MISSISSIPPI'S PHASE II SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) GUIDANCE MANUAL

11/06/02 DRAFT

FOR CITIES, COUNTIES AND OTHER REGULATED AND NON-REGULATED ENTITIES

A guide to application requirements and program development for coverage under Mississippi's Phase II Small Municipal Separate Storm Sewer System General Permit and development of a Storm Water Management Program (SWMP) on a voluntary basis for non-regulated entities

General Permits Branch
Environmental Permits Division
Office of Pollution Control
Mississippi Department of Environmental Quality
P.O. Box 2261
Jackson, Mississippi 39225-2261
August 2002

TABLE OF CONTENTS

CHAPTER VI
POLLUTION PREVENTION/GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

APPENDIX

ACKNOWLEDGEMENTS

This document was prepared by the Mississippi Department of Environmental Quality (MDEQ), General Permits Branch members Jim Morris and Kenneth LaFleur in part with information from the following documents: EPA's draft Model Municipal Separate Storm Sewer System (MS4) General Permit, EPA's BMP menu, EPA's Phase II Fact Sheets, EPA's Examples of Phase II BMPs and Associated Measurable Goals, and Colorado's Phase II Municipal Guidance.

DISCLAIMER

The information contained in this manual is intended to inform the public and does not establish or affect legal rights or obligations. This disclaimer also applies to all Phase II information on the MDEQ's web site. References to other web sites is intended for informational purposes only and does not imply any official MDEQ endorsement of, or responsibility for, the opinions, ideas, reliability, data or products presented at those locations, or guarantee the validity of the information provided. Reference to any specific commercial products, process or service by trade name, trademark, manufacturer, or otherwise does not constitute or imply MDEQ's endorsement or recommendation.

This guidance document is in preliminary form, and is subject to revision until the MS4 General Permit is issued by the Mississippi Environmental Quality Permit Board.

INTRODUCTION

THIS MANUAL OUTLINES MISSISSIPPI'S PHASE II REQUIREMENTS AND GENERAL GUIDANCE ON HOW TO SATISFY THESE REQUIREMENTS

A. Regulatory Requirements

The permitting of small Municipal Separate Storm Sewer Systems (MS4s) is required as a result of USEPA's Phase II Storm Water Rule. This National Pollutant Discharge Elimination System (NPDES) final regulation was promulgated on December 8, 1999. Mississippi has been delegated to implement the NPDES program and the Mississippi Department of Environmental Quality (MDEQ) is the permitting authority.

What constitutes an MS4 is often misinterpreted and misunderstood. The term MS4 does not solely refer to city and county owned storm sewer systems, but rather a much broader application that can include, in addition to local jurisdictions, State departments of transportation, universities, local sewer districts, hospitals, military bases, and prisons. In addition, an MS4 is not just a system of underground pipes – it can include roads with drainage systems, gutters, and ditches. The regulatory definition of an MS4 follows:

> According to 40 CFR 122.26(b)(8), ***"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 storm water; (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."

The Phase II Final Rule requires nationwide coverage of all operators of small MS4s that are located within the boundaries of a Bureau of the Census-defined "urbanized area" (UA) based on the latest decennial Census. An urbanized area (UA) is a land area comprising one or more places {core and fringe} with urban limits defined by a population density of 1,000 people per square mile and its contiguous census tracks of 500 people per square mile — that together have a residential population of at least 50,000. It is a calculation used by the Bureau of the Census to determine the geographic boundaries of the most heavily developed and densely populated areas. MDEQ will provide maps depicting urbanized areas to regulated entities. The list of incorporated places and counties automatically designated under the Storm Water Phase II Rule are: Bay St. Louis Biloxi, Brandon, Clinton, D'Iberville, DeSoto County, Flowood, Forrest County, Gautier, Gulfport, Hancock County, Harrison County, Hattiesburg, Hinds County, Horn Lake, Jackson County, Lamar County, Long Beach, Madison, Madison County, Moss Point, Ocean Springs, Pascagoula, Pass Christian, Pearl, Petal, Rankin County, Richland, Ridgeland, Southaven, and Waveland.

Many MS4s fall partially within urbanized areas (as defined by the US Census). The Phase II municipal regulation only requires those portions of the MS4 within the urbanized areas to have MS4 permit coverage. This provision does not apply to those MS4s designated by MDEQ in their entirety. The

applicant must, at a minimum, implement each program area for the entire urbanized area within their jurisdiction, or, if designated separately by MDEQ, the entire designated area. However, MDEQ recommends that each permittee apply the permit provisions to their entire MS4, for the following reasons:

- ease of administration for the regulated entity as well as MDEQ
- provides consistent requirements for developers, municipal staff, residents, industries, etc. across the permittee's jurisdiction
- areas near the urbanized area boundaries will probably be included in the next census, and so will need coverage in the future
- the storm water pollution potential from the urban fringe is similar to the potential from urbanized areas
- MDEQ may designate the entire MS4 as needing permit coverage, due to certain circumstances (e.g., discharge to sensitive waters, TMDL in place, high potential for water quality impacts due to land use, large number of complaints for certain areas, etc.)

The Phase II regulation also requires MDEQ to evaluate a potentially designated list of municipalities to determine if permitting is required. The potentially designated municipalities are those with populations greater or equal to 10,000 and a population density greater than 1,000 people per square mile. The list of potentially designated municipalities according to the 2000 census are Brookhaven, Clarksdale, Cleveland, Columbus, Greenville, Greenwood, Indianola, Laurel, McComb, Natchez, Oxford, and Yazoo City. Our evaluation criteria and selection process have been completed and were approved by EPA on 11/12/02. None of the potentially designated municipalities will be regulated during the first permit cycle (5 years). However, we are recommending they begin some form of storm water management and have sent them information about beginning a program.

General permits are strongly encouraged by EPA. The Phase II program has been designed specifically to accommodate a general permit approach. General permits prescribe one set of requirements for all applicable permittees and are a less burdensome permitting process than the individual permit process. Therefore, the Mississippi Department of Environmental Quality (MDEQ) strongly encourges designated entities to apply for Coverage under the **Small Municipal Separate Storm Sewer System (MS4) General NPDES Permit**. This permit will be available by December 2002.

Mississippi's MS4 General Permit requires municipalities to prepare and implement a Storm Water Management Program (SWMP) that includes basic requirements for Best Management Practices (BMPs) that address six minimum control measures. This plan and Notice of Intent (application) must be submitted by March 10, 2003

B. The Six Minimum Controls are:

1. Public education and outreach on storm water impacts
2. Public involvement and participation
3. Illicit connection and discharge detection and elimination
4. Construction site runoff control
5. Post-construction storm water management in development and redevelopment
6. Pollution prevention and good housekeeping of municipal operations

There are required BMPs in the permit (i.e. development of a storm sewer system map) and in addition, regulated entities will have to choose appropriate BMPs for their MS4 that address the above six minimum

control measures. The list of required BMPs and chosen BMPs will be part of the SWMP that is required. BMPs that satisfy the six minimum controls are also required elements. During the term of the permit (5 years), additional measures may be required when A) a Total Maximum Daily Load (TMDL) has been specified for a receiving waterbody, when B) a Watershed Management Plan has been adopted for a watershed or C) if a coverage recipient's SWMP proves to be inadequate in reducing pollutants in storm water runoff.

It is important to note that many of the requirements of the permit may be satisfied by coordinating efforts with other regulated entities, municipalities and counties. On a broader scale, some aspects of a public education program may be addressed through existing state public education resources. **Additionally, an entity may already have in place programs that satisfy mandatory requirements of the permit**. In this case, the program or segments shall be fully described in the program. If the program or segments will be used to fulfill the permit requirement, then the description will be considered as a commitment to continue them.

MDEQ supports cooperation between permit holders in complying with the six minimum measures. The regulation allows for a municipality to rely on another entity to implement all or part of a minimum control measure to comply with the permit. The coverage recipients must still make sure that the requirements of the minimum control measures are met. If the entity that the permitted MS4 operator is relying on to carry out the requirements of the minimum control measure fails to meet the permit requirements, it is the permittee's responsibility to then find alternative means to assure compliance.

Attached are recommendations, guidance and examples of what other regulated MS4s have done in order to comply with federal regulations. It is important to keep in mind that cities and counties have a great degree of flexibility in determining how to satisfy the six minimum control measure requirements. We envision that Storm Water Management Programs will continue to improve as the General Permit is modified and improved over subsequent permitting cycles.

C. Notice of Intent (Permit Application)

This section discusses the application process. The deadline for submittal of the MS4 Notice of Intent (MS4 NOI) is **March 10, 2003**

Waivers – Federal regulations allow MDEQ to waive permit coverage for each small MS4 in jurisdictions with a population under 1,000 within urbanized areas where the discharge is not causing problems to a connected MS4 and the discharge is not a cause of impairment to a water body to which it discharges. Therefore, all small MS4s (ex. hospitals, schools, prisons, and military bases) with an overnight population under 1,000 will be waived from permit requirements, unless and until MDEQ is made aware of significant pollutant loadings to a physically connected MS4 or to an adjacent water body.

MDEQ will provide MS4 Notice of Intent (MS4 NOI) application forms to the regulated community (see Appendix G). In addition to the MS4 NOI, **a Storm Water Management Program (SWMP) must accompany the permit application**. The SWMP will include the BMPs that small MS4s will implement for each of the storm water minimum control measures and justification as to why each BMP was selected. The justification must include a brief discussion on why each BMP will be an effective element that addresses the minimum control measure. In addition, the SWMP will include measurable goals for each of the minimum control measure components, including, as appropriate, a proposed schedule of dates for each of the measurable goals, interim milestones and the frequency of the action. Justification as to why each measurable goal was selected must also be included with the application. This justification must

include a brief discussion on why the measurable goal is an effective measurement of the permittee's progress towards compliance with the minimum measure.

MDEQ will review all applications for completeness, and adequacy in meeting the intent of the regulations and the requirements of the general permit. If an application is complete and adequate, the applicant will be notified in writing that the SWMP meets the minimum requirements of the permit. A certificate of coverage will accompany the letter (See Appendix F). If the MDEQ determines that the proposed program, BMPs or any of the measurable goals are inadequate, the applicant will be notified and required to amend the SWMP.

The regulated entity will be required to complete implementation of all six minimum measures by the end of the first permit term, February 28, 2008. The schedule for the goals must reflect a relatively steady level of effort throughout the permit term. That is, the compliance dates should not all be near the end of the permit term. Basic program tools such as maps and ordinances, etc. should be scheduled in the beginning of the 5 year permit cycle. The Phase II NPDES program encourages the MS4 to evolve and refine the MS4's program goals in subsequent permit cycles. The permittee's Annual Report will require a summary of progress made towards each goal. A standardized format for annual reports will be provided by MDEQ if time & resources permit. MDEQ also realizes that some changes in the SWMP may be necessary during the term of the permit. The general permit list procedures to allow for such changes.

In some cases, a small MS4 may already have a program or segments of a program in place and functioning that meets the requirements of the regulation. In this case, the program or segments shall be described in the application. If the program or segments will be used to fulfill the permit requirement, then the description will be considered as a commitment to continue them.

A regulated entity may partner with another regulated entity to develop and/or implement a SWMP. However, each regulated entity remains responsible for the implementation of the SWMP in their MS4. Each regulated entity must fill out a MS4 NOI form. The SWMP must clearly describe which regulated entity will be implementing each control measure.

The information provided in the application must be accurate to the best knowledge and belief of the applicant. However, MDEQ recognizes that as programs mature some program elements may be found to be ineffective or impracticable. The general permit will describe the process to be used in this situation.

Table 1. shows the important milestone dates.

Table 1. – Schedule

Activity	Date/Deadline
MDEQ drafts the Small MS4 General Permit	May 2002 – October 2002
MDEQ issues the Small MS4 General Permit	December 2002
Application deadline for Phase II Small MS4s	March 10, 2003
Deadline for the implementation of all six minimum control measures	March 9, 2008

D. Measurable Goals

Measurable goals are described in the Phase II rule as BMP design objectives or goals that quantify the progress of program implementation and the performance of your BMPs. They are objective markers or milestones that the MS4 (and MDEQ) will use to track the progress and effectiveness of your BMPs in reducing pollutants to the Maximum Extent Practicable (MEP).

Once submitted in the permit application, the BMPs and measurable goals that you selected become requirements of your storm water management program. MDEQ, however, can review your program and require changes in the mix of chosen measurable goals if they are found to be inconsistent with the provisions of the MS4 General Permit.

The following information describes steps you can take to select measurable goals appropriate for your program. As you do this, MDEQ recommends that you seek input from and actively involve both the public and key stakeholders.

Maximum Extent Practicable (MEP) is the statutory standard that establishes the level of pollutant reductions that operators of regulated MS4s must achieve. The Clean Water Act (CWA) requires that NPDES permits for discharges from MS4s ‘‘shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods.’’ Compliance with the conditions of the general permit and the series of steps associated with identification and implementation of the minimum control measures will satisfy the MEP standard. EPA has intentionally not provided a precise definition of MEP to allow maximum flexibility in MS4 permitting. MS4s need the flexibility to optimize reductions in storm water pollutants on a location-by-location basis. EPA envisions that this evaluative process will consider such factors as conditions of receiving waters, specific local concerns, and other aspects included in a comprehensive watershed plan. Other factors may include MS4 size, climate, implementation schedules, current ability to finance the program, beneficial uses of receiving water, hydrology, geology, and capacity to perform operation and maintenance. The pollutant reductions that represent MEP may be different for each small MS4, given the unique local hydrologic and geologic concerns that may exist and the differing possible pollutant control strategies. Therefore, each MS4 will determine appropriate BMPs to satisfy each of the six minimum control measures through an evaluative process.

EPA envisions application of the MEP standard as an iterative process. MEP should continually adapt to current conditions and BMP effectiveness and should strive to attain water quality standards. Successive iterations of the mix of BMPs and measurable goals will be driven by the objective of assuring maintenance of water quality standards. If, after implementing the six minimum control measures there is still water quality impairment associated with discharges from the MS4, after successive permit terms the permittee will need to expand or better tailor its BMPs within the scope of the six minimum control measures for each subsequent permit. EPA envisions that this process may take two to three permit terms.

It is recommended that the SWMP contain a variety of short and long-term goals. At a minimum, measurable goals should contain descriptions of actions taken to implement each BMP, anticipated achievement by each goal, and the frequency and dates for such actions to be taken. Also, EPA recommends that you use your BMPs and measurable goals to help establish a baseline against which future progress at reducing pollutants to the MEP can be measured. For example, information on current water quality conditions, numbers of BMPs already implemented, and the public’s current knowledge/awareness of storm water management would be useful in setting this baseline.

There are a number of different ways you can write your measurable goals. MS4s may consider developing measurable goals based on one or more of the following general categories:

1. *Tracking implementation over time*. Where a BMP is continually implemented over the permit term, a measurable goal can be developed to track how often, or where, this BMP is implemented.

2. *Measuring progress in implementing the BMP*. Some BMPs are developed over time, and a measurable goal can be used to track this progress until BMP implementation is completed.

3. *Tracking total numbers of BMPs implemented*. Measurable goals also can be used to track BMP implementation numerically, e.g., the number of wet detention basins in place or the number of people changing their behavior due to the receipt of educational materials.

4. *Tracking program/BMP effectiveness*. Measurable goals can be developed to evaluate BMP effectiveness, for example, by evaluating a structural BMP's effectiveness at reducing pollutant loadings, or evaluating a public education campaign's effectiveness at reaching and informing the target audience to determine whether it reduces pollutants to the MEP. A measurable goal can also be a BMP design objective or a performance standard.

5. *Tracking environmental improvement*. The ultimate goal of the NPDES storm water program is environmental improvement, which can be a measurable goal. Achievement of environmental improvement can be assessed and documented by ascertaining whether state water quality standards are being met for the receiving waterbody or by tracking trends or improvements in water quality (chemical, physical, and biological) and other indicators, such as the hydrologic or habitat condition of the waterbody or watershed. It should be noted that analytical water quality monitoring is not a requirement of the General Permit.

Measurable goals should include, where appropriate, the following three components:

- The activity, or BMP, to be completed;
- A schedule or date of completion; and
- A quantifiable target to measure progress toward achieving the activity or BMP.

Measurable goals that include these three components and are easy to quantify and will allow both MDEQ and MS4s to assess progress at reducing pollutants to the MEP.

To help select measurable goals, MS4s should:

1. *Consider the objective for each minimum measure.* The BMPs chosen should work toward one or more common objectives related to storm water quality improvement and should reduce pollutants to the MEP. The objectives should be based on what is known about existing pollutant sources and problems in the watershed(s) and what is required by the minimum measure. The objective may be quantified, or it may be a goal or purpose statement.

2. *Review the programs (municipal or other) that are already in place for each minimum measure.* MS4s should coordinate with other agencies, non-profit groups, citizen groups, etc., to identify existing initiatives that can be used as part of the storm water management program.

3. *Select BMPs that complement each other and work toward meeting each minimum measure.* These BMPs should address the minimum measure objective identified above and meet the regulatory requirements in the minimum measure.

4. *For each BMP, develop expeditious milestones for implementation.* MS4s should include both a timeframe and a quantity to measure, if possible. Consider the following questions:

   - When will the MS4 start implementing the BMP?
   - What institutional funding and legal issues (if any) does the MS4 need to solve before implementation can occur, and when will these issues be solved?
   - How will the MS4 keep track of the progress of implementation? (It would be useful for you to develop a spreadsheet or database to track the progress of meeting measurable goals for annual reports.)
   - How can you measure whether this BMP has been a success at reducing pollutants to the MEP, e.g., changes in behavior, number of BMPs implemented, or documented improvements in water quality?

5. *Determine how to evaluate the effectiveness of each BMP.* Although achievement of water quality standards is the goal of all CWA programs, the MS4 may need to use other means to ascertain what effects individual and collective BMPs have on water quality and associated indicators. Instream monitoring, such as physical, chemical, and biological monitoring, is ideal because it allows the direct measurement of environmental improvements resulting from management efforts. MS4s can use targeted monitoring to evaluate BMP-specific effectiveness, whereas ambient monitoring can be used to determine overall program effectiveness. Again, instream monitoring is not a requirement of the General Permit but the regulated entity should be aware of any such monitoring by a third party (MDEQ for instance) that may aid in determining program effectiveness.

6. *Derive measurable goals from the evaluation methods selected in Step 5.* Once a MS4 determine how to measure each BMP, the MS4 should identify the measurable goals to be achieved in the permit term. Consider intermediate goals that can help establish milestones for success. Measurable goals should be developed that consider operation and maintenance for structural BMPs where ongoing maintenance can be a concern. Ultimately, the evaluation methods that are chosen for each BMP should lead to a determination of the environmental benefits of each minimum measure and the overall effectiveness of the storm water management program in reducing pollutants to the MEP.

The Phase II NPDES program encourages the MS4 to evolve and refine its program goals throughout the five-year permit term and in subsequent permit cycles. The MS4 should consider using BMPs and setting measurable goals that are targeted to address existing water quality problems and prevent new water quality problems.

List of measurable parameters To aid in the formulation of measurable goals, below is a list of measurable parameters related to the third minimum measure. This list is not comprehensive and is meant to be a guide only.

1. **Identifying illicit connections**
   - Inventory conducted and sites prioritized for inspection
   - The number of field tests conducted in high-risk areas
   - Whether or not an ordinance was developed to allow entrance into private buildings for the purpose of conducting tests

- The number of illicit connections reported by business employees
- The number of survey responses indicating a possible illicit connection
- The number of illicit connections found
- The number of illicit connections repaired/replaced
- Whether or not an ordinance was developed for mandatory inspections of new buildings
- The number of new buildings inspected

2. Illegal dumping

- The number of flyers, posters, or other public education tools distributed
- The number of illegal dumps reported by citizens
- The number of penalties enforced upon the participants of illegal dumps
- Whether or not an inventory of the prime areas for illegal dumping was completed
- The number of rewards distributed to citizens who reported an illegal dump
- The number of illegal dump clean-ups completed

3. Industrial/business connections

- The number of dry weather tests completed
- The number of high-risk connections prioritized
- The number of codes developed to prohibit connections
- The number of illicit connections reported by business employees
- The number of survey responses indicating a possible illicit connection
- The number of illicit connections found
- The number of illicit connections repaired/replaced
- The number of new buildings inspected
- • Whether or not an ordinance was developed for mandatory inspections of new buildings

4. Recreational sewage

- Whether or not an inventory of high-risk areas was completed
- The number of pump-out stations installed
- The amount of waste water that pump-out stations collect
- The number of no-discharge areas created
- The number of new signs added to remind citizens of dumping policies and alternatives
- The number of enforced cases of recreational dumping
- The number of citizen complaints made reporting illegal action
- The change in water quality at marinas

5. Sanitary sewer overflows

- The frequency of routine maintenance and cleaning activities
- The number of overflows reported
- The number of overflow causes that were identified during inspections
- The number of sites repaired
- The number of rainfall gauges installed
- Whether or not an ordinance was developed to prohibit new and illicit connections

6. Wastewater connections to the storm drain system

- The number of rerouted connections
- The number of dry weather monitoring activities performed

- Whether or not an inventory and prioritization of potential connection sites was completed
- The number of field tests conducted in high-risk areas
- The number of unwarranted connections reported
- The number of unwarranted connections found
- The number of unwarranted connections repaired/replaced
- Whether or not an ordinance was developed for mandatory inspections of new buildings
- The number of new buildings inspected
- Changes in water quality at re-routed outfalls and high-risk areas

E. Standard Form For Submitting BMPs, Associated Measurable Goals, and Year to be Implemented

In order to make information consistent among coverage recipients and easily accessible during program review and compliance, the following table format should be used as a guide. Example BMPs and measurable goals will be listed in this table format for each minimum measure.

EXAMPLE TABLE

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5

F. Ordinances

This section of the guidance document discusses the types and uses of ordinances that may be helpful in assisting the Phase II regulated entities in meeting their permit requirements. For example, there are several sources of existing model ordinances that a regulated entity can use in the development of their own ordinances (see Appendix B - Guidance/Resources for Storm Water Phase II). EPA's web site at *www.epa.gov/nps/ordinance/mol2.htm* also provides a listing of references for reviewing various model, or example ordinances that may be applicable to the Phase II permitting process. In addition, *www.stormwatercenter.net* has a number of model ordinances. The NEMO workbook has these ordinances in annotated form along with "codes and ordinances worksheet" to evaluate existing ordinances. It is recommended that engineering (public works) and legal departments review each ordinance proposed for use by a regulated entity.

1. Background

Ordinances provide a means for a regulated entity to implement and enforce their permit conditions by providing a compliance mechanism that assists in the attainment of measurable goals. To the extent allowable under State or local law, ordinances (or other regulatory mechanisms) are required under the following sections:

- Illicit discharge detection and elimination – to prohibit non-storm water discharges into the storm sewer system, and implement appropriate enforcement procedures and actions
- Construction site storm water runoff control – to require erosion and sediment controls, as well as sanctions to ensure compliance

- Post-construction – to address post-construction runoff from new development and redevelopment projects, and sanctions to ensure compliance

2. Items to Consider When Drafting and Implementing Ordinances

There are several items to consider when drafting and implementing ordinances with respect to Phase II permitting requirements. Points to consider include:

- Legal authority – Does the Phase II regulated entity have the legal authority to develop and implement the applicable ordinance(s)? It is the responsibility of the regulated entity to determine if they do not have such legal authority. If they do not have legal authority, the regulated entity must provide adequate evidence of this to the Division.
- Practicability – Is the ordinance written so that all parties can clearly understand and meet their objectives and requirements? Is it designed so that it can be implemented in the field with minimal problems? Is the ordinance "enforceable" by the regulated entity?
- Applicability – Does the ordinance meet the intent, as well as the specifics, of the Phase II requirements? Does the ordinance apply to any and all appropriate entities within the regulated entity's boundaries (both physical and jurisdictional)?
- Desired goal(s) and objective(s) – Does the ordinance clearly state the applicable goals and objectives, relative to the Phase II permitting requirements? Are the goals and objectives obtainable by all parties involved? Are the overall goals and objectives of the ordinance tied to appropriate measurable goals?
- Resources – Is the cost to develop, implement, and enforce the ordinance commensurate with its priority in the overall permitting program? Are the necessary resources available to develop, implement, and enforce the ordinance?
- Implementation – Is the ordinance implementable, particularly with respect to the entity(s) that will need to meet the ordinance requirements? Are there provisions in the ordinance that may preclude it from being usable and reasonable?

3. Typical Ordinances Applicable to Phase II Permitting

Typical ordinances that may be necessary to meet the Phase II permitting requirements include, but are not limited to:

- Grading, erosion and sedimentation control (including revegetation/reclamation requirements) for construction projects (required by the construction minimum measure)
- Structural BMPs for post-construction (permanent) development and significant redevelopment projects (required by the post-construction minimum measure)
- Storm drainage design and management (e.g., Storm Drainage Design and Technical Criteria Manual)
- Aquatic buffers
- Illicit discharge detection, cleanup, and elimination (required by the illicit discharge minimum measure)
- Storm water utility
- Transfer of development rights
- Golf course management
- Wetlands and watercourse management
- Operation and maintenance of MS4s
- Operation and maintenance of short-term and long-term best management practices (BMPs)

- Litter and floatable material (nuisance) management (e.g., trash, junk, weeds and yard waste)
- Stream protection ordinances
- Landscape design code

Other tools associated with ordinances, which may also play a key role in implementing the Phase II permitting requirements, include:

- Design and construction standards
- Design guidelines
- Storm water Quality Control Plan standards
- Stream Buffer and Floodplain Overlay Districts

Each ordinance that the regulated entity develops should focus on specific objectives relative to meeting the intent and requirements of Phase II, particularly with respect to measurable goals as defined in the permit.

4. Measurable Goals – Ordinances

Before any measurable goals are developed in conjunction with applicable ordinances, the regulated entity should evaluate its current ordinances (if any) to assess needs and requirements with respect to the Phase II Program. Based on this assessment, a list of needed ordinances should be developed. Then, measurable goals for drafting, implementing, and evaluating compliance with an ordinance should be developed. The measurable goals should be developed to meet the intent and requirements of Phase II permitting, should be attainable and reasonable, and should mesh with existing technologies.

G. Financing Storm Water Management

1. The Mississippi Department of Environmental Quality (MDEQ), Office of Pollution Control, Construction Branch

MDEQ's Construction Branch has funding available under the Water Pollution Control Revolving Loan Fund Program for certain planning, permit application, design, construction, and other implementation activities needed (exclusive of operation and maintenance) to comply with the Phase II storm water requirements. These low-interest loans of 1.75 % may have up to a 20-year repayment period. Contact Mark Smith at 601/961-5130 (Email: *Mark_Smith@deq.state.mus.us*) for further information.

2. The Mississippi Department of Environmental Quality (MDEQ), Office of Pollution Control, Solid Waste Management Branch

To promote its mission of protecting Mississippi's environment, the MDEQ offers assistance grants for projects involving certain solid waste management and recycling activities. MDEQ also provides other assistance for abatement of certain solid waste problems. Grants that are available include: solid waste assistance grants, waste tire grants and Household Hazardous Waste (HHW) grants. The nonhazardous solid waste corrective action trust fund and the waste tire abatement program have monies that are available. Call Mark Williams at 601/961-5304 or Luis Murillo at 601/961-5372 for more information. An example of a facility that was funded by a HHW grant is the Environmental Service Center located in Jackson which accepts HHW. Located at the northeast corner of Hwy. 80

and Terry Road, the facility accepts HHW from Hinds, Madison and Rankin county residents at no charge. Information regarding the type of accepted hazardous waste is on the MDEQ website under "Recycling". Also see the facility brochure at *http://www.deq.state.ms.us/newweb/erchome.nsf/pages/RecyclingFiles/$file/HHWposter.jpg*

3. **Scenic and Green Communities of Mississippi**

Mississippi community leaders now have another resource to help them create 'the best' places to live, work and play. The Mississippi Urban Forest Council and the Mississippi Department of Environmental Quality are unveiling a new community development program. The program will assist communities in implementing sound natural resource conservation practices such as water quality, community forestry, scenic projects, habitat development, flood control, hazard mitigation, recycling, water shed assessments and many other valuable practices.

The Scenic and Green Communities of Mississippi program is a listing of all resources and programs in Mississippi that can assist and provide funding/ technical assistance to communities. Over 200 natural resource conservation projects will be included in the resource listing with contacts and agencies within the state that provide these services directly to communities. The listing will include all resources from state, federal, nonprofit and private entities, as well as funding sources for grants and technical experts available to advise your community.

Communities that voluntarily implement a number of these programs will be recognized regionally and statewide as a Scenic and Green Community of Mississippi. The success stories from these designated communities will be shared statewide and regionally through a variety of media.

Many communities are faced with new challenges of water quality mandates, storm water and land use issues. All of the programs listed will contribute to this ongoing challenge that community leaders and citizens share of improving economics and enhancing livability for their community Green infrastructure, conservation and urban forestry is a large piece of the puzzle in community development when addressing these and other challenges. This project will better connect state resources to the decision makers in the communities, as well as the volunteer citizens who contribute to building better communities.

One hundred communities will be invited to participate the first year of the program and receive the resource program free. If your community would like to be a leader in this valuable arena and has a history of natural resource conservation we invite you to participate. For more information contact: the Mississippi Urban Forest Council, Donna Yowell, Executive Director, 601-856-1660 or *dyowell@aol.com*.

4. **Mississippi Forestry Commission**
Two separate grant programs are available for urban forestry management. Additional information can be found at *http://www.mfc.state.ms.us*.

5. **Center for Urban Policy and the Environment, Indiana University**
The Center for Urban Policy and the Environment at Indiana University-Purdue University Indianapolis (IUPUI) in cooperation with the Watershed Management Institute, Inc. has used EPA grant money to develop a website designed to help communities find ways to pay for storm water management projects. Their web address is:
http://stormwaterfinance.urbancenter.iupui.edu/home.htm

6. **Proceedings from the National Conference on Tools for Urban Water Resources Management & Protection (EPA/625/R-00/001 2/2000)**
   Proceedings from a recent conference with several quality papers on topics such as Phase II cost estimates, developing a storm water utility fee, tools for eliminating illicit connections, public information projects, and many more directly applicable to Phase II and the six minimum measures are available. Copies in either paper or CD-ROM are available free of charge from the EPA; call (800) 490-9198 or visit the web site at *http://www.epa.gov/ncepihom* or see the National Center for Environmental Research at *http://es.epa.gov/ncer/progress/grants/96/wwshed/reice99.html*.

7. **Texas Nonpoint Source Book**
   Texas has a web site with storm water information geared to public works professionals and other interested parties. The development of this site was funded in part through a U.S. EPA 319(h) grant. This is a good resource for storm water BMP information. Visit their web site at *http://www.txnpsbook.org*.

H. Properties Listed or Eligible for Listing in the National Register of Historic Places

This permit does not authorize the implementation of a Storm Water Management Program (SWMP) which adversely affect properties listed or eligible for listing in the National Register of Historic Places. The National Register of Historic Places is the nation's official list of buildings, sites and districts, which are important in our history. Although Congress created the National Register, it is administered by the states. Each state has a historic preservation office, which is responsible for placing buildings, sites and districts on the Register. State Historic Preservation Officers (SHPOs) administer the national historic preservation program at the State level, review National Register of Historic Places nominations, maintain data on historic properties that have been identified but not yet nominated, and consult with Federal agencies during review. To see if a site is on the National Register of Historic Places contact the review and compliance officer at the Division of Historic Preservation, Mississippi Department of Archives and History, Jackson at 601/359-6940. The SHPO will require an application with a good quality showing the site location. MDEQ anticipates that adverse impacts may likely to occur from construction activities that physically disturb a listed site such as a regional detention basin.

I. Endangered Species

The permit does not authorize storm water discharges if they are likely to jeopardize the continued existence of any species that is listed as endangered or threatened under the Endangered Species Act. The MS4 must determine if any endangered species may be found in "proximity" to the storm water discharges. Determining "proximity" can be accomplished on the searchable web site cfpub.epa.gov/npdes/stormwater/endangersearch, contacting the U.S. Fish and Wildlife Service (601/321-1131), or by conducting a visual survey.

The most recent Endangered and Threatened Species County-Species List available from EPA must be used to determine impacts **prior** to submittal of the NOI. As of the date of this guidance, the most current version of the List is located on EPA's Office of Water web site at *www.epa.gov/npdes/.* MS4s must meet one or more of the criteria below for the entire term of coverage under the permit.

Criteria A: No endangered or threatened species or critical habitat are in proximity to the MS4 or the point where authorized discharges reach the receiving water; or

Criteria B: In the course of a separate federal action involving the MS4 (e.g., EPA processing request for an individual NPDES permit, issuance of a CWA §404 wetlands dredge and fill permit, etc.), formal or informal consultation with the Fish and Wildlife Service and/or the National Marine Fisheries Service (the "Services") under Section 7 of the Endangered Species Act (ESA) has been concluded and that consultation:

- Addressed the effects of your storm water discharges, allowable non-storm water discharges, and discharge-related activities on listed species and critical habitat and

- The consultation resulted in either a no jeopardy opinion or a written concurrence by the Service on a finding that the storm water discharges, allowable non-storm water discharges, and discharge-related activities are not likely to adversely affect listed species or critical habitat; or

Criteria C: The activities are authorized under Section 10 of the ESA and such authorization addresses the effects of storm water discharges, allowable non-storm water discharges, and discharge-related activities on listed species and critical habitat; or

Criteria D: Using best judgement, the MS4 has evaluated the effects of it's storm water discharges, allowable non-storm water discharges, and discharge-related activities on listed endangered or threatened species and critical habitat and do not have reason to believe the discharge and discharge-related activities will jeopardize the continued existence of any species or result in the adverse modification or destruction of critical habitat.

The key regulatory requirement is that the discharges from the MS4 are not likely to jeopardize an endangered species. Since the focus of the Storm Water Management Plan is to improve water quality, preserve and add green space, protect riparian areas, and prevent stream degradation, MDEQ believes an MS4 can document that an endangered species will not be jeopardized. However, the MS4 should pay close attention if a large BMP, such as a regional detention basin, is proposed.

J. Water Quality Standards and Total Maximum Daily Loads (TMDLs)

The Small MS4 General Permit requires, if there are storm water discharges to a 303(d) listed impaired water from a regulated entity, the SWMP shall include a section describing how the program will control the discharge of the pollutants of concern to ensure the discharges will not cause or contribute to violations of water quality standards. Furthermore, measures may be required when a Total Maximum Daily Load (TMDL) has been specified for a receiving waterbody or when a Watershed Management Plan has been adopted for a watershed.

1. What is a water quality standard?

The Clean Water Act sets national minimum goals for all waters as "fishable and swimmable." To support this goal, Mississippi has adopted water quality standards. Water quality standards are regulations with several main components:

a. **Designated use** is the use assigned to each waterbody such as aquatic life support or contact recreation. One or more uses are assigned to each waterbody.

b. **Numeric Criteria** are the in-stream conditions necessary to protect the designated use, i.e.,

physical or chemical characteristics like temperature, minimum concentration of dissolved oxygen, and the maximum concentrations of toxic pollutants.

c. **Narrative Criteria** is a general statement that prohibits pollutants at objectionable levels, such as the narrative criteria of "no toxics in toxic amounts."

If a water body does not meet one or more of the components of a water quality standard, then the water body is considered in violation of that standard

2. What is a Total Maximum Daily Load (TMDL)?

A TMDL represents the maximum amount of a pollutant that can enter a water body so that the water body will meet and continue to meet state water quality standards. Section 303(d) of the Clean Water Act requires states to identify all waters that are not meeting their water quality standards. For these waters, the state must calculate how much pollution can be put in the water without violating the standard, and then distribute that quantity to all the sources. That quantity is the sum of the point sources plus the nonpoint sources plus a safety factor to maintain the integrity of the water sources. TMDLs serve as planning tools for developing specific controls needed to meet water quality standards.

3. What does a TMDL propose?

A TMDL will propose loads from specific point sources (such as municipal wastewater treatment facilities and industrial waste treatment plants) and nonpoint sources (such as direct runoff from agricultural lands, urban areas, forested lands, etc.) in the watershed. TMDLs will access at impacts on waterbodies from many kinds of contamination, seasonal variations, and also account for background levels of pollutants (those levels occurring in nature). TMDLs compare current loads and proposed loadings with expected levels of reduction to achieve the water quality standards.

4. What about the public?

The Clean Water Act provides for any individual or organization potentially impacted by the development and implementation of a TMDL to participate in the procedures. The public may participate in the TMDL process through Mississippi's Basin Management Approach. Also, anyone is welcome to comment on a TMDL during the public notice period for the TMDL. A 30-day public notice period will be held following the publication for each TMDL. Any comments received during the public notice period will become a part of the TMDL administrative record, and will be considered by MDEQ prior to finalizing the TMDL report.

CHAPTER I

PUBLIC EDUCATION AND OUTREACH ON STORM WATER IMPACTS

An informed and knowledgeable community is crucial to the success of a municipality's storm water management program. Without a public knowledge of local water quality problems caused by storm water runoff, it may be difficult to obtain public support for a Storm Water Management Program (SWMP). This support ranges from individuals changing their daily actions to community backing for all of the six minimum measures. As with all of the minimum measures, the goal of this measure is to reduce degradation and improve water quality of state waters. In order to achieve this water quality benefit, public education programs should be targeted that improve understanding of the reasons why storm water quality programs exist. Public understanding of storm water impacts is particularly important when a municipality attempts to institute new funding initiatives or seek volunteers to help implement the program. As the public becomes aware of the personal responsibilities expected of them water quality would be protected and improved.

A. Program Requirements

1. **To satisfy this minimum control measure, the MS4 General Permit requires the regulated entity to:**

   a. Implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of storm water discharges on water bodies and the steps that the public can take to reduce pollutants in storm water runoff.

   b. Define appropriate BMPs for this minimum control measure and measurable goals for each BMP.

   c. Document the decision process for the development of a storm water public education and outreach program. The regulated entity's rationale statement must address both the overall public education program and the individual BMPs, measurable goals, and responsible persons for this program. The rationale statement must include the following information, at a minimum:

      (1) How the regulated entity plans to inform individuals and households about the steps they can take to reduce storm water pollution such as proper septic system maintenance, proper use and disposal of landscape and garden chemicals including fertilizers and pesticides, protecting and restoring riparian vegetation and properly disposing of used motor oil or household hazardous waste.

      (2) How the regulated entity plans to inform individuals and groups on how to become involved in the storm water program (with activities such as storm drain stenciling/marking, adopt-a-stream, and liter clean-up projects).

(3) Who are the target audiences for the education program who are likely to have significant storm water impacts (including commercial, industrial and institutional entities) and why those target audiences were selected.

(4) What are the target pollutant sources the public education program is designed to address.

(5) What is the regulated entity's outreach strategy, including the mechanisms (e.g., printed brochures, newspapers, media, workshops, etc.) the regulated entity will use to reach target audiences, and how many people the regulated entity expects to reach by the outreach strategy over the permit term.

(6) How the regulated entity will evaluate the success of this minimum measure, including how the measurable goals for each of the BMPs were selected.

(7) Responsibility for overall management and implementation of the storm water public education and outreach program and, if different, who is responsible for each of the BMPs identified for this program.

2. **Chapter I. A. 1. c. requires a regulated entity to document the decision process for the development of the educational program. In general, the requested information indicates the expected level of performance. This decision process will aid MDEQ in the evaluation of the Storm Water Management Program (SWMP).**

B. From EPA's BMP Menu
(For more detailed information on implementation, effectiveness, benefits, limitations, cost and references see http://www.epa.gov/npdes/menuofbmps/menu.htm or call MDEQ.)

1. **Lawn and Garden Activities**
   Public Education and Outreach on Storm Water Impacts

   a. **Description**
   Lawn and garden activities can result in contamination of storm water through pesticide, soil, and fertilizer runoff. Proper landscape management, however, can effectively reduce water use and contaminant runoff and enhance the aesthetics of a property. Environmentally friendly landscape management can protect the environment through careful planning and design, routine soil analysis, appropriate plant selection, use of practical turf areas, water use efficiency, use of mulches, and appropriate maintenance.

   Additional activities that benefit water resources include maintaining healthy plants and lawns and composting lawn wastes. Healthy plants are less susceptible to diseases and insects and therefore require minimal use of pest control measures. To promote healthy plants, it is often beneficial to till composted material into the soil. Recycling of garden wastes by composting is also effective at reducing waste, although compost bins and piles should not be located next to waterways or storm drains because leachate from compost materials can cause contamination.

b. Applicability

Many environmentally friendly lawn and garden activities can be implemented for any municipal property. Municipalities can encourage residents to use the same practices in their own yards. These practices include landscape planning; integrated pest management; planting indigenous species; soil testing; and reduction, elimination, or judicious use of fertilizers and pesticides. Planting drought-resistant plants and using water conservation practices can be especially useful in areas of low rainfall. Areas of high rainfall experience more erosion, so protecting exposed soils with vegetation and mulches is of particular importance in these areas.

2. Water Conservation Practices for Homeowners
Public Education, Awareness, and Outreach

a. Description

Water use has soared in recent years. In many parts of the United States, the limited availability of drinking water has made water conservation practices mandatory. With water consumption at an all-time high, the costs of water and sewer services continue to climb. The good news, however, is that widespread reduction in water consumption could limit the need for new or expanded water and sewage treatment plants.

b. Applicability

According to the Chesapeake Bay Program and the Alliance for the Chesapeake Bay (1993), only about 4 of the estimated 100 gallons of water that each person uses daily is actually necessary. Water usage in the home can easily be reduced by 15 to 20 percent without major discomfort by implementing a program to conserve water in the home. Municipalities should establish a public education and outreach program to demonstrate to homeowners that by making minor changes in water use habits, each household can reduce its water consumption while saving money on water and sewage bills.

3. Proper Disposal of Household Hazardous Wastes
Public Education and Outreach on Storm Water Impacts

a. Description

Many products found in homes contain chemical ingredients that are potentially harmful to people and to the environment. Chemicals such as solvents, is an example of common hazardous products in the home.

Hazardous products include the following:

- Car care and maintenance: motor oil, battery acid, gasoline, car wax, engine cleaner, antifreeze, degreaser, radiator flush, and rust preventative
- Cleaning products, paints, preservatives, strippers, brush cleaners, and solvents
- Other products labeled toxic, flammable, or corrosive or containing lye, phenols, petroleum distillates, or trichlorobenzene

b. Applicability

Municipal household hazardous waste programs are widely applicable and vary in scope. They can range from simply informing the public about the hazards of some commonly used household chemicals to establishing a household hazardous waste collection facility. With limited funding

one can implement a small education campaign and expand the program, as resources become available.

4. Pet Waste Management
Public Education and Outreach on Storm Water Impacts

a. Description

When pet waste is not properly disposed of, it can wash into nearby waterbodies or can be carried by runoff into storm drains. Since storm drains do not connect to treatment facilities, but rather drain directly into lakes and streams, untreated animal feces can become a significant source of runoff pollution.

As pet waste decays in a waterbody, it uses up oxygen, sometimes releasing ammonia. Low oxygen levels and ammonia combined with warm temperatures can be detrimental to the health of fish and other aquatic life. Pet waste also contains nutrients that promote weed and algae growth (eutrophication). Eutrophic water becomes cloudy and green, making it unattractive or even prohibitive for swimming and recreation. Pet waste also carries bacteria, viruses, and parasites that can pose risks to human health and threaten wildlife.

b. Applicability

Pet waste management is applicable to any municipality, since pet owners are a part of every community. Municipalities can do a variety of things to encourage pet owners to collect and properly dispose of their animal's waste. They can produce and distribute educational materials to residents to inform them about the effects of pet wastes on water quality and what they can do to reduce water pollution. Additionally, an ordinance can be enacted to provide a legal basis to enforce proper pet waste disposal with fines.

5. Trash Management
Public Education, Awareness, and Outreach

a. Description

Trash and floating debris in waterways have become significant pollutants, especially in areas where a large volume of trash is generated in a concentrated area. Trash in waterbodies contributes to visual pollution and detracts from the aesthetic qualities of the landscape. It also poses a threat to wildlife and human health (e.g., choking hazards to wildlife and bacteria to humans). Additionally, trash and debris can clog the intake valves on boat engines, which results in expensive repairs.

b. Applicability

When developing control strategies for trash, municipalities should consider the following points:

- Implement a control structure designed to target the most prevalent types of trash and identify the source or sources of the trash.
- Evaluate the costs for each control. Develop a budget that takes into consideration what services and facilities are already available and can be utilized at the lowest cost.
- Regular cleaning and maintenance is necessary to prevent the accumulating trash at control structures from being hazardous itself.
- Control strategies should not just transport trash to another waterbody. They should reduce the quantity of trash in the water as a whole.

6. Education/Outreach for Commercial Activities
Public Education and Outreach on Storm Water Impacts

a. Description

The key to a successful outreach campaign is to target a message to a specific audience. The target audience is the group to whom a storm water pollution message is to be addressed. Industries and businesses can be a very influential component of the watershed. Many commercial activities contribute to storm water pollution (such as vehicle washing, landscape fertilization, and improper hazardous waste disposal). Therefore, it is important to address commercial activities specifically in an outreach strategy. It is also important to recognize that in most cases incentives must be provided to encourage businesses to change their behavior.

b. Applicability

There are numerous ways to provide education and outreach for commercial activities. Materials designed for businesses can include posters, magnets, calendars, flyers, brochures, and best management practices (BMPs) fact sheets or handbooks. For example, if the target audience includes auto maintenance industries, one might consider developing and distributing educational brochures and posters to these industries that outline BMPs that reduce urban runoff volume and pollutant concentration that result from their operations. Several storm water programs also offer rewards to businesses that participate in a "storm water business" program and meet specific criteria. Such commercial storm water pollution prevention programs have been very successful across the nation.

7. Tailoring Outreach Programs to Minority and Disadvantaged Communities and Children
Public Education and Outreach on Storm Water Impacts

a. Description

Many communities are ethnically and culturally diverse and include a portion of the population that speaks a language other than English. The messages contained in signs, brochures, advertisements, newsletters, and other outreach materials that are printed only in English are mostly lost on these groups. For example, in areas such as southern Florida and southern California where a large proportion of the population consists of Spanish-speaking immigrants, it is important to reach out to non-English speaking residents and inform them about storm water pollution issues and the importance of clean water. This type of expanded outreach program is not limited to these areas. Census 2000 figures show increasing minority populations in urban centers and suburbs such as Washington, DC, (Fernandez, 2001; Cohn and Witt, 2001) and New York (Cohn, 2001), among others.

Other groups that communities can target for outreach activities are disadvantaged persons who may not have the opportunity to learn about or participate in existing programs and activities. Municipal officials and representatives can design and implement special education programs in lower income neighborhoods to listen to and address the concerns of these residents and offer suggestions about ways that these residents can improve their neighborhood and environment.

b. Applicability

It is important for municipalities to survey residents about neighborhood demographics and determine if a specialized campaign is needed in a particular area. The survey can target areas that the municipality deems most likely to contain minority and disadvantaged residents. Municipalities

can seek assistance from sociology departments at local universities to help with the survey effort or can hire a firm specializing in focus groups and polling to conduct the research.

Once minority and disadvantaged groups have been identified, an analysis of the target group should be conducted. This analysis should determine the audience s perception of storm water issues so the municipality can tailor the outreach program to the appropriate knowledge base and address specific issues of concern. This tailoring will increase the likelihood that the groups are motivated and willing to participate in the program. For example, does the audience know what a watershed is or understand what causes polluted runoff? If not, those terms should be defined in the messages.

It is also useful for the municipality to find out how the target audience gets its information to more effectively develop, format, and distribute environmental messages. Which newspapers, magazines, or newsletters do they read? To what organizations do they belong? Do they watch local news or cable television? Do they receive information in other forms such as community radio programs? Who are the opinion leaders, and how can they be reached?

8. Classroom Education on Storm Water
Public Education and Outreach on Storm Water Impacts

a. Description

Classroom education is an integral part of any storm water pollution outreach program. Providing storm water education through schools exposes the message not only to students but to their parents as well. Many municipal storm water programs have partnered with educators and experts to develop storm water-related curricula for the classroom. Fortunately, these lessons need not be elaborate or expensive to be effective.

b. Applicability

It is important to emphasize that the role of a municipality is to support a school district's effort to educate students about storm water, not to dictate what programs and materials the school should use. Municipalities should work with school officials to identify their needs. For example, if the schools request storm water outreach materials, municipalities can provide educational aids that range from simple photocopied handouts, overheads, posters, and slide shows or more costly and elaborate endeavors such as working models and displays. The Daly City (California) Utilities gave a slide show and video presentation depicting the problem of marine entanglement to an eighth grade classroom just before their 1998 beach cleanup. Afterwards they had their largest volunteer turnout ever for a cleanup.

9. Storm Water Educational Materials
Public Education and Outreach on Storm Water Impacts

a. Description

Storm water education starts with a well-thought and well-developed outreach plan. The outreach plan should identify goals and objectives, classify the target audience, identify the message to be conveyed, and explain how the message will be distributed to the audience.

b. Applicability

The first step for a municipality will be to determine who the target audience is or whether there is more than one audience to target (see Attitude Survey fact sheet). If there is more than one

audience to address, can they be reached simultaneously or should they be prioritized? This will depend on the type(s) of audiences to reach and the message(s). Once the target audience(s) has/have been determined and the storm water message has been packaged, distribution can begin. Outreach materials (posters, flyers, magnets, etc.) will not help prevent storm water pollution if the target audience does not receive and read them. Common distribution mechanisms include direct mail, door-to-door distribution, telephone, targeted businesses, presentations, handouts at events, media outlets, and messages posted in public places. Deciding how to distribute materials involves a close look at the level of time, resources, and work required. For example, if posters with a storm water message are to be printed, several things need to be decided: Should the posters be mailed to a specific audience? Should mailing tubes be purchased? Are addresses available?

10. Low-Impact Development
Public Education and Outreach on Storm Water Impacts

a. Description

Using low-impact development (LID) approaches for new development can help to achieve storm water pollution reduction goals. Through LID approaches, storm water runoff can be controlled while development objectives are achieved. An important component of a municipal LID program is public outreach. The first step in achieving LID is to encourage developers to adopt such approaches. This is followed by the development and implementation of a program to ensure design standards are met and that homeowners are adequately informed of their responsibilities. The latter should be the responsibility of the developer and homebuilder. This outreach takes the form of the developer's communicating maintenance instructions and pollution prevention measures to the property owners. The public outreach program informs property owners of their responsibilities to the environment. When successfully implemented, LID education and awareness programs accomplish the following:

- Establish a marketing tool that allows developers to attract environmentally conscious buyers
- Create more landscaped areas, enhancing the aesthetics of developed areas
- Educate property owners on effective pollution prevention measures
- Promote the proper maintenance of best management practices
- Inform commercial property owners of potential cost saving of using LID approaches

b. Applicability

Outreach for Residential Properties - LID public outreach programs accomplish the above goals by providing residential property owners with essential information to maintain a property in an environmentally friendly manner. For example, one of the critical aspects of these programs is teaching property owners to maintain previously installed pollution prevention and best management practices properly. The developer or local public agency should communicate to current or potential property owners the benefits of LID, as well as their individual maintenance responsibilities as property owners. For example, property owners should understand that effective management of an LID property includes maintaining vegetative buffers, removing trash and debris from outflow points, using fertilizers properly, sweeping paved areas, practicing water conservation, and using mowing practices that promote runoff infiltration.

Outreach for Commercial Properties - Municipalities should consider three objectives when developing an outreach program for commercial properties. First, they should educate developers and provide incentives to incorporate LID practices into their designs. Second, they should educate

existing commercial property owners and provide incentives to retrofit their properties with LID practices, especially for areas adjacent to sensitive waterbodies. Finally, municipalities should provide guidance and other assistance to property owners who have already incorporated LID practices into their landscapes.

11. Educational Displays, Pamphlets, Booklets, and Utility Stuffers
Public Education and Outreach on Storm Water Impacts

a. Description

Printed materials are a common way to inform the public about storm water pollution. Some municipalities have a public relations department or a staff member that handles these types of outreach materials, whereas others contract with public relations firms and graphic designers to develop materials. Regardless of who actually produces the materials, municipalities should be creative when deciding which media to use and what types of messages are appropriate for those media. They also need to consider the following questions:

- Who is the audience? (i.e., general public, developers, homeowners?)
- How does the audience get information? (i.e., newspaper, television, trade magazines, utility bills?)
- What knowledge base does the audience have?
- Does the audience need to be convinced about the importance of storm water pollution control?

These and other questions can guide municipalities in choosing the appropriate media and designing a message with the appropriate tone and level of information.

Some common printed materials include educational displays, pamphlets, booklets, and utility stuffers. Computer desktop publishing has made the production of many of these materials fun and easy. If money is tight, or there is limited access to a computer, attractive and effective materials using basic resources such as a photocopy machine, scissors, and glue can still be effective.

When designing the layout of a display, pamphlet, or flyer, the following issues should be considered:

- Restraint in design, consistency in artwork and graphic types, and quality materials are important factors because the audience should be invited into the materials with appealing, user-friendly layouts.
- The text should be kept to a minimum but still be interesting for readers.
- Using various formats and active voice can make the text more engaging.
- Graphics--photos, logos, or other artwork--are great for breaking up long blocks of text, allowing readers a visual break.
- Images of lakes, streams, rivers, wetlands, and other storm water features are "naturals" for enhancing any printed material. The emotional appeal they elicit can be tremendous.

b. Applicability

Educational displays, pamphlets, booklets, and stuffers can be easily exhibited and distributed to a large population. They can be made using simple materials and graphics, or they can be made more elaborate. Furthermore, these displays can be made for any and all age levels, in any language, or for specific audiences.

***** Check with MDEQ's Non-Point Source Education program for existing outreach materials. ****

12. Using the Media
Public Education, Awareness, and Outreach

a. Description

The media can be one of the strongest allies to a storm water pollution prevention campaign in educating the public about storm water issues. Through the media, a program can educate targeted or mass audiences about problems and solutions, build support for remediation and retrofit projects, or generate awareness and interest in storm water management. Best of all, packaging a storm water message as a news story is virtually free! Surveys repeatedly show high interest among the public in environmental issues, and water quality--particularly as it relates to drinking water and recreation--rates very high. Reporters are always looking for informative articles, features, or columns to fill their pages or broadcasts. As with many public education activities, it is important to do some preliminary work to refine your message and target your audience to ensure that you deliver the most effective message.

b. Applicability

Delivering educational, promotional, or motivational messages through the news media is similar to distributing them through other channels. For best results, the message should be repeated periodically and linked to something the audience values. Coverage of watershed issues from several different angles can help to accomplish this. News is the lifeblood of the media, so the message must be packaged to attract coverage. Orienting the message to the workings of the media and the needs of reporters will help keep the message focused and effective.

13. Promotional Give-Aways
Public Education, Awareness, and Outreach

a. Description

Once a storm water education and outreach program has been developed, it can be marketed through promotional give-aways. Promotional give-aways are small tokens with storm water education slogans and graphics. They are free items given to people to help them become aware of environmental issues.

b. Applicability

Promotional give-aways are an effective format to promote storm water organizations, simple actions, and general awareness. A number of items such as, posters, calendars, frisbees, magnets, key chains, tote bags, coffee mugs, bumper stickers, and baseball caps, are appropriate promotional items. When choosing a give-away item it is important to consider the cost (items such as T-shirts and hats are relatively expensive) and the alternative message it might send. For example, a frisbee might conflict with a campaign to reduce plastic waste.

14. Pollution Prevention for Businesses
Public Education, Awareness, and Outreach

a. Description

Pollution prevention (P2) is the combination of activities that reduce or eliminate the amount of chemical contaminants at the source of production or prevent this waste from entering the environment or waste stream. P2 occurs when raw materials, water energy, and other resources are used more efficiently, when less harmful substances are substituted for hazardous ones, and when toxic substances are eliminated from the production process. P2 can be accomplished through such methods as source reduction, reuse/recycling, and energy recovery. Source reduction is the preferred method of P2 and allows for the most significant improvements in environmental protection by avoiding the generation of waste. Reuse/recycling and energy recovery are also effective means of P2.

b. Applicability

P2 plans take many forms but are applicable to almost every community and industry sector. Municipalities should educate business owners to plan and implement a P2 program. However, before implementing a P2 plan, it is important to evaluate the businesses in your community to determine the most efficient and effective plan. Attending or planning a P2 conference or becoming a member of a P2 organization with other communities can spur networking and information sharing. In addition, businesses in your community can frequently increase their publicity, recognition, and patronage through being a member of such P2 organizations.

C. Examples of What Others Have Done During Phase I (from EPA's Model MS4 General Permit)

1. Storm Drain Stenciling Program

The City of Monterey, CA put together a storm drain stenciling kit that could be used by volunteers stenciling storm drains. The kit included stencils, traffic cones, trash bags, paint and paint rollers, buckets, latex gloves, orange vests, and wet paint signs. Instructions on stenciling were also provided. Volunteers were asked to mark the storm drains they had stenciled on city maps, as well as provide any locations of storm drains that were not on city maps. For further information contact Jennifer Hays, Public Works Engineering Division (408) 646-3920. Source: Model Urban Runoff Program, Appendix 3C.

2. Enviroscape Model

The cities of Monterey and Santa Cruz, CA used a 3-dimensional plastic model of a miniature city to offer a hands-on approach to demonstrate water pollution of watersheds caused by various urban runoff sources. Participants sprinkle cocoa and colored drink mixes to simulate oil, paint, herbicides and pesticides. Participants then spray water on to the site to simulate rainfall. The model was taken to schools and city events to educate and elicit support from the community. Model Available from Terrene Institute (202) 833-8317. Source: Model Urban Runoff Program, Appendix 3D.

3. City of Miami Beach, Florida MS4 Storm Water Permit - 9/30/93

As a public awareness and education program, the City of Miami Beach publicized and promoted public awareness of the hazards of illicit dumping to the storm sewer system, through newspaper articles, pamphlets and bill inserts. They established and publicized a dedicated phone number to

inform the public of the nearest locations for dumping used oil and hazardous household waste, and to report illegal dumping to the storm sewer system. They initiated sewer stenciling program and provided used oil collection sites and post these locations at the local oil retailers.

4. **Baltimore County, MS MS4 Storm Water Permit - 3/30/95**
   A pilot educational program for the control of storm water pollutants was implemented. Components of the educational program included the development of informational materials and brochures; presentation packets for distribution to schools, businesses, and homeowners; and surveys for gauging program effectiveness. Topics included the identification and reporting of illicit connections, proper disposal of household toxic waste and volunteer opportunities for conducting stream surveys and cleanups. During the second year the city performed an assessment of its educational programs and proposed a schedule for expanding successful components to the entire county.

5. **Portland, OR MS4 Storm Water Phase I Case Study**
   Portland has developed a program that regularly monitors storm water outfalls for pollution discharges, which has effectively halted illicit pollutant discharges, and is helping to prevent new pollutant discharges. In addition, with a 60 percent voter approval, Portland has established a $135.6 million bond measure to acquire up to 6,000 acres of land area to better manage sensitive watersheds and secure better protection of urban waterways. Portland's industrial permit inspection program has seen storm water violations decrease from 30 to 23 percent since their permit was issued in 1995, and compliance with storm water pollution control plans has more than doubled from 41 percent to 87 percent.

6. **Minneapolis, MN MS4 Storm Water Phase I Case Study**
   Minneapolis has demonstrated that outreach efforts can be correlated to reductions in pollutants; pesticide concentrations in storm water can be reduced through public outreach efforts. Pollutant concentrations of pesticides monitored in a Minneapolis lake dropped between 59 and 86 percent depending on the pesticide evaluated due to the outreach effort. Minneapolis's outreach effort is similar to that of many Phase I cities (e.g., San Francisco) that recognize the benefit of education and reeducation of the public about their role in protecting storm water quality. Frequently, the effectiveness of public outreach is measured in terms of changes in public awareness and behavior, but the Minneapolis case study demonstrates water quality improvement does occur as a result of public outreach efforts, a common feature in the storm water programs operated by Phase I permittees.

7. **Sacramento, CA MS4 Phase I Storm Water Case Study**
   Outreach/education efforts of Phase I jurisdictions also focus on businesses that produce high volumes of liquid wastes with the potential to pollute storm water (e.g., automotive cleaning operations/car lots, carpet cleaners). In Sacramento, CA, a Phase I MS4 permittee, an innovative program has been introduced to reduce wash water discharges from carpet cleaning businesses. Through a "Clean Business" certification program, businesses get credit for correct disposal of wash water, home-owners have a chance of winning prizes through a lottery, and wash water is treated fully at the wastewater treatment plant. While thousands of gallons of wash water are now successfully treated, monitoring to measure the change in local water quality resulting from the business outreach effort have not been funded.

D. Mississippi Guidance and Resources (for more information contact MDEQ at 601/961-5171 General Permits Branch)

1. Guidelines for Developing and Implementing this Measure

Three main action areas are important for successful implementation of a public education and outreach program:

a. Forming Partnerships

Operators are encouraged to seek assistance from non-governmental organizations (e.g., environmental, civic, and industrial organizations), since many already have educational materials and perform outreach activities. Some groups may be providing environmental education activities that can be used to reach the public. Providing basic environmental knowledge about local water bodies is an appropriate step in educating the public on impacts to local waters by urban runoff.

Participation in watershed-based organizations facilitates both intergovernmental and non-governmental coordination, and can often provide an educational opportunity for the participants in those groups. In Mississippi, MDEQ has basin coordinators to facilitate non-regulatory programs (contact MDEQ's Surface Water Division, Basin Coordinators and/or Nonpoint Source (section 319) Program). Additionally, the Nonpoint Source program employs an education coordinator who can help with contacts and educational materials.

Your local Soil and Water Conservation District (SWCD) in partnership with the Natural Resources Conservation Service (NRCS) has many of the resources and educational materials that may be helpful in your public education and outreach efforts. They also have resource people that will be willing to assist with programs. For specific names, numbers and addresses for the NRCS see their web site at *www.nrcs.usda.gov*. The Mississippi Soil and Water Conservation Commission may also be able to assist with conservation education; their web site is *www.mswcc.state.ms.us*

Additional information on Mississippi Household Hazardous Waste Program can be obtained by contacting David Peacock at 601/961-5171. Furthermore, MDEQ's library has information on a number of non-point source educational materials. MDEQ, the Mississippi Soil & Water Conservation Commission and the Natural Resource Conservation Service has developed a manual entitled Planning and Design Manual for the Control of Erosion, Sediment, and Storm Water which provides detailed information.

b. Using Educational Materials and Strategies

MDEQ's Non-Point Source Education Section has information on a number of non-point source educational materials, including brochures, video's and models. MS4 operators may use storm water educational information provided by their State, EPA Region, environmental interests, public interests, or trade organizations instead of developing their own materials.

Operators should strive to make their materials and activities relevant to local situations and issues, and incorporate a variety of strategies to ensure maximum coverage. Some examples include:

- Brochures for general public and specific audiences. These brochures describe steps individuals can take to reduce pollution of urban runoff. Fact sheets or other program elements that make a community connection with local waterbodies are critical to increase the interest in and use of this pollution prevention information.

- Alternative information sources, such as web sites, bumper stickers, refrigerator magnets, posters, and restaurant placemats;

- Storm water hotlines for information and for citizen reporting of polluters (this is particularly applicable to the illicit discharge control measure);

Educational programs for school-age children are particularly effective ways to reach large numbers of citizens. To be effective and useful to teachers, topics must fit into school curriculum. When topics related to urban runoff pollution are incorporated into existing standards, the chance of having a successful program increases significantly. Many geography and science standards cover subjects that relate to water-land interactions. For example, both the City of Jackson's Solid Waste Division and the Jackson school district held environmental camps for children. These camps were designed to provide opportunities for children to become aware of environmental concerns and to impress on their parents to do the right thing in terms of littering and other environmental issues.

Hands-on explorations that are specific to your community, and outdoor studies led by trained individuals, are the most effective educational tools. Written activities, videos and brochures are less effective, due to the overwhelming amount of media teachers already receive. Programs reaching school age children are an excellent way to build parental and community support. The following topics may be used independently or incorporated into a school-based educational program. Also see Appendix E for school curriculum materials available at MDEQ.

- Water or River Festivals are excellent ways to reach those interested in water quality topics. Mississippi's Aqua Fair is held annually in a different region of the state. Home or garden shows are good for targeted messages like proper paint disposal or garden chemical use.

- Storm Drain Stenciling or Marking with messages like "Dump No Waste, Drains Directly to…" These can stand alone or be part of other targeted programs for school-age children or homeowners' associations. Contact MDEQ's Non-Point Section for information on how to get a storm drain stenciling or marking program going. Try to use name of the most immediate local waterbody on the stencil. Students or volunteers not only mark the storm drains but also walk neighborhoods distributing door-hangers and talking with residents about proper disposal of waste and pollution prevention.

- Tributary Signage, to increase public knowledge of local water resources. Contact Jackey Key at MDEQ for further information at 601-961-5171.

- A library of educational materials for community and school groups; some sources include Hands On Save Our Streams Guide (Izaak Walton League – http://www.iwla.org/SOS/),

Virginia State Parks – Your Backyard Classrooms (http://www.dcr.state.va.us/parks/vspf.htm), and WOW! Wonders of Wetlands Activity Guide (http://www.enc.org/resources/).

- Volunteer citizen educators to staff a public education task force.

- Event participation with educational displays at home shows and community festivals.

Nonpoint Education for Municipal Officials (NEMO) is an educational program centered around a PowerPoint presentation that teaches wise land use planning and the role it plays in storm water management and reducing non-point source pollution from urban areas. Particular attention is paid to the role of impervious, or paved, surfaces in the transport and concentration of pollutants. To guide towns, NEMO outlines a three-tiered strategy of natural resource-based planning, site design, and the use of storm water best management practices that towns can use to address their land use and cope with nonpoint source pollution. By introducing water quality issues, presenting strategies that communities can adapt to their particular situations, and making a long-term commitment to work with each community, NEMO has become a catalyst for significant changes in local land use policies.

NEMO began in 1991 as a pilot project to design and test a new way of presenting information to three coastal communities in Connecticut. The technical nature of the program was designed around the intended audience of engineers, planners, and commissioners--all whom are decision-makers within the towns. Since then, NEMO has continued to give presentations by request across Connecticut and is presently being implemented in 17 other states including Mississippi.

NEMO - Mississippi will work collaboratively with local groups on watershed projects, building on the original NEMO program with additional data layers, new audiences and more partners. NEMO - Mississippi, is a cooperative educational project, which thus far includes the Mississippi Department of Environmental Quality and the Environmental Protection Agency. Funding for NEMO-Mississippi is provided by a grant from the U.S. Environmental Protection Agency Section 319 Clean Water Act Funds.

NEMO - Mississippi has been approved for use by cities and counties as part of their public education component of their storm water Phase II permit. MDEQ's Nonpoint Source section has been trained in NEMO and will be conducting workshops in Mississippi. These workshops will train people to give the presentation and use the educational tools. At the end of the workshop each participant (or group coming from one entity) will be given a copy of the NEMO presentation and workbook tailored to their county. MDEQ plans to continue offering these workshops once or twice per year and will add additional workshops as needed for anyone who is willing to give presentations in their area.

For more details on the project and its impacts, please check out NEMO CT website through the Center For Watershed Protection's website links at http://www.cwp.org or contact James MacLellan, P.E., MDEQ's NPS Section, Construction / Urban / Forestry NPS Coordinator at (601) 961-5061

E. Examples of Phase II BMPs and Associated Measurable Goals (From EPA, Office of Water and Office of Wastewater Management at http://cfpub.epa.gov/npdes/stormwater/measurablegoals/index.cfm)

Hypothetical Case Study: Smalltown, USA, is a California city of 10,000 people that has decided to conduct a general outreach campaign on storm water and to target their program to school children and restaurants. Restaurants have been identified as a significant contributor of oil and grease to both storm drains and sanitary sewers. The City would also like to increase the overall knowledge of the citizens on storm water pollution. The following BMPs and measurable goals are examples of what this City could propose:

Minimum Measure Objective: The City will educate the general public by making 30,000 impressions per year with a storm water quality message via print, local TV access, local radio, or other appropriate media.

BMP: Public education radio campaign on storm water
Measurable Goal: The City will produce and air on local radio a 30-second public service announcement on storm water and what the public can do to prevent storm water impacts. This radio ad will air at least once a week for the first two years of the permit term. The City will conduct a survey at the end of the permit term to ascertain behavioral changes in target audiences.
Justification: Storm water permits in the Los Angeles regional area require approximately 3 impressions for each person per year. Smalltown's goal is to achieve the same level of exposure.

BMP: Storm water education program for school children
Measurable Goal: A minimum of 50 percent of all school children (K-12) will be educated every two years on storm water pollution by providing the School Districts in the jurisdiction of the City with materials, including videos, live presentations, brochures, and other media.
Justification: Educating school children on storm water and water quality practices, including water conservation measures, will help promote better public awareness.

BMP: Storm water education materials for restaurant owners
Measurable Goal: Outreach material on proper storm water management practices for restaurants will be produced within one year. Inspectors from the City's health department will be trained on potential storm water violations and proper practices for restaurants within one year.
Justification: Restaurants have been identified as a significant contributor of oil and grease into both storm and sanitary sewers. This targeted educational campaign will make the restaurant owners aware of proper disposal and recycling practices for oil and grease and inform them of potential fines for illegal dumping into storm or sanitary sewers.

EXAMPLE TABLE
BMPs, Associated Measurable Goals and Year to be Implemented

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
Brochures	Brochures developed and distributed in water utility bills	X				
Hotline	Storm water hotline in place	X				
Volunteer Education	Volunteer educators trained	X				
Web Site	A web site created		X			
School education	School curricula developed		X			
Storm drain stenciling/marking	500 Storm drains stenciled/marked		X			
Restaurant education	100 percent of restaurants contacted not dumping grease or other pollutants down storm sewer drains			X		
Neighborhood/Stakeholder Meetings	5 neighborhood group meeting presentations about water conservation and good housekeeping		X	X	X	X
Pet owner education	50 percent reduction in litter or animal waste detected in discharges				X	

CHAPTER II

PUBLIC INVOLVEMENT/PARTICIPATION

The public can provide valuable input and assistance to a municipality's storm water management program. Since it is the activities of the public within urban areas that produce diffuse pollution, and the public that funds municipalities, it is imperative that the public be given opportunities to play an active role in both the development and implementation of municipal storm water management programs. An active and involved community is crucial to the success of a storm water management program. Community involvement/participation allows for broader public support, since citizens who participate in the development and decision making process are partially responsible for the program and are more likely to take an active role in its implementation. Furthermore, community involvement allows for a broader base of expertise and economic benefits. The community can be a valuable, free, intellectual resource and a conduit to other programs**,** as citizens involved in the storm water program development process provide important cross-connections and relationships with other community and government programs. This benefit is particularly valuable when trying to implement a storm water program integrated on a watershed basis.

A. Program Requirements

1. **To satisfy this minimum control measure, the MS4 General Permit requires the regulated entity to:**

   a. At a minimum, notify the public of opportunities to provide input to the process of implementing a SWMP by:

      (1) Posting a notification of opportunities to participate at the courthouse of the county in which the regulated entity exists, at the main post office serving the area of the regulated entity, and in at least one library serving the area of the regulated entity.

      (2) Publishing once a week for three weeks a notification of opportunities to participate in at least one newspaper of general circulation in the county that includes the regulated entity or, if the regulated entity is a municipality, in at least one newspaper of general circulation in that municipality.

   b. Define appropriate BMPs for this minimum control measure and measurable goals for each BMP.

   c. Document the decision process for the development of a storm water public involvement/participation program. The regulated entity's rationale statement must address both the overall public involvement/participation program and the individual BMPs, measurable goals, and responsible persons for this program. The rationale statement must include the following information, at a minimum:

      (1) How the regulated entity has and will continue to involve the public in the development and submittal of the MS4 NOI and SWMP.

(2) What is the plan to involve the public in the development and implementation of this program.

(3) Who are the target audiences for the public involvement program, including a description of the types of ethnic and economic groups engaged? The regulated entity is encouraged to actively involve all potentially affected stakeholder groups, including commercial and industrial businesses, trade associations, environmental groups, homeowners associations, and educational organizations, among others.

(4) What are the types of public involvement activities included in the program. Where appropriate, consider the following types of pubic involvement activities:

(a) Citizen representatives on a storm water management panel

(b) Public hearings

(c) Working with citizen volunteers willing to educate others about the program

(d) Volunteer monitoring or stream/beach clean-up activities

(5) How the regulated entity will evaluate the success of this minimum measure, including how the measurable goals for each of the BMPs were selected.

(6) Responsibility for the overall management and implementation of the storm water public involvement/participation program and, if different, who is responsible for each of the BMPs identified for this program

2. **Chapter II. A. 1. c. requires a regulated entity to document the decision process for the development of the public involvement/participation program. In general, the requested information indicates the expected level of performance. This decision process will aid MDEQ in the evaluation of the Storm Water Management Program (SWMP).**

B. From EPA's BMP Menu

(For more detailed information on implementation, effectiveness, benefits, limitations, cost and references see http://www.epa.gov/npdes/menuofbmps/menu.htm or call MDEQ.)

1. **Storm Drain Stenciling**
   Public Involvement/Participation

   a. **Description**
   Storm drain stenciling involves labeling storm drain inlets with painted messages warning citizens not to dump pollutants into the drains. The stenciled messages are generally a simple phrase to remind a passersby that the storm drains connect to local waterbodies and that dumping pollutes those waters. Some specify which waterbody the inlet drains to or name the particular river, lake, or bay. Commonly stenciled messages include: "No Dumping. Drains to Water Source," "Drains to River," and "You Dump it, You Drink it. No Waste Here." Pictures can also be used to convey the

message, including a shrimp, common game fish, or a depiction of the path from drain to waterbody. Communities with a large Spanish-speaking population might wish to develop stencils in both English and Spanish, or use a graphic alone.

b. Applicability

Municipalities can undertake stenciling projects throughout the entire community, especially in areas with sensitive waters or where trash, nutrients, or biological oxygen demand have been identified as high priority pollutants. However, regardless of the condition of the waterbody, the signs raise awareness about the connection between storm drains and receiving waters and they help deter littering, nutrient over-enrichment, and other practices that contribute to nonpoint source pollution. Municipalities should identify a subset of drains to stencil because there might be hundreds of inlets and stenciling all of them would be prohibitively expensive and might actually diminish the effect of the message on the public. The drains should be carefully selected to send the message to the maximum number of citizens (for example, in areas of high pedestrian traffic) and to target drains leading to waterbodies where illegal dumping has been identified as a source of pollution.

2. Stream Cleanup and Monitoring
Public Involvement/Participation

a. Description

An effective way to promote storm water awareness is to host a stream cleanup. Many people are unaware that most storm drains discharge untreated waters directly into local waterbodies. A stream cleanup allows concerned citizens to become directly involved in water pollution prevention. Participants volunteer to walk (or paddle) the length of the stream or river, collecting trash and recording information about the quantity and type of garbage that has been removed. Stream cleanups also educate members of the community about the importance of stream water quality through media coverage and publicity efforts. Many programs have experts on hand at the event to discuss the stream's ecology and history. As a result, the river is cleaner, volunteers feel a sense of accomplishment, and the community at large is better informed.

b. Applicability

Stream cleanups are applicable to all waterbodies. Almost anyone can get involved in cleanup activities schoolchildren, youth groups, neighborhood associations, local environmental groups, or individuals. Cleanups have tasks of varying levels of difficulty, so there is something for people of all ages and skills to do.

3. Reforestation Programs
Public Involvement/Participation

a. Description

Reforestation is essential to the restoration of many natural habitats. These forested buffers between land and water are an essential part of the ecosystem. In some parts of the country, however, they are disappearing at an alarming rate. Reforestation programs attempt to preserve and restore forested buffers and natural forests. In areas all over the country, volunteers, community groups, and state and local conservation groups have initiated tree-planting efforts.

Municipalities can accomplish several tasks in addition to buffer establishment and improvement with reforestation, including park improvement, neighborhood and highway beautification, and provision of shade in parking and pedestrian areas. A municipality should determine what their priorities are and identify candidate sites for reforestation based on these priorities.

With the variety of tasks involved in tree planting efforts, everyone can help out. While some people man wheelbarrows, haul the plants, or shovel ground, there are a variety less strenuous ways that volunteers can assist in these efforts. For example, to maintain a steady supply of trees, some organizations establish small nurseries where volunteers can pot seedlings and care for them for about 2 years until they are ready to be transplanted to a natural setting. Other participants in a tree-planting program might be responsible for contacting local businesses, residences, or nursery farms to seek financial or vegetative donations.

b. Applicability

As stated previously, reforestation programs can be used throughout a community to reestablish forested cover on a cleared site, establish a forested buffer along stream corridors to filter pollutants and reduce flood hazards, provide shade and aesthetic benefits in neighborhoods and parks, and improve appearance and pedestrian comfort along roadsides and in parking lots. It is up to the municipality to choose candidate sites for reforestation programs, and these decisions can be based on residents' recommendations or overall capital improvement goals of the community.

4. Wetland Plantings
Public Involvement/Participation

a. Description

Wetlands are unique ecosystems that are home to a great diversity of terrestrial and aquatic plants and animals and are beneficial in many ways. They have the ability to improve water quality by filtering and accumulating pollutants, thereby protecting adjacent rivers, lakes, and streams. Wetlands also provide food, protection from predators, and other habitat factors for many of the nation's fish and wildlife species, including endangered and threatened species. Finally, wetlands have economic value associated with recreational, commercial, and subsistence use of fish and wildlife resources.

Over time, many wetland, riparian, and lakeshore environments have become degraded by human-induced disturbances such as the introduction of invasive, non-native plants. Such exotic vegetation can reduce habitat quality (e.g., loss of food supply), contribute to an unkempt, weedy appearance, and obscure the waterbody from view. These disturbances have not only affected the natural functions of these systems by causing increased erosion, a decline in natural wetland vegetation, and degraded habitats, but they have also reduced the aesthetic value of the environment. Wetlands and waterbodies are also disturbed by land development activities in adjacent areas and in upland areas within the watershed. These disturbances often result in sediment deposition, nutrient enrichment, and increased storm water flows into the wetlands. This causes a reduction in water clarity that ultimately limits the growth of wetland plant species and submerged aquatic vegetation, the smothering of streambeds, contamination of water quality, and alteration of natural hydrology.

b. Applicability

Municipalities can plant wetland species to both preserve existing wetlands and enhance degraded wetland plant communities. Wetland plantings however, are only one part of what a municipality might undertake when restoring, protecting, or creating a wetland.

When preserving and enhancing degraded wetlands, it is often necessary to plant wetland species along shorelines, in upland habitats, and along the bottom of waterbodies. Each wetland can be divided into specific zones based on soil hydrology. Upland transitional zones are adjacent to normally wet or inundated wetland areas. These zones are extremely important to the health, function, and appearance of the wetland or waterbody. Wetland and open water zones range from having saturated soil below the ground surface (such as in a wet meadow) to being completely inundated with water (such as a shoreline or streambank). These areas can support wetland plant species ranging from sedges and shrubs that are intolerant of inundation to emergent species and submerged or floating plants.

When beginning a wetland planting, it is important to keep in mind that any entity that alters a wetland must first get a permit from the U.S. Army Corps of Engineers. This requirement is specified under the Clean Water Act, Section 404.

Municipalities can also use wetland mitigation banking when necessary. A wetland mitigation bank is a wetland area that has been restored, created, enhanced, or preserved, and is then set aside to compensate for future wetland conversion from development activities. A municipality can participate in wetland mitigation by undertaking such preservation activities under a formal agreement with a regulatory agency. In Pembroke Pines, Florida, 358 acres of degraded wetlands on city property were restored through the Florida Wetlandsbank. For more information on mitigation and conservation banking, including contact information for local bankers and regulators, contact the Terrene Institute at *www.terrene.org*.

5. Watershed Organization
Public Involvement/Participation

b. Description

A watershed organization incorporates the ideas and resources of many different groups into a single organization. The groups can consist of local governments, citizens, nonprofit environmental groups, and local universities, among others. The purpose of a watershed organization is to restore, protect, and promote the natural resources of the watershed. To accomplish this, a watershed organization might set goals for and subsequently implement public education and storm water management programs, steam clean-up events, or restoration activities.

Watersheds most likely encompass multiple jurisdictions and involve multiple government participants. It is essential for all municipalities that fall within the watershed boundaries to participate in watershed organizations. If a watershed organization is still in the conceptual stage, it will behoove the municipality to help structure it in a way that will serve all interests in the watershed. A municipality cannot--and should not--control a watershed organization, but it can support it, nurture it, and help it achieve its goals.

c. Applicability

A watershed organization can exist for any watershed, large or small, but organizations for larger watersheds are more common. In all cases where a watershed organization exists, it is crucial for

municipalities to be involved in the decision making process so the municipality's goals are achieved. In places where no watershed organization exists, municipalities can initiate the creation of one by working with other stakeholders and interested parties.

6. Stakeholder Meetings
Public Involvement/Participation

a. Description

Public involvement and public participation naturally requires the inclusion of stakeholders. Stakeholders are individuals or groups in the community that are most affected by a municipality's storm water program. They have a vested interest in the waterbody and storm water activities. Stakeholders might include citizens, local school groups, community leaders, local and state government representatives, and business owners in the watershed. Stakeholder meetings can be in the form of a local storm water management panel, a public meeting, or any type of interactive, information-sharing event.

b. Applicability

Each stakeholder has a vested interest in solving storm water management problems for the particular waterbody. Therefore, stakeholders should be solicited to contribute their ideas and concerns or to be informed of water quality issues in their community. One way to do this is through stakeholder meetings, where participants can hear what others have to say and can contribute their own ideas.

In addition to inviting the stakeholders, representatives from several local media newspapers, radio, or television news should be included. Journalists, broadcasters, and others who attend the meetings can let others know what happened, when the next meeting is, and how they can get involved.

7. Attitude Surveys
Public Involvement/Participation

a. Description

Surveys of how the public perceives storm water management can foster better planning and management programs. The results of these attitude surveys can enlighten both storm water managers and the public on what the sources of pollution are, the effects of storm water on the environment, and options for control. Public attitude surveys can bring to light what is important to the stakeholders. Program planners can use this information to determine how best to incorporate the public's needs and desires into the overall goals of any storm water management program.

b. Applicability

Attitudes toward storm water and best management practices used to manage it can influence the effectiveness of control measures and clean-up efforts. Determining public perceptions, expectations, and desires is an important place to start. Attitude surveys of interested parties can enlighten storm water managers of the appropriate steps to take and the misconceptions to fix.

8. Community Hotlines
Public Involvement/Participation

a. Description

Because regulators and authorities cannot monitor all waterbodies at once, they sometimes rely on the public to keep them informed of water polluters. Community hotlines provide a means for concerned citizens and agencies to contact the appropriate authority when they see water quality problems. A hotline can be a toll-free telephone number or an electronic form linked directly to a utility or government agency, such as the water quality control board. A typical call might report a leaking automobile, concrete washout dumped on the street, paint in a creek, or organic debris (including pet waste) in a drainage system or waterway.

b. Applicability

Generally, an investigation team promptly responds to a hotline call and, in most cases, visits the problem site. If a responsible party can be identified, the team informs the party of the problem, offers alternatives for future disposal, and instructs the party to resolve the problem. If the issue is not resolved by the responsible party (or the party cannot be identified), the proper authority takes action to remediate the situation and prevent future violations.

9. Volunteer Monitoring
Public Education, Awareness, and Outreach

a. Description

Volunteer monitoring programs encourage citizens to learn about their water resources. These volunteer monitors

- Build awareness of pollution problems
- Become trained in pollution prevention
- Help clean up problem sites
- Provide data for waters that might otherwise be unassessed
- Increase the amount of water quality information available to decision-makers at all levels of government.

The volunteers often become educators themselves, informing inquisitive passersby, family, colleagues, and friends about storm water.

Volunteers conduct a variety of activities, including

- Analyzing water samples for dissolved oxygen, nutrients, pH, temperature, and many other water constituents
- Evaluating the health of stream habitats and aquatic biological communities
- Inventorying streamside conditions and land uses that may affect water quality
- Cataloging and collecting beach debris
- Restoring degraded habitats.

Citizen monitoring can provide important data and information during the development of a storm water program. These data help determine what management practices and strategies are most appropriate for a particular community or set of issues. State and local agencies can use volunteer

data to delineate and characterize watersheds, screen for water quality problems, evaluate the success of best management practices, and measure baseline conditions and trends.

b. Applicability

Volunteer monitoring programs can be implemented in any community to augment agency-obtained data. Volunteer monitoring programs are organized and supported in many different ways. Projects might be entirely independent (initiated by volunteer groups) or associated with local, state, interstate, or federal agencies. Programs might also be associated with environmental organizations or with schools and universities. Financial support for these programs might come from government grants, partnerships with businesses, endowments, independent fund-raising efforts, corporate donations, membership dues, or a combination of these sources.

10. Adopt-A-Stream Programs

Public Education, Awareness, and Outreach

a. Description

Adopt-A-Stream programs are an excellent public outreach tool for municipalities to involve citizens of all ages and abilities. They are volunteer programs in which participants "adopt" a stream, creek, or river to study, clean up, monitor, protect, and restore. Through these activities, the adopting group or organization becomes the primary caretaker of that stretch of stream in the watershed.

b. Applicability

A municipality can tailor an Adopt-A-Stream program to allow participation from any group or organization within a watershed. Adoptions are as flexible and unique as the streams themselves. Adopting a stream is a great program for youth groups, including church groups, scouts, and school clubs, but it can also be a great activity for adult groups such as neighborhood associations, civic organizations, or businesses. Levels of involvement range from quarterly visual surveys and litter pick-ups to monthly testing to one-time habitat improvement projects. The objectives of the program are not only to remove litter, but also to improve the quality of the stream. Waste collected from stream banks and channels could spur local interest in maintaining and improving the water quality and aesthetics of all local waterbodies.

Municipalities can sponsor many different activities through Adopt-A-Stream programs, such as:

- Implementing stream cleanups
- Conducting streambank surveys
- Monitoring stream insects and gauging water quality
- Executing streambank enhancement projects, such as tree planting, to help control erosion and stabilize streambanks
- Implementing storm drain stenciling
- Conducting construction site surveys for proper storm water controls
- Promoting education about the watershed through stream walks, workshops, and other activities

C. Examples of What Others Have Done During Phase I (from EPA's Model MS4 General Permit)

1. **Public presentations**
   Conducting public presentations with city councils and municipal staff is a valuable way to approach the development of storm water management programs. To accomplish this aim, it is useful to have a 'stock presentation, 'which describes current problems, including drainage deficiencies and water quality contaminants of concern. In addition, potential funding issues, possible solutions, and the NPDES regulatory background should be addressed in the presentation. In short, the objective of the presentation is to inform the community of the need for a storm water management program. This presentation can then be used for neighborhood groups, businesses, commercial property owners and local service clubs. For a sample municipal Storm Water Management Program Presentation Outline, see Model Urban Runoff Program, Appendix 3A.

2. **Community Clean Up**
   The City of Tulsa, Oklahoma, created a floatables-reduction program that utilized education and community participation. 'Operation Cleansweep' brought citizens together to clean up designated basins, pick up roadside trash, and remove obstructions from channels. For further information contact Scott Van Loo, Environmental Compliance Specialist, Public Works Department, Tulsa, OK, (918) 591-4379. Source: NRDC, Storm Water Strategies Community Responses to Runoff Pollution, May 1999.

3. **County of Riverside, Santa Ana CA MS4 Storm Water Permit -3/8/96**
   The regional board recognizes the significance of Riverside County's Storm Water/Cleanwater Protection program and will conduct, participate, and/or assist with at least one workshop every year during the term of this permit to promote and discuss the progress of the storm water management program. The details of the annual workshop will be published in local newspapers and mailed to interested parties.

4. **City of Milwaukee, WI Storm Water Permit -10/21/94**
   A program to promote the management of stream banks and shorelines by riparian landowners to minimize erosion and restore or enhance the ecological values of the waterway.

5. **City of Monterey, CA MS4 Storm Water Phase II Community Case Study**
   In the city of Monterey, CA, a Phase II community, grass-roots efforts have assisted in identifying and implementing the necessary storm water management controls to protect the Monterey Bay National Marine Sanctuary in California, one of the most diverse marine environments in the United States. In particular, volunteers contribute, on average, an estimated 1,500 annual hours to monitor for unacceptable dry weather discharges for MS4s. The efforts of the volunteers have significantly reduced the amount of pollutants entering the estuary.

6. **Sacramento, CA MS4 Storm Water Case Study**
   In Sacramento, CA an innovative program has been introduced to reduce wash water discharges from carpet cleaning businesses. Through a "Clean Business" certification program, businesses get credit for correct disposal of wash water, home-owners have a chance of winning prizes through a lottery, and wash water is treated fully at the wastewater treatment plant. While thousands of gallons of wash water are now successfully treated, monitoring to measure the change in local water quality resulting from the business outreach effort have not been funded.

D. Mississippi Guidance and Resources (for more information contact MDEQ at 601/961-5171 General Permits Branch)

1. **Local Public Notice Requirements**
   The permit requires MS4s to comply with local public notice requirements when implementing a public involvement/participation program. This means that existing public notice requirements are for your city or county must be implemented. We are aware that these public notice requirements will vary from city to city, county to county and depend on the type of information being brought to the publics attention. **At a minimum the permit requires MDOT to notify the public of opportunities to provide input to the process of developing a SWMP by:**

   a. **Posting a notification of opportunities to participate at the courthouse of the county in which the regulated entity exists, at the main post office serving the area of the regulated entity, and in at least one library serving the area of the regulated entity.**

   b. **Publishing once a week for three weeks a notification of opportunities to participate in at least one newspaper of general circulation in the county that includes the regulated entity or, if the regulated entity is a municipality, in at least one newspaper of general circulation in that municipality.**

2. **Adopt–A–Stream Mississippi**
   Adopt-A-Stream Mississippi is a unique and cooperative effort between the Mississippi Wildlife Federation, Mississippi Department of Environmental Quality (MDEQ), Mississippi State University Coastal Research and Extension Center, and Mississippi Department of Wildlife, Fisheries, and Parks to involve citizens in stream stewardship and water quality monitoring. Adopt-A-Stream programs increase public awareness of local water resources and build partnerships to protect our most precious resource – water. Volunteers adopt a section of a stream or river and then monitor water quality, conduct clean ups, and/or improve stream habitat. For more information about the Adopt-A-Stream program, contact Charles Cockrell, Adopt-A-Stream Coordinator, Mississippi Department of Environmental Quality (Phone: 601-961-5328, Email: *Charles_Cockrell@deq.state.ms.us).*

3. **Mississippi's Basin Management Approach**
   Mississippi is managing water quality activities in a new way – it's called Mississippi's Basin Management Approach. Many agencies, organizations, and citizens are coming together to help implement this approach to protect our water resources. A basin is an area of land that drains into a common water body. There are nine major drainage basins in the state. Technical experts, stakeholders, and interested citizens will be organized in each basin to help develop a long-term plan that makes sense for managing the water resources. Managing our water resources on a basinwide scale requires the input of all the citizens in the basin – from homeowners to farmers to local officials. This new approach provides greater opportunities for citizens to participate in decision-making efforts and in shaping the future of water quality in our State. Contact one of the following Basin Coordinators for further information at 601/961-5171: Mary Katherine Brown, Richard Ingram, Vernon Hartley, Jackie Key or Steve Goff.

4. **Litter Clean-Ups**
   The Mississippi Coastal Cleanup – in conjunction with the International Coastal Cleanup – takes place each year on the third Saturday in September. Cumulatively, more than 3 million people in over 100 countries have participated in the cleanup since it became an international event in 1989. In September of 2001, more than 2,700 volunteers picked up 2,471 bags of trash at 46 sites along 73 miles of coastal waterways in Hancock, Harrison and Jackson Counties during the 13th annual Mississippi Coastal Cleanup. For more information contact Lauren Thompson, Mississippi Department of Marine Resources at 228/374-5022, ext.5226.

5. **Storm Drain Stenciling/Marking**
   In Mississippi storm drains are being marked with a ceramic disk glued to the storm drains. The markers are long lasting and eliminate the need for messy paints. Our program also includes door hanger distribution to nearby residents as a key component of the program. Contact Janet Chapman at 601/961-5171 for more information.

E. Examples of Phase II BMPs and Associated Measurable Goals (From EPA, Office of Water and Office of Wastewater Management at http://cfpub.epa.gov/npdes/stormwater/measurablegoals/index.cfm)

Hypothetical Case Study: Smalltown, USA, has decided to organize a steering committee to help in both the development and implementation of their storm water program. The City has also decided to hold a coordination meeting among key stakeholders every year to discuss how the storm water program is functioning and how it can be improved.

Minimum Measure Objective: Involve stakeholder groups, including local governments, businesses, and citizens, in making decisions about storm water management priorities and programs

BMP: Establish a NPDES storm water steering committee
Measurable Goal: The NPDES Storm Water Steering committee is established at least 6 months before the NOI is submitted and meets quarterly before and during the permit term. Membership includes representatives from the City, public, industrial and commercial groups, and construction/developer groups.
Justification: Involving stakeholders early on in the storm water management planning process will improve support for programs because the stakeholders will be able to voice their concerns and suggestions before the program is finalized.

BMP: Hold public meetings to receive input on the proposed program
Measurable goal: Three public meetings will be held on the City's proposed storm water management program before it is finalized.
Justification: Public meetings are an excellent way to inform citizens about storm water impacts in addition to gaining support for the proposed storm water management program. Key issues, especially those that directly affect the public, can be described during these meetings to increase awareness about citizen responsibility, costs, and expected benefits.

BMP: Coordination meeting
Measurable Goal: The City will annually hold a coordination meeting involving co-permittees, regulatory agencies, and interested stakeholders to discuss progress of the storm water management program and the next year's activities.
Justification: Coordination with other jurisdictions, regulatory agencies, and citizens helps to identify common goals, such as improving water quality, that are not defined by geographic boundaries. Responsibility for tasks that further these common goals can be divided among these parties to use funding and labor efficiently.

EXAMPLE TABLE
BMPs, Associated Measurable Goals and Year to be Implemented

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
Public meetings	Notice of a public meeting in different print media and bilingual flyers	X				
Citizen panel	Citizen panel established	X				
Volunteer participation	Volunteers organized to locate outfalls/illicit discharges and stencil drains	X				
Public input	Final recommendations of citizen panel		X			
Solicit public participation through radio announcements	Radio spots promoting program and participation		X			
Community clean-ups	One percent of the community participating in community clean-ups		X			
Development of watch groups	Citizen watch groups established in a certain 50 percent of neighborhoods			X		
Outreach	Outreach to all population sectors completed				X	

CHAPTER III

ILLICIT DISCHARGE DETECTION AND ELIMINATION

The permit defines an illicit discharge as any discharge to an MS4 that is not composed entirely of storm water, and has not been authorized under a discharge permit issued by the State of Mississippi. Illicit discharges enter the system through either direct connections (e.g., wastewater piping either mistakenly or deliberately connected to the storm drains) or indirect connections (e.g., infiltration into the MS4 from cracked sanitary systems, spills collected by drain outlets, or paint or used oil dumped directly into a drain). The result is untreated discharges. Illicit discharges may be continuous or intermittent. Intermittent discharges tend to occur when carried by a storm event, while continuous illicit discharges often flow during dry weather. Illicit discharges can result in untreated discharges that contribute high levels of pollutants, including heavy metals, toxics, oil and grease, solvents, nutrients, viruses, and bacteria, to receiving waterbodies. Pollutant levels from these illicit discharges have been shown in EPA studies to be high enough to significantly degrade receiving water quality and threaten aquatic life, wildlife, and human health.

A. Program Requirements

1. **To satisfy this minimum control measure, the MS4 General Permit requires the regulated entity to:**

   a. Develop, implement and enforce a program to detect and eliminate illicit discharges (as defined in 40CFR 122.26(b)(2)) into the regulated entity's small MS4.

   b. Develop, if not already completed, a storm sewer system map, showing the location of all outfalls and the names and location of all waters of the United States that receive discharges from those outfalls.

   c. To the extent allowable under State or local law, effectively prohibit, through ordinance, or other regulatory mechanism, non-storm water discharges into the regulated entity's storm sewer system and implement appropriate enforcement procedures and actions. If the regulated entity's ordinance or regulatory mechanism is already developed, include a copy of the relevant sections with the program.

   d. Develop and implement a plan to detect and address illicit discharges, including illegal dumping, to the regulated entity's system.

   e. Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.

   f. Address the non-storm water discharges or flows identified in Part I. B. 4. of this permit only if the regulated entity or MDEQ identify them as significant contributors of pollutants to the regulated entity's small MS4. The regulated entity may also develop a list of other similar occasional

incidental non-storm water discharges (e.g. non-commercial or charity car washes, etc.) that will not be addressed as illicit discharges. These non-storm water discharges must not be reasonably expected (based on available information) to be significant sources of pollutants to the MS4. If a list of incidental non-storm water discharges is developed the regulated entity must:

(1) Document in your plan any local controls or conditions placed on the discharges.

(2) Include a provision prohibiting any individual non-storm water discharge that is determined to be contributing significant amounts of pollutants to the MS4.

g. Define appropriate BMPs for this minimum control measure and measurable goals for each BMP.

h. Document the decision process for the development of a storm water illicit discharge detection and elimination program. The regulated entity's rationale statement must address both the overall illicit discharge detection and elimination program and the individual BMPs, measurable goals, and responsible persons for this program. The rationale statement must include the following information, at a minimum:

(1) The plan to detect and address illicit discharges to the regulated entity's system, including discharges from illegal dumping and spills. This plan must include dry weather field screening for non-storm water flows. This plan must also address on-site sewage disposal systems that flow into the regulated entity's storm drainage system. This description must address the following, at a minimum:

(a) Procedures for locating priority areas which include areas with higher likelihood of illicit connections (e.g., areas with older sanitary sewer lines)

(b) Procedures for tracing/locating the source of an illicit discharge

(c) Procedures for removing the source of the illicit discharge

(d) Procedures for program evaluation and assessment

(2) How the regulated entity plans to inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste. Include in the regulated entity's description how this plan will coordinate with the regulated entity's public education minimum measure and the regulated entity's pollution prevention/good housekeeping minimum measure programs. Illicit discharge education actions may include storm drain marking, a program to promote, publicize, and facilitate public reporting of illicit connections or discharges, and distribution of outreach materials.

(3) How the regulated entity will evaluate the success of this minimum measure, including how the measurable goals for each of the BMPs were selected.

(4) Responsibility for overall management and implementation of the storm water illicit discharge detection and elimination program and, if different, who is responsible for each of the BMPs identified for this program.

2. **Chapter III. A. 1. h. requires a regulated entity to document the decision process for the development of the illicit discharge detection and elimination program. In general, the requested information indicates the expected level of performance. This decision process will aid MDEQ in the evaluation of the Storm Water Management Program (SWMP).**

B. From EPA's BMP Menu

(For more detailed information on implementation, effectiveness, benefits, limitations, cost and references see http://www.epa.gov/npdes/menuofbmps/menu.htm or call MDEQ.)

1. **Failing Septic Systems**
   Illicit Discharge Detection and Elimination

   a. **Description**

   Septic systems provide a means of treating household waste for those areas that do not have access to public sewers or where sewering is not feasible. Currently, it is estimated that 25 percent of the population of the United States rely on onsite wastewater systems to treat and dispose of their household waste. Of that number, about 95 percent of the disposal systems are septic tank systems. The goal of this fact sheet is to prevent new septic systems from failing and to detect and correct existing systems that have been failing.

   Failure of on-site disposal systems can be due to a number of causes, including unsuitable soil conditions, improper design and installation, or inadequate maintenance practices. Improperly functioning septic systems are recognized as a significant contributor of pollutants (especially nitrogen) and microbiological pathogens and dispense more than one trillion gallons of waste each year to subsurface and surface waters (NSFC, 1995). Identifying and eliminating failing septic systems will help control contamination of ground and surface water supplies from untreated wastewater discharges.

   Some of the most common indicators of failing septic systems are odors and visual observances like surface pooling and patches of very green grass, particularly in the off-season or in an isolated pocket Simple field tests can also provide insight into the location of illicit discharge. For example, excess ammonia is an indication of anaerobic conditions, and fecal coliform and excess chemicals from laundry detergents indicate inadequate or failing systems (Cox, personal communication, 2000).

   Two field-screening techniques that have been used with success at identifying possible locations of failing septic systems are the brightener test and color infrared (CIR) aerial photography. The first involves the use of specific phosphorus-based elements found in many laundry products, often called brighteners, as an indicator of the presence of failing on-site wastewater systems. The second technique uses color infrared (CIR) aerial photography to characterize the performance of septic systems. This method has been found to be a quick and cost-effective method for assessing the potential impacts of failing systems and uses variations in vegetative growth or stress patterns over septic system field lines to identify those systems that may potentially be malfunctioning. Then a more detailed on-site visual and physical inspection will confirm whether the system has

truly failed and the extent of the repairs needed. County health departments or other authorized personnel may carry out these inspections.

b. Applicability

Conventional septic systems are used throughout the United States and are the wastewater treatment method mostly commonly selected for those areas without public sewer systems and treatment plants. In areas without sewer systems, there are a number of factors that should be examined to determine if conventional septic systems are the right treatment choice. The first is the size of the lot where the system is installed. Conventional septic systems have a relatively large lot size requirement to allow for even effluent distribution across the drainfield. A second factor is the soil type within a region, which influences the ability of the soil to purify effluent and allow the effluent to percolate. Other conditions that can affect septic system applicability include separation distance from the water table and bedrock, topography, flooding frequency, density of development, and distance to streams or shorelines.

2. Industrial/Business Connections
Illicit Discharge Detection and Elimination

a. Description

This management practice involves the identification and elimination of illegal or inappropriate connections of industrial wastewater sources to the storm drain system. Many of these discharges are a result of connections to the storm drain that are unknown to the business owner and may not be evident in architectural plans. The large amount of storm and sanitary sewer pipes in a community creates a complex and often confusing system of utilities, so it is not unusual for improper connections to occur.

b. Applicability

Industrial illicit connections can arise in a number of ways, including cross connections with sanitary sewers and floor drains improperly attached to storm drainage pipes. These connections may be accidental or planned, and occur in new developments as well as in existing development. For existing industries, improper connections are located by using field-screening procedures, source testing protocols, and visual inspection.

3. Sanitary Sewer Overflows
Illicit Discharge Detection and Elimination

a. Description

This fact sheet deals with detecting and correcting priority sanitary sewer overflows in a community. Sanitary sewer overflows (SSOs) involve the release of raw sewage from a separate sanitary sewer system prior to reaching a treatment facility. The raw sewage from these overflows contains bacteria and nutrients that affect both human and environmental health. These overflows occur when the flow into the system exceeds the design capacity of the conveyance system, resulting in discharges into basements, streets, and streams. A common SSO is overflowing sewage manholes that send untreated sewage into a stream. While SSOs can occasionally occur in any system due to factors such as flooding or temporary blockages, chronic overflows are an indicator of a deteriorating system or a system where development has exceeded capacity. Estimates are that about 140 overflows occur per one thousand miles of sanitary sewer lines each year (AMSA, 1994). An Association of Metropolitan Sewage Agencies survey also found that 15 to 35 percent of all sewer lines were over capacity and could potentially overflow during a storm.

b. Applicability

Sanitary sewer overflows occur in urbanized areas where a separate sanitary sewer system has been created to move wastewater from households and businesses to treatment plants. The detection and elimination of SSOs is most important because sanitary sewer collection systems represent a significant investment for urban municipalities. Depending on the their size, the cost of a sanitary sewer system can be in the billions of dollars. Therefore, programs are required not only to identify and eliminate overflows as they occur, but also to include preventative maintenance planning. There are a number of factors that contribute to sanitary sewer systems being more prone to failure and possible overflows. An important factor is the age of the pipe system. If the sewer system is older, deterioration of the main and lateral pipes can create sags in the lines, cracks, holes, and protruding laterals. This deterioration can be due to the type of material used for the pipe system or failure of the material used to seal pipe joints.

Another contributor to sanitary system failure is poor siting or installation techniques. Some sewer lines may be placed in a way that makes them very dependent on the support of the surrounding earth. When movement in the earth surrounding these lines occurs, cracks or misaligned and open pipe joints are the result.

Another factor may be the inadequate size of the existing sewer pipe. New sewer hook-ups, underground water infiltration/inflow, and inputs from roof and/or yard drain connections can cause a system to be overloaded due to the inability of undersized sewer pipe to handle increases in wet weather discharges.

Other factors, both man-made and natural, may also contribute to SSOs. Roots can create stoppages, as well as damaging the structural integrity of the sewer line. Grease from both residential and commercial sources can clog sewer lines. Ground water influences and temperature fluctuations may also contribute to sanitary sewer system failure. Equipment failure and power outages that affect pumping stations and sewage treatment plant operations also contribute to overflows.

4. Illegal Dumping
Illicit Discharge Detection and Elimination

a. Description

Illegal dumping is disposal of waste in an unpermitted area, such as a back area of a yard, a stream bank, or some other off-road area. Illegal dumping can also be the pouring of liquid wastes or disposing of trash down storm drains. It is often called "open dumping," "fly dumping," and "midnight dumping" because materials are often dumped in open areas, from vehicles along roadsides, late at night. Illegally dumped wastes are primarily nonhazardous materials that are dumped to avoid paying disposal fees or expending the time and effort required for proper disposal (USEPA Region 5, 1998).

b. Applicability

As part of its pollution prevention efforts, the Oklahoma State University's Cooperative Extension Service has developed a series of posters and other displays to promote awareness of the problems that result from illegal dumping.

5. Recreational Sewage
Illicit Discharge Detection and Elimination

a. Description
Recreational sewage management measures seek to regulate wastewater generated from outdoor activities such as boating or camping by providing alternative methods to waste disposal in place of illegal overboard discharge. Under federal law, it is illegal to discharge marine sewage from boats in navigable U.S. waters, including coastal waters up to 3 miles offshore. The law also specifies that there be "no discharge" by boats operated in lakes and reservoirs or in rivers not capable of interstate navigation. Boats with installed toilets must have an operable Coast Guard approved marine sanitation device that either holds sewage for pumpout ashore or for discharge in the ocean beyond the 3-mile limit, or that treats the sewage to Federal standards prior to discharge.

The proper disposal of recreational waste is necessary to avoid the impacts that these activities and their associated developments (i.e., marinas and campgrounds) can have on aquatic environments. Marina and recreational boat sewage can have substantial impact on water quality by introducing bacteria, nutrients, and hazardous chemicals into waterways. It has been reported that a single overboard discharge of human waste can be detected in up to a 1-square-mile area of shallow enclosed water (FL DEP, no date). These human wastes can include Streptococci, fecal coliform, and other bacteria which contribute to incidences of human disease, shellfish bed closures, alerts on eating fish, and algal blooms. Boats can be a significant source of fecal coliform bacteria in areas with high boating densities and low hydrologic flushing, and fecal coliform levels become elevated near boats during periods of high occupancy and usage (USEPA, 1993). Holding tanks on boats also concentrate pollutants and use increased levels of oxygen during decomposition. Table 1 shows a comparison of the biological oxygen demand required to break down sewage held by marine sanitation devices versus untreated and treated municipal sewage (FL DEP, no date).
Table 1. BOD Concentrations According to Sewage Type

Table 1. BOD Concentrations According to Sewage Type

Sewage	BOD concentration
Boat Sewage	1,700–3,500 mg/l
Raw Municipal Sewage	110–400 mg/l
Treated Municipal Sewage	5–100 mg/l

b. Applicability
Implementing proper disposal practices and providing services for removal of recreational wastes can alleviate the effects that this source of pollutants has on water quality.

Best management practices dealing with recreational sewage sources are most often applied in coastal areas and freshwater bodies of water where boating activity occurs. Physical factors involving the siting of marinas can affect the release of sewage to surface water due to flushing times and circulation patterns. In addition, the use of inadequate marine sanitation devices on boats can cause unintended sewage discharges. Climatic factors such as rainfall and wind also influence the circulation and flushing times for marinas. The proper siting of marina basins and adequate planning for the disposal of boater sewage are important considerations in addressing this form of illicit discharge. The same basic techniques regarding siting and pumpout provision are applicable for sewage generated at campgrounds.

6. Identifying Illicit Connections
Illicit Discharge Detection and Elimination

a. Description

Illicit connections are defined as "illegal and/or improper connections to storm drainage systems and receiving waters" (CWP, 1998). A discharge of industrial wastewater to a storm sewer is "illicit" because it would ordinarily require a permit under the Clean Water Act. Many building owners or operators are not aware that improper connections exist in their facilities. Identifying and removing illicit connections is a measure for reducing storm water pollution. In extreme cases of illicit dumping, legal action is necessary.

From 1987 to 1998, Wayne County, Michigan, investigated 3,851 businesses and industries for illicit connections to the county's storm sewer system. Of those investigated, about 8 percent had illicit connections, and where one illicit connection was found, there was an average of 2.4 improper connects at that business. To prioritize the investigation, the county relied on Standard Industrial Classification (SIC) codes of the businesses. The prioritization system was found to be successful in locating illicit discharges (Johnson and Tuomari, no date; Tuomari, no date). The City of Hialeah, Florida, uses its storm water management plan to emphasize illicit discharge detection and removal as part of its overall monitoring activities. There are at least 252 outfalls in the city, 72 of which drain into city rights-of-way. After considering the costs associated with removing illicit discharges, the city chose a proactive field screening program approach to remove these discharges (City of Hialeah, 1999).

b. Applicability

Identifying illicit and improper connections are necessary for all sewer systems, especially in areas where pollutants with unknown sources have been detected in receiving waters. The level and types of industrial activities and the surrounding land uses and ordinances will affect the methods used to identify illicit connections.

7. Wastewater Connections to the Storm Drain System
Illicit Discharge Detection and Elimination

a. Description

An illicit discharge is considered to be a discharge composed of non-storm water that enters the storm drain system through an unwarranted connection. Storm sewer systems are sometimes employed as an inexpensive or convenient alternative to proper disposal of wastewater to treatment plants. These illegal wastewater discharges can occur as illicit connections from commercial or business establishments or illegal dumping into storm drain inlets. Illicit connection detection and elimination programs seek to prevent contamination of ground and surface water supplies by regulation, inspection, and removal of these illegal sources of wastewater discharge.

Pollutants that may be found in these untreated wastewater discharges include raw sewage, heavy metals, oil and grease, solids, detergents, chlorine, potassium, ammonia and nutrients. These pollutants can have implications for both human health and the aquatic environment. Bacterial contamination from raw sewage can spread disease and close waters to fishing and swimming, and heavy metals are known to be toxic to aquatic organisms. Excessive nutrient loads can lead to eutrophication in lakes, reducing oxygen levels, and affecting aquatic species.

An example of an illicit wastewater connection is a cross-connect of a shop drain to the storm sewer. This type of improper connection often occurs in automobile-related facilities (garage/repair, tire stores, service stations, muffler/transmission shops, car washes, and auto dealerships). The Wayne County, Michigan, illicit connection investigation program found that the majority of illicit connections in nonresidential facilities were drains connected to storm sewers (Johnson, 1998). Many times the connection of the shop drain to the storm drain system is unknown to the business owner, and may not be evident in architectural plans. Shop drains that may potentially be connected to the storm sewer include floor drains, wash sinks, sump pumps and solvent sinks.

b. Applicability

Illicit connection programs tend to concentrate their efforts on areas where nonresidential facilities are located. The USEPA has estimated that approximately 60 percent of the businesses known to use or store petroleum products were improperly connected to the storm sewers systems (USEPA, 1991, as referenced by the Rouge River National Wet Weather Demonstration Project).

These improper connections often happen during new construction activities. Inadequate mapping of the internal plumbing connections for a building can lead to wastewater being discharged incorrectly to storm drains. Sewer maps may also be incorrect, leading to cross connections between the sanitary sewer lines and the storm sewer system. Thorough inspection and verification by monitoring during the entire construction phase can prevent the illegal connection of wastewater sources during new construction. For existing facilities, the location of improper connections will require the use of field screening procedures, source testing protocols, and visual inspection.

C. Examples of What Others Have Done During Phase I (from EPA's Model MS4 General Permit)

1. Identifying and Detecting Illicit Discharges with Volunteers

In 1998,the Alabama Water Watch Association and the Birmingham Storm Water Management Authority forged a partnership to train volunteers to help identify and detect illicit discharges by monitoring the city's 158 critical screening sites and outfalls. For further information contact Allison Newell, Alabama Water Watch Association, (888) 844-4785. Source: NRDC, Storm Water Strategies Community Responses to Runoff Pollution, May 1999.

2. Illicit Connections and Fluorescent Dye

Washtenaw County, MI, initiated a program whose focus was eliminating illicit connections and discharges to the storm drain system. Crews visited industrial, commercial, and residential properties and asked permission to flush fluorescent dye through toilets or drains, then monitored nearby sanitary drain lines and storm drain lines to see where the dye had gone. Over 95 percent of the facilities contacted for dye testing cooperated. If inspectors found an illicit connection to the storm drains, the owner of the manager of the building was notified and informed of potential remedies. Recommended remedies were often very simple, such as sealing an unused floor drain. If after three letters the problem was not fixed, the program refers the site to the relevant municipality for possible enforcement action under the municipality 's building code. For further information contact Janice Bobrin, Drain Commissioner, Washtenaw County, MI, (734) 994-2525. Source: NRDC, Storm Water Strategies Community Responses to Runoff Pollution, May 1999.

3. **Reporting Illicit Discharges**
   The Alameda Countywide Clean Water Program developed forms for use by inspectors during inspections of dry-weather flows. This information could then be incorporated into an Illicit Discharge Inspection Quarterly Summary Report. The number of cases of illicit discharges detected, eliminated, or status taken towards elimination are documented on the form. For further information contact Robert Hale, Alameda County Countywide Clean Water Program, Alameda County Public Works, (510) 670-5543. Source: Model Urban Runoff Program, Appendix 3I.

4. **Collection/Recycling**
   The City of Tulsa, Oklahoma, organized free dump days at the landfill and the collection/recycling of used motor vehicle fluids and household hazardous wastes. The efforts were coordinated with the Metropolitan Environmental Trust, an organization that operates recycling depots around the city. To increase participation, the city sponsored two collection days each year. Participants also received education material on the importance of recycling and using environmentally friendly alternatives to hazardous household chemicals. At the same time, other community programs focused on this issue included an environmental summit for middle and high school students and a program that involves area business through clean ups, recycling, and donations. For further information contact Scott Van Loo, Environmental Compliance Specialist, Public Works Department, Tulsa, OK, (918) 591-4379.Source: NRDC, Storm Water Strategies Community Responses to Runoff Pollution, May 1999.

5. **Baltimore County, MD MS4 Storm Water Permit -3/30/95**
   Within 6 months, the permittee shall begin implementing its illicit detection program as a pilot study and screen a minimum of 50 outfalls within the year. Within the next year, the permittee shall complete its Manual of Practice for Detection and Removal of Illicit Connections that shall include a detailed description of procedures for the investigation of illicit connections and enforcement. Additionally, the illicit detection program shall be expanded to screen at least 200 outfalls per year.

D. Mississippi Guidance and Resources (for more information contact MDEQ at 601/961-5171 General Permits Branch)

Municipal Storm Water Outfalls and State Waters

Mississippi's MS4 General Permit requires the development of a map. The map must include the location of each municipal storm water outfall, and the subsequent state waters for each outfall. To identify the storm water outfalls and the state waters within each jurisdiction, it is important to understand the definition of each.

According to 40 CFR 122.26 (b)(9), a municipal outfall means a point source "at the point where a municipal separate storm sewer discharges to state waters and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the United States and are used to convey waters of the United States."

Because a municipal storm water outfall has been defined as the point where a municipal separate storm sewer discharges to state waters, it is also important to understand what are state waters. The definition of state waters according to Mississippi's Wastewater Regulations for National Pollutant Discharge Elimination System (NPDES) Permits, "Waters of the State" means all waters within the jurisdiction of this State, including all streams, lakes, ponds, wetlands, impounding reservoirs,

marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, situated wholly or partly within or bordering upon the State, and such coastal waters as are within the jurisdiction of the State, except lakes, ponds, or other surface waters which are wholly landlocked and privately owned, and which are not regulated under the Federal Clean Water Act (33 U.S.C.1251 et seq.).

The Map

The storm sewer map that demonstrates a basic awareness of the intake and discharge areas of the system should be completed in the first year. However, the map should be dated and upgraded throughout the 5-year term. It is needed to help determine the extent of discharged dry weather flows, the possible sources of the dry weather flows, and the particular waterbodies these flows may be affecting. A map that shows the location of major pipes and outfalls can be clearly presented to demonstrate such awareness. EPA recommends collecting all existing information on outfall locations (e.g., review city records, drainage maps, storm drain maps), and then conducting field surveys to verify locations.

The following mapping guidance is taken from the Mississippi Gulf Coast Storm Water Management Tool Box.

> "Maps can be developed by adding coverages to existing geographic information systems. These coverages should include details about the storm sewer system and related infrastructure. The coverages should also include land use data whch is directly related to priority area. The map should include a method for establishing unique identification numbers for outfalls, features and illicit discharge sites.
>
> The unique identification numbers can be developed by focusing on individual basins. An example of a unique identification number for and illicit discharge is GC-1.2-ID1.72. In this example the GC means the Gordons Creek Drainage basin; 1.2 means the second tributary to the main channel of Gordons Creek; ID means illicit discharge site; and 1.72 means the illicit discharge site is 1.70 miles upstream from the confluence of tributary 1.2 with the main channel of Gordons Creek. With this numbering system, a new unique number for sites can be established at intervals of 52 feet along main channels and tributaries in a drainage basin.
>
> Unique identification numbers can be shown on the map for referencing during fields investigations. For example a drainage structure under a street immediately downstream from illicit discharge site "GC-1.2-ID1.72" may have the unique identification number "GC-1.2-S-1.69". The number indicates that this structure is 0.03 miles or 158 feet downstream from the illicit discharge site.
>
> Sites can be placed on the map by using field measurements or by obtaining coordinates using global positions systems (GPS). Features numbers are establish by map measurements."

Development of a Storm Water Control Ordinance

Each MS4 operator must put in place ordinances or other regulatory mechanisms that provide it with appropriate authority to ensure that all illicit discharges are prohibited. This authority should also ensure that reasonable efforts are made to locate and eliminate any existing illicit discharges. The ordinance must also allow for effective enforcement of illicit discharges by the municipality.

Ordinances requiring regular maintenance of private septic systems may be useful, especially where low permeability soils or high water tables inhibit proper percolation.

Covered Non-Storm Water Discharges

Part I.B.3 Mississippi's Small MS4 General Permit authorizes the following non-storm water discharges provided they do not contribute to a violation of water quality standards. MS4's would have to address these non-storm water discharges or flows only if the MS4 or MDEQ identifies them as significant contributors of pollutants to the MS4.

- $ water line flushing
- $ landscape irrigation
- $ diverted stream flows
- $ rising ground waters
- $ uncontaminated ground water infiltration (infiltration is defined as water other than wastewater that enters a sewer system, including sewer service connections and foundation drains, from the ground through such means as defective pipes, pipe joints, connections, or manholes. Infiltration does not include, and is distinguished from, inflow.)
- $ uncontaminated pumped ground water
- $ discharges from potable water sources
- $ foundation drains
- $ air conditioning condensate
- $ irrigation water
- $ springs
- $ water from crawl space pumps
- $ footing drains
- $ lawn watering runoff
- $ water from individual residential car washing
- $ flows from riparian habitats and wetlands
- $ dechlorinated swimming pool discharges
- $ street wash water
- $ discharges or flows from fire fighting activities
- $ fire hydrant flushings
- $ external building wash downs which do not use detergents

Development of an Illicit Discharge Detection and Elimination Plan

Each MS4 operator must develop an Illicit Discharge Detection and Elimination Plan. Mississippi anticipates that cities and counties will have opportunities to detect and eliminate numerous illicit discharges. Therefore, three components of an appropriate illicit detection and elimination plan should address:

- Procedures for Locating Priority Areas
- Procedures for Tracing the Source of an Illicit Discharge
- Procedures for Removing the Source of Discharge

MDEQ understands that depending upon available resources, available contractors, size of staff, and degree and character of its illicit discharges, the extent of the plans developed by regulated entities may vary widely. The determining factors on whether a plan is adequate will be whether it addresses

the areas of concern and contains all required elements. This section describes methods that may be used to address areas of concern and satisfy the requirements.

A factor that should be considered by all regulated entities is the importance of preliminary planning, reconnaissance, and record keeping in order to be proactive in managing the storm water program. It may increase costs early on to develop a management program to map inlets and pipes, survey watersheds, and understand how illicit discharges might enter into state waters, but when an illicit discharge occurs, the regulated entity can respond promptly and not in a crisis management mode.

Prioritize/Identify Problem Areas

It is important to locate priority areas, which includes areas with higher likelihood of illicit connections. For example, continuous illicit discharges (i.e., illicit connections) are less likely to occur in newer residential areas than in older residential areas. This occurs partially because criteria for subdivision development, including connections to storm sewers, became more strict with the implementation of subdivision regulations in the 80's and 90's. Also, the newer commercial/industrial areas typically have fewer illicit discharges than the older areas and it may be that industrial areas have more illicit discharges than commercial areas

An awareness of the land use, age of development, reports of illicit discharges and other information specific to each MS4 as it relates to the areas tributary to outfalls will allow an MS4 operator to prioritize their resources in the areas where most illicit discharges occur. Upon request, MDEQ's Complaint Tracking System (CTS) may be utilized to identify previous illicit discharge complaints in your area.

Although not individually required, below is a list of various methods that may be used to locate priority areas:

- Training of employees on recognition and reporting of suspected problems
- Establishing and maintaining a public complaint hotline
- Performing periodic or regular visual screening during dry weather (no less than 72 hours after the last rain fall of 0.10 inches or more)
- Performing follow-up inspections of suspect outfalls
- Sampling of suspect outfalls for parameters of concern
- Evaluating water samples (visual description and/or chemical/biological testing)
- Evaluating samples for discharges from leaking septic systems (E. coli tests)

Tracing the Source of an Illicit Discharge

Various methods can be used to find the source of illicit discharges. Initially, development of a more thorough Storm Sewer System Map may assist the regulated entity in tracing the source of an illicit discharge. Information that could be added to the Storm Sewer System Map to improve its usability may include the following, as appropriate:

- Identification of the drainage area for each outfall
- Identification of the land use for each drainage area
- Locations of all inlets
- Locations of all manholes
- Information on pre-development streams and springs
- Information regarding depth of water table

- Areas serviced by sanitary sewerage
- Areas serviced by septic systems
- Older residential areas with failing sanitary systems
- High density residential areas with septic systems
- MDEQ NPDES permittees
- Identification of older industrial/commercial & residential areas
- Significant contributors such as airports, military bases & landfills
- and agricultural operations using irrigation

Once an illicit discharge has occurred, various methods could be used to ascertain its source. Below is a list of technologies that could be incorporated in a regulated entity's Illicit Discharge Detection and Elimination Plan:

- Conducting dye-testing to delineate potential source areas
- Conducting smoke tests to delineate potential source areas
- Collecting samples of the discharge and of potential sources of the discharge, and comparing the chemical analysis results
- Using TV or video cameras to inspect storm sewers
- Recruiting public involvement to report illicit discharges by using an "illicit discharge reporting hotline"

Procedures for Removing the Source of Illicit Discharge

There are various proven methods that can be used to remove/correct illicit discharges. Often, training of designated personnel on how to contact sources of illicit discharges and secure the cooperation of the party who is responsible to correct the problem is the most beneficial method in correcting illicit discharges and eliminating future discharges. Should the responsible party not be willing to remedy the problem, legal actions may be necessary to secure their cooperation. It may also be desirable to establish time frames for illicit discharge elimination and incorporate this factor as a performance measure.

Other procedures that may be helpful in discouraging future illicit discharges include:

- Dye-testing buildings in problem areas
- Dye or smoke-testing buildings at the time of sale
- Certification program that shows that buildings have been checked for illicit connections
- Inspection program of existing septic systems
- Use of TV or video cameras to inspect storm sewers
- Identification of areas of widespread septic system failure
- Storm drain stenciling/marking
- Poster campaigns
- Educational efforts (schools and non-profit public service organizations)
- Cooperative efforts with local industrial associations, chambers of commerce, homeowners' associations and merchant associations
- Utilization of third party monitoring to detect an illicit discharge (An example of the utilization of a third party monitoring group to detect illicit discharges was a case that involved beach monitoring by the Department of Marine Resources. Reports of high bacteria counts at a certain beach lead MDEQ inspectors to an illicit [raw sewage] discharge from a local business.)

Prioritization of illicit discharge detection is also advisable. Development of a plan to inspect areas more prone than others to illicit discharges will assure that scarce resources are used effectively. Additionally, procedures for dealing with illicit discharges that originate in other jurisdictions, including procedures for notification, assignment of responsibility, and follow-up enforcement efforts, are also suggested.

It is always advisable to document the surveillance of each illicit discharge as well as the actions that are taken in responding to the illicit discharge. MDEQ requires an Annual Report that must include "progress towards achieving the permittee's identified measurable goals for each of the minimum control measures." At a minimum, the regulated entity must report progress achieved towards the Illicit Discharge Detection and Elimination measurable goals provided as a part of the application (see the Measurable Goals Section). An Annual Report submitted to MDEQ may include the following:

- Progress towards completing the Storm Sewer System map
- Progress towards implementing a recycling household hazardous waste day
- Progress towards the passage of an ordinance that prohibits illicit discharges
- Progress towards training public employees
- Number of illicit discharges detected
- Number of illicit discharges eliminated
- Number of households participating in regular household hazardous waste special collection days
- Number of outfalls screened
- Number of complaints received, corrected
- Number of dye or smoke tests conducted

Information that is collected and reported in the required Annual Report to the Division can also be used for periodic reports to the city council, county commissioners, or other interested parties.

Mississippi Household Hazardous Waste Program

In recent years, public concern has grown about the effects of improper waste disposal to our air, land and water resources, including the disposal of household hazardous waste. Household hazardous waste, which enters waste streams, can injure sanitation workers, damage solid waste incinerators, and contaminate groundwater at solid waste landfills. In addition, with improper disposal it can enter and contaminate our State's waters. The Right-Way-To-Throw- Away Program provides safe outlets for household hazardous waste in compliance with the State Hazardous Waste Program and keeps household hazardous waste out of the municipal waste stream. It also provides education on the hazards of chemicals in the home and information on how to reduce the amount of household hazardous waste produced. The Right-Way-To-Throw-Away Program invites counties, municipalities, and multi-county agencies to apply for funding to establish a program for the collection and management of household hazardous waste. During 2001, $231,410.22 of grant funds were distributed to assist in thirteen household hazardous waste collection days. Combined, these collection days attracted over 3700 participants and diverted over $500,00 pounds of used paint, batteries, oils, antifreeze and hazardous chemicals. Information on Mississippi Household Hazardous Waste Program can be obtained by contacting David Peacock at 601/961-5171.

The Environmental Service Center which is located at the northeast corner of Hwy. 80 and Terry Road in Jackson, accepts household hazardous waste from Hinds, Madison and Rankin county residents at no charge. The following is a poster with facility information including what all is accepted.

E. Examples of Phase II BMPs and Associated Measurable Goals (From EPA, Office of Water and Office of Wastewater Management at http://cfpub.epa.gov/npdes/stormwater/measurablegoals/index.cfm)

Hypothetical Case Study: Smalltown, USA, has yet to survey the MS4 to identify problems and illicit connections. To initiate this process, they intend to map the entire system to systematically address potential problem areas, first with a general survey and then with a more detailed inspection. They also plan to enlist the support of the public in identifying illicit discharges or illegal dumping.

Minimum Measure Objectives: Develop a comprehensive map of the storm drain system, establish and carry out procedures to identify and remove illicit discharges, establish legal authority for enforcement actions, and encourage public education and involvement in eliminating illicit discharges.

BMP: Storm drain system map
Measurable Goal: A storm drain system map will be developed in the first year.
Justification: A comprehensive infrastructure map of the MS4 has not yet been created. Once completed, this map will aid the municipality in targeting outfalls with dry weather flows and other suspicious discharges for more in-depth inspection and monitoring and will help coordinate management activities to remove illicit connections and track storm drain system maintenance.

BMP: Identify illicit connections through dry weather screening and targeted video inspection
Measurable Goal: A survey during dry weather of 20% of the storm drain system outfalls per year will be conducted to identify non-storm water flows. Once each year's survey is complete, areas with suspicious discharges will be inspected with video cameras to detect suspected direct connections to the wastewater system and identify areas where wastewater might be leaking into adjacent storm drainpipes.
Justification: The municipality contains many older neighborhoods that will be the initial focus of the illicit discharge identification effort. Deteriorating infrastructure and questionable building codes at the time might have resulted in directly connected and/or leaking wastewater pipes. Targeted video inspection in areas with high nutrient levels, appearance of suds or oily discharges, or dry weather flows will efficiently identify these connections.

BMP: Illicit discharge/illegal dumping hotline
Measurable Goal: A hotline for citizens to report illegal dumping and suspicious discharges will be established in the first year. The hotline will be advertised by placement of one ad in the local newspaper every 6 months and an insert in each homeowner's and business's water utility bills every year.
Justification: This hotline will supplement the municipality's effort to target outfalls for video inspection and will facilitate the cleanup and remediation of dumping sites. Also, advertising the hotline will improve public involvement and will serve as an educational tool to inform the public about the hazards of illicit discharges and illegal dumping.

EXAMPLE TABLE
BMPs, Associated Measurable Goals and Year to be Implemented

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
Storm sewer map	Sewer system base map completed	X				
Storm sewer map	Storm sewer map updated		X	X	X	X
Recycling program	Recycling program for household hazardous waste in place	X				
Recycling program	Hold household hazardous waste collection days yearly		X	X	X	X
Ordinance	Ordinance prohibiting illicit discharges adopted	X				
Education	The hazards of illicit discharges training program completed		X			
Education	Provide training yearly to the public on The hazards of illicit discharges training program completed		X	X	X	X
Identifying and removing illicit discharges	75 percent of sources of illicit discharges determined			X		
Identifying and removing illicit discharges	75 percent of detected illicit discharges eliminated;				X	
Identifying and removing illicit discharges	100 percent of detected illicit discharges eliminated;					X
Identifying and removing illicit discharges	10 percent of households participating in quarterly household hazardous waste special collection days.			X		
Identifying and removing illicit discharges	95 percent of illicit discharge sources detected and eliminated				X	

CHAPTER IV
CONSTRUCTION SITE STORM WATER RUNOFF CONTROL

Polluted storm water runoff from construction sites flows into local rivers and streams. Sediment is usually the main pollutant of concern. Sediment runoff rates from construction sites are typically 10 to 20 times greater than those of agricultural lands, and 1,000 to 2,000 times greater than those of forestlands. During a short period of time, construction sites can contribute more sediment to streams than can be deposited naturally during several decades. The resulting siltation, and the contribution of other pollutants from construction sites, can cause physical, chemical, and biological harm to Mississippi's waters. For example, excess sediment can quickly fill rivers and lakes, requiring dredging and destroying aquatic habitats.

Additional pollutants are often present in storm water runoff from construction sites and may result in degradation of receiving waters. Nutrients (nitrogen and phosphorous) are of specific concern and can cause significant impairment. In addition, solid and sanitary wastes, pesticides, oil and grease, concrete truck washout, construction chemicals, construction debris and metals may be discharged and cause a negative impact on receiving waters.

A. Program Requirements

1. **To satisfy this minimum control measure, the MS4 General Permit requires the regulated entity to:**

   a. Develop, implement, and enforce a program to reduce pollutants in any storm water runoff to the small MS4 from construction activities that result in a land disturbance of greater than or equal to one (1) acre. Reduction of storm water discharges from construction activity disturbing less than one (1) acre must be included in your program if that construction activity is part of a larger common plan of development or sale that would disturb one (1) acre or more. The program must include the development and implementation of, at a minimum:

      (1) An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance, to the extent allowable under State or local law. If an ordinance or regulatory mechanism is already developed, include a copy of the relevant sections with the storm water management program description.

      (2) Requirements for construction site operators to implement appropriate erosion and sediment control best management practices.

      (3) Requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality.

      (4) Procedures for site plan review which incorporate consideration of potential water quality impacts.

(5) Procedures for receipt and consideration of information submitted by the public.

(6) Procedures for site inspection and enforcement of control measures.

b. Define appropriate BMPs for this minimum control measure and measurable goals for each BMP.

c. Document the decision process for the development of a construction site storm water control program. The regulated entity's rationale statement must address the overall construction site storm water control program, the individual BMPs, measurable goals, and responsible persons for this program. The rationale statement must include the following information, at a minimum:

(1) The procedures for site plan review, including the review of pre-construction site plans, which incorporate consideration of potential water quality impacts and consistency with local sediment and erosion control requirements.

(2) The procedures for receipt and consideration of information submitted by the public. Consider coordinating this requirement with the regulated entity's public education program.

(3) The procedures for site inspection and enforcement of control measures, including how the regulated entity will prioritize sites for inspection based on the nature of the construction activity, topography, soil characteristics, and receiving water quality. Some examples of sanctions to ensure compliance include non-monetary penalties, fines, bonding requirements and/or permit denials for non-compliance.

(4) The procedures to provide appropriate educational training measures for construction site operators.

(5) How the regulated entity will evaluate the success of this minimum measure, including how the measurable goals for each of the BMPs were selected.

(6) Responsibility for overall management and implementation of the construction site storm water control program and, if different, who is responsible for each of the BMPs identified for this program.

2. Chapter IV. A. 1. c. requires a regulated entity to document the decision process for the development of the construction site storm water runoff control program. In general, the requested information indicates the expected level of performance. This decision process will aid MDEQ in the evaluation of the Storm Water Management Program (SWMP).

B. From EPA's BMP Menu

(For more detailed information on implementation, effectiveness, benefits, limitations, cost and references see http://www.epa.gov/npdes/menuofbmps/menu.htm or call MDEQ.)

1. **Land Grading**
   Construction Site Storm Water Runoff Control

   a. **Description**
   Land grading involves reshaping the ground surface to planned grades as determined by an engineering survey, evaluation, and layout. Land grading provides more suitable topography for buildings, facilities, and other land uses and helps to control surface runoff, soil erosion, and sedimentation both during and after construction.

   b. **Applicability**
   Land grading is applicable to sites with uneven or steep topography or easily erodible soils because it stabilizes slopes and decreases runoff velocity. Grading activities should maintain existing drainage patterns as much as possible.

2. **Permanent Diversions**
   Construction Site Storm Water Runoff Control

   a. **Description**
   Diversions can be constructed by creating channels across slopes with supporting earthen ridges on the bottom side of the slopes. The ridges reduce slope length, collect storm water runoff, and deflect the runoff to acceptable outlets that convey it without erosion.

   b. **Applicability**
   Diversions are used in areas where runoff from areas of higher elevation poses a threat of property damage or erosion. Diversions can also be used to promote the growth of vegetation in areas of lower elevations. Finally, diversions protect upland slopes that are being damaged by surface and/or shallow subsurface flow by reducing slope length, which minimizes soil loss.

3. **Preserving Natural Vegetation**
   Construction Site Storm Water Runoff Control

   a. **Description**
   The principal advantage of preserving natural vegetation is the protection of desirable trees, vines, bushes, and grasses from damage during project development. Vegetation provides erosion control, storm water detention, biofiltration, and aesthetic values to a site during and after construction activities. Other benefits from preserving natural areas are because natural vegetation:
   - Can process higher quantities of storm water runoff than newly seeded areas
   - Does not require time to establish
   - Has a higher filtering capacity than newly planted vegetation because aboveground and root structures are typically denser

- Reduces storm water runoff by intercepting rainfall, promoting infiltration, and lowering the water table through transpiration
- Provides buffers and screens against noise and visual disturbance
- Provides a fully-developed habitat for wildlife
- Usually requires less maintenance (e.g., irrigation, fertilizer) than planting new vegetation
- Enhances aesthetics

4. Construction Entrances
Construction Site Storm Water Runoff Control

a. Description

The purpose of stabilizing entrances to a construction site is to minimize the amount of sediment leaving the area as mud and sediment attached to motorized vehicles. Installing a pad of gravel over filter cloth where construction traffic leaves a site can help stabilize a construction entrance. As a vehicle drives over the gravel pad, mud and sediment are removed from the vehicle's wheels and offsite transport of soil is reduced. The gravel pad also reduces erosion and rutting on the soil beneath the stabilization structure. The filter fabric separates the gravel from the soil below, preventing the gravel from being ground into the soil. The fabric also reduces the amount of rutting caused by vehicle tires by spreading the vehicle's weight over a larger soil area than just the tire width.

In addition to removal of sediment by simple friction of vehicle tires on the gravel pad, a vehicle washing station can be established at the site entrance. Wash stations, if used on a routine basis, remove a substantial amount of sediment from vehicles before they leave the site. Diverting runoff from vehicle washing stations into a sediment trap helps ensure that sediment removed from vehicles is kept on-site and disposed of properly.

b. Applicability

Typically, stabilized construction entrances are installed at locations where construction traffic leaves or enters an existing paved road. However, the applicability of site entrance stabilization should be extended to any roadway or entrance where vehicles will access or leave the site. From a public relations point of view, stabilizing construction site entrances can be a worthwhile exercise. If the site entrance is the most publicly noticeable part of a construction site, stabilized entrances can improve the appearance to passersby and improve public perception of the construction project.

5. Check Dams
Construction Site Storm Water Runoff Control

a. Description

Check dams are small, temporary dams constructed across a swale or channel. Check dams can be constructed using gravel, rock, sandbags, logs, or straw bales and are used to slow the velocity of concentrated flow in a channel. By reducing the velocity of the water flowing through a swale or channel, check dams reduce the erosion in the swale or channel. As a secondary function, check dams can also be used to catch sediment from the channel itself or the contributing drainage area as storm water runoff flows through the structure. However, the use of check dams in a channel should not be a substitute for the use of other sediment-trapping and erosion control measures. As

with most other temporary structures, check dams are most effective when used in combination with other storm water and erosion and sediment control measures.

b. Applicability

Check dams should be used in swales or channels that will be used for a short period of time where it is not practical to line the channel or implement other flow control practices (USEPA, 1993). In addition, check dams are appropriate where temporary seeding has been recently implemented but has not had time to take root and fully develop. Check dams are usually used in small open channels with a contributing drainage area of 2 to 10 acres. For a given swale or channel, multiple check dams, spaced at appropriate intervals, can increase overall effectiveness. If dams are used in a series, they should be spaced such that the base of the upstream dam is at the same elevation as the top of the next downstream dam (VDCR, 1995).

6. Filter Berms
Construction Site Storm Water Runoff Control

a. Description

A gravel or stone filter berm is a temporary ridge made up of loose gravel, stone, or crushed rock that slows, filters, and diverts flow from an open traffic area and acts as an efficient form of sediment control. A specific type of filter berm is the continuous berm, a geosynthetic fabric that encapsulates sand, rock, or soil.

b. Applicability

Gravel or stone filter berms are most suitable in areas where vehicular traffic needs to be rerouted because roads are under construction or in traffic areas within a construction site.

7. Grass-Lined Channel
Construction Site Storm Water Runoff Control

a. Description

Grass-lined channels convey storm water runoff through a stable conduit. Vegetation lining the channel reduces the flow velocity of concentrated runoff. Grassed channels usually are not designed to control peak runoff loads by themselves and are often used in combination with other BMPs such as subsurface drains and riprap stabilization. Where moderately steep slopes require drainage, grassed channels can include excavated depressions or check dams to enhance runoff storage, decrease flow rates, and enhance pollutant removal. Peak discharges can be reduced through temporary detention in the channel. Pollutants can be removed from storm water by filtration through vegetation, by deposition, or in some cases by infiltration of soluble nutrients into the soil. The degree of pollutant removal in a channel depends on the residence time of water in the channel and the amount of contact with vegetation and the soil surface. As a result, removal efficiency is highly dependent on local conditions.

b. Applicability

Grassed channels should be used in areas where erosion-resistant conveyances are needed, including areas with highly erodible soils and moderately steep slopes (although less than 5 percent). They should only be installed where space is available for a relatively large cross section. Grassed channels have a limited ability to control runoff from large storms and should not be used in areas where flow rates exceed 5 ft per second.

8. Riprap
Construction Site Storm Water Runoff Control

a. Description
Riprap is a permanent, erosion-resistant layer made of stones. It is intended to protect soil from erosion in areas of concentrated runoff. Riprap may also be used to stabilize slopes that are unstable because of seepage problems.

b. Applicability
Riprap can be used to stabilize cut-and-fill slopes; channel side slopes and bottoms; inlets and outlets for culverts, bridges, slope drains, grade stabilization structures, and storm drains; and streambanks and grades.

9. Chemical Stabilization
Construction Site Storm Water Runoff Control

a. Description
Chemical stabilizers, also known as soil binders or soil palliatives, provide temporary soil stabilization. Materials made of vinyl, asphalt, or rubber are sprayed onto the surface of exposed soils to hold the soil in place and protect against erosion from runoff and wind. Chemicals used for stabilization are easily applied to the surface of the soil, can be effective in stabilizing areas where vegetative practices cannot be established, and provide immediate protection.

b. Applicability
Chemical stabilization can be used in areas where other methods of stabilization such as temporary seeding or permanent vegetation are not effective because of environmental constraints. They can also be used in combination with vegetative or perimeter practices to enhance erosion and sediment control.

10. Mulching
Construction Site Storm Water Runoff Control

a. Description
Mulching is a temporary erosion control practice in which materials such as grass, hay, wood chips, wood fibers, straw, or gravel are placed on exposed or recently planted soil surfaces. Mulching is highly recommended as a stabilization method and is most effective when used in conjunction with vegetation establishment. In addition to stabilizing soils, mulching can reduce storm water runoff velocity. When used in combination with seeding or planting, mulching can aid plant growth by holding seeds, fertilizers, and topsoil in place, preventing birds from eating seeds, retaining moisture, and insulating plant roots against extreme temperatures.

Mulch mattings are materials such as jute or other wood fibers that are formed into sheets and are more stable than loose mulch. Jute and other wood fibers, plastic, paper, or cotton can be used individually or combined into mats to hold mulch to the ground. Netting can be used to stabilize soils while plants are growing, although netting does not retain moisture or insulate against extreme temperatures. Mulch binders consist of asphalt or synthetic materials that are sometimes used instead of netting to bind loose mulches.

b. Applicability

Mulching is often used in areas where temporary seeding cannot be used because of environmental constraints. Mulching can provide immediate, effective, and inexpensive erosion control. On steep slopes and critical areas such as waterways, mulch matting is used with netting or anchoring to hold it in place. Mulches can be used on seeded and planted areas where slopes are steeper than 2:1 or where sensitive seedlings require insulation from extreme temperatures or moisture retention.

11. Permanent Seeding
Construction Site Storm Water Runoff Control

a. Description

Permanent seeding is used to control runoff and erosion on disturbed areas by establishing perennial vegetative cover from seed. It is used to reduce erosion, to decrease sediment yields from disturbed areas, and to provide permanent stabilization. This practice is economical, adaptable to different site conditions, and allows selection of the most appropriate plant materials.

b. Applicability

Permanent seeding is well suited in areas where permanent, long-lived vegetative cover is the most practical or most effective method of stabilizing the soil. Permanent seeding can be used on roughly graded areas that will not be regraded for at least a year. Vegetation controls erosion by protecting bare soil surfaces from displacement by raindrop impacts and by reducing the velocity and quantity of overland flow. The advantages of seeding over other means of establishing plants include lower initial costs and labor inputs.

12 Sodding
Construction Site Storm Water Runoff Control

a. Description

Sodding is a permanent erosion control practice that involves laying a continuous cover of grass sod on exposed soils. In addition to stabilizing soils, sodding can reduce the velocity of storm water runoff. Sodding can provide immediate vegetative cover for critical areas and stabilize areas that cannot be vegetated by seed. It also can stabilize channels or swales that convey concentrated flows and reduce flow velocities.

b. Applicability

Sodding is appropriate for any graded or cleared area that might erode, requiring immediate vegetative cover. Locations particularly well suited to sod stabilization are:

- Residential or commercial lawns and golf courses where prompt use and aesthetics are important
- Steeply-sloped areas
- Waterways and channels carrying intermittent flow
- Areas around drop inlets that require stabilization

13 Soil Roughening
Construction Site Storm Water Runoff Control

a. Description

Soil roughening is a temporary erosion control practice often used in conjunction with grading. Soil roughening involves increasing the relief of a bare soil surface with horizontal grooves, stair-

stepping (that run parallel to the contour of the land), or tracking using construction equipment. Slopes that are not fine graded and that are left in a roughened **condition can also reduce erosion.** Soil roughening reduces runoff velocity, increases infiltration, reduces erosion, traps sediment, and prepares the soil for seeding and planting by giving seed an opportunity to take hold and grow.

b. Applicability

Soil roughening is appropriate for all slopes. Soil roughening works well on slopes greater than 3:1, on piles of excavated soil, and in areas with highly erodible soils. This technique is especially appropriate for soils that are frequently mowed or disturbed because roughening is relatively easy to accomplish. To slow erosion, roughening should be done as soon as possible after the vegetation has been removed form the slope. Roughening can be used with both seeding and planting and temporary mulching to stabilize an area. For steeper slopes and slopes that will be left roughened for longer periods of time, a combination of surface roughening and vegetation is appropriate. Roughening should be performed immediately after grading activities have ceased (temporarily or permanently) in an area.

14. Geotextiles

Construction Site Storm Water Runoff Control

a. Description

Geotextiles are porous fabrics also known as filter fabrics, road rugs, synthetic fabrics, construction fabrics, or simply fabrics. Geotextiles are manufactured by weaving or bonding fibers made from synthetic materials such as polypropylene, polyester, polyethylene, nylon, polyvinyl chloride, glass, and various mixtures of these materials. As a synthetic construction material, geotextiles are used for a variety of purposes such as separators, reinforcement, filtration and drainage, and erosion control (USEPA, 1992). Some geotextiles are made of biodegradable materials such as mulch matting and netting. Mulch mattings are jute or other wood fibers that have been formed into sheets and are more stable than normal mulch. Netting is typically made from jute, wood fiber, plastic, paper, or cotton and can be used to hold the mulching and matting to the ground. Netting can also be used alone to stabilize soils while the plants are growing; however, it does not retain moisture or temperature well. Mulch binders (either asphalt or synthetic) are sometimes used instead of netting to hold loose mulches together. Geotextiles can aid in plant growth by holding seeds, fertilizers, and topsoil in place. Fabrics are relatively inexpensive for certain applications a wide variety of geotextiles exist to match the specific needs of the site.

b. Applicability

Geotextiles can be used for erosion control by using it alone. Geotextiles can be used as matting, which is used to stabilize the flow of channels or swales or to protect seedlings on recently planted slopes until they become established. Matting may be used on tidal or stream banks where moving water is likely to wash out new plantings. They can also be used to protect exposed soils immediately and temporarily, such as when active piles of soil are left overnight. Geotextiles are also used as separators. An example of such a use is geotextile as a separator between riprap and soil. This "sandwiching" prevents the soil from being eroded from beneath the riprap and maintaining the riprap's base.

15. Gradient Terraces
Construction Site Storm Water Runoff Control

a. Description
Gradient terraces are made of either earthen embankments or ridge and channel systems that are properly spaced and are constructed with an adequate grade. They reduce damage from erosion by collecting and redistributing surface runoff to stable outlets at slower speeds and by increasing the distance of overland runoff flow. They also surpass smooth slopes in holding moisture and help to minimize sediment loading of surface runoff.

b. Applicability
Gradient terraces are most suitable for use in areas with an existing or expected water erosion problem and no vegetation, and they are only effective when there are suitable runoff outlets provided. They are usually limited to use on long, steep slopes with a water erosion problem, or where it is anticipated that water erosion will be a problem. They should not be constructed on slopes containing rocky or sandy soil. They will be effective only where suitable runoff outlets are or will be made available.

16. Soil Retention
Construction Site Storm Water Runoff Control

a. Description
Soil retention measures are structures or practices that are used to hold soil in place or to keep it contained within a site boundary. They may include grading or reshaping the ground to lessen steep slopes or shoring excavated areas with wood, concrete, or steel structures. Some soil-retaining measures are used for erosion control, while others are used for protection of workers during construction projects such as excavations.

b. Applicability
Grading to reduce steep slopes can be implemented at any construction site by assessing site conditions before breaking ground and reducing steep slopes where possible. Reinforced soil retaining structures should be used when sites have very steep slopes or loose, highly erodible soils that cause other methods, such as chemical or vegetative stabilization or regrading, to be ineffective. The preconstruction drainage pattern should be maintained to the extent possible.

17. Temporary Slope Drain
Construction Site Storm Water Runoff Control

a. Description
A temporary slope drain is a flexible conduit extending the length of a disturbed slope and serving as a temporary outlet for a diversion. Temporary slope drains, also called pipe slope drains, convey runoff without causing erosion on or at the bottom of the slope. This practice is a temporary measure used during grading operations until permanent drainage structures are installed and until slopes are permanently stabilized. They are typically used for less than 2 years.

b. Applicability
Temporary slope drains can be used on most disturbed slopes to eliminate gully erosion problems resulting from concentrated flows discharged at a diversion outlet.

18. Temporary Stream Crossings

Construction Site Storm Water Runoff Control

a. Description

A temporary steam crossing is a structure erected to provide a safe and stable way for construction vehicle traffic to cross a running watercourse. The primary purpose of such a structure is to provide streambank stabilization, reduce the risk of damaging the streambed or channel, and reduce the risk of sediment loading from construction traffic. A temporary stream crossing may be a bridge, a culvert, or a ford.

b. Applicability

Temporary stream crossings are applicable wherever heavy construction equipment must be moved from one side of a stream channel to the other or where lighter construction vehicles will cross the stream a number of times during the construction period. In either case, an appropriate method for ensuring the stability of the streambanks and preventing large-scale erosion is necessary.

A bridge or culvert is the best choice for most temporary stream crossings. If properly designed, each can support heavy loads and materials used to construct most bridges, and culverts can be salvaged after they are removed. Fords are appropriate in steep areas subject to flash flooding, where normal flow is shallow or intermittent across a wide channel. Fords should be used only where stream crossings are expected to be infrequent**.**

19 Vegetated Buffer

Construction Site Storm Water Runoff Control

a. Description

Vegetated buffers are areas of either natural or established vegetation that are maintained to protect the water quality of neighboring areas. Buffer zones reduce the velocity of storm water runoff, provide an area for the runoff to permeate the soil, contribute to ground water recharge, and act as filters to catch sediment. The reduction in velocity also helps to prevent soil erosion.

b. Applicability

Vegetated buffers can be used in any area that is able to support vegetation but they are most effective and beneficial on floodplains, near wetlands, along streambanks, and on steep, unstable slopes. They are also effective in separating land use areas that are not compatible and in protecting wetlands or waterbodies by displacing activities that might be potential sources of nonpoint source pollution.

20. Construction Sequencing

Construction Site Storm Water Runoff Control

a. Description

Construction sequencing requires creating and following a work schedule that balances the timing of land disturbance activities and the installation of measures to control erosion and sedimentation in order to reduce the on-site erosion and off-site sedimentation.

b. Applicability

Construction sequencing can be used to plan earthwork and erosion and sediment control activities at sites where land disturbances might affect water quality in a receiving waterbody**.**

21. Dust Control
Construction Site Storm Water Runoff Control

a. Description

Dust control measures are practices that help reduce surface and air movement of dust from disturbed soil surfaces. Construction sites are good candidates for dust control measures because land disturbance from clearing and excavation generates a large amount of soil disturbance and open space for wind to pick up dust particles. To illustrate this point, limited research at construction sites has established an average dust emission rate of 1.2 tons/acre/month for active construction (WA Dept. of Ecology, 1992). These airborne particles pose a dual threat to the environment and human health. First, dust can be carried off-site, thereby increasing soil loss from the construction area and increasing the likelihood of sedimentation and water pollution. Second, blowing dust particles can contribute to respiratory health problems and create an inhospitable working environment.

b. Applicability

Dust control measures are applicable to any construction site where dust is created and there is the potential for air and water pollution from dust traveling across the landscape or through the air. Dust control measures are particularly important in arid or semiarid regions, where soil can become extremely dry and vulnerable to transport by high winds. Also, dust control measures should be implemented on all construction sites where there will be major soil disturbances or heavy construction activity, such as clearing, excavation, demolition, or excessive vehicle traffic. Earthmoving activities are the major source of dust from construction sites, but traffic and general disturbances can also be major contributors (WA Dept. of Ecology, 1992). The particular dust control measures that are implemented at a site will depend on the topography and land cover of a given site, as well as the soil characteristics and expected rainfall at the site.

22. Temporary Diversion Dikes, Earth Dikes, and Interceptor Dikes
Construction Site Storm Water Runoff Control

a. Description

Earthen perimeter controls usually consist of a dike or dike and channel constructed along the perimeter of a disturbed site. Simply defined, an earthen perimeter control is a ridge of compacted soil, often accompanied by a ditch or swale with a vegetated lining, located at the top or base of a sloping disturbed area. Depending on their location and the topography of the landscape, earthen perimeter controls can achieve one of two main goals.

Located on the upslope side of a site, earthen perimeter controls help to prevent surface runoff from entering a disturbed construction site. An earthen structure located upslope can improve working conditions on a construction site by preventing an increase in the total amount of sheet flow runoff traveling across the disturbed area and thereby lessen erosion on the site. Alternatively, earthen perimeter control structures can be located on the downslope side of a site to divert sediment-laden runoff created onsite to onsite sediment trapping devices, preventing soil loss from the disturbed area.

These control practices can be referred to by a number of terms, including temporary diversion dikes, earth dikes, or interceptor dikes. Generally speaking, however, all earthen **perimeter**

controls are constructed in a similar fashion with a similar objective—to control the velocity and/or route of sediment-laden storm water runoff.

b. Applicability

Temporary diversion dikes are applicable where it is desirable to divert flows away from disturbed areas such as cut or fill slopes and to divert runoff to a stabilized outlet (EPA, 1992). They can be erected at the top of a sloping area or in the middle of a slope to divert storm water runoff around a disturbed construction site. In this way, earth dikes can be used to reduce the length of the slope across which runoff will travel, thereby reducing the erosion potential of the flow. If placed at the bottom of a sloping disturbed area, diversion dikes can divert flow to a sediment-trapping device. Temporary diversion dikes are usually appropriate for drainage basins smaller than 5 acres, but with modifications can be capable of servicing areas as large as 10 acres. With regular maintenance, earthen diversion dikes have a useful life span of approximately 18 months.

To prevent storm water runoff from entering a site, earthen perimeter controls can be used to divert runoff from areas upslope around the disturbed construction site. This is accomplished by constructing a continuous, compacted earthen mound along the upslope perimeter of the site. As an additional control measure, a shallow ditch can accompany the earthen mound.

23. Wind Fences and Sand Fences
Construction Site Storm Water Runoff Control

a. Description

A sand fence is a barrier of small, evenly spaced wooden slats or fabric erected to reduce wind velocity and trap blowing sand. They can be used effectively as perimeter controls around open construction sites to reduce the off-site movement of fine sediments transported by wind. They also prevent off-site damage to roads, streams, and adjacent properties. The spaces between fence slats allow wind and sediment to pass through but reduces the wind velocity, which causes sediment deposition along the fence.

b. Applicability

Wind fences are applicable to areas with a preponderance of loose, fine-textured soils that can be transported off-site by high winds. They are especially advantageous for construction sites with large areas of cleared land or in arid regions where blowing sand and dust are especially problematic. Shorefront development sites also benefit from using wind fences because they promote the formation of frontal dunes.

24. Brush Barrier
Construction Site Storm Water Runoff Control

a. Description

Brush barriers are perimeter sediment control structures used to prevent soil in storm water runoff from leaving a construction site. Brush barriers are constructed of material such as small tree branches, root mats, stone, or other debris left over from site clearing and grubbing. In some configurations, brush barriers are covered with a filter cloth to stabilize the structure and improve barrier efficiency.

b. Applicability

Brush barriers are applicable to sites where there is enough material from clearing and grubbing to form a sufficient mound of debris along the perimeter of an area. The drainage area for brush barriers must be no greater than 0.25 acre per 100 feet of barrier length. In addition, the drainage slope leading down to a brush barrier must be no greater than 2:1 and no longer than 100 feet. Brush barriers have limited usefulness because they are constructed of materials that decompose.

25. Silt Fence

Construction Site Storm Water Runoff Control

a. Description

Silt fences are used as temporary perimeter controls around sites where there will be soil disturbance due to construction activities. They consist of a length of filter fabric stretched between anchoring posts spaced at regular intervals along the site perimeter. The filter fabric should be entrenched in the ground between the support posts. When installed correctly and inspected frequently, silt fences can be an effective barrier to sediment leaving the site in storm water runoff.

b. Applicability

Silt fences are generally applicable to construction sites with relatively small drainage areas. They are appropriate in areas where runoff will be occurring as low-level shallow flow, not exceeding 0.5 cfs. The drainage area for silt fences generally should not exceed 0.25 acre per 100-foot fence length. Slope length above the fence should not exceed 100 feet (NAHB, 1995).

26. Sediment Basins and Rock Dams

Construction Site Storm Water Runoff Control

a. Description

Sediment basins and rock dams are two ways to capture sediment from storm water runoff before it leaves a construction site. Both structures allow a shallow pool to form in an excavated or natural depression where sediment from storm water runoff can settle. Basin dewatering is achieved either through a single riser and drainage hole leading to a suitable outlet on the downstream side of the embankment or through the gravel of the rock dam. In both cases, water is released at a substantially slower rate than would be possible without the control structure.

A sediment basin can be constructed by excavation or by erecting an earthen embankment across a low area or drainage swale. The basin can be either a temporary structure (up to 3 years) or a permanent storm water control measure. Sediment basins can be designed to drain completely during dry periods, or they can be constructed so that a shallow, permanent pool of water remains between storm events. However, depending on the size of the basin constructed, the basin may be considered a wet pond and subject to additional regulation.

Rock dams are similar in design to sediment basins with earthen embankments. These damming structures are constructed of rock and gravel and release water from the settling pool gradually through the void spaces between the rock aggregate.

b. Applicability

Sediment basins are usually used for drainage areas of 5 to 100 acres. They can be temporary or permanent structures. Generally, sediment basins designed to be used for up to 3 years are

described as temporary, while those designed for longer service are said to be permanent. Temporary sediment basins can be converted into permanent storm water runoff management ponds, but they must meet all regulatory requirements for wet ponds.

Sediment basins are applicable in drainage areas where it is anticipated that other erosion controls, such as sediment traps, will not be sufficient to prevent off-site transport of sediment. Choosing to construct a sediment basin with either an earthen embankment or a stone/rock dam will depend on the materials available, location of the basin, and desired capacity for storm water runoff and settling of sediments.

Rock dams are suitable where earthen embankments would be difficult to construct or where riprap is readily available. Rock structures are also desirable where the top of the dam structure is to be used as an overflow outlet. These riprap dams are best for drainage areas of less than 50 acres. Earthen damming structures are appropriate where failure of the dam will not result in substantial damage or loss of property or life. If properly constructed, sediment basins with earthen dams can handle storm water runoff from drainage basins as large as 100 acres.

27. Sediment Filters and Sediment Chambers
Construction Site Storm Water Runoff Control

a. Description

Sediment filters are a class of sediment-trapping devices typically used to remove pollutants, primarily particulates, from storm water runoff. Generally speaking, sediment filters have four basic components: (1) inflow regulation, (2) pretreatment, (3) filter bed, and (4) outflow mechanism. Sediment chambers are merely one component of a sediment filter system.

Inflow regulation refers to the diversion of storm water runoff into the sediment-trapping device. After runoff enters the filter system, it enters a pretreatment sedimentation chamber. This chamber, used as a preliminary settling area for large debris and sediments, usually consists of nothing more than a wet detention basin. As water reaches a predetermined level, it flows over a weir into a filter bed of some filter medium. Filter medium is typically sand, but it can consist of sand, soil, gravel, peat, compost, or a combination of these materials. The purpose of the filter bed is to remove smaller sediments and other pollutants from the storm water as it percolates through the filter medium. Finally, treated flow exits the sediment filter system via an outflow mechanism to return to the storm water conveyance system.

Sediment filter systems can be confined or unconfined, on-line or off-line, and aboveground or belowground. Confined sediment filters are constructed with the filter medium contained in a structure, often a concrete vault. Unconfined sediment filters are constructed without encasing the filter medium in a confining structure. As one example, sand might be placed on the banks of a permanent wet pond detention system to create an unconfined filter. On-line systems are designed to retain storm water in its original stream channel or storm drain system. Off-line systems are designed to divert storm water.

b. Applicability

Sediment filters may be a good alternative for smaller construction sites where the use of a wet pond is being considered as a sediment-trapping device. Their applicability is wide ranging, and they can be used in urban areas with large amounts of highly impervious area. Because confined sand filters are man-made soil systems, they can be applied to most development sites and have

few constraining factors (MWCOG, 1992). However, for all sediment filter systems, the drainage area to be serviced should be no more than 10 acres.

The type of filter system chosen depends on the amount of land available and the desired location within the site. Examples of sediment filter systems include the "Delaware" sand filter and the "Austin" sand filter. The Austin sand filter, so named because it first came into widespread use in Austin, Texas, is a surface filter system that can be used in areas with space restrictions. If space is at a premium, an underground filter may be the most appropriate choice. For effective storm water sediment control at the perimeter of a site, the Delaware sand filter might be a good choice. This configuration consists of two parallel, trench-like chambers installed at a site's perimeter. The first trench (sediment chamber) provides pretreatment sediment settling before the runoff spills into the second trench (filter medium).

28. Sediment Trap
Construction Site Storm Water Runoff Control

a. Description

Sediment traps are small impoundments that allow sediment to settle out of runoff water. They are usually installed in a drainageway or other point of discharge from a disturbed area. Temporary diversions can be used to direct runoff to the sediment trap (USEPA, 1993). Sediment traps are used to detain sediments in storm water runoff and trap the sediment to protect receiving streams, lakes, drainage systems, and the surrounding area.
Sediment traps are formed by excavating an area or by placing an earthen embankment across a low area or drainage swale. An outlet or spillway is often constructed using large stones or aggregate to slow the release of runoff (USEPA, 1992).

b. Applicability

Sediment traps are generally temporary control measures to slow concentrated runoff velocity and catch sediment, and they can be used with other temporary storm water control measures. They are commonly used at the outlets of storm water diversion structures, channels, slope drains, construction site entrance wash racks, or any other runoff conveyance that discharges waters containing erosion sediment and debris. Sediment traps can also be used as part of a storm water drop intake protection system when the inlet is located below a disturbed area and will receive runoff with large amounts of sediment.

29. Storm Drain Inlet Protection
Construction Site Storm Water Control

a. Description

Storm drain inlet protection measures are controls that help prevent soil and debris from site erosion from entering storm drain drop inlets. Typically, these measures are temporary controls that are implemented prior to large-scale disturbance of the surrounding site. These controls are advantageous because their implementation allows storm drains to be used during even the early stages of construction activities. The early use of storm drains during project development significantly reduces the occurrence of future erosion problems (Smolen et al., 1988).

Three temporary control measures to protect storm drain drop inlets are

- Excavation around the perimeter of the drop inlet
- Fabric barriers around inlet entrances
- Block and gravel protection

Excavation around a storm drain inlet creates a settling pool to remove sediments. Weep holes protected by gravel are used to drain the shallow pool of water that accumulates around the inlet. A fabric barrier made of porous material erected around an inlet can create an effective shield to erosion sediment while allowing water flow into the storm drain. This type of barrier can slow runoff velocity while catching soil and other debris at the drain inlet. Block and gravel inlet protection uses standard concrete blocks and gravel to form a barrier to sediments while permitting water runoff through select blocks laid sideways. In addition to the materials listed above, limited temporary storm water drop inlet protection can also be achieved with the use of straw bales or sandbags to create barriers to sediment. For permanent storm drain drop inlet protection after the surrounding area has been stabilized, sod can be installed as a barrier to slow storm water entry to storm drain inlets and capture erosion sediments. This final inlet protection measure can be used as an aesthetically pleasing way to slow storm water velocity near drop inlet entrances and remove sediments and other pollutants from runoff.

b. Applicability

All temporary controls should have a drainage area no greater than 1 acre per inlet. It is also important for temporary controls to be constructed prior to disturbance of the surrounding landscape. Excavated drop inlet protection and block and gravel inlet protection are applicable to areas of high flow where overflow is anticipated into the storm drain. Fabric barriers are recommended for smaller, relatively flat drainage areas (slopes [5 percent leading to the storm drain). Temporary drop inlet control measures are often used in combination with each other and other storm water control techniques.

30. General Construction Site Waste Management
Construction Site Storm Water Runoff Control

a. Description

Building materials and other construction site wastes must be properly managed and disposed of to reduce the risk of pollution from materials such as surplus or refuse building materials or hazardous wastes. Practices such as trash disposal, recycling, proper material handling, and spill prevention and cleanup measures can reduce the potential for storm water runoff to mobilize construction site wastes and contaminate surface or ground water.

b. Applicability

The proper management and disposal of wastes should be practiced at any construction site to reduce storm water runoff. Waste management practices can be used to properly locate refuse piles, to cover materials that may be displaced by rainfall or storm water runoff, and to prevent spills and leaks from hazardous materials that were improperly stored.

31. Spill Prevention and Control Plan
Construction Site Storm Water Runoff Control

a. Description
Spill prevention and control plans should clearly state measures to stop the source of a spill, contain the spill, clean up the spill, dispose of contaminated materials, and train personnel to prevent and control future spills.

b. Applicability
Spill prevention and control plans are applicable to construction sites where hazardous wastes are stored or used. Hazardous wastes include pesticides, paints, cleaners, petroleum products, fertilizers, and solvents.

32. Vehicle Maintenance and Washing Areas
Construction Site Storm Water Runoff Control

a. Description
Maintenance and washing of vehicles should be conducted using environmentally responsible practices to prevent direct, untreated discharges of nutrient-enriched wastewater or hazardous wastes to surface or ground waters. This involves designating covered, paved areas for maintenance and washing, eliminating improper connections from these areas to the storm drain system, developing a spill prevention and cleanup plan for shop areas, maintaining vehicles and other equipment that may leak hazardous chemicals, covering fuel drums and other materials that are stored outdoors, and properly handling and disposing of automotive wastes and wash water.

b. Applicability
Environmentally friendly vehicle maintenance and washing practices are applicable for every construction site to prevent contamination of surface and ground water from wash water, fuel, coolant, or antifreeze spills or leaks.

33. Contractor Certification and Inspector Training
Construction Site Storm Water Runoff Control

a. Description
In many municipalities, erosion and sediment control plans are required under ordinances enacted to protect water resources. These plans describe how a contractor or developer will reduce soil erosion and contain and treat runoff that is carrying eroded sediments. Plans typically include descriptions and locations of soil stabilization practices, perimeter controls, and runoff treatment facilities that will be installed and maintained before and during construction activities. In addition to special area considerations, the full ESC plan review inventory should include (Smolen et al., 1988):

- Topographic and vicinity maps
- Site development plan
- Construction schedule
- Erosion and sedimentation control plan drawings
- Detailed drawings and specifications for practices
- Design calculations

- Vegetation plan

One of the most important factors determining whether or not erosion and sediment controls will be properly installed and maintained on a construction site is the knowledge and experience of the contractor. Many communities require certification for key on-site employees who are responsible for implementing the ESC plan.

Several states have contractor certification programs. The State of Delaware requires that at least one person on any construction project be formally certified. The Delaware program requires certification for any foreman or superintendent who is in charge of onsite clearing and land disturbing activities for sediment and runoff control associated with a construction project. Responsible personnel are required to obtain certification by completing a Department of Natural Resources and Environmental Control-sponsored or approved training program. All applicants seeking approval of a sediment and runoff plan must certify that all personnel involved in the construction project will have a certificate of attendance at a Department-sponsored or approved training course before initiation of any land-disturbing activity (DNREC, no date). A description of this certification requirement can be found at the DNREC web site at *www.dnrec.state.de.us/newpages/ssregs14.htm*.

The Maine Department of Environmental Protection offers a Voluntary Contractor Certification Program (VCCP) that is a non-regulatory, incentive-driven program to broaden the use of effective erosion control techniques. The VCCP is open to any contractor who is involved with soil disturbance activities including filling, excavating, landscaping, and other types of earthworks. For initial certification, the program requires attendance at two 6-hour training courses and the successful completion of a construction site evaluation. To maintain certification, a minimum of one 4-hour continuing education course within every two-year period thereafter is required. Local soil and water conservation district personnel will complete construction site evaluations during the construction season. Certifications are valid until December 31st of the second year after issuance. Certification will entitle the holder to advertise services as a "DEP Certified Contractor" (MDEP, 1999). More information about this program can be found on the MDEP web site at *http://www.state.me.us*

Oftentimes, municipalities do not have the funding and staffing resources to support a construction site inspection program. Municipalities can implement a private inspector program in which individuals can receive stormwater management and erosion and sediment control training to become certified inspectors to reduce the burden on the governing agency. These private inspectors can be hired directly by the contractor when the governing agency anticipates that a larger, more complicated site will require substantial agency resources.

Contractor certification programs are supplements to a municipal inspection and enforcement program. Such programs will not work if the contractors and inspectors are not held accountable, even without certification. Because there is a potential for contractors and private inspectors to abuse their certification, states such as Delaware require spot checks by county enforcement agents.

b. Applicability

Contractor certification programs are applicable for municipalities that require erosion and sediment control plans for construction sites. Training and certification will help to ensure that the plans are properly implemented and best management practices properly installed and maintained.

Inspector training programs are appropriate for municipalities with limited funding and resources for erosion and sediment control program implementation. The inspectors will lighten the financial and staffing burden of governing agencies to ensure compliance on construction sites.

34. Construction Reviewer
Construction Site Storm Water Runoff Control

a. Description

According to some state's regulations, the construction reviewer should be able to perform routine inspections of construction sites. According to the state of Delaware, the construction reviewer should follow the following guidelines:

- Perform a construction review of active construction sites on at least a weekly basis.
- Within five calendar days, inform the person engaged in the land disturbing activity, and the contractor, by a written construction review report of any violations of the approved plan or inadequacies of the plan. The plan approval agency shall be informed, if the approved plan is inadequate, within five working days. In addition, the appropriate construction review agency shall receive copies of all construction review reports.
- Refer the project through the delegated inspection agency to the proper department for appropriate enforcement action if the person engaged in the land disturbing activity fails to address the items contained in the written construction review report. Verbal notice shall be made to the proper department.

b. Applicability

Construction reviewer training is considered an extremely important aspect of erosion and sediment control and stormwater enforcement. Construction reviewer training allows for third party inspections of construction permits and BMP implementation. Third party inspections free up state personnel to from the time-consuming efforts to inspect each construction site. However, construction site reviewer training is still in its infant stages and is not yet a nationwide program.

35. BMP Inspection and Maintenance
Construction Site Storm Water Runoff Control

a. Description

To maintain the effectiveness of construction site storm water control Best Management Practices (BMPs); regular inspection of control measures is essential. Generally, inspection and maintenance of BMPs can be categorized into two groups--expected routine maintenance and nonroutine (repair) maintenance. Routine maintenance refers to checks performed on a regular basis to keep the BMP in good working order and aesthetically pleasing. In addition, routine inspection and maintenance is an efficient way to prevent potential nuisance situations (odors, mosquitoes, weeds, etc.), reduce the need for repair maintenance, and reduce the chance of polluting storm water runoff by finding and correcting problems before the next rain.

Routine inspection should occur for all storm water and erosion and sediment control measures implemented at a site. These measures may include, but are not limited to, grass-covered areas, seeded areas, mulched areas, areas stabilized with geotextiles or sod, silt fences, earth dikes, brush barriers, vegetated swales, sediment traps, sediment basins, subsurface drains, pipe slope drains, level spreaders, storm drain drop inlet protection measures, gabions, rain barrels, and road and site entrance stabilization measures. Nonroutine maintenance refers to any activity that is not

performed on a regular basis. This type of maintenance could include major repairs after a violent storm or extended rainfall, or replacement and redesign of existing control structures.

In addition to maintaining the effectiveness of storm water BMPs and reducing the incidence of pests, proper inspection and maintenance is essential to avoid the health and safety threats inherent in BMP neglect (Skupien, 1995). The failure of structural storm water BMPs can lead to downstream flooding, causing property damage, injury, and even death.

b. Applicability

All storm water BMPs should be inspected for continued effectiveness and structural integrity on a regular basis for the life of the construction project. Generally, all BMPs should be checked after each storm event in addition to the regularly scheduled inspections. Scheduled inspections vary between BMPs. Structural BMPs like storm drain drop inlet protection might require more frequent inspection than other BMPs to ensure proper operation. Inspection and maintenance of BMPs should continue until all construction activities have ended and all areas of a site have been permanently stabilized. During each inspection, the inspector should document whether the BMP is performing correctly, any damage to the BMP since the last inspection, and what should be done to repair the BMP if damage has occurred.

36. Model Ordinances

Construction Site Storm Water Runoff Control

a. Description

Erosion and sedimentation from construction sites can lead to reduced water quality and other environmental degradation. Municipalities can enact erosion and sediment control ordinances for construction sites. These local regulations are intended to safeguard the public, protect property, and prevent damage to the environment.

b. Applicability

Ordinances promote the public welfare by guiding, regulating, and controlling the design, construction, use, and maintenance of any development or other activity that disturbs or breaks the topsoil or results in the movement of earth on land. Erosion and sediment control ordinances consist of permit application and review, and they can require an erosion and sediment control plan. A number of communities have dealt with construction sites by using an ordinance requiring permits, review and approval, erosion and sediment control plans, design requirements, inspections, and enforcement. A model ordinance is available on EPA's web site at *www.epa.gov/nps/ordinance/mol2.htm*.

C. Examples of What Others Have Done During Phase I (from EPA's Model MS4 General Permit)

1. Guidance Brochures

The cities of Fairfield and Suisun City (CA) developed a guidance brochure, which was targeted to the development/construction community. It details storm water controls for small construction sites (less than 5 acres). The material also provides information about why storm water controls are needed and how construction activities affect storm water quality. Furthermore, the brochure includes information about plan requirements: general site information; site topography with map; sediment control practices; housekeeping practices; and materials management practices. For further information

contact Fairfield-Suisun Urban Runoff Management Program (707) 429-8930.Source: Model Urban Runoff Program, Appendix 3O.

2. **Educating Contractors**
   The city of Chattanooga, Tennessee developed an erosion control education program. Although on-site training sessions were initially conducted for contractors, the city found the most success with the development of the Erosion Control School. Both private sector and city government personnel involved in land development may sign up for the Erosion Control School, which is co-sponsored by the city and the Chattanooga Home Builders Association. In a free four-hour session, the attendees learn the city's erosion control requirements, as well as cost-effective ways to meet those requirements. Tests before and after the course measure learning and those who pass the second test receive a certification card. For further information contact Douglas Fritz, Water Quality Supervisor, Tennessee Department of Public Works (423) 757-0013. Source: NRDC, Storm Water Strategies Community Responses to Runoff Pollution, May 1999.

3. **Enforcement**
   Active enforcement of local requirements is a cornerstone of the construction runoff program for the Garland, Texas. Inspectors visit each construction site at least monthly, with some higher-priority sites receiving more frequent visits. The program uses stop-work orders (rather than citations) to get developers to correct violations such as faulty, or nonexistent, structural or source controls. Site operators were found to make corrections within 24 hours. In addition, EPA Region 6 in Dallas has assisted Garland and other cities in the region with enforcement activities of more severe violations. For further information contact Philip Welsch, Storm Water Coordinator, City of Garland, TX, (972) 205-2189. Source: NRDC, Storm Water Strategies Community Responses to Runoff Pollution, May 1999.

4. **Bal Harbour Village, FL MS4 Storm Water Permit - 9/30/93**
   The permittee will amend its land development regulations to require that applicants submit specific plans for local erosion and sediment control for the development of the site. Such plans will be a combination of notes (statements) and specifically noted locations on the plan sheets. These plans will be reviewed and subject to approval simultaneously with other plan materials required by the permittee.

5. **City of Miami Beach, FL MS4 Storm Water Permit - 9/30/93**
   A procedure for educating contractors and developers is being reviewed, where the contractor will go through a checklist and sign for the items that will be adopted to minimize site runoff. This list when approved at the processing stage shall become part of the issued building permit and thus be subject to regular building inspections. Building sites over 50,000 square feet shall be required to submit a site plan in addition to the above showing control measures during the various phases of construction. Some of the measures included in the checklist shall be:
   a. Availability of on site detention control for holding concrete truck and miscellaneous washing runoffs.
   b. Perimeter barrier fences with reverse slope access way to contain storm runoff.
   c. Use of containers to confine solid waste and construction debris.

6. **Nashville, TN MS4 Storm Water Permit - 4/3/96**
   The permittee shall improve its construction site inspection and enforcement procedures by carrying out the following:
   a. To hire and train three additional construction inspectors (12 months).
   b. To update the inspector's checklist to meet the state's general permit (12 months).
   c. To establish an electronic database of construction sites to enable tracking of inspections, complaints, violations, and follow-up (12 months).
   d. To purchase 4 vehicles and associated equipment for inspectors.
   e. To conduct annual training workshop for construction inspectors.
   f. To modify existing ordinances to set up greater penalties (12 months).
   g. To gain greater priority in the environmental court for violations at construction sites (24 months).

D. Mississippi Guidance and Resources (for more information contact MDEQ at 601/961-5171 General Permits Branch)

1. **Development of a Construction Storm Water Management Program**
   In developing a construction storm water management program, MDEQ recommends the State's existing construction storm water permitting program be used as a guide. EPA's Phase I Storm Water Regulations {published on November 16, 1990 - 40 CFR 122.26(b)(14)(xi)} requires construction activity disturbing five or more acres be covered under a Storm Water NPDES Permit. EPA's Phase II Regulations {published on December 8, 1999} extends the existing Phase I Regulations to apply to construction activity that results in the disturbance of 1 acre or more. Mississippi's existing NPDES Construction Storm Water General Permit covers the entire state for Phase I construction activities. This permit requires the development of a Storm Water Pollution Prevention Plan (SWPPP). This SWPPP must describe and ensure the implementation of practices, which will reduce pollutants in storm water discharges and assure compliance with the terms and conditions of the permit. In addition MDEQ has developed a SWPPP guidance manual for construction activities that provides assistance in developing a SWPPP. These documents can be obtained by contacting MDEQ's General Permit Branch at 601/961-5171 or can be found at MDEQ's web site: *www.deq.state.ms.us*.

   For a more thorough description of erosion and sediment controls, see "Mississippi's "Planning & Design Manual for the Control of Erosion, Sediment & Stormwater", MDEQ, MSSWCC, U. S. Dept. of Agriculture NRCS, Jackson, MS, 1994. This manual may be purchased by contacting MDEQ's Non-Point Source Section at 601/961-5171 and is also available electronically at *http://abe.msstate.edu/csd/p-dm/.* In addition a pocket "Field manual for Erosion and Sediment Control on Construction Sites in Mississippi" is now available for no cost to the Phase II regulated entities to give to their inspectors. Contact James MacLellan with the Non-Point Source Section of MDEQ at 601/961-5171.

   MDEQ will continue to regulate all construction projects through the Storm Water Small Construction General Permit (one acre to less than 5 acres) and the Storm Water Construction General Permit (five acres and greater). Therefore, MDEQ recommends using the state's existing construction storm water permitting program as a guide. This would make the two construction programs (local MS4 and State) consistent for the builders, developers, etc. This is especially important for large construction projects (five acres and above) because they will be submitting a copy of the CNOI and Storm Water Pollution Plan to copy to MDEQ and one copy to the regulated MS4. It would be a significant burden reduction

for the applicants if the requirements were similar. This would also be helpful for the regulated MS4 because MDEQ has a lot of available information concerning storm water permitting programs that will satisfy the Construction Site Runoff Minimum Measure Control requirements.

2. Minimum Design Criteria

A standard operating procedure must be developed to guide the operators of construction activities in the selection and design of appropriate erosion and sediment control BMPs and waste control measures. Again, MDEQ's current construction Storm Water General Permit is available to see what the state currently requires. The standard operating procedure should incorporate guidelines for the following areas.

a. Best Management Practices (BMPs)

Guidelines for the appropriate selection and design of construction, structural and non-structural BMPs should be provided. The design criteria and standards can be provided by reference to existing criteria manuals. Again MDEQ has two such manuals and a field inspector's erosion and sediment control manual. When considering construction structural and non-structural BMPs, it is often more effective to stress performance-based specifications than method-based specifications. In other words, it might be better to require contractors to minimize or eliminate the transportation of sediment off site than to specifically require silt fences or detention ponds.

b. Materials Handling

Materials handling BMPs must be required. At a minimum, such BMPs must include controlling waste, such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site, that may cause adverse impacts to water quality. Spill prevention and containment practices should be included such as, but not limited to, providing containment for materials, waste, and fuel stored on the construction site.

3. Control Mechanism

An administrative or other control mechanism must be used to ensure that the requirements to develop and maintain erosion, sediment and materials handling controls are clear to the developer and/or contractor. One way to do this is to incorporate the requirements into an existing city or county permit or approval. This simplifies the process by using an existing mechanism, and gives the MS4 operator more authority to ensure that the requirements are being met.

4. Storm Water Control Site Plans

The construction program must include a mechanism to determine if a construction site is in compliance with the above provisions. The MS4 operator must develop a standard operating procedure for the development of a storm water control site plan based on the Minimum Design Criteria (see section 1). The regulation also requires that the municipality develop procedures for plan submittal and review. It is the MDEQ's expectation that storm water control site plans will be submitted to the MS4 operator for all areas of significant development and redevelopment. The following items are suggested for the development of the standard operating procedure:

a. Procedures for reviewing and approving storm water control site plans.

b. System to track the status of the storm water control site plans.

The regulation does not require that all submitted plans be reviewed and/or approved. However, the regulated entity must provide adequate project oversight to prevent inadequate storm water control site plans from being implemented and resulting in degradation of state waters.

5. Inspections and Enforcement

As construction commences, BMPs should be in place and the MS4 operator's inspection and enforcement activities should begin. A standard operating procedure for site inspection and enforcement of control measures must be developed. The standard operating procedure for site inspections can incorporate two segments: an inspection program through the reviewing authority to ensure and maintain compliance, and a separate inspection program maintained by the operator of each construction site.

a. MS4 Inspection Program

It is suggested that a monitoring and inspection guide be developed for the MS4 Inspection Program to ensure that consistent actions are taken. Specific items to include are:

- A standard for performing inspections. This could include a single inspection form applicable to residential, industrial, commercial, and municipal developments. As part of the development of the standard, an evaluation should be made of the frequency of inspections for high and low priority sites based on proximity to sensitive areas, seasonal climactic changes, or other area-specific concerns. A system that prioritizes sites may benefit both the MS4 operator and environment, by ensuring that resources are targeted at those sites with the highest potential to affect water quality.

- A system for tracking the storm water control site plans. The system should be capable of identifying sites due for inspections and those sites for which there has been an enforcement action, and provide needed information for the Annual Report.

Municipal inspection protocols can be tailored to the specifics of each municipality's Construction Program plan. Some plans might be complaint driven, while some plans may be more inspection-driven and, thus, more extensive. At a minimum, all programs should include:

(1) Compliance Inspections. Compliance inspections are routine inspections conducted to ensure that the BMPs are implemented according to approved plans or as required by the site conditions and are receiving proper maintenance. The inspector not only verifies that the BMPs are functioning according to design and that only allowable discharges are occurring, but also confirms that the required documentation of inspection and BMP modification is occurring. This should include an appropriate level of follow-up when deficiencies are discovered.

Compliance inspections are advisable at the onset of construction to confirm the proper implementation of the storm water control site plan. Additionally, final inspections may be needed to ensure that proper revegetation and stabilization is in place, and that all temporary erosion and sediment controls have been removed, before program coverage terminates.

(2) Complaint Response Inspections. Each reviewing authority must have the ability to respond to third party concerns regarding the implementation of a site's storm water control site plan and BMPs. This could include a point of contact, response protocol (either a telephone call to operator, inspection of site by representative of that reviewing authority, or some other means

of follow-up with the construction site), and review of the plan, as appropriate. An appropriate level of follow-up should be included when deficiencies are discovered.

(3) Reconnaissance Inspections. These can be used to facilitate compliance inspections by adding a random, visual check that a construction site is in compliance, or that a construction site has filed the storm water control site plan with the MS4 operator. These inspections can be performed by municipal staff already in the field, such as right-of-way inspectors, or by staff performing numerous brief erosion and sediment control inspections in one day.

The following can be considered for inclusion when developing a schedule for any of the inspection programs listed above.

- The size of the disturbed area. The larger the area of disturbed land, the more sediment likely to run off the site and the more difficult it is for the contractor to ensure that BMPs are implemented properly. In general, the larger construction sites will require more frequent inspections.

- The length of time that the site will be left disturbed. The longer a site remains unstabilized, the greater the potential for a water quality impact. Therefore, sites that will be under construction for long periods should be inspected more frequently.

- The proximity of the construction site to areas of significant environmental concern. Sites located close to environmentally sensitive areas, such as wetlands or streams, endangered species habitat, on steep slopes or where the slopes are erosive should be inspected more frequently to ensure that the BMPs necessary to protect these areas are implemented and properly maintained. Sites located close to streams should be watched more closely.

- The phase of construction. The impact from a construction site is directly related to the type of activity on site. During initial ground clearing and excavation, the potential for impact is at its greatest. Inspections should be more frequent during this phase of construction than during subsequent phases.

- Past experiences with the site operators and/or their representatives. Inspections should be more frequent if a construction operator with whom the MS4 operator has experienced past compliance difficulties runs the site.

b. Operator Inspections

Separate procedures should be developed to document the inspection of construction sites by the operator of a construction project and by the MS4 operator. This includes a means of tracking and documenting the inspections performed and following up to ensure that corrective actions are taken.

Requirements for inspections by the operator of a site should include regularly scheduled inspections, as well as post-event (storm, snowmelt, and etc.) inspections, to ensure that the BMPs are operating as designed, determine if maintenance is needed, and to locate and clean up any areas where sediment and debris have run off the site.

Results of all regularly scheduled and storm event inspections should be required to be readily accessible to representatives of the reviewing authority.

6. Training and Education for Construction Site Operators

An education and training program must be developed for municipalities, their representatives and/or construction contractors. At a minimum, the program must include an informational program for construction site operators unfamiliar with the reviewing authority's regulatory requirements. This would likely be provided with other pre-development documents.

Additional components of this part of the program could include:

a. An informational and training program on BMPs (requiring them to watch a video or hand out a construction guidance manual).

b. A resource list for existing storm water training programs.

c. Notification of upcoming educational opportunities.

d. Encouraging construction groups in the area to provide such training to their members. This training would benefit their members by providing the information needed to comply with MS4 and State regulations to avoid enforcement actions and penalties.

7. Enforcement

An Enforcement Program for construction site erosion, sediment and materials handling controls must be developed. The system should address appropriate responses to common noncompliance issues, such as failure to implement or maintain BMPs. The system should also specify when and how enforcement procedures, such as stop work orders or summons to appear before a magistrate, will be used, and how these activities would be tracked.

There are several options available for formal action. They include:

- Withholding of grading or building permit or building inspections
- Warning letter/inspection report
- Letter of noncompliance
- Stop-work order
- Withholding of the Certificate of Occupancy
- Permit revocation
- Notice of violation and order with monetary fines
- Municipal summons

8. Responses

It is important that the MS4 operator address the range of problems that can occur at a construction site in a manner that reflects the seriousness of the situation. The following is a sample guide that addresses the more common situations that can occur and those measures that should be taken prior to formal action.

a. Failure to Obtain a State Permit

Some developers or contractors may need to be reminded of the need to obtain a State storm water construction permit. If it is determined that a permit is not obtained from the State for a site that requires permit coverage, some suggested actions are:

(1) Deny approval for construction until a State permit is obtained.
(2) Inform the developer/contractor of the need to obtain a State permit and give them a deadline to apply for a permit from the State, beyond which the MS4 operator will notify the MDEQ.
(3) Notify the MDEQ.

b. Failure to Develop a Storm Water Control Site Plan

One of the most elementary violations that can occur at the site is the failure to develop the required storm water control site plan. In most cases, it is recommended that the MS4 operator not approve any development plans without the completion and/or approval of the storm water control site plan. This will ensure that construction cannot commence until the plan is completed. A suggested action if a plan is not developed is to withhold approval of the development plan.

c. Failure to Implement the Storm Water Control Site Plan

The most significant violation that can occur at the site is the failure to implement the storm water control site plan. This can range from failing to implement all, or a portion of the plan, to failing to properly install the BMPs. It is suggested that the MS4 operator try to determine why the plan is not being implemented as approved before deciding on appropriate follow-up. Specifically, determine if it is the result of ignorance of the requirements, a change in site conditions, or a general disregard for the requirements.

d. Failure to Maintain BMPs

It is important to not only implement the plan, but to ensure that the BMPs implemented are maintained. As with failure to implement the plan, it is necessary to determine the cause of the noncompliance. Suggested actions include:

(1) Document the need for maintenance on the inspection report. Provide time for the contractor to address the concerns. A follow-up inspection will need to be conducted.
(2) If the contractor fails to take the necessary measures, meet with the owner and contractor to discuss the necessary measures and time frames for addressing the problems.
(3) If actions are not taken in the specified time frame, issue a Letter of Noncompliance that requires the necessary measures to be taken. (Also see options under Enforcement, section 7 above.)

e. Failure to Modify the Erosion and Sediment Plan

Since it is not always possible to anticipate site conditions, it may be necessary for the stormwater control site plan to be modified to reflect changing site conditions. It is also important for the construction site operator to have a plan that accurately reflects the site. Compliance with the plan as drafted is required. The construction site operator should note those areas of the plan that prove to be inadequate or unnecessary and take the steps necessary to implement any necessary changes and modify the plan. Enforcement for failing to modify the plan may only need to be considered if the construction site operator fails to make modifications when the plan has proven to be inadequate to protect water quality. The MS4 operator should also consider setting up an approval process for amended plans.

f. Failure by Operator to Perform Inspections

In addition to those violations that directly affect water quality, there are other violations of the plan that are related to the required documentation of the activities. These violations are handled differently than the others. If there is a failure to perform inspections, the following actions can be taken.

(1) Document the need to perform inspections in the inspection report.
(2) Advise the site owner and operator of the requirement to perform the inspections, and have them submit inspection reports to the MS4 operator at a set frequency.
(3) Re-inspect the site to determine if inspections have been performed.
(4) If the operator fails to perform inspections at the required frequency, begin formal enforcement that requires the performance of the inspections and submission of the reports on a predetermined basis.

9. Obtaining Public Input

A program or procedures must be developed for the receipt and consideration of public inquiries, concerns and information submitted regarding construction sites. This provision is intended to further reinforce the public participation program (see Chapter II), and to recognize the crucial role that the public can play in identifying instances of noncompliance.

The MS4 operator is required only to consider the information submitted, and may not need to follow up and respond to every complaint or concern. Although some form of enforcement action or reply is not required, the MS4 operator is required to demonstrate acknowledgment and consideration of the information submitted. A simple tracking process will suffice in which submitted public information, both written and verbal is recorded and then given to the construction site inspector for possible follow-up.

E. Examples of Phase II BMPs and Associated Measurable Goals (From EPA, Office of Water and Office of Wastewater Management at http://cfpub.epa.gov/npdes/stormwater/measurablegoals/index.cfm)

Hypothetical Case Study: Smalltown, USA, is experiencing significant new development and the City plans to establish a regulatory and enforcement mechanism for both erosion and sediment controls at construction sites.

Minimum Measure Objective: Establish a set of minimum erosion and sediment control (ESC) requirements for construction sites that disturb more than 5,000 square feet, including planning, installation, inspection, and maintenance of ESC practices.

BMP: Require ESC plans for any land disturbance greater than 5,000 square feet
Measurable Goal: A draft ordinance and guidance will be prepared within one year. A final ordinance and ESC guidance will be available within two years.
Justification: Small construction sites have been shown to contribute as much sediment as large sites on a per acre basis. Therefore, planning for erosion and sediment control practices and procedures in advance of starting construction is an important step in preventing sediment from entering the MS4.

BMP: Require the use of appropriate perimeter controls on construction sites
Measurable Goal: ESC requirements will be revised to require all construction sites on slopes in excess of 5 percent and in areas where calculations indicate pooling of water behind the structure to use steel-reinforced silt fencing. Additional requirements include proper installation and maintenance of these and other perimeter controls.
Justification: Traditional perimeter controls, such as standard silt fence, have higher failure rates when water pools behind the control. Requiring steel-reinforced silt fence, which is standard silt fence fortified with chain-link fencing and steel stakes, in critical areas will reduce damage to perimeter controls during storm events.

BMP: Develop a certification program for contractors
Measurable Goal: Achieve 80% compliance with ESC requirements by the end of the first permit term.
Justification: Educating contractors about the proper selection, installation, inspection, and maintenance of BMPs will help to ensure compliance with ESC requirements.

EXAMPLE TABLE
BMPs, Associated Measurable Goals and Year to be Implemented

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
Ordinance	Adopt ordinance or other regulatory mechanism	X				
Public input	Procedures for receipt and consideration of information submitted by the public developed and in place	X				
Site inspections	Procedures for site inspection developed	X				
Enforcement & compliance	Enforcement & compliance policy developed	X				
Site inspections	Site inspections conducted		X	X	X	X
Compliance	60 percent rate of compliance achieved by construction operators		X			
Compliance	90 percent rate of compliance achieved by construction operators				X	

CHAPTER V

POST-CONSTRUCTION STORM WATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT

Post-construction storm water management in areas undergoing new development or redevelopment is necessary because runoff from these areas has been shown to significantly affect receiving water bodies. Many studies indicate that prior planning and design for the minimization of pollutants in post-construction storm water discharges is the most cost-effective approach to storm water quality management. There are generally two forms of substantial impacts from post-construction runoff. The first is caused by an increase in the type and quantity of pollutants in storm water runoff. As runoff flows over areas altered by development, it picks up harmful sediment and chemicals such as oil and grease, pesticides, and heavy metals. These pollutants often become suspended in runoff and are carried to receiving waters, such as lakes, ponds, and streams. Once deposited, these pollutants can enter the food chain through small aquatic life, eventually entering the tissues of fish and humans. The second kind of post-construction runoff impact occurs by increasing the quantity of water delivered to the water body during storms. Increased impervious surfaces interrupt the natural cycle of gradual percolation of water through vegetation and soil. Instead, water is collected from surfaces such as asphalt and concrete and routed to drainage systems where large volumes of runoff quickly flow to the nearest receiving water. The effects of this process include stream bank scouring and downstream flooding, which often lead to a loss of aquatic life and damage to property.

A. Program Requirements

1. **To satisfy this minimum control measure, the MS4 General Permit requires the regulated entity to:**

   a. Develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one (1) acre, including projects less than one (1) acre that are part of a larger common plan of development or sale, that discharge into the regulated entity's small MS4. The program must ensure that controls are in place that would prevent or minimize water quality impacts.

   b. Develop and implement strategies, which include a combination of structural and/or non-structural best management practices (BMPs), appropriate for the regulated entity.

   c. Use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects to the extent allowable under State or local law. If this ordinance or regulatory mechanism is already developed, include a copy of the relevant sections with the program.

   d. Ensure adequate long-term operation and maintenance of BMPs.

e. Define appropriate BMPs for this minimum control measure and measurable goals for each BMP.

f. Document the decision process for the development of a post-construction storm water management program. The regulated entity's rationale statement must address the overall post-construction storm water management program, the individual BMPs, measurable goals, and responsible persons for this program. The rationale statement must include the following information, at a minimum:

(1) The regulated entity's program to address storm water runoff from new development and redevelopment projects. Include in this description any specific priority areas for this program.

(2) How the regulated entity's program will be specifically tailored for the regulated entity, minimize water quality impacts, and attempt to maintain pre-development runoff conditions.

(3) Any non-structural BMPs in the program, including, as appropriate:

(a) Policies and ordinances that provide requirements and standards to direct growth to identified areas, protect sensitive areas such as wetlands and riparian areas, maintain and/or increase open space (including a dedicated funding source for open space acquisition), provide buffers along sensitive water bodies, minimize impervious surfaces, and minimize disturbance of soils and vegetation and encourage infill development in higher density urban areas, and areas with existing storm sewer infrastructure.

(b) Education programs for developers and the public about project designs that minimize water quality impacts.

(c) Measures such as minimization of the percentage of impervious area after development, and minimization of directly connected impervious areas.

(4) Any structural BMPs in the program, including, as appropriate:

(a) Storage practices such as wet ponds and extended-detention outlet structures.

(b) Filtration practices such as grassed swales, bioretention cells, sand filters and filter strips.

(c) Infiltration practices such as infiltration basins, infiltration trenches and pervious concrete.

(5) Ensure the appropriate implementation of the structural BMPs by considering some or all of the following:

(a) Pre-construction review of BMP design

(b) Inspections during construction to verify BMPs are built and properly designed

(c) Post-construction inspection and maintenance of BMPs

(d) Penalty provisions for non-compliance

(6) How the regulated entity will evaluate the success of this minimum measure, including how the measurable goals for each of the BMPs were selected.

(7) Responsibility for overall management and implementation of the regulated entity's post-construction storm water management program and, if different, who is responsible for each of the BMPs identified for this program.

2. **Chapter V. A. 1. f. requires a regulated entity to document the decision process for the development of the post-construction storm water management control program. In general, the requested information indicates the expected level of performance. This decision process will aid MDEQ in the evaluation of the Storm Water Management Program (SWMP).**

B. From EPA's BMP Menu

(For more detailed information on implementation, effectiveness, benefits, limitations, cost and references see http://www.epa.gov/npdes/menuofbmps/menu.htm or call MDEQ.)

1. **Wet Pond**
   Post-Construction Storm Water Management
   in New Development and Redevelopment

   a. **Description**
   Wet ponds (a.k.a. storm water ponds, retention ponds, wet extended detention ponds) are constructed basins that have a permanent pool of water throughout the year (or at least throughout the wet season). Ponds treat incoming storm water runoff by settling and algal uptake. The primary removal mechanism is settling as storm water runoff resides in this pool, and pollutant uptake, particularly of nutrients, also occurs through biological activity in the pond. Wet ponds are among the most cost-effective and widely used storm water practices. While there are several different versions of the wet pond design, the most common modification is the extended detention wet pond, where storage is provided above the permanent pool in order to detain storm water runoff in order to provide settling.

   b. **Applicability**
   Wet ponds are widely applicable storm water management practices. Although they have limited applicability in highly urbanized settings, and in arid climates, they have few other restrictions.

2. **Infiltration Basin**
   Post-Construction Storm Water Management
   in New Development and Redevelopment

   a. **Description**
   An infiltration basin is a shallow impoundment that is designed to infiltrate storm water into the ground water. This practice is believed to have a high pollutant removal efficiency, and can also help recharge the ground water, thus restoring low flows to stream systems. Infiltration basins can be challenging to apply on many sites, however, because of soils requirements. In addition, some studies have shown relatively high failure rates compared with other management practices.

b. Applicability
Infiltration basins have select applications. Their use is often sharply restricted by concerns over ground water contamination, soils, and clogging at the site.

3. Infiltration Trench
Post-Construction Storm Water Management
in New Development and Redevelopment

a. Description
An infiltration trench (a.k.a. infiltration galley) is a rock-filled trench with no outlet that receives storm water runoff. Storm water runoff passes through some combination of pretreatment measures, such as a swale and detention basin, and into the trench. There, runoff is stored in the voids of the stones, and infiltrates through the bottom and into the soil matrix. The primary pollutant removal mechanism of this practice is filtering through the soil.

b. Applicability
Infiltration trenches have select applications. While they can be applied in most regions of the country, their use is sharply restricted by concerns due to common site factors such as potential ground water contamination, soils, and clogging.

4. Porous Pavement
Post-Construction Storm Water Management
in New Development and Redevelopment

a. Description
Porous pavement is a permeable pavement surface with an underlying stone reservoir to temporarily store surface runoff before it infiltrates into the subsoil. This porous surface replaces traditional pavement, allowing parking lot storm water to infiltrate directly and receive water quality treatment. There are a few porous pavement options, including porous asphalt, pervious concrete, and grass pavers. Porous asphalt and pervious concrete appear to be the same as traditional pavement from the surface, but are manufactured without "fine" materials, and incorporate void spaces to allow infiltration. Grass pavers are concrete interlocking blocks or synthetic fibrous gridded systems with open areas designed to allow grass to grow within the void areas. Other alternative paving surfaces can help reduce the runoff from paved areas but do not incorporate the stone trench for temporary storage below the pavement (see Green Parking fact sheet). While porous pavement has the potential to be a highly effective treatment practice, maintenance has been a concern in past applications of the practice.

b. Applicability
The ideal application for porous pavement is to treat low traffic or overflow parking areas. Porous pavement may also have some application on highways, where it is currently used as a surface material to reduce hydroplaning (see Roadway Maintenance).

5. Bioretention
Post-Construction Storm Water Management in New Development and Redevelopment

a. Description

Bioretention areas are landscaping features adapted to provide on-site treatment of storm water runoff. They are commonly located in parking lot islands or within small pockets of residential land uses. Surface runoff is directed into shallow, landscaped depressions. These depressions are designed to incorporate many of the pollutant removal mechanisms that operate in forested ecosystems. During storms, runoff ponds above the mulch and soil in the system. Runoff from larger storms is generally diverted past the facility to the storm drain system. The remaining runoff filters through the mulch and prepared soil mix. Typically, the filtered runoff is collected in a perforated underdrain and returned to the storm drain system.

b. Applicability

Bioretention systems are generally applied to small sites, and in a highly urbanized setting. Bioretention can be applied in many climatological and geologic situations, with some minor design modifications.

6. Sand and Organic Filters
Post-Construction Storm Water Management in New Development and Redevelopment

a. Description

Sand filters are usually two-chambered storm water practices; the first is a settling chamber, and the second is a filter bed filled with sand or another filtering media. As storm water flows into the first chamber, large particles settle out, and then finer particles and other pollutants are removed as storm water flows through the filtering medium. There are several modifications of the basic sand filter design, including the surface sand filter, underground sand filter, perimeter sand filter, organic media filter, and Multi-Chamber Treatment Train. All of these filtering practices operate on the same basic principle. Modifications to the traditional surface sand filter were made primarily to fit sand filters into more challenging design sites (e.g., underground and perimeter filters) or to improve pollutant removal (e.g., organic media filter).

b. Applicability

Sand filters can be applied in most regions of the country and on most types of sites. Some restrictions at the site level, however, might restrict the use of sand filters as a storm water management practice (see Siting and Design Considerations).

7. Storm Water Wetland
Post-Construction Storm Water Management in New Development and Redevelopment

a. Description

Storm water wetlands (a.k.a. constructed wetlands) are structural practices similar to wet ponds (see Wet Pond fact sheet) that incorporate wetland plants into the design. As storm water runoff flows through the wetland, pollutant removal is achieved through settling and biological uptake within the practice. Wetlands are among the most effective storm water practices in terms of pollutant removal and they also offer aesthetic value. Although natural wetlands can sometimes be

used to treat storm water runoff that has been properly pretreated, storm water wetlands are fundamentally different from natural wetland systems. Storm water wetlands are designed specifically for the purpose of treating storm water runoff, and typically have less biodiversity than natural wetlands both in terms of plant and animal life. Several design variations of the storm water wetland exist, each design differing in the relative amounts of shallow and deep water, and dry storage above the wetland.

A distinction should be made between using a constructed wetland for storm water management and diverting storm water into a natural wetland. The latter practice is not recommended because altering the hydrology of the existing wetland with additional storm water can degrade the resource and result in plant die-off and the destruction of wildlife habitat. In all circumstances natural wetlands should be protected from the adverse effects of development including impacts from increased storm water runoff. This is especially important because natural wetlands provide storm water and flood control benefits on a regional scale.

b. Applicability

Constructed wetlands are widely applicable storm water management practices. While they have limited applicability in highly urbanized settings and in arid climates, wetlands have few other restrictions.

8. Grassed Swale
Post-Construction Storm Water Management
in New Development and Redevelopment

a. Description

The term swale (a.k.a. grassed channel, dry swale, wet swale, biofilter) refers to a series of vegetated, open channel management practices designed specifically to treat and attenuate storm water runoff for a specified water quality volume. As storm water runoff flows through these channels, it is treated through filtering by the vegetation in the channel, filtering through a subsoil matrix, and/or infiltration into the underlying soils. Variations of the grassed swale include the grassed channel, dry swale, and wet swale. The specific design features and methods of treatment differ in each of these designs, but all are improvements on the traditional drainage ditch. These designs incorporate modified geometry and other features for use of the swale as a treatment and conveyance practice.

b. Applicability

Grassed swales can be applied in most situations with some restrictions. Swales are very well suited for treating highway or residential road runoff because they are linear practices.

9. Grassed Filter Strip
Post-Construction Storm Water Management
in New Development and Redevelopment

a. Description

Grassed filter strips (a.k.a. vegetated filter strips, filter strips, and grassed filters) are vegetated surfaces that are designed to treat sheet flow from adjacent surfaces. Filter strips function by slowing runoff velocities and filtering out sediment and other pollutants, and providing some infiltration into underlying soils. Filter strips were originally used as an agricultural treatment practice, and have more recently evolved into an urban practice. With proper design and

maintenance, filter strips can provide relatively high pollutant removal. One challenge associated with filter strips, however, is that it is difficult to maintain sheet flow, so the practice may be "short circuited" by concentrated flows, receiving little or no treatment.

b. Applicability

Filter strips are applicable in most regions, but are restricted in some scenarios because they consume a large amount of space relative to other practices. Filter strips are best suited to treating runoff from roads and highways, roof downspouts, very small parking lots, and pervious surfaces. They are also ideal components of the "outer zone" of a stream buffer (see Buffer Zones fact sheet), or as pretreatment to a structural practice. This recommendation is consistent with recommendations in the agricultural setting that filter strips are most effective when combined with another practice (Magette et al., 1989). In fact, the most recent storm water manual for Maryland does not consider the filter strip as a treatment practice, but does offer storm water volume reductions in exchange for using filter strips to treat some of a site.

10. Catch Basin

Post-Construction Storm Water Management in New Development and Redevelopment

a. Description

A catch basin (a.k.a. storm drain inlet, curb inlet) is an inlet to the storm drain system that typically includes a grate or curb inlet and a sump to capture sediment, debris, and associated pollutants. They are also used in CSO watersheds to capture floatables and settle some solids. Catch basins act as pretreatment for other treatment practices by capturing large sediments. The performance of catch basins at removing sediment and other pollutants depends on the design of the catch basin (e.g., the size of the sump), and maintenance procedures to retain the storage available in the sump to capture sediment.

b. Applicability

Catch basins are used in drainage systems throughout the United States. However, many catch basins are not ideally designed for sediment and pollutant capture. Ideal application of catch basins is as pretreatment to another storm water management practice. Retrofitting existing catch basins may help to improve their performance substantially. A simple retrofit option is to ensure that all catch basins have a hooded outlet to prevent floatable materials, such as trash and debris, from entering the storm drain system.

11. In-Line Storage

Post-Construction Storm Water Management in New Development and Redevelopment

a. Description

In-line storage refers to a number of practices designed to use the storage within the storm drain system to detain flows. While these practices can reduce storm peak flows, they are unable to improve water quality or protect downstream channels. Storage is achieved by placing devices in the storm drain system to restrict the rate of flow. Devices can slow the rate of flow by backing up flow, as in the case of a dam, or weir, or through the use of vortex valves, devices that reduce flow rates by creating a helical flow path in the structure. A description of various flow regulators is included in Urbonas and Stahre (1990).

b. Applicability

In-line storage practices serve the same purpose as traditional detention basins (see Dry Extended Detention Pond). These practices can act as a surrogate for aboveground storage when little space is available for these aboveground storage facilities.

12. Alum Injection

Post-Construction Storm Water Management in New Development and Redevelopment

a. Description

Alum injection is the addition of alum (an aluminum sulfate salt) solution to storm water, causing fine particles to flocculate (i.e., gather together to form larger particles), and settle out. Other pollutants can be scavenged also. Alum injection can help meet downstream pollutant concentration loads by reducing the concentrations of fine particles and soluble phosphorus. Alum treatment systems generally consist of a flow-weighted dosing system designed to fit inside a storm sewer manhole, remotely located storage tanks to provide the doser with alum, and a downstream pond which allows the alum, pollutants, and sediments to settle out (Kurz, 1998). When alum is injected into storm water it forms harmless precipitates, AlPO4 and Al (OH) 3. These precipitates combine with heavy metals and phosphorus causing them to be deposited into the sediments in a stable, inactive state (WEF, 1992). The collected mass of alum precipitates, pollutants, and sediments are commonly referred to as floc.

b. Applicability

The injection of liquid alum into storm sewers has been used to reduce the water quality impacts of storm water runoff to lakes and receiving waterbodies, particularly to reduce high phosphorus levels. Because of high installation and operation costs, alum injection is best applied in situations where a large volume of water is stored in one area, as in the case of CSO storage areas at wastewater treatment plants. Alum treatment can also be implemented as a pretreatment step to further reduce turbidity and TSS (Kurz, 1998).

13. On-Lot Treatment

Post-Construction Storm Water Management in New Development and Redevelopment

a. Description

The term "on-lot treatment" refers to a series of practices that are designed to treat runoff from individual residential lots. The primary purpose of most on-lot practices is to manage rooftop runoff and, to a lesser extent, driveway and sidewalk runoff. Rooftop runoff, and particularly residential rooftop runoff, generally has low pollutant concentrations compared with other urban sources (Schueler, 1994). The primary advantage of managing runoff from rooftops is to disconnect these impervious surfaces, reducing the effective impervious cover in a watershed. Many of the impacts of urbanization on the habitat and water quality of streams are related to the fundamental change in the hydrologic cycle caused by the increase of impervious cover in the landscape (Schueler, 1994a).

Although there are a wide variety of on-lot treatment options, they can all be classified into one of three categories: 1) practices that infiltrate rooftop runoff; 2) practices that divert runoff or soil moisture to a pervious area; and 3) practices that store runoff for later use. The best option depends

on the goals of a community, the feasibility at a specific site, and the preferences of the homeowner.

The practice most often used to infiltrate rooftop runoff is the dry well. In this design, the storm drain is directed to an underground rock-filled trench that is similar in design to an infiltration trench (see Infiltration Trench fact sheet). French drains or Dutch drains can also be used for this purpose. In these designs, the relatively deep dry well is replaced with a long trench with a perforated pipe within the gravel bed to distribute flow throughout the length of the trench.

Runoff can be diverted to a pervious area or to a treatment area using site grading, or channels and berms. Treatment options can include grassed swales, bioretention, or filter strips. The bioretention design can be simplified for an on-lot application by limiting the pre-treatment filter and in some cases eliminating the underdrain (see Bioretention fact sheet). Alternatively, rooftop runoff can simply be diverted to pervious lawn areas, as opposed to flowing directly to the street, and thus the storm drain system.

Practices that store rooftop runoff, such as cisterns and rain barrels, are the simplest in design of all of the on-lot treatment systems. Some of these practices are available commercially and can be applied in a wide variety of site conditions. Cisterns and rain barrels are particularly valuable in the arid southwest, where water is at a premium, rainfall is infrequent, and reuse for irrigation can save homeowners money.

b. Application

Some sort of on-lot treatment can be applied to almost all sites, with very few exceptions (e.g., very small lots or lots with no landscaping). Traditionally, on-site treatment of residential storm water runoff has been encouraged, but has not generally been an option to meet storm water requirements. There are currently at least two jurisdictions; however, who offer "credits" in exchange for the application of on-site storm water management practices. In Denver, Colorado, sites designed with methods to reduce "directly connected impervious cover," including disconnection of downspout runoff from the storm system, are permitted to use a lower site impervious area when computing the required storage of storm water facilities (DUDFCD, 1992). Similarly, new regulations for Maryland allow designers to subtract each rooftop that is disconnected from the total site impervious cover when calculating required storage in storm water management practices (CWP, 1998).

14. Buffer Zones

Post-Construction Storm Water Management in New Development and Redevelopment

a. Description

An aquatic buffer is an area along a shoreline, wetland, or stream where development is restricted or prohibited. The primary function of aquatic buffers is to physically protect and separate a stream, lake or wetland from future disturbance or encroachment. If properly designed, a buffer can provide storm water management and act as a right-of-way during floods, sustaining the integrity of stream ecosystems and habitats. Technically, aquatic buffers are one type of conservation area, function as an integral part of the aquatic ecosystem, and can also function as part of an urban forest.

The three types of buffers are water pollution hazard setbacks, vegetated buffers, and engineered buffers. Water pollution hazard setbacks are areas that separate a potential pollution hazard from a waterway. By providing setbacks from these areas in the form of a buffer, the potential for pollution can be reduced. Vegetated buffers are any number of natural areas that exist to divide land uses or provide landscape relief. Engineered buffers are areas specifically designed to treat storm water before it enters into a stream, lake, or wetland.

b. Applicability

Buffers can be applied to new development by establishing specific preservation areas and sustaining management through easements or community associations. For existing developed areas, an easement may be needed from adjoining landowners. A local ordinance can help set specific criteria for buffers to achieve storm water management goals.

In many regions of the country, the benefits of buffers are amplified if they are managed in a forested condition. In some settings, buffers can remove pollutants traveling in storm water or ground water. Shoreline and stream buffers situated in flat soils have been found to be effective in removing sediment, nutrients, and bacteria from storm water runoff and septic system effluent in a wide variety of rural and agricultural settings along the East Coast and with some limited capability in urban settings. Buffers can also provide wildlife habitat, recreation, and be reestablished in urban areas as part of an urban forest.

15. Urban Forestry
Post-Construction Storm Water Management in New Development and Redevelopment

a. Description

Urban forestry is the study of trees and forests in and around towns and cities. Since trees absorb water, patches of forest and the trees that line streets can help provide some of the storm water management required in an urban setting. Urban forests also help break up a landscape of impervious cover, provide small but essential green spaces, and link walkways and trails.

Successful urban forestry requires a conservation plan for individual trees as well as forest areas larger than 10,000 ft^2. A local forest or tree ordinance is one technique for achieving conservation, and by including specific measures to protect and manage these areas, urban forests and trees can also help reduce storm water management needs in urban areas.

b. Applicability

From a stream preservation perspective, it is ideal to retain as much contiguous forest as possible. At the same time, this may not be an option in many urban areas. If forested areas are fragmented, it is ideal to retain the closest fragments together.

In rapidly urbanizing areas, where clearing and grading are important, tree preservation areas should be clearly marked. Delineating lines along a critical root zone rather than a straight line is essential to preserving trees and can help reduce homeowner complaints about tree root interference into sewer or septic lines.

16. Eliminating Curb and Gutters
Post-Construction Storm Water Management in New Development and Redevelopment

a. Description

This better site design practice involves promoting the use of grass swales as an alternative to curb and gutters along residential streets. Curb and gutters are designed to quickly convey runoff from the street to the storm drain and, ultimately, the local receiving water. Consequently, curb and gutters provide little or no removal of storm water pollutants. Indeed, curbs often act as a pollutant trap where deposited pollutants are stored until they are washed out in the next storm. Many communities require curb and gutters as a standard element of their road sections, and discourage the use of grass swales. Revisions to current local road and drainage regulations are needed to promote greater use of grass swales along residential streets, in the appropriate setting. The storm water management and pollutant removal benefits of grass swales are documented in detail in the Grassed Swale fact sheet.

b. Applicability

The use of engineered swales in place of curb and gutters should be encouraged in low and medium density residential zones where soils, slope and housing density permit. However, eliminating curb and gutters is generally not feasible for streets with high traffic volume or extensive on-street parking demand (i.e., commercial and industrial roads), nor is it a viable option in arid and semi-arid climates where grass cannot grow without irrigation. Moreover, the use of grass swales may not be permitted by current local or state street and drainage standards.

17. Green Parking
Post-Construction Storm Water Management in New Development and Redevelopment

a. Description

Green parking refers to several techniques applied together to reduce the contribution of parking lots to the total impervious cover in a lot. From a storm water perspective, application of green parking techniques in the right combination can dramatically reduce impervious cover and consequently, the amount of storm water runoff. Green parking lot techniques include setting maximums for the number of parking lots created, minimizing the dimensions of parking lot spaces, utilizing alternative pavers in overflow parking areas, using bioretention areas to treat storm water, encouraging shared parking, and providing economic incentives for structured parking.

b. Applicability

All of the green parking techniques can be applied in new developments and some can be applied in redevelopment projects, depending on the extent and parameters of the project. In urban areas, application of some techniques, like encouraging shared parking and providing economic incentives for structured parking, can be very practical and necessary. Commercial areas can have excessively high parking ratios and application of green parking techniques in various combinations can dramatically reduce the impervious cover of a site.

18. Alternative Pavers
Post-Construction Storm Water Management in New Development and Redevelopment

a. Description

Alternative pavers are permeable surfaces that can replace asphalt and concrete and can be used for driveways, parking lots, and walkways. From a storm water perspective, this is important because alternative pavers can replace impervious surfaces, creating less storm water runoff. The two broad categories of alternative pavers are paving blocks and other surfaces, including gravel, cobbles, wood, mulch, brick, and natural stone. While porous pavement is an alternative paver, as an engineered storm water management practice it is discussed in detail in the Porous Pavement fact sheet.

Paving Blocks

Paving blocks are concrete or plastic grids with gaps between them. Paving blocks make the surface more rigid and gravel or grass planted inside the holes allows for infiltration. Depending on the use and soil types, a gravel layer can be added underneath to prevent settling and allow further infiltration.

Other Alternative Surfaces

Gravel, cobbles, wood, and mulch also allow varying degrees of infiltration. Brick and natural stone arranged in a loose configuration allow for some infiltration through the gaps. Gravel and cobbles can be used as driveway material, and wood and mulch can be used to provide walking trails.

b. Applicability

Alternative pavers can replace conventional asphalt or concrete in parking lots, driveways, and walkways. At the same time, traffic volume and type can limit application. For this reason, alternative pavers for parking are recommended only for overflow areas. In residential areas, alternative surfaces can be used for driveways and walkways, but are not ideal for areas that require handicap accessibility.

19. BMP Inspection and Maintenance
Post-Construction Storm Water Management in New Development and Redevelopment

a. Description

To maintain the effectiveness of postconstruction storm water control Best Management Practices (BMPs), regular inspection of control measures is essential. Generally, inspection and maintenance of BMPs can be categorized into two groups--expected routine maintenance and non-routine (repair) maintenance. Routine maintenance refers to checks performed on a regular basis to keep the BMP in good working order and aesthetically pleasing. In addition, routine inspection and maintenance is an efficient way to prevent potential nuisance situations (odors, mosquitoes, weeds, etc.), reduce the need for repair maintenance, and reduce the chance of polluting storm water runoff by finding and correcting problems before the next rain.

In addition to maintaining the effectiveness of storm water BMPs and reducing the incidence of pests, proper inspection and maintenance is essential to avoid the health and safety threats inherent

in BMP neglect (Skupien, 1995). The failure of structural storm water BMPs can lead to downstream flooding, causing property damage, injury, and even death.

b. Applicability

Under the proposed Storm Water Phase II rule, owners and operators of small MS4 facilities would be responsible for implementing BMP inspection and maintenance programs and having penalties in place to deter infractions (USEPA, 1999). All storm water BMPs should be inspected for continued effectiveness and structural integrity on a regular basis. Generally, all BMPs should be checked after each storm event in addition to these regularly scheduled inspections. Scheduled inspections will vary among BMPs. Structural BMPs such as storm drain drop inlet protection may require more frequent inspection to ensure proper operation. During each inspection, the inspector should document whether the BMP is performing correctly, any damage to the BMP since the last inspection, and what should be done to repair the BMP if damage has occurred.

C. Examples of What Others Have Done During Phase I (from EPA's Model MS4 General Permit)

1. Soil Erosion and Storm Water Runoff Control Ordinance

In 1991,Grand Traverse County, Michigan, adopted an ordinance requiring on-site retention for all commercial developments and new subdivisions. The county developed the ordinance in cooperation with the community through open workshops, hearings, and a citizens' advisory committee. The ordinance requires soil erosion and storm water runoff control permits at sites greater than 1 acre or within 500 feet of a lake or stream. For further information contact, Maureen Kennedy Templeton, Drain Commissioner, Grand Traverse County, MI (616) 922-4731. Source: NRDC, Storm Water Strategies Community Responses to Runoff Pollution, May 1999.

2. Development Planning

As part of the approval process for new development, the City of Pittsburg (CA) has standard conditions for all new businesses. In this manner, the city can direct development to protect water quality. Requirements for trash enclosures and drainage from paved surfaces are among the standard conditions listed. Standard conditions may not apply to each specific project; therefore, each project is reviewed individually with a Community Development staff person at the time of application. For further information contact Community Development Department, City of Pittsburgh, (510) 439-4920. Source: Model Urban Runoff Program, Appendix 3U.

3. Storm Infiltration Project

The City of Maplewood, Minnesota, initiated a storm water infiltration project in 1995. The project utilizes a swale system rather than a traditional curb and gutter system to manage runoff. Residents choose how they want to plant the swales with native, water-loving species. High assessments on homes for curb and gutter improvements were avoided with this approach. For further information contact Ken Haide, City Engineer, Maplewood, MN, (612) 770-4550; Cliff A Chenger, Ramsey Washington Watershed District, (617) 777-3665. Source: NRDC, Storm Water Strategies Community Responses to Runoff Pollution, May 1999.

4. Urban Watershed Retrofit Program

In Austin, Texas, private developers can choose to make a payment to the city based on the amount of new impervious cover instead of installing on-site water-quality controls. The ordinance fee, along

with monthly drainage utility fees, generates funds for retrofitting performed by the city. The city has used this process to produce a series of interconnected wet ponds for pollutant education from storm water. For further information contact Leila Gosselink, Project Administrator, City of Austin Watershed Protection Department, TX, 512-499-1863. Source: NRDC, Storm Water Strategies Community Responses to Runoff Pollution, May 1999.

5. **Nashville, TN MS4 Storm Water Permit -4/3/96**
   The permittee shall require, in areas of new development and significant redevelopment, installation of urban storm water BMP's. In particular the permittee shall: i) establish design criteria for wet and extended dry detention ponds and define the conditions when such ponds shall be installed; Due 1 year from permit date ii) collect influent and effluent data on at least three of the newly installed ponds (24-48 months from permit date); iii) report yearly on the performance of these ponds (3rd, 4th,and 5th annual reports) iv) define "significant redevelopment" and establish criteria for installing water quality control systems in redevelopment.

6. **Nashville, TN MS4 Storm Water Permit -4/3/96**
   The permittee shall define its master planning effort (within 12 months) by investigating the following matters and setting forth a strategy to address each matter: i) changes to laws, ordinances, rules, etc. ii) educating and involving the city council and planning and zoning boards iii) design criteria for new development, including restrictions on impervious area; use of pervious paving material; source treatment, flow attenuation and infiltration devices; locating local and regional detention basins; provisions for recharge of groundwater; and restrictions for development in steeply sloped areas. iv) changes to administrative procedures; and v) education of land developers.

7. **Prince George's County, MD Phase I MS4 Community (Permit and Case Study)**
   All new developments [in the County] are required to treat the first 1/2-inch of runoff from their site as well as the 2, 10, and 100-year storm events. Although the Storm water Ordinance allows for waivers of on-site controls, rarely, if ever, are water quality-related (first 1/2-inch) controls waived. Quantity controls are only waived when there is no possible threat of structural flooding. The typical structural water quality control devices used for all types of development include: infiltration trenches, retention and detention basins, oil/grit separators, vegetative filters, and buffers. (Prince George's County, MD, Storm Water Management Program requirements under their Phase I MS4 permit) Prince George's County, MD, has evolved into a leader of information management/analysis as away to provide better storm water management. The county conducts ongoing, multi-year assessments of storm water runoff, which has lead to improved land development techniques, creating a new site design process to control storm water runoff, referred to as low impact development (LID). The principle goal of LID is to provide the maximum protection to the existing stream ecology by maintaining the watershed's pre-developed hydrologic regime (a decrease in runoff generation between 75- and 95-percent from current land development designs). LID allows the site planner/developer to use a wide array of simple, cost-effective techniques that focus on site-level hydrologic control. Several other Phase I municipalities are actively following the development of LID techniques (e.g., Portland, OR), to help shape their future storm water management efforts. Decreased pollutant concentrations in a water body are not the only measurable benefit that the LID approach addresses. Additional benefit to the environment ensues because of problems avoided. Changes in development techniques and patterns that decrease percent imperviousness and combined with BMPs that infiltrate storm water runoff from new developments mean local streams will retain their current natural condition. Where implemented appropriately, LID designs should be able to yield a pollutant load reduction simply because less runoff occurs. (from Case Study)

8. **Austin, TX MS4 Storm Water Case Study (Assessment of Controls)**
   In Austin, TX, a Phase I MS4, a joint public/private enterprise between the state of Texas and a private developer is installing storm water detention ponds to minimize the impacts of a mixed-use development while providing aesthetic and economic benefits. The resulting pollutant load reduction for the detention ponds has been estimated based on local rainfall patterns, design parameters used in the pond, and removal efficiencies typical of detention ponds. Compared to an unmanaged condition, the ponds will reduce the sediment discharged annually from the site by several tons and reduce nutrients discharged between 44 and 65 percent.

D. Mississippi Guidance and Resources (for more information contact MDEQ at 601/961-5171 General Permits Branch)

1. **Regulatory Mechanism**
   The permit requires that the MS4 operator establish an ordinance or other regulatory mechanism requiring the implementation of post-construction runoff controls. The MS4 operator should evaluate the area under consideration and identify management objectives for streams, wetlands, and other receiving waters. Areas where urban development is likely to occur and areas that are sensitive to the effects of urbanization should be identified. Consideration should be given to receiving waters, topography, soil types, groundwater uses and potential impacts, and other relevant factors. This evaluation will help improve water quality by guiding the development of a community away from sensitive areas, and by restricting certain types of growth to areas that can support it without compromising water quality.

2. **Review and Approval Procedures**
   The regulation requires the post-construction program to include controls to determine if new development and redevelopment designs incorporate adequate structural and/or nonstructural BMPs. The MS4 operator should review their existing "review and approval" procedures to determine if the current program includes elements required in the regulation, or if additional improvements are warranted. If a review and approval procedure does not exist, a program should be developed.

   Elements that should be considered for inclusion in the review and approval procedure are described in the following.

   - **Develop a standard operating procedure** for the new development or redevelopment plan reviews and approval. The standard operating procedure should identify the department(s) to be included in the process, and should summarize minimum nonstructural and structural BMP requirements as a checklist.
   - **Develop a system to track the status of plans**. This system can be combined with existing tracking systems.

3. **Design Criteria and Standards**
   A standard operating procedure should be developed for the selection and design of appropriate non-structural and structural BMPs. The design criteria and standards can be provided by reference to existing criteria manuals such as Mississippi's "Planning and Design manual for the Control of Erosion, Sediment and Stormwater" (See Appendix H for order form). The standard operating procedure should incorporate guidelines for the following minimum measures.

- **Planning** – Runoff problems can be addressed effectively with sound planning procedures. The planning process should include Master Plans and Comprehensive Plans that should be reflected in zoning ordinances.

- **Non-Structural Practices** – These controls are intended to prevent or control the sources of pollutants. These can include controls on disposal of household waste and toxins, use of pesticides, herbicides, and fertilizer, illicit discharges, good housekeeping, preventative maintenance, and protect sensitive areas such as wetlands and riparian areas, maintain or increase open space, maintain buffers along waterbodies and minimize impervious surfaces.

- **Structural Practices.** – These controls are intended to reduce the amount of pollutants that enter state waters. They include:
  - **Storage Practices** – Storage or detention BMPs control storm water by gathering runoff in wet ponds, dry basins, or multi-chamber catch basins and slowly releasing it to receiving waters or drainage systems. These practices control storm water volume and settle out particulates for pollutant removal.
  - **Infiltration Practices** – Infiltration BMPs are designed to facilitate the percolation of runoff through the soil to groundwater, thereby reducing both storm water quantity and mobilization of pollutants. Examples are infiltration basins/trenches, dry wells, and porous pavement.
  - **Vegetative Practices** – Vegetative BMPs are landscaping features that, with optimal design and good soil conditions, enhance pollutant removal, maintain/improve natural site hydrology, promote healthier habitats, and increase aesthetic appeal. Grassy swales, filter strips, and artificial wetlands are examples.

- **Regional BMPs –** These controls are usually implemented downstream of a large drainage area. They can be online (located in the state waters), or offline (prior to entering state waters). In general, where regional BMPs such as a detention pond exist, some onsite BMPs will be necessary.

If the regional BMPs are being placed prior to discharging into state waters, then the regional BMPs can be used to meet the post-construction requirement, and additional on-site BMPs may only be needed to assist in the function of the regional BMPs. However, if the regional BMPs are located after stormwater runoff has discharged into state waters, including natural drainageways being utilized by the municipality as part of their MS4, this may be a violation of the regulation's requirement to protect state waters. Waters of the State cannot be used to treat storm water runoff. An online system (located in state waters) can only be used to control water quantity.

4. Ensure Adequate Long-Term Operation and Maintenance of BMPs

Under this program, a regulated entity must develop, implement and enforce a program that ensures adequate long-term operation and maintenance of BMPs.

EPA recommends that small MS4 operators evaluate various operation and maintenance management agreement options. The most common options are agreements between the MS4 operator and another party such as post-development landowners (e.g., homeowners' associations, office park owners, other government departments or entities), or regional authorities (e.g., flood control districts, councils of government). These agreements typically require the post-construction property owner to be responsible for the operation and maintenance. This may include conditions which: allow the MS4 operator to be reimbursed for operation and maintenance performed by the MS4 operator that is the

responsibility of the property owner but is not performed; allow the MS4 operator to enter the property for inspection purposes; and in some cases specify that the property owner submit periodic reports.

As the coverage recipient, the ultimate responsibility for compliance is placed on the regulated entity. There is general agreement that BMPs must be maintained to operate properly. However, most municipalities prefer and require that responsibility for operation and maintenance of structural controls, such as a storm water detention basin, remain with the private-property owner. Municipalities normally require a drainage easement that precludes modification of the BMP and allows legal access to the property for inspection and actions as necessary to maintain the operation of the BMP as originally intended.

Municipalities, as part of the approval process for any development, can require that certain conditions be met prior to receiving its approval to proceed with construction of the development. Usually, the most important of those conditions are contained on the recorded plat. In all instances, municipalities should require that, as part of the plat, it be noted that the legal title holder to the property is responsible for maintaining the BMPs, and that the municipality has the legal right to enforce that obligation, either by legal action to obtain compliance, or by performing the maintenance itself and then collecting those expenses by recording a lien on the property. In addition to the above procedure, the municipality can require each approved development, prior to the approval of the plat, to create a Homeowners' Association (HOA). See the sample financial responsibility form in Appendix D.

For residential areas, the land area in a subdivision where a BMP is located is usually held in common by an HOA. The HOA is a legal entity that can levy assessments on developed properties within the subdivision to raise funds for expenditures to operate and maintain infrastructure held in common. The formation of the HOA can encompass various terms, conditions, responsibilities and authorities. The MS4 operator should ensure that these include the legal responsibility to maintain the BMPs installed in the development, as well as the legal authority to levy an assessment on each owner to pay for that maintenance. In addition, the HOA should have the right to impose a lien on an owner's property for failure to pay the assessment. All of these powers should be set forth in the articles of incorporation of the HOA, its bylaws, and the covenants, conditions and restrictions, which affect all of the property in the development. The covenants are recorded with the County Clerk, and are enforceable by the HOA.

For commercial developments, such as a shopping mall, a relatively large area of land is involved that would be developed by one individual (or corporation), and subsequently sold or leased to relatively few tenants or property owners. It is likely that this land would be built at one time with one or two structural BMPs comprising a system for the entire site. Individual lots for industrial, commercial, or residential use would also follow this model where on-site BMPs would be designed and constructed. For these properties, the requirements for operation and maintenance of on-site BMPs should identify the responsible party as part of the development agreement and be recorded for the property. In addition, municipalities should consider requiring the formation of an owners' association in those instances in commercial development where there will be multiple owners of the real property. An ordinance or other regulatory mechanism should indicate that, regardless of whether the owner or tenant is responsible for the maintenance, the MS4 operator would enforce on the owner if the maintenance were not performed.

HOAs have not always remained diligent in their responsibilities, and they have at times provided notification of dissolution. Under a strict interpretation of "ensure" as contained in the regulation, the municipality could be held liable for the responsibility of operation and maintenance of BMPs on

private property. Therefore, by assuring through the development approval process that the owner of the real property will ultimately be legally responsible for the maintenance of the BMPs, a municipality has done all in its power to "ensure" that the BMPs will be maintained as agreed. To this end, the municipality should not only provide for the performance of the needed maintenance by itself, if necessary, but should also include a process whereby a lien of record (or similar legal action) can be placed on the owner's property. The lien would be used to assure collection of the owner's share of the maintenance costs expended by the municipality.

The standard for permit compliance for MS4 permits is that municipalities ensure maintenance and operation of BMPs to the maximum extent practicable (MEP). In determining if an MS4 operator has complied to the MEP, the MDEQ may consider such factors as the adequacy of the MS4 operator's post-construction program, its ability to require that the necessary actions be performed by the responsible parties, how the MS4 operator has carried out the post-construction program, and, if necessary, the MS4 operator's ability to provide appropriate mechanisms to ensure such maintenance and operation.

It is expected that the MS4 operator will put into place procedures, ordinances or other regulatory mechanisms that will require, to the extent allowed by State or local law, that BMPs be appropriately designed and planned, and provide for enforceable operation and maintenance by the owner/operator. Factors such as the extent of the inspection/verification system, and the procedures in place and implemented for instances when BMPs are not operated and/or maintained, can be evaluated by the MDEQ to determine if the MS4 operator's program meets the MEP standard.

Some additional measures that a municipality may consider for inclusion in this management program are:

- Regular inspections of BMPs and a report sent to the owner/operator noting compliance or deficiencies, as discussed below in section 5.
- Requirement for a surety bond, letter of credit, or other financial instrument to be held by the municipality in case of default on maintenance responsibility.
- "Charge-back" provisions where the municipality will perform the required maintenance of a BMP and invoice the owner for repayment.
- Policy that all BMPs are transferred into public ownership (by deed or easement), and fees are assessed for operation and maintenance by the municipality.
- Establish a maintenance contract with a private subcontractor for maintenance of municipally-owned BMPs.
- Establish a fee system whereby privately owned BMPs are maintained under a contract with a private subcontractor, but the municipality administers the contract.

a. Recommendations

It is recommended that all municipalities evaluate their existing ordinances to determine if sufficient authority currently exists to comply with the provisions of this regulation. If not, the following or a similar model ordinance is recommended for adoption:

> "All storm water best management practices (BMPs) shall have an enforceable operation and maintenance agreement to ensure that the system functions as designed. This agreement will include any and all maintenance easements required to access and inspect the BMP(s), and to perform routine maintenance as necessary to ensure proper functioning of the storm water BMP. In addition, prior to the issuance of any permits for land development, legally binding documents

shall be adopted and agreed to wherein the owners of the real property associated with the BMPs that benefit that property are held ultimately responsible for the proper maintenance of all storm water BMPs, including a mechanism for the collection of the costs of the maintenance if it is not performed by the owners of the property."

The adoption and implementation of an ordinance; its enforcement (if necessary); obtaining drainage easements; and review/approval of covenant restrictions for all new development and redevelopment approved in the municipality, will satisfy this section of the regulation.

5. Monitoring Long-Term Compliance

The permit requires the MS4 operator to ensure adequate long-term operation and maintenance of BMPs. Inspection and Enforcement programs are required. The elements of the programs should include the following.

a. Database

It would be helpful if the MS4 operator developed a database of all new post-construction BMPs in its jurisdiction. In addition to being an important tool for other elements of the Post-Construction minimum measure, such as inspections and enforcement, the database could be used for mailings to remind BMP owners to perform necessary maintenance. This would aid in providing information for the annual report and would allow the MS4 to receive "credit" for a TMDL implementation plan (if required).

b. Enforcement Program

An enforcement program must be implemented. The program must address appropriate responses to common noncompliance issues with developers/property owners, such as failure to maintain BMPs. The system should also specify when and how items such as summons to appear before the magistrate will be used, and how these activities would be tracked. Several options for formal action are available. They include:

- Verbal warning to the developer/property owner
- Letter of noncompliance
- Notice of violation and order
- Charge back to contractor for work completed by MS4 representatives
- Municipal summons

E. Examples of Phase II BMPs and Associated Measurable Goals (From EPA, Office of Water and Office of Wastewater Management at http://cfpub.epa.gov/npdes/stormwater/measurablegoals/index.cfm)

Hypothetical Case Study: Smalltown, USA, has substantial existing development and many neighborhoods that are still growing. For existing development, the City plans to use on-lot treatment to handle some storm water by disconnecting impervious surfaces. The City also wants to ensure that existing storm water controls are functioning properly. Growing areas will also be targeted by requiring impervious area disconnection and new storm water controls.

Minimum Measure Objective: Reduce the volume and improve the quality of storm water runoff by disconnecting impervious surfaces and installing and maintaining structural storm water controls.

BMP: Reduce directly connected impervious surfaces in new developments and redevelopment projects by requiring that grassed swales or filter strips be installed along roadsides in lieu of curbs and gutters
Measurable Goal: Directly connected impervious road surfaces in new developments and redevelopment areas will be reduced by 30 percent (relative to the traditional scenario in which curbs and gutters are used) over the course of the first permit term.
Justification: Opportunities abound to provide treatment and infiltration of runoff in the right-of-way adjacent to roads. This practice would provide on-lot treatment of storm water, reduce the total volume of storm water being discharged from sites, and increase the time of concentration of the runoff that is generated from road surfaces.

BMP: Develop a program for maintenance of structural storm water controls
Measurable Goals: In the first year, conduct an inventory of structural runoff controls. In year 2, develop a GIS to integrate the location of these controls with schedules for regular inspection and maintenance. Conduct four inspections of each structural control per year and conduct regular maintenance as prescribed for each type of practice.
Justification: There are many structural controls located throughout the municipality that are owned and operated by both public and private entities. Before a comprehensive maintenance plan can be implemented to address all of the practices, a complete list of BMPs and their locations and site conditions needs to be compiled. An inspection and maintenance schedule can be developed to maximize efficiency and minimize labor requirements. The system can be expanded to include other types of MS4 maintenance, including street sweeping, catch basin cleaning, storm drain flushing, etc.

BMP: Develop and implement a storm water ordinance and guidance or a design manual that include performance standards designed to control runoff impacts
Measurable Goal: By year 3 of the permit term, 95% of all building permits will include descriptions and plans regarding storm water control practices and site designs that comply with the criteria and guidance specified or referenced in the municipal code.
Justification: Ordinances are an effective way to establish performance standards for runoff controls. These performance standards might, for example, specify a target for percent removal of annual post-development total suspended solids loadings, require maintenance of annual ground water recharge rates, or limit runoff volumes and rates such that receiving waters are not negatively impacted.

EXAMPLE TABLE
BMPs, Associated Measurable Goals and Year to be Implemented

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
Develop strategies	Develop strategies that include structural and/or non-structural BMPs	X				
Ordinance	Strategies codified by use of ordinance.	X				
Reduce impervious surfaces	Reduce percent of new impervious surfaces associated with new development projects by 15 percent		X	X	X	X
Improve water quality	Improve clarity and reduced sedimentation of local water bodies		X	X	X	X

CHAPTER VI

POLLUTION PREVENTION/GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS

The Pollution Prevention/Good Housekeeping for Municipal Operations minimum control measure is a key element of the MS4 storm water management program. This measure requires the MS4 operator to examine and subsequently alter their own actions to help ensure a reduction in the amount and type of pollution that: (1) collects on streets, parking lots, open spaces, and storage and vehicle maintenance areas and is discharged into local waterways; and (2) results from actions such as street maintenance, environmentally damaging municipal land development and flood management practices, or poor maintenance of storm sewer systems. While this measure is meant primarily to improve or protect receiving water quality by altering municipal activities, facility operations and property management, the MS4 operator can also realize cost savings from such things as spill prevention (thus reducing clean-up costs), inventory control, and re-use/recycling of materials.

A. Program Requirements

1. **To satisfy this minimum control measure, the MS4 General Permit requires the regulated entity to:**

   a. Develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations.

   b. Using training materials that are available from EPA, your State, or other organizations, the regulated entity's program must include employee training to prevent and reduce storm water pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance.

   c. Define appropriate BMPs for this minimum control measure and measurable goals for each BMP.

   d. Document the decision process for the development of a pollution prevention/good housekeeping program for municipal operations. The regulated entity's rationale statement must address the overall pollution prevention/good housekeeping program, the individual BMPs, measurable goals, and responsible persons for this program. The rationale statement must include the following information, at a minimum:

      (1) The regulated entity's program must specifically list the municipal operations that are impacted by this operation and maintenance program. The regulated entity must also include a list of industrial facilities that the regulated entity owns or operates which are covered by General

Storm Water Permits or have individual NPDES Storm Water Permits. Include the facility's coverage number and/or permit number.

(2) Any employee training program the regulated entity will use to prevent and reduce storm water pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance. Describe any existing, available materials the regulated entity plans to use. Describe how this training program will be coordinated with the outreach programs developed for the public information minimum measure and the illicit discharge minimum measure.

(3) The regulated entity's program description must specifically address the following areas:

(a) Maintenance activities, maintenance schedules, and long-term inspection procedures for controls to reduce floatables (including froth, oil and floating solids) and other pollutants to the MS4.

(b) Controls for reducing or eliminating the discharge of pollutants from streets, roads, highways, municipal parking lots, maintenance and storage yards, waste transfer stations, fleet or maintenance shops with outdoor storage areas, and salt/sand storage locations and snow disposal areas the regulated entity operates.

(c) Procedures for the proper disposal of waste removed from the MS4 and municipal operations, including dredge spoil, accumulated sediments, floatables, and other debris.

(d) Procedures to ensure that new flood management projects are assessed for impacts on water quality and existing projects are assessed for incorporation of additional water quality protection devices or practices.

(4) Responsibility for overall management and implementation of the pollution prevention/good housekeeping program and, if different, who is responsible for each of the BMPs identified for this program.

(5) How the regulated entity will evaluate the success of this minimum measure, including how the regulated entity selected the measurable goals for each of the BMPs.

a. Develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from the regulated entity's operations.

b. Using training materials that are available from EPA, the State, or other organizations, the regulated entity's program must include employee training to prevent and reduce storm water pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance.

c. Define appropriate BMPs for this minimum control measure and measurable goals for each BMP.

d. Document the decision process for the development of a pollution prevention/good housekeeping program for municipal operations. The regulated entity's rationale statement must address the overall pollution prevention/good housekeeping program, the individual BMPs, measurable goals,

and responsible persons for this program. The rationale statement must include the following information, at a minimum:

(1) The regulated entity's program must specifically list the municipal operations that are impacted by this operation and maintenance program. The regulated entity must also include a list of industrial facilities that the regulated entity owns or operates which are covered by General Storm Water Permits or have individual NPDES Storm Water Permits. Include the facility's coverage number and/or permit number.

(2) Any employee training program the regulated entity will use to prevent and reduce storm water pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance. Describe any existing, available materials the regulated entity plans to use. Describe how this training program will be coordinated with the outreach programs developed for the public information minimum measure and the illicit discharge minimum measure.

(3) The regulated entity's program description must specifically address the following areas:

(a) Maintenance activities, maintenance schedules, and long-term inspection procedures for controls to reduce floatables (including froth, oil and floating solids) and other pollutants to the MS4.

(b) Controls for reducing or eliminating the discharge of pollutants from streets, roads, highways, municipal parking lots, maintenance and storage yards, waste transfer stations, fleet or maintenance shops with outdoor storage areas, salt/sand storage locations and waste transfer stations.

(c) Procedures for the proper disposal of waste removed from the MS4 and regulated entity's operations, including dredge spoil, accumulated sediments, floatables, and other debris.

(d) Procedures to ensure that new flood management projects are assessed for impacts on water quality and existing projects are assessed for incorporation of additional water quality protection devices or practices.

(4) How the regulated entity will evaluate the success of this minimum measure, including how the measurable goals for each of the BMPs were selected.

(5) Responsibility for overall management and implementation of the pollution prevention/good housekeeping program and, if different, who is responsible for each of the BMPs identified for this program.

2. Chapter VI. A. 1. d. requires a regulated entity to document the decision process for the development of the pollution prevention/good housekeeping for municipal operations program. In general, the requested information indicates the expected level of performance. This decision process will aid MDEQ in the evaluation of the Storm Water Management Program (SWMP).

B. From EPA's BMP Menu

(For more detailed information on implementation, effectiveness, benefits, limitations, cost and references see http://www.epa.gov/npdes/menuofbmps/menu.htm or call MDEQ.)

1. Automobile Maintenance
Pollution Prevention/Good Housekeeping for Municipal Operations

a. Description

This pollution prevention measure involves creating a program of targeted outreach and training for businesses and municipal fleets (public works, school buses, fire, police, and parks) involved in automobile maintenance about practices that control pollutants and reduce storm water impacts. Automotive maintenance facilities are considered to be storm water "hot spots" where significant loads of hydrocarbons, trace metals, and other pollutants can be produced that can affect the quality of storm water runoff. Some of the waste types generated at automobile maintenance facilities and at homes of residents performing their own car maintenance include the following:

- Solvents (paints and paint thinners)
- Antifreeze
- Brake fluid and brake lining
- Batteries
- Motor oils
- Fuels (gasoline, diesel, kerosene)
- Lubricating grease

Estimates show that each year over 180 million gallons of used oil is disposed of improperly (Alameda CCWP, 1992) and that a single quart of motor oil can pollute 250,000 gallons of drinking water (DNREC, 1994). For this reason, automotive maintenance facilities' discharges to storm and sanitary sewer systems are highly regulated. Fluid spills and improper disposal of materials result in pollutants, heavy metals, and toxic materials entering ground and surface water supplies, creating public health and environmental risks. Alteration of practices involving the cleanup and storage of automotive fluids and cleaning of vehicle parts can help reduce the influence of automotive maintenance practices on storm water runoff and local water supplies.

b. Applicability

The automotive repair industry is the leader in number of generators and amount of total waste produced for small quantity generators of hazardous waste in the United States (USEPA, 1985). Common activities at maintenance shops that generate this waste include the cleaning of parts, changing of vehicle fluids, and replacement and repair of equipment. These activities are also performed by residents at home in their driveway in the course of normal vehicle care. Since the use of automobiles is not limited by geographic or climatic conditions, maintenance facilities are present nationwide and the concerns involving waste created during vehicle repair are similar across the country. In ultra-urban areas, the impacts of automotive maintenance practices are more pronounced due to the greater concentrations of vehicles and higher levels of impervious surface.

2. Vehicle Washing
Pollution Prevention/Good Housekeeping for Municipal Operations

a. Description

This management measure involves educating the general public, businesses, as well as municipal fleets (public works, school buses, fire, police, and parks) on the water quality impacts of the outdoor washing of automobiles and how to avoid allowing polluted runoff to enter the storm drain system. Outdoor car washing has the potential to result in a high loads of nutrients, metals, and hydrocarbons during dry weather conditions in many watersheds, as the detergent-rich water used to wash the grime off our cars flows down the street and into the storm drain. Commercial car wash facilities often recycle their water or are required to treat their wash water discharge prior to release to the sanitary sewer system, so most storm water impacts from car washing are from residents, businesses, and charity car wash fundraisers that discharge polluted wash water to the storm drain system. According to the surveys, about 55 to 70 percent of households wash their own cars, with the remainder going to a commercial car wash. 60 percent of residents could be classified as "chronic car-washers" that wash their cars at least once a month (Smith, 1996 and Hardwick, 1997). Between 70 and 90 percent of residents reported that their car wash water drained directly to the street, and presumably, to the nearest stream. It has been estimated that 25 percent of the population of the United States may be classified as chronic car washers, which translates into about 27 million potential residential car wash polluters (Center for Watershed Protection, 1999).

b. Applicability

Car washing is a common routine for residents and a popular way for organizations such as scout troops, schools, and sports teams to raise funds. This activity is not limited by geographic region, but its impact on water quality is greatest in more urbanized areas with higher concentrations of automobiles. Currently, only a few pollution prevention programs incorporate proper car washing practices as part of an overall message to residents on ways to reduce nonpoint source pollution. Other programs have extended this message to include charity car washes and provide these charity groups with equipment and training to alleviate the problems associated with polluted wash water entering the storm drain system.

3. Illegal Dumping Control
Pollution Prevention/Good Housekeeping for Municipal Operations

a. Description

Illegal dumping control as a management practice involves using public education to familiarize residents and businesses with how illegal dumping can affect storm water. By locating and correcting illegal dumping practices through education and enforcement measures, the many risks to public safety and water quality associated with illegal disposal actions can be prevented. For storm water managers, illegal dumping control is important to preventing contaminated runoff from entering wells and surface water, as well as averting flooding due to blockages of drainage channels for runoff.

Several types of illegal dumping can occur. The first is the illegal dumping (also known as "open dumping," "fly dumping," or "midnight dumping") of litter that occurs at abandoned industrial, commercial, or residential buildings, vacant lots, and poorly lit areas such as rural roads and railway lines. This dumping primarily happens to avoid disposal fees or the time and effort required for proper disposal at landfills or recycling facilities. A second type of illegal dumping

involves disposal of water that has been exposed to industrial activities and then released to the storm drainage system, introducing pollutants into storm water runoff.

b. Applicability

Illegal dumping can occur in both urban and rural settings and happen in all geographic regions. The effects of illegal dumping may be more pronounced in areas with heavier rainfall, due to the greater volume of runoff. In more urbanized areas, illegal dumping may occur due to inaccessibility of recycling or solid waste disposal centers that are often located on the suburban-rural fringe.

4. Landscaping and Lawn Care
Pollution Prevention/Good Housekeeping for Municipal Operations

a. Description

This management measure seeks to control the storm water impacts of landscaping and lawn care practices through education and outreach on methods that reduce nutrient loadings and the amount of storm water runoff generated from lawns. Research has indicated that nutrient runoff from lawns has the potential to cause eutrophication in streams, lakes, and estuaries (CWP, 1999a and Schueler, 1995a). Nutrient loads generated by suburban lawns as well as municipal properties can be significant, and recent research has shown that lawns produce more surface runoff than previously thought (CWP, 1999b). Pesticide runoff (see the Factsheet on Pest Control in the Pollution Prevention Category) can contribute pollutants that contaminate drinking water supplies and are toxic to both humans and aquatic organisms.

Landscaping, lawn care, and grounds maintenance are a big business in the United States. It has been estimated that there are 25 to 30 million acres of turf and lawn in the United States (Robert and Roberts, 1989, Lawn and Landscape Institute, 1999). If lawns were classified as a crop, they would rank as the fifth largest one in the country on the basis of area, after corn, soybeans, wheat, and hay (USDA, 1992). In terms of fertilizer inputs, nutrients are applied to lawns at about the same application rates as those used for row crops (Barth, 1995a). The urban lawn is also estimated to receive an annual input of five to seven pounds of pesticides per acre (Schueler, 1995b).

Not many residents understand that lawn fertilizer can cause water quality problems—overall, less than one fourth of residents rated it as a water quality concern (Syferd, 1995 and Assing, 1994), although ratings were as high as 60 percent for residents that lived adjacent to lakes (Morris and Traxler, 1996, MCSR, 1997). Interestingly, in one Minnesota survey, only 21 percent of homeowners felt their own lawn contributed to water quality problems, while over twice as many felt their neighbors lawn did (MCSR, 1997). Unlike farmers, suburban and rural landowners are often ignorant of the actual nutrient needs of their lawns. According to surveys, only 10 to 20 percent of lawn owners take the trouble to take soil tests to determine whether fertilization is even needed (CWP, 1999). The majority of lawn owners are not aware of the phosphorus or nitrogen content of the fertilizer they apply (Morris and Traxler, 1996) or that mulching grass clippings into lawns can reduce or eliminate the need to fertilize. Informing residents, municipalities, and lawn care professionals on methods to reduce fertilizer and pesticide application, limit water use, and avoid land disturbance can help alleviate the potential impacts of a major contributor of nonpoint source pollution in residential communities.

b. Applicability

Lawn care, landscaping, and grounds maintenance are done in all parts of the country, in all types of climates, and in every type of community from rural to urban. Lawn fertilization is one of the most widespread watershed practices conducted by homeowners. In a survey of resident attitudes in the Chesapeake Bay, 89 percent of residents owned a yard, and of these, about fifty percent applied fertilizer every year (Swann, 1999). The average rate of fertilization in ten other resident surveys was even higher, at 78 percent, although this could reflect the fact that these surveys were biased towards predominantly suburban neighborhoods, or excluded non-lawn owners. Because lawn care, landscaping, and grounds maintenance are such common practices, education programs for both residents, municipalities, and lawn care professionals on reducing the storm water impacts of these practices are an excellent way to improve local water quality.

5. Pest Control
Pollution Prevention/Good Housekeeping for Municipal Operations

a. Description

This management measure involves limiting the impact of pesticides on water quality by educating residents and businesses on alternatives to pesticide use and proper storage and application techniques. The presence of pesticides in storm water runoff has a direct impact on the health of aquatic organisms and can present a threat to humans through contamination of drinking water supplies. The pesticides of greatest concern are insecticides, such as diazinon and chloropyrifos, (CWP, 1999 and Schueler, 1995) that even at very low levels can be harmful to aquatic life. A recent study of urban streams by the U.S. Geological Survey found that some of the more commonly used household and garden insecticides occurred at higher frequencies and concentrations in urban streams than in agricultural streams (USGS, 1999). The study also found that these insecticide concentrations were frequently in excess of USEPA guidelines for protection of aquatic life.

The major source of pesticides to urban streams is home application of products designed to kill insects and weeds in the lawn and garden. It has been estimated that an average acre of a well maintained urban lawn receives an annual input of five to seven pounds of pesticides (Schueler, 1995). Pesticide pollution prevention programs try to limit adverse impacts of insecticides and herbicides by providing information on alternative pest control techniques other than chemicals or explaining how to determine the correct dosages needed to manage pests. Lawn care and landscaping management programs often include pesticide use management as part of their outreach message.

6. Parking Lot and Street Cleaning
Pollution Prevention/Good Housekeeping for Municipal Operations

a. Description

This management measure involves employing pavement cleaning practices such as street sweeping on a regular basis to minimize pollutant export to receiving waters. These cleaning practices are designed to remove sediment debris and other pollutants from road and parking lot surfaces that are a potential source of pollution impacting urban waterways (Bannerman, 1999). Although performance monitoring for the Nationwide Urban Runoff Program (NURP) indicted that street sweeping was not very effective in reducing pollutant loads (USEPA, 1983), recent improvements in street sweeper technology have enhanced the ability of present day machines to pick up the fine grained sediment particles that carry a substantial portion of the storm water

pollutant load. Many of today's sweepers can now significantly reduce the amount of street dirt entering streams and rivers, some by significant amounts (Runoff Report, 1998). A debate as to whether this ability to pick up finer particles will improve the overall pollutant removal effectiveness of street sweepers is ongoing, and further research is required to establish the optimal sweeping frequency for pollutant removal and what streets are most appropriate for a sweeping program.

b. Applicability

Street sweeping is practiced in most urban areas, often as an aesthetic practice to remove sediment buildup and large debris from curb gutters. In colder climates, street sweeping is used during the spring snowmelt to reduce pollutant loads from road salt and to reduce sand export to receiving waters. Seventy percent of cold climate storm water experts recommend street sweeping during the spring snowmelt as a pollution prevention measure (CWP, 1997). The frequency and intensity of rainfall for a region are also key variables in determining how streets need to be swept to obtain desired removal efficiency. Other factors that affect a street sweeper's ability to reduce nonpoint pollution include the condition of the street, its geographical location, the operator's skill, the presence of parked cars, and the amount of impervious area devoted to rooftop.

7. Roadway and Bridge Maintenance
Pollution Prevention/Good Housekeeping for Municipal Operations

a. Description

This practice involves pollution prevention techniques that reduce or eliminate pollutant loadings from existing road surfaces as part of an operation and maintenance program. Substantial amounts of sediment and pollutants are generated during daily roadway and bridge use and scheduled repair operations, and these pollutant loadings can threaten local water quality by contributing heavy metals, hydrocarbons, sediment, and debris to storm water runoff. Table 1 shows some of the constituents that can be present in highway runoff and their primary sources.

As Table 1 demonstrates, numerous pathways for pollutant deposition on roadways and bridges influence the water quality of storm water runoff. Routine performance of general maintenance activities such as sweeping, vegetation maintenance, and cleaning of runoff control structures can help alleviate the impacts of these pollutants. Modifications in roadway resurfacing practices and application techniques for salt and other deicers can also help reduce pollutant loads to storm water runoff and protect the quality of receiving waters.

Table 1. Highway runoff constituents and their primary sources (Source: USEPA, 1993)

Constituent	Primary Sources
Particulates	Pavement wear, vehicles, atmosphere
Nitrogen, Phosphorus	Atmosphere, roadside fertilizer application
Lead	Tire wear, auto exhaust
Zinc	Tire wear, motor oil, grease
Iron	Auto body rust, steel highway structures, moving engine parts
Copper	Metal plating, brake lining wear, moving engine parts, bearing and bushing wear, fungicides and insecticides
Cadmium	Tire Wear, insecticides

Chromium	Metal plating, moving engine parts, brake lining wear
Nickel	Diesel fuel and gasoline, lubricating oil, metal plating, brake lining wear, asphalt paving
Manganese	Moving engine parts
Cyanide	Anticake compound used to keep deicing salt granular
Sodium, Calcium, Chloride	Deicing salts
Sulfate	Roadway beds, fuel, deicing salts
Petroleum	Spills, leaks or blow-by of motor lubricants, antifreeze and hydraulic fluids, asphalt surface leachate

b. Applicability

Roadway systems are a large part of the infrastructure of urban areas across the country, and require regular repairs and maintenance due to traffic use and climatic conditions. The level of pollutants found in road and bridge runoff is variable and is determined by a number of factors in addition to traffic volume and climate. Other factors affecting pollutant levels include surrounding land use, the design of the bridge or roadway, the presence of roadside vegetation, the use of insecticides, and the frequency of accidents and spills that can introduce hazardous chemicals. In colder climates, the amount of deicer applied to melt ice and snow can also influence the level of certain pollutants in road runoff and its impacts on local water quality.

8. Storm Drain System Cleaning
Pollution Prevention/Good Housekeeping for Municipal Operations

a. Description

Storm drain systems need to be cleaned regularly. Routine cleaning reduced the amount of pollutants, trash, and debris both in the storm drain system and receiving waters. Clogged drains and storm drain inlets can cause the drains to overflow, leading to increased erosion (Livingston et al., 1997). Benefits of cleaning include increasing dissolved oxygen, reduced levels of bacteria, and support of instream habitat. Areas with relatively flat grades or low flows should be given special attention because they rarely achieve high enough flows to flush themselves (Ferguson et al., 1997).

b. Applicability

This measure is applicable to all storm drain systems. The same principles can be applied to material and waste handling areas, paved and vegetated areas, waterways, and new development projects (Ferguson et al., 1997).

9. Alternative Products
Pollution Prevention/Good Housekeeping for Municipal Operations

a. Description

Using alternatives to toxic substances drastically reduces their presence in storm water and receiving waters. The most common toxic substances found in the home are cleaners, automotive products, and pesticides. Fertilizers, paints, and fuels are among other common hazardous

substances frequently found in ground water because of improper disposal (WEF and ASCE, 1998).

b. Applicability

The promotion of safer alternative products should be coupled with other programs designed to reduce the presence of hazardous or toxic materials in homes and storm water runoff. Examples of such programs are hazardous materials collection, good housekeeping or material management practices, oil and automotive waste recycling, and spill response and prevention (WEF and ASCE, 1998).

Examples of commonly used products and safer alternatives are as follows (adapted from Washington State Department of Ecology):

- Aerosols: Pump-type, or non-aerosol products, should be used.
- Chemical Fertilizers: Composting yard clippings and food scraps is an option. Manure (in measured amounts) is another alternative to chemical fertilizers.
- Household Cleaners and Detergents: Many other non- or less-toxic alternatives to harsh cleansers exist—a listing of these alternatives can be found at *www.healthdept.co.pierce.wa.us/water/haz/alter.html*.
- Motor Oil: Re-refined motor oil should be used. Doing so will spur the market for recycled motor oil and decrease reliance on new oil supplies.
- Pesticides: Keeping homes and gardens free from food and breeding areas for insect pests prevents the need for pesticides. Onion, garlic, and marigold plants help keep garden pests at bay.

10. Hazardous Materials Storage

Pollution Prevention/Good Housekeeping for Municipal Operations

a. Description

Failure to properly store hazardous materials dramatically increases the probability that they will end up in local waterways. Many people have hazardous chemicals stored throughout their homes, especially in garages and storage sheds. Practices such as covering hazardous materials or even storing them properly can have dramatic impacts.

b. Applicability

Hazardous material storage is relevant to both urban and rural settings and all geographic regions. The effects of hazardous material leakage may be more pronounced in areas with heavier rainfall, due to the greater volume of runoff.

11. Road Salt Application and Storage

Pollution Prevention/Good Housekeeping for Municipal Operations

a. Description

The application and storage of deicing materials, most commonly salts (sodium chloride), can lead to water quality problems for surrounding areas (Koppelman et al., 1984). Salts, gravel, sand, and other materials are applied to highways and roads to reduce the amount of ice during winter storm events. Salts lower the melting point of ice, allowing roadways to stay free of ice buildup during cold winters. Sand and gravel increase traction on the road, making travel safer.

b. Applicability

This practice is applicable to areas that receive snowfall in winter months and require deicing materials. Municipalities in these areas must ensure proper storage and application for equipment and materials.

12. Spill Response and Prevention

Pollution Prevention/Good Housekeeping for Municipal Operations

a. Description

Spill response and prevention plans should clearly state measures to stop the source of a spill, contain the spill, clean up the spill, dispose of contaminated materials, and train personnel to prevent and control future spills.

b. Applicability

Spill prevention and control plans are applicable to construction sites where hazardous wastes are stored or used. Hazardous wastes include pesticides, paints, cleaners, petroleum products, fertilizers, and solvents.

13. Used Oil Recycling

Pollution Prevention/Good Housekeeping for Municipal Operations

a. Description

Used motor oil is a hazardous waste because it contains heavy metals picked up from the engine during use. Fortunately it is recyclable because it becomes dirty from use, rather than actually wearing out. However, as motor oil is toxic to humans, wildlife, and plants, it should be disposed of at a local recycling or disposal facility. Before disposal, used motor oil should be stored in a plastic or metal container with a secure lid, rather than dumped in a landfill or down the drain. Containers that previously stored household chemicals, such as bleach, gasoline, paint, or solvents should not be used. Used motor oil should also never be mixed with other substances such as antifreeze, pesticides, or paint stripper.

Used motor oil is recycled in a number of different ways. It can be *reprocessed* into fuel for heating and cooling homes. Reprocessing is the most common method of recycling used oil in the United States. Approximately 750 million gallons of used oil are reprocessed every year and marketed to asphalt plants, steel mills, boilers, pulp and paper mills, cement/lime kilns, and a number of other places. Motor oil can also be *burned* in furnaces for heat or in power plants to generate electricity for homes, businesses, or schools. It can also be *blended* for marine fuels, *mixed* with asphalts for paving, or be *used* in industrial burners. Used motor oil can also be used in specially designed municipal garages, space heaters, and automotive bays. Finally, used motor oil can be *re-refined* into lubricating oils that meet the same standards as virgin/new oil. All of these methods of recycling help to conserve valuable energy resources.

When establishing oil recycling programs, municipalities should provide the public with the proper informational resources. Programs should encourage the public to contact local service stations, municipal governments, the county government office, or the local environmental or health departments, if they are unsure where to safely dispose of their oil. The public can also call 1-800-RECYCLE or contact Earth's 911 at www.1800cleanup.org/ for more information. Finally, state government contacts, who might be able to provide information about oil recycling, can be obtained by the public at *www.noraoil.com/where.html.*

Municipalities also need to address oil filter recycling in their recycling programs. Programs should encourage the public to check with local collection facilities to determine whether oil filters are recycled locally. The Filter Manufacturers Council, which was established in 1971 to monitor regulatory and technological developments that affect the oil industry, can also be used as a resource for the public. The Council operates a hotline (1-800-99-FILTER) and a web site (*www.filtercouncil.org/*) to provide information about state regulations and companies that transport, recycle, and process used oil filters. If oil filters are not recycled locally, empty filters should be wrapped in newspaper and disposed of with regular household waste. Oil filters must always be drained of oil whether recycling or disposing of the filter. The public should also check with trash collectors to determine if their state permits disposal of oil filters in landfills.

b. Applicability

Motorists that have their oil changed can be classified as a do-it-yourselfer or a do-it-for-me. A do-it-yourselfer changes their own oil because they want to save money, they enjoy it, or they take pride in the quality of their own workmanship. According to a recent survey, more than 30 percent of motorists change their own oil. Between 43 to 62 million gallons of used oil were collected and recycled by do-it-yourselfers in 1997 (API, 2000). Therefore, it is important that do-it-yourselfers recycle their used oil. A do-it-for-me has their oil changed at places such as service stations or quick lubes and should be sure to check if their mechanic recycles motor oil.

To make recycling motor oil more convenient for the do-it-yourselfers, oil recycling programs should be located throughout all communities. Although oil-recycling programs are appropriate in any community, urban areas are in particular need of programs, as more motor oil is used in these areas to maintain a larger number of vehicles. Therefore, oil recycling programs should more heavily target urban areas and provide a greater number of facilities for recycling oil in these areas.

14. Materials Management
Pollution Prevention/Good Housekeeping for Municipal Operations

a. Description

Responsibly managing common chemicals, such as fertilizers, solvents, paints, cleaners, and automotive products, can significantly reduce polluted runoff (WEF and ASCE, 1998). Such products must be handled properly in all stages of their useful lives. Materials management entails the selection of the individual product, the correct use and storage of the product, and the responsible disposal of associated waste(s).

b. Applicability

In many cases, industries can implement simple housekeeping practices in order to manage materials more effectively. Proper management reduces the likelihood of accidental spills or releases of hazardous materials during storm events. In addition, health and safety conditions at the facility will improve.

Some simple practices for managing materials are improving maintenance of industrial machinery, material storage and inventory controls, routine cleaning and inspection of facilities where materials are stored or processed, maintaining organized workplaces, and educating employees about the benefits of the above practices (USEPA, 1992).

C. Examples of What Others Have Done During Phase I (from EPA's Model MS4 General Permit)

1. **Floatable Removal**
   The City of Cocoa Beach, Florida, developed an insert for catch basins that makes floatable removal more effective and easy. Twice per month, storm water crews inspect and clean as necessary all 760 storm water drains in Cocoa Beach. Sediment-clogged storm lines are cleaned on a schedule using a truck with a jet hose and vacuum. For further information contact City of Cocoa Beach, Florida, Storm water Department, (407) 868-3292.Source: NRDC, Storm Water Strategies Community Responses to Runoff Pollution, May 1999.

2. **Park Design to Reduce Pesticide and Fertilizer Use**
   The Howard County (MD) Parks and Recreation Department found that wildflower meadows were twenty times less expensive to maintain than conventional turf grass. This strategy also reduces the amount of pesticides and fertilizers applied to county grounds. They are currently incorporating the strategy into new parks as they are being developed. For further information contact Mark Rabb, Howard County Parks and Recreation Department, MD, (410) 313-4730.

3. **Municipal Maintenance**
   The Alameda Clean Water Program provides an example of a pollution prevention plan for a fleet maintenance facility. The plan requires the following: a pollution prevention team, site map, list of significant materials, description of potential pollutants, and assessment of potential pollutant sources, and storm water BMPs. For further information contact Robert Hale, Alameda County Countywide Clean Water Program, Alameda County Public Works, (510) 670-5543. Source: Model Urban Runoff Program, Appendix 3L.

4. **Denver, CO MS4 Storm Water Permit -5/10/96**
   Denver will assess and minimize the impacts on water quality of receiving waters from any flood management projects that it undertakes .At the time when substantial maintenance or rehabilitation work is planned, Denver will also evaluate the feasibility of retro-fitting existing structural flood control devices to provide additional pollutant removal from storm water.

5. **Baltimore County, MD MS4 Storm Water Permit -3/30/95**
   Baltimore County shall conduct maintenance inspections of all storm water management facilities at least once every three years.

6. **Prince Georges County, MD Storm Water Permit -11/17/93**
   Within 3 years, the permittee shall perform an assessment regarding the effects of road maintenance activities including street sweeping, litter control, deicing procedures, and the application of herbicides for vegetation control on storm water discharges. This assessment shall include an analysis alternative practices for reducing pollutants associated with road maintenance activities. Within those three years, the permittee shall incorporate effective alternative practices in its road maintenance procedures for reducing pollutants.

7. **Palo Alto, CA MS4 Phase I Storm Water Permit**
   In Palo Alto, CA, a Phase I MS4 permittee, pollution prevention planning and engineering resulted in a decrease in pollutant concentrations originating from public utility yards. Concentrations of metals

in storm water runoff decrease significantly with BMP employment and regular monitoring has demonstrated that improvements in

D. Mississippi Guidance and Resources (for more information contact MDEQ at 601/961-5171 General Permits Branch)

In developing a Pollution Prevention/Good Housekeeping Management Program, MDEQ recommends the Industrial Storm Water Pollution Prevention Plan (SWPPP) requirements found in Mississippi's existing NPDES Baseline Storm Water General Permit be used as a guide. In addition MDEQ has developed an Industrial SWPPP Guidance Manual that may provide some assistance in developing a municipal pollution prevention program. These documents can be obtained by contacting MDEQ's General Permit Branch at 601/961-5171 or can be found at MDEQ's web site: *www.deq.state.ms.us.*

The intent of this control measure is to ensure that existing and future municipal operations are performed in ways that will minimize contamination of storm water discharges. This measure includes municipal operations performed on non-municipally-owned property, and municipal operations performed by private contractors. The MDEQ encourages the MS4 operator to consider the following components when developing their program for this measure:

1. **Maintenance activities, maintenance schedules, and long-term inspection procedures** for structural and non-structural controls to reduce floatables and other pollutants discharged from storm sewers.

2. **Controls for reducing or eliminating the discharge of pollutants from municipal facilities/areas** such as:
   - Streets
   - Roads
   - Highways
   - Municipal parking lots
   - Maintenance and storage yards
   - Fleet or maintenance shops with outdoor storage areas
   - Sand/salt storage locations
   - Waste transfer stations

   and from activities such as:
   - Park and open space maintenance
   - Fleet and building maintenance
   - Street maintenance
   - New construction of municipal facilities
   - Storm water system maintenance

   Documentation of the BMPs to be used can take the form of a runoff control plan or the equivalent. Such a plan should include the following elements, as applicable:
   a. Activity description
   b. Facility/area site map

c. Description of potential pollutant sources, including an evaluation of that potential.
d. Stormwater Management Controls. The description of storm water management controls should address the following minimum components, including a schedule for implementing such controls:
   (1) Preventive maintenance
   (2) Good housekeeping
   (3) Spill prevention and response procedures
   (4) BMPs for pollutant sources
   (5) Employee training
e. Inspection procedures
f. Reporting procedures. The Annual Report to the MDEQ should include information on overall conformity with the runoff control plan for each facility and activity covered.

During the initial evaluation, if the MS4 operator determines that there is a very low risk for potential storm water impacts from the facility or activity (i.e., no industrial activities or materials exposed to storm water, wastes recycled or disposed of properly, etc.), then a runoff control plan (or the equivalent) does not need to be developed for the facility. If such facilities or activities are subject to changing circumstances, they should be periodically re-evaluated to determine if plan development for the facility or activity is needed.

3. **Procedures for the proper disposal of waste removed from storm sewer systems** and other areas listed in 2, above, including dredge spoil, accumulated sediments, floatables, and other debris.

4. **Ways to ensure that new flood management projects assess the impacts on water quality** and examine existing projects for incorporation of additional water quality protection devices or practices. The MDEQ encourages coordination with flood control managers for the purpose of identifying and addressing environmental impacts from such projects.

The effective performance of this control measure hinges on the proper maintenance of the BMPs used, particularly for sections 1 and 2, above. For example, structural controls, such as grates on outfalls to capture floatables, typically need regular cleaning, while non-structural controls, such as training materials and recycling programs, need periodic updating.

E. Examples of Phase II BMPs and Associated Measurable Goals (From EPA, Office of Water and Office of Wastewater Management at http://cfpub.epa.gov/npdes/stormwater/measurablegoals/index.cfm)

Hypothetical Case Study: Smalltown, USA, hopes to reduce the amount of pollutants generated by municipal operations that accumulate on ground surfaces and are transported by runoff to receiving waters. Because the appearance of algal blooms during spring and summer indicates a nutrient problem, the City plans to target municipal lawn and garden activities and spill prevention to reduce the amount of chemicals entering the MS4 through improper storage, use, and handling practices. They also intend to reduce the amount of salt applied to roads during winter road maintenance operations.

Minimum Measure Objective: Reduce the amount of nutrients entering receiving waters through education of municipal employees about lawn care activities, spill prevention and control, and vehicle washing.

BMP: Training program for grounds maintenance and landscaping crews
Measurable Goals: In the first year, develop a pollution prevention workshop for all municipal employees

responsible for grounds maintenance and landscaping at public facilities. Once per year, hold an additional workshop for new employees and crew managers. Achieve a 40% reduction in fertilizer and pesticide use and a 25% reduction in water use after 3 years.
Justification: Grounds maintenance and landscaping crews use substantial quantities of water and artificial chemicals, the combination of which has led to elevated levels of nutrients and toxics in receiving waters. The workshop will emphasize the benefits of recycling organic material; reducing the use and planning the timing of application of chemicals and water; selecting native vegetation to reduce water, nutrient, and maintenance demand; and achieving cost savings through reduced labor and material inputs.

BMP: Develop spill prevention and control plans for municipal facilities
Measurable Goals: Develop plans describing spill prevention and control procedures by the end of Year 1. Conduct annual spill prevention and response training sessions for all municipal employees. Distribute educational materials, e.g., posters and pamphlets, to each municipal facility by the end of Year 2.
Justification: Municipal employees do not receive formal training in spill prevention and containment practices, but in recent years several spills have resulted in hazardous chemicals reaching the storm drain system due to improper handling and containment procedures. The poster, which will be posted in chemical storage and use areas, will describe materials and techniques that should be used to contain a spill as well as preventative measures that can reduce the likelihood of spills.

BMP: Incorporate the use of road salt alternatives for roadway deicing
Measurable Goals: During the 1st year, reduce the amount of road salt applied to roadways by 50% through the use of less-toxic alternatives, such as liquid calcium magnesium acetate (CMA).
Justification: CMA is just as effective as road salt at deicing, but it appears to be much less harmful to the environment and is less corrosive.

EXAMPLE TABLE
BMPs, Associated Measurable Goals and Year to be Implemented

BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5
Pollution Prevention Plan	Pollution Prevention Plan completed	X				
Employee Education	Employee training materials developed	X				
Maintenance Plan developed	Maintenance schedule for BMPs established, procedures developed for catch basin cleaning and street sweeping.	X				
Employee Training	Pollution Prevention training for appropriate employees performed twice per year		X	X	X	X
Recycling	Recycling program implemented.		X	X	X	X
Pollution Prevention Plan	Pollution Prevention Plan implemented		X	X	X	X
Floatables reduction	50 percent reduction in floatables discharged			X		
Reduction in pesticide, salt and sand use.	25 percent reduction in pesticide and salt and sand use.			X		

Appendix A -DEFINITIONS

All definition contained in Section 502 of the Act and 40 CFR 122 shall apply to this permit and are incorporated herein by reference. For convenience, simplified explanations of some regulatory/statutory definitions have been provided, but in the even of a conflict, the definition found in the Statute or Regulation takes precedence.

Best Management Practices or "BMPs" Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of State. BMPs also include treatment requirements, operating procedures, and practices to control runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

CFR or Code of Federal Regulations A document containing all finalized regulations. The contents of 40 CFR are all related to the environmental aspects.

Control Measure Control Measure as used in this permit, refers to any Best Management Practice or other method used to prevent or reduce the discharge of pollutants to waters of the United States

CWA or The Act CWA or The Act means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub.L. 92-500, as amended Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483 and Pub. L. 97-117, 33 U.S.C. 1251 et. seq.

Illicit Connection Illicit Connection means any man-made conveyance connecting an illicit discharge directly to a municipal separate storm sewer.

Illicit Discharge Illicit discharge is defined at 40 CFR 122.26(b)(2) means any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and those non-storm water discharges identified in Part I.B.3. of this permit.

Major Receiving Water(s) Major receiving water(s) are those waters of the State that are named on a United States Geological Quadrangle Map.

Maximum Extent Practicable (MEP). MEP is the statutory standard that establishes the level of pollutant reductions that operators of regulated MS4s must achieve. The CWA requires that NPDES permits for discharges from MS4s ''shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods.'' Compliance with the conditions of the general permit and the series of steps associated with identification and implementation of the minimum control measures will satisfy the MEP standard. EPA has intentionally not provided a precise definition of MEP to allow maximum flexibility in MS4 permitting. MS4s need the flexibility to optimize reductions in storm water pollutants on a location-by-location basis. EPA envisions that this evaluative process will consider such factors as conditions of receiving waters, specific local concerns, and other aspects included in a comprehensive watershed plan. Other factors may include MS4 size, climate, implementation schedules, current ability to finance the program, beneficial uses of receiving water, hydrology, geology, and capacity to perform operation and maintenance. The pollutant reductions that represent MEP may be different for each small MS4, given the unique local hydrologic and geologic concerns that may exist and the differing possible pollutant control strategies. Therefore, each permittee will determine appropriate BMPs to satisfy each of the six minimum control measures through an evaluative process.

EPA envisions application of the MEP standard as an iterative process. MEP should continually adapt to current conditions and BMP effectiveness and should strive to attain water quality standards. Successive iterations of the mix of BMPs and measurable goals will be driven by the objective of assuring maintenance of water quality standards. If, after implementing the six minimum control measures there is still water quality impairment associated with discharges from the MS4, after successive permit terms the permittee will need to expand or better tailor its BMPs within the scope of the six minimum control measures for each subsequent permit. EPA envisions that this process may take two to three permit terms.

Measurable Goals Measurable goals are a municipality's storm water program goals, which are intended to gauge permit compliance and program effectiveness.

Municipality A municipality is a city, town, county, district, association, or other public body created by or under State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes.

MS4 MS4 is an acronym for "Municipal Separate Storm Sewer System" and is used to refer to either a Large, Medium, or Small Municipal Separate Storm Sewer System (e.g. "the Jackson MS4"). The term is used to refer to either the system operated by a single entity or a group of systems within an area that are operated by multiple entities (e.g., the Jackson MS4 includes MS4s operated by the city of Jackson, the Mississippi Department of Transportation, the University Medical Center and others). Municipal Separate Storm Sewer is defined at 40 CFR 122.26(b)(8) and 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) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, 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 CWA that discharges to waters of the United States; (ii) Designed or used for collecting or conveying storm water; (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.

National Pollutant Discharge Elimination System or "NPDES" – Section 402 of the federal Clean Water Act.

NOI NOI is an acronym for "Notice of Intent" to be covered by this permit and is the mechanism used to "register" for coverage under a general permit.

Permittee The MS4 operator to whom the storm water discharge permit is issued.

Phase II Second stage of the State and Federal storm water permit regulations.

Regulated Entity a small MS4 within the State of Mississippi and located fully or partially within an urbanized area as determined by the latest Decennial Census pursuant to 40 CFR 122.32, or designated by MDEQ pursuant to 40 CFR 123.35.

Small Municipal Separate Storm Sewer System Small Municipal Separate Storm Sewer System is defined at 40 CFR 122.26(b)(16) and refers to all separate storm sewers that are owned or operated by the United States, a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, 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 CWA that discharges to waters of the United States, but is not defined as "large" or "medium" municipal separate storm sewer system. This term includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. The term does not include separate storm sewers in very discrete areas, such as individual buildings.

Storm Water Storm water is defined in 40 CFR 122.26(b)(13) and means storm water runoff, snowmelt runoff, and surface runoff and drainage.

Storm Water Management Program (SWMP) Storm Water Management Program (SWMP) refers to a comprehensive program to manage the quality of storm water discharged from the municipal separate storm sewer system.

Total Maximum Daily Load or "TMDL" means the calculated maximum permissible pollutant loading to a waterbody at which water quality standards can be maintained. The sum of wasteload allocations (WLAs) and load allocations (LAs) for any given pollutant.

Urbanized Area An urbanized area (UA) is a land area comprising one or more places {core and fringe} with urban limits defined by a population density of 1,000 people per square mile and its contiguous census tracks of 500 people per square mile — that together have a residential population of at least 50,000.

Appendix B
Guidance/Resources for Storm Water Phase II

Mississippi Department of Environmental Quality (MDEQ)
Environmental Permits Division (EPD)
General Permits Branch
(601) 961-5171

The following is a list of resources that is recommend for developing and implementing a Phase II storm water program. See MDEQ's web page @ http://www.deq.state.ms.us for a list of the designated municipalities requiring NPDES Storm Water Permitting under Phase II and other relevant information concerning storm water (i.e. permits & guidance manuals are found under the General Permits Branch). Current census information may be found at http://www.census.gov/. Special thanks to the Colorado Department of Public Health and Environment for a partial list of the following resources.

A. EPA

A.1. EPA Storm Water Phase II

EPA has several web sites with lots of information and good FAQs:

- http://cfpub.epa.gov/npdes/home.cfm?program_id=6 EPA's Storm Water Program Home Page.
- http://cfpub.epa.gov/npdes/stormwater/swfinal.cfm?program_id=6 14 fact sheets covering the Small MS4 Program, the Six Minimum Measures, Permitting and Reporting, the Construction Program, and the Industrial "No Exposure" Waiver
- http://www.epa.gov/sbrefa/documents/sbar_panel3.htm A copy of the EPA regulation is available at this site
- http://www.epa.gov/owm/sw/phase2 More information can be obtained by calling EPA's Storm water Phase II Rule Hotline at (202) 260-5816, or by sending an e-mail to sw2@epa.gov.
- http://www.epa.gov/OW-OWM.html/sw/phase2/comguide.pdf This EPA compliance guidance manual is intended to aid regulated entities in complying with the Storm Water Phase II final rule.
- http://www.tetratech-test.com/bmpmanual/htmfolder/index.htm a draft menu of BMPs that addresses each of the six minimum control measures and two draft model permits for small construction activities and regulated small municipal separate storm sewer systems (MS4s)
- http://www.epa.gov/owm/sw/toolbox/ EPA is providing the tools necessary to facilitate implementation of the Final Phase II storm water program in an effective and cost-efficient manner. The "tool box" includes the following components: Fact Sheets, Guidance Documents, Menu of BMPs, Information Clearinghouse, Training and Outreach Efforts, Technical Research, EPA's Office of Research & Development's Urban Watershed Management Branch, Support for Demonstration Projects, Compliance Monitoring/Assistance Tools, Local Government Environmental Assistance Network. EPA will have a fully operational tool box in place by the time the general permits are issued.
- http://www.epa.gov/npdes/stormwater/measurablegoals/part2.htm what Measurable goals are BMP design objectives or goals that quantify the progress of program implementation and the performance of your BMPs. Measurable goals become requirements of the storm water management program.

A.2. EPA Compliance Assistance Centers

EPA has established ten sector-specific Compliance Assistance Centers. They cover broader environmental issues than just storm water, but might be useful. The first one is the most relevant to Phase II municipalities.

- National Metal Finishing Resource Center – www.nmfrc.org
- Paints and Coatings Resource Center – www.paintcenter.org
- Printed Wiring Board Resource Center – www.pwbrc.org
- Printers' National Environmental Assistance Center – www.pneac.org
- Transportation Environmental Resource Center – www.transource.org

B. General BMPs

With the approach of the Phase II deadline for implementation, many municipalities, consultants and water resource planners have begun the process of determining what mix of the best management practices (BMPs) will be needed to comply with Phase II's six minimum measures and to obtain permit coverage. Because Phase II is a narrative rule generally requiring the implementation of BMPs for obtaining permit coverage, selecting the right mix of BMPs is critical. The following guidance will help in selecting the proper of BMPs for your particular municipality.

See Also:

- Item A.1. – http://www.tetratech-test.com/bmpmanual/htmfolder/main_page.htm – EPA's draft menu of BMPs
- http://www.epa.gov/npdes/menuofbmps/BMP_files.htm
- http://www.epa.gov/owm/sw/toolbox/ EPA's "tool box" which a menu of BMPs
- Item C.3. - This guidance offers insight on developing the 6 minimum control measures

B.1. Center for Watershed Protection

The center provides objective and scientifically sound information on effective techniques to protect and restore urban watersheds. Workshops, journals, publications and links are available. There is a strong focus on Low Impact Development. Also a good section on model ordinances and several quality reference books.

- 8391 Main Street
  Ellicott City, MD 21043-4605
  Phone: (410) 461-8323
  http://www.cwp.org
  Some recommended publications (visit their web page for more information):
  - Rapid Watershed Planning Handbook – $40 + s/h. A Guide to creating an effective watershed plan quickly and at a low cost.
  - Better Site Design: A Handbook for Changing Development Rules in Your Community - $35+s/h. This handbook outlines 22 guidelines for better developments and provides detailed rationale for each principle. Includes a sample Codes & Ordinances Worksheet.

B.2. Know Your Watershed

Tips, tools, and resources for watershed management. Sponsored by the Conservation Technology Information Center (CTIC) at Purdue University. Available publications include a Local Ordinance Manual and an Urban Stream Restoration Field Manual.

- http://www.ctic.purdue.edu/KYW/

B.3. National Resource Defense Council (NRDC) Storm Water Strategies

Report available for download from the net on community responses to runoff pollution, including 100 case studies.

- http://www.nrdc.org/water/pollution/nstorm.asp
- Steps to clean up pollution: http://www.nrdc.org/water/pollution/gsteps.asp

B.4. National Storm Water Best Management Practices (BMP) Database (EPA/ASCE, 4/01)

Database of monitoring results showing effectiveness of structural and non-structural BMPs. Currently, the database and web site do not include much analysis of the data; this will be added in the future. Data contributions are being solicited on an on-going basis. Available as CD-ROM, or on the web at http://www.bmpdatabase.org.

- Call Jane Clary or Jonathan Kelly at Wright Water Engineers, Inc., (303) 480-1700, or email at *clary@wrightwater.com* for a copy of the CD-ROM and user's guide (free).

B.5. Proceedings from the National Conference on Tools for Urban Water Resources Management & Protection (EPA/625/R-00/001 2/2000)

Proceedings from a recent conference with several quality papers on topics such as Phase II cost estimates, developing a storm water utility fee, tools for eliminating illicit connections, public information projects, and many more directly applicable to Phase II and the six minimum measures. Highly recommended.

- Copies in either paper or CD-ROM are available free of charge from the EPA; call (800) 490-9198 or visit the web site at http://www.epa.gov/ncepihom.

B.6. Storm Water News

A good source of technical information on storm water. Includes a large library of technical papers.

- http://www.stormwater-resources.com/

B.7. Texas Nonpoint Source Book

A web site with storm water information geared to public works professionals and other interested parties. The development of this site was funded in part through a U.S. EPA 319(h) grant. A great resource for storm water BMP information.

- http://www.txnpsbook.org

B.8. Planning & Design Manual for the Control of Erosion, Sediment & Storm Water

Mississippi's manual provides technical guidance for the control of erosion, sediment, and storm water from nonpoint sources (NPDES) and for the preparation of erosion, sediment, and storm water control plans as needed. The manual is a cooperative effort by Mississippi Department of Environmental Quality, Mississippi Soil & Water Conservation Commission and USDA Soil Conservation Service. The manual is also available (free) electronically at http://abe.msstate.edu/csd/p-dm/

Manual $20

Mississippi Department of Environmental Quality
P.O. Box 2261
Jackson, MS 39225-2261
Phone: (601) 961-5171
http://www.deq.state.ms.us

B.9. Field Testing of a Sock-Type Catch Basin Insert

This report presents the findings of the most comprehensive study to date of catch basin inserts used for storm water pollution control on existing developed sites. The study was funded by a grant from the National Fish and Wildlife Foundation and commissioned by PlanetCPR - a non-profit organization.

- For obtaining a copy call PlanetCPR @ (206) 285-3888
  Fax: (206) 285-3887
  email: www.planetcpr.org

C. General Phase II Program Guidance

See Also:

- Item A.1. - EPA Storm Water Phase II
- Item B.7. – This Nonpoint Source Book contains guidance on program planning and implementation

C.1. California Model Urban Runoff Program (MURP)

A how-to guide for developing urban runoff programs for small municipalities. Developed by the City of Monterey, CA.

- Available for free on the internet at http://www.swrcb.ca.gov/~rwqcb3/Downloads/downloads.html (or try http://www.swrcb.ca.gov/stormwtr/index.html) or a hard copy for $195 from:
  Copy King
  MURP Order
  498 Calle Principal
  Monterey, CA 93940
  (831) 373-1251

C.2. Designing and Implementing an Effective Storm Water Management Program (APWA)

110 page manual with good information for getting your Phase II program started. A CD-ROM is also available with the complete Phase II regulation, the EPA BMP database (Item B.4.) and case studies, and other ancillary information. Also available is a Storm Water Facilitators Guide with step by step instructions for an APWA chapter or agency to conduct its own storm water workshop, and videotape of the 2/15/2000 APWA videoconference with the EPA.

- For questions about content call (816) 472-6100 x3582
  Questions about ordering, call (816) 472-6100 x3560
  Costs:
  Videotape of Teleconference = $69 +s/h
  Storm Water Manual for Phase II Programs w/ CD= $35 + s/h
  Storm Water Facilitators Guide = $75 + s/h
  Package of all three above = $149 +s/h
  Video tape and Storm Water Manual for Phase II Programs w/ CD= $95 + s/h

C.3. "How To" Guide for Storm Water and Urban Watershed Management

This guidance manual was developed by the Troy State University Center for Environmental Research and Service as an element of a U.S.EPA funded cooperative study. This manual focuses on storm water program development in Phase II communities, and offers insight on developing the 6 minimum control measures. This guide is available at the ADEM website:
http://www.adem.state.al.us/EnviroProtect/WatershedMan/watman/Documents/watershed/StrmwtrPhaseIIMan.pdf

- Contact Mr. Michael William Mullen (Director of the Center for Environmental Research and Service) at Troy State University (313) 670-3624. Email: mmullen@troyst.edu

C.4. The Stormwater Manager's Resource Center (SMRC) web site

The Stormwater Manager's Resource Center (SMRC) web site is made possible through a grant from the Environmental Protection Agency, Office of Water, Office of Wastewater Management, Assistance Agreement #828077-01. The SMRC site is managed and published by the Center for Watershed Protection, Inc., a 501(c) 3 organization located in Ellicott City, Maryland. The SMRC web site was funded to provide Phase II communities with the tools and techniques necessary to protect their watersheds and to enhance and restore their local water resources. The SMRC is designed specifically for stormwater practitioners, local government officials and others that need technical assistance on stormwater management issues

- http://www.stormwatercenter.net/

D. Tools for the Six Minimum Measures

See Also:

- Item A.1. - The EPA has developed Fact Sheets on each of the 6 Minimum Measures.
- Item C.3. – This guide offers insight on developing the 6 minimum control measures.

D.1. Public Education & Outreach

See Also:

- Item B.1. – The Center for Watershed Protection includes education & outreach in their watershed planning publications.
- Item B.5. – These proceedings include several papers covering successful education & outreach efforts.
- Item B.6. – The "Library" section of this site contains several articles on Education.
- Item B.7. – The Nonpoint Source Book contains guidance on planning and implementing education and outreach programs and examples of materials available for use.
- Item C.1. – The MURP covers public education.

D.1.i. League of Women Voters Education Fund – Water Resources

Information regarding educational programs and resources offered through the League of Women Voters, including the Wetlands Citizen Education Program. The League of Women Voters is very active in storm water education in Colorado.

- http://www.ourwater.org/
- http://www.lwv.org/where/protecting/water.html

D.2. Public Involvement/Participation

See:

- MDEQ Power Point presentation with notes that may be used for public outreach efforts. This presentation can be found at MDEQ's web page @ http://www.deq.state.ms.us. under the General Permit Branch (Technical Guidance).
- Item B.5. – These proceedings include papers covering successful public involvement programs.
- Item C.2. – This manual includes guidance on building community support with stakeholder involvement.

D.3. Illicit Discharge Detection & Elimination

See Also:

- Item B.5. – These proceedings include papers covering illicit discharge detection tools and programs.

D.3.i Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems - A User's Guide (EPA/600/R-92/238)

EPA manual released in 1992 on Illicit Discharge Detection.

- Available from the National Technical Information Service (NTIS Order Number PB93-131472INZ) for $34+ s/h. Order online at http://www.ntis.gov/ or call 1-800-553-6847.

D.3.ii Rouge River National Wet Weather Demonstration Project - Illicit Connection Reports

Free downloadable report on illicit connections and other technical topics.

- http://www.wcdoe.org/rougeriver/techtop/

D.4. Construction Site Storm Water Runoff Control

See Also:

- Items B.4., B.5., B.6., B.7., and B.8. – All of these have good BMP information for construction site controls.
- Item B.5. and B.7.– Both of these contain guidance on setting up Construction Site Storm Water Runoff Control programs.

D.4.i. International Erosion Control Association

Their web site provides information regarding news, conferences, training and exhibits regarding erosion control, as well as links to other sites. They also publish a journal called Erosion Control.

- http://ieca.org/

D.5. Post Construction Storm Water Management

See Also:

- Item B.1. – The Center for Watershed protection has extensive information on BMPs for post construction runoff controls, as well as guidance on how to develop your municipal program. This is a highly recommended source for information on this minimum measure.
- Item B.4. – Although not complete, the database does contain some data on the effectiveness of post construction BMPs.
- Item B.5. – These proceedings include papers on Post Construction Storm Water Management practices and programs.
- Item B.8. – MDEQ's manual is recommended as a resource post construction BMPs.

D.5.i. Low Impact Development Manuals (Prince George County, Maryland Department of Environmental Resources, Programs and Planning Division, EPA 841-B-00-003 and EPA 841-B-00-002, 1/2000)

Two technical manuals on Low Impact Development (LID): Low Impact Development, an Integrated Design Approach (EPA 841-B-00-003) was prepared by local planners, engineers, developers, and officials. This document details how to develop and implement LID methods from an integrated design perspective. Low Impact Development Hydrologic Analysis (EPA 841-B-00-002) is the companion document to the LID design manual. This document contains methodology that can be used to estimate changes in site hydrology due to new development, and also to design appropriate treatment systems to maintain the pre-development hydrology of the site.

- Copies available free of charge from the EPA; call (800) 490-9198, or visit the web site at http://www.epa.gov/ncepihom/

D.6. Pollution Prevention/Good Housekeeping for Municipal Operations

See:

- Items B.4., B.5., B.6.,& B.7. – All of these have good information on BMPs for municipal operations.

E. Financing Storm Water Management

E.1. The Mississippi Department of Environmental Quality (MDEQ), The Office of Pollution Control, Construction Branch

MDEQ's Construction Branch has funding available under the Water Pollution Control Revolving Loan Fund Program for certain planning, permit application, design, construction, and other implementation activities needed (exclusive of operation and maintenance) to comply with the Phase II storm water requirements. These low-interest loans of 2.5 % may have up to a 20-year repayment period. Call Mark Smith at 601/961-5130 (Email: Mark_Smith@deq.state.mus.us) for further information.

E.2. Center for Urban Policy and the Environment, Indiana University

The Center for Urban Policy and the Environment at Indiana University-Purdue University Indianapolis (IUPUI) in cooperation with the Watershed Management Institute, Inc. has used EPA grant money to develop a website designed to help communities find ways to pay for storm water management projects.

- http://stormwaterfinance.urbancenter.iupui.edu/home.htm

See Also:

- Item B.5. – These proceedings include papers on administering and funding storm water programs.
- Item B.7. – The Nonpoint Source Book contains guidance on setting up storm water utilities.

F. Upcoming Phase II Workshops

F.1. The American Public Works Association (APWA) in cooperation with the U.S. EPA

It's possible that EPA will have new funding available for APWA to do a new program series on Storm Water. Right now, EPA has indicated some interest in a program that highlights case studies from both Phase I and Phase II communities. If we hold such a program, the expected date(s) will start appearing on our calendar of events at http://www.apwa.net/Education sometimes this fall. For more information contact Karen Wilson, Project Manager, American Public Works Association at (816) 472-6100, ext 3565 or by e-mail at kwilson@apwa.net

F.2. A Mississippi Department of Environmental Quality grant to the Southeast Mississippi Resource Conservation and Development (RC&D) Council will fund four workshops on Urban Conservation Landscaping during the month of November 2002. The Workshops are entitled "Urban Landscapes in the 21st Century." Workshops will be held in Meridian, Hattiesburg, Biloxi, Hancock County (city to be determined). For more information, contact Joe Doss (RC&D Coordinator) or Chris Bowen (Chairman, Southeast Mississippi RC&D Council, Inc.)

Southeast Mississippi RC&D Council, Inc.
P.O. Box 15519
Hattiesburg, MS 39404-5519

Phone:	(601) 296-1187
Toll-Free Phone:	1-888-645-1187
Fax #:	(601) 296-1253
E-mail:	council@smrcd.org

F.3. American Society of Civil Engineers (ASCE) Continuing Education

Municipal Storm Water Management. Special focus on storm water utilities, storm water NPDES Phase II, and new storm water management. This two and a half day seminar provides a condensed, comprehensive review of all key aspects of municipal storm water management – from planning and institutional concerns to technical design considerations. It will teach you both the "how" and why" of storm water management.

- Dallas, TX/November 13-15, 2002
- Las Vegas, NV/ February 13-15, 2003

- Atlanta, GA/January 22-24, 2003
- Washington, DC/March 12-14, 2003

How to reach them:

ASCE Continuing Education
P.O. Box 79536, Baltimore
Maryland 21279-0536

Phone - 1-800-548-2723
Fax – 703-295-6144
Email – conted@asce.org

F.4. Internation Erosion Control Association's (IECA's) 34th Annual Conference & Expo – Las Vegas, NV

Did you know that the same highway solution of Syntex 401 Nonwoven geotextile they use in New Zealand could be used in California? Or the turf reinforcement mat in Chattanooga, TN can be used for slope stabilization in malaysia? No matter what you answered… you will benefit from IECA's 34th Annual Conference and Expo where erosion contorl professionals from around the word come together for a "Gathering of Global Solutions" in Las Vegas, Nevada, February 24-28, 2003.

Contact: Kate Nowak
Kate@ieca.org
970-879-3010 ext. 15.

G. Associations to Contact for Additional Information

- American Public Works Association (APWA) – 202.393.2792 or www.apwa.net
- Water Environment Federation (WEF) – 1.800.666.0206 or www.wef.org
- American Society of Civil Engineers (ASCE) – 1.800.548.2723 or www.asce.org
- International Erosion Control Association – 1.800.455.4322 or www.ieca.org
- Erosion Control Magazine – www.erosioncontrol.com
- Storm water Magazine – www.stormh2o.com

Contact Jim Morris (Jim_Morris@deq.state.ms.us) at MDEQ to provide comments and/or recommendations for additional resources or guidance needs. Information on what your city/county has done to this date to comply with Phase II is welcome – all information received will be shared with other regulated communities.

Last Updated – November 6, 2002

Appendix C
Newspaper Articles

These are newspaper articles collected by MDEQ over the past year. All of them are involved with storm water in some way. The articles will show that storm water management for municipal entities is not new in Mississippi and some activities that are ongoing could easily become part of a comprehensive storm water plan. Some articles illustrate the need for storm water management.

WEDNESDAY, JUNE 12, 2002 ■ 3B

Dog parks proposed on beaches

■ Owners would pay registration fee; vote may be in July

The Associated Press

BILOXI

Harrison County supervisors may vote next month to allow dogs on four parks along the county's 26-mile beach.

The proposed dog parks would be located in Pass Christian, Long Beach, Gulfport and Biloxi. They would be confined to areas about a half-mile long each.

Sand Beach Director Bobby Weaver, who proposed the plan, said allowing dogs to run the beaches will not put pooches in popular bathing areas.

"Most of these areas are located in residential areas or in undeveloped areas," Weaver said. "All of these areas have available parking."

On Monday, Weaver presented the first draft of a proposed amendment to the no-dog ordinance to supervisors.

Under the proposal, dog owners would pay a $25 registration fee to the Sand Beach Department plus $10 for each additional dog. Tourists would pay a $5 fee. Weaver said dog owners would have to show proof the animals had been vaccinated.

Weaver said dogs would be allowed off their leashes along the wet sand portion of the shoreline and in the water. He said dog owners would be responsible for cleaning up after their animals.

Jeff Taylor, who put together the original Sand Beach master plan more than 10 years ago and helped Weaver with his proposal, said dog owners would be largely responsible for making the plan work.

"This would be largely owner-operated and own-regulated," Taylor said.

6B ■ THE CLARION-LEDGER ■ SATURDAY, JUNE 22, 2002

Hotel owner cited in beach contamination

From staff and wire reports

High bacteria levels on a Biloxi beach came from raw sewage deliberately pumped into the Mississippi Sound by a beachfront hotel owner, officials say.

After closing the polluted stretch of beach near Rodenberg Avenue Wednesday, city and state officials traced the sewage to the Super 8 Motel on Beach Boulevard, said Phil Bass, pollution control chief for the Mississippi Department of Environmental Quality.

Owner Dominic Bui had installed a pump and 50-foot hose to divert his patrons' sewage into a storm drain that emptied into the sound near the beach, Bass said. He was apparently trying to avoid repairing a broken lift station.

Bui could not be reached for comment.

"This was certainly willful," Bass said. "You don't accidentally buy a pump and run a hose to the storm drain."

The beach will remain closed until environmental officials determine bacteria levels are safe, he said.

The city has ordered Bui to bring in vacuum trucks to clean the sewage. He will appear in community court on Thursday.

Bass said DEQ will certainly fine Bui, and was discussing with the state attorney general's office whether to pursue criminal charges.

"We're dealing with him harshly," he said.

According to DEQ beach monitoring data, bacteria levels at the beach near Rodenberg Avenue have been higher than other areas for months.

The beach briefly exceeded state health standards for bacteria on March 14, May 23 and May 31, and it has been above maximum levels constantly since Wednesday.

Bass said officials have been "keeping their eye" on the area for several weeks, and trying to determine the source of the bacteria. ■

Clarion-Ledger staff writer James V. Walker contributed to this report.

New sewer ordinances planned

■ District wants oversight of septic systems, growth

By Sylvain Metz
Clarion-Ledger Staff Writer

RANKIN COUNTY

If you live out in the country, chances are you have sewerage service provided by a rural water association.

On the other hand, you may be so far out in the county, you have had to install your own system. You may have a septic tank or maybe one of those later, mechanical models that churn the slurry of raw sewerage itself.

To get a handle on the different systems and ensure they work without interruption, the Cleary Water, Sewer and Fire District has rewritten its ordinances which, if approved by the state Board of Health and the state Department of Environmental Quality, would make it the overseer of these types of systems.

Residents would pay a monthly sewer maintenance fee, said Cleary Water, Sewer and Fire District Manager Kenn Munn.

Bill Harvey, a resident of the Cleary community in Rankin County, has a septic tank. Other than having to have it pumped out occasionally, it is relatively trouble-free, he said.

His only other cost is for chemicals which have to be added periodically to ensure there are enough bacteria to attack the waste and clean the water.

"It's very easy to do. Pour (chemicals) in the toilet, flush it and let it go," Harvey said.

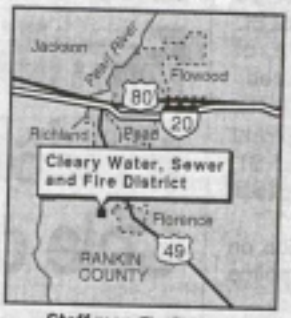
"It's a good operating septic system. It won't be pure water but it will be good quality."

Chris and Melissa Luckett, also of the Cleary community, don't have a septic tank. They have a mechanical system that routinely breaks down.

The couple, who have been in their home 10 years, say the motor on their system first broke down after they had been in their home six months.

The motor turns a rod which churns the sludge, bringing the water to the top and cleaning it before it runs out of the tank.

Over the past 10 years, the motor has been replaced three times and has to be replaced yet again. It is an expensive ordeal, she said, costing the couple "hundreds of dollars" each time.



Staff map / The Clarion-Ledger

"Our sewer treatment plant has broken down so many times, it's not even funny," said Melissa Luckett.

When it works, "it's wonderful," she said.

Until it's fixed, the water from the tank runs out untreated.

Under Cleary's proposal, new homes unable to tie into the district's sewer system would have to choose from a handful of mechanical systems selected by the district. With so many to choose from, Munn said it would be impractical for his crew to become experts on all available systems. So the district will choose those found to be the most practical and user friendly.

New septic tanks will no longer be allowed to be placed on lots in the district.

In the event the unit needs maintenance or, as in the case of the Lucketts, the motor goes bad, the district will replace parts and make repairs to bring the unit into working order at no cost to the homeowner, Munn said.

Current systems will be grandfathered in as long as they work, Mumm said.

Inspections will be carried out and if a particular homeowner's system is found not to be working, a specified amount of time will be provided to fix it.

Otherwise, individuals must purchase one of the pre-approved systems, install it and come under the Cleary maintenance plan, Munn said.

If the plan is approved next year, Cleary will be the first district in the state to operate under this type of system.

It's not a new concept, Munn said. Many other states including Oregon, New Jersey, Michigan, Wisconsin, North Carolina and Virginia have similar ordinances in place.

"This area is going to start jumping," said Kenneth D. Johnson, chairman of the utility. "If we don't plan now, we will end up with places that have sewerage running into ditches."

This plan, Johnson said, "helps the whole community."

Parks, green space top priority

By JENNY WOODRUFF
Sun Staff Writer

PARKS AND GREEN SPACE remain a top priority in a city that has more than doubled its population in a decade.

The city of Ridgeland continues to make decisions to enhance the quality of life for its residents, according to Mayor Gene McGee.

With a planned August opening of the city's new signature park, Freedom Ridge, building more multi purpose trails, sprucing up existing parks and encouraging green space in developing businesses and neighborhoods, these are just some of the ways the city is accomplishing its goals.

"Quality recreational facilities do a tremendous amount to enhance the quality of life for our residents and visitors," McGee said. "It is also directly related to economic growth."

When people are looking for a place to locate their business or for a place to locate their home, they are looking for areas where emphasis is placed on safe quality recreation, according to McGee.

"That can mean a baseball facility to some people, a soccer field to some, but it also can mean bike trails and green space," he added.

Freedom Ridge, named at a recent board of aldermen meeting, is the outdoor facility located on the Hart Property, next to the police station on School Street.

The $3,742,500 facility will include a fully-lighted, four-field soccer complex with a control building to house a storage area, concession stand and restroom; a fully-lighted, four-field softball complex with a building to house restrooms, a concession stand and a storage area.

Also included will be a facility for the city's maintenance department, a playground area that will feature two play structures, as well as walking trails throughout the property.

THE MULTI PURPOSE trails are also being used and McGee is glad.

"We have probably not done one project in Ridgeland in my 10 years as mayor and in fact even when I was on the board that has brought more positive results than starting the program on our pedestrian trails," he said. "There is a tremendous benefit and people are excited that we have those pedestrian trails planned all across our city."

Construction on phase two of the multi purpose trails is scheduled to begin this spring or summer, according to McGee.

The new 2.5 mile trail will pick up on Highway 51 where the trail currently leaves off. It will go to Highland Colony Parkway via the Natchez Trace over the interstate crossing over the railroad on a separate pedestrian bridge to the north of the existing Natchez Trace bridge.

Parks

(Continued from Page One)

playground structure at Hite Wolcott Park.

"We thought it was time for a change and the board was good enough to give us the money to do that," Chance said. "That is about a $35,000 project."

Money and land are the two big issues the department faces when coming up with new park ideas.

In the city's future land use plan, a need for more green space is suggested, Chance said.

"We are in a situation right now with the parks we have, we feel like we provide something for everyone especially when Freedom Ridge opens," he said. "There are future plans, but the two big things facing us are trying to acquire land or have land donated and money to develop those areas."

in R'land

Another leg of the trail will cross at Jackson Street and Sunnybrook Road and go to Steed Road.

Green space is also encouraged in new residential and commercial development in the city.

"A lot of emphasis is being put on green areas and landscaping and aesthetic beauty," he said. "We want to provide some neighborhood park facilities and eventually have parks on the west side of I-55."

DEVELOPER GARY Cress recently donated five acres adjacent to Friendship Park to the city of Ridgeland.

The recreation and parks department is waiting to see exactly what to do with the property, according to director Chris Chance.

"We will start looking at that at the first of the year, if nothing else, it will be maintained as green space," he said.

The department is currently focusing on replacing the

(See Parks, Page 10A)

CIAP: Protecting Wolf River, green spaces granted funding

From 1B

voice in how the funds are spent.

Feil's group wants to use $350,000 of CIAP funds to purchase 7 miles of land along the banks of the Wolf River, to protect the area from development and logging. After talking with the Harrison County Board of Supervisors, local business interests and state officials, they won broad support for their plan.

"The Wolf River has been an avid canoeing stream for a generation or more, and it's much more valuable to the Gulf Coast as a protected natural area," Feil said.

The Hancock County Chamber of Commerce also won a grant to help develop a plan for more green spaces in the county.

Sue Chamberlain, who presented the chamber's proposal, said she enjoyed working with representatives from across the coast who wanted to help the project succeed.

"I expected to have to bow up and compete for resources, but it didn't work like that," Chamberlain said. "People wanted to offer us help finding even more funding sources."

After coordinating with other groups and agencies about common goals, she said she now has a better idea where the region is headed over the next few years.

"This was a great way to take a project on the front burner and put some heat on it," she said.

Blueprint inked to help gulf area

■ $24.3 million in federal money to fund ecological projects

By James V. Walker
Clarion-Ledger Staff Writer

Gov. Ronnie Musgrove signed off on a blueprint Friday to spend $24.3 million in federal money to improve the ecology of the Mississippi Gulf Coast.

The plan includes multimillion dollar habitat restoration and infrastructure improvements, along with smaller projects, like management of exotic, invasive cogon grass and a center for rescuing stranded dolphins.

The program, called the Coastal Impact Assistance Program, is sending money back to coastal states from revenues paid to the federal government for offshore oil leases.

A total of 81 projects sponsored by governments, universities, business groups and environmental groups are included in the plan, which now must go to the U.S. Department of Commerce for final approval.

The diversity of projects reflects the wide range of people involved in the planning process, said Jayne Buttross, who coordinated CIAP planning for the state Department of Environmental Quality.

"We wanted to be as inclusive and open as we possibly could in the time allowed," Buttross said. "This is how government is supposed to work, and we're proud of it."

Another reason for the variety of projects was a federal rule limiting the amount spent on infrastructure, like stormwater drainage and sewer improvements, to 23 percent, she said.

Sewer improvements loom large among the infrastructure projects. All three coastal counties have submitted sewer and wastewater treatment projects, and they are among the largest projects in the proposal.

Growth on the Gulf Coast has outstripped the ability of local governments to expand their sewer systems, and septic tanks built in wetlands and other low-lying coastal areas can fail and allow sewage to reach waterways, she said.

Joe Feil, chairman of the Wolf River Conservation Society, said DEQ did an exemplary job of coordinating the planning to give everyone on the coast, from university researchers to the smallest nonprofit groups, a

See CIAP, 4B

Deer Island

An investment in state's resources

Mississippi only lacks a little legislative tweaking to purchase Deer Island, a sliver of land off the Gulf Coast, which would preserve one of the state's rarest natural resources.

The largely undeveloped 4.5-mile barrier island could soon be assumed from private ownership through the state using federal funds and state bonds to be repaid by (mostly casino lease) fees in the Tidelands Trust Fund.

Secretary of State Eric Clark, U.S. Sen. Thad Cochran, 5th District U.S. Rep. Gene Taylor and members of the Coast legislative delegation deserve credit for pursuing this investment in Mississippi's future. As Clark has said repeatedly, 100 years from now, our Coast should look like the Mississippi Gulf Coast and not like Atlantic City.

This is a good investment toward that end.

FRIDAY, FEBRUARY 1, 2002 ■ 2B

Erosion problem likely to see fix

■ Supervisors expect $150,000 in federal funds

MADISON COUNTY

By Ken Wilbanks
Clarion-Ledger Staff Writer

Federal funding is available to curb erosion that's threatening some homes in the Mallard Pointe and Tavern Hills subdivisions of Madison County.

Tom Heard, Natural Resource Conservation Service district conservationist, told supervisors recently that $150,000 "is in hand" to help stop erosion at a creek that threatens several homes in the subdivisions.

The creek winds through south Madison County and ends at the reservoir.

Officials said with the area's dense growth, the runoff became more pronounced when fewer ecological measures were taken to control it, such as setting aside land to absorb the stormwater.

Heard said the erosion is affecting Post Road, but it is not in imminent danger. Officials said the damage started after heavy rains in April 1995.

"This is a problem that has existed for some time in the Mallard Pointe area with a ditch that runs between Tavern Hills subdivision on the north and Mallard Pointe subdivision on the south," said District 1 Supervisor Bill Banks. "There are several houses ... that are in danger of going into that ditch."

Supervisors authorized board president David Richardson of District 3 to sign the contract after board attorney Dewey Hembree has reviewed it.

Heard said Madison County will contract for the work to rebuild creek banks and realign the creek from the Natchez Trace to Post Road.

The county also will be responsible for acquiring "necessary land rights and easements required, inspect the work and bill NRCS, and we'll reimburse the county as we go," Heard said.

Heard said NRCS will provide "100 percent of the costs of either the engineer's cost estimate or the actual costs, whichever is less, up to $150,000."

"We've got about four months to get this under way," he said. "This is strictly a county project."

Heard also told supervisors his agency has asked for money to help the county fix erosion problems under the bridge on Joe Hall Road.

"It falls under our emergency work," he said.

Heard said stabilizing the bridge will cost an estimated $123,000.

"Right now, it's set up as a 75-25 cost share," he said. "We put up 75 percent of the money and do all of the engineering work, contract it and all that.

"Once we get the funds in hand, we'll sit down with the county and decide if it wants to do it that way or go so much as a 95-5. We'd put up 95 percent of the funds and the county would do all the work."

Supervisors approved Richardson signing the application requesting the funds upon Hembree's review.

Father, son plead guilty to illegal dumping

■ Fielders admit hazardous waste improperly discarded

By James V. Walker
Clarion-Ledger Staff Writer

A father and son stood side by side in federal court Thursday, both pleading guilty to charges of illegally dumping hazardous waste.

James Fielder, president of Pearl-based Truck, Trailer and Equipment Inc., and his son Allen testified they paid an employee to haul used cleaning solvents a few miles away from the company's U.S. 80 facility and dump them in the woods.

The employee, Carlos Lindsey, was spotted hauling leaking, unmarked 50-gallon drums in the back of his pickup in March 2000 by an FBI agent, according to the indictment.

When confronted, Lindsey told the agent he was paid $25 for each drum to find a place to dump the barrels.

James Fielder and his son, a company manager, face up to five years in prison and a $250,000 fine for conspiracy to violate the Clean Water Act and federal hazardous waste laws.

James Fielder also pleaded guilty before U.S. District Judge William H. Barbour on behalf of the company, which faces fines as high as $500,000.

"We will vigorously pursue those who despoil our natural environment by dumping waste into our public waterways," said EPA investigator David McLeod.

Lindsey pleaded guilty last month to the same felony conspiracy charges.

Earlier on Thursday, company officer Archie Stewart pleaded guilty to a misdemeanor charge of negligence, which carries a maximum penalty of one year in prison and a $100,000 fine.

Stewart told U.S. Magistrate Judge James Sumner that since the early 1980s, the company had been regularly pouring its waste into a wetlands and stream that ran behind its facility.

After Pearl Fire Department code inspectors discovered what was happening and warned the company to hire a licensed hazardous waste handler, the Fielders began paying Lindsey to dump the drums further away, according to the indictment. That was in November 1999.

The company has paid for a major cleanup behind the building and is waiting for final approval of its efforts from the Mississippi Department of Environmental Quality.

Sentencing for James and Allen Fielder and the corporation is set for April 12.

Tote those toxics to city's service center

Q: A few weeks ago in the paper was listed a place to take empty paint cans, thinner and other not-too-toxic stuff for disposal. I think it was at the corner of U.S. 80 and Terry Road. Also seems that the article told the times people would be there.

We have several cans of waste we need to get rid of and want to do it responsibly. Can you help? Thanking you for your assistance in this matter. — **Mrs. Clean**

A: Jackson's Solid Waste Division recently opened a service center at which residents can dispose of household hazardous waste that garbage trucks won't pick up.

The Environmental Service Center is located at 1708 Terry Road at its intersection with U.S. 80. The center will accept motor oil, antifreeze, paint and paint thinner, car batteries, pesticides and herbicides, brake fluid, furniture polish aerosols, oven cleaners and pool chemicals.

The center is open on Tues days and Thursdays and ever fourth Saturday.

For details, call 960-0000 fo the center or 960-1193 for Jack son's Solid Waste Division.

■

Ask Jack Sunn appears Mon day through Saturday. To send i questions, write Jack Sunn, Th *Clarion-Ledger*, Box 40, Jackso MS 39205-0040 or e-mail jack sunn@jackson.gannett.com.

Ridgeland alderman wants clean streets

By JENNY BOURN
Sun Staff Writer

The appearance of Wheatley Street is just as important as that of Highland Colony Parkway, according to Ridgeland Ward Four Alderman Larry Roberts.

And so as much attention should be paid to its upkeep, he contends.

"I think this is very important for our city," Roberts said.

Currently Ridgeland pays approximately $1,000 a month for Browning Ferris Industries (BFI) to sweep 15 widely used streets in Ridgeland once a month.

Roberts wants the service increased to twice a month.

"A lot of people use Wheatley when they turn off County Line Road to empty ashtrays, throw out cans and other garbage," Roberts said. "It is unsightly to our city."

Increasing the sweeping to twice a month would make a big difference on keeping the city beautiful and clean, Roberts believes.

"It is something we are trying to work on," he said. "We have another contract that takes care of Highland Colony pretty well and I am wanting Wheatley to look like the parkway. It is just as important."

Having the 15 streets swept twice a month would cost the city approximately $24,000 a year.

By comparison, portions of the city of Jackson are swept nightly, according to BFI Public Sector Specialist W.K. Perry.

"In the (Wheatley) area, there are still a lot of places that have construction trucks from a job site and that red dirt gets all over the street," Perry said. "But that is a decision that is strictly up to the mayor and board of aldermen."

DEQ awards waste grants

State environmental regulators recently awarded $220,000 in household hazardous waste collection grants to local communities across the state.

The grants are through the Right Way to Throw Away program, which supports proper disposal of items no longer collected in normal trash pickups. These items include old tires, paint, household cleaners, pesticides, batteries and motor oil.

Communities receiving the grant funds will host a special collection day for such items some time during 2002. Receiving the funds are: George County, McComb, Cleveland, Three Rivers Solid Waste Management Authority in Tupelo, Ridgeland, Laurel, Pascagoula and Vicksburg.

R'land officials budget for implementing GIS

By JENNY BOURN
Sun Staff Writer

RIDGELAND OFFICIALS are taking steps to keep up with the 21st century.

By budgeting approximately $500,000 over the next few years, city officials will implement a Geographic Information System (GIS).

The GIS will use aerial photos of the city to create computerized maps to allow the city's departments to view all data in one system, but it is capable of a great deal more.

All city records are currently in paper files. Over the next three to four years, city departments will file their records electronically on one server.

"The GIS basically allows us to view the data in its actual real-world location," Ridgeland City Planner Jim Markel said. "It gives us increased constituent performance and allows us to make better decisions. It also manages our data much better which in turn gives us increased efficiency."

The cost of implementing the GIS system has been substantially reduced since most of the work will be done within the city.

"The city is going into the process of moving a step farther into modern technology," Mayor Gene You have to keep up, and this is something of modern technology that will help our city do a better job."

The city will hire a technician who will input data into the system.

BUT WARD FOUR Alderman Larry Roberts believes the city might be spending too much money on this system.

"I don't think we have discussed it enough now to determine how much it is going to cost," Roberts said. "The system is only as good as you are committed to it and to be committed to it depends on the information you put in to it.

"To make the system work you've got to keep it current and to keep it current you have to get that data loaded as soon as it comes in."

McGee does not see the GIS system as a real added expense because records must always be maintained.

"You are going to keep up with it either way— by making copies and buying more filing cabinets and trying to find a place to store it or are you going to be more efficient with the way you keep records and the way you keep information?"

The GIS will eventually show law enforcement officers, firefighters and emergency medical teams the quickest routes to an emergency situation, and will provide such

Computerized maps show wetlands, flood zones

The Associated Press

BILOXI

A computerized map that shows wetlands, flood plains and soil types is steering development away from environmentally sensitive areas on the Coast.

The map is becoming a must-have tool for developers, governments and citizens.

"The real estate people have been coming out of the woodwork," said Tina Shumate, director of the Comprehensive Resource Management Plan, a federally-funded project that created the map. "They said this was going to save them a lot of time."

Real estate agents use the map to show which areas are suitable for development and where development would be slowed by laws that protect wetlands and flood zones.

Shumate's staff has handed out more than 250 computer disk copies of the software. Work stations and software have been given to seven counties and 11 municipalities across the Coast.

The map shows municipal boundaries, soil types, flood zones, roads and wetlands.

Real estate agent Scott DeLano has used the program to predict growth trends in the Coast's real estate market.

"I'm looking at where the new houses are going to be and where the commercial developments are going to be in the next five to 15 years," said DeLano. "I can use the CRMP as a tool to ... help inform my investors."

The map is also available for viewing at 18 government offices across the Coast, including the Harrison County zoning department, which has used the map to help landowners learn about their property.

"We've used it when people own property on creeks and rivers, and we show them the flood zones," said Patrick Bonck, zoning administrator for Harrison County.

County tackles storm runoff

Teams with Corps on water quality

By Maria Burnham
burnham@desotoappeal.com

The Army Corps of Engineers signed an agreement Monday to help DeSoto County and its municipalities develop a plan to deal with storm water runoff.

The plan must be submitted to the Environmental Protection Agency and meet its newest regulations.

The county and cities are working together to submit a unified plan by the March 2003 deadline.

"We need to look at this not as a city problem but as a countywide problem," said Wayne Mansfield, Southaven city planner. "So we can ... put development on the same page wherever (companies) are developing in DeSoto County, be it Horn Lake or Southaven."

Wayne Mansfield

Among the things the cities and county must determine are the best management practices to prevent soil erosion and water pollution.

Typical soil management practices include silt fencing, street cleansing and vegetative cover, Mansfield said.

"All of this has to do with water quality," Mansfield said.

Most of DeSoto County's streams are listed as impaired, Mansfield said, which means there are too many

See WATER, DS2

From 1B

Survey forms, still available, due by Friday

on a scale of one to five how much they agree or disagree.

Statements, taken from the survey, include:

■ Residential uses should be within walking distance of at least one existing or planned commercial area.

■ Residential development should incorporate public amenities such as open space and pedestrian connections.

■ Sustaining existing employment areas is a high priority even if it means expanding into an existing neighborhood.

There are open-ended questions too, including:

■ What land use issues are you facing in your neighborhood?

■ What are the key transportation issues in your area?

■ What community facility improvements are needed in your neighborhood?

The last comprehensive plan the city adopted was in 1989. Fox said city officials hope to have proposed land use, transportation and community facilities plans by summer.

"Our citizens' input is so important," Fox said. "Now is the time to voice opinions about land use, not after decisions have been made."

■ Questionnaires, due by Friday, are available on the city's Web site www.city.jackson.ms.us by clicking on the link to City Hall, then on the link to Planning followed by the link to the city's comprehensive plan. Questionnaires may also be picked up at public libraries or from the Planning Department inside the Warren Hood building at 200 S. President St.

Citizen input on land use in city sought

■ Questionnaire part of FABRIC planning process

By Gregg Mayer
Clarion-Ledger Staff Writer

Jackson city planners are asking residents how land around neighborhoods should be used.

It's the second step in the city's in-the-works comprehensive plan called FABRIC, or For A Better Revitalized Inclusive Community. FABRIC's intent is the development of a new land-use plan, a community facilities plan and a transportation plan.

Using a three-page questionnaire, officials want to find out how residents think land should be used throughout the capital city, particularly around neighborhoods.

Jackson resident Dalton Johnson, who belongs to the Citizens Southwest Inc. neighborhood association, is helping take the questionnaires door-to-door.

"The thing is, when they get ready to plan, they need to get input from the community for what the community wants," Johnson said, explaining people can say if they want apartments nearby or shopping centers within walking distance or maybe neither.

Last year, city planners gathered information in a series of public meetings to establish FABRIC's goals, such as enhanced quality of life and community image, strong neighborhoods and reliable, cost-effective and equitable community facilities, services and infrastructure.

"Because it has been a citizen-driven plan, we want that involvement to continue," Corinne Fox, deputy director of the city's planning department, said of the new questionnaires. "We will tabulate (the questionnaires), review them and use that as input into the development of the future land-use plan.

"How do these communities want their communities to look? That's what these are for."

On the questionnaire, participants are asked to rank

See SURVEY, 4B

From Page DS1

Water

pollutants in the water.

Most of the blame for the impaired status lies with pollutants that can't be traced to a source, Mansfield said. An example is motor oil spilled on a parking lot that washes with the rain into a creek.

Improving water quality is important not just for drinking purposes but also to preserve natural resources, Mansfield said.

The cost of developing the plan is $140,000 over two years, said DeSoto County administrator David Armstrong.

The price will be split among the parties involved. The corps will pay $70,000; DeSoto County, $23,800; Hernando, $4,200; Horn Lake $9,100; Olive Branch, $14,000; and Southaven $18,900.

— *Maria Burnham: (901) 333-2031*

Phase two stormwater planning study to begin

WHILE SOME Rankin municipalities are deciding whether to work together on a joint watershed study, the city of Brandon has decided join in with the county.

The Miss. Department of Environmental Quality has issued a mandate requiring cities in Rankin County as well as the county itself to do a study on current and future stormwater runoff. The cities of Richland, Pearl, Brandon and Flowood have had to decide between letting the county handle the study and all that goes along with it — leaving the costs to the county as well — or paying for the study themselves. The DEQ would still hold the cities responsible if something went wrong, leaving them facing stiff fines.

All along, the mayors of each city have said they prefer to face the responsibility and the costs of the study in order to personally make sure everything is done according to the specifications set by the DEQ.

HOWEVER, the Brandon board of aldermen have opted to save money and let the county handle their portion of the study.

"I would like to go on our own but we are going with the county," said Mayor Roe Grubbs of Brandon. "Basically it's because the county is paying for it. I gave them all the options just like we do with everything, and they made the decision."

Richland, Flowood and Pearl are currently negotiating a deal to work together on their portion of the study. This would allow the cities to use the same company and split the costs.

Since the water that originates in Flowood runs from Pearl into Richland, it makes sense for the three to collaborate on the project. Having the same company performing the study in all three areas should make things easier later when it comes time to interpret the study.

"I definitely think it should be a joint study," said Mayor Shirley Hall of Richland. "In the west side of the county we all have same water basin. When you do the basin, you have to do the entire thing. The best way to handle it is to split the costs. It's what's best for the long term."

Currently, the three are still working out the details of the agreement, which should be decided within the next two weeks.

"Right now we're still looking into an interlocal agreement with Richland and Flowood," said Mayor Jimmy Foster of Pearl. "We haven't discussed the details fully with the board, but we're planning on going ahead with the interlocal study anyway.

"The City Attorney, Jim Bobo, has reviewed the agreement with the two cities and sent it back to Flowood and Richland. March 5 is when the agenda for the board meeting is set. They hope to have a vote at that time."

IN FLOWOOD, Mayor Gary Rhoads said, "They are going to go over it this week and we are supposed to vote on it soon. We need to get started as soon as possible. It takes about a year to complete. We don't know who will do the study but we will be advertising for bids to see who is qualified and what the costs will be. We want to get the best and get it done."

The DEQ deadline for the phase two stormwater planning permit is March 8, 2003.

MDOT grant brings green space to city's downtown

Low shrubs to enhance driver safety

By Sylvain Metz
Clarion-Ledger Staff Writer

Downtown Brandon will be awash in greenery this time next year, thanks to a $250,000 enhancement grant from the Mississippi Department of Transportation.

The grant, received several years ago, will allow the city to add green space, replacing portions of concrete sidewalks and parking spaces along East Government Street between College Street and the Civil War monument.

"I think it will be wonderful," said Azalia Boyce, owner of Boyce Emporium.

"I'm delighted because we want people to come down and see us," said Boyce, 90.

"It's going to make a difference downtown," said Brandon Mayor Roe Grubbs.

Bradford pear trees will be replaced with Drake elms and nandinas, allowing motorists an aesthetic but clear view of the highway.

The biggest change will center around the monument.

The crepe myrtles will be replaced with turf and a concrete walkway surrounded by a wrought iron fence. The crepe myrtles will be replanted elsewhere.

Portions of the four parking lots around the monument will go green, with a net loss of two parking spaces, Grubbs said.

There will be two sets of three flag poles on each side of the Confederate monument. The old light poles will be replaced with something modern that doesn't detract from the setting, Grubbs said.

Historical markers will be installed on the island.

The Brandon Garden Club, among others, have provided input on the project.

After meeting with the garden club, other civic groups and local business owners who will be affected by the work, engineering consultant Pat Guest said, "nobody had any problem with (the plans)."

One requirement from MDOT was that the plan not interfere with driver safety, Grubbs said. To meet the requirement, all plants, trees and shrubbery had to be high enough or low enough so as to not obstruct the vision of drivers.

"We had to go through a long process of give and take to get what we felt like would enhance downtown and (one that MDOT) could live with (regarding) safety issues," Guest said.

Now that preliminary plans have been approved, Guest said he expects formal plans will take about two months to complete.

With the state highway department's blessing, work could start in early fall, he said.

Appendix D

SAMPLE FINANCIAL RESPONSIBILITY/OWNERSHIP FORM STORMWATER MANAGEMENT

Part A

1. Project Name: _____

2. Location of project: County: _____

   City or Township: _____ Highway/Street: _____

3. Approximate date project construction will be commenced: _____

4. Purpose of development (residential, commercial, industrial, etc):
   _____

5. Method of storm water runoff treatment (retention/detention, grassed swales, etc):
   _____

6. Approximate impervious acreage for project: _____

7. Has a storm water management plan been filed? Yes_____ No_____

8. OPC Permit No. _____

9. Person to contact should storm water management issues arise with project:

   Name: _____ Telephone:_____

10. Landowner(s) of Record (use blank page to list additional owners):

    _____
    Name(s)

    _____ _____
    Current Mailing Address Current Street Address

    _____ _____
    City State Zip City State Zip

Part B

1. Person(s) or firm(s) who are financially responsible for this project (use blank page to list additional persons or firms):

_____
Name of Person(s) or Firm(s)

_____ _____
Mailing Address Street Address

_____ _____
City State Zip City State Zip

Telephone: _____ Telephone: _____

2. If the Financially Responsible Party is a Corporation, give name and street address of the Registered Agent.

_____
Name of Person(s) or Firm(s)

_____ _____
Mailing Address Street Address

_____ _____
City State Zip City State Zip

Telephone: _____ Telephone: _____

3. If the Financially Responsible Party is a Partnership, give the name and street address of each General Partner (use blank page to list additional partners):

_____
Name of Person(s) or Firm(s)

_____ _____
Mailing Address Street Address

_____ _____
City State Zip City State Zip

Telephone: _____ Telephone: _____

The above information is true and correct to the best of my knowledge and belief and was provided by me under oath. (This form must be signed by the financially responsible person if an individual or his attorney-in-fact or if not an individual by an officer, director, partner, or registered agent with authority to execute instruments for the financially responsible person). I agree to provide corrected information should there be any change in the information provided therein.

_____ _____
Type or print name Title or Authority

_____ _____
Signature Date

I, _____, a Notary Public of the County of _____, State of Mississippi, hereby certify that _____ appeared personally before me this day and being duly sworn acknowledged that the above form was executed by him. Witness my hand and notarial seal, this ____day of _____, _____.

_____
Notary

Seal My commission expires _____.

Appendix E
MDEQ Library – List of Available Educational Materials From Non-Point Source Group

Title	Description	NPS Category	Age Group
H2O Facts - What You Can Do to Help Reduce Non Point Source (NPS) Pollution	NPS fact sheet	general and urban	grade 5th - adult
Conserve Mississippi poster	land use poster	general	grades 5th - 12th, adult
Repair of Failing Onsite Wastewater Systems	brochure		adults
Plugging Abandoned Water Wells	booklet		adults
Help Keep Mississippi's Waters Clean	fact sheet		
Our Little River video	video		grades 5th - 12th, adult
Enviroscape landscape model	NPS water model	general	grades 3-12, adults
Groundwater flow model	NPS water model	general	grades K-12, adults
Planning and Design Manual for the Control of Erosion, Sediment & Stormwater	large binder	urban/construction	Adult
Field Manual for Erosion & Sediment Control on Construction In Mississippi	field manual	Urban/construction	adult
Water Source Book grades 3 - 5	lesson plan		teachers and students
Water Source Book grades 6 - 8	lesson plan		teachers and students
Water Source Book grades 9 - 12	lesson plan		teachers and students
Water Source Book video	"how to" video		teachers and students
Water Source Book grades K – 2	lesson plans		teachers and students
Mississippi Environmental Resource Guide		Educational Material Catalog	teachers and students
The Story of Wendy Water coloring book	coloring book		pre-K- 3rd grade
Sammy Soil coloring book	Coloring book		pre-K- 3rd grade
Oh Give Me a Home videos	field trip video	general	grades K - 5th
It's Up to Us Video	BMP for video	general	Adult
Backyard Conservation fact sheets	fact sheets	land owner	grades 6 -12, adults
Oh, Give Me a Home!	lesson plans	general	grades K - 5th

	The Wonders of Wetlands	lesson plan		grades K -12, teachers
	And Your Point Is?	story booklet		grades K - 6th
	Murky Water Caper	story booklet		grades K - 6th
	Mississippi's Coastal Wetlands		general NPS and wetlands	grades 6 - 12, adults
	Adopt-A-Stream Mississippi field manual			teens, adults
	Adopt-A-Stream workshop	brochure		teens, adults
	Outdoor Classroom	3-ring binder	general	teachers and students
	Storm Drain Marking Program	brochure		
	The Unclear Future of Clear Creek lesson plan	field trip video	general	grades 6 - 12
	The Unclear Future of Clear Creek video	urban NPS brochure	urban	grade 5th - adult
	Citizen's Guide to Reducing Urban NPS Pollution	handbook	agricultural	adults
	NPS Problems and Solutions brochure			grades 3 -12, adults
	Backyard Conservation booklet	fact sheets	Land owner	grades 6 – 12, adults
	Backyard Conservation fact sheets	brochure		adults
	Managing our Waters Basin by Basin brochure	water info booklets	general	grades 3 - 12, adults
	Needed: Clean Water booklet	water info booklets	general	grades 3 - 12, adults
	Ground Water: Protecting Our Resources booklet	water info booklets	general	grades 3 - 12, adults
	Water Conservation booklet	water info booklets	general	grades 3 - 12, adults
	Wastewater Treatment booklet	lesson plan		teachers and students
	Water Source Book grades K - 2	lesson plan		teachers and students
	Just Passing Through Video	industrial education video	urban	adults
	Model Urban Natural Resources Conservation Plan	Handbook	urban	adults
	Citizen’s Guide to Reducing Urban NPS Pollution	Video	Urban	7th - adults

Appendix F

State of Mississippi

Department of Environmental Quality

Office of Pollution Control

Certificate of Permit Coverage

under Mississippi's Municipal Separate Storm Sewer System General NPDES Permit
Be it known

Urbanized Area

Mississippi

having submitted an acceptable Municipal Separate Storm Sewer System Notice of Intent and associated Storm Water Management Program, is hereby granted this Certificate of Permit Coverage in order to discharge storm water associated with the Municipal Separate Storm Sewer System

Receiving Stream: Anyname Creek
Anyname County

_____
Chief, General Permits Branch

Coverage No: MSR**
Date of Coverage: March 10, 2003
Date Coverage Expires: February 28, 2008

*****This page is intentionally blank*****

Appendix G

MUNICIPAL SEPARATE STORM SEWER SYSTEMS NOTICE OF INTENT (MS4 NOI)

FOR COVERAGE UNDER THE STATE OF MISSISSIPPI'S GENERAL STORM WATER PERMIT FOR DISCHARGES ASSOCIATED WITH SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s)

This Notice of Intent (NOI) covers regulated Small Municipal Separate Storm Sewer Systems (MS4s). The Mississippi Department of Environmental Quality (MDEQ) in accordance with federal regulations has identified the regulated MS4s. **Do not apply for coverage under the Phase II Municipal Permit unless you have been notified by MDEQ.**

Submission of this application constitutes notice that the entity identified in Item 1 of this form agrees to comply with all applicable terms and conditions of the Small MS4 General Permit (MSRMS4). Furthermore, the applicant understands that implementation of the storm water management program areas as described in the application is required to begin as soon as permit coverage is issued by MDEQ.

NOI Due Dates: For those MS4s automatically designated pursuant to 40 CFR 122.32(a)(1), the owner or operator of the MS4 shall submit a NOI by March 10, 2003. For those MS4s designated by MDEQ pursuant to 40 CFR 122.32(a)(2) the owner or operator of the MS4 shall submit a NOI within 180 days of MDEQ notification, or March 10, 2003, whichever is later.

NOI Completeness: All items of the NOI, including attachments, must be completed **accurately and in their entirety** or the NOI will be deemed incomplete, and processing of the NOI will not begin until all information is received. One original copy of the completed NOI (no faxes) shall be submitted to:

Chief, Environmental Permits Division
Mississippi Department of Environmental Quality, Office of Pollution Control
P.O. Box 2261
Jackson, Mississippi 39225-2261

Joint NOIs: Submit one copy. The final submittal package should also include one copy of the joint attachments per applicant.

If you have questions about this NOI, please contact the MDEQ at (601) 961-5171.

INSTRUCTIONS

Item 1. **MS4 Identification:** Provide the name and address of the MS4 (the city, town, county or district), local contact, and mailing address. Indicate the status as a city, county or other public entity. If available, include the email addresses of the local contact, and the legally responsible person (the person who signs the application – see Item 8).

Item 2. **Location Description:** Provide a narrative description of the geographical location of the MS4, including city or town (this is especially important for systems at military bases and large education, hospital or prison complexes, and special districts and associations).

Item 3. **Location Map:** A location map for the MS4 (hard copy only) must be submitted. The boundaries of permit coverage must be indicated. (This information is also necessary in order to complete Items 4 and 6.) For enforcement purposes, the map must be of sufficient detail so that the exact boundaries, by street or other demarcation, can be determined. This information is available from the US Census Bureau.

The map must show the city, town, county, district boundaries or service area, as applicable. Counties must also indicate the unincorporated area boundaries. For any MS4s that are partially within an urbanized area, the location map must show the urbanized area boundaries.

It is recommended to start with the portion of the USGS (U.S. Geological Survey) quadrangle map showing the MS4 area. These are available and easily obtainable for the entire state (call the Office of Geology 601-961-5523). Although not particularly current, they do provide a large amount of information for very little effort. You can then use the USGS map as a guide for preparing your location map, which will probably be more detailed. If alternative maps are used, they must be of sufficient scale so that individual property locations can be determined in relation to the urbanized area and the municipal boundaries. For MS4s such as universities and military bases the map should be of an appropriate scale to clearly indicate the property boundaries. Maps should be folded to 8½ x 11 inches.

Item 4. **Receiving Waters:** Identify the named receiving waters within the MS4 permitted boundaries. Receiving waters are any waters of the State of Mississippi. These can also be obtained from USGS quad maps. In addition, list all 303(d) listed impaired waterbodies.

Item 5. **Joint NOIs:** Two or more applicants may submit a joint application, i.e., a single submittal that addresses all program areas for each applicant. Each joint applicant must complete and submit their own MS4NOI form. Each joint applicant will receive permit coverage and will be responsible and liable for program implementation in their area.

Item 6. **Population:** Indicate the resident number of people living within the permitted area. For special districts such as hospitals, universities, military bases etc., indicate the average overnight population (i.e., how many people is the facility/entity designed for overnight accommodations?) If your permitted area is less than the total area of your MS4 you may estimate the population.

Item 7. **Attachments:** A Storm Water Management Plan as required by Part IV of the General Permit for Small MS4s must be submitted. (If you are a submitting a joint application, refer to Appendix A for additional requirements.) You should use the document entitled "Mississippi's Phase II Small Municipal Separate Storm Sewer System (MS4) Guidance Manual" as a basis for program development, although using additional sources is strongly encouraged. The Guide is available at http://www.deq.state.ms.us or by calling 601-961-5171. MS4s for the three coastal counties should use the "Mississippi Gulf Coast Storm Water Management Toolbox" as well.

Item 8. **NOI Certification:** The application must be signed to be considered complete. In all cases, it shall be signed as follows: in the case of a municipal, state, or other public agency, by either a principal executive officer, or ranking elected official.

APPENDIX A - JOINT MS4 NOI INSTRUCTIONS

Two or more MS4s may submit a joint NOI, i.e., a single submittal that addresses all program areas for each applicant. Program areas or sections of program areas may be performed jointly with another entity, or solely by another entity. Each applicant must fill out a MS4 NOI. The attachments may be jointly prepared, and the entire package jointly submitted. For filing purposes, one copy of the attachments is required per applicant.

Item A. Indicate all of the entities that are applying jointly. Include your own agency on the first line.

Item B. Indicate, for your MS4 only, which entities are responsible for carrying out which storm water program areas. If more than one entity is responsible (for either part of or the entire program area listed), check all boxes that are applicable. The numbers assigned to the entities in Item A correspond to the numbers along the top of the table.

Item C. An Interlocal Agreement or the equivalent must be submitted, covering all program areas that will be implemented partly or entirely by another entity.

Program areas or sections of program areas that will be performed jointly with another entity, or solely by another entity, must be clearly indicated. For example, under the Public Education measure, it may state that "City A and City B will perform this program area jointly." Or, "City A will perform this program area on behalf of Special District B and as per the attached Interlocal Agreement."

GENERAL PERMIT APPLICATION STORMWATER DISCHARGES ASSOCIATED WITH SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) (Permit No. MSRMS4)

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

Please print or type. All items must be completed accurately and in their entirety or the application will be deemed incomplete and processing of the permit will not begin until all information is received. Please refer to the instructions for information about the required items. An original signature of the applicant is **required.**

1. **Name and address of the MS4**:

Name _____

Mailing Address _____

City, State and Zip Code _____

County _____

Phone Number (____)

Entity Type: County ☐ City/Town ☐ Other: _____

Local Contact (responsible for program implementation) _____

Title _____ Phone Number (____)_____

Email address (local contact) _____

Email address (legally responsible person) _____

2. **Location of the MS4:**

Location Description (narrative) _____

_____

3. **Location Map/Boundaries:**

a. Where will the SWMP will be implemented?:
☐ Urbanized Area Only, or ☐ Entire Jurisdiction.

b. <u>All entities except counties</u>
Location map must be attached showing <u>city, town, or district boundaries</u>, and urbanized area (UA) boundaries, if part(s) of the MS4 is within a UA.

c. <u>Counties only</u>
Location map must be attached showing county boundaries, unincorporated area boundaries within the county, and urbanized area (UA) boundaries.

4. **Major receiving waters (state waters) within the permitted area:**

_____

_____

_____

_____

All 303(d) listed impaired waterbodies within the permitted area (cities and counties):

_____

_____

_____

_____

5. **Part of a Joint NOI?** No☐ Yes ☐ If Yes, complete and attach Appendix A.

6. **Population:** _____

7. **Attachments.** Storm Water Management Plan as required by Part IV of the General Permit for Small MS4s. (See Appendix A for additional requirements for Joint Applicants.)

8. **Signature of Legally Responsible Person**

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment."

_____

Signature of Applicant Date Signed

_____

Name (printed)[1] Title

[1] This NOI shall be signed according to the General Permit Part VI.E.

APPENDIX A - JOINT NOTICE OF INTENTS

A. **Joint NOI**

List all entities implementing entire control measures. Entities implementing a component of a control measure should be identified in the SWMP and not on the NOI (use additional pages as needed):

1. (Responsible Entity, MS4 in Item 1, page 2) _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

B. **Entities Implementing Control Measure – Table 1**

	Entities Implementing Control Measures (use numbers from Item A, above)							
Storm Water Program Areas for MS4	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
a. Public Education and Outreach								
b. Public Participation and Involvement								
c. Illicit Discharge Detection and Elimination								
d. Construction Site Storm Water Runoff Control								
e. Post-Construction Storm Water Management								
f. Pollution Prevention and Good Housekeeping for Municipal Operations								
g. Other _____								

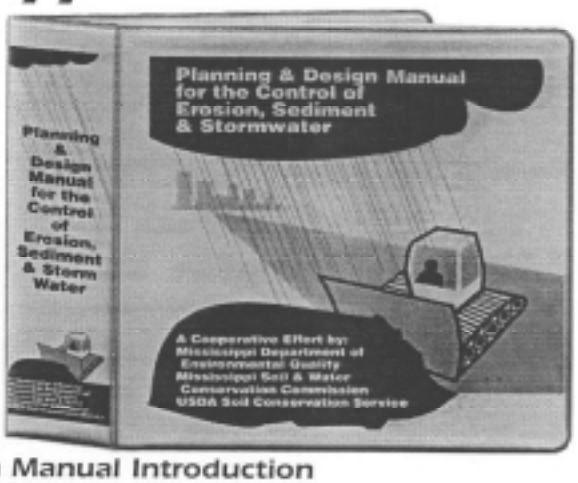
C. **Legal Agreement**. Attach a copy of the interlocal agreement, or equivalent, between the regulated MS4 identified in A. 1. above and the entity or entities responsible for implementing the control measure(s).

Appendix H

ORDER TODAY!

Mississippi's New

Planning and Design Manual for the Control of Erosion, Sediment and Stormwater



A **technical guidance manual** for the control of erosion, sediment, and stormwater from nonpoint sources (NPS) and for the preparation of erosion, sediment, and stormwater control plans.

- Ch.1. Planning and Design Manual Introduction
  - WHAT IS A BEST MANAGEMENT PRACTICE?
- Ch. 2. Erosion, Sediment and Stormwater Control Plan Guidance
- Ch. 3. Overview of Erosion, Sediment, and Stormwater Control Practices (BMPs)
  - COLOR PHOTOGRAPHS OF 42 PRACTICES
- Ch. 4. Best Management Practice Standards
  - TEMPORARY PRACTICES
  - PERMANENT PRACTICES
- Ch 5. Vegetative Practice Standards
- Ch. 6. Hydrology
  - PROCEDURES FOR DETERMINING PEAK WATERSHED DISCHARGE
- Ch. 7. Sample Erosion, Sediment and Stormwater Control Plan
- Ch. 8. References

The Manual is a Cooperative Effort by:
_Mississippi Department of Environmental Quality
_Mississippi Soil and Water Conservation Commission
_USDA Soil Conservation Service

COST PER COPY:

$ 20.00

(Includes Shipping & Handling)

TO ORDER PLANNING AND DESIGN MANUAL FOR THE CONTROL OF EROSION, SEDIMENT, AND STORMWATER:

Enclose a check or money order for $ 20.00 per manual payable to:
Mississippi Department of Environmental Quality, P.O. Box 20305, Jackson, Mississippi 39289-1305.

NAME _____

ADDRESS _____

_____

CITY _____ STATE _____ ZIP CODE _____

PHONE #(_____) _____

Quantity Manuals Ordered ___ Total Amount Enclosed $ _____

FOR OFFICE USE ONLY:
Date Payment Received
_____
Date Manual Shipped
_____