

PENNSYLVANIA CAMPAIGN FOR CLEAN WATER

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July 18, 2007

Deputy Secretary Cathy Myers
Pennsylvania Department of Environmental Protection
Rachel Carson State Office Building
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Dear Secretary Myers:

We are pleased that the Department of Environmental Protection (the Department) is presently reviewing and revising Chapter 102 and planning on expanding its scope to include post-construction stormwater management. We discussed some of our suggestions for improvements to Chapter 102 during our meeting with you on June 4, 2007. This letter expands upon the issues we discussed at the meeting.

1. Erosion and Sediment Control

a. Agricultural activities

We support revisions to Section 102.4(a) addressing erosion and sediment control requirements for agricultural activities. We understand that a separate workgroup to discuss these issues has been formed and will meet on June 27. In a separate letter, we will work to develop specific suggestions for revisions to this section of Chapter 102 that we hope the agricultural E&S workgroup and the Department will consider as it develops its revisions.

b. Other earth disturbance

We recommend revising Section 102.4(b) to add several provisions regarding implementation of E&S controls on other earth disturbance activities. We believe that such provisions are necessary to ensure consistency with the new Stormwater BMP Manual and its emphasis on minimizing disturbance, as well as the Department's new NPDES Permitting Initiatives, which emphasize engineering oversight and "team approaches" to site design. Specific provisions should include:

- Require the limits of disturbance on E&S Plans to mimic the limits of disturbance shown on post-construction stormwater plans, ensuring that minimization of earth disturbance is maximized as contemplated in the new Stormwater BMP Manual.
- Require phased construction on all earth disturbances consisting of a "Phase 1" and a "Phase 2." Phase 1, after approval from the appropriate Conservation District or the Department, shall consist of the construction and implementation of all E&S controls as shown on the approved E&S Plan. Phase 2 shall consist of

all other earth disturbance necessary for actual construction. Following Phase 1, consulting engineers must certify E&S controls “as built” and submit to the Department or conservation district for review, site inspection and written approval before a permittee may proceed to Phase 2. This phased approach will assure appropriate placement and installation of E&S controls which will help prevent the accelerated erosion and sedimentation that occurs when such BMPs are inappropriately placed or implemented or where construction proceeds out of sequence.

- Limit earth disturbance during the non-growing season so that opportunities for full vegetative cover on construction sites is enhanced. Because size of the operation can increase the potential for accelerated erosion and sedimentation, we recommend prohibiting earth disturbance activity greater than or equal to 5 acres during the non-growing season. Earth disturbance activity greater than or equal to 1 acre but less than 5 acres would be permitted during the non-growing season, but minimization of disturbance through staging and immediate stabilization using geotextile erosion control mats/blankets, mulches or turf reinforcement mats would be required. Earth disturbance less than 1 acre during the non-growing season would also be permitted, but immediate stabilization using these same advanced techniques would again be required.
- Similar to other state E&S requirements, limit the drainage area for any sediment basins to 25 acres or less. This will minimize failure rates of sediment basins and discourage the establishment of large sediment basins that are converted to permanent detention basins which are contrary to the goals of the new Stormwater BMP manual.
- Require that direct point source discharges from sediment control facilities to streams be eliminated as an option. Instead, require all discharges to receiving waters to be discharged to the edge of required forested buffer areas and be equipped with appropriate BMPs to diffuse the discharge and prevent gullyng. This approach will allow for the buffer to perform one of its most critical functions—filtering nutrient and sediment pollution.
- To provide strong incentive for ensuring that E&S controls are properly designed and implemented, we further suggest that the Department implement a “three strikes” policy, whereby permit holders would face significant repercussions, such as time-limited prohibitions, for improperly designing, installing, and maintaining E&S controls.

i. Special Protection E&S BMPs

Section 102.4(b)(6) lists “Special Protection BMPs” that must be implemented to control erosion and sedimentation in Exceptional Value (EV) and High Quality (HQ) streams. We support the concept of requiring more protective BMPs in EV and HQ streams. However, some of the Special Protection BMPs required in Section 102.4(b)(6) do not conform well to the new advances in stormwater management that are now supported by science and reflected in the

Department's BMP Manual. For example, Section 102.4(b)(6)(i) sets forth "special sediment basin requirements" that require sediment basins to be oversized and to dewater within a certain timeframe. Large sediment basins are often converted to large detention basins, which are no longer the preferred stormwater management facility. They are largely ineffective as a water quality improvement tool. We recommend that the "Special Protection BMPs" be revised to better reflect an emphasis on minimizing disturbance and non-structural BMPs. Such Special Protection BMPs may include:

- 300-foot forested buffers along all HQ and EV streams.¹ All discharges to receiving streams shall be discharged to the edge of the forested buffer area and be equipped with appropriate BMPs to diffuse the discharge and prevent gullyng.
- Minimize earth disturbance and utilize low impact design consistent with post-construction stormwater management antidegradation requirements.
- Staging during construction and immediate stabilization of disturbed areas using advanced stabilization techniques including seeding combined with geotextile erosion control mats/blankets, mulches or turf reinforcement mats.
- Lining of all channels, collectors and diversions using these same advanced stabilization techniques.

Simply because a permittee employs the required Special Protection BMPs does not mean that the permittee has achieved compliance with Chapter 93 antidegradation requirements, particularly requirements to evaluate and use feasible nondischarge alternatives to manage post-construction stormwater. We recommend clarifying that the implementation of Special Protection BMPs to control erosion and sedimentation do not in and of themselves ensure compliance with Chapter 93 antidegradation requirements.

ii. Riparian buffer requirement

We are also supportive of a new provision that requires all earth disturbance activities to maintain a forested riparian buffer of minimum width on all streams. Overwhelming scientific consensus establishes the importance of forested riparian buffers in protecting the water quality of rivers and streams and controlling stormwater runoff and erosion and sediment and nutrient pollution.

Several organizations in the Campaign have worked over the past few months to develop a consensus recommendation for a forested buffer requirement that is based on sound science and draws upon our collective professional experience in restoring and protecting riparian buffers and streams. We recommend a minimum buffer width of 100 feet on all streams. Additional feet should be required based on factors that require additional protection, including special protection status, stream order and slope. Our full recommendation is set forth as an attachment to this letter.

¹ This buffer width is consistent with our recommended buffers for EV and HQ waters. See enclosed document regarding the buffer rule.

2. Post Construction Stormwater Management

We are very supportive of the Department's plans to expand the scope of Chapter 102 to include post-construction stormwater management. This will allow the Department to fully integrate existing stormwater management and permitting requirements that are presently being implemented, with new guidance provided by the Department's recently finalized Stormwater BMP Manual. Chapter 102's new post-construction stormwater management section should address the following:

a. Post-Construction Stormwater Management Plan requirements

Current requirements for NPDES permitting and development of post-construction stormwater management plans (PCSM Plans) should be incorporated into this section. As it develops this section, the Department should include the following provisions:

- A clear requirement that all earth disturbance activities greater than one acre must obtain an NPDES permit for stormwater associated with construction activities.
- A requirement that, for all such NPDES permits, including general permits, a PCSM Plan be developed by the permittee and approved by the Department following technical review of submitted plans.
- A provision requiring permittees to minimize disturbance of existing soils and vegetation and implement low impact design features to the maximum extent possible to meet post-construction stormwater management requirements. We suggest strong language that requires preservation of natural topography and vegetation outside of the development footprint to reduce unnecessary land disturbance and preserve natural hydrology on the site.
- A requirement that PCSM Plans meet existing control guidance for volume, rate and water quality control as set forth in Chapter 3 of the BMP Manual.
- As part of PCSM Plan development, a requirement to conduct an initial natural features site analysis and integrate stormwater management into the site development design process as set forth in Chapter 4 of the BMP Manual.
- A requirement to use the worksheets in Chapter 8 of the BMP Manual to provide calculations necessary to achieve compliance with volume, rate and water quality control guidance.
- A requirement that all stormwater BMPs set forth in the PCSM Plan be certified by licensed professional engineers "as built" pursuant to the approved design in the PCSM Plan. Failure to construct BMPs to approved design can fail to mitigate and can even exacerbate stormwater problems. Ensuring that BMPs are built as designed is critical to ensuring that BMPs function properly in practice, not just on paper. To provide strong incentive for ensuring that stormwater BMPs are properly designed, built and certified, we further suggest that the Department require applicants to provide information in the

permit application regarding any previous occasions where its consulting engineer had improperly certified BMPs. If improper certification has been submitted to the Department on three or more separate occasions, the Department should utilize its authority under the Clean Streams Law to deny the permit for lack of ability or intent to comply with the law, and should consider referring the matter to the Department of State for investigation of professional licensing abuses.

b. Operation and maintenance requirements

We agree with the Department that operation and maintenance (O&M) requirements for stormwater BMPs should also be added to Chapter 102. Many existing problems that cause damage to downstream receiving waters and property owners are a result of failures to properly operate and maintain BMPs after they are installed. Too often, the person who becomes legally responsible for a BMP is the property owner who happens to own the parcel on which the BMP is located. The homeowner is often unaware of the existence of the BMP or his or her responsibility to maintain it, resulting in loss of the utility and function of the BMP over time.

The solution is to clearly assign responsibility from the start of the process. The developer must be required to specify in his application for an NPDES permit a plan for the long term operation and maintenance of all BMPs set forth in its PCSM Plan. The approved O&M plan and associated O&M agreement should become part of the NPDES permit as a permit condition.

We recommend the establishment of O&M regulations that require the following critical elements:

- Permittees to identify the responsible party in its PCSM Plan. If the development company ceases operation after development is complete, some other entity must be delegated responsibility, such as a homeowners association or individual property owner. Whatever arrangement is selected must be outlined in the PCSM Plan submitted to the Department, and the arrangement must be a credible one that can be reasonably expected to succeed over a period of 50 or more years.
- The Department to provide written notification to the responsible parties identified in the PCSM Plan. The notice should specify, at a minimum, location of the BMP, implementation requirements for the BMP and O&M requirements of the responsible party. The notice should be recorded with the county recorder of deeds so that subsequent buyers of the property are aware of the BMP and O&M obligations.
- Permittees to provide a written O&M agreement as part of its NPDES permit application. A formal agreement between the applicant and the responsible party that clearly outlines O&M responsibilities is the best way to ensure long term operation and maintenance of BMPs.
- Permittees to permanently protect BMPs, either by deed restriction or conservation easement, to safeguard against accidental or intentional destruction of BMPs.

- Alternatively, bonds could be required to ensure long term O&M of BMPs. Under this system, the developer would post a long term bond that could be forfeited and used to restore BMPs if at any time the BMPs were not properly operated or maintained. Issues that would need to be addressed before a bonding system were adopted include whether there are legal restrictions limiting the number of years a bond can be held, the circumstances in which a bond is needed, who would hold the bond, and the amount of the bond.

c. Stormwater discharges onto land owned by others

We support the Department's proposed provision that would require a permittee to receive permission from an adjacent landowner before discharging stormwater onto his or her property. We agree that responsible stormwater management does not have to burden landowners to unburden our rivers and streams. Responsible stormwater management should be considerate of landowner interests. Requiring permission of an adjacent landowner before allowing a permittee to discharge stormwater onto his or her property should help to ensure that stormwater management continues to abate, rather than contribute to, nuisance.

This provision should be clear, however, that, where the discharge is directly to waters of the Commonwealth, or to lands owned by the permittee and then to waters of the Commonwealth, permission from downstream property owners is not required.

d. Discharges to special protection waters

We recommend that the Department include a provision specifying that the point source antidegradation implementation requirements in 25 Pa. Code § 93.4c apply to all proposed stormwater discharges in HQ or EV watersheds. The Department should further specify that, in order to satisfy the nondischarge alternative requirement, the permittee must ensure no net increase from pre-development to post-development in rate, volume or concentration of pollutants in stormwater runoff for all storm events.

As a parallel to existing Section 102(b)(6), we support the establishment of Special Protection PCSM BMPs to be employed in EV and HQ waters. These BMPs should be focused on protecting water quality of receiving streams by eliminating discharges, minimizing site disturbance and ensuring no net increase in volume and pollutant concentration of runoff. Such Special Protection BMPs may include:

- 300 foot forested buffers along all streams.² All discharges to receiving streams shall be discharged to the edge of the forested buffer area and be equipped with appropriate BMPs to diffuse the discharge and prevent gullying.
- Minimize earth disturbance through methods presented in section 1.b of this letter and require the utilization of low impact site design which reduce the generation of stormwater and are consistent with post-construction stormwater management antidegradation requirements.

² This buffer width is consistent with our recommended buffers for EV and HQ waters. See enclosed document regarding the buffer rule.

- Post-construction BMPs that capture and remove stormwater and provide for enhanced pollutant removal through infiltration, evapotranspiration or reuse, such as bioretention/rain gardens, vegetated swales, infiltration trenches, pervious pavement, rain barrels, and green roofs.

As with provisions regarding Special Protection E&S BMPs, we recommend clarifying within the regulations that the implementation of Special Protection PCSM BMPs do not in and of themselves ensure compliance with Chapter 93 antidegradation requirements.

e. Discharges to impaired waters

We recommend developing a new provision that requires all NPDES permits issued for stormwater discharges to nutrient and sediment impaired waters to mandate “no net increase” of pollutants.

There are over 7,200 miles of sediment and 2,500 miles of nutrient impaired streams in the Commonwealth. In numerous other streams it is highly likely that nutrient and sediment-laden runoff contributes to a “threatened” stream condition. Given current development trends, the probability is strong that urban stormwater runoff will continue to grow as a significant source of impairment in the foreseeable future unless strategies are implemented to reduce its water quality impacts.

We recommend that the Department develop a permit strategy similar to the program implemented by the State of Vermont in 2004. Under this strategy, individual NPDES permits would be required for stormwater discharges to impaired waters associated with any new construction or redevelopment greater than one acre. These permits would require permittees to meet a “net zero” pollution standard (i.e. no additional sediment or nutrient load by the discharge than that which would occur if the site of the discharge were in its pre-existing or “natural” condition) for post-construction stormwater discharges to impaired streams.

For redevelopment projects, compliance with the “net zero” standard could be achieved by upgrading the existing stormwater system to meet as closely as possible the volume and water quality control guidance standards in the BMP Manual. If site conditions do not allow the “net zero” discharge standard to be met by upgrading the existing stormwater system, the standard could be achieved by mitigating the remaining impact by implementing additional water quality improvement projects in the same stormwater-impaired water.

f. Discharges of stormwater associated with oil and gas operations

We are pleased to see that, despite the Clean Water Act exemptions created by the federal Energy Policy Act of 2005, the Department has recently developed an E&S general permit for earth disturbance associated with oil and gas operations and has included the development and implementation of a PCSM Plan as a requirement of the permit.

However, we recommend that revisions to Chapter 102 include provisions specific to earth disturbances associated with oil and gas operations to ensure consistency with other regulated earth disturbances.

First, we recommend that Chapter 102 include provisions specifying that the acreage limit for application of the E&S permit be changed from greater than 5 acres to greater than 1 acre. As with earth disturbance associated with construction, earth disturbance associated with oil and gas operations of 1 to 5 acres create the potential for accelerated erosion and sedimentation and increased stormwater runoff that must be properly managed in order to protect the water quality of receiving streams.

Second, to be consistent with other earth disturbances, we recommend that the regulations specify that the E&S general permit cannot be used for discharges to special protection waters; rather, an individual permit is required. Currently the E&S general permit can be used in special protection waters.

Third, we recommend that in determining the size of the operation, access roads be considered. Many oil and gas operations have relatively small and discrete areas in which exploration and extraction occurs, yet requires establishing extensive road networks through environmentally-sensitive land.

Finally, all of the specific provisions relating to the requirements for PCSM Plans set forth in Section 2.a of our comments should be applicable to oil and gas earth disturbances.

g. Notice of NPDES permit applications/notices of intent

We recommend that a public notice section be added to Chapter 102 regarding notice and an opportunity to comment on NPDES permit applications for stormwater discharges.

The Department does not presently publish in the *Pennsylvania Bulletin* notices of receipt of notices of intent (NOIs) for coverage under the NPDES general permit for stormwater discharges associated with construction activities. By failing to provide notice and an opportunity to comment, the Department's present policy violates the public participation requirements of the Clean Water Act. The Department fails to provide public notice of receipt of these NOIs even though it requires the submission and technical review of PCSM Plans. These PCSM Plans contain the "substantive information" about how a discharger will reduce pollutants and meet effluent limitations and standards, and thus are "functionally equivalent" to permit applications. *See Environmental Defense Center v. EPA*, 344 F.3d 832, 856 (9th Cir. 2003). Accordingly, failure to provide notice and an opportunity to comment on NOIs prior to permit issuance is a violation of 33 U.S.C. §§ 1342(a)(1), 1342(j). *Id.*

In order to correct this problem, we recommend that the revised Chapter 102 regulations include a notice provision that requires receipt of both NOIs for coverage under the NPDES general permit and applications for individual permits to be noticed in the *Pennsylvania Bulletin* for a minimum 30-day public comment period.

h. Development of new general permits

The Department has discussed the possibility of developing new general permits that would be tailored to specific earth disturbance activities, such as construction of single family dwellings. The Chapter 102 presentation distributed to the WRAC several months ago discusses possible development of permits-by-rule.

We oppose the development of any NPDES permits-by-rule for stormwater discharges. Permits-by-rule do not allow for the submission of technical information for review by Department technical review staff to establish appropriate effluent limits for each discharge. This is a fundamental requirement of the Clean Water Act. The Act mandates in several provisions that NPDES permits shall only be issued “where such permits ensure that every discharge of pollutants will comply with all applicable effluent limitations and standards.” *Waterkeeper Alliance v. EPA*, 399 F.3d 486, 498 (2d Cir. 2005) (citing 33 U.S.C. §§ 1342(a)(1); 1342(a)(2); 1342(b)). Pennsylvania’s NPDES stormwater permits do not contain numeric effluent limits. Rather, the effluent limitations and standards required by the Clean Water Act are based on mandatory application of BMPs sufficient to control pollutants. Where effluent standards and limitations are BMP-based, it is critical that the E&S and PCSM Plans submitted by permittees setting forth the obligation to develop, implement and maintain those BMPs receive a thorough and independent technical review by the agency issuing the permit. Permits-by-rule do not allow for meaningful technical review of these plans and the BMPs they prescribe, and thus should not be used as a way to streamline permitting.

We do not oppose development of new general permits for certain specific low impact activities such as single family dwellings on small sites, so long as the submission and technical review of PCSM Plans are still required, for the reasons just discussed. As we stated in our comments on the Department’s NPDES Stormwater Permit Initiatives, however, we do oppose the development of a general permit for earth disturbances on Brownfields. Controlling E&S and managing stormwater on Brownfields can be complicated, particularly when dealing with contaminated soils and toxic hot spots. Regulation of these complex environmental issues is better accomplished through individual permits.

i. Permit fees

Chapter 102 revisions present an opportunity to revisit permit fees for NPDES stormwater permits. Additional funding for the stormwater program could be generated by developing a new fee system that requires increased permit fees based on the size of the disturbance or complexity of design. This would have the dual benefit of encouraging site disturbance minimization and linking the fee amount to the amount of Department staff time needed to review permit applications. To maximize benefit to the stormwater program and help address existing staff and permit review shortcomings, fees should be channeled directly to the program instead of the general fund.

3. Duties of Municipalities

As stormwater is inexorably intertwined with land use, municipalities must play a critical role in achieving better stormwater management in Pennsylvania. We recommend that the Department include new sections in the revisions to Chapter 102 which clearly define this role.

a. Adoption of stormwater management ordinances as protective as the new model ordinance.

The new model municipal stormwater ordinance, which will hopefully soon be completed and released, is an important step forward, adding water quality provisions and volume control standards to existing peak rate standards in municipal stormwater management ordinances.

Chapter 102 should specify that an ordinance at least as protective as the model ordinance must be adopted by every municipality in the Commonwealth. Municipalities that have already adopted a stormwater management ordinance that is not as protective as the model ordinance would be required to modify their existing ordinance in order to bring it into compliance with the minimum standards set forth in the new model ordinance. Municipalities should be given a specific timeframe within which to revise their ordinance as needed.

b. Delegation of additional authority to regulate stormwater to municipalities.

We are very concerned about any possible initiative that would delegate more authority over stormwater permitting to municipalities. While we believe that municipalities have an important role to play in reviewing projects for compliance with their local stormwater ordinance, we do not believe that this role replaces state review for compliance with the federal Clean Water Act and Pennsylvania Clean Streams Law. We believe local reviews complement state review but cannot replace it.

In addition, we are concerned that in the past, many municipalities have weakened the implementation of their stormwater ordinance with excessive waivers. This has allowed projects to move forward that do not comply with the spirit or letter of their local ordinance.

We are also very concerned that many municipalities do not have the capacity or technical expertise to adequately implement and enforce their ordinance, particularly in regard to water quality requirements mandated by the Clean Water Act, the Clean Streams Law and Chapter 93. Many municipalities have limited staff resources, very limited technical support and only a cursory understanding at best with respect to water quality statutes and regulations. This includes municipal engineers, who would be expected to conduct thorough technical review of a complicated development plan and PCSM Plan that addresses critical water quality components, such as the need to implement BMPs to meet effluent limitations to control pollution as required by the federal Clean Water Act and the need to protect existing and designated uses of receiving waters. Impacts on hydrology, aquatic life and geomorphology must all be addressed.

If the Department is insistent on moving forward with a stronger municipal role, it should establish clear requirements for municipalities to qualify for this larger role. This should include: (i) standards for minimum staffing/technical consultants to ensure proper technical review of development plans and PCSM Plans; (ii) a prohibition against use of waivers; and (iii) a requirement that all plans must comply with the municipal ordinance, the Clean Water Act, the Clean Streams Law and Chapter 93.

4. Enforcement

Effective stormwater management during and after construction requires that responsible parties maintain operational control and supervision over construction projects. One of the important aspects of a regulatory program is the credible threat of enforcement and prosecution if significant violations are found. Both E&S control and PCSM are necessary to protect and maintain water quality designated and existing uses.

Inspectors, whether they work for a conservation district or the Department, should be required to document all violations found during inspections. This is the standard practice in other Department programs. Not all violations are significant, and some violations can be corrected immediately. However, subsequent follow-up action is often necessary to correct violations, and the conservation district inspector or the Department inspector must document these actions. In cases where follow-up action is needed, notices of violation should be issued and subsequent actions should be logged in the Department's compliance monitoring system.

We recommend that Section 102.32 be revised to provide clear steps in a progressive program of enforcement measures which the Department or the conservation district will take to correct violations. Notices of violation should not be followed by subsequent notices of violation without further agency action to resolve ongoing compliance problems. Rather, if violations are not corrected after a set time period after notices of violation are issued, the regulations should require the issuance of enforcement orders specifying corrective action. Issuance of enforcement orders should be accompanied by issuance of civil penalties in amounts that provide actual deterrence to permittees and are not simply viewed as a cost of doing business.

We also recommend that Section 102.41, which delegates enforcement responsibilities to conservation districts, be expanded to include performance requirements for conservation districts. Conservation districts should be held to the same performance standards as the Department staff when they are enforcing a delegated program such as erosion and sedimentation control.

In previous sections of these comments, we recommend new provisions to require or encourage practices that will have great water quality benefits, including: (i) phased approach to E&S control, including mandatory Phase 1 certification; (ii) limiting disturbance and use of low impact development techniques; and (iii) improved long term operation and maintenance of stormwater BMPs. Because these three practices are particularly important, we recommend that special enforcement provisions be established to encourage their implementation. Specifically:

- The Department or properly delegated conservation district should be required to approve in writing Phase 1 "as built" certifications after site inspection. Submitting false Phase 1 certifications and conducting Phase 2 earth disturbance without receiving Phase 1 approval should be considered a violation of the NPDES permit and subject the permittee to enforcement action.
- Conducting earth disturbance or vegetative clearing in areas marked as "no disturbance" on approved E&S or PCSM Plans shall be considered a violation of the NPDES permit and subject the permittee to severe enforcement action.

- The regulations should specify that O&M plans and agreements shall be attached to NPDES permits and incorporated into NPDES permits as permit conditions. Failure to conduct O&M activities as required in the written O&M plan or agreement shall be considered a violation of the NPDES permit and subject the permittee and the party responsible for O&M to enforcement action.

5. Stormwater Management Planning

The Department's initial steps toward a more comprehensive and integrated approach to stormwater management began with the release of the Comprehensive Stormwater Management Policy in 2002. Among the goals of that policy was the integration of PCSM Plans into Act 167 Stormwater Management Plans and MS4 Permits.

The revisions to Chapter 102 provide an opportunity to affirmatively link watershed stormwater planning to site design and onsite stormwater management. We recommend that the Department include a new section that would govern Act 167 planning and make this critical link. Specifically, we recommend that provisions be developed to ensure that Act 167 plans take a comprehensive approach to stormwater management by ensuring that water quality elements consistent with the new BMP Manual and current approaches to NPDES permitting are addressed in plans. These new provisions should require new and revised Act 167 plans to include:

- Compliance with volume, rate and water quality control guidance set forth in the BMP Manual.
- Provisions that encourage and guide municipalities and permittees to minimize disturbance of existing soils and vegetation and implement low impact design features and infiltration techniques to meet post-construction stormwater management requirements.
- Provisions that require new development within the watershed to conduct initial natural features site analysis and integrate stormwater management into the site development design process as set forth in Chapter 4 of the BMP Manual.
- Provisions that require all E&S and PCSM recommendations set forth above in Sections 1 and 2 of these comments

A subsequent provision should affirmatively state the obligation of municipalities to develop ordinances at least as protective as the Department's new model ordinance to implement these and other elements of the Act 167 Plan. Additionally, as required by Act 167, such ordinances will be reviewed and updated at least every 5 years. Similar linkages should be made to integrate MS4 requirements.

A restructured approach to stormwater management allows communities to plan for growth in a way that meets the critical objectives of improved stormwater management, and then put those

plans into action through local ordinances and NPDES permitting programs that are comprehensive, streamlined and protective of water quality.

Conclusion

Thank you for the opportunity to submit these recommendations for revisions to Chapter 102. We look forward to working with your staff on the workgroup discussing the revisions, and in subsequent dialogue. If you have any questions concerning this letter, please contact us. We would be happy to meet with you and your staff to discuss our ideas in more detail.

Sincerely,

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PROPOSED BUFFER REQUIREMENTS FOR CHAPTER 102 REGULATIONS

Everyone pays the price for pollution and flooding in our streams—the high cost of treating and purifying water for drinking; loss of recreational opportunities (fishing, swimming and canoeing) and associated economic windfalls; community desolation; and the staggering cost of flood damage and property loss. Watersheds do not respect political boundaries. As such, streams flow from one jurisdiction to the next; thus protection and restoration of our watersheds must be a concerted effort among all our local governments within a watershed. One of the best ways to stabilize a stream and protect water quality is to preserve the stream’s surrounding ecosystem, or corridor.

A stream corridor is composed of several essential elements including the stream channel itself, associated wetlands and vernal ponds, floodplains and forests. The body of scientific research indicates that stream buffers, particularly those dominated by woody vegetation, are instrumental in providing numerous ecological and socioeconomic benefits. Simply put, riparian corridors protect and restore the functionality and integrity of streams. Some of the benefits often cited in the literature are summarized below.

Increased property values by adding to the natural character and providing viewsheds within the community

One study noted a 32% increase in properties adjacent to a greenbelt and another reported that 82% of communities with buffers viewed them positively (n=39). In the Pennypack Park area of Philadelphia, the stream buffer network was found to increase adjacent property values by an average of 33%, with a net increase of more than \$3.3 million in real estate. Another such system in Boulder, CO was found to increase property values as well, resulting in an additional \$500,000 in tax revenue per year (CWP, 1998).

Prevention of flood-related damage by storing flood waters

Tourbier (1994) noted that buffer systems in conjunction with LID practices work by utilizing natural processes to provide significant detention through depression storage and infiltration. As a result, peak rate and volume of post-construction runoff can often be reduced dramatically.

Decreased need for stormwater infrastructure

Building upon the work of Tourbier and others, research has consistently concluded that because of the hydrological impacts of buffers, those areas which preserve and restore such systems may require less or smaller sized stormwater infrastructure, such as detention basins. (Miller and Sutherland, 1999) This fact is widely recognized and many state and local stormwater management programs, including Pennsylvania’s, allow for the “crediting” of stormwater that is discharged to intact buffer systems.

Trapping and filtering sediment, nutrients, and other pollutants from runoff

Numerous studies have concluded that buffers, particularly forested varieties, provide significant removal of aquatic contaminants, including toxics. While site specific conditions dictate the effectiveness of such systems, many researchers have concluded that buffers can remove upwards of 80 to 90% of such contaminants when equal or greater to 100 feet in width. See summary table below.

For instance, Lowrance (2001) found that for nitrogen, the smallest buffer (15 ft) provided a 5% reduction, while the widest buffer (170 ft) exceeded a 95% reduction. Nitrogen content from the narrow buffers (15 ft to 100 ft) was mostly nitrate; the wider buffers had an even division of nitrate and ammonium. As the buffer width increased, the amount of organic nitrogen as a percentage of the total runoff also increased. A switch from inorganic to organic nitrogen is likely to be beneficial to the aquatic system because organic nitrogen is not as easily utilized by harmful algal blooms. For phosphorus, the smallest buffer (15 ft) was effective, reducing 62% of the load; however, the widest buffer (170 ft) removed 90% of the total phosphorus load. Sediment reductions were also dependent on buffer width. Sediment reductions increased as buffer width increased, up to a 90% reduction for a buffer width of 55 ft. It is notable, however, that Lowrance described the sediment load from the adjacent land as “low” and not of “a level of input that would stress the sediment load reduction capacity of the buffer.” One would expect that land with a greater susceptibility for erosion would necessitate a wider buffer.

A 2003 study by Vellidis et al. examined a restored forested riparian wetland (average width of 125 feet) that was buffering an area of manure application and a heavily fertilized pasture. This three zone buffer removed 66% of total nitrogen and 59% of total phosphorus. Significantly, this research indicates that “within the first eight years following restoration, restored areas can retain large masses and high percentages of the nutrients entering.”

Summary of Select Studies Reporting Percentage of Pollutant Reductions Based on Buffer Size

Study	Year	% Reduction based on Buffer Size:											
		~15 ft (4.6 m)			~35 ft (10.7 m)			~100 ft (30.5 m)			> 100 ft (> 30.5 m)		
		N	P	S	N	P	S	N	P	S	N	P	S
Vellidis <i>et al.</i>	2003										66%	59%	
Lowrance <i>et al.</i>	2001	5%	62%	60%	50%	65%	80%	80%	80%	90%	95%	90%	90%
Lowrance <i>et al.</i>	1995	4%	29%	61%	23%	24%	75%	80%	77%	97%			
Schwer & Clausen	1989							76%	78%	89%			
Magette <i>et al.</i>	1987	17%	41%	72%	51%	53%	86%						
Barker & Young	1984										99%		
Young <i>et al.</i>	1980							87%	88%				

Enhanced in-stream uptake and sequestration of nutrients and other pollutants

Research by the Stroud Water Research Center has concluded that forested buffer systems, as opposed to grassed systems, provide enhanced *in situ* (instream) contaminant sequestration and degradation primarily due to increased biological activity. The researchers noted that increased nitrogen attenuation and pesticide degradation were particularly associated with forested stream buffers (Sweeney et al., 2004).

Reduced stream bank erosion

The root systems associated with vegetated buffers protect and support the banks and other critical parts of a stream’s morphology, allowing it to resist erosive forces and remain stable. The vegetation’s roots hold the riparian lands in place, maintaining the hydraulic roughness of the bank, slowing flow velocities in the stream near the bank. Root systems of woody shrubs and trees do a better job of anchoring soils—a function turf grass cannot do effectively (NRC, 2002).

Enhanced habitat for fish and other aquatic organisms by moderating water temperatures

Buffers also regulate stream temperature through shading, important for healthy habitat. Studies have concluded that removal of streamside vegetation can result in a temperature increase of 6 to 9 degrees Centigrade (Leavitt, 1998). A Pennsylvania study found increases from 4 to 9 degrees Fahrenheit which is the equivalent of moving the stream over 400 miles south (Klapproth, and Johnson, 2000). Also, riparian vegetation moderates stream temperature reducing the daily and seasonal fluctuations in stream temperature. The heating up of a stream reduces the oxygen carrying capacity of the waterway, harming stream life that is temperature-sensitive. Klapproth and Johnson also noted water temperatures are important in regulating phosphorus concentrations when water reaches above 60 °F, phosphorus is more readily released from its sediment hosts and dissolved into the stream as a pollutant. Increased water temperatures also produce heavy growth of filamentous algae (from increases of 9 °F), encourage the growth of parasitic bacteria, and can adversely affect benthic organisms.

Meyer et al. (2005) noted that not only the presence but also the size of forested stream buffers have a profound impact on a stream's ability to support trout populations. Researchers found that when forested buffer widths were reduced from 100 feet to 50 feet, stream temperatures increased 2.9 °F to 4.2 °F while fine sediments increased 11%. Although these changes may appear small numerically, they resulted in an 81-88% reduction in young trout populations.

Enhanced habitat for fish and other aquatic organisms by providing woody debris

The rich habitat adds to the organic food base and increases biological diversity and productivity of stream communities (Sweeney et al., 2004). In small upland streams as much as 75% of the organic food base may be supplied by dissolved organic compounds or detritus such as fruit, limbs, leaves, and insects that fall from the forest canopy (Welsch, 1991). Benthic organisms feed on the detritus, forming the basis of the food chain (Sweeney et al., 2004).

Clearly, protecting existing and restoring lost forested stream buffers will have profound impact on the health and integrity of waters of the Commonwealth. We believe that the science supports an expanded set of requirements to assure ecological integrity and restoration while sustaining, and even enhancing, economical activity. To that end, we have devised the following set of technically-based recommendations for stream buffer protection and restoration as part of the Commonwealth's Chapter 102 revision process.

Recommendations

In order to achieve the goals set forth in the federal Clean Water Act and Pennsylvania's Clean Streams Law, we recommend all streams be afforded a minimum 100 horizontal foot forested buffer extending from the top of the stream bank on either side of the stream (unless the floodplain exceeds this distance, in which case, the floodplain area is used), with additional areas as outlined below:

- First and Second order streams: An additional 50 feet from the top of the bank would be required to more fully protect these vulnerable but very valuable waterways.
- Special Protection Waters: An additional 200 feet from the top of the bank would be required to ensure greater protection for the best streams in the Commonwealth. Additional protection beyond that ordinarily required should also be provided to streams that are

tributaries to Special Protection streams (if the tributary is not already classified EV or HQ) in order to ensure protection of the downstream Special Protection water quality.

- Steep Slope: Additional distances would be added based on the following formula: add 10 feet if slope is 10-15%; 20 feet if slope 16-17%; 30 feet if slope is 18-20%; 50 feet if slope is 21-23%; 60 feet if slope is 24-25%; and 70 feet if slope exceeds 25%.
- In areas where development is proposed and a forested buffer does not exist, Chapter 102 would require full restoration using native plant species.
- In areas where there are Threatened & Endangered Species concerns, irrespective of the size and vegetation type requirements for buffers, the Department shall ensure that buffers are of a size and vegetation type necessary to protect state or federal threatened or endangered species and their habitat. To meet this requirement, buffers may be wider than the minimum widths or be maintained in a vegetation type other than woody vegetation.
- Language establishing a mechanism in which buffers are afforded some form of permanent protection.
- Areas containing Impaired Waters: Developers in impaired waters would have the option of either choosing to extend the buffer an additional 50 feet from the top of the bank beyond the other requirements **or** to implement the following improvements in the buffer area **and** in the developed area adjacent to it:
 - Improvements to the buffer area:
 - 50% or more of trees planted in the buffer must be of two inch caliper or greater, and tree species composition should consist of a diverse mix of native tree species planted in the proper hydrologic zone as listed in Appendix B of the Pennsylvania Stormwater BMP Manual.
 - Applicants must develop and implement an operation and maintenance plan for the buffer to be approved by DEP. The O&M plan must require maintenance activities for a minimum of 5 years, include measures to control invasive species, deer and rodent damage, and require replacement of all deceased trees for a minimum of the first 3 years.
 - Applicants must provide permanent protection of riparian buffer area by placing a conservation easement on the property.
 - Improvements to adjacent area:
 - Achieve no net increase in pre-development to post-development volume, rate and concentration of pollutants in water quality using alternative site design, low impact development principles such as limiting disturbance, infiltration BMPs and other environmentally sound stormwater BMPs.
 - Through deed restriction for all lots sold and as a condition of any final land development plan approval, ban the use of fertilizers, pesticides, herbicides or other chemicals on lawns and other portions of the property, except that herbicides may be used for invasive species control in riparian buffers if part of an O&M plan approved by DEP.
 - Developments must replace any trees removed during the development process with the caliper of removed trees approximately matched by the sum of the caliper of replacement trees (ie four 3 inch trees replace one 12 inch tree).

We also believe that a forested buffer be defined as: An area of diverse species of native woody vegetation (trees and shrubs) that is adjacent to a body of water which is managed to maintain the integrity of stream channels and shorelines, to reduce the impact of upland sources of

pollution by trapping, filtering, and converting sediments, nutrients, and other chemicals, and to supply food, cover, and thermal protection to fish and other wildlife. A riparian buffer area is considered forested if the existing vegetation consists of at least 66% woody vegetation.

Chapter 102 should also explicitly state that the buffer zone is a non-disturbance area where disturbance of vegetation or soil is limited to restoration activities or other activities that minimally disrupt existing tree cover and vegetation and soil mantle. No new structures shall be allowed in the buffer zone. Any minimal impact uses proposed for the buffer zone must be permitted by DEP and must be offset by buffer improvements or extension of the buffer zone.

Please note, we intend to propose buffer protection language for areas including nontidal wetlands, vernal pools, lakes and ponds at a later date in order to perform additional research on practices in other states and review the studies that have been conducted.

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