

# Managed Release Concept (MRC)




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- **What Is It?**
- **Justification for Use**
- **System Components**
- **Benefits**
- **Design Criteria**
- **Reporting**
- **Example**

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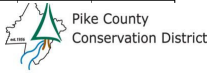
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**What is It?**

- Approved Alternative BMP
- Go to Alternative BMP's List on DEP Website  
<https://www.dep.pa.gov/Business/Water/CleanWater/StormwaterMgmt/Stormwater%20Construction/Pages/E-5%20Resources.aspx>

Alternative PCSM BMP	Description	Function	DEP Review Date	Example
Managed Release Concept (MRC)	<p>MRC provides for the controlled release of a portion of the stormwater captured by a BMP, preferably vegetated, at a rate similar to the lateral un-saturated flow to surface waters from undeveloped areas, which should not cause environmental degradation. A PA-licensed Professional Engineer must design any BMP that uses MRC. MRC may be used only under limited situations.</p> <p><b>Important links:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">MRC concept paper with design standards</a></li> <li>• <a href="#">MRC BMP Design Summary sheet (Biosd) (PDF)</a> (one sheet must be completed and submitted per proposed BMP using MRC)</li> <li>• <a href="#">MRC Frequently Asked Questions</a></li> <li>• <a href="#">MRC Design Examples</a></li> <li>• <a href="#">MRC Review Checklist</a></li> </ul>	VR, WQ	12/13/2018, 5/4/2019, 8/25/2020	<a href="#">MRC Video Presentation</a> produced by Villanova University

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**What is It?**

- Satisfies Volume requirement 102.8.(g)(2) through volume *management* in lieu of volume reduction (infiltration)
- Used When Infiltration is Proven not to be Feasible
- Used to Meet Volume, possibly Water Quality Requirements for all or a portion of a Site (2 year Storm)
- Can be above ground or underground systems
- Can be incorporated into a rate control feature (Detention Basin)
- Potential retrofit option for BMP's not infiltrating




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**Justification for Use**

- Thorough Pre-Development Site Characterization
  - Infiltration is extremely limited (raw testing rates below 0.2" / hr.)
  - Infiltration not feasible (high water table, shallow limiting zone)
  - Infiltration undesirable (sinkholes, contamination)
- Structural and Non Structural BMP's and Evapotranspiration (ET) Maximized
- Downstream flow path will remain stable for anticipated flows
- Can be used for general and individual permits
- Calculations by a PE
- Soils Testing:
  - Overall Site Testing- test every 40,000 sf of ED, minimum of 4 tests
  - Site restoration areas may be removed from required testing area
  - Tests in most accommodating soil horizon based on "deep hole" soil analysis and classification.




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**Review**

- DEP Review (unless delegated to Conservation District)
  - Total Drainage Area to MRC > 3 acres
  - Total Impervious to MRC > 1.5 acres
  - Overall Project Impervious increase over 10 acres (including gravel)
  - Impaired Waters for Siltation or Flow Alterations
  - If Deviations from Design Standards-Individual Permit




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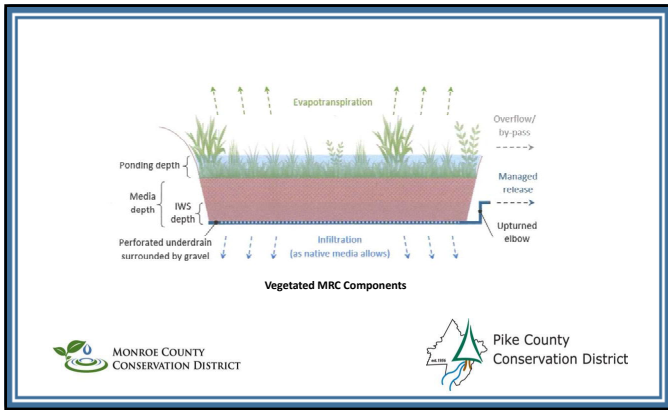
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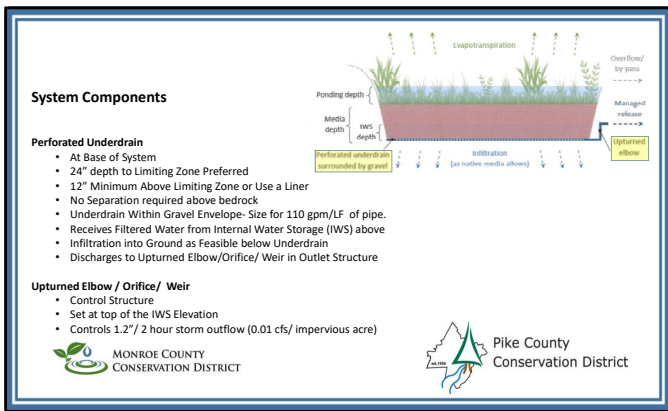
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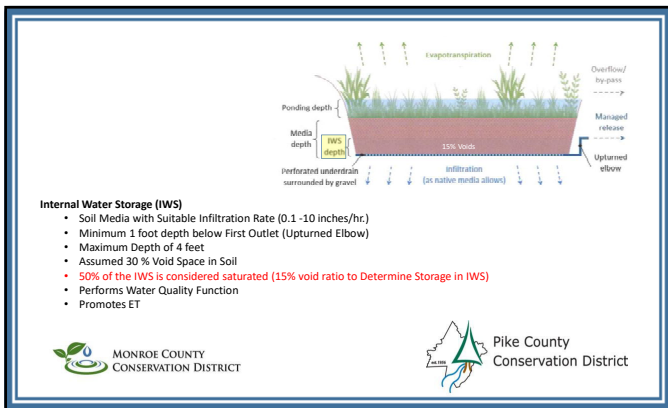
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**Media Depth**

- Soil Media with Suitable Infiltration Rate (0.1 -10 inches/hr.)
- Minimum 2 foot depth , *including IWS depth*
- Maximum Depth of 4 feet
- Assumed 30 % Void Space in Soil above IWS
- Media Above IWS is assumed dry for Routing Considerations (30% Voids)
- Water Quality Function
- Promotes ET

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**Ponding Depth**

- Size and Depth determined so that ALL STORMS are fully drawn down within 72 hours.
  - No Standing Water-Water only left in underlying Media)
  - **This requirement will dictate the footprint of the facility.**
- Vegetation in 75% of the MRC Surface (above ground system). **Native Mix and Plantings**

**Overflow/Bypass**

- Handle storms > 2 year or provides Rate Control Function

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**Benefits**

- MRC designed in accordance with design standards meets the Volume Requirements for the contributing disturbed area to the MRC.
- A Vegetated MRC designed in accordance with design standards meets the Volume and Water Quality Requirements for the contributing disturbed area to the MRC.

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**1.2"/ 2 hour storm analysis:**

- Determine Runoff Volume to MRC from the 1.2"/ 2 hr Storm = $V_{1.2}$
- Determine Equivalent Impervious Area
  - $IMP_{EQ} = V_{1.2} \text{ (cubic feet)} / (.0833 \text{ feet} * 43,560 \text{ ft}^2)$
- Determine the Allowable Discharge through the Underdrain/ Upturned Elbow
  - Discharge=(0.01 cfs/ acre) \* (Equivalent Impervious Area)- Round to nearest hundredth cfs
  - Storm is routed through system (15% void in IWS and 30% in soil above). Adjust outlet size to meet Allowable Discharge




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**2 Year Storm Analysis:**

- 2 Year 24 Hour Storm reduced to the 1 year Predevelopment Rate
- 2-100 year storms need to dewater to the top of media depth within 72 hours (168 for underground systems)
- Use Same Void Ratios (15%, 30%) for all design storm routings
- Volume Managed = 2 Year Post Development Inflow Volume to MRC




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**Reporting**

- MRC Design Summary Sheet
- PCSM Module 2
- PCSM Spreadsheet




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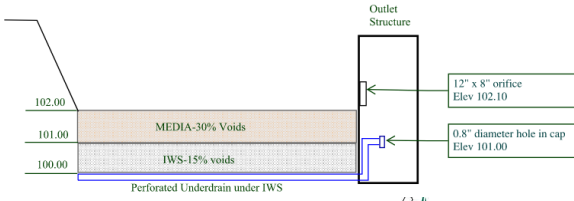






**2 Year / 24 hour storm Analysis:**

- 1 year Predevelopment Peak Runoff=1.46 cfs
- Set the Control Orifice for the 2 yr. + storms above the Peak Water Elevation of the 1.2 year Storm (102.01)
- Set Orifice at Elevation 102.10



**2 Year / 24 hour Routing**

- Inflow Volume=25,836 <sup>1</sup>3
- Meets 1 yr. Pre=1.46 cfs
- Dewatering=36 hours after storm ends



**100 Year / 24 hour Routing**

- Dewatering=38 hours after storm ends





## Questions?



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## Contact Information

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