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Via Email and Regular Mail

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*RE: Comment on Draft Technical Guidance 385-2208-001*

Dear Mr. Starosta:

Thank you for the opportunity to comment on Draft Technical Guidance 385-2208-001, *Sewage Facilities Planning Module Review for Onlot Sewage Systems Proposed in High Quality and Exceptional Value Watersheds*. I am submitting these comments on behalf of the Delaware Riverkeeper; the Delaware Riverkeeper Network (DRN), a private, nonprofit organization with over 12,000 members throughout the Delaware River Watershed; the Raymond Proffitt Foundation; the Lower Susquehanna Riverkeeper and Stewards of the Lower Susquehanna, Inc.; and the Aquashicola / Pohopoco Watershed Conservancy.

Please find below our comments on Draft Technical Guidance 385-2208-001 (DTG 385-2208-001).

**The need for this technical guidance**

We strongly support the Department of Environmental Protection's (DEP) efforts, in compliance with the antidegradation policy of the Clean Water Act, to protect exceptional value (EV) and high quality (HQ) waters when onlot sewage systems are proposed. Given the persistence of nitrates in groundwater and the potential for long-term impacts from activities that introduce nitrates to groundwater, preventing impacts from nitrates should be one of DEP's first lines of defense for EV and HQ streams to ensure no degradation occurs to these important waterways.

However, we have concerns as to whether the adoption of DTG 385-2208-001 would address uncertainty in the preparation of sewage facilities planning modules and the permitting of onlot

sewage systems. We also question whether it would achieve the desired protection for EV and HQ streams.

### **Application of this technical guidance**

DTG 385-2208-001 represents DEP's attempt to address nitrate impacts from onlot sewage treatment systems. The guidance applies only to new individual or community onlot system installations. The policies and practices are recommended for replacement individual or community onlot systems, but not required. We believe this guidance should also be required to apply to replacement onlot systems. Pre-existing sewage systems are allowed to continue to operate in an EV or HQ watershed under all existing applicable permits and approvals. However, new or expanded wastewater treatment facilities that propose new, additional or increased discharges to HQ or EV waters must undergo the antidegradation review. Similarly, replacement onlot systems should also be required to comply with DTG 385-2208-001 for replacement individual or community onlot systems is necessitated, especially when replacement is necessitated by hydraulic overloading of an inadequately sized system.

### **Occurrence of Nitrate**

DEP's review of nitrate levels in Pennsylvania's rivers and streams falls short of providing a true picture of the fate of nitrates in the environment. Regional variation in nitrates in groundwater and surface water can be the result of a variety of factors including the presence or absence of carbon source materials on the soil column. For example, the current low levels of nitrates in forested headwater streams in Pike County, despite the impacts of prevalent onlot systems there, may be resulting from dissolved organic carbon mitigating nitrate impacts. An analysis of variation in groundwater geochemistry as it relates to nitrate reduction as well as in-stream nitrate reduction would be useful and potentially provide protection factors that could be incorporated into DEP's formula for, and more accurately help to determine potential reduction in, nitrate concentrations.

Citing Reese and Lee (1998), DTG 385-2208-001 asserts a downward trend in nitrates in groundwater. However, Reese and Lee concluded that "[t]he presence of a trend at one or even a few monitoring points does not necessarily equate to improving or declining groundwater quality on a regional basis."<sup>1</sup> Reese and Lee further noted that:

Although [Fixed Station Network] monitoring points were selected to be representative of the groundwater basin, the total number of monitoring points nevertheless represents a small portion of regional groundwater. Because the

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<sup>1</sup> Reese, S. and Lee, J. 1997. *Summary of Groundwater Quality Monitoring Data (1985 - 1997) from Pennsylvania's Ambient and Fixed Station Network (FSN) Monitoring Program*. Pennsylvania Department of Environmental Protection. Retrieved from [http://www.google.com/url?sa=t&rct=j&q=pa%20dep%20groundwater%20monitoring%20nitrates&source=web&cd=3&cad=rja&ved=0CDsQFjAC&url=http%3A%2F%2Fwww.dep.state.pa.us%2Fdep%2Fdeputate%2Fwater%2Fwc%2Fsubjects%2Fsrceprot%2Fground%2Fsympos%2Fground\\_paper.doc&ei=vKhuUbyqEsPl4AOy24HYAw&usg=AFQjCNGq9-mDFW1wHtTem1meU8gJrYw-ng](http://www.google.com/url?sa=t&rct=j&q=pa%20dep%20groundwater%20monitoring%20nitrates&source=web&cd=3&cad=rja&ved=0CDsQFjAC&url=http%3A%2F%2Fwww.dep.state.pa.us%2Fdep%2Fdeputate%2Fwater%2Fwc%2Fsubjects%2Fsrceprot%2Fground%2Fsympos%2Fground_paper.doc&ei=vKhuUbyqEsPl4AOy24HYAw&usg=AFQjCNGq9-mDFW1wHtTem1meU8gJrYw-ng).

monitoring points that underwent trend analysis represent only a small segment of the basin, caution must be taken when interpreting the information on trends.<sup>2</sup>

DEP has had the opportunity to amass data on nitrate levels in groundwater across Pennsylvania through hydrologic analysis that can be required of project sponsors. With data on actual conditions in hand, DEP could have better tailored protection factors regionally or locally. We recommend that DEP undertake an effort to gather background nitrate levels in EV and HQ watersheds before adopting this guidance. This information could be used to identify failing onlot sewage treatment systems with subsurface disposal of treated sewage to a soil absorption field. Failing systems could be replaced and presence of failing systems could be used to in the development of a formula that would reveal the true protection factor need for new systems proposed in areas where nitrates in groundwater are already high.

### **Protection and Maintenance of Water Quality**

DEP proposed evaluation of possible water quality effects due to nitrate contribution from nonpoint sources such as septic systems using a watershed-based approach. Elsewhere, DEP acknowledges that a watershed-based approach requires defining the size of the watershed.<sup>3</sup> However, DTG 385-2208-001 does not specify the watershed scale on which nitrate contributions from nonpoint source will be evaluated. A map delineating Pennsylvania's 10-digit hydrologic unit code (HUC 10) watersheds is included in DTG 385-2208-001, suggesting that DEP plans to work at this level. However, we would recommend working, at a minimum, at HUC-14 or finer scale.

The watershed scale to be used for the purpose of this guidance needs to be clearly defined. We recommend that DEP define the watershed size it will use for this watershed-based approach and make that proposed size available for public comment.

### **BMP requirements and options**

DEP has assigned best management practices (BMPs) protection factors based supposedly on their projected effectiveness in reducing nitrate from septic systems to levels that protect surface water quality. However, the rationale for assigning these values is not provided. Without documentation of the process behind this decision-making, the process for assigning protection factors to BMPs appears subjective. DEP must present a more complete description as to how protection factors for the BMPs presented in DTG 385-2208-001 were developed, as well as the science upon which that decision-making was based.

In addition, the rationale presented for the BMPs assume a starting nitrate concentration for septic effluent of 45 mg/l. However, nitrogen concentration in domestic wastewater can vary widely. The range for total nitrogen in domestic wastewater is given as 20 to 70 mg/L by

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<sup>2</sup> *Ibid.*

<sup>3</sup> Bureau of Water Supply and Wastewater Management, 2006. *Pennsylvania DEP's Three-Year Plan for TMDL Development*. Pennsylvania Department of Environmental Protection. Retrieved from <http://www.dep.state.pa.us/dep/deputate/watermgt/wqp/wqstandards/TMDL/TMDL%20Projection.pdf>.

Tchobanoglous, et al. (as cited in *Nutrient Control Design Manual: State of Technology Review Report*, EPA/600/R-09/012, 2009). With this level of variability, the selected protection factor of 45 would prove inadequate and to protect high strength septic effluent to reduce levels of nitrate-N to approximately 1 mg/L. The result would be levels of nitrates in groundwater that can impact and degrade EV and HQ streams. In addition, for onlot systems that produce low strength wastewater, designing to achieve a protection factor of 45 would result in unnecessary cost. We recommend that DEP require the beginning nitrate concentration for septic effluent must be determined to determine whether protection factors are indeed adequate.

### ***Onlot system density BMP***

A proposed onlot system must achieve a total protection factor of 45 or more. Under this BMP, which is essentially dilution, a protection factor of 4 is assigned to a one acre lot. However, this does not address the issue of siting of the onlot system within the lot. New development proposed for a 12 acre lot would achieve a protection factor of 46 with no other BMPs required. As a result, one onlot system could be installed. Taking DTG 385-2208-001 alone, no restrictions prevent the developer from installing the onlot system immediately adjacent to an EV or HQ stream, thereby negating the benefit of dilution provided by the 12 acre lot. In this scenario, groundwater flow would move immediately to stream, not through the remaining acreage. Unattenuated nitrogen would effectively degrade the adjacent EV or HQ stream. We recommend that DEP provide additional guidance for onlot density that addresses this issue.

### ***Setback Distance BMP***

DEP proposes using setback distance as a BMP in addition to onlot system density, asserting that this BMP accounts for reduction processes other than dilution (onlot system density). But the use of both onlot system density BMP and setback distance BMP would result in double-counting the land within the setback distance that is within the property boundary. We recommends amending this BMP to exclude that portion of the setback distance square footage that is within the property boundary from the total acreage size used to calculate onlot system density if both BMPs are to be applied. This would avoid double counting this area in the development of the protection factor total.

### ***Riparian Forest Buffer BMP***

We applaud DEP's selection of riparian forest buffer as a BMP to protect EV and HQ streams from degradation from onlot sewage systems. However, as proposed, DEP is once again allowing double counting to occur. DTG 385-2208-001 would apply to the installation of new individual or community onlot system installations. Many of these installations would already be associated with earth disturbance activities if one acre or more, and therefore require a permit under 25 Pa. Code §102. For EV and HQ watersheds, 25 Pa. Code §102.14 already requires a 150 foot riparian forest buffer. To achieve this, a project sponsor can protect an existing riparian forest buffer, convert an existing riparian buffer to a riparian forest buffer, or establish a new riparian forest buffer.

DEP is specifically allowing the riparian forested buffer protections that fulfill 25 Pa. Code §102.14 to also count toward the total protection factor value for onlot sewage systems. Whether voluntary or mandatory, a project sponsor can use the full value of the buffer toward determining

the protection factor value. Moreover, 25 Pa. Code §102.14 allows for trading or offsetting credits for buffers. We urge that DEP explicitly state that those any portion of a riparian forested buffer for which the nutrient credits have been traded is ineligible to count toward the protection factor total.

DEP's rationale for the lower protection factors for riparian forest buffers less than 150 feet in width cite Newbold, et al., which found lower efficiencies than the average for similar studies. However, DEP does not address in its protection factors one reason presented by Newbold, et al., as to why they found lower efficiencies: high inputs from upslope sources. Newbold et al. speculated that the studied buffer:

received the convergent flow from an entire basin to the origin of a first-order stream, whereas most previous riparian buffer studies have focused on incremental inputs from lateral flow paths. Headwater streams typically lie in convergent basins with larger contributing area per unit length than do higher order streams.<sup>4</sup>

Following this reasoning, DEP's formula to determine the necessary protection factor total should incorporate a value for location of the stream reach within the watershed. Newbold et al also raise interesting questions about the role of soils types, age of riparian forest buffer and the potential for enhancement of habitat area within the stream to improve uptake and processing of nitrogen. Therefore, we recommend that DEP incorporate watershed reach and soils into its formula for determining the necessary protection factor total. In addition, we suggest in-stream habitat enhancement that could be shown to increase denitrification could also be considered as a BMP.

### ***Riparian Buffer BMP***

DEP assigns a protection factor to riparian forest buffer with a width of 150 feet, which can reliably remove 90% of the nitrate in the subsurface flow. However, DEP only assigns a protection factor of 3.33 for a riparian buffer 150 feet in width, despite removing 70% of the nitrate in the subsurface flow. Following DEP's calculations for assigning a protection factor for a riparian forested buffer, a protection factor of 7 would be appropriate for a riparian buffer 150 feet in width. Similarly, a protection factor of 3 would be assigned to a riparian buffer 100 feet in width.

### ***Permeable Reactive Barrier BMP***

DEP assigns a protection factor of 4 to permeable reactive barriers, a higher value than the agency assigns to a riparian forested buffer 100 feet in width or a riparian buffer 150 feet in width, which would have removal efficiencies of 90% and 70%, respectively, according to DTG 385-2208-001. These comparable nitrate removal efficiencies suggest that a riparian forested buffer 100 feet in width or a riparian buffer 150 feet in width at least merit protection factors more in alignment with those assigned to permeable reactive barriers.

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<sup>4</sup> Newbold, J. et al. 2010. Water Quality Functions of a 15-year-old Riparian Forest Buffer System. *Journal of the American Water Resources Association* 46:299-310. Retrieved from [http://www.stroudcenter.org/about/pdfs/dn\\_Newboldetal\\_2010\\_RiparBuffrArticle.pdf](http://www.stroudcenter.org/about/pdfs/dn_Newboldetal_2010_RiparBuffrArticle.pdf).

It should also be noted that nitrate removal may improve as riparian forests mature. By contrast, permeable reactive barriers have a limited lifespan and are likely to cost more than the predicted range of \$5,000 to \$15,000 per EDU. In laboratory column tests of a core from a 15-year-old permeable reactive barrier in continuous operation, Robertson et al. found that nitrate removal had declined by about 50% compared to year one.<sup>5</sup>

DEP's adoption of permeable reactive barriers as a BMP in this technical guidance relies in part upon the United States Environmental Protection Agency's (EPA's) 2010 recommendation of this technology for reducing nitrate-N in septic effluent. The cited document, *Guidance for Federal Land Management in the Chesapeake Bay Watershed*, EPA/841-R-10-002, has as its primary audience land managers in federal agencies who are responsible for meeting water quality goals and implementing water quality programs on agricultural land. The purpose of the document is "to present an overview of the practices and information resources available for federal land managers and others to achieve water quality goals in the most cost-effective and potentially successful manner." We recommend that DEP instead consider BMPs based upon their suitability or cost effectiveness for use with onlot sewage systems.

#### ***Denitrifying onlot treatment system technology BMP***

DEP has been reviewing innovative and experimental onlot treatment systems for roughly 20 years. More recently, the agency adopted a technical verification protocol for review of these systems, but DEP has not revised its *Alternate Systems Guidance*, 362-0300-007, for alternate onlot sewage treatment systems since 2003. We recommend that DEP use the development of DTG 385-2208-001 as an opportunity to update and expand approved alternate onlot sewage treatment systems.

Given that eight Pennsylvania counties (Allegheny, Armstrong, Beaver, Delaware, Lancaster, Lehigh, Montgomery and Philadelphia) are projected to be at high or extreme risk for water shortages by 2050 as a result of global warming, we recommend that DEP adopt a policy supporting onlot sewage systems that would improve water sustainability. Such a policy would promote the development of water infrastructure that separates greywater and blackwater for treatment, recovery and reuse. Where feasible, urine separation/diversion systems should be encouraged. DEP's adoption of a policy supporting urine diversion and recycling would result in both water and energy savings.

DEP has assigned advanced onsite denitrifying wastewater treatment technology a protection factor of 2, while qualifying that a proportionally higher protection factor may be awarded if such a system can reliably demonstrate higher nitrogen removal rates.

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<sup>5</sup> Robertson, W., Vogan, J. and Lombardo, P. 2008. Nitrate Removal Rates in a 15-Year-Old Permeable Reactive Barrier Treating Septic System Nitrate. *Ground Water Monitoring & Remediation* 28(3)65-72. Retrieved from <http://info.ngwa.org/gwol/pdf/pdf/081183177.pdf>.

The EPA has provided a range of total nitrogen removal rates for onlot treatment system technology.<sup>6</sup> *Table 1. Typical N-removal ranges for managed systems* is reproduced here with technology achieving 80% removal rates highlighted:

**Table 1. Typical N-removal ranges for managed systems**

Process	Percent Total N removal
RSF	40 - 50
RSF with recycle to ST or AUF	70 - 80
ST-FFS with recycle to ST or AUF	65 - 75
SBR <sup>a</sup>	50 - 80
SS and removal	60 - 80
SS-TT R	40 - 60
ISF -AUF	55 - 75

<sup>a</sup>Commercially available systems.

Note: RSF = recirculating sand filters; AUF = anaerobic upflow filter; ST = septic tank; FFS = fixed-film system; SBR = sequencing batch reactor; SS = source separation; TT = treatment applied to both systems; R = recombined; ISF = intermittent sand filter.

Higher removal rates for specific systems and configurations have been reported elsewhere. Therefore, we recommend assigning a higher protection factor for denitrifying onlot treatment system technology.

### **Other BMPs**

DTG 385-2208-001 provides a very limited list of BMPs for onlot systems proposed in EV and HQ watersheds, essentially detailing only three BMPs: dilution, through lot size and setback distance; buffer, either riparian forested or riparian; and permeable reactive barrier. Denitrifying onlot treatment system technology is mentioned, but the low protection factor that has been assigned would probably deter interest in that technology. Constructed wetlands including pretreatment greywater wetlands should also be mentioned.

DEP does retain the discretion to assign protection factors to BMPs not included in this guidance. However, DEP is seeking public comment now on the BMPs included here. The public's opportunity to impact DEP decision-making is now. To ensure full compliance with federal antidegradation policy and full satisfaction of the public participation process in state antidegradation programs and implementation procedures, DEP should offer a more complete range of BMPs for public comment.

### **Planning**

Under DTG 385-2208-001, DEP is relying upon individual municipalities to ensure consistency of proposed sewage facilities with the requirements to protect EV and HQ streams through their official sewage facilities plans. However, as many Pennsylvania municipalities have official

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<sup>6</sup> United States Environmental Protection Agency. 2002. Onsite Wastewater Treatment Systems Manual, EPA/625/R-00/008. Retrieved from [http://water.epa.gov/aboutow/owm/upload/2004\\_07\\_07\\_septics\\_septic\\_2002\\_osdm\\_all.pdf](http://water.epa.gov/aboutow/owm/upload/2004_07_07_septics_septic_2002_osdm_all.pdf).

sewage facilities plans 20 years old or older,<sup>7</sup> we are concerned that timely and complete compliance with this guidance by municipalities is unlikely, potentially leaving EV and HQ streams open to degradation.

***Official Plans, Official Plan Update Revisions and Special Studies (when applicable)***

DTG 385-2208-001 allows for the application of a protection factor for a given BMP if that BMP is established by municipal ordinances. However, the adoption of a riparian forest buffer ordinance/riparian buffer ordinance by a municipality presumes the existence or creation of that buffer for the purposes of determining the total protection factor score, regardless of whether the presumed buffer failed or was never planted. This presumption could theoretically result in protection of an EV or HQ stream while allowing for real degradation of EV and HQ waters when onlot sewage systems are proposed. We strongly support the use of riparian forested and riparian buffers to protect EV and HQ streams. However we do not support using only a presumption of riparian forested buffer/riparian buffer ordinance for automatically a protection factor. We recommend ongoing documentation for buffers used to achieve protective factors.

***Official Plan Revisions, Supplements and Exceptions***

DTG 385-2208-001 relies on Chapter 102 requirements for documentation of buffers. Persons who protect an existing buffer, or convert or establish a buffer, are to provide DEP with buffer documentation within one year of establishment or protection of the buffer; however, no long-term monitoring or evaluation as to the size, health or preservation of the riparian forested buffer/riparian buffer is required.

Chapter 102.14 requires that buffers including access easements must be protected in perpetuity through deed restriction, conservation easement, local ordinance, permit conditions or any other mechanisms that ensure the long-term functioning and integrity of the riparian buffer. However, deed restrictions can be forgotten, easements can be broken, and ordinances and permit conditions can be ignored. DEP should establish a structure that allows for consistent enforcement of buffer protections across Pennsylvania.

DEP proposes facilitating the tracking of riparian buffers and their approval as BMPs through the completion of the Chapter 102 reporting form, whether the buffer is being installed under Chapter 102 or not. We recommend that DEP establish an online directory where data on buffers approved as BMPs under this guidance or for Chapter 102 can be entered. This database should be available to the public and searchable by street address, municipality, county and watershed.

DTG 385-2208-001 adds to the content about which a sewage enforcement officer (SEO) must be knowledgeable. The SEO is responsible for advising an applicant about available options for the planning, design and construction of an individual or community onlot disposal system. To perform these duties under DTG 385-2208-001, the SEO should be able to advise an applicant for an onlot system regarding the condition of streambank, composition and health of the buffer, and measuring percent canopy cover. The SEO will also be responsible for confirming that the vehicle

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<sup>7</sup> Pennsylvania Department of Environmental Protection. 2011. *Pennsylvania Act 537 Official Plan Aging*. Retrieved from [http://www.portal.state.pa.us/portal/server.pt/community/plan\\_status\\_maps/10586](http://www.portal.state.pa.us/portal/server.pt/community/plan_status_maps/10586).



for perpetual preservation of the buffer, and any practices required by that vehicle, are addressed before issuing an onlot sewage treatment system permit.

We recommend that an SEO who has successfully completed the appropriate DEP-approved continuing education course on riparian forested buffers /riparian buffers, which includes specific information necessary to determine the suitability for a buffer to meet the proposed BMP, may be allowed to independently review the adopting of this BMP. When SEOs have not completed such training, proposals using riparian forested buffers / riparian buffers as BMPs must be submitted to the DEP regional office for review and comment.

Similar requirement for SEOs should be applied to the use of permeable reactive barrier technology as part of an onlot sewage system.

In conclusion, we urge DEP to revise DTG 85-2208-001 as recommended to ensure that the goal of maintaining and protecting water quality in EV and HQ watersheds will be achieved. Thank you for the opportunity to comment on this important new guidance.

Sincerely,



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the Delaware Riverkeeper

John Hoekstra, Executive Director  
Raymond Proffitt Foundation

Michael Helfrich, The Lower Susquehanna Riverkeeper  
Stewards of the Lower Susquehanna, Inc.

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