



Establish funding

A self-sustaining fund should be established to provide for the costs of long-term maintenance and inspection activities. An initial cost estimate should be prepared at the time of construction and agreed to by all parties involved in the O&M plan. The fund should provide for the costs associated with routine maintenance, property management, inspections and record keeping as well as providing for remedial maintenance that can be anticipated over the life of the stormwater facilities.

Keep complete records

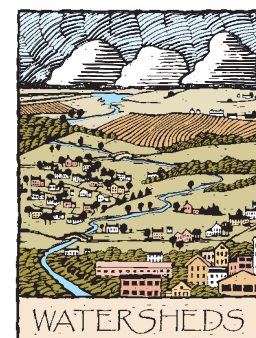
The party responsible for the stormwater facility should keep accurate and complete records. Typical records would include a log of all inspections, repairs and maintenance performed at the site, copies of inspection reports, invoices for work performed, financial records of the funds established to pay for the O&M plan, photographs of the facilities, and copies of the plans and agreements that make up the O&M documents for the site.

Conclusion

Today stormwater facilities are more complex than ever before and subsequently require more attention by the end user. Establishing and putting into action an on-going Operation and Maintenance program is the key to successful stormwater management.

Additional resources

The Watershed Management Institute, Inc. (WMI) has prepared a book for the U.S. EPA Office of Water entitled *Operation, Maintenance, & Management of Stormwater Management* (August 1997). This book is also available at the following EPA Web site <http://www.epa.gov/owow/nps/wmi/>.



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Maintaining Stormwater Facilities A Good Idea Whose Time Has Come

The Chester County Water Resources Authority (CCWRA), as part of the planning efforts completed for *Watersheds, Chester County's Integrated Water Resources Management Plan*, developed "The Ten Principles of Effective Stormwater Management." The "Ten Principles" present a holistic approach to watershed management. Of these "Ten Principles," nine involve practices for effective stormwater management that are incorporated into the design of any subdivision or land development project. Principle number 8 is different. Principle 8 simply states that we should "ensure long-term operation and maintenance of stormwater facilities." This principle is all about seeing to it that the approved and constructed stormwater management facilities actually keep doing what they were designed to do long after the house, shopping center or business park is built. Recommendations on how to accomplish effective long-term operation and maintenance of stormwater facilities are presented herein.

Stormwater facilities include a wide assortment of constructed practices designed to manage, treat, control and/or infiltrate the stormwater runoff from a certain area of land. Typical facilities include swales, sumped storm inlets, infiltration basins, and detention basins. But the best stormwater management facility design cannot preclude the need for long-term maintenance and repair of these facilities in order to keep the facility functioning as originally designed. Lack of proper operation and maintenance is often cited as the number one reason for failure of stormwater facilities.



Periodic removal of collected debris and sediment trapped by storm catch basins is a simple but important maintenance practice.

Maintaining Stormwater Facilities

Developing an Operation and Maintenance (O&M) Program

So, what are the key components of long-term operation and maintenance of stormwater facilities? First is the creation of a detailed drawing or plan and appropriate legal agreement that establishes the Operation and Maintenance (O&M) program, including an O&M plan, for a specific site. Second is implementing the O&M program. This includes performing site inspections and addressing maintenance issues as they occur. Implementation will require funding, record keeping, and the ability to enforce the O&M plan and agreement.

Prepare an O&M plan

The O&M plan (or drawing) is typically prepared during the design and approval process for the site. The goals of an O&M plan are to establish an effective site-specific maintenance program that will prolong the service life of the stormwater facilities, minimize expensive repairs, and ensure its continued safe, effective and reliable performance. An O&M plan should identify the specific owner and responsible party, specify operation and maintenance activities, and be updated with as-built conditions of all stormwater facilities. Typical components to consider when developing the O&M plan are described below.

- **Establish performance standards and access.** The O&M plan should clearly describe the stormwater facilities on the site, and explain how each facility is intended to function and operate over time. All drainage and access easements should be shown and any site restrictions to be recorded against the property identified. All such easements and restrictions should “run with the land” and be binding upon the landowner and any successors in interest.



Constructed stormwater basin berms can be damaged by burrowing animals. This can lead to possible failure of the basin.

- **Describe care and maintenance.** The O&M plan should provide a general description of operation and maintenance activities for all stormwater facilities. Maintenance should be divided into preventive, routine and remedial categories.

Source control is one example of a preventive maintenance strategy that seeks to protect the stormwater facility and therefore minimize maintenance by reducing runoff or pollutants at the source. Source control can include routine street sweeping or reduced use of fertilizers, pesticides, and herbicides.

Routine maintenance addresses the expected activities required to keep the stormwater facility in proper condition. Routine maintenance may include mowing, vegetation maintenance, and clean out of accumulated debris and sediment.

Standardized inspection checklists should be developed for each type of stormwater facility present at a site.

- **Establish inspection schedule and budget.** The O&M plan should describe the actions, budget, and schedule for operating and maintaining the stormwater facilities. The description should be written in a clear manner, consistent with the knowledge and understanding of the intended user. In order to identify and keep track of maintenance needs, a detailed inspection schedule should be established and implemented during the life of the stormwater facility. An inspection schedule will identify what is to be inspected, when to inspect and how often. The goal of the inspection process is to identify maintenance issues so they can be addressed on a regular basis.

Prepare an O&M agreement

A stormwater management agreement should be developed in conjunction with the O&M plan. The agreement should establish the specific parties responsible for ownership of the stormwater facilities and implementation of the O&M plan. The agreement should also establish the entity that may enforce the O&M plan and agreement. Typical restrictions would provide the enforcement entity with the ability to cause corrective measures to be performed or take corrective measures if it is determined that required stormwater facilities have been eliminated, altered, or improperly maintained. In many cases, a municipality is provided the right, but not the responsibility, to enter a site and enforce the O&M plan and agreement. A good agreement will establish how enforcement is to be carried out.

Remedial maintenance refers to the non-routine or corrective maintenance, rehabilitation and/or reconstruction of the stormwater facility that is not otherwise addressed under routine maintenance. Remedial maintenance is typically done when some part of the facility deteriorates due to aging or damage. Remedial maintenance may involve repairing or replacing inlet or outlet structures, or repairing areas of excessive erosion and slope failure.



Remedial maintenance is necessary when some part of the facility deteriorates due to aging or damage, such as the excessive erosion in this swale.