11.3 MANUFACTURED TREATMENT DEVICES (NON-GI)

Manufactured Treatment Devices (MTDs) are proprietary stormwater treatment systems used to address the stormwater quality impacts of land development, and they rely upon a variety of mechanisms to remove pollutants from stormwater runoff. This chapter solely address those MTDs that do not meet the definition of green infrastructure at N.J.A.C. 7:8-1.2, and for which a waiver or variance from N.J.A.C. 7:8-5.3 is required. For MTDs that do meet the green infrastructure definition, see *Chapter 9.5: Green Infrastructure Manufactured Treatment Devices*.

When selecting an MTD for a particular site, the peak flow rate of the Water Quality Design Storm, the contributory drainage area and the physical size limits of its installation area must be known in advance. An MTD must have a Department-issued certification letter in order to be accepted for use and be sized in accordance with its published verification report. Provided the required waiver or variance is granted and all of the design criteria in this chapter is followed, the total suspended solids (TSS) removal rate is either 50 or 80%, depending upon the individual certification of the device, which may be found at:

https://dep.nj.gov/stormwater/stormwater-manufactured-treatment-devices/.

N.J.A.C. 7:8 Stormwater Management Rules – Applicable Design and Performance Standards		
	Green Infrastructure	Not Allowed
	Stormwater Runoff Quantity	Not Allowed
GR	Groundwater Recharge	Not Allowed
%	Stormwater Runoff Quality	Only with a waiver or variance from N.J.A.C. 7:8-5.3, 50 or 80% TSS, depending upon posted NJDEP certification

Introduction

An MTD is a proprietary device used to treat stormwater runoff. There are two types of MTDs currently certified by the Department: hydrodynamic sedimentation (HDS) devices and filtration devices.

- HDS devices are flow-through structures that remove pollutants by settling either by creating a swirling vortex, through the use of a baffle system or laminar plates or a combination of those mechanisms.
- Filtration devices remove pollutants by passing stormwater runoff through filter media.

Only with a waiver or variance from N.J.A.C. 7:8-5.3 may an MTD, designed in accordance with this chapter, be used to satisfy the standards for stormwater runoff quality, since this BMP does not meet the definition of green infrastructure.

Finally, all MTDs must have a maintenance plan and must be reflected in a deed notice recorded in the county clerk's office to prevent alteration or removal.

Applications

Only if a waiver or variance from the green infrastructure requirements of N.J.A.C. 7:8-5.3 is obtained may non-GI MTDs be used to meet the stormwater runoff quality requirement. The total suspended solids (TSS) removal rate for MTDs is based on NJDEP certification of each device. To merit the NJDEP certified TSS removal rate, MTDs must be correctly sized to treat the Water Quality Design Storm (WQDS) and be designed in accordance with all of the design criteria specified in this chapter. The most current MTD certifications with sizing information can be found on the Department's stormwater website at:

https://dep.nj.gov/stormwater/stormwater-manufactured-treatment-devices/.

Note that this certification list is subject to change. As technologies evolve, additional MTDs may become certified and get added to the list. Conversely, existing certifications may expire and be removed from the list. Therefore, it is important to check the website regularly when considering using an MTD in any type of site design.

Design Criteria

Basic Requirements

Presented below are general design criteria for MTDs; however, each MTD has additional design criteria based on the type of device and the model. All of the following design criteria must be incorporated into the design in order to receive the certified TSS removal rate. For a full list of design criteria for a specific MTD, refer to the certification documents found online at:

https://dep.nj.gov/stormwater/stormwater-manufactured-treatment-devices/.

Flow Rate

- All MTDs must be selected based on the peak flow rate of the Water Quality Design Storm (WQDS) for the entire contributory drainage area to the MTD, which may have size restrictions. For more information on specific limitations refer the certification letter for that specific MTD.
- When calculating the flow rate using Natural Resource Conservation Service (NRCS) methodology, the DelMarVa unit hydrograph may not be used. The standard unit hydrograph with a peak rate factor of 484 must be used in this calculation.
- When calculating the time of concentration, the travel time for sheet flow must use the depth of rainfall generated by the projected 2-year storm as defined and determined pursuant to N.J.A.C. 7:8-5.7(d).

- Future connections to a system that includes an MTD are prohibited if the proposed maximum stormwater quality treatment flow rate of the existing MTD would be exceeded.

Configuration

- The MTD must be designed and installed with the same configuration utilized during the testing for verification by NJCAT.
- Designs for HDS MTDs may not include grate inlets directly into the unit unless they were specifically tested with this type of inlet.
- In designs for HDS MTDs, inflow and outflow pipe angles must follow the testing configuration. Unless other angles are specifically tested during the verification, only inlet and outlet pipes of 180 degrees (straight line) are acceptable.

Structural

- The minimum separation from the seasonal high water table (SHWT), where required, is dependent upon the MTD that is chosen.
- All devices subject to vehicular loading must be designed for at least HS-20 traffic loading at the surface.
- All joints and connections must be watertight.
- The manhole cover, or other approved permanent marker, must clearly indicate that it is a pollutant-trapping device.

Safety

All MTDs must be designed to safely convey overflows to down-gradient drainage systems. The design of the overflow structure must be sufficient to provide safe, stable discharge of stormwater runoff in the event of an overflow. Safe and stable discharge minimizes the possibility of adverse impacts, including erosion and flooding in down-gradient areas. Therefore, discharge in the event of an overflow must be consistent with the Standards for Off-Site Stability found in the *Standards for Soil Erosion and Sediment Control* in New Jersey.

Outflow

Blind connections to down-gradient facilities are prohibited. Any connection to down-gradient stormwater management facilities must include access points such as inspections ports and manholes, for visual inspection and maintenance, as appropriate, to prevent blockage of flow and ensure operation as intended. All entrance points must adhere to all Federal, State, County and municipal safety standards such as those for confined space entry.

Tailwater

The effects of tailwater must be considered based upon the MTD manufacturer's recommendations.

Access Requirements

An access roadway must be included in the design to facilitate monitoring and maintenance. If the access roadway is constructed of impervious material, take note that it may be subject to the groundwater recharge, stormwater runoff quality and/or stormwater runoff quantity requirements at N.J.A.C. 7:8-5.4, 5.5 and 5.6, respectively.

Sizing an MTD

The example below illustrates how to size an MTD to treat the runoff generated by the WQDS. The Stormwater Management rules ("the Rules") at N.J.A.C. 7:8-5.7 specify that only the NRCS methodology may be used. For more information, see *Chapter 5: Stormwater Management Quantity and Quality Standards and Computations* in this manual.

Example 1: The following parameters apply for a site located in Mercer County:

Area =	0.25 ac
Slope =	5%
CN Value =	98 (100% Impervious)
Projected 2-year storm rainfall depth	3.84 inches
Hydraulically most distant point to the inlet of MTD	110 ft

Step 1: Calculate Time of Concentration

The calculation of the time of concentration follows the steps in Example 5-1. As stated previously, the rainfall depth for the 2-year storm, P_2, used in the sheet flow calculation shall be that of the projected 2-year storm. The maximum sheet flow length calculated by McCuen-Speiss limitation is 909 ft, which is greater than 100 ft. Therefore, 100 ft is used for the sheet flow length. The shallow concentrated flow length is 10 ft. The total time of concentration is 0.8 minutes.

Step 2: **Calculate the WQDS Peak Flow Rate**

When calculating the peak flow rate using NRCS methodology for an MTD, the SCS Standard DUH, which is with a peak rate factor of 484, must be used. Using the NRCS methodology with the time of concentration calculated in *Step 1*, the WQDS peak flow rate is 0.77 cfs.

Step 3: **Select an MTD by evaluating the model in accordance with the NJDEP Certification Letter**

The Department's MTD web page found online at:

https://dep.nj.gov/stormwater/stormwater-manufactured-treatment-devices/

contains a separate table with a column listing the MTDs not considered GI that are certified at the time of publication of this chapter for use as an MTD. Clicking on the word *certification* in the appropriate cell of the table will open the certification letter for that MTD, which includes either an example on how to size the MTD or a table with model numbers and allowable flow rates for each model. The information presented in the certification letter must be used to size the MTD.

Take note that some of the MTDs listed in this table are certified for a TSS Removal Rate of 80%. These are the filtration type MTDs, and sizing requires that two methods of evaluation be performed and then the results are to be compared. The selection of a model of a specific filtration type MTD listed on the Department's MTD web page shall be based on the maximum allowable drainage area evaluation method and the maximum treatment flow rate evaluation method in the certification letter. The model of the MTD to be used is the highest minimum configuration determined by the two methods. In this case, if a specific model of the MTD has a maximum allowable drainage area greater than 0.25 acres, but the maximum treatment flow rate (MTFR) of the specific model is less than 0.77 cfs, another model that has a higher MTFR greater than 0.77 cfs shall be selected.

However, there are also MTDs listed in this table that are certified for a TSS Removal Rate of 50%. These are the HDS type MTDs, which must be sized based **only** upon the MTFR evaluation. The model of the MTD to be used is the highest minimum configuration determined by the MTFR method. In this case, if a specific model of the MTD has a MTFR that is less than 0.77 cfs, another model that has a higher MTFR greater than 0.77 cfs shall be selected.

Considerations

If an MTD is being considered for an outfall retrofit, it is essential to calculate the current Water Quality Design Storm flow rate based on the entire inflow drainage area at the outfall before selecting the MTD. Additionally, the annual cost of components may be a deciding factor in the selection process when considered over the life cycle of an MTD unit. For more information on components which require periodic replacement, refer to the Operations and Maintenance Manual for the MTD being evaluated for suitability.

Maintenance

Regular and effective maintenance is crucial to ensure effective MTD performance; in addition, maintenance plans are required for all stormwater management facilities associated with a major development. There are a number of required elements in all maintenance plans, pursuant to N.J.A.C. 7:8-5.8; these are discussed in more detail in *Chapter 8: Maintenance and Retrofit of Stormwater Management Measures*. Furthermore, maintenance activities are required through various regulations, including the New Jersey Pollutant Discharge Elimination System (NJPDES) rules, N.J.A.C. 7:14A. Specific maintenance requirements for MTDs are presented below; these requirements must be included in MTD's maintenance plan.

General Maintenance

- All structural components must be inspected, at least once annually, for cracking, subsidence, spalling, erosion and deterioration.
- Components expected to receive and/or trap debris and sediment must be inspected for clogging at least twice annually, as well as after every storm exceeding 1 inch of rainfall.

- During inspections, the MTD must be examined for standing water. If standing water is present in the MTD, and standing water is not a component of the MTD design, corrective action must be taken and the maintenance manual must be revised to prevent similar failures in the future.
- Sediment removal should take place when all runoff has drained from the MTD.
- Disposal of debris, trash, sediment and other waste material must be done at suitable disposal/recycling sites and in compliance with all applicable local, state and federal waste regulations.
- The maintenance plan must indicate the maximum allowable level of oil, sediment and debris accumulation. These levels must be monitored during inspections to ensure that removal of these materials is performed when necessary.
- In addition to the requirements for maintenance listed above, maintenance in accordance with the MTD manufacturer's recommendations must be included in the maintenance manual and performed as indicated.

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