Maryland
Department of
the Environment

Alternative Crediting Methodology for Impervious Area Disconnections to Amended Soils - Maryland

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Timeline of Events

- Draft Expert Panel Report Distributed for Comments (5/16/16)
- MDE Submits Initial Comments (6/20/16)
- MDE & Expert Panel Members Discuss Comments (7/12/16)
- USWG July Meeting (7/26/16) – Includes Distribution of Comments
- MDE Initiates Independent Peer Review (8/1/16)
- MDE Submits MD's Crediting Methodology to USWG (9/9/16)
- USWG September Meeting (9/20/16)

MDE's Comments (June 20, 2016)

- MDE submitted comments on the draft report "Recommendations of the Expert Panel to Define Removal Rates for Disconnecting Existing Impervious Area Runoff From Stormwater Management Systems"
- MDE expressed concern that several of the conditions expressed in the report were less stringent than existing requirements found in the 2000 Maryland Stormwater Design Manual.
- MDE also commented that the proposed methods (see Sections 4 & 5) rely on the relationship between soil properties (e.g., saturated hydraulic conductivity or "Ksat") and NRCS runoff curve numbers (RCNs). Specifically, MDE expressed concern that there is no established relationship between Ksat and RCNs.
- To resolve this issue, MDE suggested that the report be reviewed by several known experts on RCN methods. MDE later petitioned several experts for their comments (8/20/16)

MDE's Alternative Method

- **The proposed methods (Sections 4 & 5) are less stringent than existing requirements found in the 2000 Maryland Stormwater Design Manual.**

- **MDE's alternative for Maryland is based on the Disconnection of Rooftop and Non-Rooftop Runoff Techniques described in Chapter 5 of the Design Manual.**

- **This is permitted by language added to the current report:**
  - **"The statements and procedures outlined in this Expert Panel Report are intended to supplement existing jurisdictional requirements. Nothing in the Expert Panel Report shall affect jurisdictional regulatory and other legal requirements." – added at request of PA DEP.**

MDE's Alternative Method

- **Maryland's NPDES Phase I MS4 Permits:**
  - **PART IV.E.2.a requires that restoration plans be "…based upon the treatment of the WQ_v criteria and associated list of practices defined in the [Design Manual]."**

- **Disconnection of Rooftop and Non-Rooftop Runoff Techniques (N-1 & N-2), 2000 Maryland Stormwater Design Manual (the "Design Manual", MDE, 2000 & 2009)**

MDE's Alternative Method

- **Disconnection Non-Rooftop Runoff (N-2)**
  - **The disconnection through vegetated areas shall be at least 10 feet and shall not exceed 75 feet.**
  - **The maximum contributing impervious flow path shall be 75 feet.**
  - ***Runoff reduction for disconnections ranges from 0.1 inch to 1.0 inches.***
  - ***Disconnections should be directed over HSG A,B, or C soils. HSG D and compacted soils may need to be tilled and/or amended to increase permeability.***

N.2 – Disconnection of Non-Rooftop Runoff

2000 Maryland Stormwater Design Manual Vol. 1, Chapter 5 (p. 5.62)

Ratio of Impervious to Pervious Area (I_a:1)				
I_a:P_a	P_E	TSS	TP	TN
10.00	0.10	15.6%	14.6%	12.3%
9.00	0.11	17.2%	16.1%	13.6%
8.00	0.13	19.3%	18.0%	15.2%
7.00	0.14	21.7%	20.3%	17.3%
6.00	0.17	24.9%	23.3%	19.9%
5.00	0.20	29.1%	27.2%	23.3%
4.00	0.25	34.9%	32.6%	27.9%
3.33	0.30	40.1%	37.4%	32.1%
3.00	0.33	43.3%	40.4%	34.6%
2.50	0.40	48.9%	45.7%	39.2%
2.00	0.50	56.0%	52.3%	44.8%
1.67	0.60	61.7%	57.5%	49.3%
1.43	0.70	66.2%	61.7%	52.9%
1.25	0.80	69.7%	65.1%	55.7%
1.11	0.90	72.6%	67.8%	57.9%
1.00	1.00	74.9%	69.9%	59.8%
0.5	1.25	79.0%	73.7%	63.0%

Note: values shown in italics are interpolated

Table 9. from Section 5.1.2 (see P. 26)

Table 9. Water treated (in) per impervious acre based on initial soil conditions and organic matter content. Water treated is a representation of runoff reduction.

	Initial Organic Matter = 1.0			Initial Organic Matter = 2.0			Initial Organic Matter = 3.0		
I:P*	Loose	Medium	Tight	Loose	Medium	Tight	Loose	Medium	Tight
15	0.022	0.005	0.002	0.029	0.004	0.002	0.066	0.008	0.002
14	0.024	0.005	0.002	0.032	0.004	0.002	0.071	0.009	0.002
13	0.026	0.006	0.002	0.034	0.005	0.002	0.077	0.010	0.002
12	0.029	0.007	0.003	0.038	0.005	0.003	0.083	0.011	0.003
11	0.032	0.008	0.003	0.042	0.006	0.003	0.091	0.013	0.003
10	0.036	0.009	0.003	0.047	0.007	0.003	0.100	0.014	0.003
9	0.042	0.011	0.003	0.053	0.008	0.003	0.111	0.017	0.003
8	0.048	0.013	0.004	0.061	0.009	0.004	0.126	0.020	0.004
7	0.057	0.016	0.004	0.072	0.011	0.004	0.144	0.024	0.005
6	0.069	0.021	0.005	0.087	0.014	0.005	0.168	0.030	0.007
5	0.088	0.028	0.006	0.108	0.019	0.006	0.201	0.040	0.010
4	0.117	0.041	0.007	0.142	0.029	0.007	0.249	0.056	0.017
3	0.171	0.067	0.008	0.203	0.049	0.008	0.326	0.087	0.032
2	0.287	0.134	0.010	0.331	0.100	0.010	0.466	0.161	0.072
1	0.659	0.428	0.034	0.723	0.323	0.102	0.793	0.447	0.262
0.5	1.039	0.765	0.054	1.106	0.580	0.182	1.067	0.775	0.477
0.25	1.737	1.409	0.091	1.805	1.070	0.335	1.542	1.395	0.890

**I:P = Impervious to pervious area ratio*

Table 9. Runoff Treated (inches/imp. acre) Based on Initial Soil Conditions & Organic Matter Content

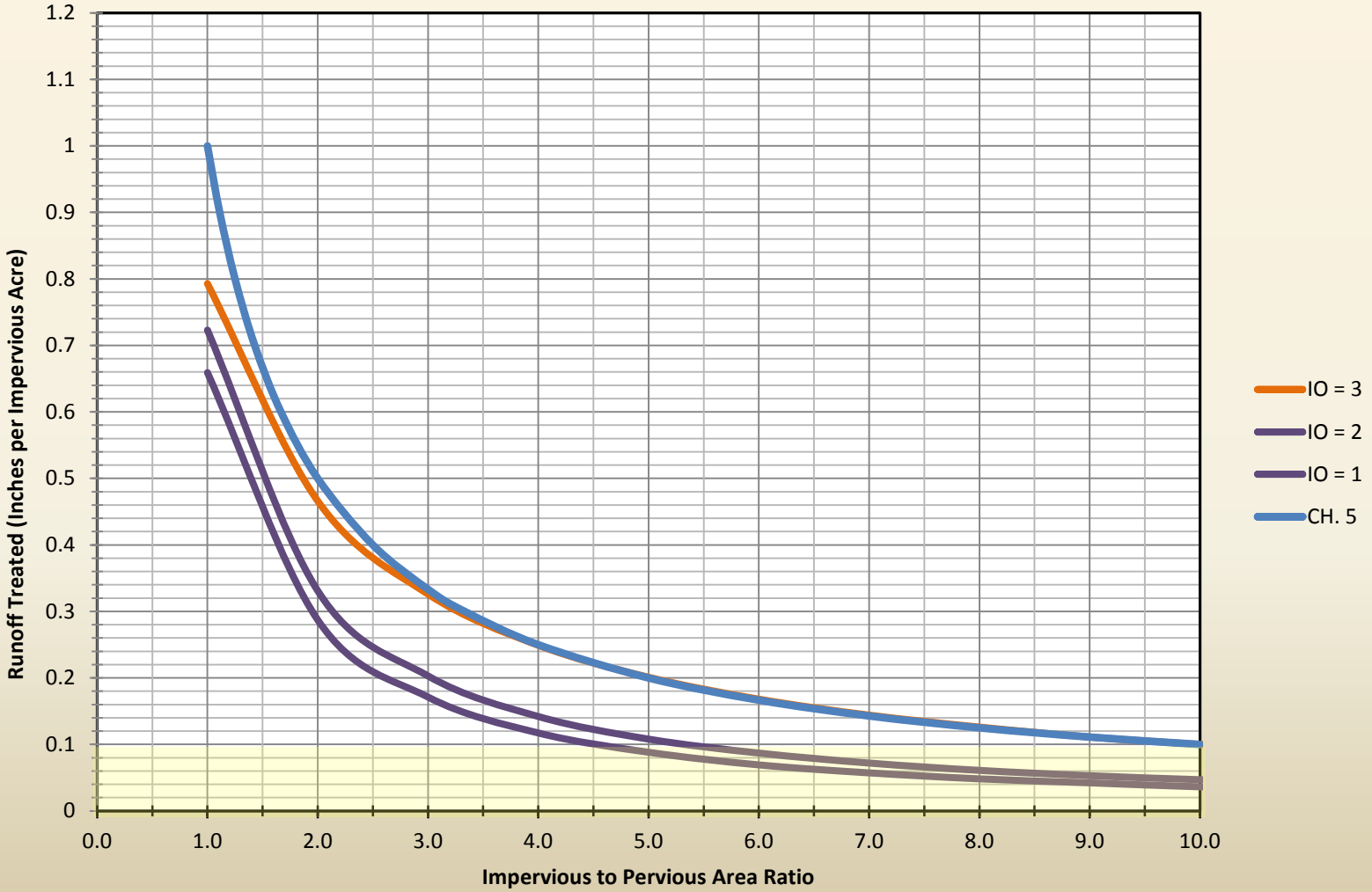
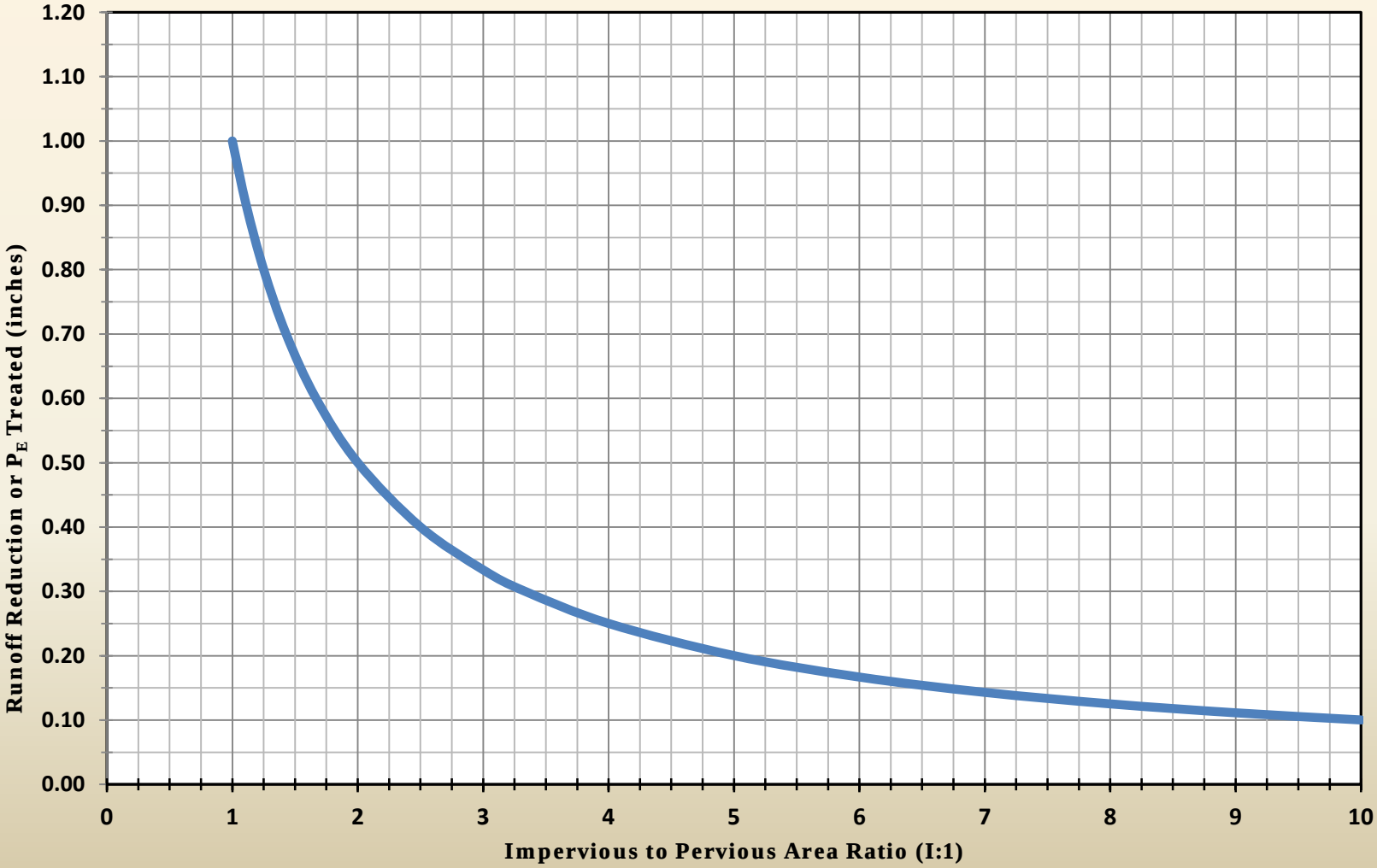


Figure 1. Runoff Treated for Impervious Area Disconnection onto Amended Soils

(Protocol to Define Nutrient and Sediment Removal Rates … Maryland)



MDE's Alternative Method

- MDE formally requests that this alternative method be added as an appendix to the Expert Panel Report.
- The alternative is conservative. It also meets the requirements found in Maryland's stormwater regulations and in the current Phase I NPDES MS4 permits.
- MDE does not consider the method as an "either/or" choice as is described in the current agenda.
- MDE believes this is a reasonable request. If the proposed appendix is included in the report, MDE would be willing to allow the report to move forward.

Independent Peer Review

- MDE expressed concerns with the use of the RCN method in conjunction with Ksat.
- To determine the validity of these concerns, MDE solicited an independent peer review of the Expert Panel report.
- The opinions expressed by these reviewers supported MDE's position.
- MDE agrees to disagree with Expert Panel on this issue.

Independent Peer Reviewers

- Robert Pitt, Ph.D., P.E., BCEE, D.WRE
  Cudworth Professor of Urban Water Systems
  Dept. of Civil, Construction, and Environmental Engineering
  University of Alabama

- Richard McCuen, Ph.D., M.ASCE
  Professor, Ben Dyer Chair in Civil Engineering
  University of Maryland, College Park

- Robert G. Traver, Ph.D., P.E., D. WRE, F.EWRI, F.ASCE
  Edward A. Daylor Chair in Civil Engineering
  Professor, Civil and Environmental Engineering
  Director, Villanova Urban Stormwater Partnership
  Director, Villanova Center for the Advancement of Sustainability in Engineering

- Richard H. (Pete) Hawkins, PhD, P.E., F.ASCE, F.EWRI, Professor Emeritus
  School of Natural Resources and Environment, Watershed Resources and Ecohydrology
  Dept. of Agricultural and BioSystems Engineering
  Dept. of Hydrology and Water Resources
  University of Arizona

- Dr. Tim J. Ward, P.E., F.EWRI, F.ASCE
  Dean, School of Engineering
  Professor of Civil Engineering
  Manhattan College in Riverdale, The Bronx, New York City

- Donald E Woodward, P.E., P.H., F.ASCE
  USDA, NRCS (ret.)
  Former National Hydrologist with the USDA, NRCS