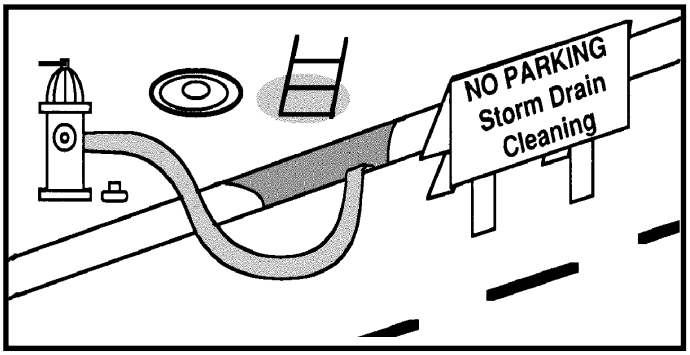
**ACTIVITY:** Storm Drainage System Flushing | AM – 05




CITY OF KNOXVILLE

| Targeted Constituents | | | | |
|---|---|---|---|---|
| ● Significant Benefit | ◗ Partial Benefit | ○ Low or Unknown Benefit | | |
| ● Sediment | ◗ Heavy Metals | ◗ Floatable Materials | ○ Oxygen Demanding Substances | |
| ○ Nutrients | ○ Toxic Materials | ◗ Oil & Grease | ○ Bacteria & Viruses | ○ Construction Wastes |

**Description**

A storm drain is flushed with water to suspend and remove deposited materials. Flushing is particularly beneficial for storm drain pipes with grades too flat to be self-cleansing. Flushing helps ensure that pipes convey design flow and also removes pollutants from the storm drain system. This management practice is likely to create a significant reduction in sediment if flushed effluent is properly collected or treated.

**Approach**

- Locate reaches of storm drain with deposition problems and develop a flushing schedule to clear storm drain of excessive deposits.
- Flushed effluent should be collected and pumped to a sediment trap, sediment basin, or a detention basin.
- Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump. The backed-up water is quickly released, resulting in the cleaning of the storm drain segment.
- If the flushed water does not drain to a stormwater treatment device (e.g., detention basin or swale), then a second inflatable device, placed well downstream, may be used to collect the flushed water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to a stormwater treatment practice. In some cases, an interceptor structure may be more practical to collect the flushed waters.

**Requirements**

- TDEC regulations prohibit the discharge of soil, debris, refuse, hazardous waste, and other pollutants that may hinder the designed conveyance capacity or damage stormwater quality or habitat in the storm drain system. This includes flushing any system connected to "Waters of the State" (any blue-line stream on the USGS quadrangle, sinkhole, or other waterway so determined by TDEC personnel in the field). TDEC must be consulted if this practice is planned.
- Equipment
  - Water source (water tank truck or fire hydrant)

- Sediment collector (eductor/vacuum truck or dredge)
- Inflatable devices to block flow
- Containment/treatment equipment for sediment and turbidity if flushing to an open channel

**Limitations**

- Most effective in smaller pipes (36-inch diameter pipe or less), depending on water supply and sediment collection capacity.
- May have difficulty in finding available upstream water source.
- May have difficulty finding downstream area to collect sediments. Requires liquid and sediment collection and disposal.

**Additional Information**

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, drainage slope, pipe length, flow rate, pipe diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency from the pipe at the time of flushing ranges between 65-75 percent for organics and 55-65 percent for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm drainage system flushing.

**References**

**30, 31, 32, 33, 34, 35, 132** (see BMP Manual Chapter 10 for list)