Issue Brief: Asset Management for Stormwater

CONTENTS

What is asset management?

Core components of asset management

Getting started

Resources

What is asset management?

Asset management is a strategic approach to maintaining and sustaining infrastructure in order to meet the needs of the community at the lowest overall life cycle cost. This approach helps communities know how and where to prioritize limited funds in order to achieve the greatest benefit. Often applied to drinking water and wastewater infrastructure, this method is well suited to managing any assets, including stormwater systems.

This issue brief is intended to introduce local governments to the asset management process and to show how it can be applied in managing stormwater assets. It was adapted from an appendix written by the Southwest Environmental Finance Center in Local Government Stormwater Financing Manual: A Process for Program Reform, published by the Environmental Finance Center at the University of Maryland.

Core components of asset management

Five core components make up an asset management program: current state of the assets, level of service, criticality, life cycle costing, and long-term funding. These components are interrelated and can be completed in any order. Each is briefly described below.

Current state of the assets

A fundamental component of asset management is determining which physical assets make up your system.

For the purposes of asset management, an asset is anything you own that has value. You can choose to limit the definition of an asset by imposing a dollar limit (such as anything over $500 in value) or by selecting anything you would write a work order on. Limiting assets in this way prevents you from having to track every nut and bolt in a system while still keeping all important assets in the inventory.

Assets that might comprise a stormwater management system

Retention ponds
Catchment basins
Pipes
Filters
Rain gardens
Tree boxes
Vegetated swales
Permeable pavements
Vegetated roofs
Cisterns
Maintenance equipment

In developing an inventory of your system assets, start with any data you already have, such as existing inventories or asset identification systems, as-built drawings or other maps, system records, photographs, and interviews with staff members.

Your inventory should include the following information for each asset:

- Current condition
- Estimated remaining useful life
- Historic value (if known) and replacement value
- Whether it requires energy
- Date of installation
- Serial number and manufacturer
- Manufacturer's suggested maintenance
- Other descriptive information such as type of material, size, etc.

Each asset should be given a unique identifier, preferably one that indicates its type and location, such as ESC1 for Elm Street Catchment Basin 1. Each asset should be inspected to the extent possible to gauge current condition. During these visits, take pictures of each asset to provide a permanent record. A helpful

This issue brief was developed by Environmental Finance Center Network (EFCN) with funding from the U.S. Department of Housing and Urban Development and the Environmental Protection Agency. As a member of the Sustainable Communities Learning Network, EFCN is providing technical assistance to recipients of grants from the federal Partnership for Sustainable Communities, which helps towns, cities, and regions develop in more economically, environmentally, and socially sustainable ways. Learn more: www.sustainablecommunities.gov.

technique is to bring a white board with you so that you can write the asset's identifier on the white board and take the picture with the board in front of the asset. This will help you easily identify the asset in the picture later.

The information you collect can be stored in a simple spreadsheet or database, or in a commercial product specifically designed for asset inventories. You will also want to create a map of your assets. This can be done at any level of sophistication, from a hand-drawn map to one created using GoogleEarth or Geographic Information Systems (GIS). If you do have GIS capability, you can link the information you've collected about each asset to its physical location.

Level of service

It is important to think about expectations for your stormwater system. What does your community want, and what will it take to achieve that goal? For example, your community may be most interested in retaining water in order to recharge shallow aquifers, or it might care most about protecting property during heavy rains or meeting water quality parameters.

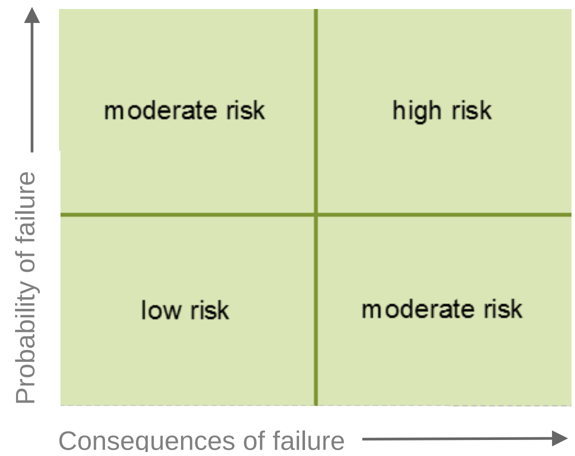
Based on these expectations, you should set goals for each of the services your system will provide. Make sure these goals meet the SMART criteria (specific, measureable, attainable, relevant, and timebound). For example, a system may set the following goal: We will operate our system such that we are able to absorb into the ground the first inch of rain from each rainfall event. The goal should be monitored over time to determine if it is being met and if not, what actions may be taken to resolve the issue.

The goals you set do not have to be permanent but rather may evolve as your community's conditions and expectations change. Goals can also increase or decrease over time, but it should be understood that level of service goals are directly tied to cost. Higher levels of service typically generate higher costs, while lower levels of service cost less. It is important for the community to understand this connection, as they will ultimately be paying for installation and upkeep of the stormwater system. When customers have a say in the level of service they want – and when they understand how much it will cost to provide that service – they are more willing to pay for it.

Criticality

Not all assets are equally important to the system. In this component, you will identify those assets that are more critical to the system's overall functioning and therefore require more attention.

Criticality is determined by considering two factors: how likely the asset is to fail, and how serious the consequences will be if it does fail. An asset that is highly likely to fail and will cause serious consequences if it does is much more critical than one that is unlikely to fail and will not cause any major problems if it does (see chart, below).



There are several modes of failure to consider:

- Mortality: The asset stops functioning due to a physical collapse or break.
- Capacity: The asset is functioning but will not provide the quantity of service required (e.g., a pipe that will not pass a sufficient quantity of flow).
- Level of service: Changes in customer needs or in regulations demand a higher level of service than the asset can deliver.
- Financial inefficiency: The asset is costing more to repair than it would to replace.

Similarly, there are various types of consequences that can result from an asset's failure. Consider the triple bottom line: financial, environmental, and social consequences. An asset's failure may damage an important wildlife nesting site, causing limited financial loss but significant environmental damage, for example. Or an asset's failure may cause serious harm to an industrial park or roadway, having significant social consequences for the customers.

The following formula may be used to calculate criticality:

Criticality = POF x COF x RF

POF = probability of failure

Use a rating of 1-5 or 1-10 that indicates how likely that particular asset is to fail, employing any of the above definitions of failure.

COF = consequence of failure

Use a rating of 1-5 or 1-10 that indicates how bad the particular consequences of failure would be.

RF = redundancy factor

This factor takes into account whether other assets are able to serve the function if the original asset fails. For example, if you have a pumping facility with three pumps and only need two, there is redundancy of 50%. A factor of 0.5 could be applied to the risk calculation for that asset, reducing the overall risk. Redundancy factors may be set at other values if desired, as long as it is consistent within the system. The redundancy factor should never be 0 no matter how much redundancy there is.

Identifying critical assets will help you prioritize maintenance and replacement dollars, so that important parts of the system are properly maintained and replaced when necessary, avoiding catastrophic breakdowns in the stormwater system. Beyond asset replacement, other options for managing known risk are creating redundancy in the system, keeping spare parts on hand in case of failure, and training staff so they are ready to respond to an emergency effectively.

As with level of service, criticality is not static. It should be reassessed every year at least, as well as when major changes are made, such as upgrades, replacements, major construction, or rehabilitation.

Life cycle costing

The most important part of the process is determining how to manage an asset over its entire life. Consider all costs, including initial installation, operation & maintenance (O&M), repair, rehabilitation, replacement, and disposal. If you consider only initial costs when deciding which asset to install, you may end up paying more in the long run. An asset that costs less to install, for example, might cost more to operate or repair.

Once an asset is installed, you will need to make decisions regarding which operation and maintenance activities to conduct, when to make repairs or rehabilitate the asset, and when to replace it. It is clear that routine and preventative maintenance helps extend an asset's life, but this requires time, money and resources. Therefore, managers must determine a reasonable amount of maintenance for each asset. This decision should rely on the criticality analysis, so that if choices have to be made regarding how to spend limited maintenance dollars, more of the budget will be spent on highly critical assets.

Similarly, asset repair, rehabilitation, and replacement decisions should be made using your criticality analysis. If an asset is highly critical – meaning its failure will cause considerable consequences – the decision will most likely be to rehabilitate or replace it rather than repair it. If an asset is moderately critical, it will probably be either repaired or rehabilitated. If it is low criticality, it will probably be repaired. The most critical assets should be replaced *before* failure occurs, while low-risk assets could be allowed to fail.

> The most important part of the process is determining how to manage an asset over its entire life. This decision should be data-driven.

The most important point with life cycle costing is to make data-driven decisions. Decisions about replacement of various assets should be made with knowledge of their condition, their repair history, the potential for rehabilitation practices, and related considerations in mind.

Long-term funding

Managing assets requires adequate funding. Funds are needed to perform routine maintenance, to pay staff, and to repair and replace assets. In this component of an asset management program, managers estimate costs for properly sustaining assets over time and develop a strategy for obtaining needed funds. Communities use various sources of revenue for stormwater management programs, ranging from general fund allocations to dedicated stormwater fees.

For communities seeking to create a new source of funding, it is critical that those who will benefit from stormwater management are involved in the process, so that they are supportive of the means chosen. The more that community members understand the benefits they'll be receiving, the more willing they will be to pay for managing the system.

Getting started

The best way to get started with asset management is to jump in. Begin with what you know and start walking through the steps. While they can be completed in any order, it's smart to begin by creating an inventory and map of your assets, if these are not already available. Getting to know the components of your stormwater program – where they're located, what condition they're in – will lead naturally to setting level of service goals for each asset and prioritizing where to spend O&M and asset replacement dollars.

As you launch your program, think about who should be involved in the process. While much of the work can be completed by a single staff member, it may be helpful to convene a team to oversee the process and help generate support for it. Your team might include relevant staff members, elected officials, and members of the public. Engaging the public right from the start is a wise idea, especially if you plan to develop a funding strategy.

Be sure to build in a method for measuring your progress, so that you can communicate your successes down the road. The Asset Management IQ Tool, described below, is one way to gauge your knowledge at the beginning of the process and to track improvement as you go. A final tip if you're just getting started is to reach out to other communities that have done asset management. The experience of peers is one of the best resources for any community wanting to successfully undertake this effort.

Resources

Asset Management for Stormwater: Making the Most of Your Investment. Environmental Finance Center Network, November 13, 2013. This webinar overviews the concept of asset management (AM) and its five core components, and it shares experiences of several Mid-Atlantic communities that have successfully used the AM framework to protect their stormwater infrastructure assets.

A.M. KAN Work! New Mexico Environmental Finance Center (now Southwest EFC), 2011. This interactive, self-guided workbook walks users through the basics of AM, using case studies in print and in 200+ video clips. The packet also includes forms and templates for use with Microsoft Excel and Access. To order a copy, contact the Southwest EFC.

Multi-Sector Asset Management Case Studies. US EPA, US DOT, US FHA, 2009. This report presents case studies from communities that are considering multi-sector or "whole government" AM strategies. These case studies are designed to gather lessons learned and summarize the knowledge and experiences of entities that have adopted AM approaches across multiple infrastructure systems.

Asset Management: A Best Practices Guide. US EPA, 2008. Targeted to owners, managers, and operators of water systems, as well as local officials, technical assistance providers, and state personnel, this short guide helps users understand the benefits of AM, best practices in AM, and how to implement an AM program.

Asset Management: A Guide for Water and Wastewater Systems. New Mexico Environmental Finance Center (now Southwest EFC), 2006. The guidebook is intended to support the efficient management of water and wastewater systems in order to meet future service demands and regulatory requirements. While it was developed for wastewater system operators and managers, the basic principles will be relevant to stormwater managers as well.

Asset Management: A Handbook for Small Water Systems. US EPA, 2003. Designed for small community water systems, this guide presents basic concepts of AM and provides the tools to develop an AM plan.

Asset Management IQ Tool. Environmental Finance Center Network, undated. Designed to help asset managers evaluate the progress of their program, this tool contains 30 multiple-choice questions covering the major components of AM and assigns a score based on responses. By taking the test before launching an AM program and repeating it on a regular basis (such as annually), managers can identify their program's strengths and weakness and track their improvement in implementing various components of AM.