Drainage System Maintenance GH-50

OBJECTIVES

- Ensure functionality of storm drain system through maintenance and monitoring
  - General Overview
  - General Practices
  - Limitations
  - Other Considerations
  - Operational Protocols
  - Specific Pollutants
  - Spill Response and Control
- Implement and conduct activities aimed at pollution prevention
  - Training
  - Special Considerations

DESCRIPTION

The stormwater conveyance system provides transport of urban/suburban stormwater runoff, snow melt runoff, and non-stormwater discharges generally to receiving waters. Most BMPs provide recommendations and protocols to reduce the potential of polluted runoff through source controls. Treatment control BMPs are also effective in reducing pollutants prior to entry to the conveyance system or waterways. However, the conveyance system is generally the "last hurdle" prior to runoff entering receiving waterways. Proper maintenance of the system provides both functionality and the reduction of pollutants entering waterways.

CONSIDERATIONS

The stormwater conveyance system is generally comprised of catch basins, inlet structures, channels, miscellaneous drains, pump stations (possibly), pipes, culverts, detention ponds, and outfalls. Curbs and gutters are generally associated as a part of conveyance system; however, for the purposes of this fact sheet, focus is afforded the "concealed" drainage system.

Professional plumbing contractors and specialized services contractors can be hired to flush the storm sewer system in lieu of self-flushing activities.

Consider stenciling drain inlets notifying the public the inlet is a part of conveyance system draining to waterways. This can be achieved through MCM #1 and Public Education as well.

Confined space training may be required for access to deep basins.

Protocols and recommendations outlined in this fact sheet can be implemented and maintained through the Post-Construction Stormwater Management Plan (PCSM Plan) for MCM #5 compliance including a proper and compliant PCSM O&M Program for permanent structural and non-structural BMPs for further water quality protection initiatives.

If a municipality only has a few basins, manually clean the basins. Mechanical cleaners such as vacuuums should be used otherwise.

RECOMMENDATIONS AND PROTOCOLS

For the objectives listed, the following represent further recommendations and protocols for road and street maintenance:

Reduce or prevent polluted discharges associated with roads and streets

General Overview

- As the final part of conveyance for both stormwater and non-stormwater, a number of common pollutants can be found in the system:
  - Trash and similar debris
  - Sediment
  - Oils and greases
  - Paints, antifreeze, and similar products
  - Cleaners and solvents
  - Fertilizers and pesticides
  - Animal waste
- Other items such as leaves, vegetation, and manufactured items (e.g. car parts, etc.) can be in the conveyance system that will pollute runoff in the system itself
- Foreign objects in a system will inhibit the functionality

Operational Protocols

- Regular inspections of the complete system
- Keep accurate records regarding the number of times a basin has been cleaned
- Record amount of waste collected
- Store wastes from cleaning activities in appropriate containers and store in a manner that does not allow discharge back into the system or to receiving waterways
- Identify and monitor known problem areas
- Develop a regular schedule for cleaning system components.

General Practices

- **Catch basins and inlets**
  - Sumps should be cleaned prior to 40% fill
  - Inlet covers should be free of debris and sediment build-up
  - Dewater wastes with outflow in to the sanitary sewer if allowed (however, water should be filtered prior to discharge into the sanitary sewer)
  - If dewatering to sanitary sewers is not allowed, water should be pumped or vacummed to a tank and properly disposed of.
  - Remove sediment, debris, litter, and so on

- **Channels**
  - Remove sediment, debris and trash build-up.
  - Observe for hydraulic functionality. Consider modifications to improve hydraulics or increase ability for pollutant removals

- **Pipes**
  - Develop a flushing schedule for identified problem areas with repeated excessive build-up
  - Collect flushed effluent and pump to sanitary sewer or dispose properly
  - Refer to INSPECTIONS AND MEASUREMENTS section of this fact sheet regarding information for illicit connections

- **Detention Ponds/Basins**
  - Remove sediment, debris and trash build-up
  - Observe for hydraulic functionality. Consider modifications to improve hydraulics or increase ability for pollutant removals
- **Outfalls**
  - Observe for non-stormwater discharges.
  - Inspect for functionality and structural integrity.
  - Focus towards outfalls and illict dishcarges is provided under MCM #3 of an MS4 Permit
- **Pump Stations**
  - Clean pump station storm drains regularly to remove silt and trash
  - Clean outlet structures as necessary

Specific Pollutants

- All pollutants currently measured at USGS Station WQN0273 on the Conestoga River can be considered pollutants conveyed throught the system to waterways Such pollutants include nutrients (incl. nitrogen and phosphorus), sediment, metals, oil and grease, organics, inorganics, bacteria, and so on.

Limitations

- A vactor truck for flushing can cost upwards of $200,000.
- A water source is necessary for cleaning or flushing pipes and the system. Wastewater must be collected and treated from cleaning
- Flushing is considered more successful with pipes with less than a 36" diameter
- Certain components of the system may be "deeded" to residential homeowners for maintenance purposes.

Spill Response and Control

- Have spill clean-up materials readily available
- Refer to BMP Fact Sheet GH-10, Spill Prevention and Control for more information

Other Considerations

- Establish a system for tracking illegal dumping hot spots at locations within the system
- Cleaning and maintenance activities may disturb local acquatics
- Maintenance of components located within defined boundaries of wetlands may be subject to additional regulations and requirements
- Private property access may be needed to track illegal discharges up a gradient
- Methods for tracking or identifying illicit connections include dye testing, smoke testing, flow monitoring, TV inpections, and visual inspections
- Using the outfall map required under MCM #3 and corresponding requirement for a grid on the map can aid in developing a realistic maintenance schedule
- Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediment

Implement and conduct activities aimed at pollution prevention

Training

- Refer to BMP Fact Sheet GH-1 regarding training for more information

- Train employees regarding proper maintenance activities and recommendations outlined in this BMP fact sheet and related fact sheets

Special Considerations

- Ensure inlets or drains are protected near repair or construction activity sites, including activities by others
- Consider debris capture systems, especially for problem areas
- Flow management must be compatible with stormwater quality goals in a "stream corridor."
- Consider corridor reservations, corridor restorations, bank treatment, geomorphic restoration, grade control, and buffer systems when planning an entire stream corridor that may or may not include drainage system components. This will aid in reducing cleaning and maintenance frequency of drainage systems. Such systems may be a part of Green Infrastructure Plans. Plus such systems generally improve water quality and acquatics. Entities such as LandStudies can aid in design and installations
- Treatment control BMPs in conjunctions with source control BMPs will reduce build-up in drainage systems

DOCUMENTATION

Proper documentation practices are essential for any municipal SWMP to show compliance with the Clean Water Act, NPDES, and generally the requirements of the permit issued to allow discharges through the defined MS4. As with all sections of an MS4 permit, all documentation should be centralized.

For drainage system maintenance, templates are provided within the BMP manual to assist the municipality with documentation compliance. The templates can be used for compliance; however, the following documents are recommended as a minimum for compliance:

- **Training Record:** This document is used to provide record of a training event or session relative to drainage system maintenance.
- **Training and Education Log:** Enter a completed training record for drainage systems into the log.
- **Drainage System Maintenance Schedule**
- **Event Record:** If a discharge is observed during a repair or maintenance activity, an event record should be executed that also outlines response and remediation procedures. Major rain events, encountered illict discharges, observed discharges that may associated with an illict connection, and encountered dumped materials are all items that should be recorded as an event.
- **Activity Record:** Complete when remediation is conducted or improvements are made to roads and streets. Note protection measures of inlets, waterways, and so on that were implemented. Complete activity records for remediation or investigation of encountered events. Complete activity records for maintenance activities such as pipe flushing or basin cleaning. Note loads removed or disposal methods.

- **Inspection Record:** Complete an inspection based on the recommendations in the section titled "INSPECTIONS AND MEASUREMENTS" or as outlined in your SWMP
- **Inspection, Event, and Activity Log:** Enter an inspection, activity, or event record for drainage system maintenance into the log as outlined within this BMP.

INSPECTIONS AND MEASUREMENTS

Frequency of inspections for drainage systems is recommended as follows:

- *Regular Inspection:* Conduct a regular inspection of drainage systems based on an applicable frequency and ability. An applicable frequency should be determined based on the use of the drainage system and known problem areas. Frequencies (with cleaning recommendations) are recommended as follows:

  Basins/inlets: inspect all inlets/basins every 1-2 years (at least 50% of system inspected and cleaned each year; inspect inlets/basins in known problem areas every 6 months - 1 year (clean as needed)

  Pipes/Lines: inspect pipes at least once every year (clean as needed); inspect known problem areas twice a year (clean as needed)

  Detention basins/pump stations/channels/other: inspect throughout the year (clean as needed)

  Special: facilities such as Green Infrastructure or Corridor Reservations can be inspected every 2-3 years or as recommended by consultants/ architects/engineers associated with such systems. New systems should be inspected on a more frequent basis (such as quarterly) until the system is established.

- *Rain Event Inspection:* Inspect and clean as needed after major rain events and all facilities affected by emergency response activities. Initial inspections should afforded to known problem areas. Develop inspection protocol that includes at least 25% of the system after "defined" rain events.

Items that should be inspected and maintained (and recommended maintenance actions):

Evidence of pollutants: observe for evidence of pollutants such as sediment, paints, trash, and so on

Basins/Inlets: Structurally sound and ensure clean and free of sediment and debris

Pipes: structurally sound and free of build-up or debris

Clean-outs: Ensure structurally sound, remove debris and sediment (if applicable) build-up. Replace cracked or leaking clean-outs

Other: inspect detention basins, culverts, outfalls, pump stations, and so on for integrity; remove sediment and debris build-up

Cleaning equipment: proper operation and free of leaks; repair as required

Special: develop items for inspection for special components of systems such as filtering devices, separators, debris capture systems, and so on. A recommendaiton for frequency of inspections may be provided by a manufacturer in certain instances.

Corridor Reservations: free of debris and litter

Effectiveness can be measured a number of ways. Ultimate effectiveness may be dependent on analytical monitoring of surrounding waterways. Documenting effective load removals in the system against a calculated load can demonstrate effectiveness. Proper documentation practices can further provide a level of demonstrating effectiveness (such as documentation relative to identifying and remediation of illicit connections, cleaning activities, and training).

SOURCES

U.S. Environmental Protection Agency Storm Drain System Cleaning at http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=102&minmeasure=6

California Stormwater Quality Association, Municipal Stormwater Best Management Practice Handbook (2004 edition) at http://www.cabmphandbooks.com/Municipal.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program at http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Santa Clara Valley Urban Runoff Pollution Prevention Program at http://www.scvurppp-w2k.com/pdfs/ps/PS_SDOM.PDF

Pennsylvania Department of Environmental Protection; final version of PAG-13 at http://files.dep.state.pa.us/Water/Watershed%20Management/WatershedPortalFiles/StormwaterManagement/PAG-13/FinalPAG-13.pdf