided by WVDEP did not include e-mail addresses or telephone numbers for many of the permittees. Also, many counties in West Virginia have only limited Internet access, so respondents may not have access to e-mail or Internet sites. Finally, web surveys are not cost effective when the targeted population is small (Schonlau et al., 2002).

Because MS4 communities are spread across the state, extensive personal interviews were prohibitively expensive and time consuming. In general, telephone interviews with respondents such as program supervisors are difficult to complete and often require several calls to schedule a time to complete the survey.

In addition to the mail survey, authors conducted personal interviews on a limited basis to refine the survey tool, to increase our response rate, and to clarify some answers provided on returned surveys.<sup>14</sup>

A first wave of the survey was mailed to all 30 respondents during the second week of May, 2007. Three weeks later, telephone calls were made to all MS4 supervisors who have not yet returned their surveys. Respondents who express a willingness to complete the survey on the telephone were given the opportunity to do so. A second copy of the survey was mailed to all non-respondents during the first week of July, and either telephone or personal interviews were attempted with all non-respondents throughout July and August, 2007.

A total of 22 surveys were completed either by mail, telephone, or personal interview.<sup>15</sup> The number of returned surveys affected the analytical methodology used. It should be noted that phone and personal interviews provided significantly more comprehensive survey responses and would be recommended as more effective and appropriate approaches for such a survey of busy public officials. Time savings from the mailing approach were not significant considering calls had to be made to all non-respondents and multiple mailings were conducted, and such savings were undermined by the sparse responses on many of the surveys returned by mail.

Because of the small number of cases and the fact that most responses were categorical rather than interval level, only nonparametric analysis could be conducted. Statistical Package for the Social Sciences (SPSS) and Excel software were used to perform the quantitative analysis of survey data. Qualitative analysis was performed by the authors independently and then collaboratively. Content analysis software was not necessary for this project due to the small number of survey responses.

---

<sup>14</sup> Institutional Review Board protocols were followed.

<sup>15</sup> Two surveys were completed by personal interview, three were completed as a mixture of mail and telephone, and seventeen were returned via e-mail, fax, or regular mail.

## 5. RESULTS

The permit file research, survey, and interviews, taken together, help understand a number of aspects of the implementation of local MS4 programs. The survey instrument is included as Appendix A, and all answers to every open-ended question are included as Appendix B. These answers were generally coded into categories before the results were compiled into the tables in this section.

Before asking about specific aspects of local MS4 programs, survey respondents were asked to name the purpose of the state MS4 program. As shown in Table 6, 75% of respondents are aware that the purpose of the state MS4 program is related to water quality. Of these, some respondents also state that the goal of the state MS4 program includes flooding. This is understandable because of the strong links between managing stormwater for pollution control and for flood control.

**Table 6: Purpose of the state MS4 program**

Purpose	Frequency (N=22)	Percent of respondents (N=20)
Water quality only	12	60%
Water quality and flooding	3	15%
Public education	1	5%
Cynical response	4	20%
Did not respond	2	

Respondents were also asked about their goals for their local MS4 programs. These goals, shown in Table 7, are aligned with the state purpose: 73% are related to water quality. Public education is considered to be an important goal by 41% of the MS4 communities. Public education and outreach is one of the six MCMs, and is often the initial focus of new MS4s because it is relatively cheap and easy to implement and can raise public awareness.

**Table 7: Local MS4 program goals**

Goal	Frequency (N=22)	Percent of respondents (N=22)
Water quality only	7	32%
Water quality and flooding	3	14%
Water quality and public education	6	27%
Public education only	3	14%
Cynical response	2	9%
Nothing	1	5%
Did not respond	0	

Before MS4s were established, one-third of respondents did nothing to manage stormwater. The other communities managed stormwater through their Public Works Department or via mapping and other programs, as shown in Table 8. Those that addressed stormwater in the past often focused on structural maintenance such as cleaning out storm drains. Maintenance often fell behind because of a lack of sufficient funding and focus. Many communities got by with a minimum of funding and effort. Now, with MS4 permits, many communities spend more time and effort on public education, and many have more money to address stormwater issues at a broader scope.

Statistical tests were performed to determine whether MS4s transitioning from old programs differ from those starting from scratch. A difference of means test found that those who had a program before were less ambitious in their MS4 planning than those who did not have an earlier program.

**Table 8: Stormwater management before MS4s were established**

Management before MS4s	Frequency (N=22)	Percent of respondents (N=21)
Mapping/Other programs	9	43%
No stormwater management	7	33%
Public Works Department	5	24%
Did not respond	1	

Once permitted, MS4s needed to develop their SWMPs. These programs could be developed directly by local government or utility officials, by outside contractors, or both. According to the survey, while most MS4s were developed by local governments and/or local utilities, about one-third of MS4s relied on outside contractors (Table 9).

**Table 9: Entities that developed MS4 programs**

Entity	Frequency (N=22)	Percent of respondents (N=22)
Local government	11	50%
Local utility	8	36%
Outside contractor	7	32%
Other	3	14%
Did not respond	0	

A similar breakdown is seen in terms of the entities that implement—as opposed to develop—the MS4 programs. As shown in Table 10, most are implemented by local governments and/or utilities. Outside contractors are used by 14% of responding MS4 communities.

**Table 10: Entities that implement MS4 programs**

Entity	Frequency (N=29)	Percent of respondents (N=22)
Local government	12	55%
Local utility	9	41%
Outside contractor	3	14%
Other	5	23%
Did not respond	0	

MS4s in West Virginia face difficulties and obstacles in implementing their programs, as shown in Tables 11 and 12. The most persistent difficulty mentioned by respondents is raising the funds and resources necessary to implement the program. Public outreach and internal/local support are also significant difficulties.

While some obstacles are similar to the difficulties, others are not. Sufficient staff and time is the most

**From the survey:  
Difficulties and obstacles**

“Elected officials will not get involved enough.”

“Securing funding for staff and equipment.”

“Educating and bringing the community (citizens and stakeholders) up to speed on why stormwater management is important and what the new rules and regulations mean.”

“Cooperation between city departments.”

“We're responsible for enforcing things that the DEP is not responsible for enforcing.”

frequently reported obstacle. In addition, almost one-quarter of MS4s report that elected officials are an obstacle to implementing their MS4 programs

**Table 11: Difficult aspects of implementing MS4 programs**

<b>Difficult aspects</b>	<b>Frequency (N=27)</b>	<b>Percent of respondents (N=18)</b>
Funding/resources	6	33%
Internal/local support	4	22%
Public outreach	5	28%
Getting organized/planning	3	17%
Enforcement	2	11%
Don't know yet	3	17%
Did not respond	4	

**Table 12: Obstacles to implementing MS4 programs**

<b>Obstacles</b>	<b>Frequency (N=33)</b>	<b>Percent of respondents (N=21)</b>
Staff and time	10	48%
Collecting fees	2	10%
Funding	6	29%
MS4 program staff	1	5%
Elected officials	5	24%
Public	8	38%
Did not respond	1	

When asked more generally about frustrating aspects of their MS4 programs, respondents raise several issues, as shown in Table 13. Issues related to leadership and outside area jurisdiction were mentioned by almost one-half of respondents. Funding is a frustration for more than one-third.

**From the survey:  
Frustrations**

“Lack of DEP structure and framework and specific mandated requirements.”

“Unfunded mandate.”

“Public outrage.”

**Table 13: Frustrations with implementing MS4 programs**

<b>Frustrations</b>	<b>Frequency (N=24)</b>	<b>Percent of respondents (N=19)</b>
Staff and time	3	16%
Funding	7	37%
Leadership/outside area jurisdiction	9	47%
Cynical response	2	11%
Did not respond	3	

On the other hand, MS4s have found implementation of some program elements to be easy, as shown in Table 14. In particular, more than one-third of respondents state that organizational issues have been easy to implement. One-quarter state that mapping was easy. It should be noted, however, that ten of the 22

MS4 communities either did not respond to this question or provided a cynical or frustrated response. This suggests that many MS4s are not finding implementation particularly easy.

**Table 14: Easy aspects of implementing MS4 programs**

Easy aspects	Frequency (N=22)	Percent of respondents (N=16)
BMPs and pollution prevention	2	13%
Organizational issues	6	38%
Mapping	4	25%
Cynical/frustrated response	4	25%
Did not respond	6	

When asked what they are most proud of, most MS4s talk about their efforts to clean up stormwater and implement BMPs. A much smaller percentage of MS4s, 18%, are proud of their education and public awareness efforts, and 12% are proud that they are succeeding with little support (Table 15).

Seven of the 22 MS4s either did not respond to this question or provided a response that was coded as “Nothing.” While many MS4s are proud of their programs, some clearly are not.

**From the survey:  
Proud aspects**

“Mapping.”

“Cooperation between this department and DEP in constructing the rain garden.”

“Keeping storm system and creeks cleaner than they were.”

“The ability to be a thrifty manager to comply with NPDES permit on minimal money and support.”

**Table 15: Proud aspects of implementing MS4 programs**

Proud aspects	Frequency (N=24)	Percent of respondents (N=17)
Cleanup/BMPs	10	59%
Ability to succeed with little support	2	12%
Cooperation	2	12%
Education/public awareness	3	18%
Nothing	2	12%
Did not respond	5	

### 5.1 Ambitiousness

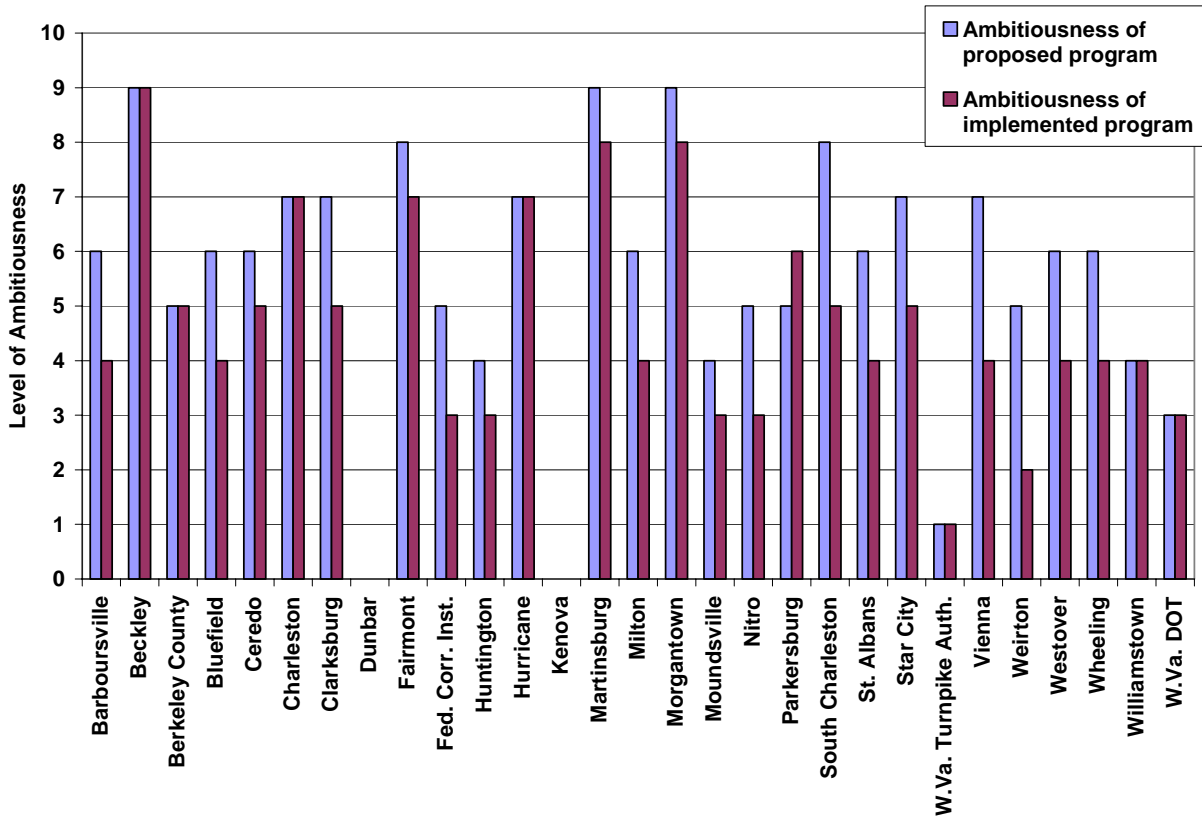
As described in Section 4, the ambitiousness of each MS4’s proposed program and implemented program were ranked on a scale of one to ten. The first ranking, called ambitiousness of proposed program, represents the ambitiousness of what was proposed in the permit application and SWMP. The second ranking, called ambitiousness of implemented program, focuses on what was actually done, and is based on annual reports. The ambitiousness of West Virginia’s MS4s varies widely, as shown in Figure 4.

While all MS4s are ranked on the same scale, certain caveats should be noted. The three non-traditional MS4s—the Department of Transportation, Turnpike Authority, and Federal Correctional Institution—have fairly unique plans that are not necessarily comparable with the others. Also, Berkeley County



scored only a five, but it could be considered to be very ambitious based on the fact that it sought to be involved in the program from the beginning and was not mandated to participate at all.

**Figure 4: Ambitiousness of West Virginia MS4s**



## 5.2 Attitudes

The MS4 program is new in West Virginia, and for it to succeed to its fullest potential, community members, local elected officials, and MS4 staff all must buy in to the program.

Community members fund the program through their tax dollars or monthly fees; therefore, community understanding and support is essential if local governments are going to allocate budget dollars, pass ordinances, or start stormwater utilities that charge fees. This need for community support is related to the public education and outreach MCM. While this MCM is generally focused on teaching people about stormwater and about what they can do themselves to control stormwater pollution, a secondary benefit can be the development of understanding and support for the MS4 program as a whole. For this reason, the successful implementation of public education and outreach efforts may be necessary before community and local elected official support can be garnered to develop a sufficient funding stream, and ultimately a successful program over the long term.

Local elected officials are crucial too: City council members or county commissioners vote on budgets and stormwater ordinances. Elected officials can provide the leadership to help make the program a success. But elected officials who do not buy in to the MS4 program can also stand in the way. For

example, in some communities, local elected officials have strong influence on how stormwater utilities are managed. A lack of support from local officials can hamper the success of an MS4 program.

Finally, MS4 staff implement the program. If they support the program and think creatively and strategically, the MS4 program can succeed and improve year-to-year. If staff's primary responsibility is for other programs—for example, maintaining roads or running a wastewater utility—then the MS4 program might not receive the focused attention that is required. Worse yet, if MS4 staff do not think the MS4 program is worthwhile, it can easily fail.

While the attitudes all three groups of people—community members, local elected officials, and MS4 staff—are important for the success of local MS4 programs, surveys were sent only to MS4 program contacts. Therefore, we have no indication of the support of community members or local elected officials for MS4 programs. Although the initial mailing list included permittees, which often included mayors, in most cases the elected official provided us the name and contact information for the person in charge of the MS4 program, and the MS4 staff member completed the survey.<sup>16</sup>

One question on the survey asked if, overall, the MS4 program is worthwhile. 61% report that it is worthwhile, while an additional 11% state that it is a little worthwhile. Taken together, almost three-quarters of the respondents consider the program to be at least a little worthwhile. Still, these numbers do not reflect a total buy-in to the program, as 28% state that the program is not worthwhile.

MS4s can be distinguished between those that are out of compliance, those that are merely compliant and those that are innovative and creative. Specifically, one MS4 program director noted that his/her goal in implementing an MS4 program was to foster “community understanding, acceptance, and commitment.” Programs that focus on higher goals such as these have a better chance at success and maintenance through the involvement of their community members.<sup>17</sup>

### **5.3 Funding**

Funding MS4 programs is a consistent and complex problem. For MS4s without stormwater utilities, funding is generally allocated from general funds, and large allocations sufficient for comprehensive MS4 programs are less likely to be allocated. When stormwater utilities are implemented, funding can be generated directly from monthly fees, outside of the annual budgeting process.

It is difficult to quantify MS4 budgets. Efforts to do so in the survey for this report did not result in useable data. One reason for this difficulty is that MS4 responsibilities often overlap various city departments such as the Street Department or Public Works Department. In communities where there is no specific allocation for the MS4 program, it is difficult to quantify the MS4 budget. In contrast, in communities with stormwater utilities, or with specific line item budgets for the MS4 program, it is generally easier to quantify MS4 budgets.

MS4s may fund their programs in different ways, as shown in Table 16. MS4s are split relatively evenly between those that fund their programs with revenue generated by the MS4 program, those that receive specific allocations, and those that receive no specific allocation but are funded as one part of a larger budget.

---

<sup>16</sup> The 22 respondents included two elected officials and one city manager.

<sup>17</sup> An analysis was conducted to compare survey responses from respondents who consider the program worthwhile versus those that do not. This analysis did not result in statistically significant differences.

**Table 16: Funding mechanisms for MS4 programs**

<b>Funding mechanism</b>	<b>Frequency (N=22)</b>	<b>Percent of respondents (N=19)</b>
No allocation (part of a larger budget)	7	37%
Specific allocation within a larger budget	6	32%
Revenue generated by MS4 program	6	32%
Did not respond	3	

MS4s were asked if they plan to implement their program through a stormwater utility. A total of 70% have either established a stormwater utility, are in the process of creating a utility, or are considering creating a utility. Only 30% of respondents do not plan to implement a stormwater utility (Table 17).

**Table 17: Plans to implement the MS4 program through a stormwater utility**

<b>Plans for stormwater utility</b>	<b>Frequency (N=22)</b>	<b>Percent of respondents (N=20)</b>
Already have utility	6	30%
In process of implementing utility	1	5%
Considering creating a utility	7	35%
Do not plan to implement utility	6	30%
Did not respond	2	

Local ordinances are required to start such a utility and to make it operational. MS4 communities were asked if they will establish ordinances, if existing ordinances are sufficient, or if no ordinances are necessary. As shown in Table 18, 43% of MS4 communities have already enacted ordinances, and 57% intend to enact ordinances. The fact that 57% of MS4s intend to enact ordinances underscores the importance of generating and maintaining buy-in from local elected officials.

Some communities with ordinances may need additional ordinances. For example, in Morgantown, one ordinance placed the stormwater drainage system under the management, control, and operation of the existing Morgantown Utility Board. A second ordinance established a stormwater utility, and a third provided details on stormwater management plans and permits.

**Table 18: Status of ordinances to establish a stormwater utility**

<b>Status of ordinances</b>	<b>Frequency (N=26)</b>	<b>Percent of respondents (N=21)</b>
Existing ordinances are sufficient	3	14%
Yes, have enacted ordinances	9	43%
Yes, intend to enact ordinances	12	57%
No ordinances necessary	1	5%
Did not respond	1	

Respondents used a variety of resources to establish stormwater utilities, and many used more than one resource. Legal advisors were used by 88% of respondents. Almost the same percentage of MS4s, 81%, relied on other MS4s to help develop ordinances. This is one area where partnerships among MS4s have been formed to share information. The Internet is also widely used to help develop ordinances: More than one-half of respondents relied on the Internet (Table 19).

**Table 19: Resources used to develop ordinances to establish a stormwater utility**

<b>Resources used</b>	<b>Frequency (N=44)</b>	<b>Percent of respondents (N=16)</b>
Legal advisors	14	88%
Other MS4s	13	81%
Internet	9	56%
Other resources	2	13%
Did not respond	6	

MS4s with boundaries that extend beyond city boundaries note the difficulty of collecting their fees outside the city border. In the survey, many programs expressed frustration that development is occurring outside of their city limits, and extending MS4 jurisdiction beyond city limits did little to help with funding because fee collection efforts were often futile.

Some MS4 staff view the MS4 program as an unfunded mandate. This is mentioned by three different respondents with regard to the purpose of the state MS4 program, once under local goals by another respondent, and twice under frustrations. Five separate respondents noted this altogether. Especially in these communities, WVDEP may need to be more creative, or provide incentives, to encourage participation and creative implementation, especially in ways that do not require a significant amount of local funds.

MS4s that think creatively may be able to use the MS4 program as a mechanism to draw new grants or investment into the area. For example, Morgantown’s Burroughs Run and Poponoe Run project demonstrates creativity in lining up many different funding sources to accomplish a flooding/water quality project. This project is also instructive because it was used when the MS4 was being established to get buy-in from elected officials and the public. Even though this project was originally justified on flood control grounds, the Morgantown Utility Board successfully made the case that flooding and water quality are linked and appropriately addressed by the new MS4. This promise to prioritize a solution to the longstanding Burroughs Run and Poponoe Run flooding problems helped smooth out the approval of the necessary ordinances to establish the stormwater utility.

**Creative funding for a large MS4 project in Morgantown**

The Morgantown Utility Board recently secured various types of funding for a flood control and stormwater management project on Burroughs and Poponoe Runs in Morgantown. Funding included an \$8.5 million stormwater loan under the Clean Water State Revolving Fund, the first such infrastructure loan for a stormwater project. Additional funding was provided by a Clean Water Act Section 319 grant and from the West Virginia Department of Transportation and the City of Morgantown. This project demonstrates that it is possible for MS4 communities to receive funding for compelling projects from a variety of sources, in addition to local residents and businesses.

While grants and loans can play a large role in funding successful stormwater projects, the fee structures set by stormwater utilities are also very important. For example, some MS4 communities in West Virginia and other states provide incentives to install LID practices and retrofits by offering discounted stormwater fees. Morgantown, for example, bills commercial sites based on the percentage of impervious surface on each parcel and has considered discounts for using practices such as green roofs and pervious pavers.

Communities may also consider using *in lieu* fees where compliance may be cost-prohibitive and does not, alone, have a critical effect on water quality. These fees could then be used to fund larger public GI projects such as wetland restoration, public rain gardens, and retrofits of public buildings and grounds. Transparency in the planning, designation, and use of such fees is critically important. Williamsburg and Winchester, Virginia have both used such programs to design regulatory flexibility and local benefits into protective stormwater regulations. Integrating stormwater management with other community priorities and planning efforts is another way to secure diverse funding sources and avoid unintended results of stormwater programs like sprawl or disincentives for downtown redevelopment. Additional creative and proven approaches to MS4 financing are presented by the Center for Urban Policy and the Environment (2008).

#### **5.4 Training**

MS4s are run by people, and the more skilled the staff, the better the results. There is an ongoing need for low-cost, frequent training so that the people implementing MS4 programs are well educated, make connections with WVDEP and other MS4s, and stay up-to-date with the most effective technologies and concepts.

This need for more skilled MS4 staff is illustrated by a recent change in West Virginia's construction stormwater general permit. Until recently, this permit required post-construction stormwater management, but it was modified in November 2007 and no longer includes this requirement. Within MS4 boundaries, however, this requirement is still in place, but will be only regulated through the MS4 permit. This shift is therefore likely to place a greater burden on local MS4s that may require a greater familiarity with post-construction concepts.

To deliver information to MS4 staff, workshops are popular. WVDEP held numerous stormwater workshops from 2004 through 2007, many of which focused on MS4s. Workshops have also been good opportunities to allow MS4 staff to share success stories and to find ways to collaborate. One interesting recent WVDEP workshop integrated smart growth with stormwater management, with an audience that included stormwater managers (See box).

##### **The West Virginia Smart Growth Conference**

In 2007, WVDEP sponsored a conference on smart growth for stormwater managers, planners, city councilors, and mayors. The conference focused on integrating smart growth approaches into SWMPs.

While it includes much more than stormwater management, smart growth practices can help reduce impervious areas and preserve open spaces and natural lands.

Most MS4 communities—86% of those surveyed—attended WVDEP workshops (Table 20), and 90% of respondents found them useful (Table 21). Based on this feedback, further WVDEP workshops for MS4s would be advisable.

**Table 20: Types of workshops attended**

<b>Workshop</b>	<b>Frequency (N=39)</b>	<b>Percent of respondents (N=21)</b>
WVDEP workshops	18	86%
USEPA or other external workshops	9	43%
Internal workshops	5	24%
Other workshops	4	19%
None	3	14%
Did not respond	1	

**Table 21: Found WVDEP workshops useful**

<b>Found WVDEP workshops useful</b>	<b>Frequency (N=22)</b>	<b>Percent of respondents (N=20)</b>
Yes	18	90%
No	2	10%
Did not respond	2	

In addition to workshops, partnerships among MS4s can be an effective way to improve capacity. For example, as described above, 81% of MS4s used other MS4s as information sources for stormwater ordinances. Another obvious avenue for collaboration is in the public education and outreach MCM. MS4s might share efforts in developing or printing educational materials. The Morgantown and Beckley MS4s, for example, collaborated in the design and printing of storm drain medallions.

## **5.5 Implementation**

Implementing the MS4 permit requires actions for each of the six MCMs. While the survey did not ask each MS4 for an exhaustive list of practices used to implement each MCM, it did ask about interesting structural and outreach practices that have been implemented.

Structural practices mentioned most frequently by respondents include better development practices and more or better green spaces (Table 22).

**From the survey:  
Interesting structural practices**

“Demonstration rain garden.”

“Grass swales.”

“Requiring more green areas on parking lots.”

**Table 22: Interesting structural practices**

<b>Practice</b>	<b>Frequency (N=28)</b>	<b>Percent of respondents (N=17)</b>
Better development practices	8	47%
More/better green spaces	8	47%
Jurisdictional/organizational changes	3	18%
No interesting structural practices	4	24%
Did not respond	5	

In terms of interesting outreach practices, more than one-half of respondents report that they are educating the public by advertising (Table 23). Almost as many MS4s, 41%, are educating children through the schools. Two MS4s report that they are involved in helping to form local watershed groups.

**From the survey:  
Interesting outreach practices**

“Advertising in town paper.”

“Joining local watershed groups.”

“Billboards”

“We provide an informational program for the elementary school each year.”

**Table 23: Interesting outreach practices**

Practice	Frequency (N=28)	Percent of respondents (N=17)
Education: schools	7	41%
Education: advertisements	9	53%
Local formation of watershed groups	2	12%
No interesting outreach practices	5	19%
Did not respond	5	

Implementation of the MS4 permit should lead to water quality improvements, but monitoring to document these improvements is not required in the permit. Still, 43% of MS4s (N=21) are monitoring stormwater outfalls, and 46% (N=22) are monitoring streams. Monitoring would be needed to confirm whether the practices implemented through the SWMP are benefiting local streams and rivers.

Expectations for water quality improvements are generally high for this program. Almost one-quarter of respondents already report seeing water quality improvements in receiving streams, and more than one-quarter expect to see improvements in the next three years. Overall, 62% of MS4s either already see improvements or expect improvements at some point in the future (Table 24).

But these high expectations are not universal: 29% do not know if water quality improvements will take place, and 10% expect to never see improvements. One factor in West Virginia is that some MS4 communities are small towns on large rivers, and some respondents from these MS4s express doubt that any actions they take could have any measurable impact on the rivers.

**Table 24: Expectations for water quality improvements**

Expectation	Frequency (N=22)	Percent of respondents (N=21)
Already see improvements	5	24%
Expect improvements in next three years	6	29%
Expect improvements after three years	2	10%
Never expect improvements	2	10%
Don't know	6	29%
Did not respond	1	

In addition to water quality improvements, the implementation of practices through the MS4 program may have other ancillary benefits. In fact, most MS4s report such benefits. The largest percentage of MS4s report that implementing their MS4 program also leads to beautification. Almost one-third report

that public awareness is a benefit of their MS4 program. In addition, about one-quarter of respondents note that implementing the MS4 program also results in local infrastructure improvements (Table 25). This link between MS4s and local infrastructure illustrates how the MS4 program can be used as a way to build support and garner funding for infrastructure that otherwise might not be improved. A total of seven MS4s either did not respond or state that the MS4 program has no other benefits.

**Table 25: Other benefits from implementing MS4 programs**

<b>Other benefit</b>	<b>Frequency (N=28)</b>	<b>Percent of respondents (N=19)</b>
Beautification	7	37%
Public awareness	6	32%
Local infrastructure improvements	5	26%
No benefits	4	21%
Flood control	2	11%
Organizational	1	5%
Did not respond	3	

## 5.6 Program evaluation and enforcement

While the survey did not ask explicitly about program evaluation and enforcement, some respondents chose to provide feedback through an open-ended question. Our additional research reveals that stormwater managers face various obstacles to effective SWMP development and implementation that can be directly aided by targeted evaluation and enforcement by WVDEP.

For example, we found a need for specific technical assistance or guidance, which could be provided efficiently, for example, as part of a regular program evaluation from WVDEP and through the development of a statewide stormwater management practices manual.

MS4s also noted a lack of support or cooperation from other local agencies. A credible threat of enforcement from WVDEP could help local MS4 leaders overcome this lack of cooperation.

In addition, program evaluation and enforcement could help convince local MS4 leaders to devote more resources to the program. Still, some local MS4 leaders do not believe the program needs to be implemented in a serious or effective manner, because of flexible MCMs and non-quantitative goals. With more specific feedback from WVDEP, some MS4 staff explained, they could more easily implement their permits because they would know exactly what to do.

Consistent annual reports across all MS4s would help WVDEP evaluate and enforce the permits. A suggested template for an annual reporting form is included in Appendix D. At a minimum, annual reports should include: the permit requirements and SWMP goals, a summary of the year’s activities toward accomplishing planned activities for each MCM, and justifications for significant diversions from

**From the survey:  
Evaluation and enforcement**

“The DEP should have taken a role in MS4 other than to say here are six control measures. Should have been done like an NPDES permit— here are requirements spelled out exactly.”

“The state should develop a technical drainage manual like the one the state of Georgia and other states have developed.”

“The state and MS4 communities could end up having a very high number of varying stormwater manuals, rules, and regulations throughout the state that could significantly vary from community to community if something is not done very soon.”



the approved SWMP. USEPA provides very specific guidance to states on how to define measurable goals for small MS4s and how to evaluate MS4 programs (USEPA, Undated and 2007g).

The WVDEP MS4 program may also want to require MS4s to provide water quality monitoring data, particularly in communities with receiving streams on the 303(d) list. The permittee could collect original data, or could compile data already collected through other state or local programs.

Uniform reporting can help the state's MS4 program staff overcome time constraints by helping the staff evaluate each program more quickly and thoroughly than is possible with the current diversity of reports sent to WVDEP. Many annual reports are difficult if not impossible to evaluate against the MS4s' original SWMPs and permit applications.

With standardized annual reports, MS4 managers would benefit from knowing in advance what elements of information will be evaluated by the state as they implement their programs over the course of the year. Local MS4 managers will also know up front whether activities are to be reported quantitatively or qualitatively.

#### **Evaluation and enforcement in communities with both MS4s and CSOs**

Thirteen communities in West Virginia face both CSO and MS4 permitting requirements. The CSO program requires communities to implement nine MCMs (See Table 5), several of which are similar or complementary to MS4 MCMs. A specific type of watershed-based permit called an integrated individual municipal permit allows a municipal permittee to combine different types of related permits (e.g., CSO and MS4) to reduce time and costs associated with filing and reporting on the two permits separately (Zobrist and Meunier, 2006). In many cases, the activities required for compliance with each permit are also similar and can be consolidated or at least coordinated to improve the effectiveness and efficiency of the municipality's efforts in both programs.

State evaluations of the implementation of MS4 programs can either be screening level or detailed. Screening level evaluations should enable the quick identification of problem areas within a program that need further attention in future evaluations; these evaluations should happen annually. This can be done by reviewing the program files and conducting a phone interview or short visit to the community. Detailed evaluations require a longer visit. They should also include an assessment of the management of the program, as well as inspections of MS4 maintenance activities, construction activities, post-construction controls, and other planned activities. Detailed evaluations can be conducted less often but are perhaps most critical in the first year or two of the program so that the community receives the guidance and assistance from WVDEP needed to set the program on the right track.

Citizens, watershed organizations, and rate payers can also play a watchdog role. Increased transparency and citizen involvement would help MS4s reach their goals in various ways: by helping to get citizens actively involved in support of local programs; by using citizen pressure for increased interagency accountability and cooperation; and by reducing opposition to the program based on misunderstandings about its goals, mandates, and activities.

## **5.7 Partnerships**

Small MS4s often have limitations on budgets and staff. Partnerships can be an effective way to pool resources and make local MS4 programs more efficient and effective. Partnerships among MS4s can help reduce the cost of implementation by sharing ideas and resources. There are many clusters of MS4s that

are very close together (See Figure 1), which would facilitate cooperation. Partnerships within the MS4 community—for example with local watershed organizations or universities—can also be helpful.

### 5.7.1 Among MS4s

Some partnering is already taking place among MS4s. For example, as discussed above, many MS4s relied on other MS4s when developing stormwater utilities. According to the survey, more than one-half of responding MS4s are already sharing information with other MS4s, and an additional 20% plan to share information in the future (Table 26).

Partnerships can go further than information sharing, and the most natural partnerships might be those communities that are in close proximity. For example, Wheeling and Bethlehem; Martinsburg and Berkeley County; and Morgantown, Star City, Westover, and the Federal Correctional Institution are adjacent or overlapping.

**Table 26: Information sharing among MS4s**

Status of information sharing	Frequency (N=22)	Percent of respondents (N=20)
Yes, sharing	11	55%
Sharing planned but not undertaken	4	20%
No sharing planned	5	25%
Did not respond	2	

Establishing partnerships among West Virginia MS4s is not a new idea. In a WVDEP MS4 workshop in May 2005, MS4 staff and consultants performed an exercise to identify the types of activities they could best accomplish via partnerships. In addition, a WVDEP MS4 workshop in November 2005 brought in experts from Kentucky who had worked to bring 33 MS4s together to jointly implement their SWMPs.

### 5.7.2 Within the MS4 community

According to the survey, while only 20% of responding MS4s are already working with outside groups, an additional 25% would like to, and 35% might be willing. Only 20% state that they are not willing to work with outside groups (Table 27).

MS4s might enter into local partnerships with watershed organizations. For example, the City of Morgantown partnered with Friends of Deckers Creek to mark storm drains. And these same two entities partnered with a broader range of organizations on a household hazardous waste collection day.

In addition to watershed organizations, other potential local partners include scouts, community beautification organizations, college student clubs, or high school or middle school classes. Engaged groups could help implement practices with volunteer labor, and could also spread positive and useful information through the community about the program. These groups can also make suggestions for how MS4 activities can be designed to provide ancillary benefits to the community beyond the primary goals of the program.

**Table 27: Willingness to work with outside groups**

<b>Willingness</b>	<b>Frequency (N=22)</b>	<b>Percent of respondents (N=20)</b>
Yes, we are	4	20%
Yes, we would like to	5	25%
Maybe	7	35%
No	4	20%
Did not respond	2	

Whether acting through local community groups or as individuals, citizen understanding of stormwater rules is essential to ensure that the watershed is not being used as a pollution sink. WVDEP provides guidance for citizen involvement in permitting processes (WVDEP, 2006b). Citizen participation can help local MS4s and the state MS4 program learn about and solve stormwater pollution issues.

### **5.8 Jurisdictional issues**

In some cases, multiple agencies or levels of government might have joint responsibility for stormwater management. The survey therefore asked about jurisdictional issues.

Some MS4s are concerned with jurisdictional issues with railroads. In two cases, railroads are reported not to take care of their inlets in their rights-of-way through MS4 areas.

**From the survey:  
Jurisdictional issues**

“Get WVDEP enforcement into the game.”

“Getting city council and municipal judge to be tough on penalties and enforcement.”

“[West Virginia Division of Highways] operations and permitting folks are taking actions that are contrary to the goals and objectives of our MS4 permit. To overcome this, the key will be stronger communication between entities.”

In addition, some MS4s are concerned with jurisdictional issues with the West Virginia Division of Highways. In particular, one MS4 in an interview expressed a concern over the lack of participation from this agency in maintaining the stormwater management systems on its roads within the MS4 area.

Jurisdictional issues may also arise where MS4 and city boundaries do not overlap. In this case, it may be difficult to collect fees from areas outside of the city boundary (See Section 3.2).

Finally, jurisdictional issues arise with enforcement. The MS4 program essentially envisions joint enforcement of construction sites by MS4s and WVDEP. If WVDEP does not credibly enforce the general construction stormwater permit, it can undermine local MS4 programs’ efforts to work together with other responsible parties. In addition, co-permitting has not yet been used in the state to address jurisdictional overlaps.

## 6. RECOMMENDATIONS

West Virginia's MS4 program is up and running. Many communities are embracing the program, developing stable funding streams, and implementing practices to reduce stormwater pollution. Some, however, remain cynical about the program and are moving slowly if at all.

Recommendations for MS4s are intended to help communities implement their local programs more effectively and more efficiently. Recommendations are also provided for WVDEP because the agency oversees the permit and plays a key role in supporting MS4 communities. Finally, recommendations for community members and organizations are also provided because buy-in and participation from the local community is essential if MS4s are to reach their fullest potential.

### 6.1 For MS4s

#### ***6.1.1 Use public education and outreach efforts not just to teach people about stormwater, but also to develop understanding and support for the MS4 program as a whole***

The successful implementation of public education and outreach efforts is an important first step in implementing a successful MS4 program. These efforts can increase support for a sufficient funding stream from community members and local elected officials. One means to accomplish this may be to establish an annual award for the implementation of an innovative community or individual stormwater project.

#### ***6.1.2 Establish a consistent and transparent funding mechanism***

Whether an MS4 implements a stormwater utility or relies on annual appropriations from local governments, a consistent and transparent funding mechanism is necessary so that the program can be implemented successfully. Building community support for your program through outreach, education, and publicized demonstration projects with multiple community benefits can help secure and protect public funding streams.

#### ***6.1.3 Consider stormwater fees that include incentives for behavior change, prevention, and increased local benefits***

If your MS4 is funded with stormwater fees, think creatively about a fee structure that will provide incentives for people and businesses to use practices that help meet the goals of the MS4 program. For example, discounts could be provided as incentives to install LID practices, green roofs, or pervious pavers. Fees could be based on the percentage of impervious surface on each parcel.

Communities may also consider using *in lieu* fees where compliance on specific sites may be cost-prohibitive and does not, alone, have a critical effect on water quality. These fees could then be used to fund larger public GI projects such as wetland restoration, public rain gardens, and retrofits of public buildings and grounds.

#### ***6.1.4 Request the use of Supplemental Environmental Project funds for high profile, educational stormwater management projects***

Supplemental Environmental Project funds are sometimes collected as a penalty for an environmental violation. The violator can negotiate to invest in a local environmental protection or restoration project rather than pay that money in fines. Talk with WVDEP about the availability of such funds in your area. Make sure you have a specific and justifiable project in mind for use of the funds.

**6.1.5 Find ways to link the MS4 program to other community benefits and other programs**

Implementing an MS4 program can provide community benefits in addition to improved water quality and decreased flooding. By finding ways to link the MS4 program to these other benefits and programs, MS4 staff can gain buy-in from local residents and leaders. Establishing linkages could also result in resource sharing that allows more innovative and effective practices to be implemented.

**6.1.6 Look for opportunities to align the MS4 program with the need to preserve and improve aging infrastructure**

Many MS4 communities face a declining tax base, aging infrastructure, and population loss. These characteristics present challenges for MS4s because more problems must be fixed with a shrinking tax base. But these characteristics also present an opportunity for MS4s, because MS4s can be part of the solution for preserving aging infrastructure or using stormwater runoff reduction and GI planning strategies to reduce the need to replace some of that infrastructure.

**6.1.7 Consider integrating county stormwater management requirements with MS4s**

While many counties have enacted stormwater ordinances that deal with water quantity, only Berkeley County has requested coverage under the MS4 program to also deal with water quality. Combining these efforts to address quantity and quality would allow for a more holistic approach to stormwater management. Practically speaking, however, more counties would need to become MS4 permittees.

**6.1.8 Coordinate regulation and enforcement with other elements of the WVDEP stormwater program**

In addition to the MS4 program, WVDEP also regulates construction stormwater and industrial stormwater permits. WVDEP may have more tools at its disposal than local MS4s to enforce stormwater problems. Work with the WVDEP Stormwater Team, your field inspector, and local municipal staff to outline a formal, clearly defined plan, roles, and responsibilities for enforcing stormwater regulations in your community cooperatively, so that no level of government is portrayed as being heavy handed relative to the others.

**6.1.9 Request that WVDEP consider permitting or co-permitting non-traditional MS4s within your jurisdiction**

USEPA's MS4 guidelines encourage states to permit public entities that own and operate separate storm sewer systems. If there is a large public hospital, university, park system, government complex, or similar entity that discharges stormwater in your MS4 jurisdiction and meets the USEPA criteria provided in this document, then that entity should be covered under the MS4 general permit. WVDEP is reliant, to some degree, on communities to help identify those non-traditional facilities. Communities benefit by having increased efforts spent on stormwater management within their jurisdiction.

**6.1.10 Request combined CSO and MS4 program oversight if the community is subject to both programs**

Some measures required for the implementation of CSO and MS4 programs are similar. MS4 communities that are also CSO communities can save administrative time and improve effectiveness of stormwater management efforts by coordinating these efforts where appropriate. Meet with the relevant WVDEP staff to discuss options for formally coordinating the WVDEP and municipal oversight and reporting tasks of the two programs through wet weather permits or other means.

## **6.2 For WVDEP**

### ***6.2.1 Fund promotional efforts to increase buy-in and demonstrate creative practices***

WVDEP would likely facilitate increased buy-in to the MS4 program if there were more opportunities to work jointly on specific projects. Sponsoring or co-sponsoring at least one innovative stormwater project per year—such as the Martinsburg rain garden—would increase the perception among MS4 managers, local officials, and the general public that WVDEP is an active partner. If WVDEP were to fund projects annually, this support could be awarded competitively to communities requesting project support. Support could also be targeted strategically to communities where the MS4 program has been cast in a negative light.

In addition, an annual statewide award for innovative stormwater practices could be integrated with WVDEP's other annual awards, and could provide motivation and recognition for local MS4 programs.

### ***6.2.2 Standardize the SWMP and annual reporting forms***

Standardized forms would help small communities better understand expectations of them, and better track their own successes and goals. These forms would also help local MS4 managers explain to partner agencies the importance of the stormwater program, ideally improving intergovernmental understanding and support. A standardized, electronic form would be a boon to time-strapped MS4 program staff at WVDEP to more quickly and objectively evaluate plans and progress of each community. This evaluation is critical for providing communities with well-targeted technical support, and is also an important foundation for taking enforcement action, should it become necessary.

### ***6.2.3 Use non-threatening program evaluation meetings to strengthen local MS4 programs and provide targeted technical assistance***

WVDEP offers significant evaluation and assistance to MS4s currently by providing workshops or *ad hoc* municipal-specific assistance upon request or during periodic visits. Scheduling formal program evaluation meetings with municipal MS4 staff can clarify to staff what is required of them, provide WVDEP MS4 staff with a more comprehensive idea of what is happening in different MS4 programs and where specific assistance is needed (even if not directly requested), and set transparent compliance and enforcement standards. Such formal evaluation meetings would be best facilitated by using the standardized electronic SWMP and annual reporting forms discussed above.

### ***6.2.4 Send clear signals to MS4 communities that flexible programming is not synonymous with voluntary programming, and that permits can and will be enforced***

While most communities are working diligently to implement this still-new program, others are less interested. In some cases, municipal MS4 staff may not have bought into the program, and in other cases elected officials might directly or indirectly hold back progress. If WVDEP signals that enforcement is likely, then MS4 staff can use this signal to help generate buy-in to the program among related local authorities. Additionally, clear enforcement criteria are needed to signal to those communities that are working to implement their programs effectively that they should not reconsider effort levels based on neighboring or overlapping MS4s' unsanctioned non-compliance. Evaluation meetings could be a good way to clarify compliance issues to MS4s in a formal, non-threatening, and respectful manner.

### ***6.2.5 Permit non-traditional facilities, and regulate them as co-permittees***

West Virginia has numerous state and federal facilities that can likely be covered under the MS4 program. Ensuring that public facilities are held to the same standards as small communities is important for public

relations, and it makes environmental and fiscal sense. Lack of coordination on common goals among spatially overlapping but distinct jurisdictions is harmful to any program. For stormwater management, this is particularly counterproductive since water problems generally do not conform to political boundaries. Non-traditional facilities can be co-permittees. For example, in Morgantown, consideration could be given to whether the Morgantown Municipal Airport, West Virginia University, federal post office, county parks, and West Virginia Division of Highways could all be named as co-permittees with the City of Morgantown and other adjacent municipal MS4s. This may increase the regulatory burden on co-permittees, but overall it would distribute responsibilities more evenly across the community and could lead to a more effective program across all six MCMs. WVDEP should work with traditional permittees to identify potential key non-traditional MS4s within their jurisdictions.

#### ***6.2.6 Ensure more developed and developing land is covered under MS4 permits or other effective stormwater controls***

Some MS4 communities are losing population, and many of the fastest developing areas of the state actually fall *outside* of MS4 boundaries. While retrofitting properties effectively is often a very expensive process, LID ordinances that are clearly defined with specific guidance for implementation have been shown repeatedly to both decrease costs to public budgets (especially infrastructure costs, but also operation and maintenance costs) and to decrease significantly even developers' costs of projects.

While annexation can allow MS4 municipalities to expand their corporate limits to provide for the orderly extension of municipal services to areas becoming urbanized, this process often occurs too late in the land development and planning process, and retrofits are the only remaining approach for communities to address stormwater-related water quality problems. As a result, growing municipalities acquire developments with design problems that increase community costs and are expensive to fix.

One solution would be for WVDEP to ensure that fast developing land outside of MS4 boundaries are included in the MS4 program, either by expanding existing MS4 boundaries, or by using state discretion to issue permits to fast-growing counties. Alternatively, like in Maryland, a state law can require certain stormwater practices such as LID state-wide.

#### ***6.2.7 Provide more specific technical support to communities***

One of the ways that Maryland is able to impose statewide LID mandates on all projects without creating an economic burden upon communities or developers is by providing very specific design and implementation guidance. This allows many Phase II communities to simply refer developers to existing state statutes and guidance. A West Virginia stormwater manual needs to be developed at the state level if local and regional agencies are going to require practices that implement LID and that reduce runoff efficiently and effectively.

A West Virginia manual would not have to be developed from scratch. Maryland's 11 principles of ESD could be a good starting place. The Virginia Department of Recreation and Conservation is working with Virginia Tech University to develop an on-line technical BMP guidance manual that can be easily updated so practitioners can access the latest in BMP technology and efficiency estimates.

#### ***6.2.8 Continue and expand workshops for MS4s***

Most survey respondents attended previous WVDEP workshops, and almost everyone found them useful. Continuing and expanding these workshops will ensure that new MS4 staff can get up to speed on stormwater issues, and can cover new and emerging topics. Workshops are also helpful for sharing success stories and encouraging partnerships.

### ***6.2.9 Find a way to help MS4s collect fees within their watersheds, but outside of city limits***

MS4s that extend beyond city limits note the difficulty of collecting their fees outside the city boundary. In the survey conducted for this report, many programs expressed frustration that extending MS4 jurisdiction beyond city limits did little to help with funding because fee collection efforts were often futile. Assistance from WVDEP in devising a solution to this fundamental issue could help new MS4s establish the financial footing that is necessary to build a successful program.

### ***6.2.10 Clarify linkages between MS4 program and reduction of pollution in impaired waters***

Annual reports submitted by MS4s, with two exceptions, made no mention of how practices were reducing pollutant discharges to locally impaired streams. The common public understanding of stormwater programs is to associate them with the quantity and timing of storm flows, not water quality. However, the purpose of the MS4 program is to improve water quality. In fact, where WVDEP develops TMDLs for areas covered by MS4 permits, MS4s may be required to reduce specific stormwater pollution loads. Current MS4 permits do not require water quality monitoring, which makes it difficult to gauge the success of reducing pollutant discharges into impaired waters. Further education efforts for the general public, MS4 staff, and local elected officials on the links between water quality and quantity would be helpful.

### ***6.2.11 Develop progressive, evolving goals when permits are reissued***

Some MCMs are ongoing, but others can be adjusted over time. For example, it may be unreasonable to expect every community to develop a runoff and pollutant model of their MS4 coverage area within one or two years. But it is also not unreasonable to expect that this be an eventual goal of the MS4 program. Starting with the mapping of outfalls and systems that most communities are scheduled to accomplish this permit period, the next permit should require a step forward from there: possibly water quality monitoring, runoff modeling, or mapping of impervious surfaces by parcel or lot. Particularly in communities that feed polluted runoff to impaired streams, modeling runoff patterns is critical for taking effective pollution control measures and for enabling the TMDL process to work.

## **6.3 For community members and organizations**

### ***6.3.1 Get involved***

Community involvement is a key factor in the success of an MS4 program. Community support for the MS4 program, as reflected through organizations and local elected officials, can help MS4s develop a stable funding stream, implement practices, and succeed in reducing stormwater pollution.

### ***6.3.2 Get educated***

Citizens should read about their local MS4 program, and review WVDEP and USEPA Internet resources to better understand how they can become part of the solution to stormwater pollution problems. Citizens can readily find practices and projects to do at home or in coordination with their workplace, school, or local watershed association to reduce their “stormwater footprint.” Rain gardens, rain barrels, and pervious pavers are among the easiest practices that most urban homes, workplaces, and schools can consider.

### ***6.3.3 Know your stormwater and water quality rights***

Citizen understanding of stormwater rules for individuals, businesses, residences, and others in the community is essential to ensure that the watershed is not being used as a pollution sink. Citizens should



learn about the procedures at the state and local levels for complying with and enforcing MS4 and other stormwater regulations and educate neighborhood and other groups about these procedures. Some MS4 communities have online or phone reporting systems, and WVDEP provides guidance for citizen involvement. People should be encouraged to always follow up with complaints or reports to ensure appropriate action is being taken.

#### ***6.3.4 Help spur creative community projects***

Citizen involvement is key in developing plans for innovative community-wide stormwater projects such as rain gardens, porous pavers in public park areas or around municipal buildings, or rain barrel distribution programs. Citizens should be encouraged to contact WVDEP and local MS4 staff for information about how to finance creative projects with state, federal, or private grant funds. For example, WVDEP has the option to require Supplemental Environmental Projects for permit violations. These projects might be able to fund community projects addressing related environmental improvements. Such projects would have to be coordinated closely with local stormwater managers.

#### ***6.3.5 Support local stormwater programs with your pen***

Writing to local newspapers and elected officials about local experiences with stormwater and the importance of stormwater management can be a very effective way to educate local leaders about the importance of the MS4 program. This kind of vocal support indirectly reinforces MS4 managers as they seek support for activities, whether financial or collaborative, from other city agencies and offices.

## REFERENCES

- Adams, L, E Dove, and D Leedy. 1984. Public Attitudes Toward Urban Wetlands for Stormwater Control and Wildlife Enhancement. *Wildlife Society Bulletin* 12(3):299-303.
- American Rivers. 2002. *Paving Our Way to Water Shortages: How Sprawl Aggravates the Effects of Drought*. Washington, DC: Smart Growth America.
- Berkeley County Source Water Assessment and Protection Team. 2004. Berkeley County, West Virginia Source Water Assessment and Protection (SWAP) Project. March.
- Blair, Meyishi Pearl. 2007. Pipeline. *Public Service Commission Newsletter*. March-April.
- Blankenship, Karl. 2007 "Groups advocate tougher stormwater permits in region; Caps on impervious surfaces, measurable pollution limits in runoff among items sought." *Chesapeake Bay Journal*. July/August.
- Center for Urban Policy and the Environment. 2008. *An Internet Guide to Financing Stormwater Management*. <http://stormwaterfinance.urbancenter.iupui.edu>. Accessed February 12.
- Center for Watershed Protection. 2001a. *The Economic Benefits of Better Site Design in Virginia*. For Virginia Department of Conservation and Recreation. December.
- \_\_\_\_\_. 2001b. *The Economic Benefits of Protecting Virginia's Streams, Lakes, and Wetlands*. For Virginia Department of Conservation and Recreation. December.
- Zielinski, Jennifer. 2000a. *The benefits of better site design in residential subdivisions*. In: *The Practice of Watershed Protection*. Thomas R. Schueler and Heather K. Holland, eds. Ellicott City, MD: Center for Watershed Protection.
- \_\_\_\_\_. 2000b. *The benefits of better site design in commercial development*. In: *The Practice of Watershed Protection*. Thomas R. Schueler and Heather K. Holland, eds. Ellicott City, MD: Center for Watershed Protection.
- Clevenger, Brian. 2007. MS4 Stormwater Program Manager, Maryland Department of the Environment. Conversation with author Schrecongost. October 24.
- The Conservation Fund, Freshwater Institute. 2006. *Jefferson County Green Infrastructure Assessment*. [www.wvnet.org/JCGIA\\_main.htm](http://www.wvnet.org/JCGIA_main.htm). Accessed November 24.
- Green Infrastructure Center. 2008. *Green Infrastructure Center, Welcome*. [www.gicinc.org](http://www.gicinc.org). Accessed February 12.
- Hankins, Joseph. 2007. Vice President, The Conservation Fund. Conversation with author Schrecongost. October 22.
- Maryland Department of the Environment. 2007a. *NPDES General Permit for Discharges from Small Municipal Separate Storm Sewer Systems*. [www.mde.state.md.us/programs/waterprograms/sedimentandstormwater/storm\\_gen\\_permit.asp](http://www.mde.state.md.us/programs/waterprograms/sedimentandstormwater/storm_gen_permit.asp).
- \_\_\_\_\_. 2007b. *Maryland's Stormwater Management Act of 2007*. [www.mde.state.md.us/Programs/WaterPrograms/SedimentandStormwater/swm2007.asp](http://www.mde.state.md.us/Programs/WaterPrograms/SedimentandStormwater/swm2007.asp). Accessed December 11.
- \_\_\_\_\_. 2004. *National Pollutant Discharge Elimination System General Permit for Discharges from State and Federal Small Municipal Separate Storm Sewer*

- Systems. General Discharge Permit No. 05-SF-5501. General NPDES No. MDR 055501. [www.mde.state.md.us/assets/document/REV94S~1.pdf](http://www.mde.state.md.us/assets/document/REV94S~1.pdf). Effective Date: November 12.
- Molloy, Jennifer. 2007. USEPA Water Permits Division. E-mail to author Schrecongost. September 18.
- Morgantown Utility Board. 2007. Burroughs Run/Poponoe Run Stormwater Control Project. [www.mub.org/pdfs/fullexesum.pdf](http://www.mub.org/pdfs/fullexesum.pdf). March 15.
- New Jersey Department of Environmental Protection. 2005. Highway Agency Stormwater General Permit. Division of Water Quality. [www.state.nj.us/dep/dwq/pdf/final\\_highway\\_permit.pdf](http://www.state.nj.us/dep/dwq/pdf/final_highway_permit.pdf). Effective date September 1.
- Ralston, Mark R. and IS Oweis. 1999. Geotechnical Engineering Considerations for Stormwater Management in Karst Terrain. *Pennsylvania Stormwater Management Symposium*. Villanova University, Villanova, Pennsylvania. October 20-21.
- Schonlau, Matthias, RD Fricker, and MN Elliott. 2002. Conducting Research Surveys Via E-Mail and the Web. *Rand*.
- Schueler, Tom. 2008. Telephone conversation with author Schrecongost. January.
- \_\_\_\_\_. 2000. The importance of imperviousness. In: *The Practice of Watershed Protection*. Thomas R. Schueler and Heather K. Holland, eds. Ellicott City, MD: Center for Watershed Protection.
- Stranko, Tim. 2007. Steptoe & Johnson PLLC. E-mail to author Schrecongost. July.
- Sutherland, Roger C. 2000. Methods for estimating the effective impervious area of urban watersheds. In: *The Practice of Watershed Protection*. Thomas R. Schueler and Heather K. Holland, eds. Ellicott City, MD: Center for Watershed Protection.
- United States Census Bureau. 2007a. County data for 1990 and 2000. [http://arcdata.esri.com/data/tiger2000/tiger\\_download.cfm](http://arcdata.esri.com/data/tiger2000/tiger_download.cfm). Downloaded December.
- \_\_\_\_\_. 2007b. Interim Population Projections. [www.census.gov](http://www.census.gov).
- United States Department of Agriculture. 2007. Economic Research Service. West Virginia State Fact Sheet. Downloaded from [www.ers.usda.gov/StateFacts/WV.htm](http://www.ers.usda.gov/StateFacts/WV.htm). Data updated August 30, 2007.
- United States Environmental Protection Agency (USEPA). 2008a. National Menu of Stormwater Best Management Practices. <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm>. Visited January 21.
- \_\_\_\_\_. 2008b. About Smart Growth. [www.epa.gov/dced/about\\_sg.htm](http://www.epa.gov/dced/about_sg.htm). Visited January 21.
- \_\_\_\_\_. 2008c. Environmental Benefits Of Smart Growth. [www.epa.gov/dced/topics/eb.htm](http://www.epa.gov/dced/topics/eb.htm). Visited January 21.
- \_\_\_\_\_. 2007a. Report to West Virginia Department of Environmental Protection: Options for WV's General Stormwater Permit under NPDES Phase II. November 1.
- \_\_\_\_\_. 2007b. Development Growth Outpacing Progress in Watershed Efforts to Restore the Chesapeake Bay. Office of Inspector General. Report No. 2007-P-00031.
- \_\_\_\_\_. 2007c. Managing Wet Weather with Green Infrastructure: a periodic update on activities. Volume 2007, Issue 1. September.
- \_\_\_\_\_. 2007d. Green Infrastructure Statement of Intent. USEPA and National Association of Clean Water Agencies (NACWA), Natural Resources Defense Council

- (NRDC), Low Impact Development Center (LID), Association of State and Interstate Water Pollution Control Administrators (ASIWPCA). April 19.
- 
- \_\_\_\_\_. 2007e. Press Release: USEPA, State, Environmental Groups Promote “Green Infrastructure” Solutions to Water Pollution. April 19.
- 
- \_\_\_\_\_. 2007f. USEPA Watershed-based Permitting Technical Guidance, Watershed-based National Pollutant Discharge Elimination System (NPDES) Permitting Technical Guidance. Office of Wastewater Management. USEPA 833-B-07-004. [http://www.USEPA.gov/npdes/pubs/watershed\\_techguidance\\_entire.pdf](http://www.USEPA.gov/npdes/pubs/watershed_techguidance_entire.pdf). August.
- 
- \_\_\_\_\_. 2007g. MS4 Program Evaluation Guidance. Office of Wastewater Management. USEPA-833-R-07-003. January.
- 
- \_\_\_\_\_. 2007h. Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices. Nonpoint Source Control Branch. EPA 841-F-07-006. December.
- 
- \_\_\_\_\_. 2005. Stormwater Phase II Final Rule, Fact Sheet 2.1, Who’s Covered? Designation and Waivers of Regulated Small MS4s. Office of Water. USEPA 833-F-00-003. Revised December.
- 
- \_\_\_\_\_. 1995a. Combined Sewer Overflows: Guidance for Nine Minimum Controls. Office of Water. 832-B-95-003. May.
- 
- \_\_\_\_\_. 1995b. Economic Benefits Of Runoff Controls. Office of Wetlands, Oceans and Watersheds (4503F). EPA 841-S-95-002. [www.epa.gov/nps/runoff.html](http://www.epa.gov/nps/runoff.html). September.
- 
- \_\_\_\_\_. Undated. Measurable Goals Guidance for Phase II Small MS4s. [www.epa.gov/npdes/pubs/measurablegoals.pdf](http://www.epa.gov/npdes/pubs/measurablegoals.pdf).
- United States Geologic Survey. 2003. USGS Landcover (2001 Impervious Dataset). Created September 1.
- Virginia Department of Conservation & Recreation. 2008. Natural Heritage: The Virginia Conservation Lands Needs Assessment. [www.dcr.virginia.gov/natural\\_heritage/vclna.shtml](http://www.dcr.virginia.gov/natural_heritage/vclna.shtml). Accessed February 14.
- West Virginia Department of Environmental Protection (WVDEP). 2007a. 2006 Integrated Water Quality Monitoring and Assessment Report. Division of Water and Waste Management.
- 
- \_\_\_\_\_. 2007b. Fact Sheet, Rationale and Information for General NPDES Permit for Construction Stormwater. Division of Water and Waste Management. July 31.
- 
- \_\_\_\_\_. 2007c. Stormwater Permit Team Website. Stormwater Construction General Permit ([www.wvdep.org/dwwm/stormwater/construction.htm](http://www.wvdep.org/dwwm/stormwater/construction.htm)), Multi Sector Stormwater Permit ([www.wvdep.org/dwwm/stormwater/multi.htm](http://www.wvdep.org/dwwm/stormwater/multi.htm)), and Municipal Separate Storm Sewer System (MS4) General Permit ([www.wvdep.org/dwwm/stormwater/MS4.htm](http://www.wvdep.org/dwwm/stormwater/MS4.htm)). Visited December 4.
- 
- \_\_\_\_\_. 2007d. Order Book, listing Administrative Orders and other enforcement actions from 12/20/04 through 10/4/07.
- 
- \_\_\_\_\_. 2006a. Final Report, Water Resources Protection Act Water Use Survey. December 29.
- 
- \_\_\_\_\_. 2006b. Citizen’s Guide. Office of Environmental Advocate.

- West Virginia Department of Health and Human Resources. 1999. State of West Virginia Source Water Assessment and Protection Program. Bureau for Public Health, Office of Environmental Health Services, Environmental Engineering Division. August 1.
- West Virginia Flood Protection Task Force. 2004. West Virginia Flood Protection Plan. [www.wvca.us/flood](http://www.wvca.us/flood).
- Wilkins, Sherry. 2008. MS4 Coordinator and Environmental Resource Specialist, WVDEP. Personal communication. January 2.
- \_\_\_\_\_. 2007. Current MS4 Municipalities. Updated April 18.
- Worthen, Blaine, J Sanders, and J Fitzpatrick. 1997. Program Evaluation: Alternative Approaches and Practical Guidelines, Second Edition. Addison Wesley.
- Zobrist, Marcus and D Meunier. 2006. Watershed-based NPDES Permitting. Environmental Trading Network Training Workshop on Water Quality Trading. Water Permits Division, USEPA. Washington, DC. August.

## APPENDIX A: THE SURVEY INSTRUMENT

### SURVEY MS4 COMMUNITIES IN WEST VIRGINIA

1. Name of MS4:

**In the first section, we have some general questions.**

2. What do you think is the fundamental purpose behind **the state's** MS4 program?
3. What do you think is/are the most important goal(s) for **your** MS4 program?
4. Some communities already had stormwater efforts in place before the MS4 program began, while others did not. How did your community manage stormwater before the MS4 program began, if at all?
5. When did this office receive formal notification of the requirement for an MS4 permit?  
Year: \_\_\_\_\_ Month: \_\_\_\_\_
6. What is the job title of the MS4 program **supervisor** in the local government or utility board? (For example, Stormwater Manager, Utilities Director, Wastewater Treatment Plant Operator, Mayor)
7. What is **your** job title?

8. Sometimes the same agency, department, or firm is responsible for both **developing** and **implementing** MS4 programs. For your MS4, who is responsible for each?

<b><u>Developing the MS4 program</u></b> <b>(Check all that apply)</b>	<b><u>Implementing the MS4 program</u></b> <b>(Check all that apply)</b>
<input type="checkbox"/> 1. Local government What office or department? _____	<input type="checkbox"/> 1. Local government What office or department? _____
<input type="checkbox"/> 2. Local utility/sanitary board	<input type="checkbox"/> 2. Local utility/sanitary board
<input type="checkbox"/> 3. Outside contractor For what office or department? _____	<input type="checkbox"/> 3. Outside contractor For what office or department? _____
<input type="checkbox"/> 4. Other _____	<input type="checkbox"/> 4. Other _____

**In this section, we have some questions about the implementation of your MS4 program.**

9. Have you or do you plan to implement your MS4 Program through a stormwater utility?
1.  We already implement through a stormwater utility
  2.  We are in the process of implementing through a stormwater utility
  3.  We are considering creating a stormwater utility
  4.  We do not plan to implement through a stormwater utility

10. Did or will your community enact any new ordinances to establish the stormwater utility and/or to implement your MS4 program (Check all that apply)?

- 1.  No ordinances are necessary
- 2.  Existing ordinances were already sufficient
- 3.  Yes: have enacted ordinance(s)
- 4.  Yes: intend to enact ordinance(s)

If you answered Yes (3 or 4):

a. What types of ordinance(s)?

b. Who has or will draft/develop the ordinance(s)?

c. What resources were or will be used in developing the ordinance(s)?

- 1.  Web sites
- 2.  Other MS4s
- 3.  Legal advisors
- 4.  Other: \_\_\_\_\_

11. How much human resource time/effort supports the **implementation** of the MS4 program?

Type of staff	Percent of effort accomplished by contractors or consultants	Number of internal staff	Total number of hours per week for these internal staff, on average
Supervisor (from Question 9)			
Engineer			
Laborer			
Secretary and Support Staff			
Legal Counsel			
Other: _____			

12. Do volunteers or community organizations help implement your MS4 program?

- 1. No
- 2. Yes. Please describe: \_\_\_\_\_



13. How is your MS4 implementation funded?

1. \_\_\_ MS4 funds are part of a larger budget with no specific allocation to the MS4 program
2. \_\_\_ MS4 funds have a separate line within a general larger budget
3. \_\_\_ Revenue is generated by the MS4 program.

If you answered 3:

a: Please describe:

- i. \_\_\_ Fees with utility bills: \_\_\_\_\_
- ii. \_\_\_ Fines and permit application fees on construction projects: \_\_\_\_\_
- iii. \_\_\_ Other: \_\_\_\_\_

14. What were your MS4 program expenditures in fiscal year 2005/2006? (If you chose 1 in the previous question, please estimate your MS4 expenditures here)

- \$ \_\_\_\_\_ Contractor/Consultant  
\$ \_\_\_\_\_ Capital  
\$ \_\_\_\_\_ Salaries/Wages  
\$ \_\_\_\_\_ Supplies/Materials  
\$ \_\_\_\_\_ Training/Education  
\$ \_\_\_\_\_ All other expenditures. Please describe: \_\_\_\_\_  
\$ \_\_\_\_\_ Estimated total expenditures for 2005/2006

15. How was the budget set for your MS4 program?

16. What aspects of MS4 implementation have been difficult to accomplish?

17. What aspects were easily accomplished?

18. As you **implement** your MS4 program, have you or are you taking any steps to share information or activities with other MS4s?

1.  None planned
2.  Planned but not yet undertaken
3.  Yes, we are sharing information and/or activities with other MS4s.

If you answered 2 or 3:

a. Please describe:

19. Have any of your MS4 Program staff attended trainings/workshops related to MS4 implementation over the last 3 years (Check all that apply)?

1.  No
2.  DEP-sponsored stormwater trainings/workshops
3.  Internally-sponsored trainings/workshops
4.  EPA or other externally provided trainings/workshops
5.  Other. Please describe: \_\_\_\_\_

If you answered 2:

a. Are the DEP-sponsored trainings/workshops valuable?

1.  Yes
2.  No

20. Do you think DEP provides the support you need to help you **implement** your MS4 program?

1.  Yes
2.  No

If you answered No:

a. What support should DEP provide?

21. What obstacles do you see in implementing your MS4 program?

22. Please explain any jurisdictional issues that may impact your ability to **implement** your MS4 program in any of the following categories.

1. WVDEP or EPA

2. WV DOH/Railroads

3. Local/MS4 coverage area

23. What problems do you perceive to exist related to enforcing your MS4 program?

24. To understand the impact from your MS4, you might choose to monitor outfalls and/or streams. Are you monitoring outfalls and/or streams as part of your MS4 program?

<b>Monitoring outfalls?</b>	<b>Monitoring streams?</b>
___ 1. No. Why not?  	___ 1. No. Why not?  
___ 2. Yes. Please describe.  	___ 2. Yes. Please describe.  

25. Are you or would you be interested in working with a school, local watershed or other civic organization to conduct monitoring?
1. \_\_\_ No
  2. \_\_\_ Maybe
  3. \_\_\_ Yes, we are
  4. \_\_\_ Yes, we would like to
26. When do you expect to see the first instream water quality improvements due to your MS4 efforts?
1. \_\_\_ Already see improvements
  2. \_\_\_ In the next 3 years
  3. \_\_\_ After 3 years
  4. \_\_\_ Never
  5. \_\_\_ Don't know
27. What interesting structural practices are being implemented or planned as a result of your MS4 program? (Some new ideas include low impact development techniques, green roofs, rain gardens, etc)
28. What interesting public outreach practices are being implemented or planned as a result of your MS4 program? (Some new ideas include mascot contests, creation of a watershed group, targeted special presentations, etc....)

**Finally, we'd like to get your general perspective on your MS4 program.**

29. While MS4 programs focus on water quality and quantity, certain practices may also have other benefits. What other benefits have you found, or do you expect, to result from implementation of your MS4 program (such as protecting and renewing infrastructure, community pride or beautification, etc.)?
30. What aspect(s) of your MS4 program are you most frustrated by?
31. What aspect(s) of your MS4 program are you most proud of?



## APPENDIX B: RESPONSES TO OPEN-ENDED QUESTIONS

What do you think is the fundamental purpose behind the state's MS4 program?

Address secondary stormwater point sources in a more rural environment.
Clean water/erosion control.
Compliance with an unfunded federal mandate of the Clean Water Act to put the burden of inspection and monitoring stormwater onto local authorities. And most importantly to clean up our greatest natural resource.
Erosion and sediment control; Protect water quality.
I think the process should be a part of ICC as it relates to building permits, not by making local ordinances.
Improved water quality.
Improvement and protection of surface water quality.
Locate and monitor illicit discharges and eventually eliminate them.
Passing the buck on to someone else. It's a federal mandate that was handed to the state and the state handed to us. Local communities have to pay for a federal mandate.
Reduced pollution and flooding associated with stormwater runoff.
Separate sanitary from stormwater; clean streams and rivers.
The state MS4 program's fundamental purpose to enforce provisions of Phase II of the stormwater rules under the Clean Water Act. This is done through WV DEP's permitting program. The goal of the MS4 program would be to reduce pollution from urban runoff sources that is discharged by municipal separate storm sewers in West Virginia.
To develop a plan/program for addressing pollution generated from stormwater runoff.
To help clean up our creeks and the Ohio River from unwanted chemicals, etc.
To improve the quality of City's stormwater.
To improve the water quality of the state's streams and lakes.
To maintain clean and safe streams so they can provide water for drinking and provide a safe habitat for aquatic life.
Training, educating the public, enhance water quality.
Unfunded mandate.
Water quality improvement.
We are new to the program and don't know anything about the state's program.

What do you think is/are the most important goal(s) for your MS4 program?

According to the planning done by our Stormwater Action Committee, a community stakeholder committee, the two important goals for our program are to address the aging drainage infrastructure in our community and all of the management problems that result and second to educate the public on stormwater issues and the role they play in this type of pollution.
Cleaner and less water into streams.
Community understanding/acceptance/commitment.
Cost of service versus water quality standards.
Development of effective programs and policies that preserve or enhance the quality of stormwater runoff, control the quantity of runoff, reduce erosion, and prevent flooding.
Education of the public and good housekeeping of city facilities.
Improve stream quality.
Improve water quality, ID stormwater problems, educate public.
It should be addressed at the national level.
Keeping the DEP from fining us. It's not realistic, just lots of paper work. Amount of work is not relative to our impact. [Statement deleted to preserve confidentiality].
Less and cleaner water at the end of the storm pipes.
Mapping the stormwater network in turn creates mapping for sanitary network.
Provide public education/awareness of local impact upon our watershed.
Public education and pollution prevention.
Raise public awareness; address areas of illicit discharges.
Separating the sanitary from the storm.
To aid in the overall program.
To decrease stormwater pollutants.
To monitor and track the effectiveness of SWM measures and to improve runoff conditions by implementing various BMPs.
To prevent the illegal products from getting into stormwater inlets; to control run-off at all construction and building sites; educate public about proper procedures and care of stormwater.
Total compliance with Phase II permit requirements including more stringent construction monitoring and regulation, illicit discharge elimination, mapping the existing sewer system, and public education regarding pollution prevention to reduce the pollutants in our stream.

Some communities already had stormwater efforts in place before the MS4 program began, while others did not. How did your community manage stormwater before the MS4 program began, if at all?

Absolutely no documentation on any upgrades projects. Upgrades were made only out of necessity.
Catch basins/drop inlets routinely inspected and cleaned; monitor new construction for erosion/existing ordinance on stormwater.
City crews maintained storm sewers, the city ordinances call for green spaces, the city participates in a tree-street program, city has a beautification commission, the sanitary board has an ongoing Sewer System Evaluation Program identifying potential cross connections.
Continued sewer separation projects to help eliminate combined sewer overflows. Started with [number deleted to preserve confidentiality] CSOs, now down to [number deleted to preserve confidentiality].
Did not manage.
It has never been managed.
No real effort prior to MS4 program. We only concerned ourselves with the quantity of water to be handled.
None.
Nothing.
Our Public Works Division controlled the situation and by ordinance sewer and water have been separated.
Our stormwater management was through the Public Works Department. We did cleaning, maintenance, & construction.
Practicing some of the BMPs and post construction runoff.
Similar to a lot of the things we were required to do with new permit. Street sweeping, catch basin cleaning—mostly for beautification goals.
Stormwater was mainly handled in a reactive manner and primarily focused on addressing drainage problems. The City Public Works Department routinely responded to citizen complaints and addressed problems. Two major flood control projects have been completed by NRCS in the City since 1995.
SWM/ES ordinance adopted in 2003. Ordinance is very good and is strongly enforced.
The City had an ongoing program of daily street sweeping and drain inlet cleaning. Several years prior to the start of our MS4 program we completed a GIS mapping system for the city's utilities including storm sewer structures and pipes.
The city is a combined sewer community with [number deleted to preserve confidentiality] permitted CSO points. It is estimated the city has at least a [percentage deleted to preserve confidentiality] combined system. The only stormwater management in the city prior to MS4 was regulating the combined system to disallow additional water volume to be added into the system from new construction and/or developments and minimal erosion and sediment controls.
The mapping system of street and of the sewer system.
Through individuals NPDES permits with associated monitoring and reporting.
Through Public Works Department through the general fund.
Through the city Public Works Department.

Did or will your community enact any new ordinances to establish the stormwater utility and/or to implement your MS4 program? If Yes, What types of ordinance(s)?

3 ordinances were necessary, 1) adding stormwater to the duties of the Sanitary Board; 2) officially creating a stormwater utility under the Sanitary Board; 3) ordinance establishing rules governing the utility, defining rates, and enacting stormwater pollution control programs (illicit discharge, construction site runoff, and post construction runoff, etc.).
Building/Construction; Fee for impervious surfaces; illegal dumping.
Construction runoff control/fines and penalty/develop regulations.
Create utility; transfer authority from city to utility; enact rates and design standards.
Established a stormwater utility; put it under the Sanitary Sewer Board; set fees; and set rules and regulations.
Giving city legal authority to fully implement its SWMP.
Illicit discharge detection and elimination. Possible creation of a stormwater utility, adoption of a stormwater manual currently under development. All ordinances will include entire watersheds beyond corporate boundaries, inspection, and penalties.
Not sure.
One that covers entire program.
Ordinances to enable city staff to inspect and regulate on provide property. Plan utility creation and fee establishment.
Planning, construction, fees, enforcement.
Regulatory.
Review and upgrade is tentatively planned.
Stormwater management.
Stormwater, construction, post-construction.
Updated construction ordinance.

How was the budget set for your MS4 program?

Based on estimated income.
Based on income from fees.
Based on personnel services and projects.
By council.
City council approved \$30,000. City did not carry over remaining \$28,000.
Estimated – unknown.
General funds to get started.
Guesstimated by Mayor.
Implementation planning stage.
It is included in the storm sewer maintenance line item in our annual budget.
No budget, address sanitary issues on a project by project basis.
None yet.
Not yet been set.
Planning was done through a stakeholder committee called the stormwater action committee based on their work of determining the top priorities for the MS4, defining a level of service and benchmarking program costs with programs from across the country through the reference to the work of Andrew Reese and comparison with other WV MS4s. Our first year budget will be [dollar amount deleted to preserve confidentiality]. In year 2, when we transition to non-residential rates based on impervious area the budget will be about [dollar amount deleted to preserve confidentiality].
Previous history.
Request from Public Works budget by City Engineering.
Stormwater is assigned in general fund budget each year.
There was no actual budget for the Stormwater Manager during FY 05/06. Other than salary. I was fortunate to get funding from other departments to accomplish the mapping, BMP maintenance, etc. by working diplomatically with the department heads to accomplish common goals.

What aspects of MS4 implementation have been difficult to accomplish?

Additional funding.
Community involvement.
Don't know just getting started.
Educating public who are against paying fees.
Elected officials will not get involved enough - hard to learn new language of MS4 program and all the acronyms and very hard to then translate that to make city staff and community members feel like program/goals are important and what they need to do about it if the language is so foreign. Also, community is extremely small and small sanitary board staff was already tapped on small budget.
Funding and internal support and changes.
Funding, mapping.
Getting the program started to the point where the city can hire a program coordinator.
Getting the time set aside for all Dept. public education and public involvement.
Haven't received permit to implement from DEP.
Illicit discharges and upgrade assessments.
Just getting started.
Payment of mapping services. City is only mapping 20% of the city each of the 5 years.
Post construction runoff control on EVERY PERMIT.
Public involvement and construction and post-construction ordinance and implementation.
Public outreach - education and participation.
Securing funding for staff and equipment.
There have been many difficult aspects. One of the biggest obstacles has been educating the developers and constructors, you now must regulate. In our local area, we have found both representatives from the area as well as folks from the outside are not well informed on the Phase II rules and regulations. So, you have to educate each and basically provide a high level of assistance as they try to design and build their project. These high levels of assistance use a lot of available staff resources and prevents our program from focusing on other areas. Resources are also a major issue. The 6 minimum control measures are so diverse, it is difficult to find employees that have the skills necessary to address all 6 MCM areas. That is because each MCM requires different skill sets. For small WV municipalities, it is hard to justify hiring multiple staff to cover all MCMs. It also may be more cost effective if it was possible to form collaborative partnerships with other MS4 communities.



What aspects were easily accomplished?

All kind of hard, but maybe passing the initial ordinance was easiest.
BMPs.
Discovered several stormwater issues during several development projects; a few assessments completed in certain areas during construction activities.
Getting credit toward measurable goals when completing significant stormwater problematic projects.
Maintenance, construction, repair, cleaning, monitoring.
Management of municipal operations with stormwater contamination potential.
Mapping.
Mapping.
Mapping outfalls, staffing.
None.
None - it has been an uphill battle.
Nothing has been easy. Forming the watershed association has probably been our biggest success. The effort is resource intensive though.
Organization of program - it looks good on paper.
Pollution prevention and good housekeeping BMPs.
The Sanitary Board did a lot of the mapping in 2005-2006.
Workshops provided by governmental agencies.

Do you think DEP provides the support you need to help you **implement** your MS4 program? If No, What support should DEP provide?

Arranging funding strategies and enable enforcement.
DEP should be ones doing this program. They are the environmental enforcement, aren't they?
Funding help, websites, newsletter, role model.
Money and state inspectors.
More interaction and brainstorming sessions among the MS4 communities throughout the state to share ideas, experiences, and programs. A statewide stormwater committee chaired by DEP personnel would be very helpful.
Provide small towns by helping pay part of anticipated costs. No more fees.
Training and money.
What support should DEP provide? While DEP does make an effort to provide resources, the level of support is nowhere near where it needs to be to have successful MS4 programs in the state. DEP could help insure the success of the program by providing some assistance to help form a municipal collaborative to help cost share public education costs, since our cities' media markets overlap so much. DEP could also help produce a state stormwater reference manual that cities could reference in their stormwater ordinances. Having a common manual is good for economic development because site developers will have a common reference of criteria for across the state instead of having to learn 20 or 30 different sets of standards/criteria. Other states have figured this out (Maryland, Virginia, Georgia, Minnesota, etc.) A common stormwater manual is also more cost effective for programs because they don't have to spend the money developing and then maintaining 20 or 30 different manuals or criteria.

What obstacles do you see in implementing your MS4 program?

A large obstacle is educating and bringing the community (citizens and stakeholders) up to speed on why stormwater management is important and what the new rules and regulations mean. From our experiences, these concepts are totally foreign to a lot of people and you must educate them to get the community buy-in necessary to sustain the program. Additional obstacles are getting multiple entities on the same page as far as regulation and control of the MS4. Our service area includes extra-jurisdictional areas outside of corporate limits as well as many miles of roadway maintained and controlled by WV DOH. Currently, there are some obstacles we must overcome concerning getting these other entities to recognize the concerns we are having. For instance, WV DOH operations and permitting folks are taking actions that are contrary to the goals and objectives of our MS4 permit. To overcome this, the key will be stronger communication between entities.
Additional funding.
Adequate staffing.
Collecting the annual fees.
Collection of the utility.
Community leaders are too scared to create utilities or implement fees.
Compliance by public and private sectors.
Cooperation between city departments.
Cost of testing when one chemist could cover several communities.

Creating a funding source for the stormwater program is a very big obstacle. The citizens have faced many rate increases from the local sanitation authority over the past 6 years and another increase is coming very soon due to stringent EPA and DEP regulations on CSO's. The EPA and DEP should evaluate the two programs. 1) Stormwater six minimum controls and 2) Combined Sewer Overflow nine minimum controls to demonstrate where there are common areas of the two programs. One of the common areas would be system wide mapping and should be required as part of the CSO long term control plan for the entire sewer system to be mapped and studied including all sanitary and storm sewers. This method could allow for certain sewer separation projects and cost-effective stormwater runoff reductions that could drastically impact and lower the number of CSO events per year which is the ultimate goal of the CSO program. It seems that nobody wants to listen to that approach because the belief is that both systems should be treated as total separate programs. This is not a cost-effective approach to solving the CSO problem. The citizens of this city cannot afford to pay additional projected sanitary fees of up to \$100 per average household along with an additional stormwater fee.
DOH and RR runoff.
Educating public and contractors.
Equipment cost.
Getting \$ for educational materials.
Getting city council and municipal judge to be tough on penalties and enforcement.
Getting city council involved with MS4 program - they listen, but...
Getting city council to approve ordinances.
Getting staff to assist with inspections/properly record results and take notes.
Local politics and lack of leadership.
Manpower - extra costs to cities.
Money.
Money.
Not enough people to get the job done right.
People.
Prioritizing capital improvement projects.
Public education.
Public interest.
Staffing.
Staffing.
The most obvious concern with WVDEP has to be how the MS4 regulations fit with their construction stormwater permit program. As a local entity we are afforded the opportunity to review plans in more detail than the state agency has the resources to do. We also happen to know about more of the on the ground issues (water quality problems/downstream flooding concerns, etc.). As EPA has advocated it probably makes sense for the state agency to delegate the general construction stormwater permit down to the local level. It also streamlines permitting, inspection and enforcement if fewer entities are involved. Another concern has been that training of stormwater inspectors is not standardized and there is no standard guidance, so too much subjectivity enters into reviewing sites and differing opinions between local inspectors and DEP inspectors can become a problem and potentially undermines the authority and credibility of the local MS4 authority.
The town feels that the stormwater utility will cause rift among citizens. It hard to educate.
This poses a political nightmare to some cities.
Time.
Time.
Time.
Time constraints.
We're responsible for enforcing things that the DEP is not responsible for enforcing. Drainage approved by the city may have caused flooding from new subdivision and victims sued city, but DEP had to approve that too but they don't get sued, so it's uneven that we are responsible for this and DEP is not.

What problems do you perceive to exist related to enforcing your MS4 program?

Adding work load to already impossible schedule.
Adequate staffing.
Areas outside city limits.
Community understanding/acceptance.
Cost of testing.
Current legislation and ordinances do not provide for any penalties for non-compliance.
Economic growth and low impact development awareness.
Money. If the City can do it ok, but no additional taxes, fees, etc.
No funds - no way to collect from public.
None.
None.
Outside city limits property owners.
Overlap with DOH, public outrage over fees.
Proper record keeping. Follow up.

PSC attempted involvement. People have been complaining to the PSC about their fees and so the PSC came in and tried to regulate us but we got our attorney to get us out of that.
Public participation.
Same as above.
The WVDEP has no repercussions for non-enforcement. The town won't do anything unless directed to.
There is none! The WVDEP needs to put some ramifications into effect.
Two concerns are what means are available to our utility to enforce payment of stormwater fees and the limits of power our program may have as far as enforcement and monetary fines for violations of MS4 program rules and regulations.

What interesting structural practices are being implemented or planned as a result of your MS4 program? (Some new ideas include low impact development techniques, green roofs, rain gardens, etc)

BMPs, parking lot modifications, LIDs.
Building, grading or other land development permits required for all land activities.
Considering pervious concrete and asphalt for maintenance facilities, catch basin filters, etc.
Developers are encouraged to include runoff reduction in their projects but no specific practice is required.
Grass swales.
In cooperation with the [watershed association deleted to preserve confidentiality], we are planning to build a demonstration rain garden in the MS4. We also are going to be doing a rain barrel workshop. We continue to educate our staff and the development community on low impact development.
Lot more retention ponds by developers. More tree plantings. City has incorporated tree commission into city stormwater plan. More green space in city's and development's plans.
None as of yet.
None yet.
None yet.
Rain gardens.
Requiring more green areas on parking lots.
Some people in the city want to change the ordinance so that home builders can install rain gardens instead of detention ponds, but this is a bad idea because no one is going to be able to monitor if those gardens are kept up to a functional purpose and it's going to be hard to even judge if the initial design is really good enough.
Still planning them.
The city is currently in the process of creating a stormwater manual that will include Low Impact Development as part of the new and redevelopment construction processes. An overall reduction in stormwater runoff, time of concentration, and bio-filtration methods will result.
Underground retention.
We are currently looking at potential wetlands site for the reduction of nutrients in stormwater.

What interesting public outreach practices are being implemented or planned as a result of your MS4 program? (Some new ideas include mascot contests, creation of a watershed group, targeted special presentations, etc....)

Advertising in town paper so far. Other ways planned.
Billboards, door knob hangers, flyers, PSAs.
Development of a 2 hour class for high school students.
Joining local watershed groups/pamphlets at our tourist information shops.
Just getting started.
Just giving out MS4 literature on all City fill permits and commercial development permits has generated a lot of questions from public.
Newspaper/website, public schools.
None.
None at this time.
None yet.
None yet.
School programs for outreach plus our mascot [mascot name deleted to preserve confidentiality]—we have a costume, no I don't wear that thing.
Special presentations.
The city is currently developing a mascot to be used in the future.
The MS4 was instrumental in forming the watershed group and continues to support those efforts. We have had special presentations to civic groups, school age children and builders/developers. We hope to establish a brown bag lunch series in the near future.
We have given talks to promote awareness of the impacts of stormwater runoff.
We provide an informational program for the elementary school each year.

While MS4 programs focus on water quality and quantity, certain practices may also have other benefits. What other benefits have you found, or do you expect, to result from implementation of your MS4 program (such as protecting and renewing infrastructure, community pride or beautification, etc.)?

Beautification.
Beautification most of all.
Community pride.
Community pride in small towns and beautification is much needed.
Don't know. Won't be able to see difference in Ohio ever.
Emergency service responses due to mapping, protecting building sites.
General education of public's responsibilities to protect our stormwater.
Improving the condition of local infrastructure is the largest benefit, but there will be some spillover benefits with stormwater rules including better site design, which translates into other urban planning benefits. For instance, increased landscaping and natural areas in development projects.
In my opinion, only new construction allows for assessment of the existing stormwater system.
Mapping of the stormwater network and fixing a lot of problematic areas that have been discovered.
None yet.
One spin-off could be a stream side park.
Protecting infrastructure. Have had concrete truck and carpet cleaning company problems - general public awareness.
Related is the dredging of the city reservoir that is all filled in from poor construction practices causing runoff. We hope to keep it clear of future problems because of the MS4 ordinances.
Renewing infrastructure.
We expect to reduce residential flooding and significantly reduce the number of CSO events annually.
We have developed a community beautification committee. Also developing a community training for the general public through our newsletter.
We have these practices already in place, beautification committee and town pride.

What aspect(s) of your MS4 program are you most frustrated by?

\$\$\$ not enough.
Adequate personnel.
At this time, limited time to work on the program.
Good housekeeping by the public outside area.
In-house practices.
Lack of funding.
Lack of interest from the general public.
Lack of leadership willingness to participate and funding of the program.
Never seeming to have enough resources is a tremendous problem. Although the Phase II regulations do not have discharge limits, they are very resource intensive to manage given the 6 different minimum control measure areas. This is burdensome for small municipalities like those in WV, because resources are always limited. The state's rural nature also makes it difficult for MS4s to consolidate into regional permits or partner or cost share.
No funding from the federal government.
No funds.
No leadership from the national level. Cities do not have authority to reach the total watershed area. No money to do the project.
Paperwork.
People do not care; until council/mayor/board members take an active role, MS4 programs will fail; lack of DEP structure and framework and specific mandated requirements, don't know what they want specifically.
Private sector cooperation.
Public outrage, lack of stakeholder group.
The entire program as it is not realistic for many towns to work with.
The lack of other state agencies and authorities beyond DEP to take a lead role and step up to help create plans, policies and documents in common areas that all MS4s and other communities can share.
Unfunded mandate.

What aspect(s) of your MS4 program are you most proud of?

Addressing illicit discharges.
BMPs.
Cooperation between this department and DEP in constructing the rain garden.
Creation of new mapping for the city.
Educating young people because they will continue BMPs long after us older folk are gone.
Formal stormwater pollution prevention at municipal operations.
Internal staff education and organization.
It's not implemented yet.
Mapping.
Mapping.
Mapping.
N/A.
None yet.
Public education, keeping storm system and creeks cleaner than they were.
Stream monitoring program. Mapped entire city's streams, water quality issues, outfalls, storm drains, illicit discharges, volume of flows. All color coded, all done in-house.
The ability to be a thrifty manager to comply with NPDES permit on minimal money and support.
The formation of [watershed association deleted to preserve confidentiality] has had many successful projects with measurable benefits. This group obviously will improve water quality, but its efforts will also motivate others to improve our water environment. Obtaining community buy-in into this issue is critical.
To safeguard the general health and welfare of the public.

Please provide any other comments you may have on your MS4 program or on the state's MS4 program.

Currently working on management requirements.
Definition of MS4 needs to be clarified—too vague. Remove DOH oversight in cities.
Get some enforcement together and implement or else this problem will drag!
Get WVDEP enforcement into the game. Require system mapping.
Getting help to make city governments commit to funds and stormwater utilities. A couple of cities have but at least a half dozen cities should establish a stormwater utility.
Give us time to get going, then ask.
I feel we need to continue with public awareness and education promoting the fact that our activities as a community impact out watershed and downstream users. Through this awareness promote a greater sense of stewardship for our waterways.
Need more assistance in technical training and with the political process to help move the program locally.
On a scale of 1 to 10, I would grade 3.5.
Ordinances need to be a part of the ICC code/state building code - not on a town by town piecemeal system.
Please send results.
Should call it something besides stormwater program because people only think of storm drains when they hear stormwater and this program is more comprehensive and should be called something like an urban water quality program.
The DEP should have taken a role in MS4 other than to say here are six control measures. Should have been done like an NPDES permit—here are requirements spelled out exactly.
The state and MS4 communities could end up having a very high number of varying stormwater manuals, rules, and regulations throughout the state that could significantly vary from community to community if something is not done very soon. Contractors, state employees, engineers, etc. will have a difficult time deciphering the varying methods and ultimately will not be the best approach to a statewide effort to effectively clean up our water.
The state should develop a technical drainage manual like the one the state of Georgia and other states have developed. Georgia municipalities have endorsed and adopted the manual as their own in order to have commonality throughout the state. The manual covers everything regarding stormwater including design criteria, construction methods, BMPs, etc. Each municipality can add their own local section to apply to specific items or problems in their communities.
We are all expecting the NPDES permit to get more difficult and more expensive to comply with. It's hard to convince people to pay now; it will be more difficult if the prices go up.
We are just getting started on certain parts of the program.
Yes, there are many stormwater issues in our City that would still be issues whether our community was designated a Phase II community or not. Like any type of infrastructure, storm sewers need to be maintained and improved. A stormwater utility gives our community the ability to address these issues and improve citizens' quality of life.

## APPENDIX C: COMMUNITIES REMOVED FROM MS4 PROGRAM

When WVDEP began implementing the MS4 program in 2002, it considered an additional 11 communities for inclusion in the MS4 program. Of these, ten received waivers from the program, and one has been declassified as an MS4. These communities are listed in Table 28, along with an explanation for their removal from the MS4 program. These 11 communities are not considered further in this report.

**Table 28: Communities removed from the West Virginia MS4 program**

Name	How removed	Date	Notes
Belle, Town of	Waived	August 10, 2005	Waiver approved conditionally with Belle agreeing to conduct monitoring and IDDE procedures. Administrative Order issued September 23, 2005.
Benwood, City of	Waived	May 25, 2005	Not required to implement any SWMP. Must comply with their CSO program
Chesapeake, City of	Waived	January 5, 2007	
East Bank, Town of	Declassified	April 17, 2003	
Follansbee, City of	Waived	June 17, 2005	Not required to implement any SWMP. Must comply with their CSO program.
Glen Dale, Town of	Waived	December 27, 2005	Waiver approved conditionally with Glen Dale agreeing to conduct monitoring and IDDE procedures. Administrative Order was issued on December 27, 2005.
Marmet, City of	Waived	June 27, 2005	CSO community
McMechen, City of	Waived	July 7, 2005	CSO community
Montgomery, City of	Waived	June 27, 2005	CSO community
Poca, Town of	Waived	February 1, 2006	
Wellsberg, City of	Waived	July 7, 2005	CSO community

Source: Wilkins (2007).

## **APPENDIX D: SUGGESTED FORMAT FOR ANNUAL REPORTS**

The template provided in this appendix could be used by the WVDEP MS4 program as a basis to develop a standardized annual reporting form for MS4 permittees. Standardizing these forms for all communities would improve transparency and objectivity in the evaluation process. As well, such a form would decrease the time communities spend developing their own forms and the time WVDEP staff use to interpret all the various reporting formats that communities use now.

As WVDEP enforcement staff are trained on the MS4 program, such a form would also improve the quality, efficiency, and objectivity of communication between MS4 staff conducting evaluations and staff responsible for enforcement. It is also not unreasonable to expect these forms to be completed and submitted electronically, again, increasing efficiency, objectivity, and transparency of permit implementation and compliance efforts.

WVDEP could also use this form to clearly distinguish BMPs that are required by MS4 program and those that are suggested. For example, if the program would like to mandate water quality testing at outfalls, this could be explained under the BMP name (water quality testing) in Column 1 as “Mandatory” or even “Mandatory three times per year.”

The form should list all BMPs on the USEPA menu to encourage communities to take a slightly more standardized approach to BMP language than is currently being used in West Virginia reports. Room for other BMPs should also be added. As well, managers should be encouraged to report each activity separately if various activities correspond to the same BMP, again to help the permittee and WVDEP in their efforts to evaluate program performance and permit compliance.





## APPENDIX E: BENEFITS OF BETTER SITE DESIGN

Sustainable and comprehensive stormwater management benefits communities, homeowners, and even builders. According to USEPA:

“Environmental benefits are not the only valid reason for encouraging developers to incorporate urban runoff controls into new residential and commercial developments. Increased property values can result from aesthetically landscaped controls. Both homeowners and developers have realized benefits from beautification of areas adjacent to waterways and detention ponds. Residents find the beauty and tranquility of water, as well as fish, birds, and other wildlife, highly desirable. The beauty of natural surroundings increases real residential property values by up to 28 percent while also enhancing the quality of life. Commercial property owners, too, can benefit when their property is adjacent to an aesthetically designed urban runoff control. They can realize lower vacancies, lower tenant turnover, and high rental prices. Real estate professionals agree that the more amenities a property has, the faster it will sell or rent. Of course, to maintain higher property values, aesthetics must be considered during the operation and maintenance of wet ponds and constructed wetlands over the years. Moreover, for runoff controls to be successful, they must have the support of people in the community as well as developers (Adams et al., 1984). Then, everyone can benefit.” (USEPA, 1995b).

The Center for Watershed Protection outlines the benefits of better site design with a focus on economic, environmental, and aesthetic benefits in residential and commercial developments (Zielinski, 2000a and b)

On behalf of the Virginia Department of Conservation and Recreation, the Center also offers a collection of case studies and analyses on the benefits of stormwater management in Virginia (Center for Watershed Protection, 2001a and b). According to the Center for Watershed Protection (2001a), total infrastructure costs are reduced significantly in three of four Virginia case studies (Table 29).

**Table 29: Benefits of better site design in Virginia from the Center for Watershed Protection**

Case study	Percent of natural areas conserved	Percent reduction in impervious cover	Percent reduction in stormwater impacts			Percent reduction in total infrastructure costs
			Runoff	N load	P load	
Fields at Cold Harbor, Hanover County	80.4	25.3	12.2	6.4	6.4	47.2
Governor's Land, James City County	49.3	21.7	14.3	17.5	17.3	14.5
Rivergate, Alexandria	0	32	30	25	28	49
The Arboretum III, Chesterfield County	5.1	12	19.7	36	37.1	NC

Source: Copied from Center for Watershed Protection (2001a), Table 2. NC=Not calculated. For Rivergate, Alexandria, open space area is maintained as landscaped parkland.