

**STORMWATER  
MANAGEMENT  
OPERATION &  
MAINTENANCE  
MANUAL**

*Prepared for:*


Major Site Plans  
Block 44 \* Lot 15.01



Toms River Township,  
Ocean County  
New Jersey

*Care of:*  
Harvey Karen  
150 Tennis Court  
Wall, NJ 07719

Revised June 25, 2019  
August 16, 2018  
Project Number: 1423.0016



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LAND SURVEYORS

PLANNERS

LANDSCAPE ARCHITECTS

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**TABLE OF CONTENTS**

|  | <u>Page Number</u> |
|--|--------------------|
| I. Introduction .....                              | 3                  |
| II. Ownership Responsibility .....                 | 3                  |
| III. Preventative and Corrective Maintenance ..... | 4-9                |
| IV. Detailed Log Sheet.....                        | 10-17              |
| V. Maintenance Equipment and Procedures.....       | 18-19              |
| VI. Cost Estimate of Maintenance Tasks.....        | 20-22              |
| VII. Copies of Manufacturer's Warranties.....      | 23                 |
| VIII. As-Built Construction Plans.....             | 24                 |
| IX. Definitions.....                               | 25                 |

**I. INTRODUCTION**

This manual is for the maintenance of the stormwater management system proposed for the Major Site Plan located in Manchester Township, Ocean County, New Jersey. Regular and thorough maintenance is necessary to keep the infiltration / detention basins and rain gardens performing effectively and reliably. Failure to perform necessary maintenance can lead to diminished performance, deterioration, failure, health, and safety problems, mosquito breeding, and vermin. This maintenance plan includes maintenance tasks and equipment, schedules of tasks to be completed, ownership responsibility, and approximate cost estimates related to the required maintenance.

**II. OWNERSHIP RESONSIBILITY**

Name of Owner and Responsible Party: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone Numbers

Home: \_\_\_\_\_

Work: \_\_\_\_\_

Cell: \_\_\_\_\_

Emergency: \_\_\_\_\_

I, \_\_\_\_\_ of full age, being duly sworn according to law on oath disposes and says, that the deponent resides at \_\_\_\_\_ in the municipality of \_\_\_\_\_ in the County of \_\_\_\_\_ in the State of \_\_\_\_\_ that \_\_\_\_\_ is the owner and responsible party for the Stormwater Management Infiltration / Detention Basins and Rain Gardens located within the proposed Major Site Plan in Manchester Township, Ocean County, New Jersey.

\_\_\_\_\_  
(Owner to Sign Here)

Sworn to and subscribed

Before me this \_\_\_\_\_

Day of \_\_\_\_\_ 20 \_\_\_\_\_

\_\_\_\_\_  
A Notary Public of New Jersey

*Note: The owner and responsible party for the infiltration / detention basins and rain gardens must be recorded on the deed of property on which they are located. Any change in this information or change in property ownership must also be recorded on the deed.*

*Note: The person or party 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.*

### **III. PREVENTATIVE AND CORRECTIVE MAINTENANCE**

The person or party with maintenance responsibility must evaluate the maintenance plan for effectiveness at least twice a year and revise as necessary. An onsite inspection must be performed at least twice a year and an inspection form which is located in Section IV of this manual shall be filled out during each of these inspections. A formal inspection must be performed at least once a year. A copy of every completed inspection form shall be kept in the Detailed Log section of this manual. Below is a list of Preventative, Correction and Aesthetic Maintenance Tasks for the proposed infiltration / detention basins and rain gardens.

#### **PREVENTATIVE MAINTENANCE PROCEDURES**

The purpose of Preventative Maintenance (routine maintenance) is to assure that the infiltration / detention basins and rain gardens are operational and safe at all times, while minimizing the need for emergency or corrective maintenance.

##### **1. Grass Cutting**

A regularly scheduled program of mowing and trimming the grass on site and particularly around the basins and rain gardens during the growing season will help to maintain a tightly knit turf, prevent diseases, pests and the intrusion of weeds. At a minimum grass should be mowed at least once a month during the growing season; however the site should be evaluated routinely to determine if more frequent mowing needs to take place. In general, grass should not be allowed to grow more than 1 to 2 inches between cuttings. Allowing the grass to grow more than this amount prior to cutting it may result in damage to the grass' growing points and limit its continued healthy growth. Grasses within the rain gardens shall be carefully maintained so as not to compact the soil, and through hand-held equipment, such as a hand held line trimmer. Grass cuttings should be bagged and removed from the site. Agencies such as the Ocean County Soil Conservation District can provide valuable assistance in determining optimum mowing requirements.

##### **2. Grass Maintenance**

Grassed areas require periodic fertilizing, de-thatching and soil conditioning to maintain healthy growth. Inspection of established grass areas should be performed at least twice annually during both the growth and non-growth season. Provisions should be made to re-seed and re-establish any grassed areas damaged by sediment accumulation, storm water flow, or other causes. When re-establishing or restoring grassed areas, biweekly inspections of the grasses health should be performed during the first growing season or until the grass is established. Agencies such as the

Ocean County Soil Conservation District can provide valuable assistance in establishing a suitable grass maintenance program.

### 3. Vegetative Cover

Trees, shrubs, and ground cover require periodic maintenance, including fertilizing, pruning, and pest control to maintain a healthy growth. Inspection of vegetated areas health, density, and diversity must be done at least twice annually and provisions should be made to restore any vegetation, correct any erosion or scouring problems and maintain optimum vegetation health. When restoring vegetation, biweekly inspections of the vegetation's health should be performed during the first growing season or until the vegetation is established. Vegetative cover within the rain gardens must be maintained at 85%. Any damage must be addressed through replanting. Whenever possible vegetation deficiencies should be addressed without the use of fertilizers and pesticides. Any unwanted growth should be removed with minimum disruption to the remaining vegetation and the subsoil. The Ocean County Soil Conservation District can be of assistance in establishing a preventative maintenance program for the site.

### 4. Removal and Disposal of Trash and Debris

A regularly scheduled program of debris and trash removal will reduce the chance of structures becoming clogged and inoperable during storm events. Additionally, removal of trash and debris will prevent possible damage to vegetated areas and eliminate potential mosquito breeding habitats. Disposal of debris and trash must comply with all local, county, state, and federal waste management control regulations. Only suitable disposal and recycling sites should be utilized. Agencies such as the Division of Solid Waste Management of the New Jersey Department of Environmental Protection should be contacted for information on disposal regulations.

### 5. Sediment Removal and Disposal

Accumulated sediment should be removed before it threatens the operation or storage volume of the stormwater management facilities. The basins and rain gardens must be inspected for clogging and excessive debris and sediment accumulation at least four times annually as well as after every storm exceeding one (1) inch of rainfall. Some of the components that will require careful inspection for excessive debris and sediment accumulation are but not limited to, the basin bottoms, riprap aprons, inflow points, storm sewer inlets and storm pipes. Sediment and debris removal should take place when the systems are thoroughly dry. Disposal of debris, trash, sediment and other waste material should be done at suitable disposal / recycling sites and in compliance with all local, count, state and federal regulations. Agencies such as the Division of Solid Waste Management of the New Jersey Department of Environmental Protection should be contacted for information on disposal regulations.

The infiltration / detention basins have been designed to fully infiltrate the water from the design storm events within the required 72-hour time period. The following table provides the designed drain times for each of the storm events.

**NORMAL DRAIN TIME CHART**

| <b>Structure</b>     | <b>Water Quality</b> | <b>2 year</b> | <b>10 year</b> | <b>100 year</b> |
|----------------------|----------------------|---------------|----------------|-----------------|
| Infiltration Basin 1 | 2.90 hours           | 24.60 hours   | 24.75 hours    | 24.90 hours     |
| Infiltration Basin 3 | 2.75 hours           | 23.90 hours   | 24.35 hours    | 24.55 hours     |
| Infiltration Basin 4 | 2.85 hours           | 24.55 hours   | 24.75 hours    | 25.15 hours     |

If the drain times exceed the times listed above, corrective maintenance procedures will have to be implemented. Soil samples shall be taken to check the permeability rates of the soil below the structure. These soil tests shall comply with NJAC 7:50-6.8(a)biv(2). If the soil tests show the permeability rate is less than 1” per hour or more than 20” per hour, the system shall be repaired and restored to its original design condition.

GENERAL PROCEDURES

1. Elimination of Potential Mosquito Breeding Habitats

The most effective mosquito control program is one that eliminates potential breeding habitats. Almost any stagnant pool of water can be attractive to mosquitoes, and the source of a large mosquito population. Ponded water in areas such as open cans and bottles, debris and sediment accumulations, and areas of ground settlement provide ideal locations for mosquito breeding. A maintenance program dedicated to eliminating potential breeding areas is certainly preferable to controlling the health and nuisance effects of flying mosquitoes. The Ocean County Mosquito Control Commission can provide valuable information on establishing this maintenance program.

2. Inspection

Regularly scheduled “formal” inspections of the infiltration / detention basins and rain gardens should be performed by qualified inspectors. The primary purpose of the inspections is to ascertain the operational condition and safety of the systems. Inspections will also provide information on the effectiveness of regularly scheduled Preventative and Aesthetic Maintenance procedures, and will help to identify where changes in the extent and scheduling of the procedures are warranted. Finally, the inspections should also be used to determine the need for and timing of Corrective Maintenance procedures. It should be noted that, in addition to regularly scheduled formal inspections, an onsite inspection should be performed during every

visit to the site by maintenance or supervisory personnel. A sample inspection checklist is included in Section IV.

### 3. Reporting

The recording of all maintenance work and inspections provide valuable data on the infiltration basins and rain gardens. Review of this information will also help to establish more efficient and beneficial maintenance procedures and practices. Along with the written reports, a chain of command for reporting and solving maintenance problems and addressing maintenance needs should be established. Everyone from field personnel to the maintenance director, should be encouraged to report any problems or suggest any changes to the maintenance program.

## **CORRECTIVE MAINTENANCE PROCEDURES**

Corrective Maintenance (emergency or non-routine maintenance) should be performed when necessary to correct problems or malfunctions and to restore the intended operation and safe condition of the infiltration / detention basins and rain gardens.

### 1. Removal of Debris and Sediment

Sediment, debris and trash which threaten the discharge capacity of the systems should be removed immediately and properly disposed of in a timely manner. If water is failing to infiltrate in the infiltration / detention basins and rain gardens within 72 hours after the end of the storm, corrective measures must be taken. Deep tilling (12 inches) and turning of the soil to break up clogged surface layers on the system bottoms is one method. Equipment and personnel must be available to perform the removal work on short notice. The lack of an available disposal site should not delay the removal of trash, debris, and sediment. Temporary disposal sites should be utilized if necessary.

### 2. Structural Repairs

Structural damage to outlet and inlet structures, trash racks, and headwalls from vandalism, flood events, or other causes must be repaired promptly. Equipment, materials and personnel must be available to perform these repairs on short notice. The immediacy of the repairs will depend upon the nature of the damage and its effects on the safety and operations of the systems. The analysis of structural damage and the design and performance of structural repairs should only be undertaken by qualified personnel.

### 3. Embankment and Slope Repairs

Damage to embankments and side slopes must be repaired promptly. This damage can be the result of rain or flood events, vandalism, animals, vehicles, or neglect. Typical problems include settlement, scouring, cracking, sloughing, seepage, and rutting. Equipment, materials and personnel must be available to perform these repairs on the nature of the damage and its effects on the safety and operation of the facility. The analysis of damage and the design and performance of geotechnical repairs should only be undertaken by qualified personnel.

### 4. Dewatering

It may be necessary to remove ponded water from within the systems if they are not performing properly. Portable pumps may be necessary to remove the ponded water temporarily until a permanent solution can be implemented.

### 5. Extermination of Mosquitoes

If neglected, the systems can readily become an ideal mosquito breeding area. Extermination of mosquitoes will usually require the services of an expert, such as the Ocean County Mosquito Extermination Commission. Proper procedures carried out by trained personnel can control the mosquitoes with minimum damage or disturbance to the environment. If mosquito control becomes necessary, the preventative maintenance program should also be re-evaluated, and more emphasis placed on control of mosquito breeding habitats.

### 6. Erosion Repair

Vegetative cover or other protective measures are necessary to prevent the loss of soil from the erosive forces of wind and water. Where a re-seeding program has not been effective in maintaining a non-erosive vegetative cover, or other factors have exposed soils to erosion, corrective steps should be initiated to prevent further loss of soil and any subsequent danger to the stability of the facility. Soil loss can be controlled by a variety of materials and methods, including riprap, gabion lining, sod, seeding, concrete lining and re-grading. The Ocean County Soil Conservation District can provide valuable assistance in recommending materials and methodologies to control erosion.

### 7. Elimination of Trees, Brush, Roots and Animal Burrows

The stability of embankments and side slopes can be impaired by large roots and animal burrows. Additionally, burrows can present a safety hazard for maintenance personnel. Trees and brush with extensive, woody root systems should be completely removed from embankments to prevent their destabilization and the creation of seepage routes. Roots should also be completely removed to prevent their decomposition within the embankment. Root voids



and burrows should be plugged by filling with material similar to the existing material, and capped just below grade with stone, concrete or other material. If plugging of the burrows does not discourage the animals from returning, further measures should be taken to either remove the animal population or to make critical areas of the facility unattractive to them.

#### 8. Snow and Ice Removal

Accumulations of snow and ice can threaten the functioning of the systems. Providing the equipment, materials and personnel to monitor and remove snow and ice is necessary to assure the continued function during the winter months.

### **AESTHETIC MAINTENANCE PROCEDURES**

Aesthetic Maintenance (routine maintenance), although not required to keep the basins, and rain gardens operational, it will maintain the visual appeal and will benefit everyone within the local community.

#### 1. Graffiti Removal

The timely removal of this obvious eyesore will restore the aesthetic quality of the community. Removal can be accomplished by painting or otherwise covering it, or removing it with scrapers, solvents or cleansers. Timely removal is important to discourage further graffiti and other acts of vandalism.

#### 2. Grass Trimming

Although time consuming, trimming of grass edges around structures and fences will provide for a neat and attractive appearance of the facilities.

#### 3. Control of Weeds

Although a regular grass maintenance program will keep weed intrusion to a minimum, some weeds will invariably appear. Periodic weeding, either chemically or mechanically, will not only help to maintain a healthy turf, but will also keep grassed areas looking attractive.

#### 4. Details

Careful, meticulous, and frequent attention to the performance of maintenance items such as painting, tree pruning, leaf collection, debris removal, and grass cutting will result in the systems remaining both functional and attractive.

**All** maintenance procedures are to be performed in accordance with OSHA regulations.

**IV. DETAILED LOG SHEET**

A copy of every inspection form completed, maintenance – related work orders, and preventative and corrective maintenance procedures performed must be filed or recorded in this section of the manual. If any reviews are performed by a public entity with administrative, health, environmental, or safety authority over the site a copy of their report or findings must also be placed in this section of the manual.

A blank inspection checklist, inspection log, maintenance work order and checklist, and maintenance log has been enclosed in the following section.

## INSPECTION CHECKLIST

FACILITY: \_\_\_\_\_  
 LOCATION: MANCHESTER TOWNSHIP, OCEAN COUNTY, NEW JERSEY  
 INSPECTOR: \_\_\_\_\_ DATE: \_\_\_\_\_ WEATHER: \_\_\_\_\_

Infiltration / Detention Basin 1.

| Facility Item                     | Ok condition | Routine Maintenance | Urgent Maintenance | Comments |
|-----------------------------------|--------------|---------------------|--------------------|----------|
| Basin Embankments and Side Slopes |              |                     |                    |          |
| A. Vegetation growth              |              |                     |                    |          |
| B. Erosion                        |              |                     |                    |          |
| C. Sediment                       |              |                     |                    |          |
| D. Trash and Debris               |              |                     |                    |          |
| E. Aesthetics                     |              |                     |                    |          |
| F. Other                          |              |                     |                    |          |
| Basin Bottom                      |              |                     |                    |          |
| A. Vegetation growth              |              |                     |                    |          |
| B. Erosion                        |              |                     |                    |          |
| C. Standing Water                 |              |                     |                    |          |
| D. Sediment                       |              |                     |                    |          |
| E. Trash and Debris               |              |                     |                    |          |
| F. Aesthetics                     |              |                     |                    |          |
| G. Other                          |              |                     |                    |          |
| Basin Inlet Structures            |              |                     |                    |          |
| A. Condition of Structure         |              |                     |                    |          |
| B. Erosion                        |              |                     |                    |          |
| C. Trash and Debris               |              |                     |                    |          |
| D. Sediment                       |              |                     |                    |          |
| E. Aesthetics                     |              |                     |                    |          |
| F. Other                          |              |                     |                    |          |
| Basin Outlet Structures           |              |                     |                    |          |
| A. Condition of Structure         |              |                     |                    |          |
| B. Erosion                        |              |                     |                    |          |
| C. Trash and Debris               |              |                     |                    |          |
| D. Sediment                       |              |                     |                    |          |
| E. Mechanical Components          |              |                     |                    |          |
| E. Aesthetics                     |              |                     |                    |          |
| G. Other                          |              |                     |                    |          |

| Facility Item                                    | Ok Condition | Routine Maintenance | Urgent Maintenance | Comments |
|--|--------------|---------------------|--------------------|----------|
| Basin Perimeter                                  |              |                     |                    |          |
| A. Vegetation                                    |              |                     |                    |          |
| B. Erosion                                       |              |                     |                    |          |
| C. Trash and Debris                              |              |                     |                    |          |
| D. Aesthetics                                    |              |                     |                    |          |
| E. Fences and Gates                              |              |                     |                    |          |
| F. Other   |              |                     |                    |          |
| Miscellaneous                                    |              |                     |                    |          |
| A. Effectiveness of Existing Maintenance Program |              |                     |                    |          |
| B. Potential Mosquito Habitats                   |              |                     |                    |          |
| C. Mosquitoes                                    |              |                     |                    |          |
| D. Animal burrows                                |              |                     |                    |          |

Infiltration / Detention Basin 3.

| Facility Item                     | Ok condition | Routine Maintenance | Urgent Maintenance | Comments |
|-----------------------------------|--------------|---------------------|--------------------|----------|
| Basin Embankments and Side Slopes |              |                     |                    |          |
| A. Vegetation growth              |              |                     |                    |          |
| B. Erosion                        |              |                     |                    |          |
| C. Sediment                       |              |                     |                    |          |
| D. Trash and Debris               |              |                     |                    |          |
| E. Aesthetics                     |              |                     |                    |          |
| F. Other                          |              |                     |                    |          |
| Basin Bottom                      |              |                     |                    |          |
| A. Vegetation growth              |              |                     |                    |          |
| B. Erosion                        |              |                     |                    |          |
| C. Standing Water                 |              |                     |                    |          |
| Facility Item                     | Ok condition | Routine Maintenance | Urgent Maintenance | Comments |
| D. Sediment                       |              |                     |                    |          |
| E. Trash and Debris               |              |                     |                    |          |
| F. Aesthetics                     |              |                     |                    |          |
| G. Other                          |              |                     |                    |          |
| Basin Inlet Structures            |              |                     |                    |          |
| G. Condition of Structure         |              |                     |                    |          |
| H. Erosion                        |              |                     |                    |          |
| I. Trash and Debris               |              |                     |                    |          |
| J. Sediment                       |              |                     |                    |          |

| Facility Item                                    | Ok condition | Routine Maintenance | Urgent Maintenance | Comments |
|--|--------------|---------------------|--------------------|----------|
| Basin Inlet Structures cont.                     |              |                     |                    |          |
| K. Aesthetics                                    |              |                     |                    |          |
| L. Other   |              |                     |                    |          |
| Basin Outlet Structures                          |              |                     |                    |          |
| A. Condition of Structure                        |              |                     |                    |          |
| B. Erosion                                       |              |                     |                    |          |
| C. Trash and Debris                              |              |                     |                    |          |
| D. Sediment                                      |              |                     |                    |          |
| E. Mechanical Components                         |              |                     |                    |          |
| E. Aesthetics                                    |              |                     |                    |          |
| G. Other   |              |                     |                    |          |
| Basin Spillway                                   |              |                     |                    |          |
| A. Vegetation                                    |              |                     |                    |          |
| B. Erosion                                       |              |                     |                    |          |
| C. Trash and Debris                              |              |                     |                    |          |
| D. Other   |              |                     |                    |          |
| Basin Perimeter                                  |              |                     |                    |          |
| A. Vegetation                                    |              |                     |                    |          |
| B. Erosion                                       |              |                     |                    |          |
| C. Trash and Debris                              |              |                     |                    |          |
| D. Aesthetics                                    |              |                     |                    |          |
| E. Fences and Gates                              |              |                     |                    |          |
| F. Other   |              |                     |                    |          |
| Miscellaneous                                    |              |                     |                    |          |
| A. Effectiveness of Existing Maintenance Program |              |                     |                    |          |
| B. Potential Mosquito Habitats                   |              |                     |                    |          |
| C. Mosquitoes                                    |              |                     |                    |          |
| D. Animal burrows                                |              |                     |                    |          |

Infiltration Basin 4.

| Facility Item                     | Ok condition | Routine Maintenance | Urgent Maintenance | Comments |
|-----------------------------------|--------------|---------------------|--------------------|----------|
| Basin Embankments and Side Slopes |              |                     |                    |          |
| A. Vegetation growth              |              |                     |                    |          |
| B. Erosion                        |              |                     |                    |          |
| C. Sediment                       |              |                     |                    |          |
| D. Trash and Debris               |              |                     |                    |          |
| E. Aesthetics                     |              |                     |                    |          |
| F. Other                          |              |                     |                    |          |

| Facility Item                                    | Ok condition | Routine Maintenance | Urgent Maintenance | Comments |
|--|--------------|---------------------|--------------------|----------|
| Basin Bottom                                     |              |                     |                    |          |
| A. Vegetation growth                             |              |                     |                    |          |
| B. Erosion                                       |              |                     |                    |          |
| C. Standing Water                                |              |                     |                    |          |
| D. Sediment                                      |              |                     |                    |          |
| E. Trash and Debris                              |              |                     |                    |          |
| F. Aesthetics                                    |              |                     |                    |          |
| G. Other   |              |                     |                    |          |
|  |              |                     |                    |          |
| Basin Inlet Structures                           |              |                     |                    |          |
| Condition of Structure                           |              |                     |                    |          |
| M. Erosion                                       |              |                     |                    |          |
| N. Trash and Debris                              |              |                     |                    |          |
| O. Sediment                                      |              |                     |                    |          |
| P. Aesthetics                                    |              |                     |                    |          |
| Q. Other   |              |                     |                    |          |
|  |              |                     |                    |          |
| Basin Spillway                                   |              |                     |                    |          |
| A. Vegetation                                    |              |                     |                    |          |
| B. Erosion                                       |              |                     |                    |          |
| C. Trash and Debris                              |              |                     |                    |          |
| D. Other   |              |                     |                    |          |
|  |              |                     |                    |          |
| Basin Perimeter                                  |              |                     |                    |          |
| A. Vegetation                                    |              |                     |                    |          |
| B. Erosion                                       |              |                     |                    |          |
| C. Trash and Debris                              |              |                     |                    |          |
| D. Aesthetics                                    |              |                     |                    |          |
| E. Fences and Gates                              |              |                     |                    |          |
| F. Other   |              |                     |                    |          |
|  |              |                     |                    |          |
| Miscellaneous                                    |              |                     |                    |          |
| A. Effectiveness of Existing Maintenance Program |              |                     |                    |          |
| B. Potential Mosquito Habitats                   |              |                     |                    |          |
| C. Mosquitoes                                    |              |                     |                    |          |
| D. Animal burrows                                |              |                     |                    |          |

Rain Garden 1

| Facility Item        | Ok condition | Routine Maintenance | Urgent Maintenance | Comments |
|----------------------|--------------|---------------------|--------------------|----------|
| A. Vegetation growth |              |                     |                    |          |
| B. Erosion           |              |                     |                    |          |
| C. Standing Water    |              |                     |                    |          |
| D. Sediment          |              |                     |                    |          |
| E. Trash and Debris  |              |                     |                    |          |
| F. Aesthetics        |              |                     |                    |          |
| G. Other             |              |                     |                    |          |

Rain Garden 2

| Facility Item        | Ok condition | Routine Maintenance | Urgent Maintenance | Comments |
|----------------------|--------------|---------------------|--------------------|----------|
| A. Vegetation growth |              |                     |                    |          |
| B. Erosion           |              |                     |                    |          |
| C. Standing Water    |              |                     |                    |          |
| D. Sediment          |              |                     |                    |          |
| E. Trash and Debris  |              |                     |                    |          |
| F. Aesthetics        |              |                     |                    |          |
| G. Other             |              |                     |                    |          |

Rain Garden 3

| Facility Item        | Ok condition | Routine Maintenance | Urgent Maintenance | Comments |
|----------------------|--------------|---------------------|--------------------|----------|
| A. Vegetation growth |              |                     |                    |          |
| B. Erosion           |              |                     |                    |          |
| C. Standing Water    |              |                     |                    |          |
| D. Sediment          |              |                     |                    |          |
| E. Trash and Debris  |              |                     |                    |          |
| F. Aesthetics        |              |                     |                    |          |
| G. Other             |              |                     |                    |          |

Rain Garden 3

| Facility Item        | Ok condition | Routine Maintenance | Urgent Maintenance | Comments |
|----------------------|--------------|---------------------|--------------------|----------|
| A. Vegetation growth |              |                     |                    |          |
| B. Erosion           |              |                     |                    |          |
| C. Standing Water    |              |                     |                    |          |
| D. Sediment          |              |                     |                    |          |
| E. Trash and Debris  |              |                     |                    |          |
| F. Aesthetics        |              |                     |                    |          |
| G. Other             |              |                     |                    |          |

## MAINTENANCE WORK ORDER AND CHECKLIST

FACILITY: \_\_\_\_\_  
 LOCATION: MANCHESTER TOWNSHIP, OCEAN COUNTY, NEW JERSEY  
 CREW: \_\_\_\_\_ WORK STARTED: date \_\_\_\_\_ time \_\_\_\_\_  
 EQUIPMENT: \_\_\_\_\_ WORK COMPLETED: date \_\_\_\_\_ time \_\_\_\_\_  
 WEATHER: \_\_\_\_\_ TOTAL MANHOURS OF WORK: \_\_\_\_\_

### PREVENTATIVE MAINTENANCE

| Work Item  | Items<br>Required | Items<br>Done | Comments and Special Instructions |
|--|-------------------|---------------|-----------------------------------|
| 1. Grass Cutting                                       |                   |               |                                   |
| 2. Grass Maintenance                                   |                   |               |                                   |
| A. Fertilizing   |                   |               |                                   |
| B. Re-Seeding  |                   |               |                                   |
| C. De-Thatching  |                   |               |                                   |
| D. Pest Control  |                   |               |                                   |
| E. Other   |                   |               |                                   |
| 3. Vegetative Cover                                    |                   |               |                                   |
| A. Fertilizing   |                   |               |                                   |
| B. Pruning   |                   |               |                                   |
| C. Pest Control  |                   |               |                                   |
| D. Other   |                   |               |                                   |
| 4. Trash and Debris Removal                            |                   |               |                                   |
| 5. Sediment Removal                                    |                   |               |                                   |
| 6. Elimination of Potential Mosquito Breeding Habitats |                   |               |                                   |
| 7. Animal Burrows Filled In                            |                   |               |                                   |
| 8. Other Preventative Maintenance                      |                   |               |                                   |
| A.   |                   |               |                                   |
| B.   |                   |               |                                   |



CORRECTIVE MAINTENANCE

| Work Item  | Items Required | Items Done | Comments and Special Instructions |
|--|----------------|------------|-----------------------------------|
| 1. Removal of Debris & Sediment                        |                |            |                                   |
| 2. Structural Repairs                                  |                |            |                                   |
| 3. Embankment & Side Slope Repairs                     |                |            |                                   |
| 4. Dewatering  |                |            |                                   |
| 5. Control of Mosquitoes                               |                |            |                                   |
| 6. Erosion Repair                                      |                |            |                                   |
| 7. Elimination of Trees, Brush, Roots & Animal Burrows |                |            |                                   |
| 8. Snow & Ice Removal                                  |                |            |                                   |
| 9. Basin Bottom tilling                                |                |            |                                   |
| 10. Jet flushing / vactor cleaning                     |                |            |                                   |
| 11. Other  |                |            |                                   |

AESTHETIC MAINTENANCE

| Work Item           | Items Required | Items Done | Comments and Special Instructions |
|---------------------|----------------|------------|-----------------------------------|
| 1. Graffiti Removal |                |            |                                   |
| 2. Grass Trimming   |                |            |                                   |
| 3. Weeding          |                |            |                                   |

NOTES:

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## V. MAINTENANCE EQUIPMENT AND PROCEDURES

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### MAINTENANCE EQUIPMENT AND MATERIALS

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This Table lists the equipment and materials which are typically required to maintain the basins and rain gardens. It is presented as a general guide to assist owners, maintenance directors, designers, and financial planners in establishing specific facility maintenance programs. Specific manufacturers, brand names, and types of equipment are not included, as availability, personal preference, and specific usage must also be determined for each maintenance program.

#### A. GRASS MAINTENANCE EQUIPMENT

1. Tractor-Mounted Mowers
2. Riding Mowers
3. Hand Mowers
4. Gas Powered Trimmers
5. Gas Powered Edgers
6. Seed Spreaders
7. Fertilizer Spreaders
8. De-Thatching Equipment
9. Pesticide and Herbicide Application Equipment
10. Grass Clipping and Leaf Collection Equipment

#### B. VEGETATIVE COVER MAINTENANCE EQUIPMENT

1. Saws
2. Pruning Shears
3. Hedge Trimmers
4. Wood Chippers

#### C. TRANSPORTATION EQUIPMENT

1. Trucks for Transportation of Materials
2. Trucks for Transportation of Equipment
3. Vehicles for Transportation of Personnel

MAINTENANCE EQUIPMENT AND PROCEDURES

D. DEBRIS, TRASH, AND SEDIMENT REMOVAL EQUIPMENT

1. Loader
2. Backhoe
3. Grader
4. Vactor Truck

E. MISCELLANEOUS EQUIPMENT

1. Shovels
2. Rakes
3. Picks
4. Wheel Barrows
5. Fence Repair Tools
6. Painting Equipment
7. Gloves
8. Standard Mechanics Tools
9. Tools for Maintenance of Equipment
10. Office Space
11. Office Equipment
12. Telephones
13. Safety Equipment
14. Tools for Concrete Work (Mixers, Form Materials, etc.)
15. Welding Equipment (for Repair of Trash Racks, etc.)

F. MATERIALS

1. Topsoil
2. Fill
3. Seed
4. Soil Amenities (Fertilizer, Lime, etc.)
5. Chemicals (Pesticides, Herbicides, etc.)
6. Mulch
7. Paint
8. Paint Removers (for Graffiti)
9. Spare Parts for Equipment
10. Oil and Grease for Equipment and SWMF Components
11. Concrete

**VI. COST ESTIMATE FOR MAINTENANCE TASKS**

**SWMF MAINTENANCE EQUIPMENT AND MATERIAL COSTS**

| GRASS MAINTENANCE EQUIPMENT |                   |                |
|-----------------------------|-------------------|----------------|
|                             | Purchase          | Rent (per day) |
| Hand Mower                  | \$300-\$500       | \$25-\$40      |
| Riding Mower                | \$3,000-\$5,000   | \$75-\$100     |
| Tractor Mower               | \$15,000-\$20,000 | \$100-\$300    |
| Trimmer/Edger               | \$200-\$500       | \$25-\$35      |
| Spreader                    | \$100-\$200       | \$20-\$30      |
| Chemical Sprayer            | \$200-\$500       | \$25-\$40      |

| VEGETATIVE COVER MAINTENANCE EQUIPMENT |               |                |
|--|---------------|----------------|
|  | Purchase      | Rent (per day) |
| Hand Saw                               | \$15          | \$5            |
| Chain Saw                              | \$300-\$500   | \$15-\$35      |
| Pruning Shears                         | \$25          | \$5            |
| Shrub Trimmer                          | \$200         | \$25-\$35      |
| Brush Chipper                          | \$1000-\$5000 | \$50-\$150     |

| TRANSPORTATION EQUIPMENT |                   |                      |                   |
|--------------------------|-------------------|----------------------|-------------------|
|                          | Purchase          | Lease<br>(per month) | Rent<br>(per day) |
| Van                      | \$10,000-\$15,000 | \$400                | \$50-\$70         |
| Pickup Truck             | \$10,000-\$15,000 | \$400                | \$50-\$70         |
| Dump Truck               | \$30,000-\$50,000 | \$1200               | \$75-\$150        |
| Light Duty Trailer       | \$3,000-\$5,000   | \$150                | \$30-\$50         |
| Heavy Duty Trailer       | \$10,000-\$20,000 | \$500                | \$100-\$200       |

| DEBRIS, TRASH, AND SEDIMENT REMOVAL EQUIPMENT |                    |                      |                   |
|---|--------------------|----------------------|-------------------|
|   | Purchase           | Lease<br>(per month) | Rent<br>(per day) |
| Front End Loader                              | \$50,000-\$100,000 | \$1500-\$2000        | \$200-\$400       |
| Backhoe                                       | \$30,000-\$50,000  | \$1200               | \$150-\$300       |
| Excavator                                     | \$100,000+         | \$2000+              | \$400-\$1000      |
| Grader  | \$100,000+         | \$2000+              | \$400-\$1000      |
| Vactor Truck                                  |                    |                      | \$400 - \$800     |

| MISCELLANEOUS EQUIPMENT |               |                |
|-------------------------|---------------|----------------|
|                         | Purchase      | Rent (per day) |
| Shovel                  | \$15          | \$5            |
| Leaf Rake               | \$15          | \$5            |
| Soil Rake               | \$15          | \$5            |
| Pick                    | \$15          | \$5            |
| Wheelbarrow             | \$100-\$200   | \$10           |
| Gloves                  | \$5           | N/A            |
| Portable Compressor     | \$500-\$1,000 | \$50-\$100     |
| Portable Generator      | \$500-\$1,000 | \$50-\$100     |
| Concrete Mixer          | \$500-\$1,000 | \$25-\$50      |
| Welding Equipment       | \$500-\$1,500 | \$35-\$70      |

| MATERIALS                                |                       |
|--|-----------------------|
|  | Purchase              |
| Topsoil                                  | \$35/Cubic Yard       |
| Fill Soil                                | \$15/Cubic Yard       |
| Grass Seed                               | \$5/Pound             |
| Soil Amenities (Fertilizer, Lime, etc.)  | \$0.05/sq.ft.         |
| Chemicals (Pesticides, Herbicides, etc.) | \$10/gallon           |
| Mulch                                    | \$25/Cubic Yard       |
| Paint                                    | \$20/Gallon           |
| Paint Remover                            | \$10/Gallon           |
| Machine/Motor Lubricants                 | \$5/Gallon            |
| Dry Mortar Mix                           | \$4/50 Pound Bag      |
| Concrete Delivered to Site               | \$60-\$100/Cubic Yard |

**NOTES:**

1. Estimated equipment costs are based upon Industrial/Commercial grade equipment.
2. The cost estimates presented above are intended for general planning and comparison purposes.

COSTS OF SWMF MAINTENANCE TASKS

PREVENTATIVE MAINTENANCE TASKS

|                        | Man-Hours |
|------------------------|-----------|
| Grass Cutting          | 20        |
| Grass Maintenance      | 20        |
| Trash & Debris Removal | 8         |
| Sediment Removal       | 12        |
| Mobilization           | 1         |
| Inspection & Reporting | 4         |

CORRECTIVE MAINTENANCE TASKS

|                        | Man-Hours |
|------------------------|-----------|
| Trash & Debris Removal | 8         |
| Structural Repairs     | 20        |
| Dewatering             | 8         |
| Mosquito Extermination | 4         |
| Erosion Repair         | 8         |
| Snow & Ice Removal     | 8         |
| Mobilization           | 2         |

AESTHETIC MAINTENANCE TASKS

|                       | Man-Hours |
|-----------------------|-----------|
| Grass Trimming        | 8         |
| Weed Control          | 8         |
| Landscape Maintenance | 4         |
| Graffiti Removal      | 4-8       |

**NOTES:**

1. Cost estimates are presented in terms of man-hours. These values should be used in conjunction with applicable personnel rates to determine labor costs for a specific program or facility.
2. The cost estimates presented above are intended for general planning and comparison purposes.

**VII. MANUFACTURER'S WARRANTIES**

Originals or copies of all manufacturers' warranties on pertinent measure components **must be** inserted into this section of the maintenance manual.

**VIII. AS-BUILT CONSTRUCTION PLANS**

A copy of the as-built construction plans shall be inserted into this section upon completion.

As-Built Construction Plans Inserted \_\_\_\_\_

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Print Name



## **IX. DEFINITIONS**

Debris: rough, broken bits of stone, wood, glass, etc.

Deterioration: to become less in quality or value

Formal Inspection: to be completed once a year by a licensed professional engineer. A copy of every inspection must be kept in the Log Section of the Maintenance Plan.

Onsite Inspection: To be completed twice a year by the owner of the Stormwater Management Facility or the Head of Maintenance. A copy of every inspection must be kept in the Log Section of the Maintenance Plan.

Porosity: the ratio of the volume of a material's pores to its total volume.

Pruning: to remove dead or living parts from a plant that are unnecessary.

Qualified inspector/personnel: a licensed professional engineer.

Rutting: a groove, furrow, or track, esp. one made in the ground.

Scouring: the washing away or removal of particles.

Sediment: matter that settles to the bottom and deposited.

Sloughing: material that is worn down or discarded.