

# **New Jersey Stormwater Best Management Practices Manual**

February 2004

## **C H A P T E R 8**

# **Maintenance and Retrofit of Stormwater Management Measures**

## **Maintenance of Stormwater Management Measures**

Research and experience have demonstrated that regular and thorough maintenance is necessary for stormwater management measures to perform effectively and reliably. They have also demonstrated that failure to perform such maintenance can lead to diminished performance, deterioration, and failure, in addition to a range of health and safety problems including mosquito breeding, vermin, and the potential for drowning. The potential for such problems to develop is accentuated by many of the very features and characteristics that allow stormwater management measures to do their job, including standing or slowing moving water, dense vegetation, forebays, trash racks, dams, and the need to continually function in all types of weather. As implied by their name, stormwater management measures are also expected to become the repositories for sediment, nutrients, trash, debris, and other pollutants targeted by the NJDEP Stormwater Management Rules. For this reason, stormwater management measures share maintenance requirements with more mundane items as vacuum cleaner bags, car motor filters, and floor mats, all of which require regular inspection and cleaning, sediment and debris removal, and periodic replacement.

In recognition of these needs and potential problems, the NJDEP Stormwater Management Rules require that a maintenance plan be developed for all stormwater management measures incorporated into the design of a major development. This maintenance plan must contain specific preventative and corrective maintenance tasks, schedules, cost estimates, and the name, address, and telephone number of the person or persons responsible for the measures' maintenance.

In accordance with the Rules, this section of Chapter 8 has been developed to provide guidelines for the development of such maintenance plans. Specific maintenance guidance for structural stormwater management measures is presented in *Chapter 9: Structural Stormwater Management Measures*. Additional maintenance information is also provided in the NJDEP Stormwater Management Facility Maintenance Manual, including maintenance tasks and equipment, inspection procedures and schedules, ownership responsibilities, and design recommendations to minimize and facilitate inspection and maintenance tasks.

Finally, it should be noted that a stormwater management measure that includes a dam as defined in the NJDEP Dam Safety Standards at N.J.A.C. 7:20 must also have an operations and maintenance manual for the dam as described at 7:20-1.11.

## **Maintenance Plan Contents**

According to the NJDEP Stormwater Management Rules, all maintenance plans for stormwater management measures must include the following:

1. The name, address, and telephone number of the person or persons responsible for the preventative and corrective maintenance of the stormwater management measure. If the plan identifies a party other than the owner or developer as having responsibility for maintenance, i.e., a public entity or homeowners' association, the plan must include a copy of the other party's written agreement to assume this responsibility. This agreement must include a copy of any ordinance or regulation that requires the owner or developer to dedicate the stormwater management measure and/or its maintenance to the other party.
2. Specific preventative and corrective maintenance tasks such as removal of sediment, trash, and debris; mowing, pruning, and restoration of vegetation; restoration of eroded areas; elimination of mosquito breeding habitats; control of aquatic vegetation; and repair or replacement of damaged or deteriorated components. Detailed maintenance information for specific structural stormwater management measures is presented in Chapter 9. Maintenance needs of nonstructural measures are discussed in *Chapter 2: Low Impact Development Techniques*.
3. A schedule of regular inspections and tasks. Detailed inspection tasks and schedules for specific structural stormwater management measures are presented in Chapter 9.
4. Cost estimates of maintenance tasks, including sediment, trash, and debris removal.
5. Detailed logs of all preventative and corrective maintenance performed at the stormwater management measure, including all maintenance-related work orders.

In addition, as described in the NJDEP Stormwater Management Facility Maintenance Manual, the following items should also be included in the maintenance plan:

1. Maintenance equipment, tools, and supplies necessary to perform the various preventative and corrective maintenance tasks specified in the plan. Sources of specialized, proprietary, and nonstandard equipment, tools, and supplies should also be provided.
2. Recommended corrective responses to various emergency conditions that may be encountered at the stormwater management measure. It should be noted that, if the stormwater management measure includes a Class I or II dam as defined in the NJDEP Dam Safety Standards at N.J.A.C. 7:20, an emergency action plan for the dam is also required. See N.J.A.C. 7:20-1.7(f) for more information.
3. Maintenance, repair, and replacement instructions for specialized, proprietary, and nonstandard measure components, including manufacturers' product instructions and user manuals.
4. Procedures and equipment required to protect the safety of inspection and maintenance personnel.
5. Approved disposal and recycling sites and procedures for sediment, trash, debris, and other material removed from the measure during maintenance operations.
6. Originals or copies of manufacturers' warranties on pertinent measure components.
7. As-built construction plans of the stormwater management measure and copies of pertinent construction documents such as laboratory test results, permits, and completion certificates.

## **Maintenance Plan Considerations**

In addition to the plan contents described above, a maintenance plan should address the following important aspects of stormwater management measure maintenance.

### **Access**

All stormwater management measures' components must be readily accessible for inspection and maintenance. Therefore, trees, shrubs, and underbrush must be pruned or trimmed as necessary to maintain access to the stormwater management measure via roadways, paths, and ramps. This includes paths through perimeter vegetation to permanent pools, aquatic benches, and safety ledges to allow for the inspection and control of mosquito breeding. In addition, the exact limits of inspection and maintenance easements and rights-of-way should be specified on stormwater management measure plans and included in the maintenance plan.

### **Training of Maintenance Personnel**

Maintenance training begins with a basic description of the purpose and function of the overall stormwater management measure and its major components. Such understanding will enable maintenance personnel to provide more effective component maintenance and more readily detect maintenance-related problems. Depending on the size, character, location, and components of a stormwater management measure, maintenance personnel may also require training in specialized inspection and maintenance tasks and/or the operation and care of specialized maintenance equipment. Training should also be provided in the need for and use of all required safety equipment and procedures.

### **Aesthetics**

The impacts of the aesthetics of the stormwater management measures on the surrounding community should be included in the consideration for the design and selection of the stormwater management measure.

## **Required Maintenance Plan Procedures**

Once the maintenance plan is completed, the NJDEP Stormwater Management Rules require that the following procedures be followed:

1. Copies of the maintenance plan must be provided to the owner and operator of the stormwater management measure. Copies must also be submitted to all reviewing agencies as part of each agency's approval process. In addition, a copy should be provided to the local mosquito control or extermination commission upon request.
2. The title and date of the maintenance plan and the name, address, and telephone number of the person with stormwater management measure maintenance responsibility as specified in the plan must be recorded on the deed of the property on which the measure is located. Any change in this information due, for example to a change in property ownership, must also be recorded on the deed.
3. The person with maintenance responsibility must evaluate the maintenance plan for effectiveness at least annually and revise as necessary.
4. A detailed, written log of all preventative and corrective maintenance performed at the stormwater management measure must be kept, including a record of all inspections and copies of maintenance-related work orders.
5. The person with maintenance responsibility must retain and, upon request, make available the maintenance plan and associated logs and other records for review by a public entity with administrative, health, environmental, or safety authority over the site.

# Retrofit of Existing Stormwater Management Measures

Retrofitting can be defined as expanding, modifying, or otherwise upgrading existing stormwater management measures. As such, retrofitting stormwater management measures can reduce some of the adverse groundwater recharge and stormwater quantity and quality impacts caused by existing land developments. In many instances, existing stormwater management measures can be dramatically improved, and downstream water bodies protected, through effective retrofitting.

Beginning in the 1970s, many new developments were constructed with stormwater detention facilities. Many of these facilities were built to control the stormwater quantity impacts of 10-year, 25-year, and/or 100-year storms. However, smaller storm events that are typically responsible for the majority of stormwater quality and streambank erosion problems may not have been addressed. Therefore, retrofitting such facilities to also control these smaller storm events can begin to address these problems.

Another important benefit of retrofitting stormwater management facilities is the opportunity to correct site nuisances, maintenance problems, and aesthetic concerns. Retrofitting also allows a community to keep pace with new stormwater management regulations or objectives. It can help a community address a particular stormwater quantity or quality problem that has developed as a result of deficiencies in its existing or past stormwater regulations or a problem that has been identified through a regional plan or TMDL. Addressing such problems through the construction of new stormwater management measures at future land developments may be impractical or even impossible, leaving retrofitting as the only effective technique.

In addition to such basic considerations as need and cost, three important factors must be considered when evaluating retrofit possibilities: health and safety, effectiveness, and maintenance. All three should be thoroughly reviewed before undertaking a stormwater management measure retrofit to help justify the cost and effort and ensure the retrofitted measure's long-term success.

## Health and Safety

A retrofit must not increase health and safety risks in any way. For example, the storage volume in an existing detention basin presently used for stormwater quantity control must not be reduced to provide new stormwater quality enhancement without ensuring that the lost quantity storage will not adversely increase peak basin outflows and cause downstream flooding or erosion. Similarly, an existing, well-functioning wet pond must not be converted to a constructed stormwater wetland for enhanced stormwater quality control if the potential for mosquito breeding will increase significantly without adequate additional control measures.

## Effectiveness

In many retrofit situations, it may not be possible to upgrade the stormwater management measure to meet all current groundwater recharge and stormwater quality and quantity standards. This means that relative performance improvements for a range of retrofits must be evaluated to determine which one represents the optimum combination of effectiveness, viability, and cost. As a result, the final retrofit selected for an existing stormwater measure will have to be based on its relative rather than absolute effectiveness. In such relative determinations, both the costs and benefits of the evaluated retrofits become more influential factors than when an absolute performance standard is used.

## Maintenance

It should be expected that if a retrofit will increase a stormwater management measure's pollutant removal capability, it will also increase the rate and total volume of sediment, trash, debris, and other stormwater pollution that will accumulate in the measure. In addition, the chemical or biological composition of this sediment may be of significantly lower quality, and potentially either hazardous or toxic,

than the sediment previously captured. Finally, the retrofit may increase the number and/or complexity of components in an existing stormwater management measure. All of these factors can cause increases in the level, frequency, complexity, and/or cost of the present inspection and maintenance efforts performed at the stormwater management measure. Increased staffing, improved equipment, and more specialized training may be required to properly maintain the new, retrofitted measure. Therefore, the extent and impacts of any increased inspection and/or maintenance requirements should be determined and thoroughly evaluated.

Once a retrofit has been determined to be safe, effective, and manageable, two basic approaches can be followed: modify an existing stormwater management measure or construct a new or additional one. Basins designed primarily for flood control may be retrofitted to enhance stormwater quality and groundwater recharge benefits. For example, the pollutant removal rates of an existing detention basin can be improved by creating an extended detention wetland. However, as noted above, the retrofit must maintain the basin's existing flood and erosion control capabilities. As a result, the basin's total storage volume may need to be increased. In addition, new measures such as infiltration systems, permeable paving, and bioretention systems can be introduced at sites where the soil permeability and depth to the seasonal high water table are suitable. Areas for such new measures include parking lot islands, vacant land, and roadside swales.

In addition to structural measures, nonstructural stormwater management measures can be used to enhance the stormwater management of an existing development site. Roofs are one of the largest sources of concentrated runoff from commercial developments. Clean roof runoff can be directed by downspouts to a dry well, disconnecting a portion of the runoff from the storm sewer system and both reducing runoff volume and restoring groundwater recharge. Flat roofs can be retrofitted with vegetation, which can reduce the stormwater impacts of the building. Overflow parking areas and fire lanes can utilize pervious paving systems, which can also reduce runoff and enhance recharge. Vegetative filters can be incorporated into existing developments where runoff from paved or intensely managed turf areas can be discharged across the filters. This may require the removal or slotting of existing curbs along the edge of parking lots or roads. Parking lots with vegetated aisle dividers may be particularly amendable to this type of filter strip application.

In addition, catch basins and drain inlets that are part of a traditional curb and gutter stormwater collection system can be retrofitted with one of several different manufactured treatment devices that catch sediments, trash, organic matter, and other particulates. These proprietary devices are particularly useful in areas with limited space. Several varieties of manufactured treatment devices are available for installation at strategic locations near a discharge point or as a pre-treatment to an existing basin. Additional information regarding manufactured treatment devices is provided in *Chapter 9: Structural Stormwater Management Measures*.

Finally, education should be considered as a retrofit component. Control of household waste, fertilizers, and pesticides can dramatically reduce concentrations or problem pollutants that adversely affect downstream water quality. Prevention is most often the best method for eliminating pollutants from stormwater runoff. *Chapter 2: Low Impact Development Techniques* provides important information regarding stormwater pollution prevention.

## References

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