

# **STORMWATER MANAGEMENT SYSTEM OPERATION AND MAINTENANCE PLAN**

**Washington Street Lot 3  
0 Washington Street in Sherborn, MA**

In order for the stormwater management system to function properly as designed, the system must be inspected on a regular basis and maintained. The responsibility for the maintenance and operation of the system will be as follows:

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Routine inspections and some of the routine maintenance tasks will be performed by the owner's maintenance personnel. Hired outside contractors will be utilized for some items such as the removal of trapped oils, hydrocarbons and sediment and for non-routine repairs.

The stormwater management system contains the following Stormwater Best Management Practices (BMPs):

- Trench Drain
- Subsurface Infiltration System
- Sediment Forebay
- Rain Garden
- Stone Infiltration Trench
- Pipe Outfalls

## **OPERATION AND MAINTENANCE MANUAL**

Upon completion of the project, a complete Stormwater Management System, Operation and Maintenance Plan (O&M) shall be prepared containing detailed plans of the as-built system components, a description of the purpose and function of each component, inspection and maintenance tasks and schedules, check lists, and report forms.

## **INSPECTIONS AND MAINTENANCE**

The following pages describe the inspection, routine maintenance and non-routine maintenance which are required for each BMP. These are described in a general manner at this time. The final O&M Plan will contain detailed information and actual schedules. The inspection and maintenance requirements are based on the recommendations from the MassDEP Stormwater Management Standards Handbook, February 2008.

The recommended procedures below should be followed strictly for at least the first two years of the system operation. During that period, the observations and experience gained from the monitoring and maintenance will provide the information necessary so that adjustments can be made for the most efficient operation and maintenance of the system.

## **NON-STORMWATER DISCHARGES**

This is to provide notice to the owner and operator(s) of the subject property that the discharge of any non-stormwater to the stormwater management system is prohibited. Also, there shall be no modifications to the stormwater system for the purpose of discharging non-stormwater to the system. Non-stormwater discharges are any liquid or materials that are not the result of natural rainfall runoff or runoff from snow and ice melt. Non-stormwater discharges include, but are not limited to, detergents, soaps and sanitary sewage. The purpose of this is to protect groundwater and surface water quality, and the downstream wetland resource areas, as well as to ensure compliance with applicable laws.

## **CONFINED SPACE ENTRY**

Note that any inspections or maintenance activity of underground piping, chambers, deep manholes, etc that requires entry into the system must be in accordance with OSHA confined space regulations.

# **TRENCH DRAIN**

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## **DESCRIPTION AND FUNCTION**

This structure collects stormwater from the driveway. The inlet of the trench drain is a grate over the precast concrete structure.

## **INSPECTIONS**

The trench drain should be inspected at least four times per year including at the end of the foliage and snow removal seasons. For a full inspection, remove the grate and inspect the general condition of the unit including the amount of floating debris and the presence of hydrocarbons if any. If the inspection finds a large presence of hydrocarbons, such as a layer of floating oil or a strong odor of gas, hydrocarbons should be removed immediately. Pipe outlet should be clear of debris. To be effective, the sump must be water tight to maintain a permanent pool to the outlet pipe invert. If the water level is below the outlet pipe, closer inspection for possible leaks is warranted. Note that a water level somewhat below the outlet level is normal during extended periods with no precipitation due to evaporation and minor expected seepage.

## **ROUTINE MAINTENANCE**

Initially, the trench drain should be cleaned a minimum of two times a year and additionally if necessary based on the results of the quarterly inspection. Cleaning consists of the removal of floating hydrocarbons and accumulated sediment, and clearing the inlet grate and outlet pipe. A hazardous waste disposal contractor must perform the removal of hydrocarbons.

## **NON-ROUTINE MAINTENANCE**

These are structural repairs and replacement of system components. Typical items for this BMP may include:

- Repairing the outlet pipe
- Filling cracks in the concrete
- Resetting of inlet grates

## **MAINTENANCE EQUIPMENT**

- Hand tools for opening grates
- Vacuum pumping truck (haz-mat contractor for hydrocarbon removal)

## **SUBSURFACE INFILTRATION SYSTEM**

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### **DESCRIPTION AND FUNCTION**

Recharger #1 is subsurface infiltration system and is constructed with HDPE chambers surrounded by washed stone and filter fabric. The chambers create voids within the stone to provide stormwater infiltration. The chambers are constructed in a permeable soil suitable for infiltrating. An emergency overflow is provided for the system once the storage volume is exceeded. Inspection Ports are to be brought to finished grade and will be used for observation of the ponding depth and condition of the chamber units.

The purpose of the infiltration system is to meet the recharge requirements and to treat runoff from the building roof per the MassDEP Stormwater Management Standards.

### **INSPECTIONS**

Recharger #1 should be inspected after every major storm for the first few months. After this time period it may be inspected once each year and should preferably be inspected two to three days after a significant storm event. The inspection should examine whether the system is draining properly following storms. The underground infiltration system should drain within a maximum of 72 hours following a storm event. Pipe inlets and outlets should be clear of debris and there should be no significant accumulation of sediment in the chambers. The annual Recharger #1 inspection is to view the interior of the chamber through the inspection ports. A significant accumulation of sediment may indicate a problem with soil migrating into the system from the surrounding soil indicating a failure of the filter fabric protection or a pipe problem in the pipe leading into the system.

### **ROUTINE MAINTENANCE**

Recharger #1 only received roof runoff so sediment removal should rarely be required. Routine maintenance generally includes clearing debris from the inlet and outlet pipes if found during an inspection.

### **NON-ROUTINE MAINTENANCE**

These are structural repairs and replacement of system components. Typical items for this BMP may include:

- Repairing the inlet pipes
- Resetting covers
- Removal of significant accumulation of sediment from the chambers that affects the infiltration capacity.

### **MAINTENANCE EQUIPMENT**

- Hand tools for opening inspection ports, flashlight.

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## **SEDIMENT FOREBAY**

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### **DESCRIPTION AND FUNCTION**

A sediment forebay is a pretreatment device designed to slow incoming stormwater flow and provide sediment removal prior to discharge to the rain garden. The volume of the forebay generally contains the equivalent of 0.1 inch of runoff from the contributing impervious surface tributary to the forebay.

### **INSPECTIONS**

The sediment forebay should be inspected monthly and following large storm events (greater than 2 inches). Inspect the general condition of the unit including the amount of floating debris and the presence of hydrocarbons if any. If the inspection finds a large presence of hydrocarbons, such as a layer of floating oil or a strong odor of gas, it should be removed immediately and the source of the hydrocarbons investigated for further removal at upstream BMPs. Measure the amount of sediment that has collected. The Pipe inlet should be clear of debris. Filter berms should be intact, clear of debris and functional.

### **ROUTINE MAINTENANCE**

The forebay should be cleaned twice per year and additionally or less as necessary based on the results of the monthly inspection. Cleaning consists of the removal of floating hydrocarbons, accumulated sediment, and debris. A hazardous waste disposal contractor must perform the removal of hydrocarbons (if any).

The side slopes of the forebay should be kept clear of woody growth.

### **NON-ROUTINE MAINTENANCE**

These are structural repairs and replacement of system components. Typical items for this BMP may include:

- Repairing the inlet pipe.
- Replacing or repair of stone lining.

### **MAINTENANCE EQUIPMENT**

- Hand tools for cleaning trash and sediment
- Vacuum pumping truck (haz-mat contractor for hydrocarbon removal)

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## **RAIN GARDEN**

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### **DESCRIPTION AND FUNCTION**

The rain garden uses soils, plants, and microbes to treat stormwater before it is infiltrated and/or discharged. The rain garden is a shallow depression filled with sandy soil topped with a thick layer of mulch and planted with dense native vegetation. The runoff percolates through the soil media that acts as a filter.

### **INSPECTIONS**

The rain garden requires careful attention while plants are being established and seasonal landscaping maintenance thereafter. Inspect the sediment forebay and the rain garden regularly for sediment build-up, structural damage, and standing water. Overall, the rain garden should be inspected monthly. Remove and replace dead vegetation as well as trash and other debris. The areas should be inspected for trash and debris, vegetative health, stability, and soil erosion.

### **ROUTINE MAINTENANCE**

Remove and replace dead vegetation semi-annually or as needed. Removal of trash and debris should take place monthly with replacement of mulch occurring 1-2 times per year. Mow ground cover vegetation once per year. Prune shrubs and trees 1 or 2 times per year as recommended for the particular plant species. Other tasks include fertilizing (only when necessary), liming, watering, pruning, and weed and pest control if necessary to maintain the health of the vegetated cover.

### **NON-ROUTINE MAINTENANCE**

These are structural repairs and replacement of system components. Typical items for this BMP may include:

- Major repairs to vegetation
- Replace the media and vegetation when prolonged ponding of water occurs following rain events (greater than 72 hours).
- Repair of eroded areas creating an improperly functioning rain garden

### **MAINTENANCE EQUIPMENT**

- Typical lawn and vegetation maintenance equipment (mower, rakes, pruning shears, etc.)
- Shovels, trash bags, and wheelbarrow for removal of sediment.

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## **STONE INFILTRATION TRENCH**

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### **GENERAL INFORMATION**

This system is a stone infiltration trench that receives stormwater and snowmelt runoff from the driveway and precipitation that sheet flows directly onto the trenches. The trench system infiltrates at least one inch of the runoff from the contributing driveway area into the ground. Maintenance consists of keeping the surface stone and overflow clear of sediment, debris and any clogging.

### **INSPECTIONS**

The stone trench should be inspected every 6 months, and after significant rain events. Inspect the general condition of the area including the amount of debris and sediment on the surface of the stone. One inspection should be in the fall after the leaves have dropped, and the other inspection should be in the spring. During those inspections, check for trapped sediment, debris, and clogging of the filter fabric under the top stone layer.

### **ROUTINE MAINTENANCE**

Cleaning consists of the removal of accumulated sediment and debris from the surface stone.

### **NON-ROUTINE MAINTENANCE**

These are structural repairs and replacement of system components. Typical items for this BMP may include:

- Removing the surface stone, cleaning and replacement of the filter fabric and the surface stone
- Repair any erosion from the overflow areas

### **MAINTENANCE EQUIPMENT**

- Hand tools for cleaning trash and sediment from the surface.

## **PIPE OUTFALLS**

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### **INSPECTIONS**

The pipe outfalls should be inspected monthly and after a significant rain event for the first few months of operation and twice per year minimum following that. Inspect the general condition of the area including the amount of debris, the presence of hydrocarbons if any, the amount of sediment, the condition of the vegetation within and adjacent to the pipe outlets, the condition of the outfall stone and the area downstream. If the inspection finds a large presence of sediment, it should be removed. Pipe outfalls should be clear of debris with special attention for any erosion.

### **ROUTINE MAINTENANCE**

The pipe outfalls should be cleaned a minimum of one time per year and additionally, if necessary, based on the results of the inspections. Cleaning consists of the removal of accumulated sediment and debris. Vegetation around the pipe outlet should be trimmed throughout the year. Any erosion should be fixed immediately. A hazardous waste disposal contractor must perform the removal of hydrocarbons if any.

### **NON-ROUTINE MAINTENANCE**

These are structural repairs and replacement of system components. Typical items for this BMP may include:

- Re-vegetation of surrounding areas
- Replacement of riprap stone lining at outfalls

### **MAINTENANCE EQUIPMENT**

- Hand tools for cleaning trash and sediment

**STORMWATER MANAGEMENT SYSTEM**  
**INSPECTION AND MAINTENANCE**  
**FORMS**

**CONTENTS:**

**INSPECTION FORMS**

- Trench Drain
- Subsurface Infiltration System
- Sediment Forebay
- Rain Garden
- Stone Infiltration Trench
- Pipe Outfalls

**MAINTENANCE / REPAIR RECORD FORM**

<b>STORMWATER BMP</b>	<b>INSPECTION SCHEDULE</b>	<b>MAINTENANCE SCHEDULE</b>
TRENCH DRAIN	4x per year	2x per year
INFILTRATION SYSTEM	1x per year	1x per year
SEDIMENT FOREBAY	4x per year	2x per year
RAIN GARDEN	12x per year	2x per year
STONE INFILTRATION TRENCH	2x per year	2x per year
PIPE OUTFALLS	2x per year	2x per year

## TRENCH DRAIN

## Routine Inspection Checklist

## Inspections - Monthly

[illegible]

\* Presence of hydrocarbons is a clearly visible layer of oil, gasoline, grease, hydraulic fluid, etc., floating on the surface or a strong odor of gas or oil



# INFILTRATION SYSTEM - RECHARGER #1

## Routine Inspection Checklist

[illegible]

\* Presence of hydrocarbons is a clearly visible layer of oil, gasoline, grease, hydraulic fluid, etc., floating on the surface or a strong odor of gas or oil

# SEDIMENT FOREBAY

## Routine Inspection Checklist

## Inspections - Quarterly

[illegible]

\* Presence of hydrocarbons is a clearly visible layer of oil, gasoline, grease, hydraulic fluid, etc., floating on the surface or a strong odor of gas or oil

# RAIN GARDEN

# Routine Inspection Checklist

# Inspections Monthly

[illegible]

STONE INFILTRATION TRENCH

Routine Inspection Checklist      Inspections - Semi-annually and after significant rains.

Date	Surface Stone	Sediment Depth	Debris	Perimeter Curbs	Outlet

COMMENTS

PIPE OUTFALLS

Routine Inspection Checklist

- Inspected semi-annually.

Date	Draining Properly	Sediment	Structural Integrity	Pipe Inlet/Outlet	Debris	Outlet Erosion

