State of Delaware
DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL
DIVISION OF WATERSHED STEWARDSHIP
285 BEISER BOULEVARD, SUITE 102
DOVER, DELAWARE 19904

CONSERVATION PROGRAMS
SECTION

PHONE (302) 608-5458

**SEDIMENT & STORMWATER PROGRAM**
**REGULATORY GUIDANCE MEMORANDUM**
**RGM - 6**

Date: TBD

Title: Extended Detention RPv Credit and Design Procedures

Synopsis: The DSSR allows for post construction stormwater BMPs to be oversized to provide RPv credit beyond the regulatory requirement for the drainage area being managed by that BMP. The RPv extra credit may be used to offset RPv shortfalls for unmanaged or undermanaged areas of the site. Alternately, it may be used as an offset in accordance with DSSR Section 13.

This RGM provides background on the regulatory requirements, defines how RPv credit beyond the regulatory requirement is quantified, and establishes procedures for demonstrating compliance and RPv extra credit specifically for extended detention (ED) BMPs.

Effective Date: TBD

Responsible Staff Members

Elaine Z. Webb, P.E.
Engineer VI

Brendan R. Diener, P.E.
Engineer V

**Background**

The resource protection goal of the *Delaware Sediment and Stormwater Regulations* (DSSR, 7. Del. Admin Code §5101) is to design sites with best management practices such that the developed runoff of the Resource Protection Event meets a target runoff for the site that is based on an open space condition for pre-development non-forested areas and a woods condition for any areas that were forested in the pre-development condition. The Delaware Urban Runoff Management Model, DURMM, computes the target runoff goal for sites based upon pre and post land cover conditions considering the hydrologic soil group within the limit of disturbance (LOD).

For runoff reduction BMP designs, such as infiltration, runoff to be managed is capped at 1". In accordance with DSSR §11.10.2, §11.10.6.2.1 and §11.13.6.1, detention practices and wet ponds receive full runoff reduction credit and compliance for practices that provide 48-hour extended detention of the full RPv. These extended detention practices may be wet extended detention ponds, dry extended detention basins, or underground extended detention facilities. For the purposes of this RGM, all extended detention BMPs providing 48-hour extended detention will be referenced as ED practices.

The DSSR §5.2.3.1.4 allows for BMPs that treat more runoff than required to meet the target runoff goal to generate RPv credit that can be used to manage other site LOD areas that are unmanaged. This RGM will clarify how DURMM computes the target runoff, compliance, extra credit and the extra credit rate and provide procedures for demonstrating compliance or extra credit for ED practices.

**Definitions**

Compliance Rate - The allowable peak release rate from an ED practice, in units of cubic feet per second, derived from the Resource Protection volume in units of cubic feet discharged over 48 hours, not exceeding five times the average discharge rate.

Credit – A volume in units of cubic feet, generated by a BMP or by impervious reduction, that meets the volume required for compliance.

Extra Credit – A volume in units of cubic feet, generated by a BMP or by impervious reduction, that exceeds the volume required for compliance and may offset unmanaged or partially managed areas of the LOD.

Extra Credit Rate – The allowable peak release rate from an ED practice, in units of cubic feet per second, for extra credit which is derived from the volume generated from the Weighted Target Runoff discharged over 48 hours, not exceeding five times the average discharge rate.

Weighted RPv – The depth of runoff, in inches, which represents the developed site runoff in the post condition, considering the weighted hydrologic soil group. This runoff value includes only the area within the LOD.

Weighted Target Runoff – The depth of runoff, in inches, which represents the developed site runoff goal of open space, woods, or impervious considering hydrologic soil group and the pre-development condition. This runoff value includes only the area within the LOD.

**Computing RPv Credit and Extra Credit for ED Practices**

DURMMv2.6 incorporates a calculated value for the compliance rate and extra credit rate as RPv Tab Steps 5.4 and 5.5, respectively.

The compliance rate, which is the Resource Protection volume discharged over 48 hours, not exceeding five times the average discharge rate, is based on runoff from the full drainage area to the ED practice using the following equation to result in units of cubic feet per second:

$$Q_{Compliance}(cfs) = 5 \times \left(\frac{RPv\ Runoff\ Volume\ (cf)}{172800\ (sec)}\right)$$ Equation 1

The extra credit rate, which is the volume generated from the Weighted Target Runoff discharged over 48 hours, not exceeding five times the average discharge rate, is based on runoff from the LOD drainage area to the ED practice using the following equation:

$$Q_{Extra}(cfs) = 5 \times \left(\frac{Weighted\ Target\ Runoff\ (ft) \times Combined\ LOD\ (sf)}{172800\ (sec)}\right)$$ Equation 2

RPv credits for ED practices are apportioned based on the design release rate as follows:

$$Q_{Design} > Q_{Compliance},\ Credits\ (cf) = 0\ (cf), noncompliant$$

$$Q_{Design} \leq Q_{Compliance},\ Credits\ (cf) = RPv\ Shortfall\ (cf), compliant$$

$$Q_{Design} \leq Q_{Extra},\ Extra\ Credits\ (cf) = (Weighted\ RPv\ (ft) * Combined\ LOD\ (sf)) - RPv\ Shortfall\ (cf)$$

**Extended Detention Design Procedures**

DURMMv2.6 integrates a workflow for ED practices to calculate the RPv credits generated based on the design release rate. To demonstrate extra credit for ED practices, complete DURMMv2.6 for the BMP catchment area referring to the following steps in the RPv tab:

- Step 5.4: The Compliance Rate is calculated upon selection of the appropriate ED practice.
- Step 5.5: The Extra Credit Rate is calculated upon selection of the appropriate ED practice.
- Step 5.6: The RPv peak discharge rate from the hydrologic modeling software is entered into the green input cell.
- Step 5.7: Indicates if compliance for the drainage area has been met for the appropriate ED practice.
- Step 5.8: Lists any extra credit generated from the ED practice. Extra credit is available only when the design discharge rate is equal or is less than the computed extra credit rate based on the weighted target runoff.

Similar to projects with runoff reduction BMPs, the DURMMv2.6 Report Tab incorporates the ED practice management provided in line 40, in units of cubic feet. This allows the same entry into the RPv Summary Table for runoff reduction practices and ED practices. The RPv Summary Table will incorporate the appropriate values generated from the ED practice when analyzing the overall project compliance.

When analyzing compliance for sites having ED practices, DSSR §5.2.3.2 also requires the following:

> *If additional measures are necessary to manage the remainder of runoff from the RPv to achieve the pre-development runoff rate from the RPv, then additional BMPs shall be utilized to achieve the pre-development runoff rate.*

**Alternatives**

The Compliance Rate may be manually calculated to demonstrate compliance within a particular drainage area in accordance with Equation 1, above. However, the pursuit of extra credit from ED practices will not be accepted without the use of BMP drainage area level DURMMv2.6.