

City of Cambridge, MA

Department of Public Works

Good Housekeeping Manual - Best Management Practices to Prevent Stormwater Pollution



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**THE
WORKS**
CAMBRIDGE
DEPARTMENT
OF PUBLIC

**City of Cambridge, MA
Department of Public Works
Good Housekeeping Manual –
Best Management Practices to Prevent Stormwater Pollution**

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Glossary of Terms

Activities: Practices that occur routinely at City-owned facilities and as part of the City's operations.

Best Management Practices (BMPs): Includes schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent, eliminate, or reduce the pollution of the receiving waters. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Catch Basin: An underground structure used to collect runoff and divert it to the stormwater or combined sewer system.

Construction Activity: Includes clearing, grading, excavation, and contractor activities that result in soil disturbance.

Discharge: A release or flow from a canal, conduit, sewer, drain, outfall, pump, stack, tank or treatment process, or any emission, intentional or unintentional, including but not limited to, flow resulting from spilling, leaking, seeping, pumping, pouring, emitting, emptying, depositing, dumping, releasing, injecting, escaping, leaching or infiltration whether direct or indirect.

Hazardous Waste: A waste or combination of wastes that, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either cause or significantly contribute to an increase in mortality or an increase in serious irreversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed. This type of waste possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity) or appears on special EPA or Massachusetts Department of Environmental Protection (DEP) lists. Regulated under the federal Resource Conservation and Recovery Act.

Illicit Discharges: Any discharge to a drainage system that is not composed entirely of stormwater, with the exception of discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the MS4) and discharges resulting from fire-fighting activities.

Municipal Separate Storm Sewer System (MS4): A conveyance or system of conveyances designed or used for collecting or conveying stormwater, including any road with a drainage system. Street, gutter, curb, inlet, piped storm drain, pumping facility, retention, or detention basin, natural or manmade or altered drainage channel, reservoir, and other drainage structure that together comprise the stormwater drainage system owned or operated by the City.

Non-Stormwater Discharge: Any discharge to a municipal separate storm sewer (MS4) that is not composed entirely of stormwater.

Non-point Source Pollution: Pollution which occurs when water runs over land or through the ground and picks up natural and human-made pollutants and discharges them in surface waters or

introduces them into groundwater.

NPDES Permit: NPDES is an acronym for National Pollutant Discharge Elimination System. The NPDES Permit is the permit required and issued by EPA to control point source discharges of pollutants to waters of the United States or separate stormwater drainage systems. It shall also mean the permit issued to the City by EPA for its combined sewer and stormwater discharges.

Oil/Water Separator: A receptacle designed to separate petroleum-based oil and grease from water body, wetland, or land surface. Also called a trap or interceptor.

Outfall: A point source as defined by 40 CFR § 122.2 as the point where the municipal separate storm sewer discharges to waters of the United States. An outfall does not include open conveyances connecting two municipal separate storm sewers or pipes, tunnels or other conveyances that connect segments of the same stream or other waters of the United States, and that are used to convey waters of the United States. Also called an outlet.

Point Source: Any discernible, confined, and discrete conveyance from which pollutants are or may be discharged.

Pollutant: An element, constituent, or property of wastewater, or of agricultural, industrial, manufacturing, or commercial process water, or leachate, or any other substance which causes the alteration of chemical, physical, biological, or radiological integrity of water through its introduction therein. Generally, any substance introduced into the environment that adversely affects the usefulness of a resource.

Pollution Prevention: Practices and actions that reduce or eliminate the generation of pollutants.

Pretreatment: The reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater to a less harmful state prior to or in lieu of discharging or otherwise introducing such pollutants into the wastewater system. Pretreatment shall include the reduction or alteration of pollutants by physical, chemical, or biological processes, process changes, or other means except as prohibited by 40 CFR §403. Dilution is not pretreatment.

Runoff: Water originating from rainfall, melted snow, or irrigation water, which is not absorbed into the ground. Instead, it flows over the land into streams, other surface bearing water or drainage structures.

Run-on: Off-site stormwater surface flow or other surface flows which enters your site.

Secondary Containment: Structures, usually dikes or berms, surrounding tanks or other storage containers, designed to catch spilled materials from the storage containers.

Sedimentation: The process of depositing soil particles, clays, sands, or other sediments that were picked up by runoff.

Sediments: Soil, sand, and minerals washed from land into water, usually after rain, that collect in reservoirs, rivers, and harbors, destroying fish nesting areas and clouding the water, thus preventing sunlight from reaching aquatic plants. Farming, mining, and building activities without proper implementation of BMPs will expose sediment materials, allowing them to be washed off the land after rainfalls.

Significant Materials: Includes (but not limited to): raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designed under § 101(14) of CERLCA; any chemical the facility is required to report pursuant to § 313 of Title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag, and sludge that have the potential to be released with stormwater discharges.

Significant Quantities: The volume, concentrations, or mass of a pollutant in stormwater discharge that can cause or threaten to cause pollution, contamination, or nuisance that adversely impact human health or the environment and cause or contribute to a violation of any applicable water quality standards for receiving water.

Source Control BMPs: Operational practices that reduce potential pollutants at the source.

Source Reduction (also Source Control): The technique of stopping and/or reducing pollutants at their point of generation so that they do not come into contact with stormwater.

Stormwater: water resulting from rainfall or other precipitation that runs off surfaces during or after a storm.

Stormwater Control Measure (SCM): techniques for managing stormwater to prevent or reduce non-point source pollutants from entering surface or ground waters. Structural SCMs are practices that have been specifically designed, constructed, and installed for the purposes of conveying, collecting, storing, discharging, recharging, or treating stormwater.

Stormwater Drainage System: Above- and below-ground structures for transporting stormwater to streams or outfalls for flood control purposes.

Toxicity: Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies.

Introduction

The City of Cambridge (the City) is required to develop and implement good housekeeping best management practices to prevent pollution as a part of the 2016 Massachusetts Small MS4 General Permit (MS4 Permit). In most areas of Cambridge, stormwater is conveyed through a system of catch basins and stormwater pipes commonly referred to as a drainage system. Stormwater pollution can be conveyed through the drainage system and affects the quality of the City's surface waters including the Alewife Brook, Charles River, and Fresh Pond. The procedures included in this manual are intended to minimize pollution.

These procedures address municipal activities at facilities owned or operated by the City and operation and maintenance of MS4 infrastructure owned or operated by the City. The Good Housekeeping Manual is a guidance document prepared by the Department of Public Works (DPW) in cooperation with other municipal departments, for all City staff. Specific users, departments, and divisions with activities at facilities that have the potential for stormwater pollution include the following:

- DPW Staff, including the following divisions:
 - Administration, Engineering, Fleet and Vehicle Maintenance, Parks (including Cambridge cemetery), Urban Forestry, Recycling, Streets and Sewers, Sanitation, and Street Cleaning
- Capital Buildings
- Traffic, Parking, and Transportation
- School Department
- Fire Department
- Water Department
- Police Department
- Libraries
- Human Services Program

Municipal Facilities

Procedures under this category address parks and open space, buildings and facilities where pollutants are exposed to stormwater, and storage of City vehicles and equipment.

MS4 Infrastructure

Procedures under this category address inspection, cleaning and maintenance of catch basins, street sweeping, proper storage of catch basin and street sweeping debris, winter road maintenance and inspection and maintenance of stormwater treatment structures.

Catch Basin Inspection, Cleaning, and Maintenance: See BMP 10. The City's Streets and Sewer Maintenance Division is responsible for inspection and cleaning of catch basins. Sewer crews use a combination of a clam shell and vacuum truck to regularly clean catch basins. Cartegraph is used to track cleaning where crews complete an inspection and measure sediment depth prior to each cleaning. The Streets and Sewer Division and DPW Engineering's remedial contract maintain catch basins, including repairs and routine catch basin upgrades to replace catch basins without deep sump and hoods.

Street Sweeping: See BMP 9. The City's Street Sweeping Division is responsible for conducting street cleaning. The City sweeps each side of every residential street once per month using a mechanical broom sweeper. In addition, a regenerative air vacuum truck is used three times per year.

Storage of Catch Basin and Street Sweeping Debris: See BMPs 9 & 10. The City manages street sweepings and catch basin cleaning debris in compliance with current Massachusetts Department of Environmental Protection policies. Street cleaning debris is stored either at DPW's Maintenance Garage at Hampshire Street in a designated storage bay or in designated dumpsters at DPW's Alewife Transfer Station.

Winter Road Maintenance: See BMPs 1 & 2. The City's Streets Division is responsible for winter road maintenance, including application of brine prior to a storm, salt application, plowing and snow removal. The Parks Division is responsible for salt application and snow removal on sidewalks. In 2024, Cambridge developed a Salt Reduction Plan which describes existing and proposed BMPs for municipally maintained surfaces to reduce the amount of chloride discharged to impaired waterbodies.

Inspection and Maintenance of Stormwater Treatment Structures: See SCMs 1-11. DPW's Engineering Division is responsible for inspection of stormwater treatment structures. SCMs, oil water separators, and dry wells within the MS4 separated area are inspected annually and inspections are tracked in Cartegraph. Maintenance is conducted by the City's Sewer Division on an as-needed basis based on results of inspections, such as cleaning inlet and outlet structures or flushing pipe. The City also completes regular vegetation maintenance through a designed SCM maintenance contract.

How to Use this Manual

Each facility site operator should complete the following:

1. If not familiar with stormwater pollutants and water quality impacts, **review Appendix G.**
2. **Review drainage maps for the site** that provide details about the layout of the City's stormwater drainage system including catch basins, manholes, and drainage flow paths. This data is available online using [AxisGIS](#). The system maps provide important information to guide actions described in this Manual.
3. **All municipal facilities should review the Best Management Practices (BMP) sheets for procedures relevant to their sites and implement these practices in daily operations.** The pollution prevention and good housekeeping controls outlined in this document are standard operating procedures for City personnel and for use at all applicable City-owned facilities and drainage infrastructure. These BMPs are intended to serve as guidance on good housekeeping practices as they relate to reducing pollutants in runoff from municipal operations.
 - Each of the BMP fact sheets provides a description of the practice, the pollution prevention approach, suggested practices, inspection procedures, and maintenance

procedures.

- The BMP fact sheets include targeted facilities and operations. The potential pollutants associated with these targeted facilities and operations are identified in Appendix G.

4. Complete good housekeeping inspections at regular intervals:

- Use the Good Housekeeping Inspection Form found in Appendix B when completing a site inspection once per year.
- For facilities with individual Stormwater Pollution Prevention Plans (SWPPPs), reference the SWPPP inspection form when completing a site inspection once per quarter. Operators of SWPPP sites must also attend annual SWPPP training with DPW Engineering staff.

Facilities with leases or contractors performing work on site may wish to review Appendix F for template language that can be inserted into municipal leases or field program contracts.

Note facilities may also be covered under the Multi-Sector General Permit (MSGP), which has additional requirements not included in this document. Facilities adjacent to wetlands may have Wetlands Protection Act Orders of Conditions for certain maintenance activities in proximity to wetland resources.

Sites within Separated Sewer Areas

All facilities within separated sewer areas must be inspected annually.

Note to comply with MS4 Permit requirements and minimize stormwater pollution, each facility in the separated sewer area with stormwater control measures (SCMs) and/or oil/water separators must complete inspections on an annual basis. SCMs require more detailed annual inspections of each individual structure than included on the Good Housekeeping Inspection Form. The SCM inspections are completed by DPW Engineering Staff in Cartegraph and submitted to the EPA annually, but these structures should also be inspected as part of Good Housekeeping Inspections by facility staff. Report any required maintenance or cleaning needed to DPW.

Sites within Combined Sewer Areas

Although the Final MS4 Permit does not regulate facilities that are within the combined sewer areas, the City is taking proactive measures to manage infrastructure and prevent stormwater related issues. For this reason, this manual is prepared for all facilities. The inspection frequency for facilities in the combined sewer area and/or without stormwater control structures, such as enclosed offices and certain parks and open spaces, is recommended on an as-needed basis. For more information about requirements for a specific facility, please review Appendix E, which is available on-file with the DPW.

GOOD HOUSEKEEPING FORM AND INSPECTION PROTOCOLS

Inspection Form

Appendix B includes a Good Housekeeping Inspection Form that should be completed on an annual basis by facility personnel for City properties or operations. Complete one form per property. The form includes three parts:

1. **Part I BMP Checklist:** to identify what BMPs are applicable to the site and an assessment of the effectiveness of the BMPs implemented. The effectiveness of the BMP depends on whether proper procedures and protocols identified in Appendix C are currently being implemented. The comments section serves to provide how inadequate BMPs will be addressed. Note BMPs (Best Management Practices) in this section refer to site operations and good housekeeping practices.
2. **Part II SCM Checklist:** to identify what SCMs have been installed on the site and an assessment of the condition and performance of the SCMs. The effectiveness of the SCM can be assessed using the information found in Appendix D. Note SCMs (Stormwater Control Measures) in this section refer to permanent structural controls installed for the purposes of stormwater treatment.
3. **Part III Personnel and Property Changes Evaluation:** the form includes a section on property changes to evaluate whether new BMPs/SCMs should be incorporated into the activities of the facility.

Note SCMs require more detailed annual inspections of each individual structure than included on the Good Housekeeping Inspection Form. The SCM inspections are completed by DPW Engineering Staff in Cartegraph and submitted to the EPA annually.

Recordkeeping

It is important to keep a record of the inspection forms at an appropriate department designated facility. Please also return these completed forms via email to Cambria Ung (cung@cambridgema.gov) and Yilkal Bekele (ybekele@cambridgema.gov) at the City's Department of Public Works. Inspection forms for facilities and City-wide operations should be completed during a time of the year that applicable activities are being conducted. Good housekeeping inspection forms for a given permit year (July 1st to June 30th) should be completed and submitted to the DPW by June 1 (annually).

APPENDIX A - FACILITY SITE DRAINAGE LOCUS MAPS (ON FILE)

APPENDIX B - GOOD HOUSEKEEPING INSPECTION FORM



**City of Cambridge, MA
Department of Public Works
Implementation of Stormwater
Management Plan**

**Good Housekeeping Inspection
Form**

Facility Name and ID: _____

Facility Address: _____

Facility Manager: _____

Contact Information: _____

Date: _____

Previous Inspection Date: _____

Weather and approx. Temp.: _____

Field Personnel: _____

Photo CD: _____

Separate

☐

Combined Storm Sewer area:

☐

Directions:

1. For each activity, inspect whether the Best Management Practices (BMPs) for site operations or Stormwater Control Measures (SCMs) for stormwater treatment listed are implemented at the Facility.

Y = Yes

N = No

N/A = Not Applicable

2. Indicate the overall effectiveness of the BMPs or SCMs implemented.

1 = BMP not effective (improvement is possible)

2 = BMP effective

3. Include any necessary comments. These include reasons why a BMP or SCM is not effective and the next course of action.



PART I: BMP CHECKLIST									
	ACTIVITY	BMP	BMP IMPLEMENTED			EFFECTIVENESS		COMMENTS	
1	Road Sand/Salt Application and Storage	Proper Storage	Y	N	N/A	1	2		
		Proper Disposal	Y	N	N/A	1	2		
		Proper Removal	Y	N	N/A	1	2		
		Proper Use	Y	N	N/A	1	2		
2	Snow	Proper Stockpiling	Y	N	N/A	1	2		
	Stockpiling/Removal	Procedures							
		Proper Plowing Procedures	Y	N	N/A	1	2		
3	Materials Management	Material Inventory	Y	N	N/A	1	2		
		Solid Waste	Y	N	N/A	1	2		
		Alternative Products	Y	N	N/A	1	2		
4	Hazardous Material Storage	Loading/Unloading	Y	N	N/A	1	2		
		Container Storage	Y	N	N/A	1	2		
		Maintenance	Y	N	N/A	1	2		
		Disposal	Y	N	N/A	1	2		
5	Vehicle Fueling, Maintenance and Storage	General Practices	Y	N	N/A	1	2		
		Fueling	Y	N	N/A	1	2		
		Vehicle Maintenance	Y	N	N/A	1	2		
		Disposal	Y	N	N/A	1	2		
		Used Oil Recycled	Y	N	N/A	1	2		
6	Vehicle Washing	General Wash Practices	Y	N	N/A	1	2		
		Vehicle and Equipment Cleaning	Y	N	N/A	1	2		
		Disposal	Y	N	N/A	1	2		
		Wash at Commercial Facility	Y	N	N/A	1	2		

PART I: BMP CHECKLIST					
	ACTIVITY	BMP	BMP IMPLEMENTED	EFFECTIVENESS	COMMENTS
7	Spill Prevention and Response	Implement Plan or SPCC	Y N N/A	1 2	
		Spill/Leak Prevention	Y N N/A	1 2	
		Spill Clean Up	Y N N/A	1 2	
		Reporting	Y N N/A	1 2	
8	Lawn and Grounds Maintenance	Landscaping	Y N N/A	1 2	
		Fertilizer and Pesticide Management	Y N N/A	1 2	
		Debris Removal	Y N N/A	1 2	
9	Street and Parking Lot Sweeping	Sweep in the spring	Y N N/A	1 2	
		Properly dispose of sweep material	Y N N/A	1 2	
		Maintain a log of sweeping activities	Y N N/A	1 2	
10	Catch Basin Cleaning	Clean in the spring after sweeping activities	Y N N/A	1 2	
		Properly dispose of catch basin cleanings	Y N N/A	1 2	
		Maintain a log of cleaning activities	Y N N/A	1 2	
11	Stormwater, Sanitary and Water Line Maintenance	Protocols in Place	Y N N/A	1 2	
12	Pet Waste and Litter	Public Education (signs, pooper scooper stations)	Y N N/A	1 2	
13	Sidewalk Cleaning and Repair	Properly clean sidewalks	Y N N/A	1 2	
		Properly repair sidewalks	Y N N/A	1 2	

PART I: BMP CHECKLIST					
	ACTIVITY	BMP	BMP IMPLEMENTED	EFFECTIVENESS	COMMENTS
14	Graffiti Cleaning	Properly clean graffiti	Y N N/A	1 2	
15	Mosquito Control	Protocols in Place	Y N N/A	1 2	
16	Waste Management	General	Y N N/A	1 2	
		Controlling Litter	Y N N/A	1 2	
		Waste Collection	Y N N/A	1 2	
		Good Housekeeping	Y N N/A	1 2	
		Chemical/Hazardous Waste	Y N N/A	1 2	
		Run-on/Runoff Prevention	Y N N/A	1 2	
17	Building Operations	Outside Pressure Washing	Y N N/A	1 2	
		Building Repair, Remodeling, Construction	Y N N/A	1 2	

PART II: SCM CHECKLIST					
	SCM	ACTIVITY	SCM IMPLEMENTED	EFFECTIVENESS	COMMENTS
1	Oil/Water Separators	Clean the Oil/Water Separators annually	Y N N/A	1 2	
		Properly dispose of Oil/Water Separators cleanings	Y N N/A	1 2	
		Maintain a log of cleaning activities	Y N N/A		
2	Green Roof	Clean the Green Roof once in early spring & once late fall	Y N N/A	1 2	
		Maintain a log of cleaning activities	Y N N/A	1 2	
3	Pervious Pavement	Clean the Pervious pavement with a	Y N N/A	1 2	

PART II: SCM CHECKLIST					
	SCM	ACTIVITY	SCM IMPLEMENTED	EFFECTIVENESS	COMMENTS
		vacuum street sweeper early spring and once in late fall			
		Maintain a log of cleaning activities	Y N N/A	1 2	
4	Bio-retention areas	Cleaned once in early spring and once in late fall	Y N N/A	1 2	
		Added 1" of mulch every six month or in spring and fall	Y N N/A	1 2	
		Maintain a log of cleaning and weeding activities	Y N N/A	1 2	
5	Dry Wells	Clean surrounding area including gutters and sump box annually	Y N N/A Y N N/A	1 2 1 2	
		Maintain a log of cleaning activities			
6	Tree Box Filters (Filterra)	Clean entire structure. Remove and dispose of debris.	Y N N/A	1 2	
		Rake media twice per year and replace mulch and filter media as needed.	Y N N/A	1 2	
		Maintain a log of cleaning activities.	Y N N/A	1 2	
7	Infiltration Chambers (Cultec)	Remove sediment and oil/grease as necessary.	Y N N/A	1 2	
		Remove any debris that may restrict inlet and outlets.	Y N N/A	1 2	
		Maintain a log of cleaning activities.	Y N N/A	1 2	

PART II: SCM CHECKLIST					
	SCM	ACTIVITY	SCM IMPLEMENTED	EFFECTIVENESS	COMMENTS
8	Infiltration Trenches	Remove sediment and oil/grease as necessary.	Y N N/A	1 2	
		Remove grass clippings and leaves from surface of the trench.	Y N N/A	1 2	
		Remove any debris that may restrict inlet and outlets.	Y N N/A	1 2	
		Maintain a log of cleaning activities.	Y N N/A	1 2	
9	Particle Separators (Stormceptors)	Measure sediment depth to determine cleanout.	Y N N/A	1 2	
		Remove and dispose of sediment and water.	Y N N/A	1 2	
		Maintain a log of cleaning activities	Y N N/A	1 2	
10	Membrane Filters (Jellyfish)	Measure sediment depth and remove once depth is >12 inches or every 3 years, whichever is sooner.	Y N N/A	1 2	
		Remove and dispose of trash, debris, and oil.	Y N N/A	1 2	
		Rinse filter cartridges once per year.	Y N N/A	1 2	
		Maintain log of cleaning activities	Y N N/A	1 2	

PART II: SCM CHECKLIST					
	SCM	ACTIVITY	SCM IMPLEMENTED	EFFECTIVENESS	COMMENTS
11	Stormwater Storage Tanks	Remove debris and accumulated particulates as needed.	Y N N/A	1 2	
		Maintain pumps, floats, and VFDs per manufacturer specifications.	Y N N/A	1 2	
		Maintain a log of cleaning activities.	Y N N/A	1 2	

PART III: PERSONNEL AND PROPERTY CHANGES EVALUATION	
Have any new staff personnel begun working at the Facility? If yes, list names of new personnel and dates personnel were/are going to be trained to implement Good Housekeeping BMPs:	Y N
Are there new significant materials that could be exposed at the Facility? If yes, describe the type, location conducted, purpose, and responsible City Department:	Y N

Are there new activities that could expose significant materials at the Facility?

Y N

If yes, describe the type, location conducted, purpose, and responsible City Department:

Are there new major changes to the Facility drainage (e.g., new construction, grading activities, etc.)? Y N

If yes, describe:

Suggested improvements (or new BMPs/SCMs) include the following:

APPENDIX C – BMPS FOR SITE OPERATIONS

BMP 1 - ROAD SAND/SALT APPLICATION AND STORAGE

DESCRIPTION

DPW's policy is to strictly use salt on street rights-of-way and to pre-treat roadways before and expected snow/ice storm with a brine solution made from "solar salt". A few facilities do use sand/salt mixtures. Proper road salt and facility sand/salt applications storage is necessary to prevent contamination to surface and ground water supplies. Salts are very soluble—once in contact with water there is no way to remove salt. The major reasons for keeping salt covered and controlling use are that salt:

- Kills vegetation
- Corrodes infrastructure
- Blocks storm drains and swales
- Increases sedimentation to streams and rivers
- Small quantities (5% road salt) contain phosphorus, nitrogen, copper, and cyanide

POLLUTION PREVENTION APPROACH

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater system.

SUGGESTED BEST MANAGEMENT PRACTICES

Proper Storage

Storage facilities for salt and sand/salt mixtures should have the following key elements:

- Covered structure on impervious surface.
- Drainage should be diverted away from storage facility.
- Sand/salt handling should be done within storage facility.
- Should not be located in a water supply watershed or within 100-year floodplain.

Proper Disposal

Disposal of sand/salt mixtures should not be done in the following areas:

- Wetlands
- Any surface waters
- Well locations and public drinking supplies

Proper Removal

- Street cleaning of all City roadways once per month between April and December.
- Catch basin cleaning completed, as necessary.

Proper Use

- Establish a low salt area near any water bodies or residential areas.
- Regulate the amount of road salt applied to prevent over-salting of motorways and increasing runoff concentrations.

TARGETED FACILITIES AND OPERATIONS

- All City-Owned Facilities
- Street Rights-of-Way

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics
- Low Dissolved Oxygen

REFERENCE

- "Cambridge Public Works Snow Operations"

- Vary the amount of salt applied to reflect site-specific characteristics, such as road width and design, traffic concentration, and proximity to surface waters.
- Provide calibration devices for spreaders in trucks to aid maintenance workers in the proper application of road salts.
- Establish air temperature and snow depth conditions favorable for successful use of salt.
- Use alternative materials, such as sand or gravel, in especially sensitive areas.
- Use alternative products such as Magic Salt.

INSPECTION PROCEDURES

- Inspect salt storage shed for leaks on a regular basis including Fall and Spring.
- Inspect salt application equipment including calibration equipment and spreaders.
- Inspect salt regularly for lumping or water contamination.
- Inspect surface areas for evidence of runoff – salt stains in ground near and around the salt storage shed, loading area, or downslope.
- Inspect for excessive amounts of salt on roads.

MAINTENANCE PROCEDURES

- Service trucks and calibrated spreaders annually to ensure accurate, efficient distribution of salt.
- Educate and train operators on hazards of over-salting to roads and environment at the beginning of the snow season as part of meetings with supervisors and drivers.
- Repair salt storage shed leaks.

BMP 2 - SNOW STOCKPILING/REMOVAL

DESCRIPTION

Proper snow management in terms of stockpiling and removal can prevent or minimize runoff and pollutant loading impacts. Snow piles can contain trash, nutrients, sediments, salt, sand, and vehicle pollutants (petroleum, antifreeze, and oil) that can directly be carried into surface waters during snowmelt.

POLLUTION PREVENTION APPROACH

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system.

SUGGESTED BEST MANAGEMENT PRACTICES

The City's Policy is to restrict stockpiling of snow. During extreme conditions when stockpiling is necessary the following practices should be applied:

- Do not stockpile snow near or within direct drainage to surface waters.
- Do not stockpile snow in wooded areas, around trees, or in vegetated buffer zones due to sediment and salt damage to vegetation.
- Stockpile snow in pervious areas where it can slowly infiltrate.
- During plowing activities on pervious surfaces, blading (plow lowers blade below ground surface level and plows the upper layers of soil in addition to overlying snow) should be avoided to prevent erosion.
- Do not dispose of snow into waters of the United States. Snow disposal activities, including selection of appropriate snow disposal sites, will adhere to the Massachusetts Department of Environmental Protection Snow Disposal Guidance, Guideline No. BWR G2015-01 (Effective Date: December 21, 2015), located at:
<http://www.mass.gov/eea/agencies/massdep/water/regulations/snow-disposal-guidance.html>

INSPECTION PROCEDURES

- Check snow piles for debris that could be windblown.

MAINTENANCE PROCEDURES

- Contain sediments as snow melts and removed every Spring from snow storage areas. This includes sweeping roadways and parking lots or other impervious areas.
- During plowing activities, avoid blocking drainage structures including catch basins, swales, and channels.

TARGETED FACILITIES AND OPERATIONS

- City-Wide Operations
- Street Rights-of-Way

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Oil & Grease

REFERENCE

- "Cambridge Public Works Snow Operations"

BMP 3 - MATERIALS MANAGEMENT

DESCRIPTION

Materials management entails the selection of the individual product, the correct use and storage of the product, and the proper disposal of associated waste(s). It is important to be responsible with common chemicals and solvents including paints, cleaners, and automotive products to reduce contamination to stormwater runoff.

POLLUTION PREVENTION APPROACH

Proper management reduces the likelihood of accidental spills or releases of hazardous materials into storm drains or during storm events. In addition, health and safety conditions at the facility will improve.

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system.

SUGGESTED BEST MANAGEMENT PRACTICES

Material Inventory

- Identify all hazardous and non-hazardous substances by reviewing purchase orders and conducting a walk-through of facility.
- Compile Material Safety Data Sheets (MSDS) for all chemicals. These should be readily accessible to all facility employees.
- Label all containers of significant materials that include cleaners, fuels, and other hazards.
- Identify handling, storage, and disposal requirements of all chemicals.
- Use environmentally friendly or non-hazardous substitutes when appropriate that include but not limited to H₂Orange₂, Orange Thunder, and Simple Green®.
- Keep hazardous materials and waste off the ground.
- All drums and containers should be in good condition and properly labeled.
- Loose materials including any gravel piles should be covered or placed in shelter.

Solid Waste

- Trash storage bins, dumpsters, and disposal areas should be clean and free of debris, especially those located near catch basins.
- Dumpsters maintained in good condition and securely closed at all times.
- Clean up equipment and materials.
- Dispose of within local, state, and federal laws. This includes Section 8.24 of the City Ordinance.
- Temporary trash storage should be inspected weekly before taken to the local privately owned transfer station.

TARGETED FACILITIES AND OPERATIONS

- All City-Owned Facilities
- All City-Owned Parks and Open Spaces
- All Fleet Vehicle and Equipment Operations

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics
- Low Dissolved Oxygen

- Debris piled including sweepings, construction, and wood debris should be inspected weekly before removed off site.

INSPECTION PROCEDURES

- Physical on-site verification of sealed floor drains (or redirected to sanitary sewer).
- Regular inspection of material storage areas (inside and outside) to verify items are not exposed to precipitation and are covered or in enclosed areas.
- Regular inspection and cleaning of oil/water separators by qualified contractor or facility personnel.
- Inspect stormwater discharge locations and onsite stormwater drainage infrastructure (e.g., catch basins) regularly (for contaminants, soil staining, plugged discharge lines).

MAINTENANCE PROCEDURES

- Repair or replace any leaking/defective containers and replace labels, as necessary.
- Maintain caps and/or covers on containers.
- Maintain aisle space for inspection of products/wastes.
- Routinely clean work spaces.
- Properly collect/dispose of waste.
- Routinely maintain and inspect vehicles and equipment.
- Train employees routinely and when new products enter the facility on proper use, storage, disposal, and safety concerns. MSDS sheets should be reviewed and readily accessible in central facility location.
- Review any Spill Prevention, Control, and Countermeasure (SPCC) Plan. Plans in place for a specific facility for petroleum products.

BMP 4 - HAZARDOUS MATERIAL STORAGE

DESCRIPTION

It is important to properly store hazardous materials to prevent them from contaminating stormwater runoff. Hazardous materials include:

- Cleaning agents: solvents, drain cleaners, and bleach
- Vehicle maintenance fluids: motor oil, gasoline, antifreeze, degreasers, and radiator flush
- Water treatment chemicals
- Paints

Refer to Appendix A for list of typical hazardous materials at specific City Facilities.

POLLUTION PREVENTION APPROACH

Proper management reduces the likelihood of accidental spills or releases of hazardous materials during storm events. In addition, health and safety conditions at the facility will improve.

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system.

SUGGESTED BEST MANAGEMENT PRACTICES

Loading/Unloading

- All facilities should have proper procedures in place for loading and/or unloading hazardous materials received, especially areas located near catch basins.
- Do not conduct loading and unloading of exposed hazards during wet weather, whenever possible.
- If feasible, load and unload all materials and equipment in covered areas such as building overhangs at loading docks.
- Load/unload only at designated loading areas.
- Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections.

Storage

- When possible, store indoors.
- Storage of reactive, ignitable, or flammable liquids must comply with the Massachusetts Fire Prevention Regulations for the Storage of Flammable and Combustible Materials (527 CMR 14.03).
- Place containers in a designated area that is paved, free of cracks and gaps, and impervious in order to contain leaks and spills. The area should also be covered.
- Provide secondary containment for hazardous materials and waste placed outdoors.
- Keep containers away from high traffic areas.

TARGETED FACILITIES AND OPERATIONS

- All City-Owned Facilities
- All Fleet Vehicle and Equipment Operations

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics
- Low Dissolved Oxygen

- Cover all containers and drums or place under shelter, if stored outdoors.
- MSDSs should be supplied for all stored materials at a specific facility, and in readily accessible location for all facility employees.
- Maintain a log inventory of materials stored at the facility.
- Chemicals should be kept in original labeled containers.
- Containers should not be overfilled.
- Store containers on pallets.
- Properly stack containers and drums.
- Storage areas should be enclosed.
- Minimize storage onsite.
- Keep storage areas clean and organized. Certain materials are collected by the DPW on Household Hazardous Waste Collections conducted several times each year.
- Contractors should be responsible for delivery, storage, and waste disposal practices.
- Containers should not be glass.
- Segregate reactive/incompatible materials (such as chlorine and ammonia).
- Place drip pans under container spouts.
- Install overfill protection on storage tanks/drums.
- Lock storage areas and provide warning signs.

INSPECTION PROCEDURES

- Check loading and unloading equipment regularly for leaks, including valves, pumps, flanges, and connections.
- Look for dust or fumes during loading or unloading operations.
- Inspect storage areas regularly for leaks or spills.
- Conduct routine inspections and check for external corrosion of material containers.
- Check for structural failure, spills and overfills due to operator error, failure of piping system.
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.
- Visually inspect new tank or container installations for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Replace containers that are leaking, corroded, or otherwise deteriorating with ones in good condition. If the liquid chemicals are corrosive, containers made of compatible materials must be used instead of metal drums.
- Label new or secondary containers with the product name and hazards.

MAINTENANCE PROCEDURES

- Conduct regular inspections and make repairs, as necessary. The frequency of repairs will depend on the age of the facility.
- Check loading and unloading equipment regularly for leaks.
- Sweep area regularly with dry broom.
- Conduct major clean-out of loading and unloading area and any sumps prior to October 1 of each year.
- Repair or replace any leaking/defective containers and replace labels, as necessary.
- Maintain caps and/or covers on containers.
- Maintain aisle space for inspection of products/wastes.
- Train employees on proper procedures and when new hazardous materials are used.

BMP 5 - VEHICLE FUELING, MAINTENANCE AND STORAGE

DESCRIPTION

Vehicle repair and service (e.g. parts cleaning and fueling), replacement of fluids (e.g. oil change), and outdoor equipment storage and parking (dripping engines) can impact water quality if stormwater runoff from areas with these activities occurring on them becomes polluted by a variety of contaminants. Spills and leaks that occur during vehicle and equipment fueling can contribute hydrocarbons, oil, and grease, as well as heavy metals to stormwater runoff. It only takes 1 gallon of oil to contaminate 1 million gallons of drinking water.

POLLUTION PREVENTION APPROACH

It is important to properly store and discard vehicle fluids including oil, transmission fluid, antifreeze, and lubricants to prevent surface and groundwater contamination from spills or improper disposal.

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system.

SUGGESTED BEST MANAGEMENT PRACTICES

General Practices

- Store fluids in labeled, plastic or metal container with a lid away from drains and catch basins.
- Place flammables in a fire safe cabinet.
- Place drip pans under leaking vehicles, valves, spigots, and pumps.
- Routinely check for leaking vehicles.
- Do not do any vehicle maintenance near storm drains.
- Vehicle maintenance should be done in covered facility.
- Install inlet catch basin equipped with a small sedimentation basin or grit chamber to remove large particles from stormwater in highly impervious areas.

Fueling

- Ensure that all fueling activities are not conducted near storm drains and dry wells or that procedures are in place to control any spills.
- Fuel storage tanks should be placed on impervious surfaces with no cracks or gaps; secondary containment is recommended.
- Provide barriers such as posts, guard rails, or bollards where tanks are exposed, to prevent collision damage with vehicles.
- Post signs at the fuel dispenser or fuel island warning vehicle owners/operators against "topping off" of vehicle fuel tanks.
- Label drains within the facility boundary, by paint/stencil (or equivalent), to indicate whether they flow to an oil/water separator, directly to the sewer, to a storm drain or into a drywall.

Vehicle Maintenance

TARGETED FACILITIES AND OPERATIONS

- DPW Maintenance Facility and Garage
- Police Maintenance Facility and Garage
- Cemetery Facilities
- Water Department Facility and Garage
- Cambridge Golf Course Garage
- Cambridge Rindge and Latin School Facilities and Auto shop
- Fire Departments, Headquarters, and Maintenance Garage
- Danehy Park Maintenance Garage
- All Fleet Vehicle and Equipment Operations

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Hydrocarbons

- Provide a designated area for vehicle maintenance on an impervious surface.
- Keep equipment clean; do not allow excessive build-up of oil and grease.
- If possible, perform all vehicle fluid removal or changing inside or under cover:
 - Keep a drip pan under the vehicle while you unclip hoses, unscrew filters, or remove other parts.
 - Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.
 - Keep drip pans or containers under vehicles or equipment that might drip during repairs.
 - Do not change motor oil or perform equipment maintenance in non-appropriate areas.
- If temporary work is being conducted outside: Use a tarp, ground cloth, or drip pans beneath the vehicle or equipment to capture all spills and drips.
- If equipment (e.g., radiators, axles) is to be stored outdoors, oil and other fluids should be drained first. This is also applicable to vehicles being stored and not used on a regular basis.

Disposal

- Recycle or properly dispose of fluids.
- Dump full pans into 55-gallon drums.
- Dispose of debris including oil filters, oil cans, rags, and clean-up supplies.
- Do not dump vehicle fluids down storm drains.
- Interior floor drains should discharge to holding tanks or be sealed.

Used Oil

- Recycle used oil.
- Do not mix wastes with used oil.

INSPECTION PROCEDURES

- Identify locations of floor drains and catch basins and know where they discharge to. Floor drains should be connected to the sanitary sewer system and catch basins should be connected to the stormwater drainage system.
- Regularly inspect vehicles and equipment for leaks and repair immediately.
- Inspect fuel storage tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Inspect fueling areas, catch basin inserts, containment areas, and drip pans on a regular schedule.

MAINTENANCE PROCEDURES

- Sweep the maintenance area on a regular basis, if it is paved, to collect loose particles. Wipe up spills with rags and other absorbent material immediately. Do not hose down the area to a storm drain.
- Clean oil/water separators, sumps, and on-site treatment/recycling units at appropriate intervals.
- Keep ample supplies of spill cleanup materials onsite. Cleanup spills immediately.
- Properly train employees on fueling and handling oil and waste oil.

BMP 6 - VEHICLE WASHING

DESCRIPTION

Wash water from vehicle and equipment cleaning activities performed outdoors or in areas where wash water flows onto the ground can contribute toxic hydrocarbons and other organic compounds, oils and greases, nutrients, phosphates, heavy metals, and suspended solids to stormwater runoff.

POLLUTION PREVENTION APPROACH

If possible, take vehicles to the City's DPW Garage vehicle wash bay or a commercial car wash facility. Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system.

SUGGESTED BEST MANAGEMENT PRACTICES

General

- Use biodegradable, phosphate-free detergents for washing vehicles as appropriate. Products include Simple Green® biodegradable car wash cleaner.
- Mark the area clearly as a wash area.
- Post signs stating that only washing is allowed in wash area and that discharges to the storm drain are prohibited. Facility employees should know where catch basins are.
- Provide a trash container in wash area.
- Those that use the facility to wash vehicles (e.g., students) should be informed of proper washing protocols.

Vehicle and Equipment Cleaning

- To collect wash water as well as prevent stormwater run-on install sumps or drain lines, construct a berm around the designated area, or grade the area.
- Consider washing vehicles and equipment inside the building if washing/cleaning must occur on-site.
- If washing must occur on-site and outdoors:
 - Use designated paved wash areas. Designated wash areas must be well marked with signs indicating where and how washing must be done. This area must be covered or bermed to collect the wash water and graded to direct the wash water to a treatment or disposal facility.
 - Cover the wash area when not in use to prevent contact with rain water.
- Use hoses with nozzles that automatically turn off when left unattended. Use high-pressure, low-volume sprays.
- Perform pressure cleaning and steam cleaning off-site to avoid generating runoff with high pollutant concentrations. If done on-site, no pressure cleaning and steam cleaning should be done in areas designated as protection areas for public water supply.

TARGETED FACILITIES AND OPERATIONS

- DPW Garage
- Cemetery Facilities
- Water Department
- Cambridge Golf Course Garage
- Amigos and King Schools
- Cambridge Rindge and Latin School
- Tobin School
- Fire Departments, Headquarters, and Garage
- Police Maintenance Garage
- Danahy Park Maintenance Garage
- All Fleet Vehicle and Equipment Operations

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics

Disposal

- Filter and recycle wash water if possible.
- If discharging to an oil/water separator, do not use detergents that disperse oil in wash water and make oil/water separators ineffective with oil passing to the sanitary sewer system. It is best to use high pressure water with no cleaning agent. If using a cleaner, it must be a non-emulsifying product such as QOR-110 (“Quick Oil Release”).

INSPECTION PROCEDURES

- Inspect floor drain systems regularly – use only those that discharge to a sanitary sewer.
- Identify the need for cleaning of catch basins, oil/water separators.

MAINTENANCE PROCEDURES

- Maintain a map of on-site storm drain locations to avoid discharges to the storm drainage system.
- Take precautions against excess use of and spillage of detergents.
- Clean vehicles only where wastes can be captured for proper disposal.

BMP 7- SPILL PREVENTION AND RESPONSE

DESCRIPTION

It is important to have a plan in place in the event a spill should occur so contaminants do not mix with stormwater runoff. A spill prevention and response plan can be effective at reducing the risk of contamination to surface and groundwater contamination—but only with proper personnel training, the availability of cleanup supplies, and when management ensures procedures are followed.

TARGETED FACILITIES AND OPERATIONS

- All City Owned Buildings
- Street and Public Rights-of-Way

POLLUTION PREVENTION APPROACH

- Create a well thought out and implemented spill prevention and response plan.
- Post a response checklist in any hazardous waste storage area with contact information (including emergency phone numbers), and spill containment procedures.
- Train personnel.
- Regularly update plan, checklists, and contact information.
- Regularly inspect spill potential areas.
- Facilities with aboveground storage tanks (ASTs) and underground storage tanks (USTs) greater than 1,320 gallons and 42,000 gallons must have SPCC Plans in place.

TARGETED CONSTITUENTS

- Nutrients
- Metals
- Oil & Grease
- Hydrocarbons
- Organics

SPILL PREVENTION AND RESPONSE PLAN

An effective Spill Prevention and Response Plan may include one or more of the following:

- Description of the facilities, the address, activities, and materials involved.
- Identification of key spill response personnel and hospital contacts.
- Identification of the potential spill areas or operations prone to spills/leaks.
- Identification of which areas should be or are bermed to contain spills/leaks.
- Facility map identifying the key locations of areas, activities, materials, structural BMPs, etc.
- Material handling procedures and safety measures for each kind of waste.
- Spill response procedures including:
 - Assessment of the site and potential impacts
 - Containment of the material
 - Notification of the proper personnel and evacuation procedures
 - Clean up of the site
 - Disposal of the waste material
 - Proper record keeping procedures
- Plan to protect all storm drains in the event of a spill.

REFERENCE

- DPW's SPCC Plan

- Descriptions of spill response equipment, including safety and cleanup equipment.

SUGGESTED BEST MANAGEMENT PRACTICES

Spill/Leak Prevention

- If possible, move material handling indoors, under cover, or away from storm drains or sensitive water bodies.
- Properly label all containers so that the contents are easily identifiable.
- Berm storage areas so that if a spill or leak occurs, the material is contained.
- Cover outside storage areas either with a permanent structure or with a seasonal one such as a tarp so that rain will not come into contact with the materials.
- Check containers (and any containment sumps) often for leaks and spills. Replace containers that are leaking, corroded, or otherwise deteriorating with containers in good condition. Collect all spilled liquids and properly dispose of them.
- Store contain, and transfer liquid materials in such a manner that if the container is ruptured or the contents spilled, they will not discharge, flow or be washed into the storm drainage system, surface waters, or groundwater.
- Place drip pans or absorbent materials beneath all mounted taps and at all potential drip and spill locations during the filling and unloading of containers. Any collected liquids or soiled absorbent materials should be reused/recycled or properly disposed of.
- For City programs that involve material transport, only transport the minimum amount of material needed for the daily activities and transfer materials between containers at a municipal yard where leaks and spills are easier to control.
- If paved, sweep and clean storage areas monthly, do not use water to hose down the area unless all of the water will be collected and disposed of properly (e.g., in an oil/water separator).
- Install a spill control device (such as a tee section) in any catch basins that collect runoff from any storage areas if the materials stored are oil, gas, or other materials that separate from and float on water. This will allow for easier cleanup if a spill occurs.
- If necessary, protect catch basins while conducting field activities so that if a spill occurs, the material will be contained.
- Keep ample supplies of spill cleanup materials including Speedi Dry and absorbent boom pads onsite.

Spill Clean Up

- Small non-hazardous spills:
 - Use a rag, damp cloth or absorbent materials for clean-up of liquids.
 - Use brooms or shovels for the general clean-up of dry materials
 - If water is used, it must be collected and properly disposed of. The wash water cannot be allowed to enter the storm drain.
 - Dispose of any waste materials properly.

- Clean or dispose of any equipment used to clean up the spill.
- Large non-hazardous spills
 - Use absorbent materials for general clean-up of liquids.
 - Use brooms, shovels, or street sweepers for the general clean-up of dry materials.
 - If water is used, it must be collected and properly disposed of. The wash water cannot be allowed to enter the storm drain.
 - Dispose of any waste materials properly.
 - Clean or dispose of any equipment used to clean up the spill properly.
- For hazardous or very large spills, the Fire Department and/or a private cleanup contractor may need to be contacted to assess the situation and conduct the cleanup and disposal of the materials.
- Chemical cleanups of material can be achieved with the use of absorbents, gels, and foams.
- Remove the adsorbent materials promptly and dispose of according to regulations.
- If the spilled material is hazardous, then the used cleanup materials, including rags, are also hazardous and must be sent to a certified laundry facility or disposed of as hazardous waste.

Reporting

- Report any spills immediately to the identified key municipal spill response personnel.
- Report spills in accordance with applicable reporting laws. Spills that pose an immediate threat to human health or the environment must be reported immediately to the City's Health Department at 617-665-3824, DPW at 617-349-4800 and the Fire Department at 911.
- Large spills including those over 10 gallons should be reported to the DPW at 617-349-4800 and the Fire Department at 911.
- Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour). An oil spill over 10 gallons and spills that reach a surface water, sewer, storm drain, ditch, or culvert leading thereto requires Massachusetts DEP notification at (888)-304-1133.
- After the spill has been contained and cleaned up, a detailed report about the incident should be generated and kept on file. The incident may also be used in briefing staff about proper procedures.

INSPECTION PROCEDURES

- Inspect secondary containment systems and oil/water separators periodically to identify any operational problems.
- Inspect containers for leaks, areas near storm receiver inlets and outlets, and floor drains for indications of spills.

MAINTENANCE PROCEDURES

- Pump out oil water separators as needed.
- Protect drains with oil absorbent materials.
- Clean out receivers on regular schedule.
- Remove spilled salt from salt loading areas, including the City's Salt Shed.

BMP 8 - LAWN AND GROUNDS MAINTENANCE

DESCRIPTION

Nutrient loads generated by suburban lawns as well as municipal properties can be significant, and recent research has shown that lawns produce more surface runoff than previously thought. Pesticide runoff can contribute pollutants that contaminate drinking water supplies and are toxic to both humans and aquatic organisms.

POLLUTION PREVENTION APPROACH

It is important to reduce pesticides, herbicides, fertilizers, and lawn debris from entering surface and ground water supplies by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater drainage system.

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system.

SUGGESTED BEST MANAGEMENT PRACTICES

Landscaping Activities

- Do not apply any chemicals (insecticide, herbicide, or fertilizer) directly to surface waters, unless the application is approved and permitted by the Massachusetts DEP.
- Use mulch or other erosion control measures on exposed soils.
- Check irrigation schedules so pesticides will not be washed away and to minimize non-stormwater discharge.
- Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the stormwater drainage system.
- Use hand or mechanical weeding where practical.
- Employ mowing techniques to maintain a healthy lawn and minimize chemical use—no more than 1” of lawn should be removed from each mowing (grasses kept at 2.5” to 3.0” high are more heat resistant than close-cropped grass).
- Keep mower blades sharp and leave clippings in place after mowing.
- Water plants in the early morning.

Fertilizer and Pesticide Management

- Follow manufacturers’ recommendations and label directions.
- Do not apply insecticides within 100 feet of surface waters such as lakes, ponds, wetlands, and streams.
- Use less toxic pesticides that will do the job, whenever possible and use the minimum amount needed. Avoid use of copper-based pesticides if possible.

TARGETED FACILITIES AND OPERATIONS

- All City-Owned Facilities with lawns and grounds
- Street and Public Rights-of-Way

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Metals
- Bacteria
- Oil and Grease
- Organics
- Low Dissolved Oxygen

- Do not use pesticides/fertilizers if rain is expected.
- Do not mix or prepare pesticides/fertilizers for application near storm drains.
- Perform a soil analyses prior to applying fertilizers to determine the appropriate nutrients required for soil conditions.
- Calibrate fertilizer distributors to avoid excessive application.
- Apply pesticides/fertilizers only when wind speeds are low.
- Work fertilizers into the soil rather than dumping or broadcasting them onto the surface.
- Irrigate slowly to prevent runoff and then only as much as is needed.
- Dispose of empty pesticide/fertilizer containers according to the instructions on the container label.
- Use up the pesticides. Rinse containers and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and the Massachusetts Department of Agricultural Resources.
- Provide secondary containment for pesticides.

Debris Removal

- Use yard waste as mulch and topsoil.
- Compost or mulch yard waste.
- Sweep up yard debris instead of hosing down.
- Clean pavement and sidewalk if fertilizer/pesticide is spilled on these surfaces before applying irrigation water.
- Do not leave yard waste in the street or sweep it into storm drains or streams.

INSPECTION PROCEDURES

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring.
- Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed.
- Inspect and remove accumulated debris from grounds.
- Routinely monitor lawns to identify problems during their early stages.
- Identify nutrient/water needs of plants.
- Inspect for problems by testing soils.

MAINTENANCE PROCEDURES

- Sweep paved areas regularly to collect loose particles.
- Wipe up spills with rags and other absorbent material immediately.
- Do not hose down the area to a storm drain.
- Keep mower blades sharp.

BMP 9 - STREET AND PARKING LOT SWEEPING

DESCRIPTION

Street and parking lot sweeping includes self-propelled equipment to remove sediment from paved surfaces that can enter storm drains or receiving waters. Sweeping is most effective for removing coarse particles, leaves, and trash. Regularly sweeping reduces catch basin cleaning. The City's Policy is to sweep all streets and parking lots a minimum of twice per year (Spring and Fall) and most streets monthly between April through December (weather permitting) and every square (including Central, Harvard, Porter, and Davis) daily.

POLLUTION PREVENTION APPROACH

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system.

SUGGESTED BEST MANAGEMENT PRACTICES

- Adhere to the City's cleaning schedule – every roadway swept once per month (April through December) and vacuum swept three times per year (Spring, Summer and Fall)
- City parking lots should be checked regularly by Facility personnel and swept when needed, but not less than twice per year (Spring and Fall)
- Any visible sediment should be swept up (including sand/salt mixtures and granular material).
- Control the number of points where vehicles leave the Facilities to allow sweeping to be focused on certain areas in parking lots.
- Sweep up the smallest particles feasible.
- Sweep in pattern to keep spilled material from being pushed into catch basins.
- Before sweeping, manually rake sand from any turf areas on surfaces to be swept.
- Use hand-held tools to assist with mechanical equipment.
- If possible, recycle Fall leaf sweepings by composting.
- The DPW should maintain a log or schedule of sweeping activities they conduct. Information should include date, locations, mileage and volume or mass of sweepings removed.
- Facilities should maintain a log or schedule for their facility parking lots. Information should include volume or mass of sweepings removed, heavily sedimented catch basins, and date of sweeping activities. By recording heavily sedimented areas, prioritizations can be made to sweep these areas or clean catch basins more frequently.

INSPECTION PROCEDURES

- Regularly inspect streets and City-owned parking lots for debris.

TARGETED FACILITIES AND OPERATIONS

- All City-Owned Facilities
- Street Rights-of-Way

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics
- Low Dissolved Oxygen

MAINTENANCE PROCEDURES

- Adjust broom frequently to maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes.
- Do not use kick brooms or sweeper attachments that tend to spread dirt.
- When unloading sweeper, make sure there is no dust or sediment release.
- Inspect sweepers to check that the contractor properly maintains and repairs them.
- Manage street sweepings in compliance with current Massachusetts Department of Environmental Protection policies:
<http://www.mass.gov/eea/docs/dep/recycle/laws/stsweep.pdf>

BMP 10 - CATCH BASIN CLEANING

DESCRIPTION

It is important to remove sediments from catch basins that can have a high concentration of pollutants including metals and hydrocarbons. These sediments can clog downstream drainage systems and transport pollutants to nearby water bodies.

POLLUTION PREVENTION APPROACH

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system.

SUGGESTED BEST MANAGEMENT PRACTICES

- Prioritize inspection and maintenance for catch basins located near construction activities
- Ensure that no catch basin at any time will be more than 50 percent full
- Document catch basins with sumps more than 50 percent full during two consecutive inspections/cleanings
- EPA recommends cleaning basins when solids reach one-third the depth from the basin bottom to the invert of the lowest pipe into or out of the basin.
- Target cleaning for early Spring or late Fall.
- Clean manually or with equipment (i.e., bucket loaders).
- Properly dispose of catch basin material or store until contractor picks up cleanings (Massachusetts DEP and EPA requires chemical analysis to determine if substance is hazardous waste).
- Repair damaged catch basins including outlet traps.
- Install hoods if catch basins do not have them.
- Inform employees that catch basins are part of the stormwater drainage system and not the sanitary sewer system.
- The DPW should maintain a log of cleaning activities. Information should include volume of sediment removed and areas with heavily filled basins.
- Facilities or the DPW should maintain a log of cleaning activities on their parking lots. Information should include volume of sediment removed, heavily filled catch basins, and dates cleaned.

INSPECTION PROCEDURES

- Inspect catch basins, grates, and ditches at least once per year (best times are before the start and before the end of the rainy season).
- Inspections should be incorporated during routine cleaning, as part of reconstruction contracts, and through requests made by residents or other City departments.
- If illicit discharges are observed or suspected, notify the Cambridge DPW at 617-349-4800.

TARGETED FACILITIES AND OPERATIONS

- All City-Owned Facilities
- Street Rights-of-Way
- Disposal of Removed Solids

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics
- Low Dissolved Oxygen

MAINTENANCE PROCEDURES

- Clean catch basins based on the cleaning schedule or as needed. Catch basins should be checked for sediment levels in sump. Those in areas that accumulate a significant amount of sediment should be cleaned more frequently.
- During catch basin repairs, any hoods missing should be replaced.
- Manage catch basin cleanings (i.e. solid materials such as leaves, sand, twigs) in accordance with current Massachusetts Department of Environmental Protection policies:
<http://www.mass.gov/eea/agencies/massdep/recycle/regulations/management-of-catch-basin-cleanings.html>

BMP 11 - STORMWATER, SANITARY AND WATER LINE MAINTENANCE

DESCRIPTION

Some operation and maintenance activities of public utilities and accidents can result in the discharge of pollutants that can pose a threat to both human health and the quality of receiving waters if they enter the storm drainage system. Sewage incident response and investigation may involve a coordinated effort between staff from a number of different departments/agencies. Storm drainage systems need to be cleaned regularly. Routine cleaning reduces the amount of pollutants, trash, and debris both in the storm drainage system and in receiving waters.

POLLUTION PREVENTION APPROACH

Inspect potential non-stormwater discharge flow paths and clear/cleanup any debris or pollutants found (i.e. remove trash, leaves, sediment, and wipe up liquids, including oil spills).

SUGGESTED BEST MANAGEMENT PRACTICES

Stormwater Drainage Maintenance

- Cleaning the storm drain by flushing is more successful for pipes smaller than 36 inches in diameter.
- A water source is necessary for cleaning. The wastewater must be collected and treated once flushed through the system.
- Depending on the condition of the wastewater, it may or may not be disposed to sanitary sewer systems.
- The efficiency of storm system flushing decreases when the length of sewer line being cleaned exceeds 700 feet.

Sanitary Sewer Maintenance

- Clean sewer lines on a regular basis to remove grease, grit, and other debris that may lead to sewer backups.
- Establish routine maintenance program. Cleaning should be conducted at an established minimum frequency and more frequently for problem areas such as restaurants that are identified.
- Cleaning activities may require removal of tree roots and other identified obstructions.
- During routine maintenance and inspection note the condition of sanitary sewer structures and identify areas that need repair or maintenance. Items to note may include the following:
 - Cracked/deteriorating pipes
 - Leaking joints/seals at manhole
 - Frequent line plugs
 - Line generally flows at or near capacity
 - Suspected infiltration or exfiltration

TARGETED FACILITIES AND OPERATIONS

- All City-Owned Facilities
- Street Rights-of-Way

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics
- Low Dissolved Oxygen

- Prioritize repairs based on the nature and severity of the problem. Immediate clearing of blockage or repair is required where an overflow is currently occurring or for urgent problems that may cause an imminent overflow (e.g. pump station failures, sewer line ruptures, sewer line blockages). These repairs may be temporary until scheduled or capital improvements can be completed.
- Review previous sewer maintenance records to help identify “hot spots” or areas with frequent maintenance problems and locations of potential system failure.
- Adhere to the permit requirements in the City’s National Pollutant Discharge Elimination System permit for Combined Sewer Overflows (CSO), the Variance for CSO Discharges and implement the Nine Minimum Control Measures.

Spills and Overflows

- Identify, track and remedy sanitary sewer overflow discharges. Identify dry weather infiltration and inflow first. Wet weather overflow connections are very difficult to locate.
- The City’s 9 permitted combined sewer overflows to the Charles River and the Alewife Brook should be checked monthly and monitored more frequently during wet weather conditions.
- Locate wet weather overflows and leaking sanitary sewers using conventional source identification techniques such as monitoring and field screening. Techniques used to identify other illicit connection sources can also be used for sewer system evaluation surveys.
- Implement community awareness programs for monitoring sanitary sewer wet weather overflows. A citizen’s hotline for reporting observed overflow conditions should be established to supplement field screening efforts.
- Establish lead department/agency responsible for spill response and containment. Provide coordination within departments.
- When a spill, leak, and/or overflow occurs and when disinfecting a sewage contaminated area, take every effort to ensure that the sewage, disinfectant and/or sewage treated with the disinfectant is not discharged to the storm drainage system or receiving waters. Methods may include:
 - Blocking storm drain inlets and catch basins.
 - Containing and diverting sewage and disinfectant away from open channels and other storm drain fixtures (using sandbags, inflatable dams, etc.).
 - Removing the material with vacuum equipment.
- Record required information at the spill site.
- Perform field tests as necessary to determine the source of the spill.
- Develop notification procedures regarding spill reporting.

Septic Systems

- Document on a map the City’s septic system.

Planned Water Line Maintenance



- Discharge to a sanitary sewer system with approval.
- Discharge to the storm drainage rain system using applicable pollution control measures. (Only available to clean water discharges such as water main/ water storage tank/water hydrant flushing).
- If water is discharged to a storm drain, control measures must be put in place to control potential pollutants (i.e. sediment, chlorine, etc.).

Examples of some storm drain protection options include:

- Silt fence – appropriate where the inlet drains a relatively flat area.
- Gravel and wire mesh sediment filter – Appropriate where concentrated flows are expected.
- Wooden weir and fabric – use at curb inlets where a compact installation is desired.
- Prior to discharge, inspect discharge flow path and clear/cleanup any debris or pollutants found (i.e. remove trash, leaves, sediment, and wipe up liquids, including oil spills).
- General Design considerations for inlet protection devices include the following:
 - The device should be constructed such that cleaning and disposal of trapped sediment is made easy, while minimizing interference with discharge activities.
 - Devices should be constructed so that any standing water resulting from the discharge will not cause excessive inconvenience or flooding/damage to adjacent land or structures.
- The effectiveness of control devices must be monitored during the discharge period and any necessary repairs or modifications made.

Unplanned Water Line Maintenance

- Stop the discharge as quickly as possible.
- Minor discharges would include direction from the DPW. In most cases, catch basins are protected with filter fabric.
- Major discharges would require the MWRA or Massachusetts DEP to be contacted.
- Inspect flow path of the discharged water:
 - Identify erodible areas which may need to be repaired or protected during subsequent repairs or corrective actions.
 - Identify the potential for pollutants to be washed into the waterway.
- If repairs or corrective action will cause additional discharges of water, select the appropriate procedures for erosion control, chlorine residual, turbidity, and chemical additives. Prevent potential pollutants from entering the flow path.

INSPECTION PROCEDURES

- Inspect for root infiltration. Tree roots are a major cause of backups.
- Inspect for water inflow/infiltration. Rainwater entering the sewer pipe can contribute to sanitary sewer overflows.

- Inspect for solids. Typical solids that buildup in the pipe and cause backups are grease, dirt, bones, tampons, paper towels, diapers, broken dishware, garbage, concrete, and debris.
- Inspect for structural defects in pipes and manholes - Sags in the line, cracks, holes, protruding laterals, misaligned pipe, and offset joints are all possible causes of backups.

MAINTENANCE PROCEDURES

- Repair structural defects in pipes and manholes immediately.
- Refurbish portions of the utility lines periodically.
- Repairs should adhere to the facility prioritization:
 - High Priority: public health risk, major structural problems, collapsed catch basins with road plates, and illicit connections.
 - Medium Priority: Main pipe lines with significant structural problems, non-functioning catch basins, and street pavements failures caused by minor pipe defects.
 - Low Priority: Installation of non-critical structures and service laterals.
- All maintenance activities should be documented through the City's current work order system.

BMP 12 - PET WASTE, WATERFOWL, AND LITTER MANAGEMENT

DESCRIPTION

Pet droppings have been found to be important contributors of pollution in estuaries and bays where there are high populations of dogs. It has been estimated that for a small bay watershed (up to 20 square miles), 2 to 3 days of droppings from a population of 100 dogs contribute enough bacteria, nitrogen, and phosphorus to temporarily close a bay to swimming and shell fishing. The Cambridge Municipal Code, Title 6 Animals, Chapter 6.04 (Section 6.04.060 Dogs – Removal of Waste Required) clearly states that individuals must pick up their pet's waste. Waterfowl waste not only raises bacteria concentrations to levels unsafe for water contact recreation, but it is also a source of nutrients that allow excessive growth of algae and rooted aquatic plants in receiving waters. Feeding of waterfowl by streams and ponds encourages waterfowl congregation in those areas.

POLLUTION PREVENTION APPROACH

Provide pet awareness and education programs with the following elements:

- Encouraging residents to clean up after their pets and to properly dispose of such wastes that may be deposited in their yards, streets, and parks.
- Posting signs in local parks describing the problem and urging cleanup and proper disposal of pet wastes.
- Discourage feeding of waterfowl at local parks, particularly where adjacent to waterways. Produce educational material and/or post signage as appropriate.

SUGGESTED BEST MANAGEMENT PRACTICES

- Put waste in the trash.
- Restrict dog access to areas of parks where swales, steep slopes and streams are.
- Provide vegetated buffers of prescribed widths between dog parks and waterways, swales, storm drain inlets, gulleys and steep slopes.
- Add pooper scooper stations with free sanitary "pick-up" bags and proper receptacles in all City-Owned parks, playgrounds, and reservations where dogs are allowed.
- Incorporate public outreach elements like signage and informational brochures into and around parks.

INSPECTION PROCEDURES

- Routinely inspect common dog walking areas for pet waste.

MAINTENANCE PROCEDURES

- Remove and properly dispose of pet waste.
- Enforce Cambridge Municipal Code: Section 6.04.060 Dogs – Removal of Waste Required.

TARGETED FACILITIES AND OPERATIONS

- All City-Owned Parks, Playgrounds, and Reservations
- Sidewalk and Street Rights-of-Way

TARGETED CONSTITUENTS

- Nutrients
- Organics
- Low Dissolved Oxygen

BMP 13 - SIDEWALK CLEANING AND REPAIR

DESCRIPTION

Pollutants on sidewalks and other pedestrian traffic areas and plazas are typically due to littering and vehicle use.

POLLUTION PREVENTION APPROACH

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system.

SUGGESTED BEST MANAGEMENT PRACTICES

Sidewalk Cleaning

- Post “No Littering” signs and enforce anti-litter laws.
- Provide litter receptacles in busy, high pedestrian traffic areas of the community, at recreational facilities, and at community events.
- Cover litter receptacles and clean out frequently to prevent leaking/spillage or overflow.
- Regularly broom (dry) sweep sidewalk, plaza, and parking lot areas to minimize cleaning with water.
- Dry cleanup first (sweep, collect, and dispose of debris and trash) when cleaning sidewalks or plazas, then wash with or without soap.
- Use biodegradable soaps and detergents to wash down sidewalks.
- Block the entrance to the storm drainage system by using filter fabric to block catch basins. Discharge wash water to landscaping or collect water and pump to a tank or discharge to sanitary sewer if allowed.
- Use deicing salts only when snow or ice is present (not as a preventive measure) and apply sparingly. Shoveling of snow is always preferred to dumping excessive amounts of deicing materials in an effort to avoid shoveling. If deicing salts are used, the residues and remaining granules should be swept up when the snow and ice has melted and reused or disposed of in your garbage. Un-shoveled or icy sidewalks can be reported to the DPW by calling (617) 349-4800, through the Snow Center website www.cambridgema.gov/snow or report through the Commonwealth Connect app at CambridgeMA.gov/311.

Sidewalk Repair

- Refer to “Standard Specification from Street Excavations and Construction (Section II, 2F).
- Schedule surface removal activities for dry weather if possible.
- Avoid creating excess dust when breaking asphalt or concrete.
- Take measures to protect nearby storm drain inlets prior to breaking up asphalt or concrete (e.g. filter fabric or sand bags around inlets).
- Clean afterwards by sweeping up as much material as possible.
- Designate an area for cleanup and proper disposal of excess materials.
- Remove and recycle as much of the broken pavement as possible to avoid contact with rainfall and stormwater runoff.

TARGETED FACILITIES AND OPERATIONS

- All City-Owned Facilities
- Sidewalk and Street Rights-of-Way

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics

REFERENCE

- “Standard Specifications for Street Excavations and Construction”, Section II, 2F)
- DPW’s “Snow: Our Winter Challenge” brochure

- When making saw cuts in pavement, use as little water as possible. Cover each storm drain inlet completely with filter fabric during the sawing operation and contain the slurry by placing straw bales, sandbags, or gravel dams around the inlets. After the liquid drains or evaporates, shovel or vacuum the slurry residue from the pavement or gutter and remove from site.
- Always dry sweep first to clean up tracked dirt. Use a street sweeper or vacuum truck. Do not dump vacuumed liquid in storm drains. Once dry sweeping is complete, the area may be hosed down if needed. Wash water should be directed to the sanitary sewer as allowed by the DPW.

INSPECTION PROCEDURES

- Inspect sidewalks regularly for trash items and stains.

MAINTENANCE PROCEDURES

- Sweep sidewalks at least as necessary to collect loose dirt and debris rather than pushing it into the street or gutter or hosing it down. Collected materials must be disposed of as regular garbage.
- Conduct spot stain removal instead of washing entire sidewalk.

BMP 14 - GRAFFITI CLEANING

DESCRIPTION

Graffiti cleaning often results in the discharge of wastewater to the storm drainage system unless the equipment operator takes steps to collect and dispose of it legally. Discharge of pressure washing wastewater to the storm drainage system is prohibited because it contains pollutants from the cleaning compounds used and/or from the objects or surfaces being cleaned.

POLLUTION PREVENTION APPROACH

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system.

SUGGESTED BEST MANAGEMENT PRACTICES

- Avoid graffiti abatement activities during rain events.
- When graffiti is removed by painting over, ensure that the catch basin inlets are protected.
- Direct runoff from sand blasting and hot water pressure washing (with no cleaning agents) into a dirt or landscaped area after treating with an appropriate filtering device.
- Use hot water for pressure washing. If using a biodegradable soap, plug nearby storm drain inlets and vacuum/pump wash water to the sanitary sewer if a graffiti abatement method generates wash water containing a cleaning compound (such as high pressure washing with a cleaning compound).
- Ensure that a non-hazardous cleaning compound is used or dispose as hazardous waste, as appropriate.

INSPECTION PROCEDURES

- Regularly inspect facilities for graffiti.

MAINTENANCE PROCEDURES

- Remove graffiti as necessary, according to the suggested Best Management Practices.

TARGETED FACILITIES AND OPERATIONS

- All City-Owned Facilities

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Metals
- Oil & Grease
- Organics
- Low Dissolved Oxygen

BMP 15 - MOSQUITO CONTROL

DESCRIPTION

Standing water can facilitate the reproduction of mosquitos that spread diseases such as eastern equine encephalitis (EEE) and West Nile virus.

TARGETED FACILITIES AND OPERATIONS

- All City-Owned Facilities

POLLUTION PREVENTION APPROACH

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system.

TARGETED CONSTITUENTS

Identify ways to improve locations with standing water to reduce the need for additional larvicide applications.

- Sediment
- Stagnant water

SUGGESTED BEST MANAGEMENT PRACTICES

- Adhere to manufacturer's application standard operating procedures
- Design new catch basins to limit the potential for standing water and mosquito reproduction.
- Minimize installation of BMPs that will collect stormwater for only brief periods then stagnate until the next event.
- Maintain and cleanout sediment traps and basins and all drainage structures to allow for positive water drainage

INSPECTION PROCEDURES

- Inspecting stormwater treatment structures for standing water and mosquito breeding locations.
- Identify additional maintenance needs to prevent water pooling and promote positive water drainage

MAINTENANCE PROCEDURES

- Eliminate unnecessary locations with standing water in stormwater treatment structures.
- Complete routine maintenance to ensure excess vegetation or sediment are not impeding water drainage.

BMP 16 - WASTE MANAGEMENT

DESCRIPTION

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter stormwater runoff.

POLLUTION PREVENTION APPROACH

The discharge of pollutants to stormwater from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, re-use, and recycling; and preventing run-on and runoff.

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system.

SUGGESTED BEST MANAGEMENT PRACTICES

General

- Cover storage containers with leak proof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater run-on and runoff with a berm. The waste containers or piles must be covered except when in use.
- Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.
- Sweep and clean the storage area regularly. If it is paved, do not hose down the area to a storm drain.
- Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain.
- Transfer waste from damaged containers into safe containers.
- Take special care when loading or unloading wastes to minimize losses.

Controlling Litter

- Post “No Littering” signs and enforce anti-litter laws.
- Provide a sufficient number of litter receptacles for the facility.
- Clean out and cover litter receptacles frequently to prevent spillage.

Waste Collection

- Keep waste collection areas clean before contractor picks up.
- Inspect solid waste containers for structural damage or leaks regularly. Repair or replace damaged containers, as necessary.
- Secure solid waste containers: containers must be closed tightly when not in use.
- Place waste containers under cover if possible.
- Do not fill waste containers with washout water or any other liquid.
- Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent

TARGETED FACILITIES AND OPERATIONS

- All City-Owned Facilities

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics
- Low Dissolved Oxygen

lamps, pesticides, etc. may not be disposed of in solid waste containers (see chemical/ hazardous waste collection section below).

- Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal.

Good Housekeeping

- Use the entire product before disposing of the container.
- Keep the waste management area clean at all times by sweeping and cleaning up spills immediately.
- Use dry methods when possible (e.g. sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.
- Stencil storm drains on the facility's property with prohibitive message regarding waste disposal.

Chemical/Hazardous Wastes

- Select designated hazardous waste collection areas on-site.
- Store hazardous materials and wastes in covered containers protected from vandalism, and in compliance with fire and hazardous waste codes.
- Place hazardous waste containers in secondary containment.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.

Run-on/Runoff Prevention

- Prevent stormwater run-on from entering the waste management area by enclosing the area or building a berm around the area.
- Prevent the waste materials from directly contacting rain.
- Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropylene or Hypalon.
- Cover the area with a permanent roof if feasible.
- Cover dumpsters to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster.
- Move the activity indoor after ensuring all safety concerns such as fire hazard and ventilation are addressed.

INSPECTION PROCEDURES

- Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- Check waste management areas for leaking containers or spills.
- Repair leaking equipment including valves, lines, seals, or pumps promptly.

MAINTENANCE PROCEDURES

- Maintain equipment for material tracking program.

BMP 17 - BUILDING OPERATIONS

DESCRIPTION

Typical building operations include cleaning operations such as outside pressure washing of buildup and repairs.

TARGETED FACILITIES AND OPERATIONS

- All City-Owned Facilities

POLLUTION PREVENTION APPROACH

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system.

SUGGESTED BEST MANAGEMENT PRACTICES

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a waste/water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.
- If soaps or detergents are not used, and the surrounding area is paved, wash water runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.
- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement. Ensure that this practice does not kill grass.

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics
- Low Dissolved Oxygen

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.
- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
- Clean paint brushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal. Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. In which case you should direct the water through hay bales and filter fabric or use other sediment filters or traps.
- Store toxic material under cover with secondary containment during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

INSPECTION PROCEDURES

- Sweep paved areas regularly to collect loose particles and wipe up spills with rags and other absorbent material immediately; do not hose down the area to a storm drain.

APPENDIX D – SCMS FOR STORMWATER MANAGEMENT

SCM 1 - OIL/WATER SEPARATORS

DESCRIPTION

Oil/Water separators/interceptors are important to prevent gasoline, oil, or sand from getting into the drainage systems. In the following places they are always required

- Repair garages where motor vehicles are serviced and repaired, and where floor drainage is provided
- Commercial motor vehicle washing facilities
- Gasoline Stations with grease racks, grease pits or wash racks
- Facilities which have oily and/or flammable waste as a result of manufacturing, storage, repair, or testing
- Public storage garages with floor drainage
- Any place where solid, oil, gasoline or other volatile liquids can enter the drainage system

POLLUTION PREVENTION APPROACH

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system.

SUGGESTED BEST MANAGEMENT PRACTICES

- DPW recommends sweeping garage floor frequently, depending on use.
- Target cleaning for early Spring or late Fall.
- Use oil absorbent materials on any liquid spills, such as oil or hydraulic fluid leaks.
- The facility manager should maintain a log of cleaning activities (including the Cambridge Work Management System). Information should include frequency of cleanings.
- It is important to remove sediments from garage floors that can have a high concentration of pollutants including metals and hydrocarbons. These sediments can clog downstream drainage systems and transport pollutants to nearby water bodies

INSPECTION PROCEDURES

- Oil/Water separators/interceptors should be inspected twice per year (best times are before the start and before the end of the rainy season).
- Oil/Water separators/interceptors should be inspected quarterly at the following facilities:
 - Water Department
 - DPW Garage
 - Fire Stations and maintenance facility
 - Police Department garage and maintenance facility
 - Municipal parking garages

TARGETED FACILITIES AND OPERATIONS

- All City-Owned Facilities
- Street Rights-of-Way
- Disposal of Removed Solids

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics
- Low Dissolved Oxygen

MAINTENANCE PROCEDURES

- Clean oil/water separators once per year at a minimum or when:
 - Sludge accumulates to 25% of the wetted height of the separator compartment; or
 - Oil accumulates to 5% of the wetted height of the separator compartment; or
 - 75% of the retention capacity is filled.
- Drains and grates should be free of debris or sediments.
- Dipping pans should be used under vehicles or spigots.
- Spill absorbent material should be ready for use.
- Floors should be kept clean and spill materials should be cleaned up in a timely manner.

SCM 2 - GREEN ROOFS

DESCRIPTION

Green roofs allow for runoff to be filtered through a soil medium that removes different pollutants before the runoff enters the stormwater drainage system. The green roof area needs to be maintained fairly frequently for the first year and then annually after that. The frequency of inspection also depends on the type of green roof that is installed.

POLLUTION PREVENTION APPROACH

The suggested Best Management Practices should be used to reduce the influx of pollutants into the storm water drainage system and increase the longevity of the green roof.

SUGGESTED BEST MANAGEMENT PRACTICES

- It is recommended that the area be cleaned extensively once in the early spring and once in the late fall.
- The area should be cleaned with hand tools, rakes, and shovels.
- Facilities and personal in-charge of the bio-retention area should keep inspection logs and cleaning activity logs.
- Frequency of inspection and maintenance should be based on type of green roof:
 - a) **Extensive <3 in. Low Nutrition Substrate**
 - Drainage outlets and inspection chambers cleared of vegetation, as with any roof.
 - Ensure outlets and shingle perimeters clear of dead and live plants.
 - Generally, they are allowed to develop into dry meadows.
 - b) **Semi Extensive – 3 in. to 6 in. low to medium nutrition substrate**
 - Drainage outlets and inspection chambers cleared of vegetation.
 - Ensure outlets and shingle perimeters clear of dead and live plants.
 - Removal of undesirable vegetation 6 monthly.
 - c) **Intensive – 6 in. + medium nutrition substrates and top soils**
 - Drainage outlets and inspection chambers cleared of vegetation.
 - Ensure outlets and shingle perimeters clear of dead and live plants.

TARGETED FACILITIES AND OPERATIONS

- All City-Owned Facilities

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Metals
- Organics
- Low Dissolved Oxygen

REFERENCE

- “Green Roof Guide” United Kingdom
- “Green Roof Standards” City of Toronto
- ASTM Standards for Green Roofs

- Intensive care of lawns, hedges etc.
- Replacement of failed plants exceeding 5% of plants installed.
- Replenishment of any areas of settled substrate.

d) Bio-diverse - very low to low nutrition

- Drainage outlets and inspection chambers cleared of vegetation.
- Ensure outlets and shingle perimeters clear of dead and live plants.
- Low vegetation is common, and none is general undesirable.

INSPECTION PROCEDURES

- Green roof areas should be inspected after every rainfall over a half inch of rainfall for the first year.
- Inspection of the green roof should be daily for the first month to ensure the area is taking properly.
- The green roof should be inspected twice a month during the growing season and once in the beginning of spring and at the end of fall.

MAINTENANCE PROCEDURES

Green roofs should be kept free of debris and weeds to ensure a properly working infiltration and stormwater management area. Routine maintenance should be done year-round.

After planting:

- The area should be watered daily for two weeks unless significant rainfall has occurred
- Inspect the green roof area for any signs of erosion.
- Ensure that the irrigation system is operational, if necessary.

After first rainfall:

- The green roof area should be free of standing within 12-hours of rainfall. No standing water should be visible within the green roof area. If the area has not drained continue to monitor, soil remediation or an improved under drain system may be needed.
- Inspect all inlets and outlet structure to ensure that runoff has drained properly with the roof.

One month of planting:

- Inspect all plants to ensure that they are free of pest and diseases; do not use any toxic pesticide or other toxic methods to remove pest and diseases. The toxic substance will enter the ground and also the storm sewer system.
- Make repairs to all areas in and around the green roof area that appear to be worn down.

- Remove any weeds from the area, ensure that all root system from the weeds have been destroyed. Do not use any toxic substances to remove weeds.

The following seasons:

- If plants are showing signs of pest, disease or are growing poorly, remove the plant(s) and replace. Inspect the plants surrounding the area to ensure that there is not a greater problem.
- During times of extended drought look for features of stress, wilting, spotted brown leaves, loss of leaves, poor plant health, etc. except when bio-diverse system is used.
- Area should be water, when needed, in the early morning when maximum absorption.
- Prune excess growth annually or more often. Trimmed material maybe recycled in with the mulch.
- Weed the area regularly; however, the area should not be mowed.
- Remove plant material away from fire walls, drainage outlets and inlets and other mechanical equipment.

SCM 3 - PERVIOUS PAVEMENT

DESCRIPTION

Pervious pavement areas allow for runoff to be filtered through a soil medium that removes different pollutants before the runoff enters the stormwater drainage system. The pervious pavement facility needs to be maintained on a yearly basis. The maintenance is relatively simple and can be done in a short amount of time depending on the size of the area.

POLLUTION PREVENTION APPROACH

The suggested Best Management Practices should be used to reduce the influx of pollutants into the storm water drainage system and increase the longevity of the pervious pavement area.

SUGGESTED BEST MANAGEMENT PRACTICES

- It is recommended that the area be cleaned once in the early spring and once in the late fall.
- The area should be cleaned with a vacuum street sweeper and the surrounding area should be cleaned of all debris.
- Facilities and personal in-charge of the pervious pavement area should keep inspection logs and cleaning activity logs.
- The area should not have any soil stockpiles, mulch, or other fine materials stored near or on top of the pavement.

INSPECTION PROCEDURES

- Pervious Pavement areas should be inspected after every rainfall over a half inch of rainfall for the first year.
- Inspection of the pervious pavement area should be monthly for the first six months to ensure the pavement and sub-bases were properly constructed.
- The pervious pavement area should be inspected at the end of the winter months to ensure that excessive winter treatment chemicals did not build-up in the pavement cross section.
-

MAINTENANCE PROCEDURES

Pervious pavement areas should be kept clean through-out the year. A vacuum sweeper is necessary to remove any sediments or other debris that has fallen in the voids of the pavement. During winter months, the pervious pavement section should be salted only. Sand and any other anti-skid product should not be placed on the pervious pavement or any area that drains to the pervious pavement. If at any time standing water is observed on the pervious pavement the area should be excavated and a pavement and below soils should be viewed for excessive sediment build-up.

TARGETED FACILITIES AND OPERATIONS

- City parking lots
- Street Rights-of-Way

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics
- Low Dissolved Oxygen

REFERENCE

- Stormwater PA - Pervious Pavement
- Stormwater Solutions

SCM 4 - BIO RETENTION FACILITIES

DESCRIPTION

Bio-retention areas allow for runoff to be filtered through a soil medium that removes different pollutants before the runoff enters the stormwater drainage system. The Bio-retention facility needs to be maintained monthly during the growing season and inspected for erosion and debris buildup.

POLLUTION PREVENTION APPROACH

The suggested Best Management Practices should be used to reduce the influx of pollutants into the storm water drainage system and increase the longevity of the bio-retention basin

SUGGESTED BEST MANAGEMENT PRACTICES

- It is recommended that the area be cleaned once in the early spring and once in the late fall.
- The area should be cleaned with hand tools, rakes, shovels, and light construction equipment. Vehicles should not be driven on the bio-retention area.
- All damage should be repaired and mulch areas that are exposed should be fixed.
- Facilities and personal in-charge of the bio-retention area should keep inspectional logs and cleaning activity logs.

INSPECTION PROCEDURES

- Bio-retention areas should be inspected after every rainfall over a half inch of rainfall for the first year.
- Inspection of the bio-retention area should be daily for the first month to ensure the area is taking properly.
- The bio-retention area should be inspected once a month during the growing season and once in the beginning of spring and at the end of fall.

MAINTENANCE PROCEDURES

Bio-retention areas should be kept free of debris and weeds to ensure a properly working infiltration and stormwater management area. Routine maintenance should be done year-round and does not require much effort if area is well kept.

After planting:

- The area should be watered daily for two weeks unless significant rainfall has occurred
- Inspect the bio-retention area for any signs of erosion.

TARGETED FACILITIES AND OPERATIONS

- All City-Owned property
- City parking lots
- Street Rights-of-Way

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Metals
- Oil & Grease
- Organics
- Low Dissolved Oxygen

REFERENCE

- University of Minnesota- Rain gardens and Maintenance
- “Vermont Rain Garden Manual”
- Fairfax County “Public Facility Manual”

- Re-mulch any area where bare soil has become exposed or mulch layer has been significantly reduced.
- If necessary, use stones to stabilize drainage paths within the bio-retention area. If it is possible use a wetland grass mixture if the area will hold the seeds

After first rainfall:

- The bio-retention area should be free of standing water within 72-hours of rainfall. No standing water should be visible within the bio-retention area. If the area has not drained continue to monitor, soil remediation or an improved under drain system may be needed.
- Ensure that mulch has not moved and settled in clumps.
- If applicable, inspect all inlets and outlet structure to ensure that runoff has drained properly with the basin.

One month of planting:

- Inspect all plants to ensure that they are free of pest and diseases; do not use any toxic pesticide or other toxic methods to remove pest and diseases. The toxic substance will enter the ground and also the storm sewer system.
- Make repairs to all areas in and around the bio-retention area that appear to be worn down.
- Add mulch to areas that are bare or insufficient mulch coverage exist.
- Remove any weeds from the area, ensure that all root system from the weeds have been destroyed. Do not use any toxic substances to remove weeds.

The following seasons:

- Every 6 months or in spring and fall, whichever comes first, add 1" of mulch.
- Once every 2 to 3 years, in the spring, apply a new 3" layer of mulch in the entire bio-retention garden.
- If plants are showing signs of pest, disease or are growing poorly, remove the plant(s) and replace. Inspect the plants surrounding the area to ensure that there is not a greater problem.
- During times of extended drought look for features of stress, wilting, spotted brown leaves, loss of leaves, poor plant health, etc.)
- Area should be watered, when needed, in the early morning when maximum absorption.
- Prune excess growth annually or more often. Trimmed material may be recycled in with the mulch.
- Weed the area regularly; however, the area should not be mowed.

SCM 5 - DRY WELLS

DESCRIPTION

Dry wells are small, excavated pits, backfilled with aggregate, and used to infiltrate uncontaminated runoff from non-metal roofs or metal roofs located outside the Zone II or Interim Wellhead Protection Area of a public water supply and outside an industrial site. Dry wells require regular and effective maintenance to ensure prolonged functioning. Dry wells are not effective for infiltrating from land uses with high pollutant loads, such as parking lots.

POLLUTION PREVENTION APPROACH

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system. Dry wells provide groundwater recharge and can provide some pollutant removal.

SUGGESTED BEST MANAGEMENT PRACTICES

- Dry wells should be inspected after every storm exceeding an inch of rainfall for the first few months after construction and annually thereafter.
- The area surrounding the dry well should be cleaned, and sediment, debris/trash, and any other waste material removed and properly disposed of.
- Facilities and personnel in-charge of the dry wells should keep inspectional logs and cleaning activity logs.

INSPECTION PROCEDURES

- Dry wells should be inspected after every rainfall over one inch for the first few months after construction to ensure proper stabilization and function. Inspections should be annual, thereafter.

MAINTENANCE PROCEDURES

Dry wells should be kept free of debris to ensure properly working infiltration. Routine maintenance should be as determined by inspections and does not require much effort if area is well kept.

- Measure the water depth in the observation well at 24- and 48-hour intervals after a storm. Calculate clearance rates by dividing the drop in water level (inches) by the time elapsed (hour).
- Evaluate the drain-down time of the dry well to ensure the maximum time of 72 hours is not exceeded. If drain-down times are exceeding the maximum, drain the dry well via pumping and

TARGETED FACILITIES AND OPERATIONS

- City-Owned property

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Metals
- Pathogens

REFERENCE

- Pennsylvania Stormwater Best Management Practices Manual
- MA Stormwater Handbook

clean out perforated piping, if included. If slow drainage persists, the system may need replacing.

- Regularly clean out gutters and ensure proper connections to facilitate the effectiveness of the dry well.
- Replace filter screen that intercepts roof runoff as necessary.
- If an intermediate sump box exists, clean it out at least once per year.

SCM 6 - TREE BOX FILTERS (FILTERRA)

DESCRIPTION

A tree box filter consists of an open bottom concrete barrel filled with a porous soil media, an underdrain in crushed gravel, and a tree. Stormwater is directed from surrounding impervious surfaces through the top of the soil media. Stormwater percolates through the media to the underlying ground. Treated stormwater beyond the design capacity is directed to the underdrain where it may be directed to a storm drain, other device, or surface water discharge. Tree box filters require regular maintenance to ensure prolonged functioning.

POLLUTION PREVENTION APPROACH

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system. Tree box filters can provide pollutant removal and can be used for pre-treatment.

SUGGESTED BEST MANAGEMENT PRACTICES

- Trees in the tree box filter should be inspected annually.
- The area should be cleaned by removing trash from the surface.
- Facilities and personnel in-charge of the tree box filter should keep inspectional logs and cleaning activity logs.

INSPECTION PROCEDURES

- Entire structure should be visually inspected annually for excessive trash or debris, broken grates, standing water, blocked inlets, media condition, and tree health.
- Trees should be inspected annually (expected tree life is 5 to 10 years)

MAINTENANCE PROCEDURES

Tree box filters should be kept free of trash to ensure proper infiltration. Routine maintenance should be as needed based on inspection results and does not require much effort if area is well kept.

- Periodically remove trash from the media surface.
- Replace mulch and filter media with bioretention media mixed for infiltration applications whenever tree is replaced.
- Add mulch when necessary to ensure 3" layer is maintained.
- Rake media surface twice per year to maintain permeability.

TARGETED FACILITIES AND OPERATIONS

- City-Owned property
- Streets and parking lots
- Catch basin inlets

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash

REFERENCE

- UNH Stormwater Center
- MA Stormwater Handbook
- Filterra design guideline

SCM 7 - INFILTRATION CHAMBERS (CULTEC)

DESCRIPTION

Infiltration chambers (subsurface structures) are underground systems that capture runoff, and gradually infiltrate it into the groundwater through rock and gravel. There are many underground infiltration systems that can be installed to enhance groundwater recharge. The most common types include pre-cast concrete or plastic pits, chambers (manufactured pipes), perforated pipes, and galleys. Infiltration chambers are constructed to store stormwater temporarily and let it percolate into the underlying soil.

POLLUTION PREVENTION APPROACH

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system. Infiltration chambers provide groundwater recharge, downstream flooding prevention, and pollutant removal.

SUGGESTED BEST MANAGEMENT PRACTICES

- Direct access to the infiltration chamber should be provided for maintenance and rehabilitation.
- The use of pretreatment BMPs will significantly minimize maintenance requirements of the chamber itself.
- Preventive maintenance should be performed at least twice a year.
- Facilities and personnel in-charge of the infiltration chamber should keep inspectional logs and cleaning activity logs.
- If possible, infiltration chambers should be inspected after all major storms (>2-year storm events).

INSPECTION PROCEDURES

- Infiltration chambers should be inspected after the first several rainfall events, and annually thereafter.
- Ponded water inside the chamber (as visible from the observation well/pretreatment structure) after 24 hours or several days often indicates that the bottom of the chamber is clogged.
- The pretreatment structures (catch basin with a two-foot sump, hooded elbow, large diameter pipe header, inlet protection device, or a pretreatment BMP) should be inspected at least once every 2-3 months for any debris that will restrict inlet flow rates.
- Water ponded at the surface of the chamber may indicate only surface clogging.
- Outfall structures such as outlet control must also be inspected every Spring and Fall for any obstructions that would restrict outlet flow rates.

TARGETED FACILITIES AND OPERATIONS

- City-Owned property
- Streets and parking lots

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Bacteria
- Metals
- Oil and Grease
- Organics

REFERENCE

- UNH Stormwater Center
- MA Stormwater Handbook

MAINTENANCE PROCEDURES

Maintenance for most chambers is minimal (most materials driven to the chamber bed will deteriorate over time), but specific maintenance needs will be determined based on annual inspection results.

- Ideally sediment and oil/grease should be removed from pretreatment BMPs after every major storm event and monthly.
- Ponding water in the chamber indicates infiltration failure from the bottom. In this case, all of the stone aggregate and filter fabric or media must be removed.
- The chamber bed should be inspected annually at the inlet and outlet areas to remove any restrictive materials.

SCM 8 - INFILTRATION TRENCHES

DESCRIPTION

Infiltration trenches are shallow excavations with no outlet that are filled with stone to create underground reservoirs for stormwater runoff. Runoff is stored in the void spaces between the stone and then gradually exfiltrates through the bottom of the trench into the subsoil and eventually into the water table.

POLLUTION PREVENTION APPROACH

Implement applicable suggested Best Management Practices to reduce the influx of pollutants to the stormwater drainage system. Infiltration trenches provide groundwater recharge, downstream flooding prevention, and pollutant removal.

SUGGESTED BEST MANAGEMENT PRACTICES

- Provide an observation well at the center of the infiltration trench to monitor runoff clearance from the system.
- The site and contributing areas should be stabilized prior to construction of the trench.
- Infiltration trenches are prone to clogging. Preventive maintenance should be performed at least twice a year.
- Facilities and personnel in-charge of the infiltration trench should keep inspectional logs and cleaning activity logs.
- If possible, infiltration trenches should be inspected after all major storms (>2-year storm events).

INSPECTION PROCEDURES

- Infiltration trenches should be inspected after the first several rainfall events, and annually thereafter.
- Ponded water inside the chamber (as visible from the observation well) after 24 hours or several days often indicates that the bottom of the chamber is clogged.
- Water ponded at the surface of the trench may indicate only surface clogging.
- Pretreatment BMPs should be inspected during the regular biannual inspections.

MAINTENANCE PROCEDURES

Routine maintenance should be completed as identified by inspections.

- Direct access should be provided to the infiltration trench for maintenance and rehabilitation.

TARGETED FACILITIES AND OPERATIONS

- City-Owned property
- Streets and parking lots
- Small residential properties

TARGETED CONSTITUENTS

- Sediment
- Nutrients
- Trash
- Bacteria
- Metals
- Oil and Grease
- Organics

REFERENCE

- UNH Stormwater Center
- MA Stormwater Handbook

- Ideally sediment and oil/grease should be removed from pretreatment BMPs after every major storm event and monthly.
- Grass clippings, leaves, and accumulated sediment should be removed monthly from the surface of the trench.
- When ponding occurs at the surface or in the chamber, corrective maintenance is required immediately.
- If the clogging appears to be only at the surface, it may be necessary to remove and replace the topsoil or first layer of stone aggregate and the filter fabric.
- Ponding water in the trench indicates infiltration failure from the bottom. In this case, all of the stone aggregate and filter fabric or media must be removed.
- Accumulated sediment should be stripped from the trench bottom and the bottom may be scarified or tilled to help induce infiltration.
- New fabric and clean stone aggregate should be refilled.

SCM 9 - PARTICLE SEPARATORS (STORMCEPTORS)

DESCRIPTION

Particle separators (Stormceptors) improve water quality by removing contaminants through the gravitational settling of fine sediments and floatation of hydrocarbons while preventing the re-suspension or scour of previously captured pollutants.

POLLUTION PREVENTION APPROACH

The suggested Best Management Practices should be used to provide long-term pollution control to stormwater runoff.

SUGGESTED BEST MANAGEMENT PRACTICES

- Preventive maintenance should be performed at least once a year.
- Facilities and personnel in-charge of the particle separator unit should keep inspectional logs and cleaning activity logs.

INSPECTION PROCEDURES

- Inspect post-construction, before putting into service.
- Inspect semi-annually for the first year to determine the sediment accumulation rate. In subsequent years, inspections will be completed annually.

MAINTENANCE PROCEDURES

Frequent inspection and cleanout are critical for proper operation of hydrodynamic separators.

- The need for maintenance can be determined easily by inspecting the unit from the surface.
- The depth of sediment can be measured from the surface without entry into the particle separator via a dipstick tube equipped with a ball valve. This tube would be inserted through the riser pipe. Maintenance should be performed once the sediment depth exceeds the guideline values.
- Maintenance is performed quickly and inexpensively with a standard vacuum truck.
- Polluted water or sediment removed from these devices should be properly handled and disposed in accordance with local, state, and federal regulations. Before disposal, a detailed chemical analysis of the material should be performed to determine proper methods for storage and disposal.

TARGETED FACILITIES AND OPERATIONS

- City-Owned property
- Streets and parking lots
- Small residential properties

TARGETED CONSTITUENTS

- Sediment
- Trash
- Bacteria
- Oil and Grease

REFERENCE

- CT Stormwater Quality Manual
- Stormceptor Maintenance Guide

SCM 10 - MEMBRANE FILTERS (JELLYFISH)

DESCRIPTION

The membrane filter system (Jellyfish) improves water quality by removing contaminants through the high flow rate membrane filter while providing a very large surface area to effectively remove fine particles and pollutants.

POLLUTION PREVENTION APPROACH

The suggested Best Management Practices should be used to provide long-term pollution control to stormwater runoff.

SUGGESTED BEST MANAGEMENT PRACTICES

- Preventive maintenance should be performed at least once a year.
- Facilities and personnel in-charge of the membrane unit should keep inspectional logs and cleaning activity logs.

INSPECTION PROCEDURES

- Inspect post-construction, before putting into service.
- Inspect frequency is site dependent. The membrane should be inspected at least quarterly for the first year to determine the sediment accumulation rate. In subsequent years, inspections will be completed annually. If possible, the membrane should be inspected after each major storm event.
- Inspect the inlet bay for floatables.
- Measure oil and sediment depth by lowering a sediment probe.
- Inspect cartridge lids.
- Inspect the maintenance access wall for broken components.
- During dry weather, there should not be standing water in the unit.
- If inspecting during wet weather, observe the rate of movement of water in the unit. Refer to manufacturer's specifications for appropriate rates.

MAINTENANCE PROCEDURES

Frequent inspection and cleanout are critical for proper operation of membrane filters. Maintenance frequency will be determined by annual inspection results.

- Sediment removal for depths reaching 12 inches or greater, or within 3 years of the most recent sediment cleaning, whichever occurs sooner.
- Floatable trash, debris, and oil should be removed.
- Deck should be cleaned and free from sediment.

TARGETED FACILITIES AND OPERATIONS

- City-Owned property
- Streets and parking lots
- Small residential properties

TARGETED CONSTITUENTS

- Sediment
- Trash
- Nutrients
- Metals
- Organics

REFERENCE

- CT Stormwater Quality Manual
- Jellyfish Filter Owner's Manual

- Filter cartridges should be rinsed and re-installed as required by the most recent inspection results, or within 12 months, whichever is sooner.
- Replace tentacles if rinsing does not restore adequate hydraulic capacity, remove accumulated sediment, or if damaged. Tentacles should be replaced at least every 5 years.
- Damaged or missing cartridge deck components must be repaired or replaced based on the most recent inspection.
- The unit must be cleaned out and filter cartridges inspected immediately after an upstream oil, fuel, or chemical spill. Replace parts as necessary.

SCM 11 - STORMWATER STORAGE TANKS

DESCRIPTION

The term stormwater storage tank can be used broadly to include underground stormwater detention systems such as pipes, vaults and tanks and rainwater harvesting devices such as barrels and cisterns. These systems can be simple or sophisticated and in general, they collect stormwater for later use, infiltration, or to be pumped elsewhere. Underground systems can provide storage capacity and are intended to control peak flows, limit downstream flooding, and provide channel protection, but only provide limited pollutant removal through settling of coarse settlement.

POLLUTION PREVENTION APPROACH

The suggested Best Management Practices should be used to provide stormwater storage, but not pollutant removal.

SUGGESTED BEST MANAGEMENT PRACTICES

- Maintenance is minimal, but the tanks and associated piping should be inspected annually. In the case of rain barrels or cisterns, specific attention to gutters, downspouts, spigots, and the tanks themselves should be included in each inspection.
- For underground detention systems with pumps, the pumps, floats, and VFDs should be inspected and maintained per manufacturer specifications.

INSPECTION PROCEDURES

- Observe the tank and associated piping annually.
- For rain barrels and cisterns, gutters, downspouts, spigots, etc. should be inspected twice per year.
- For detention tanks with pumps, the pumps, floats and VFDs should be inspected according to manufacturer specifications.
- Inspect aboveground portions of the structures for cracks.

MAINTENANCE PROCEDURES

Maintenance is minimal.

- Remove debris as needed from the runoff area.
- Remove accumulated particulates.
- Replace barrels when cracks are observed.
- Maintain pumps, floats, and VFDs per manufacturer specifications.

TARGETED FACILITIES AND OPERATIONS

- City-Owned property
- Small residential properties (rain barrels and cisterns)

TARGETED CONSTITUENTS

- Sediment

REFERENCE

- MA Stormwater Handbook
- CT DEEP Stormwater Quality Manual

**APPENDIX E: CITY-OWNED OR OPERATED FACILITIES,
PARKS/OPEN SPACES, AND EQUIPMENT INVENTORY (ON FILE)**

APPENDIX F: TEMPLATE LANGUAGE FOR REQUIREMENTS OF LEASES AND CONTRACTORS ON CITY PROPERTY

Requirements of Leases

The following is an example language that can be inserted into City leases:

“The City of Cambridge has submitted a Notice of Intent (NOI) to the Massachusetts DEP and EPA to obtain coverage under the NPDES Small MS4 General Permit. A copy of the NOI is available for review. In order to comply with the Permit requirements, the City has developed Best Management Practices (BMPs) that parties leasing City owned properties must adhere to. These BMPs contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.

Activities performed at the facility leased shall conform to the Permit and BMPs and must be performed as described within all applicable BMPs. The lessee shall fully understand the BMPs applicable to activities conducted at the facility leased prior to conducting them and maintain copies of the BMPs at the leased facility throughout the agreement duration.

Evaluation (or cost) of activities performed at the facility leased may be conducted by the City to verify compliance with BMP requirement and may be required through lessor self-evaluation as determined by the City.”

Requirements of Contractors on City Property

The following is example language that can be inserted into municipal field program contracts:

“The City of Cambridge has submitted a Notice of Intent (NOI) to the Massachusetts DEP and EPA to obtain coverage under the NPDES Small MS4 General Permit. A copy of the NOI is available for review. In order to comply with Permit requirements, the City has developed Best Management Practices (BMPs) that parties conducting the municipal activities must adhere to. These BMPs apply to any party conducting municipal activities and contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.

Work performed under this CONTRACT shall conform to the Permit requirements and BMPs and must be performed as described within all applicable BMPs. The CONTRACTOR shall fully understand the BMPs applicable to activities that are being conducted under this CONTRACT prior to conducting them and maintain copies of the BMPs throughout the CONTRACT duration. The applicable BMPs are included as Exhibit __ of this CONTRACT.

Evaluation of activities subject to BMPs performed under this CONTRACT may be conducted to verify compliance with BMP requirements and may be required through CONTRACTOR self-evaluation as determined by the City.”

APPENDIX G: STORMWATER POLLUTANTS AND THEIR IMPACT ON WATER QUALITY

Typical pollutants, including environmental affects and sources, found in stormwater runoff include the following:

Sediment

- Sediment is often viewed as the largest pollutant load associated with stormwater runoff in an urban setting. The loadings have been shown to be exceptionally high in the case of construction activity.
- Sediment is associated with numerous impacts in surface waters including increased turbidity, effects on aquatic and benthic habitat and reduction in capacity of impoundments.
- A number of other pollutants often attach to and are carried by sediment particles.

Nutrients

- The nutrients most often identified in stormwater runoff are phosphorus and nitrogen.
- In surface waters, these nutrient loads can lead to heavy algae growth, eutrophication, and low dissolved oxygen levels. Nutrients enter the storm drainage system in a variety of ways, including landscaping practices in parks and recreation areas, leaks from sanitary sewers, and animal wastes.

Organics

- Various forms of organic matter may be carried by stormwater in urban areas. Decomposition of this material by organisms in surface waters results in depleted oxygen levels.
- Low levels of dissolved oxygen severely impact water quality and life within surface waters.
- Sources of organic matter include garbage and yard waste.

Bacteria

- High bacterial levels may be found in stormwater runoff as a result of garbage, pet waste, illegal connections to sanitary sewers, and/or combined sewer overflows (CSOs).
- The impacts of bacteria on surface waters may affect recreational uses and aquatic life as well as impose health risks.

Oil and Grease

- Numerous activities in urban areas produce oil, grease, and lubricating agents that are readily transported by stormwater.
- The intensity of activities, including vehicle traffic, maintenance and fueling activities, leaks and spills, and manufacturing processes within an urban setting contribute heavily to the level of these pollutants present in adjacent surface waters.

Heavy Metals

- Heavy metals such as copper, lead, zinc, arsenic, chromium, and cadmium may be typically found in urban stormwater runoff.

- Metals in stormwater may be toxic to some aquatic life and may accumulate in aquatic animals.
- Urban sources of metals in stormwater may include automobiles, paints, preservatives, motor oil and various urban activities.

Temperature

- Stormwater runoff increases in temperature as it flows over impervious surfaces. In addition, water stored in shallow, unshaded ponds and impoundments can increase in temperature.
- Removal of natural vegetation (such as tree canopy) opens up water bodies to direct solar radiation.
- Elevated water temperatures can impact a water body's ability to support certain fish and aquatic organisms.

Pesticides and Herbicides

- Pesticides and herbicides in stormwater runoff can be toxic, even at low concentrations, to aquatic life and the birds that feed on them.

Trash and Debris

- Trash and debris including floatables, plant debris, animal wastes, street litter, and other material may contain pollutants including metals, pesticides, bacteria, and other toxins.
- Trash and debris can harbor bacteria, vectors, and lower dissolved oxygen concentrations in surface waters affecting aquatic life.

Vectors

- Vectors including mosquitoes and rodents can frequent in standing waters, including drainage structures, and eventually live and reproduce in such structures resulting in disease spread and a City nuisance.