Chapter 3: Post Construction Water Quality Stormwater Control Measures

3.1 Introduction to Stormwater Quality

Under the regulations governing the NPDES Stormwater Phase II program, Montgomery County is required to develop and implement a post-construction stormwater quality program. The County's stormwater quality program has been developed with input from stakeholders' groups and after investigating other stormwater quality programs. This chapter provides design criteria and information for stormwater quality stormwater control measures, or SCMs, to be included in stormwater quality plans.

Runoff water quality in urban areas can be extremely detrimental to local fish and wildlife habitat. Paved surfaces and standing water bodies constructed for stormwater management control can elevate the temperature of water entering streams. Chemicals in standing water and ponds are oxidized, resulting in depressed levels of dissolved oxygen. Increased runoff volumes and rates create scour and deposition damage to in-stream habitat. Activities in urbanized areas, such as vehicular traffic, deposit pollutants such as heavy metals and oil and grease on paved surfaces where they easily wash off into the streams. Stormwater quality stormwater control measures, both structural and non-structural, can reduce the amount of pollutants in stormwater.

SCMs noted in this chapter refer to the post-construction SCMs listed in Chapter 4 of this manual, installed after the site has been stabilized. Installing certain SCMs, such as bioretention areas and sand filters, prior to stabilization can cause failure of the measure due to clogging from sediment. However, with a strict construction sequence, detention ponds and other SCMs can be installed initially during construction and used as sediment control measures. In those instances, the construction sequence must require that the pond be cleaned out with pertinent elevations and storage and treatment capacities reestablished as noted in the approved stormwater management plan. The final as-built certification must verify that final elevations and volumes are established as outlined in the approved Stormwater Quality plans.

Various SCMs will have different rates of effectiveness. For most SCMs, the goal is to discharge clear stormwater with no visible pollutants and no known sources of man-made pollution (such as toxic substances, chemicals or fertilizers). The objective is to establish a baseline for pollution removal goals to evaluate the stormwater treatment SCMs, especially manufactured SCM systems, oil/water separators, or other methods of treating stormwater runoff.

There is a three-step approach to achieving higher water quality. The first step is large-scale prevention of pollution from entering or even contacting any stormwater runoff. The second step is removal of the visible components of stormwater runoff pollution, such as coarse sediment, oil and grease, bulk materials, and floating debris. The third step is the treatment and removal of the less obvious pollutants in stormwater runoff, such as fine sediment, nutrients, and heavy metals from automotive emissions.

Montgomery County requires that the first inch of rainfall must be either detained, infiltrated, or allowed to evapotranspire in some manner.

3.2 Stormwater Quality Control Requirements

The County has adopted the following requirements pertaining to stormwater quality permits:

1) The control of stormwater runoff quality County-wide is based on the management of total suspended solids (TSS). This requirement is being adopted as the basis of the County's stormwater quality management program for all areas of the County. The target TSS removal rate is 80%. A listing of post-construction control SCMs is provided in Chapter 4 that either fully meet the 80% TSS reduction goal or that partially meet the goal. It should also be noted that control of sediment is required for construction site runoff County-wide.

2) All new development and significant redevelopment affecting one acre or more of land must obtain a stormwater development permit.

3) All new hot spot type developments, such as car washes, car maintenance facilities, restaurants and other land uses characterized as priority locations (hotspots), must obtain a stormwater development permit, regardless of disturbance size.

3.3 Stormwater Permit Exemptions

Exemption for Agricultural Practices: No stormwater development permit shall be required for accepted agricultural land management practices such as plowing; cultivation; construction of agricultural structures; nursery operations such as the removal of or transplanting of cultivated sod and trees; tree cuttings at or above existing ground level; and logging operations leaving the stump, ground cover, and root mat intact. However, agricultural practices shall adhere to agricultural stormwater control measures to prevent stormwater pollution to the extent practicable and feasible.

Exemption for Residential Additions, Modifications and Accessory Structures: No stormwater quality permit shall be required for construction of accessory structures related to single family residential, duplex dwellings or their accessory buildings authorized by a valid building permit, unless said construction results in increased runoff flow, sedimentation deposition, and/or debris deposition onto adjacent properties.

3.4 Stormwater Quality Plans

Stormwater quality plans must include or address the following, at a minimum, to be considered complete:

1) A breakdown of the anticipated pervious/impervious acreage (in percentages) for the fully developed site. The impervious acreage must include driveways (paved or graveled), new roads (including roads to be upgraded), roofs, walkways, patios, decks and out buildings.

2) A description of how the proposed stormwater management system(s) will be designed, constructed, maintained and operated to:

   a. Enhance the quality of runoff through the application of stormwater control measures (SCMs) to maximize the infiltration on site by minimizing impervious surfaces, minimizing conveyance through hardened, impervious channels and conduits, and distributing flow through vegetative buffers and/or wetlands.

   b. Extend the time of concentration of stormwater runoff to the maximum practical level.

   c. Preserve and protect natural drainage way(s) (piping or channeling natural drainage ways and water courses is prohibited).

   d. Respect the practical limits of public and private storm drainage facilities and protect other properties from unreasonable adverse effects resulting from development.

3) A vicinity map and USGS topographic map excerpt identifying the drainage area(s). Drainage areas must be identified for the site and for downstream structures.

3.5 Structural Stormwater Control Measures

In SCMs, pollutant removal is achieved through a number of mechanisms. Understanding pollution removal mechanisms is important when developing a SCM design to meet a pollutant reduction goal. Some pollutants are water soluble, while others adhere to solids. Therefore, one SCM may employ several different pollutant reduction mechanisms to effectively treat urban stormwater runoff.

3.6 Selection Criteria

When developing the SCM plan, consider the land use, imperviousness of the contributing watershed, maintenance needs and general acceptance of the SCM. Each SCM description in the subsequent sections outlines such determining factors to aid in the plan development.

While most SCMs have a pollutant removal capable of meeting or exceeding the 80% TSS reduction goal, several do not. Some SCMS must be “chained” or used in conjunction with other SCMs together as SCMs to meet the overall reduction goal of 80% TSS treatment goals. For example, filter strips alone do not meet the overall reduction goal. However, filter strips combined with an infiltration trench will effectively meet the required goals.

Some structural SCMs are not pre-approved for use in the County but can potentially meet the County’s stormwater quality goals. Additional supporting information will be needed to support

the pollutant reduction ability as well as the maintenance requirements and will be reviewed on a site-by-site basis.

3.7 Innovative SCMs

Unapproved SCMs must be professionally certified. ASTM standard methods must be followed when verifying performance of new measures. New SCMs must meet the 80% TSS removal rate based upon the target water quality volume treatment requirements and must have a low to medium maintenance requirement to be considered by the County. Testing to establish the TSS removal rate must be conducted by an independent testing facility, not the SCM manufacturer.

3.8 Operation and Maintenance Agreement

Maintenance, ownership and legal liability for installed stormwater control structures and SCMs will remain the responsibility of the landowner (original developer, builder, etc.), unless and until the landowner transfers ownership to another party (i.e.: a homeowner's association or individual landowner). Transfer of ownership will also transfer maintenance responsibility and legal liability for the structure.

3.9 Stormwater Quality SCMs and Mosquito Control

Some stormwater quality SCMs either provide permanent sources of water or hold stormwater over an extended period of time and can therefore contribute to mosquito problems through providing a breeding habitat. However, if the SCMs are properly designed, installed, and maintained, mosquito problems can be minimized. The following controls should be considered when determining the appropriate SCM for each development:

1) SCMs with open ponding water (such as stormwater ponds) may need aeration or some other means of water movement through artificial means. Mosquitoes breed in stagnant water, but moving water or surface disturbances discourage mosquito breeding.

2) Mosquito breeding cycles cannot be completed in fewer than 72 hours. Therefore, SCMs should address stormwater rapidly. Completely draining a SCM in fewer than 72 hours can minimize mosquito problems by breaking the breeding cycle.

3) Good maintenance and monitoring of water holding SCMs is essential. For instance, discharge orifices should be monitored for debris or sediment clogging *weekly* in the summer months when mosquito breeding peaks

4) Since loose riprap may hold small pockets of water over a long period and provide mosquito breeding habitats, consider concrete grouting around riprap to prevent pooling, while maintaining the benefits of the riprap energy dissipation.

5) Consider introducing *Gambusia affinis* (mosquitofish) into stormwater ponds. They feed on immature mosquitoes.

6) Only use mosquito larvicides to control mosquitoes as a last resort.

For more information about SCMs and mosquito control options consult the following source: Metzger, Marco M. "Managing Mosquitoes in Stormwater Treatment Devices." University of California at Davis—Division of Agriculture and Natural Resources, Publication 8125, 2003.