



July 1, 2013

Radnor Township Board of Commissioners
301 Iven Avenue
Wayne, PA 19087

Dear Commissioners,

I was pleased to have been a participant in the Stormwater Citizen Advisory Committee process in my role as the Delaware Riverkeeper and as a resident of the Township. The information shared, learned and discussed was informative and helpful in the deliberations of the committee.

I support the implementation of a stormwater fee to help the Township address the adverse impacts that result from human-induced flooding and flood damages as long as the funds are used wisely and in a way that enhances our community and does not detract from it. But, I am troubled by some of the perspectives included in the materials from AMEC to the Board of Commissioners regarding implementation of such a program.

I offer the following comments on the materials presented to the Commissioners as included in the materials from the June 24, 2013 meeting.

A focus on simply managing stormwater runoff rather than avoiding it is a misplaced focus of the proposed stormwater utility program, particularly when one of the primary management strategies is merely detention, which actually can exacerbate flooding and flood damages.

The June 15, 2013 memo, subject "Stormwater Fee Rate Options - Option 3 Additional Information," suggests that credits to incentivize implementation of stormwater BMPs should "focus on those activities which help to avoid future costs to the program and help to manage runoff via structure stormwater BMPs." The premise that "managing" runoff via structures is the best practice for avoiding and reducing the harms of stormwater management is misplaced. In fact, the best way to help the township avoid costs is to, whenever and wherever possible, prevent stormwater runoff from occurring at the place where it is - or would be - generated, and to remove from the path of harm structures that are located in floodplains (and therefore will be assured future flooding and flood damages as long as they remain). Asserting that stormwater structures that "manage stormwater" is the most efficient

mechanism for dealing with the Township's stormwater issues sets the program immediately on a misplaced path of structural construction and increasing impervious cover. And, it allows for the highly flawed assertion that detention basins are a best management practice rather than a historic and present source of the problem for many. The focus on the stormwater utility program should, to the greatest degree possible, be focused on the use of nonstructural strategies for preventing stormwater runoff, and to the degree structures are used, they should be true best management practices designed to prevent runoff through infiltration.

Reducing impervious cover from existing development in order to avoid stormwater runoff should be included in the incentives initiative of any Stormwater Utility created by the Township.

Reducing impervious cover and instead ensuring mature wooded habitats that effectively avoid and infiltrate runoff is the best priority practice for preventing stormwater runoff. To the degree there is runoff from development, mandating the use of infiltration practices and vegetated BMPs should be the priority first options. With regard to new development, these approaches are best mandated through other Township regulatory programs. As with new development, the reduction of impervious cover and the use of strategies that prevent runoff are effective for reducing flood flows and flood damages resulting from existing development. For existing development, prevention as well as infiltration can be properly incentivized in the stormwater utility program.

While I recognize that this is a program for securing funds in order to implement stormwater practices, it is important that those funds are invested in the best solutions for avoiding and minimizing runoff as close to the source as possible, and that structures which detain, discharge and simply move around runoff are a last resort.

The incentive program could be a mechanism for reducing runoff by reducing impervious surface from existing development. Why this nonstructural strategy is given no consideration in the materials provided to the Commissioners is a mystery. Commercial facilities could be given credits for removing unnecessary impervious cover and replacing it with woodlands and wetlands that prevent runoff. Both commercial and residential properties could be given credits for replacing their lawns, a significant source of runoff, with healthy ecological habitat dominated by native trees and shrubs.

Lawns are an impervious surface that can be positively addressed through the Stormwater Utility incentives program.

Lawns take up a large area in Radnor Township – on commercial, educational, municipal and residential sites. Lawns have been documented to be a significant source of runoff, preventing the infiltration of water in much the same way pavement does. By comparison, areas dominated by trees and shrubs successfully prevent runoff and encourage infiltration and over time and space have a significant impact in preventing flooding and flood damages.

Lawns are a significant source of stormwater runoff because they have very high imperviousness, often close to that of pavement. Lawns generate significantly more stormwater runoff than meadow, scrub vegetation or forests.ⁱ

“[M]any urban soils and surfaces have much higher bulk densities (Table 1). The highly disturbed soils of urban lawns range from 1.5 to 1.9 gms/cc, while athletic fields and fill soil typically range from 1.8 to 2.0 gms/cc. These bulk density values approach the density of concrete (2.2 gms/cc).”ⁱⁱ

For Radnor Township, where there is a very high level of lawn, it seems important to capture that impervious area in the Stormwater Utility program – initially the incentives could be used to secure the replacement of lawns with healthy habitats that avoid runoff; in the long term, the utility charges being contemplated should calculate and consider lawns as impervious surfaces. In addition to increasing the success of the program at securing practices that reduce and avoid runoff, it is important to capture the concept as a matter of equity between parcels maintained largely in forest which prevent runoff versus those maintained in lawn which are actual contributors to the flooding problems of the Township. In addition, including the lawn concept in the Stormwater Utility program provides an important mechanism for educating homeowners about the issue. Including lawns in the Stormwater Utility program provides an important path for incentivizing the revegetation of lawns by homeowners and commercial sites alike.

Just by way of demonstration of the stormwater value of trees:

- ✓ A loss of tree cover over a 15 year period (1985 to 2000) in Bucks, Montgomery, Delaware, and Chester Counties, Pennsylvania and Mercer, Burlington, Camden and Gloucester Counties, New Jersey, reduced the ability of the Delaware watershed region’s urban forests to “detain almost 53 million cubic feet of stormwater, a service valued at \$105 million.”ⁱⁱⁱ
- ✓ Existing tree cover was found to prevent 65 million cubic feet of stormwater runoff in the Big Timber Creek watershed (New Jersey) saving the community \$3.3 billion in stormwater infrastructure.^{iv}
- ✓ In the Cobbs Creek watershed (Pennsylvania) existing tree cover prevented 20 million cubic feet of stormwater runoff saving the community \$1 billion in stormwater infrastructure.^v
- ✓ In the Mill Creek watershed (New Jersey) existing tree cover prevented 6.7 million cubic feet of stormwater runoff saving the community \$350 million in stormwater infrastructure.^{vi}
- ✓ And in the Frankford-Tacony watershed (Pennsylvania) existing tree cover prevented 38 million cubic feet of stormwater runoff saving the community \$2 billion in stormwater infrastructure.^{vii}

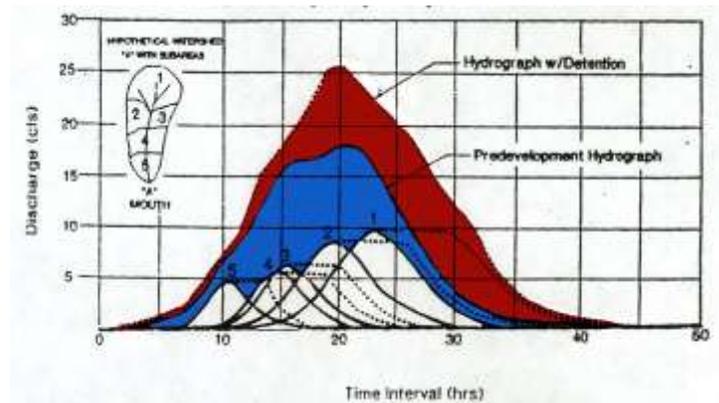
Detention Basins are not an effective solution for addressing the harms of stormwater runoff; they actually contribute to the problem and therefore should not be among the list of identified “best management practices” focused on in this program.

To the extent the Stormwater Utility program incentivizes the implementation of structural solutions for stormwater, it should include only those that reduce the volume and improve the quality of stormwater runoff – something detention basins DO NOT do. Detention basins gather runoff, hold it for a brief period, and discharge their increasing volume of water and associated contaminants directly to the local stream. As such, they are a part of the problem, and should not be considered a best management practice or a priority solution for the Township’s Stormwater Utility program.

The net effect of detention basins operating in a watershed is to further compound flooding problems. The releases from the basins extends the time over which peak flows from tributaries and detention systems merge, causing an increase in instream volume over a longer period of time.^{viii} The result is that downstream flooding is exacerbated -- flood flow is increased and extended. And the end result can be more flooding and flood damages over a longer period of time.

Detention basins only focus on the peak flow of runoff. Detention basins are designed to collect and hold stormwater for a period of time and then release it directly into the local stream through a pipe sized to pass flows at what are calculated to be pre-development, or pre-determined, peak rates. Detention basins fail to address the increased volume of runoff or the combined peak flow of runoff that enters streams from detention basins and development.

The detention-based approach to addressing stormwater runoff causes a greater volume of water to be discharged to stream systems over a longer period of time and usually at a greater velocity than is the natural condition. Detention basins do nothing to decrease the greater quantity of runoff from a developed site or watershed. Despite the fact that the pre-development peak rate of runoff may be maintained (or even reduced), because there is an increasing VOLUME of runoff, the detention basin is directly contributing MORE water to our streams over a LONGER period of time thereby increasing and extending the peak flow in the creek and that is imposed on communities.



Hydrograph showing cumulative effect of detention basins in a watershed

Furthermore, the damages that accompany the more frequent, smaller storms are growing. The 2-year storm in a natural watershed produces a flood that fills the stream to the top of its banks (“bankfull flood”).^{ix} In developing or developed watersheds, because of the increased

volume of runoff, a more frequent storm can cause a bankfull flood, while 2 to 5-year storm flows exceed the carrying capacity of the stream and consequently jump the stream's banks and can cause extensive flood damages. As a result, now the 2 to 5-year storms cause a lot of flood damage and channel erosion, and contribute significant levels of nonpoint source pollution.^x Most detention basins are designed to control only the 10 to 100-year frequency storms. Detention basins generally fail to impact the 2 to 5-year storm -- having pipes that pass those flows unchecked to the stream. These smaller storms cause many of the stormwater runoff problems that need to be addressed, particularly as development increases and damage caused by the smaller storms grows. Stormwater strategies that prevent and/or infiltration rainfall are much more effective at preventing the human induced contribution to flooding from these smaller storms.

While the AMEC report rightfully identifies pollution and groundwater recharge as important issues of focus when discussing stormwater runoff, it fails to consider that detention basins do not address these issues. Recharge is prevented by a detention basin -- they are meant to detain, not infiltrate. And only special additions to detention basins seek to address quality issues -- sometimes basins have them and sometimes they do not, but they are never as effective at removing the pollution as preventing the pollution in the first instance is or infiltrating the contaminated water through soil.

Input on the Draft Ordinance Provided:

The draft ordinance provided fails to include avoidance and nonstructural strategies as priority goals -- that needs to be remedied. These concepts should be included in both the Whereas clauses as well as the appropriate substantive elements of the ordinance.

Avoidance of runoff, and nonstructural strategies for addressing stormwater runoff needs to be given high profile and support in the ordinance, and detention basins should be removed as an identified BMP or kind of structure for which a facility would be given any credit. It is particularly ridiculous to be giving credit for the creation of a structure -- in this case detention basins -- that science, engineering and experience have shown make flooding, flood damages, flood velocity, and flood flows worse, not better.

Section 2, the statement of findings, only references the AMEC work and that of Chagrin Valley, and yet it was relatively recently that the Township invested in and secured some very important engineering, findings, and study on the issue of stormwater runoff from Cahill Associates; this body of work should also be referenced in the ordinance. It seems rather disingenuous for AMEC to only suggest that their work and that of Chagrin be included, and it absolutely fails to ensure that the benefit of the nonstructural, BMP and avoidance approaches brought forth by the Cahill Associates work be given due consideration.

The ordinance suggests that there was broad public participation by virtue of the Stakeholder Advisory Committee. While I was a member of that committee and appreciated its value to the process, I do not consider this to have been a truly public process: only committee members were generally present; the meetings were not broadly advertised, nor was public participation and presence encouraged; the meetings were specifically not televised for general

public viewing; and there was no public participation period during the meetings that would have ensured the public an opportunity to participate and help inform the discussion. So I think that language needs to be modified.

The definition of impervious area in Section 3 of the draft ordinance needs to include "lawns/lawnsapes." In light of the increased source of runoff that lawns are, and that their level of imperviousness and therefore runoff, can rival that of pavement, lawns should be included in the definition of impervious area on a site. And if that inclusion is not made now due to limitations on the level of site detail and calculation that has been secured, then it should be planned for future iterations of the ordinance.

In order to increase the overall effectiveness of the Township's Stormwater Program and the implementation of the stormwater fee, I believe it is important that the Township include incentives for reducing impervious surfaces, including lawnsapes, that scientific research has documented can contribute almost as much stormwater runoff volume as paved surfaces. An incentives program that encourages the removal of lawnsapes and other defined impervious areas, and their replacement with healthy habitats that avoid and infiltrate runoff, is an important addition that will enhance the success of the Township's stormwater efforts.

In order to ensure the program is embraced by all members of the Radnor Township community, it is important that everyone benefits from the program -- not just on a Township-wide level, but on a community level. All areas of the Township, each of its watersheds, have areas where stormwater runoff is having an adverse impact and so each of the Township's watersheds and communities should benefit from their investment in the program. Therefore, I recommend that there be an enforceable commitment which ensures that each of the Township's communities will benefit from the program by ensuring that the funds raised have to be invested, to some substantial and defined degree, in each of the Township's watersheds. Not only will this contribute to the equitable implementation of the program, it will also provide an opportunity for all residents to see and experience the benefits of the program in their own communities, thus ensuring there is growing community support for this ongoing financial investment.

I would like to reiterate the importance of making some modifications/enhancements to the basic fee structure. In the first iteration of the stormwater fee, should it be instituted, I believe strongly that the program needs to include fee forgiveness for those residents that have limited incomes and so for whom a fee would be a significant hardship.

The program would be enhanced in its effectiveness and community support if it were to include township-wide education opportunities about stormwater runoff (both quantity and quality issues) and how each individual homeowner can make personal and property choices that reduce runoff. An education component would be an effective element of the program, both near-term and long-term, and help inform any future incentives initiative that may be implemented.

I do apologize that this comment is not more detailed. I am about to leave for vacation but wanted to ensure I made some of these critical points to ensure you had them for your deliberations. If time allows, I will be happy to supplement upon my return.

With Best Regards,



Maya K. van Rossum
the Delaware Riverkeeper

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- ⁱ DNREC and Brandywine Conservancy, Conservation Design for Stormwater Management: A Design Approach to Reduce Stormwater Impacts from Land Development and Achieve Multiple Objectives Related to Land Use, September, 1997, p. 4-16. See also The Impact of Soil Disturbance During Construction on Bulk Density and Infiltration in Ocean County, New Jersey, Prepared by Ocean County Soil Conservation District, Schnabel Engineering Associates, and USDA Natural Resources Conservation Service, March 2001, Rev 06/01/01.
- ⁱⁱ The Compaction of Urban Soils, Technical Note #107 from Watershed Protection Techniques. 3(2):661-665.
- ⁱⁱⁱ American Forests. 2003. *“Urban Ecosystem Analysis Delaware Valley Region: Calculating the Value of Nature.”* March 2003 (The value attributed to these natural systems is based upon what it would have cost the region to construct basins and other solutions for intercepting the runoff.)
- ^{iv} Ibid.
- ^v Ibid.
- ^{vi} Ibid.
- ^{vii} Ibid.
- ^{viii} Bruce K. Ferguson, Stormwater Infiltration, CRC Press, 1994, p. 165
- ^{ix} Thomas Scheuller, Controlling Urban Runoff, a Practical Manual for Planning and Designing Urban BMP's, Dept. of Urban Programs Metropolitan Washington Council on Governments, 1987.
- ^x Pennsylvania Handbook of Best Management Practices for Developing Areas, Prepared by CH2MHILL, Spring 1998, p. 6-2