



Technical Support Document for the Post-Construction Stormwater Management Conditions in the General Stormwater Permit (MNR040000) for Small Municipal Separate Storm Sewer Systems

Introduction

This guidance document is intended to describe the post construction stormwater management permit conditions (Minimum Control Measure 5) as required by the General Stormwater Small Municipal Separate Storm Sewer Systems (MS4) Permit issued by the Minnesota Pollution Control Agency (MPCA). MS4 permittees are required to develop a regulatory mechanism (ordinance, policy, etc.) for construction activity within their jurisdiction such that a permanent stormwater treatment system is in place once the construction activity is complete. Construction activity is defined as any activity (i.e. clearing, grading, excavating) that will result in the disturbance of one or more acres of land or that is part of a larger common plan of development that will ultimately disturb one or more acres of land.

The requirements for post construction stormwater treatment set forth in the Permit are narrative in nature and do not contain specific numeric standards, in order to allow MS4 permittees maximum flexibility in determining how their community will meet the treatment conditions. The MPCA expects MS4 permittees to adopt treatment requirements in their regulatory mechanism that are reflective of the narrative requirements found within the Permit. There are already a number of different post construction treatment approaches currently in effect around the state of Minnesota that meet the intention of the post-construction treatment conditions as stated in Part III.D.5.a(2)(a) and (b) of the Permit. This guidance document refers to several of these stormwater treatment approaches in addition to others that communities may adopt.

In order to meet the post-construction stormwater management conditions, existing permittees have 12 months from the date the MS4 Permittee is extended Permit coverage to revise their regulatory mechanism (e.g., contract language, an ordinance, permits, standards, etc.) as well as develop a municipal review and approval process. Any new MS4 permittees designated during this permit cycle will need to develop post-construction requirements within 24 months after permit coverage is granted.

Post construction stormwater treatment requirements

Part III.D.5 of the MS4 Permit – “Post-Construction Stormwater Management”:

The MS4 permittee shall develop and implement a Post-Construction Stormwater Management program that requires the use of any combination of BMPs, with highest preference given to Green Infrastructure techniques and practices (e.g., infiltration, evapotranspiration, reuse/harvesting, conservation design, urban forestry, green roofs, etc.), necessary to meet the following conditions on the site of a construction activity to the Maximum Extent Practicable (MEP).

For new development projects – no net increase from pre-project conditions (on an annual average basis) of:

1. Stormwater discharge Volume, unless precluded by the stormwater management limitations outlined in Part III.D.5.a.(3)(a)

2. Stormwater discharges of Total Suspended Solids (TSS)
3. Stormwater discharges of Total Phosphorus (TP)

For redevelopment projects – a net reduction from pre-project conditions (on an annual average basis) of:

1. Stormwater discharge Volume, unless precluded by the stormwater management limitations outlined in Part III.D.5.a.(3)(a)
2. Stormwater discharges of TSS
3. Stormwater discharges of TP

New development

The MPCA believes that the objectives of the post-construction stormwater management conditions for new development will be met if any of the following treatment requirements are adopted into the post-construction stormwater management program. The U.S. Environmental Protection Agency (EPA) MS4 Permit Improvement Guide (dated April 2010) suggests a number of recommended treatment requirements that state permitting authorities may incorporate into their MS4 permits. The MPCA has determined that of those options outlined in the improvement guide, three, with slight modifications, will achieve the conditions set forth in the Permit which states; no net increase from pre-project conditions (on an average annual basis) of Volume, TSS or TP. In addition to the three EPA recommended post-construction stormwater management approaches (1-3 below), the MPCA will except other scientifically defensible treatment approaches. The options are:

1. Retain a runoff volume equal to one inch times the area of the proposed increase of impervious surfaces on-site:
Design and construct stormwater management practices that manage rainfall on-site, and prevent the off-site discharge of the precipitation from the first one inch of runoff from the new impervious surfaces created by the project. Discharge volume reduction can be achieved by engineered infiltration, canopy interception, soil amendments, evaporation, rainfall harvesting, and/or evapotranspiration and any combination of the aforementioned practices. This first one inch of rainfall must be 100% managed with no discharge to surface waters.
2. Retain the post-construction runoff volume on site for the 95th percentile storm:
Design, construct, and maintain stormwater management practices that manage rainfall on-site, and prevent the off-site discharge of the precipitation from all rainfall events less than or equal to the 95th percentile rainfall event. Discharge volume reduction can be achieved by engineered infiltration, canopy interception, soil amendments, evaporation, rainfall harvesting, and/or evapotranspiration and any combination of the aforementioned practices. The 95th percentile rainfall event is an event of which precipitation total is greater than or equal to 95% of all storm events over a given period of record. This approach to stormwater management is further explained in the EPA document titled "Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act". <http://water.epa.gov/polwaste/nps/upload/eisa-438.pdf>
3. Match the pre-development runoff conditions:
Design and construct stormwater management practices that preserve the pre-development runoff conditions following construction. The post-construction rate, volume and duration of discharges must not exceed the pre-project rates and the pre-project hydrograph for 1 and 2 year storms must be replicated through site design and other appropriate practices. These goals can be achieved by engineered infiltration, canopy interception, soil amendments, evaporation, rainfall harvesting, and/or evapotranspiration and any combination of the aforementioned practices. Defensible and consistent hydrological assessments and modeling methods must be used and documented.

4. Any other stormwater performance standard that achieves the volume, TSS and TP goals listed above based on modeling, research and acceptable engineering practices.
5. Adopting the Minimal Impact Design Standards (MIDS) as developed by the MPCA.

Using MIDS to meet stormwater management requirements

The 2009 Legislature directed the MPCA to “develop performance standards, design standards, or other tools to enable and promote the implementation of low impact development and other storm water management techniques” such that the “rate and volume of predevelopment storm water reaching receiving waters is unchanged compared to the runoff from developed land” (Minn. Stat. § 115.03, subd. 5c.). Upon passage of the legislation, a stakeholder group was created to assist the MPCA in this effort and the results were termed “Minimal Impact Design Standards”.

MIDS is a voluntary tool for MS4 permittees to use to reduce impacts from stormwater discharges. If a MS4 permittee adopts MIDS into their Regulatory Mechanism, the MPCA will consider the community to have satisfied the post-construction stormwater management conditions (MCM5). The MIDS performance goal for new development, which was developed considering historic Minnesota specific precipitation events, is to capture and retain on site 1.1 inches of runoff from the impervious surfaces in post-construction conditions. For redevelopment projects, the performance goal is to capture and retain on site 1.1 inches of runoff from the new and/or fully redeveloped impervious surfaces. For linear projects, the performance goal is to capture and retain onsite the larger of the following:

- 0.55 inches of runoff from the new and fully reconstructed impervious surfaces
- 1.1 inches of runoff from the net increase in impervious surfaces

The MIDS performance goals above will not always be possible due to site constraints such as contaminated soils or soils with low infiltration rates. For this reason, the MIDS stakeholder group developed a Design Sequence Flowchart to assist users in determining when a different performance goal is appropriate.

The MPCA has developed a new calculator that allows project proposers and regulatory reviewers to easily quantify the volume reduction expected from a specific stormwater management system. The MIDS calculator includes some less traditional systems that often received no volume reduction credit in the past such as a grass swale. The MPCA has also developed a Community Assistance Package (CAP) that contains ordinance development guidance to help communities adopt the MIDS standard. For more information on the MIDS approach to stormwater management, see the Minnesota Stormwater Manual:

http://stormwater.pca.state.mn.us/index.php/Performance_goals_for_new_development,_re-development_and_linear_projects

To be viewed by the MPCA as adopting MIDS a community must:

1. Incorporate the MIDS performance goals for new development and redevelopment into their Regulatory Mechanism.
2. Incorporate the flexible treatment options as outlined in the MIDS Design Sequence Flowchart into their Regulatory Mechanism.
3. Incorporate the use of the MIDS calculator.

Communities should understand that while MIDS contains many components, they do not all need to be adopted in order to meet the post-construction stormwater management permit conditions. As an example, in order to meet the treatment requirements of the Permit, a community could choose to adopt only the new development and redevelopment performance goals of MIDS. The Permit requires MS4 permittees to develop a Regulatory Mechanism to address the infiltration prohibitions and restrictions outlined in Part III.D.5.a(3). While this permit requirement is addressed in the Design

Sequence Flowchart, an MS4 permittee could choose to develop an alternative methodology to address this requirement. It is important to note that MS4 permittees cannot use the Design Sequence Flowchart unless they have adopted MIDS.

Post construction stormwater treatment requirements cont.

Post-construction stormwater management strategies implemented by a permittee should take into account the variability in hydrologic conditions which may exist in different areas within the permittee's jurisdiction. Ideally, design requirements should reflect the local naturally-occurring hydrology with respect to runoff, infiltration, evapotranspiration, and storage in order to mimic the water balance that would be present in the absence of development. Key parameters, such as rainfall patterns, soil characteristics, and topography, can be used to establish likely 'natural' hydrology. The MPCA recommends that the Regulatory Mechanism developed by the MS4 permittee allow for a combination of techniques that utilize infiltration, capture and re-use evapotranspiration and other types of low impact development techniques as appropriate, rather than relying only on infiltration or some other technique alone to meet performance goals. If infiltration practices are not appropriate for a particular project due to site limitations, other volume reduction techniques must still be considered.

If the MS4's jurisdiction lies within a Watershed District that has developed a volume reduction/treatment management strategy for post-construction that is at least as stringent as one of the management strategies above, the MS4 permittee may choose to implement those requirements across the entire MS4 jurisdiction. Some existing stormwater requirements may be similar to the ones listed above, but might be slightly less restrictive in one area while being more restrictive in another. The MPCA will evaluate these volume reduction strategies on a case by case basis.

Where re-use of stormwater is implemented, such as use with an irrigation system, volumes captured shall be given equal credit toward the volume reduction requirement by the permittees Regulatory Mechanism. Such re-use measures must be fully documented in the post-construction stormwater management program.

Redevelopment

For redevelopment projects, the MS4 Permit requires a net reduction in the amount of TP, TSS and stormwater runoff volume (unless precluded by one of the prohibitions or restrictions listed below) leaving the site as compared with pre-project conditions. Most redevelopment projects contain both impervious and pervious land cover. Impervious cover types include pavement, buildings, gravel, stockpiles and other types of highly impacted cover in which the native hydrology has been greatly altered. The MS4 Permit defines any site with less than 15% of existing impervious surfaces prior to the commencement of construction activity as new development and the new development treatment conditions would apply as if the site had no impervious surfaces prior to construction. The percentage of impervious cover is calculated by dividing the area of the existing impervious cover by the limits of disturbance of the construction activities, not by the size of the property itself.

For redevelopment projects (those with more than 15% impervious surface prior to construction) where the project proposer intends to add more impervious surfaces, the new development treatment requirements must be applied to the net increase of impervious surfaces. Additional treatment must also be included to reduce the volume (unless precluded by the limits or exceptions listed below), TP and TSS loads from the existing impervious surfaces.

Stormwater management prohibitions and restrictions

A key component of maintaining the volume of stormwater leaving a site is practices that allow infiltration to groundwater. For most sites, meeting the volume reduction requirement will require the use of infiltration. However, there can often be physical site constraints that limit the effectiveness of an infiltration system or site conditions in which stormwater infiltration must be prohibited. If construction activity is proposed on a site that meets one of the prohibitions or restrictions listed below, runoff from the limiting areas may be excluded from meeting the full volume reduction component of Part III.D.5.a(2)(a) or (b) of the MS4 permit. However the full treatment standard for TSS and TP must still be met on-site or mitigated for off-site.

Infiltration prohibitions

The use of infiltration as a stormwater treatment method is prohibited in the following areas (Part III.D.5.a [3]):

1. Where industrial facilities are not authorized to infiltrate industrial stormwater under an NPDES/SDS Industrial Stormwater Permit issued by the Agency
2. Where vehicle fueling and maintenance occur
3. With less than three (3) feet of separation distance from the bottom of the infiltration system to the elevation of the seasonally saturated soils or the top of bedrock
4. Where high levels of contaminants in soil or groundwater will be mobilized by the infiltrating stormwater

Infiltration restrictions

The permittees Regulatory Mechanism(s) shall restrict the use of infiltration techniques without a detailed engineering review, to achieve the conditions outlined in Part III.D.5.a(2)(a) or (b) sufficient to prevent adverse impacts to groundwater, when the infiltration device will receive discharges from, or be constructed in:

1. Areas of predominately Hydrologic Soil Group D (clay) soils
2. Areas within 1,000 feet up-gradient, or within 100 feet down-gradient of active karst features
3. Areas within a Drinking Water Supply Management Area (DWSMA) as defined in Minn. R. 4720.5100, subp. 13
4. Areas where soil infiltration rates are more than 8.3 inches per hour

The restrictions above do not preclude proposers of construction activity from infiltrating stormwater. Rather, the restrictions simply require that a higher level of design and review is needed. There may be opportunities to infiltrate in these areas and not impact groundwater or experience a system failure because of one of the site restrictions. For example, in an area known to have karst features, an MS4 permittee may require additional soil borings to ensure that no karst features are present in the immediate area of the infiltration system.

Exception for meeting the volume control standard

The MS4 permittee's Regulatory Mechanism may allow a lesser volume reduction requirement than required in Part III.D.5.a (2) (a) or (b) if the project meets one of the prohibitions or restrictions listed above and if the owner or operator of the construction activity implements to the Maximum Extent Practicable (MEP) other volume reduction techniques such as evapotranspiration, reuse/harvesting, conservation design, green roofs, etc. on site. If other volume reduction techniques are not used, documentation must be provided on why that decision was made.

Mitigation provisions

Mitigation provisions must be developed by the permittee for circumstances where the permittee or other owners and operators of a construction activity cannot meet the TSS and/or TP reduction requirements on the site of the original construction activity. The mitigation provisions of the Regulatory Mechanism(s) shall ensure that any stormwater discharges of TSS or TP not addressed on the site of the original construction activity are addressed through mitigation and, at a minimum, shall ensure the following mitigation requirements are met:

- Mitigation project areas are selected in the following order of preference:
 1. Locations that yield benefits to the same receiving water that receives runoff from the original construction activity
 2. Locations within the same Department of Natural Resource (DNR) catchment area as the original construction activity
 3. Locations in the next adjacent DNR catchment area up-stream
 4. Locations anywhere within the permittee's jurisdiction
- Mitigation projects must involve the creation of new structural stormwater BMPs or the retrofit of existing structural stormwater BMPs, or the use of a properly designed regional structural stormwater BMP.
- Routine maintenance of structural stormwater BMPs already required by this permit cannot be used to meet mitigation requirements of this Part.
- Mitigation projects shall be completed within 24 months after the start of the original construction activity.
- The permittee shall determine, and document, who is responsible for long-term maintenance on all mitigation projects of this Part.
- If the permittee receives payment from the owner and/or operator of a construction activity for mitigation purposes in lieu of the owner or operator of that construction activity meeting the conditions for post-construction stormwater management in Part III.D.5.a(2), the permittee shall apply any such payment received to a public stormwater project, and all projects must be in compliance with Part III.D.5.a(4)(a)-(e).

The MS4 permittee must identify priority areas within the various watersheds of its jurisdiction where mitigation projects could occur. If the owner of a construction activity cannot meet the TSS and TP requirements because of site limitations, they may either perform a mitigation project or make an in-lieu-of payment to the MS4 permittee to apply to a mitigation project at a later time.