Stormwater Program Finance & Management:

A Primer for Small Communities

RCAP

USER GUIDE

Rural Community Assistance Partnership

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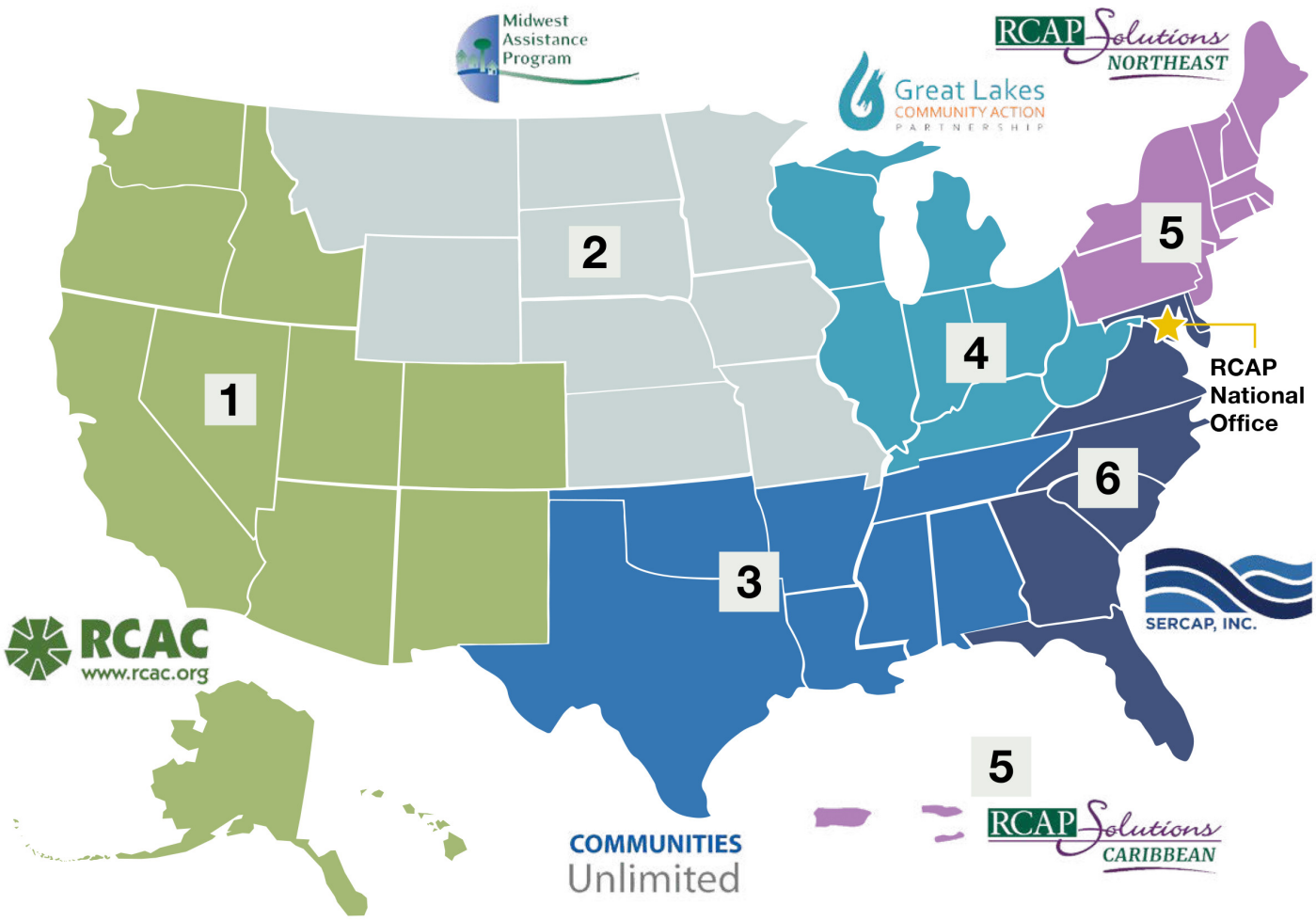
A Primer for Small Communities

The Rural Community Assistance Partnership Incorporated
1725 I St. NW, Ste 225
Washington, DC 20006

www.RCAP.org



Rural Community Assistance Partnership

The Rural Community Assistance Partnership (RCAP) is a national network of nonprofit partners with over 350 technical assistance providers across the country. RCAP works to improve the quality of life in rural America starting at the tap.

1. Western RCAP
Rural Community Assistance Corporation (RCAC)
916.447.2854
rcac.org

2. Midwestern RCAP
Midwest Assistance Program (MAP)
660.562.2575
map-inc.org

3. Southern RCAP
Communities Unlimited (CU)
479.443.2700
communitiesu.org

4. Great Lakes RCAP
Great Lakes Community Action Partnership (GLCAP)
800.775.9767
glcap.org

5. Northeastern and Caribbean RCAP
RCAP Solutions
800.488.1969
rcapsolutions.org

6. Southeastern RCAP
Southeast Rural Community Assistance Project (SERCAP)
866.928.3731
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INTRODUCTION

Communities share in the responsibility for ensuring that our country's waters remain clean today and for generations to come. Communities are also responsible for protecting their citizens, businesses, and infrastructure from natural disasters such as flooding. For these reasons, communities of all sizes have and/or need to develop programs to manage stormwater.

Stormwater refers to water that originates from precipitation events such as rain or snow that flows over land surfaces. Instead of being absorbed into the ground, stormwater runs off surfaces like roads, parking lots, rooftops, and other impervious areas, carrying pollutants and debris along with it. This runoff can pose environmental and infrastructure challenges if not managed properly.

Stormwater management is crucial to prevent issues such as flooding, erosion, and water pollution. Various strategies and infrastructure are employed to control and treat stormwater.

The purpose of this guidebook is to present an overview of stormwater management and to provide you with key information to establish and fund a stormwater management program in your community. Chapter 1 introduces stormwater management and the key elements of stormwater programs. Chapter 2 describes the regulatory framework of stormwater management. Chapter 3 examines the strategies that communities use to fund the day-to-day operations of their stormwater management programs. Chapter 4 identifies the funding sources available for stormwater infrastructure and discusses ways to maximize the useful life of assets.

Your residents and businesses are counting on you to promote clean water and to protect properties from flood damage. This guide will help you make better decisions by showing you what is involved in stormwater management, by providing insights into stormwater finance, and by raising the key issues that need to be addressed.

Engaging Technical Assistance Providers

Establishing, maintaining, and funding a stormwater management program is a complex process. As a result, you may wish to engage the services of a technical assistance provider with a background in stormwater management. Small systems may be able to receive free technical assistance from RCAP, the Rural Community Assistance Partnership and other organizations, and there are consultants for hire that specialize in stormwater management. The inside back cover of the guide provides information about RCAP's national network of nonprofit organizations working to ensure that rural and small communities throughout the United States have access to safe and affordable water, sanitation, and economic opportunity.

Technical assistance providers bring an array of ideas and experience from working with multiple communities across a geographic area. Technical assistance providers also often have more time and expertise to invest in analyses and evaluations than community staff and boards may have on their own.

Funding agencies tend to look more favorably on applications from communities that have engaged with technical assistance providers. Your residents and businesses may also be more accepting of your actions as community leaders when they are proposed by a neutral, third-party expert rather than from governmental staff.

If you decide to engage the expertise of a technical assistance provider, it is important to find one who can best assist your community. Find out what services the technical assistance provider can offer to you. Ensure that the provider is familiar with the regulations in your state, territory, or Tribal Nation. Ask for references from other communities that have worked with them previously that are similar to you in size and demographics.

CHAPTER ONE

Overview of Stormwater Management Programs

Key Terminology

Combined Sewer Overflows (CSOs) - An event in the type of sewer system that collects and conveys both sanitary wastewater and stormwater runoff where the volume of water entering the combined system exceeds its capacity to handle the flow, leading to a release of untreated sewage and stormwater runoff into the environment. This is different from sanitary sewer overflows (SSOs) where only untreated sewage is released.

Impervious Surface - Material or surface that does not allow water to penetrate or pass through.

Nonpoint Source Pollution - Contaminants carried by rainfall or snowmelt as it runs off over the land surface.

Point Source Pollution - The discharge of pollutants into a water body from a specific, identifiable source.

Rational Nexus - The legal principle that there must be a reasonable connection or relationship between the fees charged to property owners and the services or benefits provided by the stormwater management program.

Runoff - The movement of water, usually from precipitation, across the land's surface. Instead of being absorbed by the soil, the water flows over the ground, eventually making its way into streams, rivers, lakes, or other water bodies.

Stormwater - The U.S. Environmental Protection Agency defines stormwater as "rain and snowmelt that flows over land or impervious surfaces, such as paved streets, parking lots, and building rooftops, and does not soak into the ground." 1

Stormwater Best Management Practice (BMP) - A device, practice, or method that is used to manage stormwater runoff by controlling peak runoff rates, improving water quality, and managing runoff volume.

Stormwater Fees - Charges levied by a stormwater management program on property owners or users to fund the management, maintenance, and improvement of stormwater infrastructure and services.

Watershed - An area of land where all the surface water flows into a common outlet, such as a river, lake, or ocean.

[1] https://www.epa.gov/sourcewaterprotection/urbanization-and-stormwater-runoff

When precipitation such as rain and snow falls, it is part of the Earth's water cycle, a continuous process in which water moves between the atmosphere, land, and bodies of water. Under natural conditions, this precipitation is generally absorbed back into the soil through a process called infiltration, recharging groundwater. Heavy precipitation can saturate soil, causing water to "run off" to less saturated soil or to waterways directly, but this happens infrequently.

Human activity, however, has altered these natural conditions and created surfaces that cannot easily absorb water. These are known as "impervious surfaces." When water hits an impervious surface, it creates "runoff" that flows over land instead of being absorbed into it. Runoff causes problems with both water quality and water quantity. Runoff from impervious surfaces is generally known as stormwater. Runoff collects in rivers, streams, and other water bodies, contributing to surface water flow. This water eventually makes its way to larger bodies of water, such as lakes and oceans.

Stormwater runoff can exacerbate flooding, impacting infrastructure, buildings, and vehicles. Runoff from impervious surfaces is both greater in volume and faster in velocity than natural runoff would be. As a result, runoff can overwhelm natural drainage systems and exceed the capacity of water channels to convey and manage the increased volume of water. Inadequate stormwater infrastructure or the presence of debris, litter, and/or sediment in drainage systems can further impede the efficient flow of water. Poorly designed or blocked drainage systems are more likely to lead to localized flooding during heavy rain events. Intense rainfall in developed areas with a high percentage of impervious surfaces can lead to rapid and intense flash flooding.

Stormwater runoff can also have significant impacts on water quality, as it carries various pollutants and contaminants from built environments and rural landscapes into water bodies. Stormwater runoff can transport litter, trash, and debris from streets and other surfaces into water bodies. Chemical contaminants such as oil, grease, heavy metals, pesticides, herbicides, and industrial chemicals carried by stormwater can be toxic to aquatic organisms. Likewise, runoff from developed areas, agricultural lands, and other sources can carry bacteria and pathogens such as E. coli and fecal coliform, into water bodies. Stormwater runoff can carry nutrients, such as nitrogen and phosphorus, from fertilizers, farm animal manure, pet waste, and other sources into water bodies, leading to algal blooms. Sedimentation carried by runoff can reduce water clarity, interfering with light penetration and disrupting aquatic habitats.

Stormwater management programs exist to limit the water quantity and water quality impacts of runoff on both the built environment and on the natural environment. This chapter examines the causes of stormwater runoff in greater detail and explains ways that communities can limit the water quality and water quantity impacts of stormwater.

1.1 Causes of Stormwater Runoff

Stormwater runoff is generally increased when human activity alters natural landscapes. This section examines the major causes of stormwater runoff.

Impervious Surfaces

The largest cause of stormwater runoff in most communities is the presence of impervious surfaces. Impervious surfaces are materials that do not allow water to infiltrate or pass through, leading to increased runoff during rainfall or other precipitation events. These surfaces are common in communities. Some examples of impervious surfaces include:

- **Paved Surfaces:** Roads, highways, parking lots, and sidewalks are often made of asphalt or concrete, which are impermeable materials that prevent water from soaking into the ground.
- **Roofs**: Most roofs are constructed with materials like asphalt shingles, metal, or tiles, which do not allow water to penetrate. Rainwater runs off the roof and is directed to gutters and downspouts.
- **Driveways:** Whether made of concrete, asphalt, or other impermeable materials, driveways can significantly increase surface runoff.
- **Patios and Decks:** Hard surfaces used for outdoor living spaces, such as patios and decks made of materials like concrete, brick, or wood, can be impervious.
- **Swimming Pools:** The pool basin and the concrete or paved areas surrounding a swimming pool are impervious surfaces, contributing to increased runoff.
- **Tennis and Basketball Courts:** Sport courts made

of materials like asphalt or concrete are examples of impervious surfaces.
- **Plazas and Courtyards:** Urban spaces, such as plazas and courtyards with large expanses of impermeable surfaces, contribute to runoff issues in built environments.
- **Compact Gravel and Stone:** While gravel and stone may seem permeable, when the surfaces are compacted or sealed with a binding material, they can become impervious, reducing water infiltration.

The expansion of impervious surfaces in communities can lead to challenges related to stormwater management. With reduced soil infiltration, a larger proportion of rainfall must flow over impervious surfaces, picking up debris, sediment, and other contaminants along the way. Pollutants such as litter, oil, heavy metals, chemicals, nutrients, and pet waste often accumulate on impervious surfaces. This higher volume of runoff and associated debris can overwhelm and/or clog drainage systems and lead to flooding.

Impervious surfaces are also smooth and hard, causing runoff to flow at a higher velocity. Unlike natural surfaces that slow down and absorb rainfall, impervious surfaces allow water to flow more quickly, contributing to erosion in waterways and exacerbating flooding downstream.

Stormwater runoff can also increase from land that is not paved but has been altered by humans such that it limits water absorption. The three biggest contributors are farming, animal feedlots, and forestry activities.

Farming

Farming contributes to stormwater runoff. Agricultural fields are often exposed to various chemicals such as fertilizers, pesticides, and herbicides. When it rains, these substances can be washed off the fields into nearby water bodies, contributing to water pollution.

Farming practices that leave soil bare or disturb the natural vegetation cover can also increase the risk of soil erosion. When rain falls on exposed soil, the runoff detaches and transports sediment and soil particles, washing them into nearby streams and rivers, ultimately affecting water quality.

In areas where livestock graze, overgrazing reduces vegetation cover, leaving soil exposed. This can lead to increased runoff and erosion, as rainwater can easily wash away loose soil. Grazing can also compact soils, increasing runoff volume and speed.

In other agricultural areas, farmers use tile drainage systems to manage waterlogged soils and enhance crop productivity. These drainage systems, however, can increase the speed at which water moves off the fields, contributing to stormwater runoff.

Animal Feedlots

Animal feedlots, also known as concentrated animal feeding operations (CAFOs), can contribute to stormwater runoff in several ways. Feedlots generate a significant amount of manure from confined animals. If not managed properly, manure can be a source of pollutants that are washed into surface waters during rain events. Rainwater can transport nutrients (such as nitrogen and phosphorus), pathogens, and organic matter from manure piles and storage areas into nearby water bodies.

The use of veterinary pharmaceuticals in feedlots can result in the presence of these substances in manure. During stormwater runoff events, these pharmaceuticals may be carried into water bodies, potentially affecting aquatic ecosystems.

Some animal feedlots use lagoons to store and treat liquid manure. Poorly managed lagoons can overflow during heavy rain, leading to the release of untreated or partially treated animal wastewater into surrounding areas and water bodies.

Forestry Activities

While forests typically play a crucial role in regulating water flow and preventing erosion, certain forestry activities can contribute to stormwater runoff. Clear-cutting, which involves the removal of most or all trees in an area, and logging operations can disturb the natural vegetation cover and expose soil. This can increase the risk of soil erosion when it rains, leading to sediment-laden runoff that negatively impacts water quality in nearby rivers and streams. The use of heavy machinery during harvesting operations can also compact soil, reducing its ability to absorb water.

Removing trees and vegetation along stream banks (riparian zones) can reduce the ability of these areas to absorb and filter runoff. The loss of riparian vegetation can contribute to increased sedimentation and nutrient runoff into water bodies.

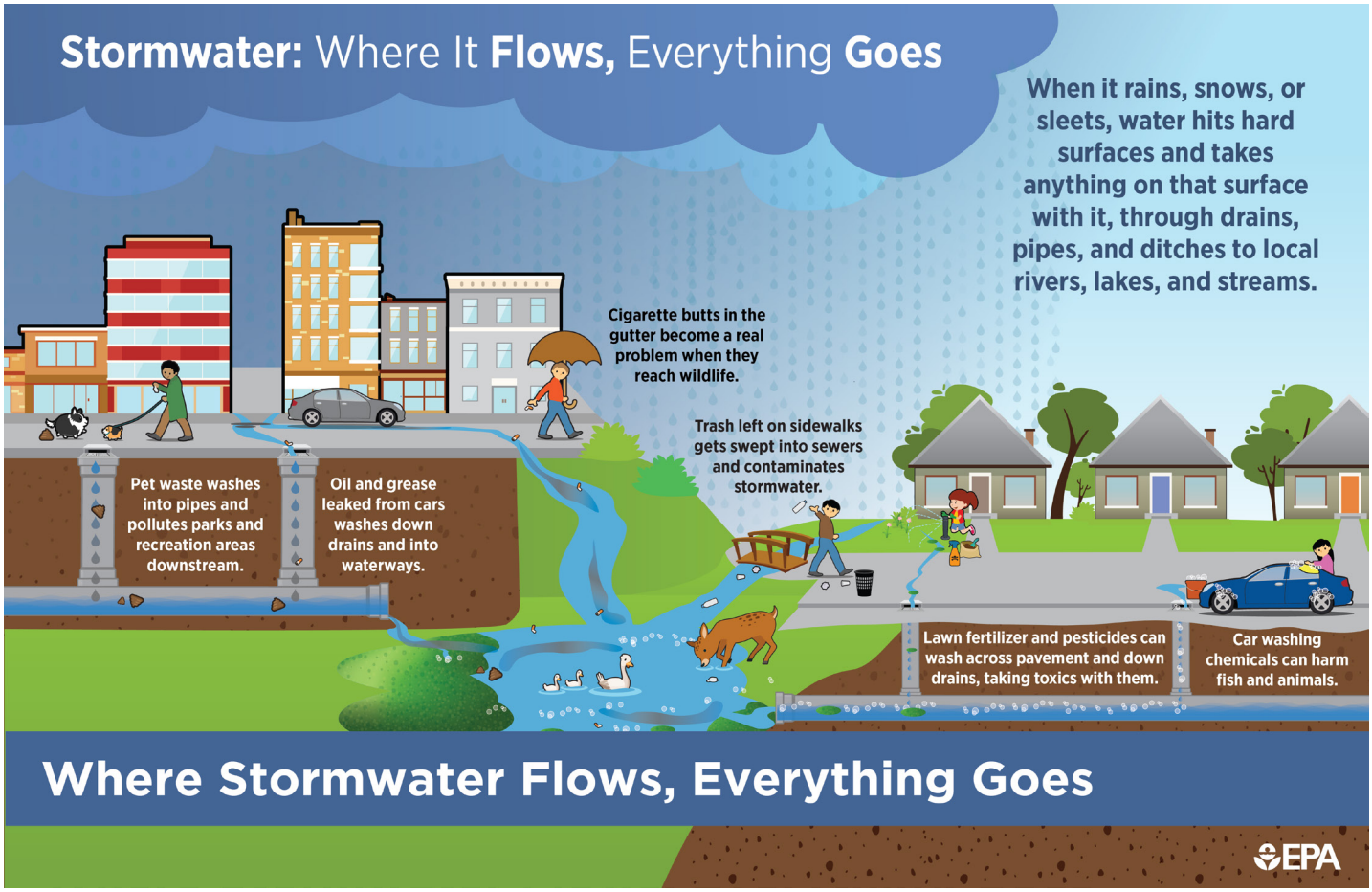
1.2 Managing Stormwater Runoff

Communities have three tools they can use to limit the impacts of stormwater runoff on water quality and flooding: storm drains, stormwater Best Management Practices (BMPs), and street sweeping.

Storm Drains

Storm drains are infrastructure components designed to collect and channel rainwater, stormwater, and melted snow from developed areas and impervious surfaces, preventing flooding and water damage. They are an essential part of stormwater management systems, and are the primary way communities can combat flooding challenges posed by stormwater. In many communities, these drains are distinct from sanitary sewers, which collect and transport wastewater/sewage from homes and businesses to treatment facilities.

Stormwater enters a storm drain system through an inlet, which is an opening or grate located at ground level. Inlets are often built into curbs. They are often strategically placed in low-lying areas, along streets, parking lots, or other impervious surfaces prone to stormwater runoff. Stormwater collected at the inlets is channeled through a network of underground pipes. These pipes are typically made of materials such as concrete or plastic and transport the stormwater away from the collection point. Most storm drain systems are designed to be gravity-flow, where the slope of the pipes allows water to flow downhill toward discharge points. In some cases, pumps may be used to assist in moving water if the terrain is flat or if water needs to be lifted to reach the point of discharge, called the outflow. The storm drain system eventually discharges stormwater into receiving water bodies, such as rivers, streams, or lakes.



Source: EPA, https://www.epa.gov/npdes/stormwater-smart-outreach-tools

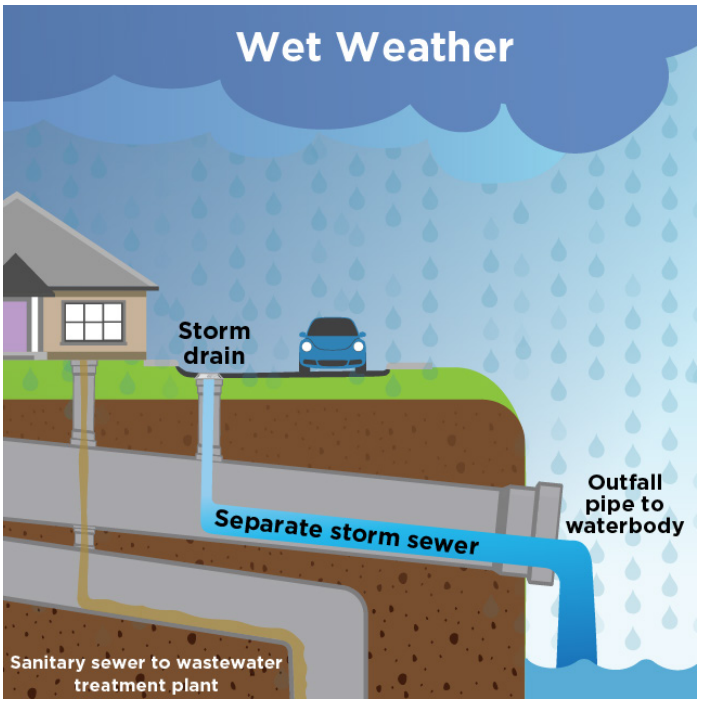
Some storm drain systems include detention basins, which temporarily hold stormwater to reduce peak flows and prevent downstream flooding. Detention basins release water gradually, helping to manage the flow. Other storm drain systems include retention basins, which permanently store water to recharge groundwater or to support aquatic ecosystems.

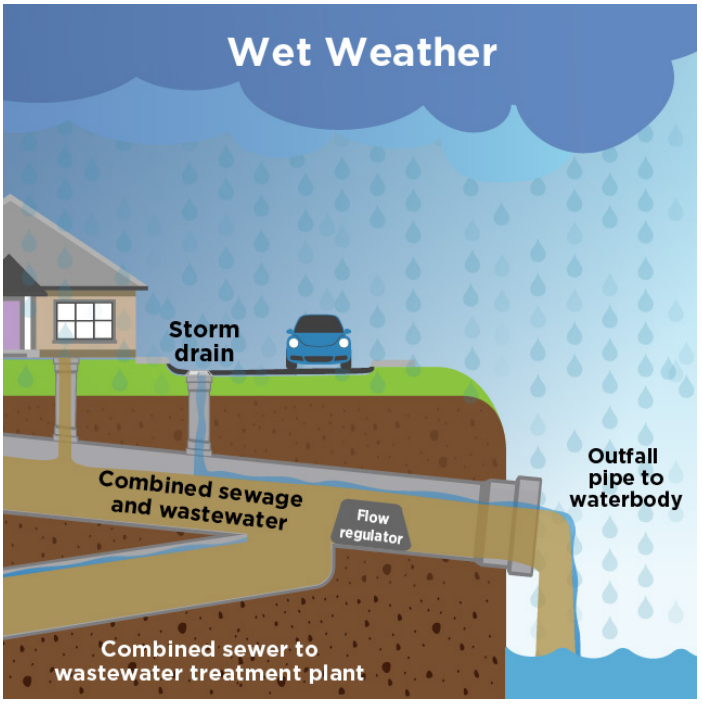
Storm drains are crucial for preventing localized flooding and reducing the risk of water damage in developed areas. However, it's important to note that, historically, traditional storm drain systems were designed only for flood control and conveyed stormwater directly into a body of water without any treatment. That's why many storm drains include signage noting that water entering into them "drains directly to" a body of water and why many communities have policies against dumping anything into storm drains.

If your community also wishes to treat stormwater, the water flowing through storm drain systems must go to a physical BMP to be cleaned before being released back into the natural environment, as discussed below..

Combined Sewer Overflows (CSOs)

Some communities have a single collection system that collects rainwater runoff, domestic sewage, and industrial wastewater into a single pipe. Normally, the system can transport all these flows to a wastewater facility for treatment before being released back into the environment. Sometimes, however, the amount of flow collected exceeds the capacity of the system, and untreated stormwater and wastewater is discharged directly into nearby bodies of water. These events are called combined sewer overflows, or CSOs. The vast majority of CSO outflows are located in the Northeast and Upper Midwest. The U.S. Environmental Protection Agency (EPA) has a set of resources for communities with combined collection systems: https://www.epa.gov/npdes/combined-sewer-overflows-csos





Source: EPA, https://www.epa.gov/npdes/combined-sewer-overflow-basics

Stormwater Best Management Practices (BMPs)

To address water quality concerns, stormwater management plans often include strategies for treating and filtering stormwater before it is discharged into natural water bodies. The structural, procedural, or managerial practices designed to prevent, reduce, or mitigate the impacts of stormwater runoff on water quality and the environment are known as stormwater Best Management Practices (BMPs).

BMPs are often tailored to specific site conditions and local regulations. They play a crucial role in sustainable stormwater management by promoting the use of nature-based solutions and reducing the adverse effects of increased runoff.

Examples of Stormwater Best Management Practices include:

- **Detention and Retention Basins:** Constructing basins to temporarily detain or retain stormwater, allowing sediments to settle, and reducing peak flows.
- **Bioretention Basins:** Creating landscaped areas with vegetation and engineered soils to capture, treat, and infiltrate stormwater.
- **Vegetated Swales and Buffers:** Establishing vegetated channels along roads or water bodies to slow down and filter stormwater runoff.
- **Rain Gardens:** Constructing shallow, vegetated depressions to capture and treat stormwater runoff, allowing for infiltration and pollutant removal.
- **Permeable Pavements:** Using materials for roads, parking lots, and walkways that allow water to pass through, promoting infiltration and reducing runoff.
- **Green Roofs:** Installing vegetation on building rooftops to absorb and detain stormwater, reducing the volume and velocity of runoff.
- **Erosion and Sediment Control Measures:** Implementing practices such as silt fences, sediment basins, and erosion control blankets to prevent soil erosion and sedimentation during construction activities.
- **Constructed Wetlands:** Developing artificial wetland areas that mimic natural wetland functions to treat stormwater and provide habitat for wildlife.

Naturally occurring wetlands are also highly effective at containing and treating stormwater runoff. As stormwater flows through a wetland, the vegetation and soil act as a filter, trapping sediments, pollutants, and nutrients. Wetlands are home to a diverse range of plant and microbial species that play a vital role in breaking down pollutants through biological processes. They are especially effective at removing nutrients such as nitrogen and phosphorus from stormwater runoff and help to trap sediment. Wetlands also have the ability to absorb and store excess water during storms, reducing the volume and velocity of runoff.

National Menu of BMPs

EPA maintains an extensive menu of stormwater BMP options for communities to consider on EPA's website: https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater

Communities can determine which type of BMP is most appropriate based on the volume and quality of the runoff. The concentration of development and amount of impervious surface is one key factor. Stormwater runoff volume and quality also depends on several other factors:

- The amount, intensity, and duration of rainfall or precipitation events, and the frequency of high-precipitation events.
- The size, shape, slope, and land cover of the watershed.
- Soil characteristics, including texture, compaction, permeability, and moisture content.
- The amount of vegetative cover and the type of vegetation.
- The types of pollutants present on impervious surfaces.

BMPs should be designed to accommodate current development and all future anticipated development. BMPs that are built for the stormwater runoff from current development only will be outdated when additional impervious surface is added.

Unlike wastewater utilities that deliver raw sewage to a single facility for treatment, stormwater management programs rely on a patchwork of decentralized installations to control flooding and improve water quality. BMPs are typically spread out across a community, each collecting stormwater from a discrete geographic area. Even small communities may have dozens or even hundreds of BMPs scattered

across their service area. Another unique feature of stormwater BMPs is that many are located on private property. BMPs often have to be situated in the places where runoff flows to when it rains—the lowest point of a geographic area—which may be on someone's land.

Resources for Stormwater BMP Selection

The process of determining the correct BMP is complex. Communities must conduct a thorough assessment of the site, including topography, soil characteristics, drainage patterns, land use, existing infrastructure, and environmental sensitivity. Communities need to identify potential sources of pollution, erosion, flooding, and other stormwater-related issues.

Web Soil Survey (WSS): provides soil data and information produced by the National Cooperative Soil Survey and is the single authoritative source of soil survey information. These data can help communities and developers better anticipate the potential runoff from new construction. The maps can be accessed at: https://websoilsurvey.nrcs.usda.gov/app/

The Federal Emergency Management Agency (FEMA): maintains flood maps that show how likely it is for an area to flood. Any place with a 1% chance or higher chance of experiencing a flood each year is considered to have a high risk. The maps can be accessed at: https://www.fema.gov/flood-maps

The Association of State Floodplain Managers: maintains a suite of resources on No Adverse Impact (NAI) floodplain management. NAI promotes the local management of floodplains and allows communities to make decisions about development so that the actions of one property owner are not allowed to adversely affect the rights of other property owners. The resources are available at: https://www.floods.org/resource-center/nai-no-adverse-impact-floodplain-management/

BMPs on Private Property

BMPs are an engineering solution to stormwater runoff that creates a public administration challenge. BMPs need to be located where runoff collects as it flows downhill, so many BMPs within a community end up being located on private property. Who, then, is legally and financially responsible for maintaining a BMP on private property? Initially, in most communities, private landowners or homeowners' associations (HOAs) were held responsible for the finance and maintenance of BMPs on their land. This approach has caused some issues because landowners and HOAs don't typically have the knowledge to maintain BMPs properly. Some communities advise private landowners to hire contractors for BMP maintenance and will issue fines if BMPs are not maintained. In other communities, the government has taken over responsibility for the finance and maintenance of all BMPs, regardless of whether they are on public land or private land. Communities that maintain BMPs on private property often need to establish easements with the property owners. An easement is a legal right that allows someone to use another person's land for a specific purpose, without transferring ownership of the land. Communities can negotiate with property owners to obtain easements that grant the right to access and use a portion of their property for stormwater BMPs, defining the rights and responsibilities of both parties regarding the use, maintenance, and liability associated with the stormwater BMPs.

Retrofitting BMPs for a Changing Climate and for Growth

In some areas, the changing climate is making precipitation events more frequent and more severe. BMPs designed for less frequent storms may no longer be adequate, leaving communities vulnerable. New Jersey Future offers a free "Stormwater Retrofit Best Management Practices Guide" to identify opportunities to retrofit existing stormwater BMPs and install new stormwater BMPs in built-out environments. The guide is available here: https://gitoolkit.njfuture.org/retrofit-guide/

Communities must also reevaluate the adequacy of existing storm drain systems and BMPs when new development occurs. A storm drain system and its associated BMPs that were designed to handle the runoff from a 20-home development will likely be inadequate if another 20 homes are built in the neighborhood.

Street Sweeping

Street sweeping is a maintenance activity that involves cleaning and removal of materials from road surfaces, streets, and public spaces. Street sweeping obviously enhances the cleanliness and aesthetics of communities, but it also prevents the accumulation of pollutants in stormwater runoff.

A lot of material collects on road surfaces that can impact water quality. Litter such as paper, plastic bags, wrappers, bottles, cans, cigarette butts, and other trash items can be discarded by pedestrians and motorists. Leaves, grass clippings, branches, and other plant materials accumulate on streets, especially during the fall or after lawn mowing or landscaping activities when community members may put organic debris in or near the road. There are metal particles from vehicles and miscellaneous objects such as nails, screws, glass shards, and other small items. By removing debris, leaves, litter, and pollutants from roadways, street sweeping helps prevent these materials from being washed into storm drains and entering water bodies during rainfall events. This helps maintain better water quality in rivers, lakes, and other receiving waters.

Street sweeping also helps prevent the accumulation of debris and sediments in the storm drain intakes themselves. Blockages in storm drain intakes can impede the flow of stormwater, leading to localized flooding and increased risk of backups. Regular street sweeping reduces the likelihood of such blockages and ensures efficient drainage.

Many communities use mechanical sweeping machines for street sweeping. These sweepers are specialized vehicles equipped with brooms, brushes, and suction systems designed to sweep and collect debris from road surfaces. These machines come in various sizes and configurations, including smaller vehicles for municipal streets and larger sweepers for highways and thoroughfares.

Many communities maintain a regular street sweeping schedule, but street sweeping can also be helpful in emergencies. For example, street sweeping can help address accidental spills of materials such as oil, chemicals, or hazardous substances on roadways. Prompt removal of these substances reduces the risk of contamination entering storm drains and water bodies.

Creating Effective Stormwater Management Programs

All the elements of effective stormwater management programs are far too complex to be explained adequately in this introductory guide. Stormwater management requires an understanding of land use, hydrology, and engineering. Communities need to develop guidance for how new construction will address stormwater and develop a procedure for evaluating site plans. Stormwater infrastructure must be adequately maintained over time, and the impact of the stormwater program on local water quality must be monitored. Communities also need to develop and adopt ordinances related to stormwater programs. The Center for Watershed Protection developed the comprehensive guide "Managing Stormwater in Your Community" to provide more comprehensive guidance to communities on forming stormwater programs. The document is available for download from this webpage: https://owl.cwp.org/mdocs-posts/post-construction-manual-managing-stormwater-in-your-community/

CHAPTER TWO

Regulatory Framework for Stormwater Management

Many communities choose to manage stormwater in order to reduce the likelihood of flooding and to improve local water quality. Some of those communities are required to manage stormwater due to federal, state, territorial, Tribal, regional, and/or local laws and regulations. This chapter explains the regulatory framework for stormwater management.

2.1 Federal Regulations

EPA regulates stormwater at the federal level under the Clean Water Act. In 1972, Congress passed the Clean Water Act, also known as the Federal Water Pollution Control Amendments of 1972. The initial focus of the Clean Water Act was point source pollution. Point source pollution refers to the discharge of pollutants into a water body from a specific, identifiable source, such as an industrial discharge, a wastewater treatment plant, a power plant, a mining operation, or a hazardous waste site.

Regulating point sources of pollution did improve water quality across the country, but it was not enough because water pollution also comes from diffuse sources across landscapes such as urban runoff, agricultural operations, and forestry activities. These diffuse sources are collectively known as nonpoint source pollution, and EPA began regulating them with the 1987 amendments to the Clean Water Act.

Water pollution is regulated under the National Pollutant Discharge Elimination System (NPDES). Point sources and nonpoint sources of pollution must obtain NPDES permits. As of 2024, EPA issues all NPDES permits for permittees in Massachusetts, New Hampshire, New Mexico, the District of Columbia, Puerto Rico, Guam, American Samoa, and the Northern Mariana Islands, as well as for some federal facilities and for Tribal Nations. All other states and territories issue their own permits.

NPDES permittees are required to sample discharges and notify both EPA and their state/territorial regulatory agency of the results, including if the facility is out of compliance with the requirements of a permit. Violations of the permit can result in fines as well as administrative orders to correct the violation.

NPDES Permit Entities

EPA maintains a list of which entity or entities issue NPDES permits by state or territory. This website shows which entity issues the permits and allows users to search current permits: https://www.epa.gov/npdes-permits

Stormwater discharges from three sources are permitted under NPDES: Municipal Separate Storm Sewer Systems (MS4s), construction activities, and industrial activities. The entity responsible for each of these types of sources is required to obtain an NPDES permit before stormwater can be discharged to prevent harmful pollutants from washing into local surface waters. This chapter will focus on MS4s.

Municipal Separate Storm Sewer Systems, or MS4s, refer to collections of publicly owned storm drains, gutters, roadside ditches, sediment ponds, and other similar features that collect stormwater and provide essential drainage and management for developed areas. MS4s specifically manage stormwater and only stormwater. **The combined sewer systems discussed in Chapter 1 are not considered MS4s**.

Phase I of the MS4 regulations applied to "large" and "medium" MS4s: cities with populations of at

least 100,000 and counties where the unincorporated population was at least 100,000, per the 1990 census.

Phase II of the MS4 regulations applied to "small" MS4s that are in Urban Areas with a population of at least 50,000 people. An "Urban Area" is a census designation based on housing unit density and/or population density and is not the same thing as a municipality.

It may seem initially that no small communities would be regulated as MS4s, but this is incorrect. It is possible for a town with a smaller population to be included in a broader, Census-designated Urban Area that has a population of at least 50,000 people, causing that town to fall under stormwater regulations. The location of Urban Areas changes with each decennial census, but once a community falls under Phase II regulations, it will always be regulated, even if its Urban Area population later falls below 50,000 people. If you are at all uncertain if you fall under the Phase II regulations, please consult with your regulatory agency for clarification.

Urban Areas

The U.S. Census maintains a list of Urban Areas on its website: https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html

MS4s subject to Phase II requirements are required to develop and implement a Stormwater Management Program that addresses six minimum control measures:

- **Public Education and Outreach:** Programs to inform the public about the impacts of stormwater runoff and actions they can take to reduce pollution.
- **Public Participation/Involvement:** Efforts to involve the public in the development and implementation of the MS4 program.
- **Illicit Discharge Detection and Elimination:** Activities to identify and eliminate illicit discharges to the storm sewer system.
- **Construction Site Runoff Control:** Requirements for controlling stormwater runoff from construction activities to prevent soil erosion and sedimentation.
- **Post-Construction Stormwater Management:** Measures to address stormwater runoff from new development and redevelopment sites, including the use of Best Management Practices (BMPs).
- **Pollution Prevention/Good Housekeeping:** Practices to reduce pollutants in stormwater runoff from municipal operations and maintenance activities.

For most MS4s, the majority of their physical infrastructure supports the Post-Construction Stormwater Management measure.

The 2010 amendments to the Clean Water Act state that reasonable and nondiscriminatory fees, charges, and assessments can be charged by NPDES and MS4 permittees for the purpose of stormwater management. These charges must be based on some fair approximation of the proportionate contribution of the property or facility to stormwater pollution. They must be used to pay or reimburse the costs associated with any stormwater management program including the full programmatic and structural costs attributable to collecting stormwater, reducing pollutants, or volume of discharge.

EPA Fact Sheets on Phase II

EPA maintains a series of fact sheets on the Stormwater Phase II final rule that can be accessed from this webpage: https://www.epa.gov/npdes/stormwater-phase-ii-final-rule-fact-sheet-series

2.2 State, Territorial, Tribal, Regional, and Local Regulations

Many states, territories, and Tribal Nations have stormwater regulations that go above and beyond the federal standards. These regulations may apply to an entire state or territory, or they may only apply to a specific region of the state or territory. The regulations may extend the federal standards to a broader set of communities, or they may enact different standards. Local governments may pass their own stormwater regulations as well. North Carolina, for example, has stormwater regulations for communities in 20 coastal counties with a goal of protecting shellfish. Massachusetts has stormwater regulations within its designated wetland areas across the state.

This guide is intended for communities across the United States, but it does not offer a summary of all stormwater regulations at every level of government. Each community must understand which stormwater regulations apply to it. If you are uncertain if you fall under any stormwater regulations, it is strongly recommended that you ask your state/territorial/Tribal regulatory authority for clarification.

CHAPTER THREE

Paying for the Operating Costs of Stormwater Management Programs

Communities need money to pay for the costs of operating stormwater management programs and also need funding to construct, maintain, and refurbish stormwater infrastructure. This chapter examines the strategies that communities use to fund the day-to-day operations of their stormwater management programs, and Chapter 4 identifies the funding sources available for stormwater infrastructure.

Is Stormwater a Utility?

Most governments operate their drinking water and wastewater services as utilities that are funded through fees charged to customers. They are self-supported, business-like units called enterprise funds and operate differently from the general services of government (education, police, fire, etc.) that are largely paid for by taxes. Is stormwater a utility or a general service of government? In most states and territories, stormwater is allowed but not required to be a utility. Some communities operate their stormwater programs as utilities, and others do not.

3.1 Costs of Operating Stormwater Management Programs

Communities incur various costs for the day-to-day operations of their stormwater management programs. These costs include:

- Personnel: Salaries, benefits, and payroll tax payments for employees who support the stormwater management program. For most small communities, employees work with the stormwater management program for only part of their time, so these personnel expenses will be shared with either the general government and/or other utilities. Personnel who work with the stormwater management program should include operations staff as well as other governmental employees who help administer the stormwater program such as municipal managers, budget and finance staff, human resources staff, attorneys, and the governing body.
- **Contract labor:** Some stormwater management programs may need to hire contractors to support operations and maintenance.
- **Administrative Costs:** General administrative expenses, including office space, utilities, liability insurance, and other overhead costs associated with running the stormwater management program.
- **Training:** Costs associated with training staff on stormwater management practices, regulations, and new technologies.
- **Water Quality Monitoring:** Regular monitoring of stormwater runoff for pollutants and contaminants to assess the effectiveness of stormwater management measures. This also includes the laboratory testing costs for analyzing water samples to determine pollutant levels and compliance with water quality standards.
- **Regulatory Compliance:** Fees associated with obtaining and renewing stormwater discharge permits required by regulatory authorities, as well

as costs related to fulfilling reporting obligations to regulatory agencies.

- **Infrastructure Maintenance and Repairs:** Materials and tools needed for regular maintenance, cleaning, and repair of stormwater drainage systems, including intakes, pipes, culverts, ditches, and catch basins.
- **Fleet-Related Expenses:** Fuel for stormwater program vehicles and equipment, such as street sweepers, vacuum trucks, and inspection tools, as well as maintenance costs for those vehicles.
- **Public Education and Outreach:** Funding for public education and outreach initiatives to raise awareness about stormwater issues and promote best management practices among residents, businesses, and local stakeholders.
- **Legal Costs:** Costs associated with legal counsel to ensure compliance with stormwater regulations, address legal challenges, and represent the utility in regulatory matters.
- **Emergency Response and Cleanup:** Funding for emergency response activities, such as addressing spills, floods, or other unforeseen events that may impact stormwater systems.
- **Mapping:** Paper and (ideally) digital maps of stormwater assets that are spread out across a community. A well-maintained GIS map of stormwater assets and hydrology can be an invaluable tool in managing runoff effectively.

Mapping

RCAP maintains a list of mapping and GIS resources including its GIS guidebook, *The Role Mapping Serves for Your Small, Rural, or Tribal Utility.* These resources can be accessed at: https://www.rcap.org/managerialfinancialhub/mapping/

Communities have two primary options to generate revenue to cover these costs of the day-to-day operations of their stormwater management programs: stormwater fees and taxes. Communities may choose one of these options, or they may fund their stormwater management programs with a combination of the two. The remainder of this chapter will examine these two funding approaches.

The Cost of Inaction

Managing stormwater may be a new cost for some communities, but there are also costs if stormwater is not managed properly. According to the National Oceanic and Atmospheric Administration (NOAA), flooding typically causes more damage in the United States than any other weather-related event, averaging $8 billion a year in damaged property. There are also about 90 fatalities per year in the United States due to flooding. The Federal Emergency Management Agency (FEMA) reports that one inch of floodwater can cause $25,000 of damage to a home. Excess pollution in surface waters increases the cost of treating drinking water and may make the waters unsuitable for swimming, fishing, and other recreational activities.

3.2 Stormwater Fees

Stormwater fees are charges levied by a stormwater management program on property owners or users to fund the management, maintenance, and improvement of stormwater infrastructure and services. These fees are a way to generate revenue specifically for addressing stormwater-related issues like pollution prevention, flood control, and the maintenance of stormwater management systems. Stormwater fees are assessed on a regular basis, such as monthly or annually, and are often included as a line item on property tax bills or utility bills. The goal is to create a sustainable and dedicated funding mechanism to address the challenges associated with stormwater management in urban and developed areas.

Fees are typically established through local ordinances or regulations, and the structure and implementation of stormwater fees varies from community to community. This section will discuss several stormwater fee structure options, but all stormwater fees regardless of structure share some common elements. Stormwater fees aim to distribute the costs of managing stormwater runoff fairly among property owners or users. Stormwater fees are often based on the principle that those who contribute more to stormwater runoff, often due to impervious surfaces

[2] https://www.weather.gov/afc/FloodSafety

[3] https://www.floodsmart.gov/flood-insurance-mitigation-discount-tool

like rooftops and parking lots, should pay higher fees. The revenue generated from stormwater fees is earmarked specifically for stormwater management activities. This ensures a dedicated and stable funding source for stormwater-related programs and projects.

Distributing the costs of managing stormwater runoff based on how much stormwater a property generates and earmarking stormwater fee revenues for the exclusive use by stormwater management programs are key elements of a legal concept known as "rational nexus." Rational nexus refers to the requirement that there must be a reasonable and logical connection between the fees imposed on property owners or users and the government's legitimate objectives in managing stormwater. The rational nexus test helps ensure that the fees are tied to the costs associated with the stormwater management activities and that there is a reasonable relationship between the fees charged and the services provided.

Rational nexus for stormwater fees is often tied to the user-pay principle. Property owners who create the most stormwater runoff and therefore benefit the most from stormwater management services are expected to contribute to the costs associated with those services in proportion to the volume of runoff they generate. The rational nexus test helps ensure that the fees are justifiable and do not unduly burden property owners, and the rational nexus test also guards against arbitrary or unreasonable fee assessments. Many of the legal challenges to stormwater fees across the country have argued that there was not a rational nexus between what was charged and the benefits provided. The legal requirements around stormwater fees are not the same everywhere, and it is strongly recommended that you consult with attorneys in your state, territory, or Tribal Nation on how to meet your legal requirements for stormwater fees.

Communities often divide their properties into categories, such as residential and non-residential, similar to how water and wastewater utility customers may be divided. Each class of properties may be charged a different fee amount or fee type.

Some communities span more than one watershed. The stormwater regulations may not be the same for each watershed, and the cost of stormwater management may differ from one watershed to the next. In these instances, communities may wish to charge a fee to properties based on their watershed.

Western Kentucky Stormwater Utility Survey

The Western Kentucky University School of Engineering and Applied Sciences conducts an annual nationwide survey of local government stormwater fees, collecting data from more than 2,000 communities. The results of the survey include the fee type, the fee amount, the population of the community, the year the fee was created, and the number of square feet per Equivalent Residential Unit (ERU), if applicable. The survey results can be accessed at this website: https://digitalcommons.wku.edu/seas_faculty_pubs/

The most common types of fees that communities charge are flat fees, fees based on Equivalent Residential Units or ERUs (also known as Equivalent Dwelling Units, or EDUs), and fees based on parcel size. Each fee type has advantages and disadvantages, which are explored below.

3.3 Fee Structures for Stormwater

Flat Fees

A stormwater flat rate fee is a fixed, uniform charge assessed to properties or users within a jurisdiction, regardless of specific characteristics such as impervious surface area, property size, or land use. A community may charge $2.00 a month, or $10.00 a month, or $15.00 a month for the stormwater management program. Every property or user subject to the stormwater fee pays the same fixed amount.

Flat rate fees offer a straightforward and simple billing structure. Property owners are charged a consistent fee, simplifying the administration and billing process. It's easy for property owners to anticipate and budget for a fixed stormwater fee. Flat fees, however, have limitations, particularly in terms of equity and fairness. Critics argue that flat rate fees may not accurately reflect the differential impacts that various properties or land uses have on stormwater management systems. Properties with larger impervious surfaces, for instance, may generate more stormwater runoff, leading to a disproportionate impact that is not reflected in a flat rate fee.

Equivalent Residential Units (ERUs)

A stormwater fee based on Equivalent Residential Units (ERUs) is a billing system where one ERU serves as a standardized measure that represents the average stormwater runoff from a typical residential property within the community. ERUs are most often measured in square feet of impervious surface. The ERU system aims to ensure fairness by assigning stormwater fees in proportion to the impact that different properties have on the stormwater management system.

Let's say a community determines the size of its ERU to be 2,000 square feet. Each residential property is assigned one ERU regardless of its actual amount of impervious surface because the ERU represents the average stormwater runoff from a typical residential lot. Non-residential properties are assigned a specific number of ERUs based on their total impervious surface area. For example, a commercial property with 8,000 square feet of impervious area, four times the impervious surface area of the average residential property, would be charged for 4 ERUs.

The ERU system allows stormwater utilities to account for the diverse characteristics of properties within their jurisdiction while maintaining a standardized and equitable fee structure. While more complex than a flat rate fee, the ERU system is generally simpler than individually measuring the impervious surface area of each property, especially when all residential properties are assessed one ERU automatically.

In the 2023 Western Kentucky University stormwater utility survey, ERUs were identified as the most common fee structure for stormwater programs regardless of the size of the community. The survey found considerable variation in the square footage size of ERUs from one community to the next, but most fell between 1,500 and 4,500 square feet.

A similar stormwater fee approach is to charge every property a fee based on the area, usually per square foot, of impervious surface. Compared to other fee structures, setting fees based on impervious surface area more accurately reflect each property's impact on the stormwater management system including residential properties, since impervious surfaces are directly related to stormwater runoff. Measuring and assessing impervious surfaces can pose administrative challenges, though, requiring accurate data collection and periodic reassessment. Historically, very few communities based their stormwater fees solely on impervious area as a result. GIS mapping and hyper-accurate aerial photography has made the process of determining actual impervious area much easier, however, and many new stormwater programs are now basing their fees on actual impervious area.

Parcel Size

A stormwater fee based on parcel size is a billing system where property owners are charged for stormwater management services based on the total land area of a property, regardless of the specific land use or the amount of impervious surfaces. This measurement is typically expressed in square footage.

A parcel-based fee structure can be simpler to administer than ERU-based or impervious surface-based fees because it focuses on a single characteristic (parcel size) rather than assessing multiple property features, and data on parcel size is often readily available. Parcel size may be more easily understood by the public than impervious surface area. Larger properties, however, may not necessarily generate more stormwater runoff than smaller properties. A small property that is largely impervious surface, for example, will likely generate more runoff than a large property that is undeveloped. Parcel size may not be the best proxy for stormwater runoff.

Stormwater Fee Credits

Some stormwater programs give property owners discounts on their stormwater fees if the property reduces its volume of stormwater runoff by installing on-site BMPs. These credits are designed to encourage environmentally responsible practices and sustainable stormwater management. Property owners must meet specific eligibility criteria to qualify for stormwater credits. These criteria are often related to the implementation of stormwater management practices that go beyond regulatory requirements. The stormwater program determines the credit amount based on the effectiveness of the implemented BMPs. The calculation may consider factors such as the percent reduction in impervious surfaces, volume of runoff managed, or the overall environmental impact.

Property owners interested in obtaining stormwater credits typically need to submit an application to the stormwater management program. The application may require documentation, engineering plans, or other evidence demonstrating the implementation and effectiveness of stormwater management practices. The program then assesses the submitted applications

to verify compliance with eligibility criteria and the effectiveness of implemented practices. Approval is granted based on a successful review. Once approved, the stormwater program adjusts the property owner's stormwater fees to reflect the awarded credits. This adjustment can result in a reduced stormwater fee or, in some cases, a complete exemption from the fee for a specified period. Stormwater credits often require ongoing monitoring and verification to ensure that the implemented practices continue to be effective. Property owners may need to submit periodic reports, conduct inspections, or provide evidence of maintenance to maintain their credits. Building on-site BMPs may only be cost-effective if the property has a large stormwater bill, so non-residential customers tend to seek out these credits more frequently than residential customers.

Additional Stormwater Fees Related to New Development

If a stormwater program requires that BMPs or other stormwater management features are included in new construction, it may charge fees to developers to cover costs related to stormwater management during and after construction:

- **Site Plan Review Fees:** For reviewing site plans submitted by property owners or developers for new construction, redevelopment, or significant land use changes.
- **Stormwater Management Plan Review Fees:** For reviewing plans outlining stormwater management practices and facilities designed to control and treat stormwater runoff during construction.
- **Post-Construction Stormwater Management Plan Review Fees:** For reviewing plans addressing long-term stormwater management measures and infrastructure after construction is complete.
- **Erosion and Sediment Control Plan Review Fees:** For reviewing plans related to erosion and sediment control measures designed to prevent soil erosion and sedimentation during construction activities.
- **Floodplain Development Review Fees**: For reviewing plans related to development activities within floodplains, including assessments of potential impacts on flooding and stormwater dynamics.

There may also be fees to inspect the BMPs to ensure that they are built according to the approved plans.

Fees Related to Ongoing BMP Monitoring

Stormwater BMPs need to be maintained properly in order to function as designed. BMPs on public property are typically monitored and maintained by the stormwater management program. In communities where the BMPs on private property are the responsibility of the private landowners, the stormwater program will often charge fees to cover the costs associated with inspecting, maintaining, and ensuring the ongoing effectiveness of stormwater management measures. This can include fees associated with the regular inspection and maintenance of stormwater BMPs, with sampling and analysis of stormwater runoff from regulated sites, and annual BMP certification fees, which may involve a review of maintenance plans, inspection records, and adherence to design specifications.

Consideration: Affordability

Stormwater fees are generally lower than the cost of other utilities such as drinking water, wastewater, and electricity, but that doesn't mean that all properties charged stormwater fees can afford them.

Low-income households often don't have any control over their stormwater fees. The most common type of stormwater fee in the United States is one based on ERUs, and many of those programs charge all residential properties one ERU regardless of the amount of impervious surface. The next most common type of stormwater fee is a flat fee where, again, all residential properties pay the same fee, regardless of the amount of impervious surface. The only way a residential property may have to reduce their stormwater fee cost is to construct an on-site BMP, and that may be too expensive for a low-income family.

Some non-residential properties also struggle to pay stormwater fees. Office buildings and shopping centers have a lot of impervious surfaces but often are profitable entities. There are other types of non-residential properties, though, that have a lot of impervious surfaces but are not as profitable, such as churches, hospitals, and schools. These properties may struggle to pay stormwater fees.

Stormwater Fee Dashboards
The University of North Carolina Environmental Finance Center offers interactive dashboard tools on stormwater fees in addition to their dashboards on drinking water and wastewater rates, based on statewide surveys. Dashboards are available for Georgia, Iowa, and North Carolina as of the writing of this guide and can be accessed at this website: https://efc.sog.unc.edu/dashboards/

3.4 Taxes

The other major source of revenue to cover the day-to-day operating costs of stormwater management programs is taxes. Taxes may be used instead of or in conjunction with stormwater fees.

Most stormwater management programs are run by local government units, such as cities, towns, villages, counties, and special districts that are legally allowed to levy certain taxes to fund their programs. The types of taxes that can be used for stormwater management programs depend on state, territorial, Tribal, and local laws, so you are strongly encouraged to consult with municipal financial advisors and/or attorneys about what types of taxes are available for your community.

One common form of tax revenue used by stormwater management programs is property tax revenue. Property taxes are taxes imposed on the value of real property, such as land, buildings, and structures. Property taxes are based on the assessed value of the property, which is determined by local tax assessors. Property taxes are a stable and reliable source of revenue. They distribute the burden among property owners based on the assessed value of their properties.

The other common form of tax revenue used by stormwater management programs is sales tax revenue. Sales taxes are taxes imposed based on the cost of goods and services. They are collected at the point of sale, usually by the retailer. The tax is added to the purchase price of goods and services, and the total amount is paid by the consumer. Sales taxes can generate revenue from both residents and visitors. The burden is spread among a broader base of consumers. Sales tax revenue may fluctuate based on economic conditions, however, and not all goods and services are subject to sales taxes, depending on local laws and regulations.

Collecting stormwater fees through existing tax collection mechanisms can streamline administrative processes. Leveraging established tax collection systems reduces the need to create separate billing structures, which can be more cost-effective and efficient. Using tax revenue also emphasizes that stormwater management is a community-wide responsibility. It reinforces the idea that all residents and property owners benefit from effective stormwater programs, and therefore, everyone contributes to the associated costs through taxation—at least every entity that pays taxes. Not every property that contributes to stormwater runoff, however, pays taxes. Churches, universities, other non-profits, and government facilities are exempt from paying property taxes, for example, but they may generate a significant amount of stormwater runoff. There is at best a weak relationship between property value and stormwater runoff volume, and there is no relationship at all between the value of goods purchased and stormwater runoff. There are also lots of competing demands for tax revenues to fund other essential local services such as education and public safety.

3.5 Fees or Taxes: Which Revenue Approach is Correct?

Stormwater management programs across the United States right now are funded by fees, by taxes, or by a mix of both. This may lead some communities to ask, which revenue approach is “correct”?

There is no one-size-fits-all approach to funding stormwater programs. The choice of program revenues should be based on local considerations, community preferences, and the goals of the stormwater management program. It is important for communities to weigh the relative benefits and drawbacks of each approach.

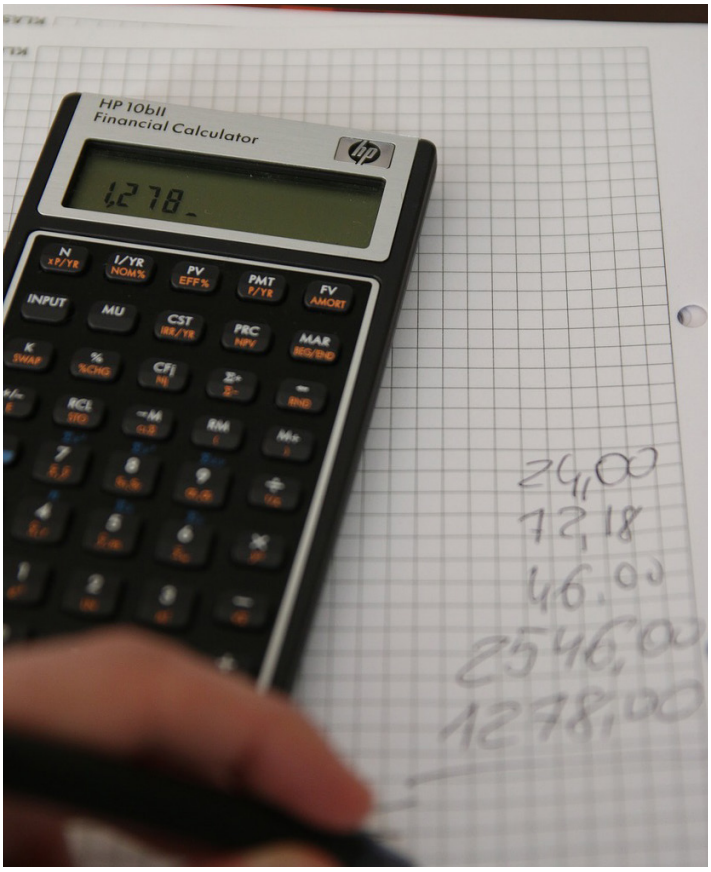
Fees often have a more direct relationship to the impact the property has on stormwater runoff. Fees are often based on the user-pay principle, meaning those who benefit from stormwater services or contribute more to stormwater runoff bear a larger financial burden. This can be perceived as a fair and equitable way to allocate costs. Credits and incentives for green infrastructure or BMPs can lead to reduced fees for those who actively contribute to runoff reduction. Fees are a dedicated revenue stream.

The introduction of new fees, however, may face public resistance, especially if residents perceive

them as additional financial burdens. Effective communication is crucial to gaining community support. Fee structures must also be carefully designed to address equity concerns.

Tax revenue, in particular property tax revenue, provides a stable and predictable funding source, allowing for long-term planning and program implementation. Municipalities can count on consistent revenue, which is especially important for ongoing maintenance and infrastructure projects. Funding through taxes emphasizes that stormwater management is a community-wide responsibility. Integrating stormwater funding into the general budget allows for better coordination with other municipal services and infrastructure projects. Using existing tax collection mechanisms can reduce administrative burdens associated with creating separate billing structures for new fees.

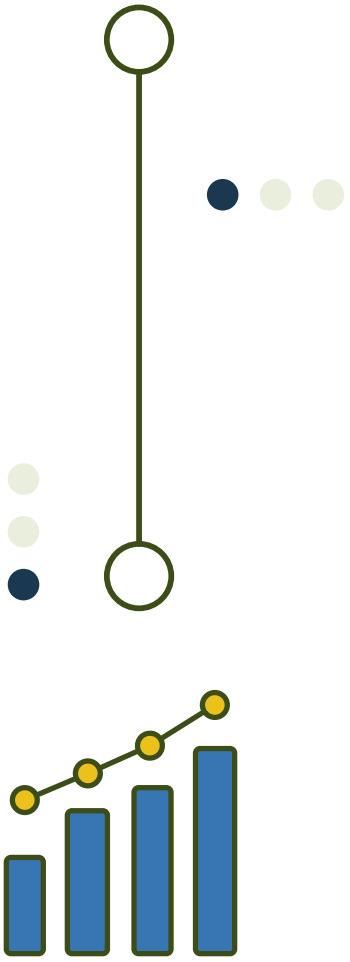
Property taxes, however, may not directly align with stormwater runoff impacts, potentially leading to concerns about fairness. Some residents may feel that they are paying more than their fair share. Taxes may also not provide as direct of a link between payment and usage as fees provide. This could lead to less awareness among residents about the specific stormwater services they are funding.



Source: https://pixabay.com/photos/money-bills-calculator-to-save-256305/

Some municipalities may use a combination of both approaches to balance their advantages and to address specific drawbacks.

Another consideration in choosing a revenue approach is to calculate how much different properties would pay each year under a fee approach versus under a tax approach. This consideration is best explained with an example, and the remainder of this chapter will present a case study of a community.



3.6 Stormwater Revenue Case Study

This case study will examine how much different properties will pay to fund the community of Woganville's stormwater management program under two revenue scenarios. The name Woganville is made up, but the data in this case study are actual numbers from a small community.

Woganville is a town of about 3,800 people with just under 2,000 parcels within its limits. The community's median household income is $44,700, which is lower than the state and national averages.

The stormwater management program's annual budget is $316,629. This budget includes the costs of salaries and benefits, payroll taxes, office supplies, supplies for operations, fuel, tools, travel, vehicle maintenance, street sweeping, drainage repairs, training, engineering services, legal fees, consulting fees, and the annual financial audit.

Woganville is considering two revenue alternatives: funding their stormwater management program exclusively with ERU-based fees or funding the program exclusively with property taxes.

For stormwater programs funded by fees, the basic formula to determine the price per ERU is:

Total Stormwater Budget / Total ERU's = Price Per ERU

For Woganville, the price per ERU would be:

$316,629 / 6,597 = $48.00 per ERU

For stormwater programs funded by property taxes, the basic formula to determine the price per dollar of assessed tax value is:

Total Stormwater Budget / Total Assessed Property Value = Price per Dollar of Assessed Value

For Woganville, the price per dollar of assessed property value would be:

$316,629 / $330,028,106 = $0.00096 per Dollar of Assessed Value

The figure below summarizes the prices that Woganville could charge its customers to fund its stormwater program fully.

ERU-Based Fees	Property Taxes
• Size of each ERU: 3,250 sq ft • Total ERUs: 6,597* ** Under the ERU model, all residential customers pay one ERU.*	• Total assessed property value: $330,028,106
ERU Price: $48.00 annually	**Per dollar of assessed value: $0.00096**

Woganville is concerned about the stormwater bills that four different types of properties would pay under each of these revenue alternatives:

- A small house, typical on the town's north side, where many of the community's lower income residents live.
- A two-story new home in a growing development on the east side of town.
- A church with a large parking lot.
- A commercial facility where the property is almost all impervious surface.

The figure on the next page shows details on the four properties.

Small House

Assessed Value: $117,110

Impervious Area: 2,300 sq ft

ERUs: 1

Large House

Assessed Value: $239,980

Impervious Area: 2,280 sq ft

ERUs: 1

Church

Assessed Value: $0

Impervious Area: 30,576 sq ft

ERUs: 9.408

Commercial Facility

Assessed Value: $612,746

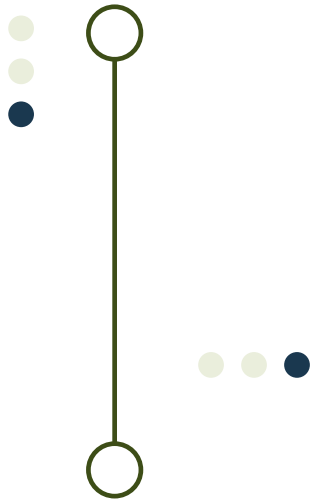
Impervious Area: 137,300 sq ft

ERUs: 42.246

These four properties would pay significantly different annual amounts to support the stormwater management program depending on whether Woganville chooses to fund the program exclusively with ERU-based fees or funding the program exclusively with property taxes, as the table below shows. Residential properties pay higher annual costs if the program is tax-based, while non-residential properties pay higher annual costs if the program is fee-based.

Property	Annual Bill if ERU-Based Fees	Annual Bill if Property Taxes
Small House	$48.00	$112.00
Large House	$48.00	$230.00
Church	$452.00	$0.00
Commercial Facility	$2,028.00	$588.00

Both of these revenue alternatives will generate $316,629 for Woganville's stormwater program, the total needed to fund the program fully. But they each have their pros and cons, as discussed in this chapter, and each impacts different properties in different ways. It will be up to Woganville's leadership to decide which approach is the most fair and appropriate for their community. Should non-profit entities with large parking lots like churches, schools, and hospitals pay stormwater fees in relation to their impervious area, or should they be exempted from paying as they are from other tax-supported activities because they have limited resources and provide a public benefit? Should a smaller home and a larger home pay the same fee for stormwater because they have similar amounts of impervious surface, or should the larger, more expensive home pay more because they can likely afford more? There are no clear answers to these questions. Communities should consider all the benefits and drawbacks of taxes and fees, fairness, and the cost to individual parcels when choosing the right revenue alternative for their stormwater management program.



CHAPTER FOUR

Financing and Managing Stormwater Infrastructure

In addition to covering day-to-day operating costs, stormwater management programs must also pay for the rehabilitation and refurbishment of existing stormwater infrastructure and the construction of new stormwater infrastructure. Stormwater infrastructure includes storm drain systems, physical Best Management Practices, street sweepers, vac trucks, and other vehicles.

One strategy for paying for infrastructure improvements is to build up reserves ahead of time and then use cash for the capital items when they need to be replaced. This approach involves careful planning. Saving an appropriate amount of money requires anticipating when an asset will need to be replaced and determining how much the replacement will cost. Then, money needs to be set aside every year between now and then to ensure that there is enough money in the bank when the time comes. If the asset must be replaced ahead of the anticipated schedule, there may not be enough money saved to pay for its replacement.

Many small communities instead rely on debt financing to pay for capital improvements. Debt financing involves borrowing money at the time the asset is replaced and then paying back the loan, with interest, over time. Communities have multiple options of where to borrow money. Some utilities borrow money through the bond market. Others get loans from traditional lenders such as banks and credit unions.

Federal, state, and territorial governments also offer subsidized loan and grant programs for critical and urgent capital projects. Eligibility for these programs often depends on the size of the community. The first part of this chapter provides an overview of a handful of the most commonly used federal programs. Because terms and eligibility change over time, it is strongly recommended that you consult with the relevant funding agencies before applying for any loan or grant program.

The Universe of Funding Programs

There are dozens of funding programs available from federal, state, and territorial governments that can be used for stormwater projects. There are also funds available from private and philanthropic sources. This guidebook only highlights a few of the major programs at the federal level. For a more thorough list of infrastructure funding programs available to your community, please consult EPA's Water Finance Clearinghouse and filter for the stormwater sector: http://www.epa.gov/wfc

4.1 USDA

One major funder of infrastructure upgrades for stormwater management programs is the U.S. Department of Agriculture (USDA). The Water and Waste Disposal Loan and Grant Program provides funding for stormwater collection, transmission, and disposal, as well as for drinking water, sewer, and solid waste infrastructure, in eligible rural areas. Eligible applicants include most state and local governmental entities, private nonprofits, and federally recognized Tribes. Applicants must be rural areas and towns with populations of 10,000 or less, Tribal

lands in rural areas, or Colonias. Long-term, low-interest loans with payback periods up to 40 years are available. If funds are available and the community meets certain criteria, a grant may be combined with a loan if necessary to keep user costs reasonable. Applications are accepted year-round and may be filed electronically using RDApply, which is USDA's online application portal, or through your local USDA office. Information on the Water and Waste Disposal Loan and Grant Program is available at: https://www.rd.usda.gov/programs-services/water-environmental-programs/water-waste-disposal-loan-grant-program

A Resource for Borrowers

RCAP has published USDA Rural Utilities Service Borrower's Guide: A How-to for Water and Wastewater Loans from USDA Rural Development to help small communities obtain and manage funding from USDA. The guide includes a description of basic requirements for USDA financing, guidelines for meeting borrower responsibilities, and instructions for preparing and submitting required management reports. The free guide is available for download at: https://www.rcap.org/managerialfinancialhub/obtaining-infrastructure-funding/

Tribes may also access funds through USDA's Water and Waste Facility Loans and Grants to Alleviate Health Risks on Tribal Lands program, which allows funds to be used for infrastructure to handle stormwater drainage. Information on the Tribal program is available at: https://www.rd.usda.gov/programs-services/water-environmental-programs/water-and-waste-facility-loans-and-grants-alleviate-health-risks-tribal-lands

Colonias may also access funds through the similar Water and Waste Facility Loans and Grants to Alleviate Health Risks for Colonias program that includes stormwater drainage. Information on the Colonias program is available at: https://www.rd.usda.gov/programs-services/water-environmental-programs/water-and-waste-facility-loans-and-grants-alleviate-health-risks-colonias

USDA Income and Property Eligibility Site

The USDA Income and Property Eligibility Site is used to evaluate the likelihood that a potential applicant is located in an eligible rural area and that the household income in that area meets certain guidelines. The site can be accessed here: https://eligibility.sc.egov.usda.gov/eligibility/

4.2 EPA

The U.S. Environmental Protection Agency (EPA) is also a major funder of stormwater infrastructure projects for communities of all sizes. The Clean Water State Revolving Fund (SRF) is the primary EPA program for stormwater management. The Clean Water SRF is a partnership between the federal government and state and territorial governments. EPA disburses funds to all 50 states and Puerto Rico; in turn, the state and Puerto Rican SRFs loan the funds for eligible infrastructure projects. Interest rates range from zero percent to market rate, and terms are typically up to 30 years. General information on the Clean Water SRF is available at: https://www.epa.gov/cwsrf

To apply, communities should contact the entity in their state or territory that administers the loan programs Clean Water SRF contacts are available here: https://www.epa.gov/cwsrf/state-cwsrf-program-contacts

The Clean Water SRF is perhaps best known for funding wastewater infrastructure, but there are eleven types of projects that are eligible to receive assistance, including projects related to stormwater. The Clean Water SRF can fund any public, private, or nonprofit entity for measures to manage, reduce, treat, or recapture stormwater or subsurface drainage water.

EPA also provides direct grant funding for stormwater in the District of Columbia, the U.S. Virgin Islands, American Samoa, Guam, and the Northern Mariana Islands under the Clean Water SRF program. The funds are managed by EPA's offices in Region 2 for the Virgin Islands, Region 3 for Washington, DC, and Region 9 for American Samoa, Guam, and the Northern Mariana Islands. Applications to these programs are made through the appropriate EPA regional office.

Tribal communities and Alaska Native Villages may be able to access loans for stormwater projects through the state where their Tribal lands are located. Projects under the Clean Water Indian Set-Aside

Program, EPA's grant program for Tribal communities, must be related to wastewater infrastructure. Projects that correct combined sewer overflow systems are eligible, but most other stormwater infrastructure projects are not. Information on the Indian Set-Aside Program can be found at: https://www.epa.gov/small-and-rural-wastewater-systems/clean-water-indian-set-aside-program

Clean Water SRF and Stormwater

EPA has a webpage explaining how the Clean Water SRF can be used to fund both "green infrastructure" and "grey infrastructure" solutions to stormwater management. The page also includes multiple case studies and can be accessed here: https://www.epa.gov/cwsrf/clean-water-state-revolving-fund-cwsrf-stormwater

EPA's Sewer Overflow and Stormwater Reuse Municipal Grant (OSG) Program can be used for the planning, designing, and construction of stormwater management projects, combined sewer overflows (CSOs), and sanitary sewer overflows (SSOs). Grants are awarded to states and territories, which will then provide sub-awards to eligible entities for projects that address infrastructure needs for CSOs, SSOs, and stormwater management. Projects for communities that are financially distressed are prioritized. Tribal communities are eligible to apply in the states where their sovereign Tribal lands are located. Information on the OSG Program can be accessed at: https://www.epa.gov/cwsrf/sewer-overflow-and-stormwater-reuse-municipal-grants-program

Grants Are Not Entirely Free Money

Grants can help communities cover the cost of needed stormwater infrastructure by limiting the financial impact on households and businesses. But before you jump in, know that grants are not entirely free money. It takes a lot of time and effort to complete a grant application. Construction grants require some level of professional planning including a full preliminary engineering report, which can be expensive. Once completed, the application can take months to be processed, and any processing delays can add to project costs. Grants are highly competitive, not guaranteed, and require diligent bookkeeping and reporting once awarded. If you're considering a grant, be aware of any community "matching" fund (as a percentage of project cost) requirements, and understand which expenses or purchases are grant eligible. RCAP's Technical Assistance Providers can assist with the development of loan and grant applications.

4.3 Other Federal Funding Options

There are multiple federal funding programs that are not specifically designed to fund stormwater management programs. But, where installing stormwater infrastructure will help achieve the goals of the funding program, stormwater management for these federal programs is a means to an end.

USDA's Watershed Protection and Flood Prevention (WFPO) Program allows funds to be used for certain flood mitigation activities such as improvements to natural drainageways or channels to prevent significant flood damage to existing developed property. Information on WFPO is available at: https://www.nrcs.usda.gov/programs-initiatives/watershed-and-flood-prevention-operations-wfpo-program

EPA's Section 319 grants are given to states, territories, and Tribes for their nonpoint source management programs to restore watersheds. Communities may apply to their state or territory for funding where stormwater BMPs are the strategy they use to restore watersheds, for example. Information on Section 319 grants is available at: https://www.epa.gov/nps/319-grant-program-states-and-territories

FEMA has funding available to help communities recover from natural disasters including floods, but FEMA also has funds available to lessen the impacts of natural disasters proactively. The Flood Mitigation Assistance grant program makes federal funds available to states, territories, federally recognized Tribal governments, and local governments to reduce or eliminate the risk of repetitive flood damage to buildings insured under the National Flood Insurance Program. These projects improve drainage and reduce flood risk for communities and can include numerous activities overlapping with stormwater management programs. Information on the Flood Mitigation

Assistance program is available at: https://www.fema.gov/grants/mitigation/flood-mitigation-assistance

FEMA also sponsors the Building Resilient Infrastructure and Communities (BRIC) program to reduce the risks communities face from disasters and natural hazards. Stormwater management is an eligible program activity. Information on BRIC is available at: https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities

State, Territorial, and Regional Funds

In addition to the federal programs identified in this chapter, your state or territory may also have loan or grant programs that can be used for stormwater management projects. Consult with your state or territory's infrastructure funding authority or with EPA's Water Finance Clearinghouse to see if there are programs available to your community. https://www.epa.gov/waterdata/water-finance-clearinghouse

Communities that receive grants do not need to repay them. Communities that receive loans can use stormwater fees and/or tax revenue to pay back the principal and interest costs. There are two additional funding mechanisms communities can use for stormwater infrastructure that are discussed below: special assessments and having developers pay at the time of construction.

4.4 Special Assessments

Some stormwater management projects like BMPs only benefit certain parts of a community, such as a specific neighborhood or commercial area. Communities can consider paying for these projects through special assessments.

Special assessments refer to additional charges or levies imposed by a local government on property owners for the purpose of financing specific public improvement projects or services such as stormwater management. These assessments are typically imposed only on properties that directly benefit from the improvements or services. Special assessments are separate from regular property taxes and are earmarked for specific projects or services rather than general municipal operations. Payment may be made in a lump sum or through installments over a specified period. In some cases, the annual amount owed on the assessment may be included in property tax bills. Levying a special assessment gives communities an opportunity to remind residents and businesses of the importance of stormwater management.

States, territories, and Tribal governments often set rules about the types of projects communities can fund through special assessments. It is strongly recommended that you consult with your attorney before implementing this funding mechanism.

4.5 Having Developers Pay at the Time of Construction

Stormwater BMPs are most commonly required for new development. Communities may require developers of new residential neighborhoods and commercial properties to contribute financially to stormwater management efforts, either by directly implementing stormwater BMPs on-site or by paying fees that go towards community-wide stormwater management initiatives. These fees could be based on the size of the developed area, the amount of impervious surface created, or other factors. The cost of the BMPs or the fees are then rolled into the price that developers charge for the properties they are developing.

Having developers pay is a way to ensure that stormwater from new construction is managed properly, and communities can mandate that BMPs are installed before issuing certificates of occupancy. This approach, however, is often invisible to the beneficiaries of the BMPs: the property owners. They essentially pay for these stormwater management installations through their mortgages, often without even realizing it. Communities will need extra public education efforts to remind residents and businesses benefitting from these BMPs of the importance of stormwater management.

Communities should think proactively about their stormwater infrastructure when new development occurs. For example, a community may be planning to build 200 new homes in one area of town over the next decade, and a developer has been approved to build the first 40 of those homes. It would be more prudent and cost-effective to design and construct stormwater infrastructure in that area to serve all 200 homes, but it would not be fair to ask the initial developer to pay for more than the share of that infrastructure needed for the first 40 homes. The community will need to consider a mix of funding sources to install this infrastructure.

4.6 Managing Infrastructure Over Time

Stormwater infrastructure is expensive to install, so communities should strive to get the longest useful life out of it before it has to be refurbished or replaced. Stormwater infrastructure is very susceptible to damage because it is typically very shallow and should be inspected more frequently than other water-related infrastructure. Properly-maintained stormwater systems can also prevent excess I&I—inflow and infiltration, or runoff from stormwater systems entering sanitary sewer systems. I&I raises the cost of sewer treatment and can damage sewer infrastructure.

Two best practices for communities to maximize the useful life of stormwater infrastructure are preventative maintenance and asset management.

Preventative Maintenance

Preventative maintenance of stormwater infrastructure involves proactive measures to inspect, clean, repair, and optimize stormwater management facilities and systems to ensure their functionality and longevity. This type of maintenance is critical for preventing issues such as flooding, erosion, water quality degradation, and structural failure. Preventative maintenance is typically part of a comprehensive stormwater management program and includes various activities aimed at keeping infrastructure in good working condition.

Preventative maintenance activities include:

- Inspecting stormwater infrastructure to identify early signs of deterioration, blockages, or other issues that could impact functionality.
- Removing accumulated sediment, debris, and pollutants from stormwater infrastructure, which helps maintain the design capacity of the system and prevents clogging.
- Managing vegetation in and around stormwater infrastructure to prevent overgrowth that could impede water flow or compromise the structural integrity of facilities.
- Regular maintenance may include trimming vegetation, removing invasive species, and promoting the growth of beneficial plants.
- Repairing cracks, addressing erosion, stabilizing embankments, and fixing damaged components to prevent further deterioration.

Preventative maintenance is an ongoing process that helps extend the life of stormwater infrastructure, reduce the risk of system failures, and ensure that stormwater management goals are met effectively.

Asset Management

All stormwater infrastructure will eventually wear out and need to be replaced, even if the community is diligent in conducting regular preventative maintenance. Communities must understand when their critical infrastructure is likely to fail and have a plan to pay for its replacement. One tool that communities can use to plan for these future capital needs is asset management. This planning is especially important for smaller communities that have fewer residents and businesses to help share in the cost of replacing assets.

Asset management is a comprehensive, integrated process for maintaining infrastructure and equipment for the most effective, least-cost allocation of resources, in order to sustain the stormwater management system over time. True asset management looks at each piece of infrastructure in a big-picture, "whole life" way that includes planning, financing, assessing risks, maintenance, record-keeping, and prioritizing replacement. Asset management has helped many communities save money over time. By being proactive versus reactive and not waiting until something breaks to replace it, communities are often able to provide more affordable, reliable service with fewer negative impacts for customers.

The asset management process assumes that you do not have enough money to do all the capital projects you wish, so it helps to identify which projects are most critical to maintain compliance and to maintain service to your community.

The stormwater asset management process is the same process your community may be using to sustain your water and wastewater infrastructure.

Asset management requires asking and answering five critical "core" questions, identified by the EPA:

- What are my assets, and what condition are they in?
- What are my sustainable level-of-service goals?
- What assets are most critical in achieving those goals?
- What are the minimum life-cycle costs of those critical assets?
- What is the best long-term funding strategy?

One aspect that can make stormwater asset management unique from water and wastewater asset management is the decentralized nature of stormwater assets. There may be significantly more assets for stormwater management programs that are spread out across the community's entire geographic footprint. Some of the assets will be on private property, and the stormwater management program will need to determine who is legally and financially responsible for these stormwater assets, as discussed in Chapter 1. If the community decides that stormwater BMPs on private property are the financial responsibility of the property owner, the stormwater management program should consider helping to educate those property owners on stormwater asset management, the benefits of proactive infrastructure replacement, and ways to pay for these critical assets.

Asset Management Resources

Several Environmental Finance Centers (EFCs) have resources on asset management programs for stormwater.

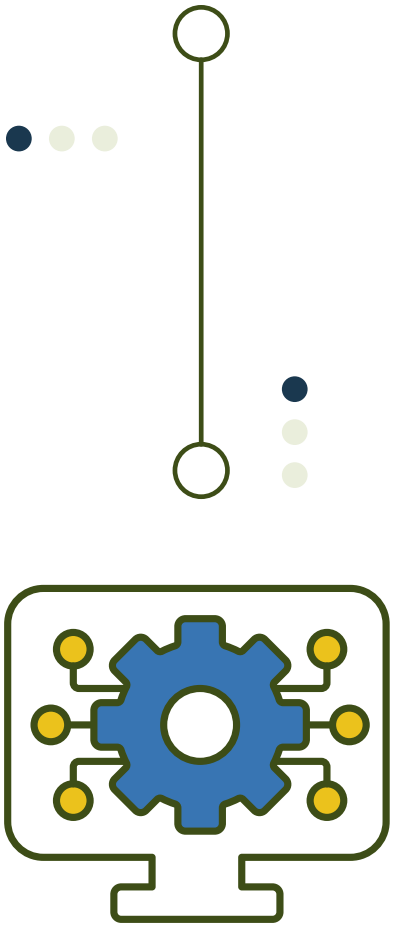
RCAP's Asset Management Guidebook
A starting point for creating an asset management plan for small water and wastewater systems in rural and Tribal communities:
https://www.rcap.org/wp-content/uploads/2024/09/RCAP-Asset-Management-Guidebook-2024.pdf

The University of Maryland EFC published an issue brief to introduce local governments to the asset management process and to show how it can be applied in managing stormwater assets:
https://arch.umd.edu/research-creative-practice/centers/environmental-finance-center/resources/publications/asset-management-stormwater

The Sacramento State Office of Water Programs EFC developed a free toolkit for asset management in municipal stormwater programs:
https://www.efc.csus.edu/asset-management/

The Southwest EFC has partnered with EPA to create a repository of documentation and tools related to Asset Management called the Asset Management Switchboard. While this repository is primary intended for water and wastewater systems, the principles included also apply to stormwater management systems. The Switchboard is available at:
https://swefcamswitchboard.unm.edu/am/

EPA has a guidebook on Asset Management in its Simple Tools for Effective Performance (STEP) guide series. This guide is written for small drinking water systems, but the principles and guidance also apply to stormwater infrastructure. The guide is available at:
https://www.epa.gov/dwcapacity/simple-tools-effective-performance-step-guide-series



CONCLUSION

Effective stormwater management provides many benefits to communities. Preventing flooding by controlling the volume and velocity of stormwater runoff protects human life and limits property damage. Flood management can also protect sewer infrastructure and prevent the release of untreated wastewater into the natural environment. Effective stormwater management also improves local water quality by limiting the pollution from runoff before it reaches sensitive water bodies. This can also lower the cost of treating drinking water.

Some communities are legally required to manage stormwater, but all communities benefit from fewer floods and better water quality. The most effective stormwater infrastructure combines storm drain systems that collect runoff with Best Management Practices or BMPs that treat runoff before it is released into the natural environment.

Communities can pay for stormwater management programs through tax revenue collected from citizens and businesses, from stormwater fees, or from a combination of both. There are also numerous federal loan and grant programs to help install stormwater infrastructure. The most effective programs use preventative maintenance and asset management to get the longest useful life out of their infrastructure, limiting costs.

Stormwater programs are complex, and navigating the myriad stormwater regulations and funding programs can be complicated. RCAP and its regional partners stand ready to assist small communities with the establishment, funding, and ongoing management of stormwater programs. Please use the back cover of this guide to identify the RCAP regional partner that serves your geographic area. Together, we can help ensure that our country's waters remain clean and our communities remain safe today and for generations to come.