

## MEMORANDUM

VIA EMAIL

To: Ed Rodgers, Delaware Riverkeeper Network

From: Mary Paist-Goldman, P.E., Princeton Hydro

Subject: Report on impacts from various PennDOT bridges within  
Tinicum Township, Bucks County, Pennsylvania  
Princeton Hydro Project No. 1020.017

Date: February 15, 2016

Pursuant to your request, I have completed a comprehensive review of three PennDOT bridges. These include the following:

- Tettermer Road ó Headquarters Road Bridge
- Cafferty Road ó Headquarters Road Bridge
- Sheep Hole Road ó Headquarters Road Bridge

My review included materials researched previously by Mr. Paul Woodworth and Mr. John Miller of our office together with information provided by you directly regarding the planned work at Sheep Hole. The bridges at Tettermer Road and Cafferty Road were replaced subsequent to the reports prepared by Mr. Woodworth and Mr. Miller. In addition, to prepare this report I conducted a site visit to all three bridges in question on January 19, 2016. Photos from the site visit are attached to this report.

Below are the key findings for the bridges in question:

### Tettermer Road Bridge

- As stated in the applications and on the drawings submitted by PennDOT, the Tettermer Road bridge project involved 0.97 acres of land disturbance. Mr. Woodworth of Princeton Hydro completed a review of the limit of disturbance based on the drawing and determined that the actual Limit of Disturbance shown is 1.53 acres. The revised delineation is attached to this memo for reference. Since the Limit of Disturbance exceeded one acre, a NPDES permit should have been obtained. All NPDES permitted projects require a Post Construction Stormwater Management (PCSM) plan.

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- Both a Thermal Impact analysis and an Antidegradation analysis module are required for NPDES permitted projects, both of which were not completed/submitted, likely because PennDOT never applied for the NPDES permit.
- According to PennDOT's Policy on Anti-degradation and Post-Construction Stormwater Management dated December 27, 2007, a PCSM is required for this project because there was an approved Delaware North Act 167 Plan dated January 16, 2002 at the time of the application regardless of the project size.
- The PennDOT Anti-degradation policy states that EV waters warrant Level 4 tier PCSM plans, which includes no increase of post-construction runoff volume and water quality analyses for TSS and TP.
- PennDOT stated there would be no increase in impervious cover from the project. Based on Princeton Hydro's review of the design plans for the project, the increase in impervious cover for the Tetterer Road project was approximately 3,001.9 square feet; an increase of 16.7%.
- Mr. Christian Volt of PADEP requested information on the PCSM for the project. To our knowledge no PCSM was ever submitted.
- The velocities for the 10-year storm event noted on the PennDOT plans showed an increase from existing conditions of nearly two feet per second.

#### Cafferty Road Bridge

- As stated in the applications and on the drawings submitted by PennDOT, the Cafferty Road bridge project involved 0.84 acres of land disturbance. Mr. Woodworth of Princeton Hydro completed a review of the limit of disturbance based on the drawing and determined that the actual Limit of Disturbance shown is 1.117 acres. The revised delineation is attached to this memo for reference. Since the Limit of Disturbance exceeded one acre, a NPDES permit should have been obtained.
- All NPDES permitted projects require a Post Construction Stormwater Management (PCSM) plan. The Tetterer and Cafferty Road bridge projects are no different.
- In terms of Alternative analysis, KCI provided two alternatives for Cafferty road, one of which was not constructible, ruling it out as an alternative and rendering the whole analysis flawed. No environmental impacts were assessed either as part of this alternatives analysis.
- PennDOT stated there would be no increase in impervious cover from the project. Based on Princeton Hydro's review of the design plans for the project, the increase in impervious cover for the Cafferty Road project was approximately 3,271.2 square feet; an increase of 21.5%.
- Mr. Christian Volt of PADEP requested information on the PCSM for the project. To our knowledge no PCSM was ever submitted.

- Widening the road impacted Little Tincum Creek downstream of the Cafferty Road bridge. At Cafferty Road, the wider road and retaining wall encroaches 2 - 3 feet into the stream (Sundale Creek, aka Little Tincum Creek) for approximately 200 linear feet, upstream of the crossing. Downstream of the crossing, the wider road, retaining wall and riprap revetment impacts the bank and encroaches into the channel for over 300 linear feet. This encroachment into the channel (i) degrades stream habitat and (ii) has caused bank erosion by constricting the channel and increasing flow velocities; and therefore, constitutes a violation of the anti-degradation status afforded to the Tincum Creek watershed. The velocities for the 10-year storm event noted on the PennDOT plans showed an increase from existing conditions of more than 11 feet per second. Photos of the site show the increase in erosion along the fence line downstream of the bridge.
- In addition, Princeton Hydro has previously identified manipulation of the hydraulic model to misrepresent proposed conditions on the part of PennDOT's design team. This manipulation resulted in reduced water surface elevations and velocities in the downstream reach below the Cafferty Road bridge. Details of the flaws are included in the declaration from Paul Woodworth dated July 12, 2011.
- The constriction leads to (i) degradation of stream habitat and (ii) increased flow velocity which scours the stream channel and devastates stream banks, stream shape, and stream stability. Both points are in violation of the PA-DEP's Antidegradation Best Available Combination of Technologies (ABACT) policy.

#### Sheep Hole Road (aka Burnt Mill) Bridge

The review of the Sheep Hole Road Bridge was limited to the site assessment and available documentation on the 106 review and the structural assessment completed in 2006. The bridge has a large opening for water to pass through currently and the hydraulics for the bridge will need to be assessed to determine potential increases in stream velocity and water depth resulting from any planned replacement. In addition, increases in impervious surfaces will increase water quantity from the site and impact temperature in the creek. As stated in the reviews of the Tettermer Road and Cafferty Road bridges above, there is a need for PCSM and ABACT to be employed in the design of the bridge repair or replacement plans.