LOADING RATIO REQUIREMENTS

Loading ratio is defined as the area of contributing DCIA divided by the bottom surface footprint of vegetated surface SMPs and the bottom footprint of infiltrating subsurface SMPs. The loading ratio is a tool that is used for sizing an SMP with consideration of acceptable sediment loading. It is a balancing point between maintenance requirements, performance requirements, and safety considerations. PWD's loading ratios are used as maximum acceptable SMP sizes for stabilized sites that are appropriately maintained; they are not necessarily the recommended loading ratios. The maximum loading ratio for vegetated surface SMPs is 16:1. The maximum loading ratio for infiltrating subsurface SMPs is 8:1.

Loading Ratios

Maximum Loading Ratios

Surface vegetated SMPs: 16:1
Subsurface infiltrating SMPs: 8:1

Maintenance

Long-term maintenance is a fundamentally important piece of an SMP's design. PWD's loading ratios were selected with the assumption that the final site will be stabilized, and the SMP will be maintained at regular intervals. Surface SMPs with a 16:1 loading ratio will require frequent maintenance, including the removal and replacement of the top layer of soil along the bottom footprint of the SMP.

Safety

The larger the loading ratio, the deeper the SMP must become to store the required volume of water. A surface basin with a 16:1 loading ratio will have a maximum Water Quality storage depth of two feet, which limits the total water depth and the risks to public safety.

Performance

The loading ratio greatly affects the performance of infiltrating SMPs by determining the footprint available for infiltration. PWD requires that all SMPs drain down in no more than 72 hours, however owners may want their SMPs to drain more quickly, thus the loading ratio may need to be reduced to meet the performance goals for the system. For example, an SMP with a loading ratio of 16:1 and an infiltration rate of 0.4 inches/hour drains down in 60 hours; however, the site owner may not want ponded water on-site for 60 hours.

Limitations

The larger the loading ratio, the less redundancy there is in an SMP. The SMP designer should consider the causes of potential failure for their SMP and attempt to minimize their likelihood and their effects. For example, a small SMP with a large impervious drainage area has the potential to receive a significant volume of water and sediment in larger storm events, which could overwhelm and/or clog the small SMP. In this case, a larger basin footprint may be warranted to safely convey the extra volume.

Subsurface SMPs are inherently more difficult to maintain because they are buried. If construction sediment or some other sediment source discharges to the subsurface basin it can become clogged. Repairing the basin could require a complete removal and replacement of the system. This is one reason why PWD requires lower loading ratios for subsurface SMPs.

When considering SMPs that receive runoff from a likely sediment source, the designer must factor into his or her design the likelihood of clogging, and therefore the need for increased maintenance frequency; the cost of maintenance/replacement; and the likelihood of this occurring when determining the appropriate sizing of the system.