Two Onsite BMP Proposals

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Virginia Department of Health

Overview

- Two manufacturers submitted requests for onsite sewage sector Best Management Practices (BMPs) to VDH May 2014.

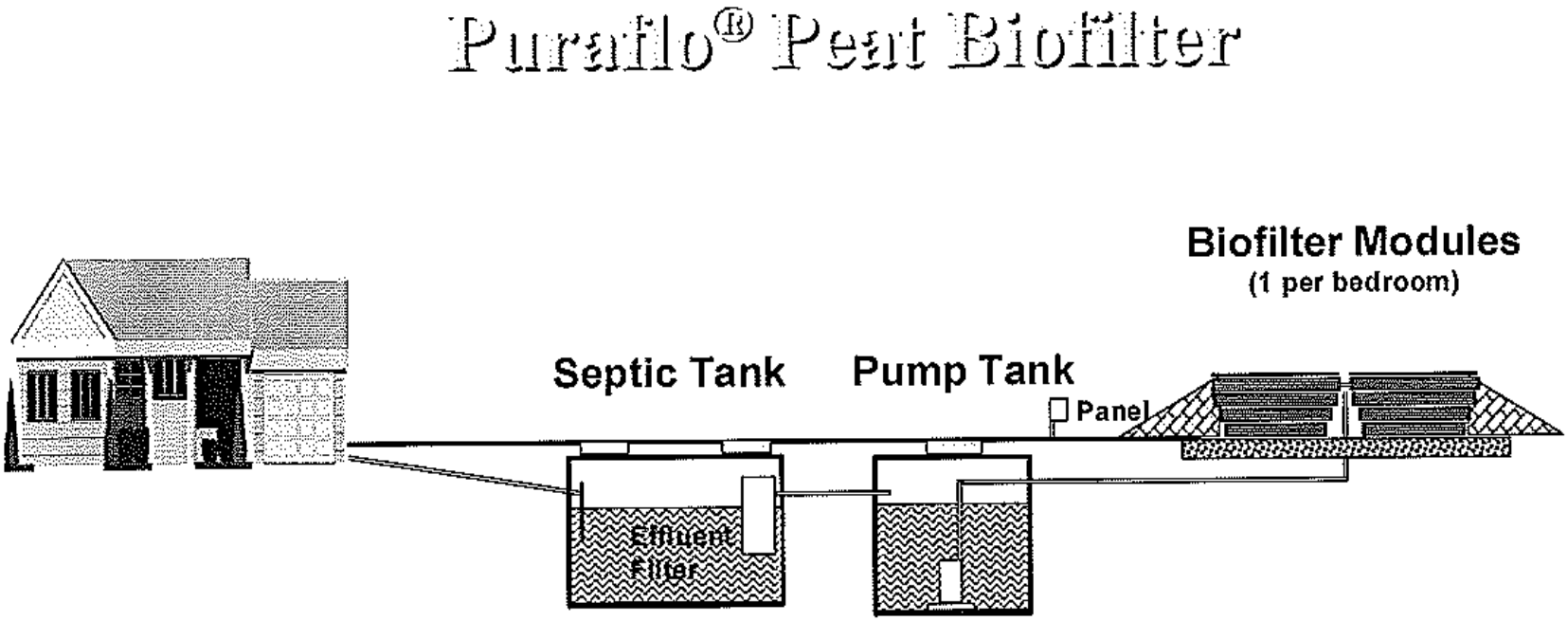
- Originally to go directly to WWTWG, but modifications to the BMP Protocol in June 2014 dictated that VDH present these BMPs.

Proposed BMPs

- Anua
  - Puraflo Peat Biofilter with shallow dispersal (≤ 18 inches) to pad or trench dispersal
  - ≥ 50% net N reduction requested
- American Manufacturing Company (AMC)
  - Filtered septic tank effluent (STE) distributed at low loading rates
  - < 12 inch install depth and > 12 inch separation to limiting feature
  - Soil texture groups 2, 3, and 4 (not 1)
  - ≥ 50% net N reduction requested

Anua Puraflo Peat Biofilter to pad/trench

Typical pad layout



Supporting Information

- Two studies cited
  - NC
  - Virginia

Anua Puraflo Peat Biofilter - NC Study

- Lindbo, D.L. and V. L. MacConnell, 2001, "Evaluation of a Peat Biofilter Treatment System," Proceedings of the Ninth National Symposium on Individual and Small Community Sewage Systems, American Society of Agricultural Engineers.
- 4 sites – all repairs of failing systems (3 pad sites, 1 trench site)
- Samples collected from:
  - Piezometers – up & down gradient, below pads/trenches
  - Septic tank
  - Peat filter
- Data suggests 81% ***net*** removal of TN from septic tank to below pads/trenches.

Anua Puraflo Peat Biofilter - VA Study

- Conducted by Old Dominion University
- 24 sites in 4 different soil texture groups
- Samples collected from:
  - Septic tank or pump tank
  - After Peat filter
  - Well 12 inches below bottom of pad/trench
  - Upgradient wells
  - Downgradient wells
- Monthly samples July 1997 to July 1998, then quarterly through August 1999

Anua Puraflo Peat Biofilter - VA Study

	Samples	Monthly Avg TN (mg/l)	% Reduction From PT	% Reduction From SC	% Reduction From PW
Background (BG)	n=72	1.84			
Pump Tank (PT)	n=108	58.12			
Puraflo Sample Chamber (SC)	n=146	34.83	40.1%		
Pad Well (PW)	n=83	14.65	74.8%	58.0%	
10-ft Down-gradient (DG)	n=85	6.04	89.6%	82.7%	58.8%

Anua Puraflo Peat Biofilter - VA Study

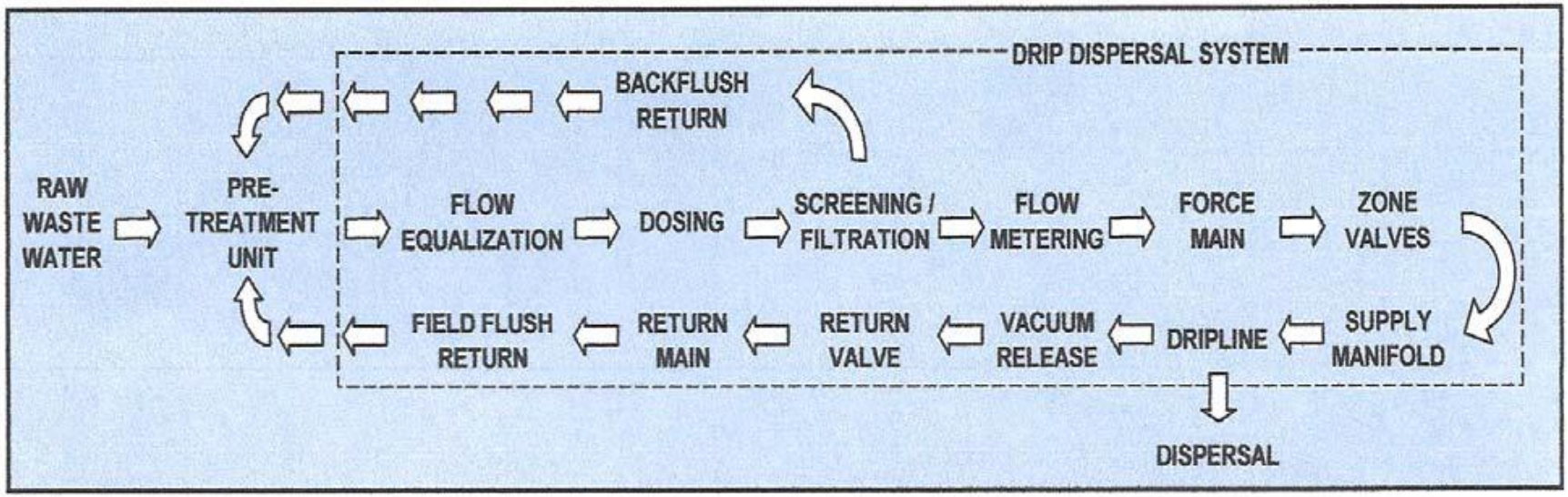
- 5 kg raw → Puraflo unit at 40% reduction → 3 kg out of Puraflo unit and into pad/trench
- Pad reduces additional 58% from Puraflo unit (sample chamber) → 1.26 kg delivered at edge of drainfield
- ***Net*** reduction beyond baseline is (4 - 1.26)/4 = 68.5%

Puraflo Peat Biofilter - Summary

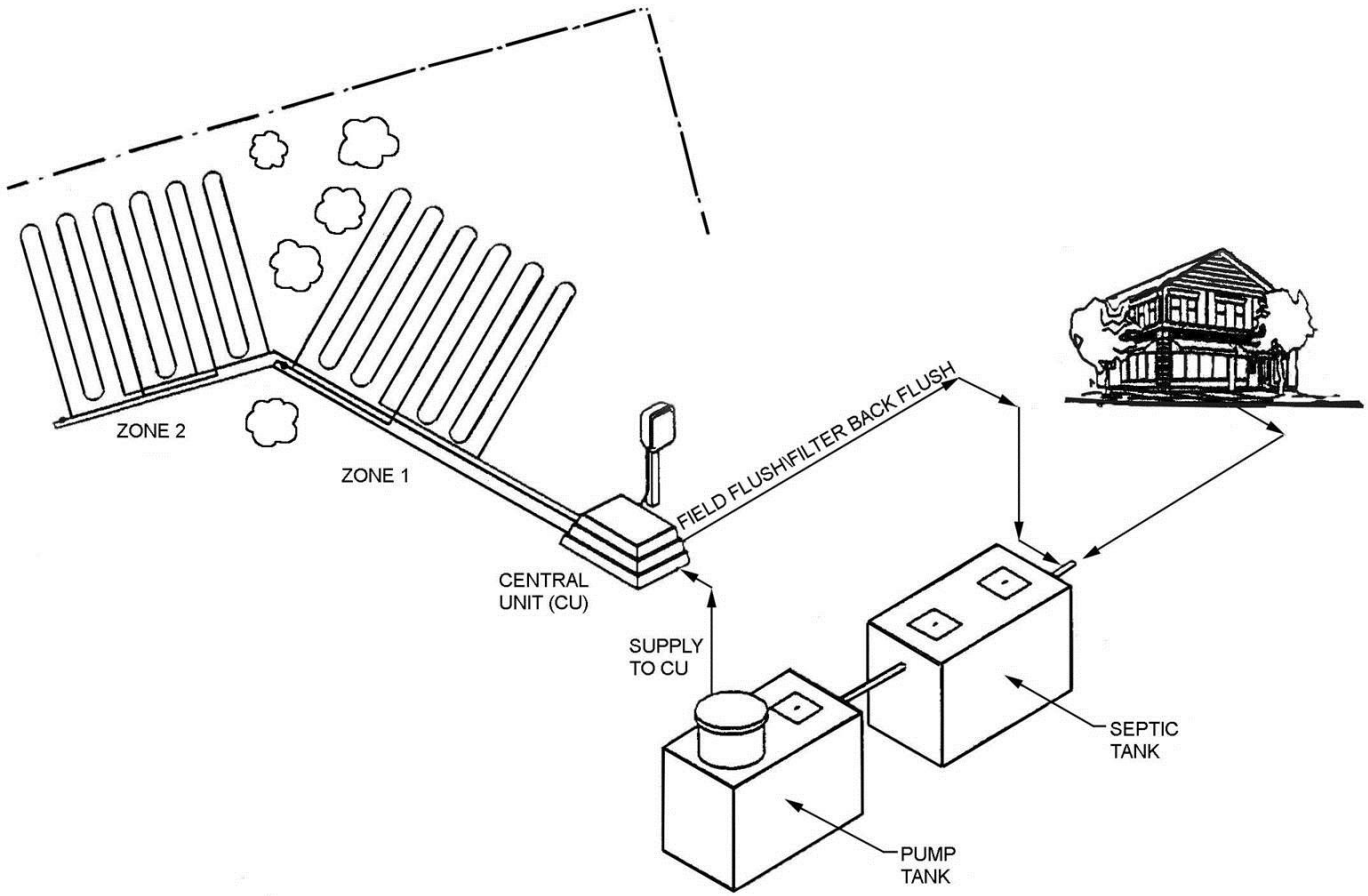
BMP Request: Anua Puraflo Peat Biofilter with shallow dispersal (≤ 18 inches) to pad or trench dispersal for ≥ 50% net N reduction.

Recommendation: Advance to Onsite BMP Panel for detailed review.

American Manufacturing Company Perc-Rite Drip Dispersal System



Typical layout



Static Plow Installation of Tubing

American Manufacturing Company Perc-Rite Drip Dispersal System

Basis

Two main studies are used in support of the request, which specifically used the Perc-Rite system:

1. Hepner, L.D., D. Linde, C. Weber, and D. Smith, 2007, "Reduction of Bacteriologic and Chemical Constituents of Septic Tank Effluent with Depth Using a Drip Dispersal System," Eleventh Individual and Small Community Sewage Systems Conference Proceedings, ASABE Publication Number 701P1107.

   Additional information on this study is found in:
   Hepner, L.D., D. Linde, C. Weber, and D. Smith, 2005, "Alternative On-Lot Technology Research – Soil Based Treatment Systems," Delaware Valley College, Doylestown, PA.

2. Hayes, J.G. Jr. and A.N. Moore, 2007, "Long Term Impacts of Micro-Irrigation 'Drip' Treatment and Disposal Systems on Delaware's Marginal Soils," Eleventh Individual and Small Community Sewage Systems Conference Proceedings.

AMC Perc-Rite Drip Dispersal

Summary from Hepner, et al. (2007):

- Three sites; 0.17 gpd/ft^2 loading rate using filtered STE
- 1200 linear feet of tubing; install depth 8-10 inches
- Moderately well-drained soil (Readington) on slope 18-24%; fragipan at 25 inches with redox above
- Lysimeters at 1, 2, 3, and 4 foot beneath soil surface
- Samples collected monthly for 20 months; ammonia and nitrate-N (assumption all organic N converted)
- 85% removal of N reported at 1-foot depth
- 5 kg x (1 - 0.85) = 0.75; (4 - 0.75)/4 x 100 = **81% *net* reduction**

AMC Perc-Rite Drip Dispersal

Summary from Hayes and Moore (2007):

- Sandy loam or loam installs
- 50 cm to seasonal high water table (SHWT) at two sites; 28 cm to limiting feature (LF) at one site; and last site has SHWT to surface (pretreated effluent)
- Three sites with STE, one site with secondary effluent
- 24 sample events obtained from piezometers upgradient, within the drainfield, and downgradient.
- Initial 18 months, then eight years later a 3-month study
- 81% removal on average in drainfield sampling wells
- 5 kg x (1 - 0.81) = 0.95; (4 - 0.95)/4 x 100 = **76% *net* reduction**

AMC Perc-Rite Drip Dispersal

WERF study by McCray, et al. (2009):

- Analysis of loading rates and soil types using N-CALC from Water Environment Research Foundation (WERF).
- Suggests a predictive relationship between hydraulic loading rate (HLR) and N reduction.
- AMC suggests that HLR is a more important design factor than soil type based on statistical testing.

AMC Perc-Rite Drip Dispersal - Summary

Request:

- Filtered septic tank effluent distributed at low loading rates
- < 12 inch install depth and > 12 inch separation to limiting feature
- Soil texture groups 2, 3, and 4 (not 1)
- ≥ 50% net N reduction

Recommendation: Advance to Onsite BMP Panel for more detailed review.