Sand Filters

Sand filters are multi-chamber structures designed to treat stormwater runoff through filtration, using a sediment forebay, a sand bed as its primary filter media, and typically an underdrain system. Sand filters can be designed in many ways; however, there are three primary sand filter system designs, surface sand filter, perimeter sand filter, and underground sand filter. A surface sand filter is a ground-level open air structure that consists of a pretreatment sediment forebay and a filter bed chamber. A perimeter sand filter is an enclosed system typically just below the ground in a vault along the edge of an impervious area such as a parking lot. Finally, an underground sand filter is for areas with limited space and high density areas and should only be considered where local communities allow this practice. Because underground sand filters require additional planning, maintenance and incorporation with the stormwater management plan, coordinate with the local community for specific maintenance concerns. Maintenance frequency on sand filters is typically high due to clogging.

There are some common problems to be aware of when maintaining a sand filter. They include, but are not limited to, the following:

- Sediment build-up
- Clogging in the inlet and outlet structure
- Clogging the underdrain
- Mosquitoes breeding in the practice
- Ant mounds

Routine inspection and maintenance should be performed on the sand filters to ensure that the structure is functioning properly. Note that if the sand filter include a grass cover or vegetation, maintenance may be required at a higher frequency during the first year the sand filter is built to ensure the proper establishment of grass cover or vegetation in the practice. For more information on vegetation in a sand filter, see Appendix D: Planting and Soil Guidance.

Inspect the sand filter after a large rainstorm. Keep drainage paths (both to and from the BMP) clean so that the water can properly infiltrate into the ground. If the sand filter is not draining properly, check for clogging at the inflow and outflow structures as well as the infiltration rate of the filter bed. In a sand filter, the filter bed is likely to become clogged at the upper layer of the filter (top 2-3 inches) and will need to be removed and replaced. If the filter becomes clogged or over-compacted, then the media should be replaced. In order to determine if maintenance is necessary, a record should be kept of the dewatering time for a sand filter. Note that sand filters are typically designed to completely drain over 40 hours.

Potential sources of excessive sediment that could clog the media include ant mounds and unstable soil upstream of the practice. Possible sources of compaction are maintenance vehicles traveling through the practice. If the underdrain does not work properly, a structural repair or cleanout to unclog the underdrain may be necessary.

In the event of snow, ensure that the snow does not pile up in the sand filter. Accumulated snow adds additional weight and may compact the sand filter, which would reduce its infiltration capacity. In addition, check to make sure that the materials used to de-ice the surrounding areas stay out of the practice to avoid clogging and further pollution.

If designed and maintained correctly, there is no danger of sand filters becoming a breeding ground for mosquitoes. A mosquito egg requires 24-48 hours to hatch. In addition, it takes 10-14 more days for the larvae to develop and become an adult. By having a sand filter that drains properly, it is unlikely that a sand filter would provide a habitat that could become a breeding area for mosquitoes. Should the sand filter become a breeding ground for mosquitoes, the problem is likely with the sand media or the overflow structure which may need to be addressed. This is for surface sand filters, where there is open water.

The table below shows a schedule for when different maintenance activities should be performed on the sand filter.

Sand Filter Typical Routine Maintenance Activities and Schedule

Activity	Schedule
• Check to see that the filter bed is clean of sediment, and the sediment chamber is not more than 50% full or 6 inches, whichever is less, of sediment. Remove sediment as necessary. • Make sure that there is no evidence of deterioration, spalling or cracking of concrete. • Inspect grates (perimeter sand filter). • Inspect inlets, outlets and overflow spillway to ensure good condition and no evidence of erosion. • Repair or replace any damaged structural parts. • Stabilize any eroded areas. • Ensure that flow is not bypassing the BMP. • Ensure that no noticeable odors are detected outside the practice.	Monthly
• Ensure that contributing area, sand filter, inlets and outlets are clear of debris. • Prune and weed to maintain appearance (if applicable). • Ensure that the contributing area is stabilized and mowed, with clippings removed. • Ensure that activities in the drainage area minimize oil/grease and sediment entry to the system. • If permanent water level is present (perimeter sand filter), ensure that the chamber does not leak, and normal pool level is retained.	As needed or 4 times during growing season

Activity	Schedule
• If filter bed is clogged or partially clogged, manual manipulation of the surface layer of sand may be required. Remove the top few inches of sand, roto-till or otherwise cultivate the surface, and replace media with sand meeting the design specifications. • Replace any filter fabric that has become clogged.	Annually
• Remove and replace the top 2-3 inches of sand in the filter.	Every 3-5 years or as needed