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# Operation and maintenance of filter strips - supplemental information

**Green Infrastructure:** Filter strips, when vegetated, provide water quality benefits, may provide some stormwater volume reduction, and may provide typical benefits of vegetation, such as habitat, depending on the vegetation type.



This page provides supplemental information on operation and maintenance (O&M) of vegetated **filter strips** ([https://stormwater.pca.state.mn.us/index.php?title=Overview\\_for\\_pretreatment\\_vegetated\\_filter\\_strips](https://stormwater.pca.state.mn.us/index.php?title=Overview_for_pretreatment_vegetated_filter_strips)). For basic information on O&M for filter strips, see Operation and maintenance (O&M) of filter strips.



Image of a vegetated filter strip

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## Maintenance activities

When inspections indicate that maintenance is necessary, the following sections provide guidelines to conduct the proper maintenance activities to restore the **pretreatment** ([https://stormwater.pca.state.mn.us/index.php?title=Pretr eatment](https://stormwater.pca.state.mn.us/index.php?title=Pretr%20eatment)) vegetated filter strip to its design efficiency.

### Removing sediment and debris buildup

As sediment is deposited after rain events, it can alter the uniform slope and result in **channelized flow**, which reduces the effectiveness of the pretreatment vegetated filter strip and can result in additional maintenance such as regrading and replanting. Removing sediment should occur when deposited sediment creates channelized flow through the pretreatment vegetated filter strip, sediment accumulation reaches the level of the contributing ground surface or **level spreader**, or when the sediment increases the water depth above the height the vegetation. Sediment removal should be completed by sweeping with a stiff bristle broom or using a vacuum truck. If a significant amount of sediment accumulates on the pretreatment vegetated filter strip (more than 2 inches) and is not removed in a timely manner, the vegetation will die off and require reseeding/replanting.

Along with removing sediment buildup, removing trash and debris is required in the maintenance process. Trash and debris buildup, like sediment buildup, can increase the chance of channelized flows, cause clogging in downstream pipe or intake structures, and negatively impact the aesthetics. If cleaning is not conducted, this trash and debris can be flushed into the full-treatment **best management practice** (BMP) during a larger rain event, which will reduce its effectiveness and result in a costlier cleanup.

### Preventing or minimizing washouts and erosion of the pretreatment vegetated filter strip

To ensure that **washout** and erosion damage of the pretreatment vegetated filter strip does not occur, maintaining sufficient vegetation and a moderate slope per the design specifications is critical. Maintaining distribution of inflow (level spreader or otherwise), a slope of 6 percent or less, vegetation cover of at least 80 percent, and grass that is at least 3 inches long is recommended.

### Vegetation establishment

Establishing full and healthy vegetation is vital to ensuring that the pretreatment vegetated filter strip will perform as designed. For the best results, weeds should be removed from the bare soil before planting. To ensure that vegetation will become established and survive the winter freeze, a minimum of 60 days before the first expected frost should be allowed for the vegetation to grow. Soil stabilization practices such as **erosion control blankets** ([https://stormwater.pca.state.mn.us/index.php?title=Erosion\\_prevention\\_practices\\_-\\_erosion\\_control\\_blankets\\_and\\_anchoring\\_devices](https://stormwater.pca.state.mn.us/index.php?title=Erosion_prevention_practices_-_erosion_control_blankets_and_anchoring_devices)) should be used during vegetation establishment. To avoid damaging the emerging vegetation and causing site compaction, vehicle and foot traffic should not be allowed during the vegetation establishment phase. Achieving a minimum of 80 percent cover on the pretreatment vegetated filter strip, per the design guidelines, will ensure that the site is stabilized after construction. Following rain events, additional inspections and possible maintenance on the full-treatment BMP downstream of the pretreatment vegetated filter strip is recommended during the vegetation establishment phase.

### Maintaining vegetation

Maintaining adequate vegetation cover is critical to sustaining the design effectiveness and mitigating erosion of the pretreatment vegetated filter strip. As previously mentioned, a minimum of 80 percent vegetation and uniform cover is needed for the pretreatment vegetated filter strip to be effective.

Vegetation maintenance includes cleanup, mowing, **invasive plant** and weed removal, and quality checks. Cleanup, as mentioned above, requires removing excess sediment, debris, and trash. Large debris and trash can be removed by hand; smaller debris and sediment require sweeping with a stiff bristle broom or using a vacuum truck. To maintain the proper length for the vegetation, regular mowing must be conducted. Mowing should not be done when the ground is wet to reduce the chance of rutting from the wheels. The party in charge of mowing the pretreatment vegetated filter strip should be made aware that it is a BMP and that they should check for any signs of degradation (e.g., erosion, lack of vegetation) or need for additional maintenance. Mowing should be done as necessary to achieve grass heights of 3 to 4 inches. For additional mowing information, see the University of Minnesota website (<https://extension.umn.edu/lawns-and-landscapes/lawn-care>). Removing invasive plants and weeds will ensure that the planted vegetation remains healthy and full. Fertilizers should only be used in the vegetation establishment phase, because adding additional nutrients is counterproductive to using the pretreatment vegetated filter strip and permanent BMP. Establishing vegetation as quickly as possible and having healthy, dense vegetation is important.

## Snow Storage

BMP areas generally should not be used as dedicated snow storage areas. If this is not possible, follow the following guidelines.

- Snow storage should not occur in areas designated as potential stormwater hotspots for road salt.
- Areas designed for **infiltration** ([https://stormwater.pca.state.mn.us/index.php?title=Stormwater\\_infiltration\\_Best\\_Management\\_Practices](https://stormwater.pca.state.mn.us/index.php?title=Stormwater_infiltration_Best_Management_Practices)) should be protected from excessive snow storage where sand and salt is applied.
- Specific snow storage areas should be assigned that will provide some **filtration** (<https://stormwater.pca.state.mn.us/index.php?title=Filtration>) before the stormwater reaches the practice areas. Note that chloride will not be removed or attenuated in filtration practices.
- When used for snow storage, or if used to treat parking lot runoff, the practice area should be planted with salt tolerant and non-woody plant species.
- Practices should always be inspected for sand build-up on the surface following the spring melt event.

## Maintenance agreements

Maintenance agreements (similar to site easements) are required for one party to define and enforce maintenance by another party and may be necessary to access the site to conduct maintenance on the pretreatment vegetated filter strip. A maintenance agreement is a legally binding agreement between two parties and is defined as “a nonpossessory right to use and/or enter onto the real property of another without possessing it.” Maintenance agreements are often required for the issuance of a permit for constructing a stormwater management feature and are written and approved by legal counsel. These maintenance agreements can be established for a defined period of time and often define the types of inspections and maintenance that are required for the pretreatment vegetated filter strip. If maintenance needs to be conducted because the party in charge of the maintenance failed per the maintenance agreement, the party responsible for routine maintenance must follow the agreed-upon reimbursement terms. Examples of three site maintenance agreements can be found at this link ([https://stormwater.pca.state.mn.us/index.php?title=Example\\_O%26M\\_plans,\\_checklists,\\_reports,\\_and\\_maintenance\\_agreements\\_for\\_vegetated\\_filter\\_strips](https://stormwater.pca.state.mn.us/index.php?title=Example_O%26M_plans,_checklists,_reports,_and_maintenance_agreements_for_vegetated_filter_strips)).

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