U-10 STORM DRAIN CLEANING

PRACTICE AT A GLANCE

- Sediment and leaf litter from streets can wash off and then collect in the catch basins and storm drains. When those materials are removed from the storm drain systems on a frequent basis, a community can earn a modest pollutant reduction credit.

- Streets represent a significant fraction of total impervious cover in the Chesapeake Bay watershed and storm drain clean-outs may be a viable strategy for reducing the toxic inputs or trash from urban watersheds, given the high level of toxic contaminants found in both street solids and sweeper wastes.

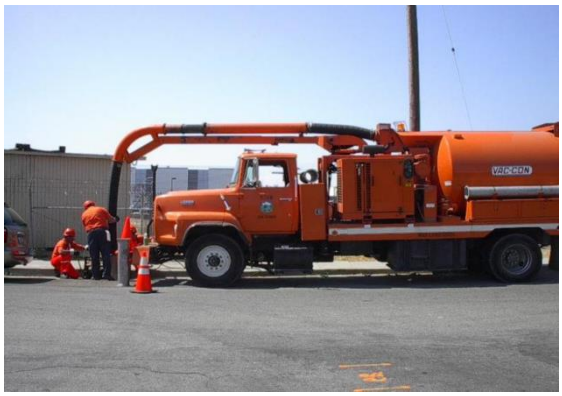
- Nutrient and sediment reductions can be achieved by removing solids directly from catch basins, from within storm drain pipes, or by capturing them at stormwater outfalls. Streets with high organic matter loads and overhead tree canopy are often the best opportunities for the highest reductions.

DESCRIPTION

Storm drain cleaning refers to the direct removal of solids from:

- Catch basins
- Within storm drain pipes
- End of outfall treatment
- Open, concrete-lined conveyance ditches

Sediment removal that occurs during ditch maintenance along open section roads is not currently eligible for this credit.



Research shows that substantial nutrient and sediment loads are trapped within catch basins and storm drains. However, measurable water quality improvement can only be achieved when they are frequently cleaned. This removal credit must be supported by data on the measured mass of the nutrient-rich sediments that is physically removed from the storm drain system.

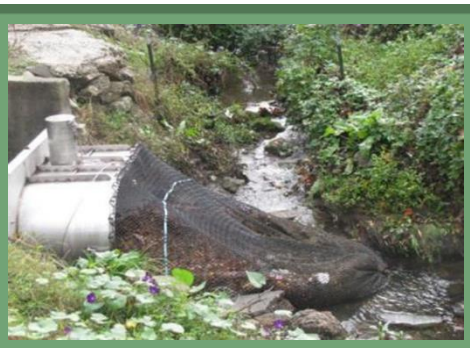
OTHER BENEFITS OF STORM DRAIN CLEANING

Storm drain clean-outs can provide other benefits to the community. For example, they can:

- Pick up trash, litter, road salt, sand and organic matter that would otherwise reach the stream
- Remove toxic pollutants and harmful bacteria before they reach local waterways
- Prevent localized flood damage caused by clogged storm drain pipes

Good Recipes for the Bay Pollution Diet

WHERE TO FIND THE BEST OPPORTUNITIES IN YOUR COMMUNITY



Bag filter installed at outfall in the Town of Easton

Multiple net filters capture organic matter at the end of a storm drain system

Trash trap installed during Nash Run stream restoration

Few communities in the Bay watershed conduct regular clean-outs in the catch basins or in their storm drain systems. The best opportunities exist in catch basins that rapidly accumulate sediment, streets with high tree canopy and storm drain outfalls with high sediment or debris loads.

GENERAL COST INFORMATION

The cost of storm drain cleaning programs is highly variable and is largely dependent upon how frequently cleaning occurs.

The bulk of municipal street cleaning budgets pays for labor costs, although initial equipment purchase and ongoing maintenance costs can be significant. The storm drain cleaning practice also requires that all materials removed be measured to determine the sediment content and organic matter content, which may add an additional cost.

TIPS FOR GETTING STARTED

Understand your current storm drain clean-out efforts in your community.

If possible, use your local Geographic Information System (GIS) to help optimize your storm drain cleaning efforts to maximize the overall pollutant reduction. Target areas with the most overhead tree canopy, as these streets are likely to be high in organic matter.

Work with your public works crews to craft improved standard operating procedures for documenting local storm drain cleaning efforts during the year (location cleaned, mass removed, landfill tickets, quality control)

Consider innovative technologies such as outfall net filters, gross solids controls, and end of pipe treatment, as more effective water quality practices.

COMPUTING THE POLLUTANT REMOVAL CREDIT

The pollutant removal credit for storm drain clean-outs is determined by calculating nutrient and sediment loads removed from the storm drain system using a five-step process, as described in the following design example:

A community wants to take credit for their catch basin cleanout program. The community collects a wet mass of 1,500 tons of material over the course of a year.

Step 1*. *Apply discount factor to remove large particles.*

Approximately 30% of solids cleaned out of storm drains are too large to be classified as total suspended solids. Multiply the wet mass collected by 0.70 to calculate the mass of eligible solids.

- Wet Mass: 1,500 * 0.70 = 1,050 tons

*Note: This step is pending Urban Stormwater Workgroup approval.

Step 2. *Determine how much of the material is sediment or organic matter*

The fractions of sediment and organic matter used for this step can be measured using a representative sample (recommended procedures are outlined in the "Verification" section of this Fact Sheet) or a default value may be used. For this example, we will say the 1,050 tons of material is half sediment and half organic matter:

- Sediment: 525 tons
- Organic matter: 525 tons

Step 3. *Convert to pounds*

Multiply the tons of sediment and organic matter by 2,000 to convert to pounds.

- Sediment: 525 tons * 2,000 = 1,050,000 lbs
- Organic matter: 525 tons * 2,000 = 1,050,000 lbs

Step 4. *Convert wet weight to dry weight*

Multiply the pounds of sediment and organic matter each by a conversion factor to determine the dry weight of the material.

- Sediment: 1,050,000 lbs * 0.7 = 735,000 lbs
- Organic matter: 1,050,000 lbs * 0.2 = 315,000 lbs

Note: while default conversion factors are available in the report and are used in this example, communities are encouraged to utilize local monitoring data if possible.

Step 5. *Determine the nutrients and sediment removed through catch basin clean-outs.*

Multiply the dry weights by nutrient enrichment and sediment delivery factors to determine the nutrients captured and removed.

- Sediment: 735,000 lbs * 0.0006 = 441 lbs of TP
- Organic matter: 315,000 lbs * 0.0012 = 378 lbs of TP
- Total Phosphorus Removal: 0.63 + 0.36 = 819 lbs of TP

Table 1. Storm Drain Clean-Out Enrichment Factor Calculations

		TP		TN		TSS	
	Quantity (lbs)	EF	Removal (lbs)	EF	Removal (lbs)	EF	Removal (lbs)
Sediment	735,000	0.0006	0.63	0.0027	1,984.5	0.3	220,500
Organic matter	315,000	0.0012	0.36	0.0111	3,496.5	0.3	94,500
Totals			**819**		**5,481**		**315,000 lbs (157.5 tons)**

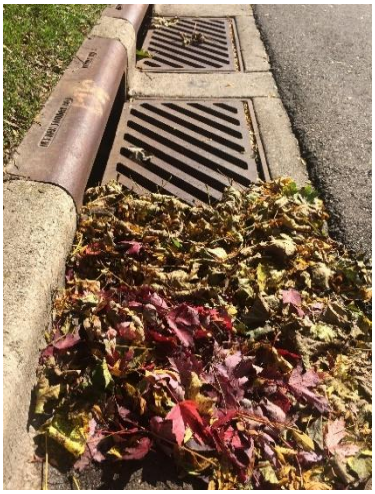
EF = Enrichment factors from Table 19 of the Expert Panel report

HOW TO REPORT THE PRACTICE TO THE STATE

Storm drain clean-outs are an annual practice, so communities need to report the pounds of nutrients and sediments removed from the storm drain system every year.

Localities should check with their state stormwater agency for specific data reporting requirements, but the following information is recommended:

- Pounds of TN, TP and TSS removed, as calculated at the end of Step 4
- Location: Provide general lat/long coordinates for one of the following:
  a) Centroid of jurisdiction, or
  b) 12 digit Hydrologic Unit Code (HUC) watershed address



Under this approach, communities will need to keep accurate records to substantiate their actual storm drain cleaning operations so that the state MS4 regulatory agency can verify the credit. Record-keeping requirements, however, should not be so onerous that localities spend more time on paperwork than cleaning their storm drains. Recommended data may include:

- How sediments and/or organic matter were measured
- Supporting documentation for the level of storm drain cleaning effort (e.g., dumpster loads, disposal tickets, tipping fees, or vactor truck loads)
- Equation used to convert wet sediment volumes to dry sediment mass
- Nutrient enrichment ratios applied to the sediment mass

WHAT IS REQUIRED TO VERIFY THE PRACTICE OVER TIME

Annual verification protocols can help document local storm drain cleaning efforts over time and provide valuable data on the pollutant characteristics of solids trapped in catch basins. The following optional verification protocols were suggested by the Expert Panel:

Localities should collect one high quality composite sample each year from the storm drains that are cleaned in a single given day.

The sample should be weighed, mixed and then allowed to dry out over several days. After a week, the sample is measured to determine the:

- Dry weight of the sample (to compute wet to dry mass conversion)
- Fraction of the sample categorized as sediment, organic matter or trash.

If the sample is mostly sediment, a subsample of the sediment should be sent to a laboratory to measure its average carbon, nitrogen and phosphorus content. Likewise, the same parameters should be measured from the organic matter.

The resulting data can be submitted in annual MS4 reports, and may be used to adjust default values in your local storm drain clean-out standard operating procedures.

RESOURCES

Type of Resource	Title of Resource	Web link
Expert Panel Report	Recommendations of the Expert Panel to Define Removal Rates for Street and Storm Drain Cleaning Practices (2016)	http://chesapeakestormwater.net/wp-content/uploads/dlm_uploads/2016/05/FINAL-APPROVED-Street-and-Storm-Drain-Cleaning-Expert-Panel-Report-Complete2.pdf
Archived webcast	Crediting Street Sweeping and Storm Drain Cleaning Webcast (2016)	http://chesapeakestormwater.net/events/webcast-street-sweeping/
Example Standard Operating Procedures	Sample Storm Drain Clean-Out Program Standard Operating Procedures: Baltimore County	http://chesapeakestormwater.net/wp-content/uploads/dlm_uploads/2017/04/Baltimore-Co-Storm-Drain-Cleanout-SOP.pdf