



<b>Standard Operating Procedures</b>	<b>SOP Number:</b>	<b>Issue Date:</b>
Town of Dracut Department of Public Works	4	June 30, 2019
<b>Stormwater Infrastructure &amp; Inspecting Constructed BMP's</b>		
Approved by: <i>The Stormwater Committee</i>		
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### Purpose:

Best Management Practices (BMPs) are policies, procedures, and structures designed to reduce stormwater pollution, prevent contaminant discharges to natural water bodies, and reduce stormwater facility maintenance costs. Constructed BMPs are permanent site features designed to treat stormwater before infiltrating it to the subsurface or discharging it to a surface water body.

This Standard Operating Procedure provides a general summary of inspection procedures for seven common constructed BMPs, including:

1. Bioretention Areas and Rain Gardens
2. Constructed Stormwater Wetlands
3. Proprietary Media Filters
4. Sand and Organic Filters
5. Wet Basins
6. Dry Wells
7. Infiltration Basins

This SOP is based on the Massachusetts Stormwater Handbook and is not intended to replace that document. This SOP is also not intended to replace the Stormwater BMP Operation and Maintenance (O&M) Plan required by the Massachusetts Wetlands Protection Act, Order of Conditions.

### Bioretention Areas and Rain Gardens

Bioretention areas and rain gardens are shallow depressions filled with sandy soil, topped with a thick layer of mulch and planted with dense native vegetation. There are two types of bioretention cells:

1. Filtering bioretention area: Areas that are designed solely as an organic filter; and
2. Exfiltration bioretention area: Areas that are configured to recharge groundwater in addition to acting as a filter.

### *Inspection & Maintenance*

Routine inspection and maintenance are important to prevent against premature failure of bioretention areas or rain gardens. Regular inspection and maintenance of pretreatment devices and bioretention cells for sediment buildup, structural damage and standing water can extend the life of the soil media.

#### **Maintenance Schedule: Bioretention Areas and Rain Gardens**

Activity	Time of Year	Frequency
Inspect for soil erosion and repair	Summer	Annually
Inspect for invasive species and remove if present	Year round	Annually
Remove trash	Year round	Annually
Mulch Void Areas	Spring	Annually
Remove dead vegetation	Winter	Bi-Annually
Replace dead vegetation	Spring	Annually
Prune	Spring or Fall	Annually
Replace all media and vegetation	Late Spring/Early Summer	As Needed

When failure is discovered, excavate the bioretention area, scarify the bottom and sides, replace the filter fabric and soil, replant vegetation and mulch the surface.

Never store snow within a bioretention area or rain garden. This would prevent required water quality treatment and the recharge of groundwater.

### **Constructed Stormwater Wetlands**

Constructed stormwater wetlands maximize the pollutant removal from stormwater through the use of wetland vegetation uptake, retention and settling. Constructed storm water wetlands must be used in conjunction with other BMPs, such as sediment forebays.

### *Inspection & Maintenance*

Routine inspection and maintenance are important to maintain the function of the constructed stormwater wetlands.

#### **Maintenance Schedule, Constructed Stormwater Wetlands: Years 0-3**

Activity	Time of Year	Frequency
Inspect for invasive species and remove if present	Year round	Annually
Record and Map:	Year round	Annually
Types and distribution of dominant wetland plants	Year round	Bi-Annually
Presence and distribution of planted wetland species	Spring	Annually
Presence and distribution of invasive species	Fall and Spring	Bi-Annually
Indications other species are replacing planted wetland species	Spring	Annually
Percent of standing water that is not vegetated	Spring or Fall	Annually
Replace all media and vegetation	Late Spring/Early Summer	As Needed
Stability of original depth zones and micro-topographic features	Summer	As Needed
Accumulation of sediment in the forebay and micropool and survival rate of plants	Year round	Annually

### Maintenance Schedule, Constructed Stormwater Wetlands: Years 4-Lifetime

Activity	Time of Year	Frequency
Inspect for invasive species and remove if present	Year round	Annually
Clean forebays	Year round	Annually
Clean sediment in basin/wetland system	Year round	Once every 10 years
Mulch Void Areas	Spring	Annually
Remove dead vegetation	Fall and Spring	Bi-Annually
Replace dead vegetation	Spring	Annually
Prune	Spring or Fall	Annually
Replace all media and vegetation	Late Spring/Early Summer	As Needed

Never store snow within a constructed stormwater wetland. This would prevent required water quality treatment and the recharge of groundwater.

### Proprietary Media Filters

Media Filters are designed to reduce total suspended solids and other target pollutants, such as organics, heavy metals or nutrients, which are absorbed onto the filter media, which is contained in a concrete structure. The substrate used as filter media depends on the target pollutants, and may consist of leaf compost, pleated fabric, activated charcoal, perlite, amended sand in combination with perlite, and zeolite. Two types of Media Filters are manufactured: Dry Media Filters, which are designed to dewater within 72 hours; and Wet Media Filters, which maintain a permanent pool of water as part of the treatment system.

### Inspection & Maintenance

Maintenance in accordance with the manufacturer's requirements is necessary to ensure stormwater treatment. Inspection or maintenance of the concrete structure may require OSHA confined space training. Dry Media Filters are required to dewater in 72 hours, thus preventing mosquito and other insect breeding. Proper maintenance is essential to prevent clogging. Wet Media Filters require tight fitting seals to keep mosquitoes and other insects from entering and breeding in the permanent pools. Required maintenance includes routine inspection and treatment.

### Maintenance Schedule: Proprietary Media Filters

Activity	Time of Year	Frequency
Inspect for standing water, trash, sediment and clogging	Per manufacturer's schedule	Bi-Annually (minimum)
Remove trash and debris	N/A	Each Inspection
Examine to determine if system drains in 72 hours	Spring, after large storm	Annually
Inspect filtering media for clogging	Per manufacturer's schedule	Per manufacturer's schedule

### Sand and Organic Filters

Sand and organic filters, also known as filtration basins, are intended for quality control rather than quantity control. These filters improve water quality by removing pollutants through a filtering media and settling pollutants on top of the sand bed and/or in a pretreatment basin. Pretreatment is required to prevent filter media from clogging. Runoff from the filters is typically discharged to another BMP for additional treatment.

### *Inspection & Maintenance*

If properly maintained, sand and organic filters have a long design life. Maintenance requirements include raking the sand and removing sediment, trash and debris from the surface of the BMP. Over time, fine sediments will penetrate deep into the sand requiring replacement of several inches or the entire sand layer. Discolored sand is an indicator of the presence of fine sediments, suggesting that replacement of the sand should be completed.

**Maintenance Schedule: Sand and Organic Filters**

Activity	Frequency
Inspect filters and remove debris	After every major storm for the first 3 months after construction completion. Every 6 months thereafter.

### **Wet Basins**

Wet basins are intended to treat stormwater quality through the removal of sediments and soluble pollutants. A permanent pool of water allows sediments to settle and removes the soluble pollutants, including some metals and nutrients. Additional dry storage is required to control peak discharges during large storm events, and if properly designed and maintained wet basins can add fire protection, wildlife habitat and aesthetic values to a property.

### *Inspection & Maintenance*

To ensure proper operation, wet basin outfalls should be inspected for evidence of clogging or excessive outfall releases. Potential problems to investigate include erosion within the basin and banks, damage to the emergency spillway, tree growth on the embankment, sediment accumulation around the outlet and the emergence of invasive species. Should any of these problems be encountered, perform repairs immediately. An on-site sediment disposal area will reduce sediment removal costs.

**Maintenance Schedule: Wet Basins**

Activity	Time of Year	Frequency
Inspect wet basins	Spring and/or Fall	Annually (Minimum)
Mow upper stage, side slopes, embankment and emergency spillway	Spring through Fall	Bi-Annually (Minimum)
Remove sediment, trash and debris	Spring through Fall	Bi-Annually (Minimum)
Remove sediment from basin	Year round	As required, but at least once every 10 years

### **Dry Wells**

Dry wells are used to infiltrate uncontaminated runoff. These BMPs should never be used to infiltrate stormwater or runoff that has the potential to be contaminated with sediment and other pollutants. Dry wells provide groundwater recharge and can reduce the size and cost required of downstream BMPs or storm drains. However, they are only applicable in drainage areas of less than one acre and may experience high failure rates due to clogging.

### *Inspection & Maintenance*

Proper dry well function depends on regular inspection. Clogging has the potential to cause high failure rates. The water depth in the observation well should be measured at 24 and 48 hour intervals after a storm and the clearance rate calculated. The clearance rate is calculated by dividing the drop in water level (inches) by the time elapsed (hours).

#### **Maintenance Schedule: Dry Wells**

<b>Activity</b>	<b>Frequency</b>
Inspect dry wells	After every major storm for the first 3 months after construction completion. Annually thereafter.

### **Infiltration Basins**

Infiltration basins are designed to contain stormwater quantity and provide groundwater recharge. Pollution prevention and pretreatment are required to ensure that contaminated stormwater is not infiltrated. Infiltration basins reduce local flooding and preserve the natural water balance of the site, however high failure rates often occur due to improper siting, inadequate pretreatment, poor design and lack of maintenance.

### *Inspection & Maintenance*

Regular maintenance is required to prevent clogging, which results in infiltration basin failure. Clogging may be due to upland sediment erosion, excessive soil compaction or low spots. Inspections should include signs of differential settlement, cracking, erosion, leakage in the embankments, tree growth on the embankments, riprap condition, sediment accumulation and turf health.

#### **Maintenance Schedule: Infiltration Basins**

<b>Activity</b>	<b>Time of Year</b>	<b>Frequency</b>
Preventative maintenance	Spring and Fall	Bi-Annually
		After every major storm for the first 3 months after construction completion. Bi-annually thereafter and discharges through the high outlet orifice.
Inspection	Spring and Fall	
Mow/rake buffer area, side slopes and basin bottom	Spring and Fall	Bi-Annually
Remove trash, debris and organic matter	Spring and Fall	Bi-Annually

