



## MEMORANDUM

**TO:** PENNSYLVANIA DEPT. OF ENVIRONMENTAL PROTECTION, RADNOR TOWNSHIP, AND VILLANOVA UNIVERSITY

**FROM:** DELAWARE RIVERKEEPER NETWORK

**SUBJECT:** VALLEY RUN RESTORATION OPPORTUNITIES DURING UNIVERSITY CONSTRUCTION

**DATE:** MAY 11, 2016

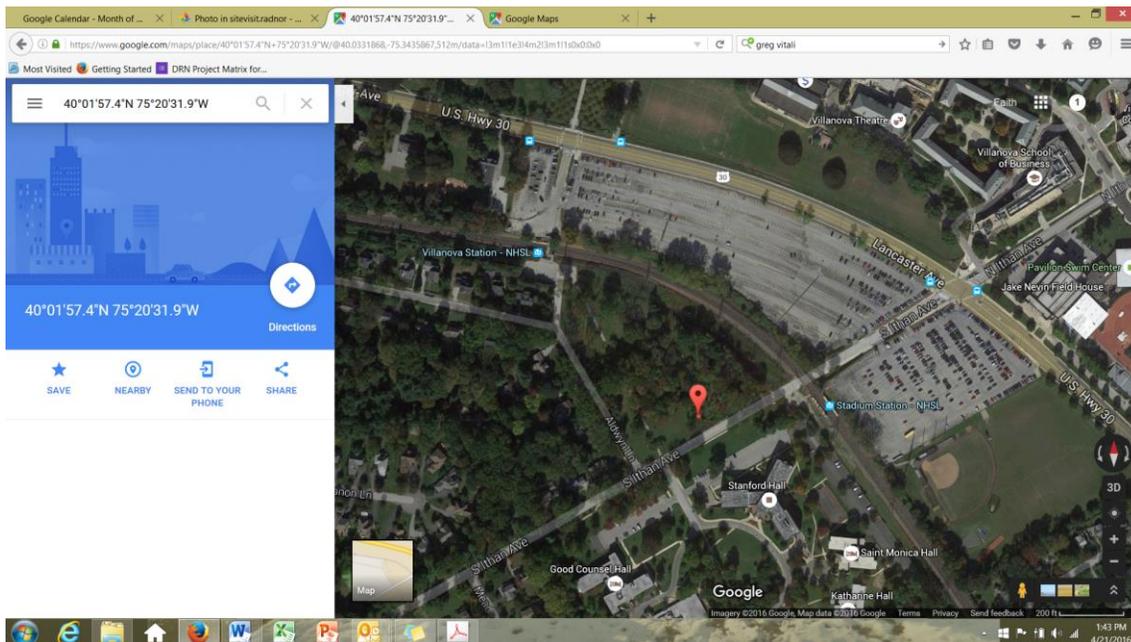
**CC:** MICHELE ADAMS, P.E., PRINCIPAL, MELIORA DESIGN ASSOCIATES LLC

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On March 29, 2016, at the request of a local community group, Delaware Riverkeeper Network (DRN) conducted a site visit to the headwaters of Valley Run that is located within an area of planned renovations by Villanova University to determine if a headwater tributary currently located underneath a parking lot may have an opportunity to be restored/daylighted during university renovations. This letter is a summary of what DRN observed during that site visit including potential recommendations for tributary restoration during the planned Villanova University construction. DRN believes that the tributary located in "the Triangle" that is currently being protected with an unmowed riparian buffer extends and begins underneath the Villanova parking lot based on our field observations. We request that DEP and Villanova determine the extent of the original buried stream under the parking lot as part of the planned design and review process. At a minimum, baseflow should be maintained to the existing tributary south of the Septa ROW, and erosive velocities managed. Conditions should also be improved along the ROW where habitat was observed and daylighting of the buried streams should be considered.

Below are DRN's observations to explain and support these findings and recommendations.

DRN began the assessment starting at South Ithan Avenue and walking upstream along the headwater tributary that is relatively forested and currently understood to be protected by Villanova University (within "the Triangle" area). The headwater stream is located between the Rail Road Right-of-Way (Septa), South Ithan Avenue, and Aldwyn Lane (see map and photo below). This tributary had streamflow present and several small riffle habitats through the forested and unmowed riparian corridor.



Map 1. Red pin represents the lower end of the forested tributary located within “the Triangle” that flows under South Ithan Road. Outlet A (explained later in the letter) flows under the Septa ROW through pipes and directly into this forested protected tributary in “the Triangle”

In this tributary in “the Triangle”, DRN biologists observed several cobble sized rocks within the riffle areas that were colonized with a low density of tolerant benthic stream macroinvertebrates. A formal benthic sample was not conducted but photos were taken of some of the benthic macroinvertebrates observed in the riffle habitat and Stroud Water Research Center confirmed benthic presence. Common netspinner caddisflies, stone-building caddisflies, snails, and water snipe fly larvae were present. Gelatinous egg masses, likely from snails, were also observed. Native plants and mature trees are growing within the unmowed riparian buffer including sensitive fern and trout lily in the understory and oak trees in the canopy. Invasive plants are present within this riparian area of the unmowed buffer including multi flora rose, lesser celandine, English ivy, bush honeysuckle, and Japanese honeysuckle.



Photo 1. Benthic invertebrates (caddisflies) observed in South forested headwater tributary in “the Triangle”



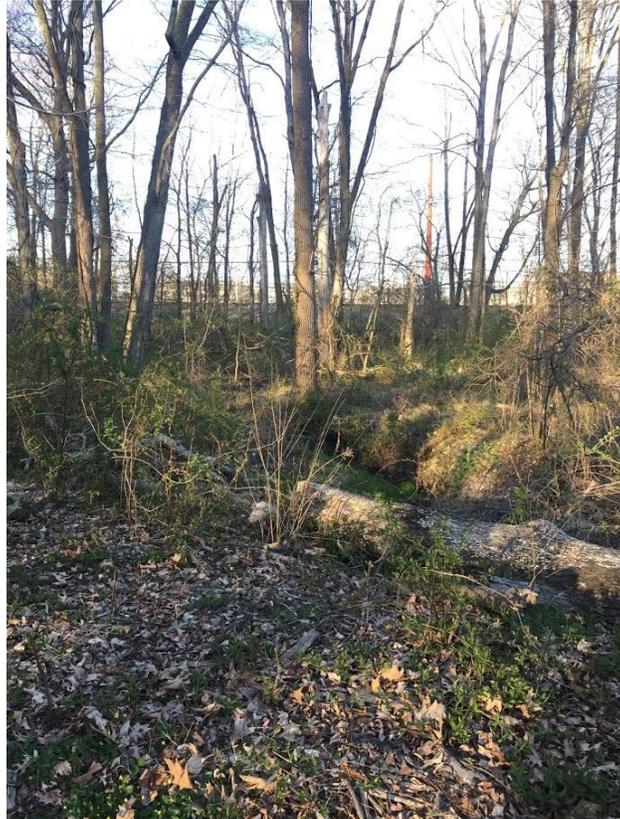
*Photo 2. Water snipe larvae and snail eggs observed in South forested headwater tributary located in "the Triangle"*



*Photo 3. Taken along bank of small forested headwater tributary facing DS toward South Ithan Avenue. This tributary is located within "the Triangle"*



*Photo 4. Culvert under South Ithan Avenue which the forested headwater tributary flows through*



*Photo 5. Forested South tributary facing upstream towards the Septa ROW and utility corridor (looking back towards the Villanova parking lots)*



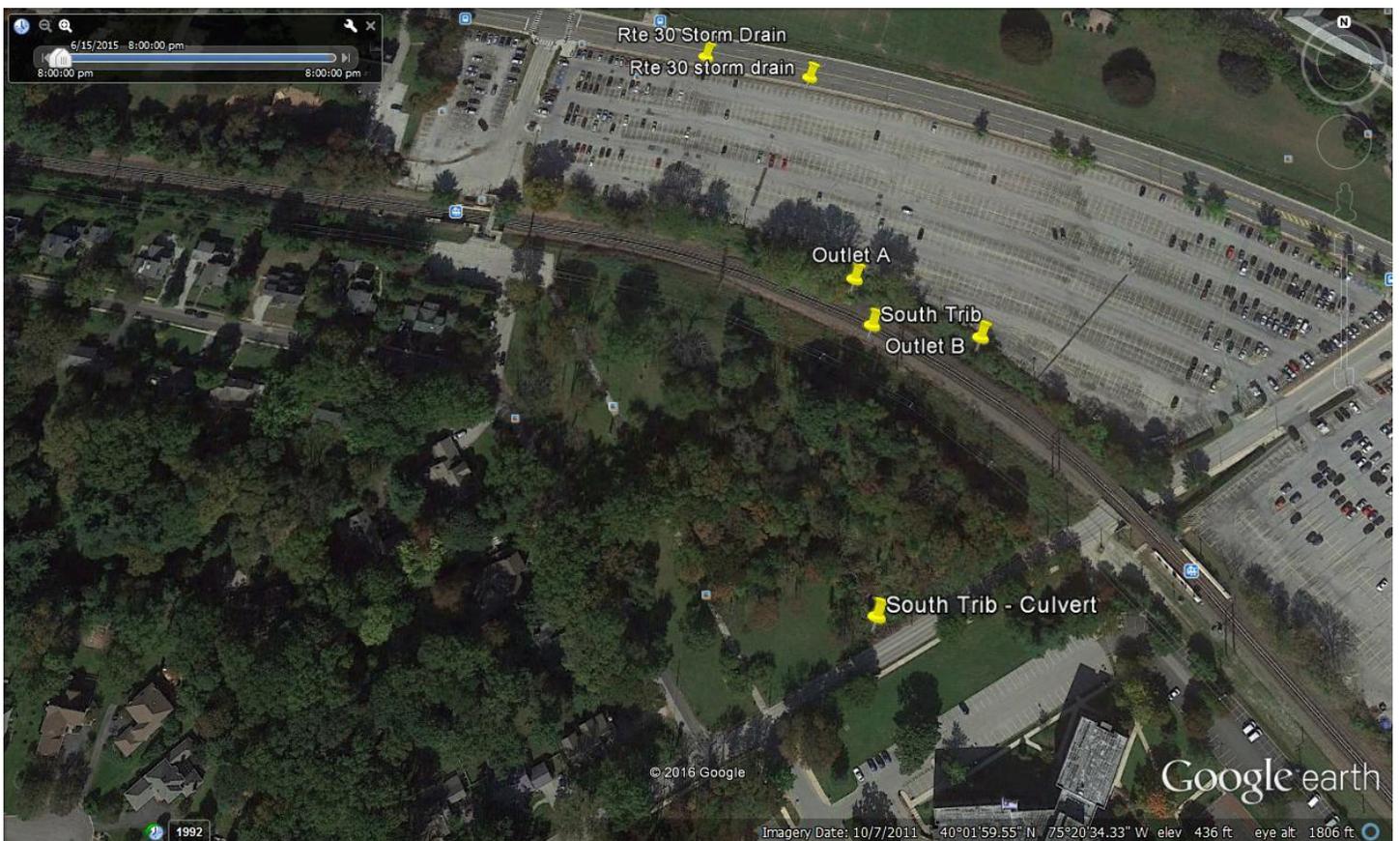
*Photo 6. Erosion in forested South tributary and evidence of high stormwater inputs from Rte 30 runoff and the northern Villanova parking lot.*



*Photo 7. Villanova parking lot located just south of Rte 30 where buried stream is located that feeds into the tributary in "the Triangle" South of Septa ROW (facing South towards the Septa ROW and utility ROW)*

DRN followed the forested tributary north to the Septa ROW and electrical utility line corridor where regular maintenance by utility crews means full sunlight and no forested buffer. Eutrophic conditions and algae were present in this section of the tributary. This area of the utility line was boggy and wet and there was evidence of wetland sedges surrounding the tributary in the utility ROW. Dogbane milkweed, sensitive fern, goldenrod, sedges, and broomsedge were some of the native species noted in the utility ROW adjacent and near the tributary.

Crossing over the SEPTA ROW to the north side of the Septa ROW, it appears that the forested tributary described and documented above (identified as the South trib on map 1) began flow farther north historically but to the present day has been buried and channelized by past development. This is typical of many of the headwater streams in the Philadelphia region. Currently, the Villanova parking lot (photo of parking lot above) that is planned to be renovated into dormitories is covering this historic flow with two older storm outlets/culverts/piping. DRN observed both outlets (Outlet A and Outlet B on map 2) and both had water flow present. Weather Underground indicated there was 0.44 in. of rain in the region on March 28, 2016. Our site visit occurred on March 29, 2016 beginning at 6:30pm. Stormwater runoff this high in the system would have been through the system by the time of our site visit so we believe this to be base flow. It appears that run off from Rte. 30 is directly fed into what was likely historically the beginnings of this tributary and this would explain the intensive streambank erosion observed during the stream walk. It appears that there is one small first order branch or seep that may have historically connected to this tributary that is now being intersected by the Septa ROW flowing out of Outlet B while Outlet A flows under the Septa ROW via a pipe and interchange and then flows directly into the tributary in “the Triangle” just south of the Septa ROW. Photos and description of these two outlets are below.



Map 2. Outlet A originating from under the parking lot flows under the Septa ROW via pipes and directly into the forested tributary located in “the Triangle”. Outlet B, likely another headwater spring or tributary, originates from under the parking lot and then flows along the base of the Septa ROW in a easterly direction to South Ithan Avenue.

DRN documented Outlet A has a junction from a pipe that we believe runs under the Villanova parking and then flows under the Septa ROW flowing directly into the forested tributary in “the Triangle”.



*Outlet A flow originating from under Villanova parking lot with trickling water that we believe flows under the Septa ROW (via a pipe) and directly into the South forested tributary in “the Triangle”. The pool of water in photo was approx. 13 inches deep.*

Outlet B, which also appears to collect and flow under the parking lot is located east of Outlet A and had a very low baseflow running adjacent and in an eastward direction along the the Septa ROW to South Ithan Ave. This above ground tributary is dominated by *Phragmites*, has evidence of trash and debris dumping within it, has very little riffle habitat, is eutrophic, and is confined between the Septa ROW and parking lot – conditions are poor. However, there was evidence of limited stream benthic life on the few cobble sized rocks that were examined along it. This tributary with erosion noted along the banks also has severe inputs from stormwater likely flowing off Rte 30 and the parking lot – see the location of highway storm drain grate maps on map below. Outlet B is likely another headwater spring/tributary that originates from under the parking lot.



*Photo 8. Outlet B that has low flow running parallel the Septa ROW (railroad) in easterly direction*



*Photo 9. Outlet B seep or tributary that flows easterly along the Septa ROW*



*Photo 10. Stream macroinvertebrates and algae in Outlet B tributary running parallel the Septa ROW*



*Photo 11. Evidence of net spinner caddisflies – in tributary originating from Outlet B*

## Potential for Daylighting and Restoring Headwater Streams

In light of these observations of historic headwater streams that are connected to the Valley Run, we are requesting that DEP and Villanova determine the extent of the original buried stream under the parking lot as part of the planned design and review process. At a minimum, baseflow should be maintained to the existing tributary south of the Septa ROW, and erosive velocities managed. Conditions should also be improved along the ROW where habitat was observed to improve conditions for these headwaters to Valley Run to better protect important macroinvertebrates colonized there that help improve water quality.

With renovations of the parking lot being planned, we strongly encourage Villanova to explore the daylighting and restoration of this headwater stream within the footprint of the Villanova parking lot which would have tremendous benefit to the watershed and which also may prove more cost effective than the maintenance of a very old culvert and replacement by a new culvert. American Rivers provides an excellent overview on daylighting that is available at this link: <http://www.americanrivers.org/wp-content/uploads/2014/04/daylighting-streams-report-2.pdf>.

In short, daylighting results in a plethora of benefits that would help protect Valley Run downstream from impacts it currently suffers, including increased hydraulic capacity for flood control, slowing water velocity to reduce downstream erosion, removal of water from combined sewer systems resulting in fewer sewer overflows, and community and ecological revitalization. These multiple ecosystem benefits, coupled with numerous community amenities, make daylighting an attractive choice to address stormwater or ecological concerns resulting from stream burial. Daylighting streams on campus would provide enhanced recreation opportunities and better quality of life for students and visitors.

Valley Run would also benefit from decreased nutrient pollution, which was evident during the stream assessment, if this buried headwater stream was daylighted and restored. Because of a small stream's significant capacity to store and transform nutrients – thereby allowing their slow and steady release rather than the short-term pulse that results in pollution and algal blooms – functioning small streams in undeveloped areas provide an essential service for communities and ecosystems. Compared to large streams, small headwater streams have more water in contact with the stream channel, allowing nutrient particles to be removed from the water column quickly. Headwater stream communities of fungi, bacteria, algae, and aquatic insects consume nutrients converting them into less harmful, more biologically useful materials. Without this valuable service of nutrient uptake, downstream reaches receive high amounts of nitrogen and phosphorus, causing eutrophication downstream and in reservoirs and coastal areas, which trigger green algal blooms coupled with the less visible dead zones, areas of low dissolved oxygen. The tributary in "the Triangle" had evidence of high nutrients, increased algae growth, and eroded banks, all of which could be alleviated with the restoration of the headwaters of Valley Run during this time of opportunity when university renovations are being planned.