DELAWARE RIVERKEEPER NETWORK

VIA Email & First Class Mail

August 29, 2014

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Engineering District 6-0
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Re: An assessment of the ecological, historical and scenic impacts of replacing the Headquarters Road Bridge over the Tinicum Creek. Prepared by Maya van Rossum, the Delaware Riverkeeper, Jon Nystedt, Delaware Riverkeeper Network Restoration Specialist and Christine McLaughlin, Ph.D.

Dear Ryan:

The Delaware Riverkeeper Network has reviewed the potential impacts of replacing the Headquarters Road Bridge over the Tinicum Creek as proposed by the Pennsylvania Department of Transportation (PennDOT). It is clear from our review of the materials and our knowledge of aquatic science that the proposed action would have a deleterious and damaging impact on the quality, flows and habitats of the Tinicum Creek. It is equally clear that PennDOT has failed to consider the environmental and/or social impacts of its bridge replacement proposal, as mandated by the National Environmental Policy Act (NEPA).

Although PennDOT has repeatedly stated that it is not ready to receive comments regarding environmental or social impacts, PennDOT described the open house held on July 30, 2014 as part of the NEPA process. Consequently, we believe it critical to protecting Tinicum Creek and the surrounding

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watershed, as well as our legal interests in the matter, to submit these comments addressing NEPA issues.[1]

Risks to Tinicum Creek Posed by Replacement Proposal

Constructing a new larger bridge over Tinicum Creek will harm the aquatic ecosystem and pose risks to the physical, chemical and ecological quality of Tinicum Creek, an exceptional value waterway within the designated Lower Delaware National Wild and Scenic River system.

The entire Tinicum Creek watershed is ranked as first priority for protection in a countywide study (Rhoads and Block 1999[2]) based on the large numbers of rare plant and animal species and the exceptional quality of its waters. Four hundred plant species and over 100 nesting bird species inhabit the watershed. The proposed new larger bridge replacement will have direct and indirect, and short-term and long-term adverse effects on water quality, river hydraulics, and aquatic organisms of the Creek.

Threats to the Creek from Construction of a Replacement Bridge

The greatest threat to the stream during construction will be fine sediment pollution which can result in direct mortality, reduced reproductive success, and detrimental changes in the food supply (Waters 1995, Owens et al. 2005). A study conducted in Pennsylvania found that even with sediment control techniques, streams impacted by highway construction carried 5 to 12 times more sediment (Weber and Reed 1976). The effects of fine sediment on stream biota have been heavily documented (Cederholm and Reid 1987; Morantz et al. 1987; Scrivener and Brownlee 1989; Argent and Flebbe 1999; Scruton and Gibson 1993; Waters 1995; Wheeler et al. 2005). Increased sedimentation causes turbidity in the water column which suffocates and shades aquatic plants (Waters 1995), damages respiratory structures and reduces habitat for macroinvertebrates (Lemly 1982, Lenat et al. 1981), and reduces fish populations through impaired visibility and reductions in prey abundance (Bruton 1985, Berkman and Rabeni 1987, Armstrong et al. 2003).

Furthermore, sediments often contain elevated levels of contaminants and nutrients resulting in eutrophication of rivers and human health concerns (i.e. higher levels of pathogens) (Owens and Walling 2002, Blake et al. 2003). While the construction impacts may be temporary at the Headquarters Bridge location, these sediments can travel long distances in the stream channel and be deposited in downstream pools and riffles resulting in long-term regional damage (Wellman et al. 2000). These kinds of construction impacts were visible during PennDOT's 2011-2012 bridge replacement project at Cafferty and Headquarters Road. Despite preventative measures, a tributary of the Tinicum Creek was often discolored because of heavy sediments. The Delaware Riverkeeper Network received numerous complaints from neighbors regarding the problem and videotaped the impacts.

Furthermore, construction activity near the stream will inevitably result in damage to riparian vegetation through soil disturbance and/or purposeful removal of vegetation for access. Riparian vegetation is critical for stream watershed protection and these buffers perform many important functions

[1] We also wish to reiterate that the NEPA process must be undertaken concurrently with both the NHPA Section 106 and DOTA 4(f) review processes. To undertake these reviews separately is not in keeping with the letter or spirit of the law.

[2] For PennDOT's convenience, a complete list of references is provided at the end of this letter.

for the stream including pollution filtering, stormwater reduction, and erosion prevention. The Delaware Riverkeeper Network also received complaints from a resident citing erosion of their property downstream of the Cafferty Road bridge replacement project resulting from the loss of vegetated streamside buffering.

Threats to the Creek from a Larger Replacement Bridge

In addition to the harms from construction, a new, larger bridge will have long-term and enduring detrimental impacts including those generated from the physical presence of the bridge, from the chemical pollutants associated with automobile traffic and from the stream channel alterations that will result.

1. Threats to Ecological Environment from a Larger Replacement Bridge

Construction of a new bridge with a larger disturbance footprint (as compared to a rehabilitated bridge designed to remain within the existing bridge footprint) will result in physical habitat impacts that are detrimental to stream health by virtue of its encroaching onto the floodplain, damaging or destroying riparian areas, and resulting soil compaction due to the increased use of heavy equipment (Wheeler et al. 2005).

The larger bridge surface will collect a variety of chemical pollutants from automobile traffic and deicing salt at a larger volume due to the increased road surface as well as the increased traffic that will result. Pollution loads in runoff from road surfaces include metals such as zinc, iron, lead, cadmium, nickel, copper, and chromium, petroleum and gasoline, and deicing salt (Wheeler et al. 2005). The concentrations of these contaminants in streams have been shown to be positively correlated to the volume of traffic (Callender and Rice 2000), supporting the contention that a larger two-lane bridge will have a greater more severe impact than the current one lane historical bridge. For example, levels of lead and zinc in fish and macroinvertebrates have been shown to be locally related to the amount of traffic at upstream highway crossings (Van Hassel et al. 1980).

Changes to the road crossing and bridge as being proposed by PennDOT are likely to increase the impact of floods in the area. Without the specific plans of the proposed new bridge, it is hard to specifically identify the kind, quantity and quality of those impacts, however, based on scientific studies, a new bridge will most likely result in changes to the turbulence, velocity, streambed gradient and water depths (Votapka 1991, Wall and Berry 2004, Coffman 2005). Currently the 25-year flood event overtops the roadway adjacent to Tinicum Creek, and therefore any additional fill placed within the flood way will increase localized flooding and also increase the frequency with which pollution from the neighboring road surface is washed into the Tinicum Creek.

In addition to, and as a result of, the water quality and hydrologic impacts of the new proposed bridge, there will be impacts to biological stream communities of both macroinvertebrates (Chen et al. 2009) and fish (Pepino et al. 2012). Aquatic organisms have a more difficult time avoiding the impacts of construction than terrestrial animals because their movements are confined to the stream channel. Providing adequate fish passage is important because the movement of fish throughout the watershed is vital for their survival. Restriction or blockage of fish movement can be caused due to different water velocities, water depths, turbulence, and loss of habitat. Many studies have recognized that road crossings, as well as the differential impacts of various construction techniques, can reduce or eliminate

fish passage (Warren and Pardew 1998, Sheer and Steel 2006).

2. Threats to Scenic and Historic Environment from a Larger Replacement Bridge

A new and larger bridge will negatively impact scenic and historical values of the area, such as the installation of significant permanent structures and stream control devices adjacent to the bridge – devices that will also have adverse impact on stream flows, quality and habitats if constructed without due attention to stream protection. PennDOT has provided no substantive information on the proposed features and site disturbance of a new and larger bridge, for instance the length and height of wing walls; length and height of walls or slopes needed for widened roads; riprap slopes or other revetment devices; stone scour protection; and the size of the area to be impacted during and after construction.

A new, two-lane bridge will destroy the unique experience of traveling through the Ridge Valley Historic District, significantly threatening the existing scenic and historic character of the community and the region and the designations provided at the federal and state level to protect them.

Bridge Rehabilitation Will Protect the Ecological, Historic and Scenic Values of Tinicum Creek and the Community

A rehabilitated Bridge will ensure protection of the ecological, historic and scenic integrity that is the underpinning of the historic and environmental designations given to the Creek, River and community.

- Rehabilitating Headquarters Road Bridge will best protect natural stream channel bottom that currently exists, promoting existing beneficial fish passage and avoiding adverse impacts to flows. There will be less likelihood of adverse impacts during a rehabilitation project for biological stream communities of both macroinvertebrates (Chen et al. 2009) and fish (Pepino et al. 2012).

- Sediment pollution loads during rehabilitation of the existing bridge are likely to be smaller than during construction of a new larger bridge because less area is disturbed, protecting existing and healthy downstream pools and riffles from sedimentation (Wellman et al. 2000).

- Construction equipment for a rehabilitation project will have a lesser impact than for a larger replacement bridge, assuming utilization of environmentally-sensitive construction techniques. Rehabilitation has the potential to avoid the use of large construction equipment that can result in the compaction of soils which affects infiltration rates (OCSCD et al. 2001, Pitt et al. 2008, Gregory et al. 2006, Law et al. 2009); therefore a rehabilitated bridge provides better opportunity for the survival of vegetation in uncompacted soils, and limits negative impacts from flood waters by maintaining healthy infiltration and evapotranspiration.

- Stream alignment will need to be addressed whether or not the Bridge is shifted. A rehabilitation project presents significant opportunity for utilizing Natural Channel Design upstream of the Bridge to guide the Creek towards the openings in the existing Bridge. Natural Channel Design can also be used to improve in-stream habitat (USDA NRCS 2007, Baldigo et al. 2008). Riparian plantings associated with Natural Channel Design can improve the riparian habitat as well as in-stream habitats. In-stream techniques such as J-hook Vanes and Cross Vanes could be used to re-direct the creek flows to those areas most desirable for stream flows, to reduce bank erosion,

and to guide the creek towards the existing bridge opening (USDA NRCS 2007).

Since minimal site design from PennDOT has been presented to date, it is difficult to discuss specifics, but caution is warranted because structural stream control techniques that control the flow and turbulence only at the Bridge, for instance wing walls, riprap slopes, and stone scour protection, miss out on the opportunity to improve the alignment, channel integrity, water quality and habitat provided by Natural Channel Design and instead can and will result in significant damage to stream integrity, quality, habitat and flows.

PennDOT has argued that stream alignment is one reason for the need to re-build the Bridge in a shifted location: that the Creek has moved away from the historic bridge openings and is now aligned towards an existing wing wall causing scour. However, because the Creek will try to continue to meander over time within the floodplain (Hickin 1974), simply shifting the bridge will not solve the problem. Any bridge location needs upstream alignment control to keep the Creek aligned with the bridge openings; significant opportunity exists upstream for the use of Natural Channel Design, as shown in Diagram 2. Therefore stream alignment issues are not a valid reason to shift the bridge away from its historic location.

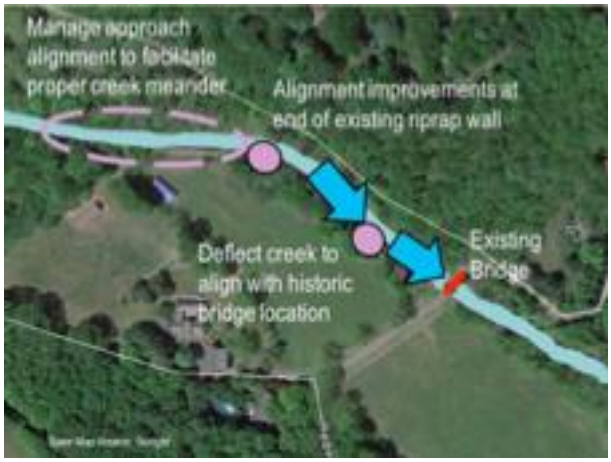


Image 1: Natural Channel Design Opportunities

Reestablishing natural flow regimes is important for undoing harm caused by inappropriate development and land management practices of the past and the present. Reestablishing natural flow regimes will also provide significant and enduring long term benefits to neighboring, downstream and even upstream communities.

Short-term objectives are the focus of the proposed new bridge construction and include things such as concrete structures to prevent increased erosion that will not fully mitigate the hydrologic and biological consequences of bridge construction. Effective mitigation such as stream restoration and upstream realignment would result in a reconstruction of the physical channel elements that resemble undisturbed channels, additional habitat for self-sustaining biotic communities, increased water quality, and long-term improvements of stream conditions.

Without Natural Channel Design employed upstream, the wing walls and hardened revetment (such as riprap) for a new and larger bridge would need to be significantly enlarged from existing,

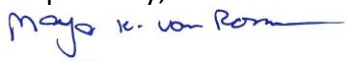
resulting in larger ecological harm near term and long term. Revetment for a new and larger bridge might include riprap (large angular stones placed in layers), partially grouted riprap, rock-and-wire mattresses, gabions, pre-cast articulating concrete blocks, rock-filled trenches, windrow revetments, used tire revetments (USDOT Federal Highway Commission, 2014). The stream alterations that would result would dramatically increase and magnify the detrimental flow, habitat and quality impacts of the project; it would also decrease the area of natural streamside habitat available for enhancing stream health and mitigation stream harms. The impacts of hardened bank protection are also visually not in character with the scenic and historical nature of the bridge site.

Conclusion

PennDOT has failed to consider or discuss these negative impacts during this critical stage of design and decision-making. At no point in the process to date has there been individual or comparative consideration of the environmental, scenic, historic, or community impacts that would result from a no-action alternative versus a rehabilitation alternative versus a replacement alternative; what little information has been provided demonstrates a serious level of harm to all of these important community attributes. As such, PennDOT is failing to fulfill its NEPA obligations and failing to give these important considerations their due.

Please include this comment in the official consulting party record. Thank you.

Respectfully,



Maya van Rossum
the Delaware Riverkeeper

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