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Understanding Municipal Separate Storm Sewer Systems (MS4s)

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Introduction

Since the passage of the Federal Water Pollution Control Act in 1972, and amendment of the Clean Water Act (CWA) in 1977, water quality has improved in the United States (Figure 1). Improvements have occurred largely due to the National Pollutant Discharge Elimination System (NPDES), which is administered by the US Environmental Protection Agency (EPA) and to the Arkansas Department of Energy and Environment – Division of Environmental Quality (DEQ). The NPDES permit program addresses water quality by regulating pollution sources that discharge into waters of the United States. However, even with these improvements to the management of water quality, degraded waterbodies still exist in Arkansas and throughout the nation.

Some pollutants move into waterbodies through systems that are designed for collecting or conveying stormwater (Figure 2). Stormwater conveyance systems are roads with curbs, gutters, grass lined and concrete ditches, catch basins, and storm drains. These systems can be owned or operated by the federal government, a state, city, township, district, university, hospital, or association, and are known as municipal separate storm sewer systems (MS4s).



Figure 1: Green heron catches a minnow from a river. Clean water is a benefit to both people and animals.



Figure 2: A storm drain outfall discharging untreated water to a stream.

These are designed to protect streets and homes by removing stormwater quickly during rain events. MS4s, as their name suggests, have separate sets of infrastructure from the sanitary sewer system to move stormwater and does not go to a wastewater treatment plant (Figure 3).

Stormwater runoff from MS4s may contain pollutants such as pesticides, fertilizers, oils, salt, litter and other debris, sediment, and bacteria (Figure 4).

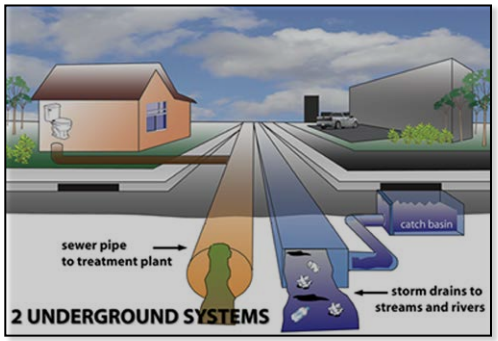

Figure 3: Grey water from sinks, baths, toilets, and industrial facilities goes to a wastewater treatment plant. Stormwater from the streets goes to streams untreated.

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Figure 4: Sediment filled water from a construction site without best management practices flows to a storm drain where it will be discharged untreated to a creek.

What is an Urban Area?

Urban Area under the current EPA final rule of 2023 is defined as a densely-housed area encompassing at least 2,000 housing units or having a population of at least 5,000 (figure 5).

Today, the EPA uses urban area maps only as described in their final rule, since the census no longer produces urban area maps and only uses urban area maps (figure 5).

Phase I

The EPA stormwater permitting program labels MS4s as either "small," "medium," or "large" for the purposes of regulation. Phase I of the EPA stormwater management program was initiated

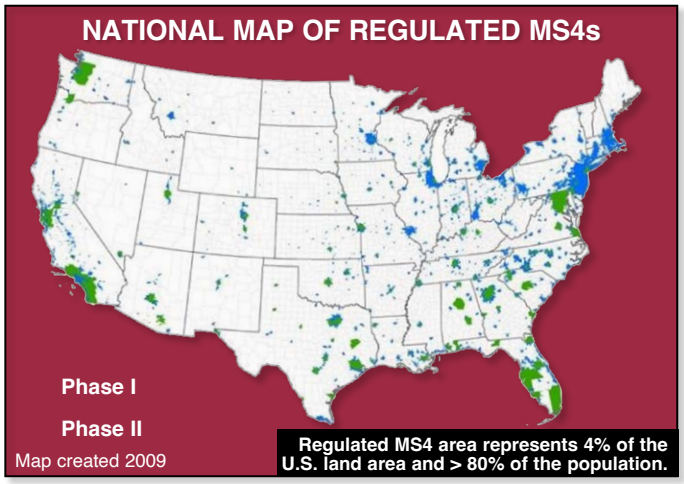

Figure 6: A national map of Phase I and Phase II MS4s.

in 1990 under the CWA. Phase I relies on NPDES permit coverage to address stormwater runoff from "medium" and "large" MS4s serving populations of 100,000 or more, construction activity disturbing 5 or more acres of land, and 10 categories of industrial activity to control polluted stormwater runoff.

Phase II

Phase II of the EPA stormwater management program expanded the Phase I program (figure 6) by requiring additional operators of small MS4s, identified as "urbanized area" by the U.S. Census Bureau, to implement programs and practices to control stormwater pollution. Small MS4's that were not located in, or adjacent to, urbanized areas were still unregulated on a case by case basis but could benefit water quality by voluntarily establishing best management practices and procedures similar to a regulated small MS4. Again, today after the 2023 final rule "urbanized area" is no longer used, only urban areas identified by the census are used to identify MS4's.

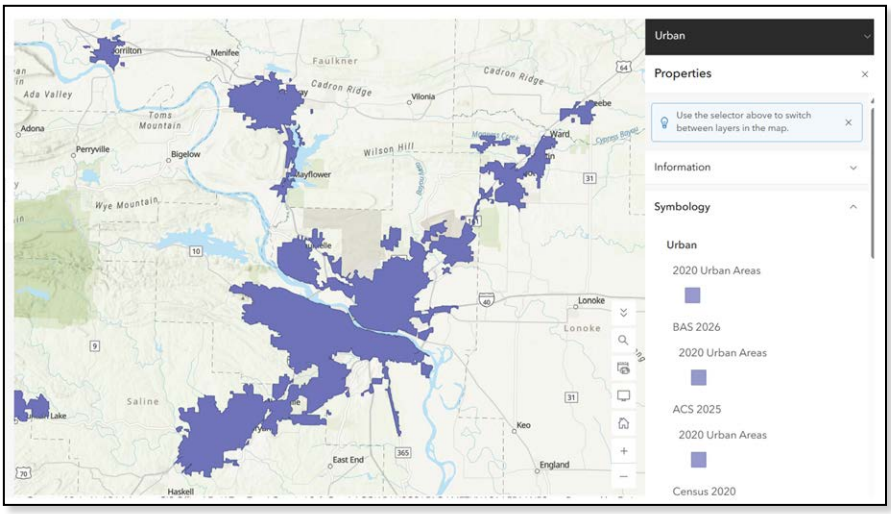

Figure 5: Urban area map from the United States census.

What are the Requirements to be a Regulated Small MS4?

A small MS4 can be designated as a regulated MS4 based on three factors:

- located within the boundaries of an urbanized area (UA) based on the most recent population census,
- located next to a UA
- located outside of a UA that contributes substantially to the pollutant loadings of a physically interconnected MS4 that is regulated.

What are the Requirements for a Small Regulated MS4?

Small regulated MS4s must submit a Notice of Intent (NOI) and a Stormwater Management Plan to apply for a General Stormwater Permit to the Arkansas DEQ and pay an annual fee to enroll for coverage or renewal, and to receive a Notice of Coverage (NOC). The permit application, or NOI, should include best management practices (BMPs) and measurable goals for each of the six minimum control measures through the creation of a Stormwater Management Programs specific to their jurisdiction.

Six Minimum Control Measures

To accomplish the protection of streams, rivers, bayous, and lakes receiving stormwater discharges, an MS4 must conduct six minimum control measures with measurable numeric or narrative goals. The permit also requires a timeline for accomplishments and the person responsible for reducing stormwater pollution. The six minimum measures are outlined below.

- **Public Education and Outreach**
  Conducting public education programs (Figure 7) and distributing materials to explain the impacts of stormwater discharges on waterbodies and steps the public can take to reduce pollutants in stormwater runoff.
- **Public Participation and Involvement**
  Providing opportunities for the public to participate in program development, stormwater planning and policy development (Figure 8).
- **Illicit Discharge Detection and Elimination**
  Map the storm sewer if not already available and find and eliminate any illicit, non-allowable, discharges that are not stormwater that are draining to the storm sewer system.
- **Construction Site Runoff Control**
  Review construction plans and inspect construction sites for compliance with implementing required stormwater pollution controls.
- **Post Construction Runoff Control**
  Use construction plans review to minimize water quality impacts and attempt to maintain pre-development runoff conditions.
- **Pollution Prevention and Good Housekeeping**
  Developing and implementing an operation and maintenance program for municipal facilities to maintain records and minimize pollutants in stormwater runoff.

Waivers for Exemption

It is possible for MS4 operators to apply for exemption if:

- The jurisdiction served by the system is less than 1,000 people within the UA,
- The system is not contributing substantially to the pollutant loadings of a physically interconnected regulated MS4, and
- the system is not discharging pollutants identified as a cause of impairment to any water body to which it discharges, and/or stormwater controls are not needed based wasteload allocations that are part of an EPA approved or established total maximum daily load (TMDL) that addresses the pollutant(s) of concern.



Figure 7: A storm drain painted with an educational message about storm drains draining to the creek.

Multiple MS4s in the Same Political Jurisdiction

Since all small MS4s within an urban area are automatically covered by phase II regulations, the result is that several governments, agencies, and institutions may have overlapping jurisdiction. In such a case, all MS4 permittees are strongly encouraged to work together to form a unified stormwater management program. Sometimes a regulated small MS4 may not have the legal authority to implement one or more of the required minimum control measures of the Phase II stormwater management program. However, in working together on a unified program, authority can be shared and all minimum control measures can be accomplished



Figure 8: A group of citizens participating in an event to remove litter from the environment.

by working toward the same goal through individual legal abilities and authorities.

MS4 Stormwater Program Implementation Options

Options for implementing a stormwater program for a regulated small MS4 include:

- sharing responsibility and costs for program development with other nearby regulated small MS4s through inter-local agreements,
- meeting requirements individually,
- participating in existing state or local programs, and
- co-permitting with another regulated small MS4.

In Arkansas, some small regulated MS4s have created regional cost-sharing programs with the University of Arkansas Division of Agriculture Cooperative Extension Service to implement the education, public outreach, public participation, and annual employee training requirements of the permit. These regional programs are recognized by DEQ as a beneficial and cost effective approach to increase program impact and to lessen the financial burden of this federal mandate.

What are the Penalties for Noncompliance?

The operator of a regulated small MS4 is required to obtain an NPDES permit that is federally enforceable, thus subjecting the permittee to potential enforcement actions and penalties by the NPDES permitting authority if the MS4 operator does not fully comply with application or permit requirements. This federal enforceability also includes the right for interested parties to sue under the citizen suit provision of the CWA.

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