

# MEMORANDUM

## VIA Electronic Mail

To: Dennis Carney, Township Manager

CC: Stephen J. Souza, Ph.D.

From: Chris L. Mikolajczyk, CLM

Subject: Aquatong Creek In-Situ Field Survey May 7, 2018

Date: 21 June 2018

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Princeton Hydro conducted the first field survey of the 2018 Aquetong Creek Monitoring Project on May 7, 2018. This field survey consisted of identifying creek flow, discharge, in-situ (Table 1) and nutrient water quality properties. In addition, visual observations were made in regards to macroinvertebrates, creek vegetation, creek substrate and characteristics that may inhibited creek flow and discharge since the removal of the Aquatong Dam. The following provides a brief discussion of the data collected at this first monitoring event, as well as comparisons to any applicable Pennsylvania Department of Environmental Protection (PADEP) surface water standards.

**ST1** – Station 1 held cold water temperatures and dissolved oxygen concentrations that were consistent with moderate discharge levels, similar to Station 2 and 3. Temperatures overall in the Creek were at or near the 12°C PADEP cold water fishery (HQ-CWF) standard for May 1 – May 15. Stirred up sediment at this station only took seconds to dissipate once it was disturbed (Picture 1). The Total Nitrogen (TN) concentration was elevated when compared with typical ecological thresholds, but well below the PADEP HQ-CWF standard of 10 mg/L. The Total Phosphorus (TP) concentration was below the typical stream ecological threshold of 0.10 mg/L. Total suspended solids were not detected. There also was the presence of an emergent wetland on the left bank with the species water starwort. Observed organisms at this site included an American eel, mayflies (nymphs and duns), worms, snails, scuds, sowbugs and Asian clam shells.

**ST2** – Station 2 held cold water temperatures and high dissolved oxygen concentrations that were consistent with moderate discharge levels, similar to Station 1 and 3. The Total Nitrogen (TN) concentration was elevated when compared with typical ecological thresholds, but well below the PADEP cold water fishery (HQ-CWF) standard of 10 mg/L. The Total Phosphorus (TP) concentration was below the typical stream ecological threshold of 0.10 mg/L. Total suspended solids were not detected. The stream banks appear to be stabilizing, but still contain fines (along each creek bank) and non-native cobbles (in creek) with minimal sinuosity. Observed organisms at this station included mayflies (nymphs), worms, scuds and native flies. Upstream of this station (between ST2 and ST3) has a large drop off, approximately 3.5 feet in height blocking upstream connectivity (Picture 2).

**ST3** – Station 2 held cold water temperatures and high dissolved oxygen concentrations that were similar to Station 1 and 3. The Total Nitrogen (TN) concentration was elevated when compared with typical ecological thresholds, but well below the PADEP cold water fishery (HQ-CWF) standard of 10 mg/L. The Total Phosphorus (TP) concentration was below the typical stream ecological threshold of 0.10 mg/L.



Total suspended solids were not detected. Discharge was the greatest at this Station at approximately 8.36 cfs and width of only 5 feet with extreme sinuosity occurring. This high discharge would likely explain the scouring, head cutting and in creek drop off observed around this station. Observed organisms at this station included frogs, salamanders, midges, blackflies, scuds and mayflies (nymphs).

**ST4** – Station 4 saw a minor 2°C increase in water temperature compared with the downstream Stations but did not appear to modify dissolved oxygen concentrations. However, it is important to note that the pH was greater than 8 which was not observed at any other stations. This Station also observed a low discharge of 0.34 cfs and held greater specific conductivity concentrations which could explain greater turbidity at this Station. The Total Nitrogen (TN) concentration was minimal when compared with typical ecological thresholds, and thus well below the PADEP cold water fishery (HQ-CWF) standard of 10 mg/L. The Total Phosphorus (TP) concentration was below the typical stream ecological threshold of 0.10 mg/L. Total suspended solids were not detected. The Station appears to have minor sinuosity with a creek width of 3 feet and the presence of invasive submerged aquatic vegetation (coontail and curlyleaf pondweed) and a warm slow-moving water species (duckweed). Observed organisms at this station included mayfly (nymphs), midges and scuds.

**ST5** – Station 5 held the greatest water temperature (26.66°C) out of the all the Stations. Temperature did not seem to have an impact on dissolved oxygen with concentrations greater than 10 mg/L. It is likely that water temperature increased at this Station because of low water depth and that it was sampled at the mid-day compared to the down creek Stations which were sampled in the early morning. Additionally, the past treatment of phragmites may have reduced shading towards this area and thus increased solar radiation at this Station. It is likely that this water temperature is slightly erroneous since in-situ water temperature and specific conductivity at the Spring Pool was similar to Stations 1, 2 and 3 down creek. The Total Nitrogen (TN) concentration was elevated when compared with typical ecological thresholds, but well below the PADEP cold water fishery (HQ-CWF) standard of 10 mg/L. The Total Phosphorus (TP) concentration was below the typical stream ecological threshold of 0.10 mg/L. Total suspended solids were not detected. Throughout this Station watercress and moss appeared along both creek banks in minimal quantities but provided important habitat for benthic macroinvertebrates. Observed organisms at this station included large quantities of scuds (living in moss), mayflies (nymphs) and midges.

The next field event is scheduled to occur in mid to late July. During this July field event, in addition to the above referenced data collection occurring once again, both benthic macroinvertebrate and fish samples will be collected at each station. A brief memo will be sent to the Township approximately 30 days after the receipt of all laboratory data.

**Field Data Tables**

**Table 1. In-Situ Water Quality in Aquatong Creek**

Date	Sample Station	Temperature (C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	pH	Specific Conductivity (us/cm)	Discharge (cfs)
5/7/2018	St1	12.2	10.7	103.5	7.89	430.1	4.83
	St2	12.39	10.72	104.2	7.88	430.3	3.49
	St3	12.26	10.54	102.2	7.77	429.9	8.36
	St4	14.27	10.81	109.6	8.24	606.6	0.34
	St5	26.66	7.93	102.3	7.76	-	4.53
	Pool	11.77	7.12	68.2	7.36	419.3	-

**Table 2. Discrete Water Quality in Aquatong Creek**

Date	Sample Station	Total Nitrogen (mg/L)	Total Phosphorus (mg/L)	Total Suspended Solids (mg/L)
5/7/2018	St1	4.4	0.05	ND <3
	St2	4.6	0.05	ND <3
	St3	3.9	0.07	ND <3
	St4	0.58	0.06	ND <3
	St5	4.8	0.05	ND <3

**Site Photographs**



Picture 1. View Up Creek at Station 1.



Picture 2. View Up Creek Drop off Between ST2 and ST3.



Picture 3. View Down Creek of ST3.



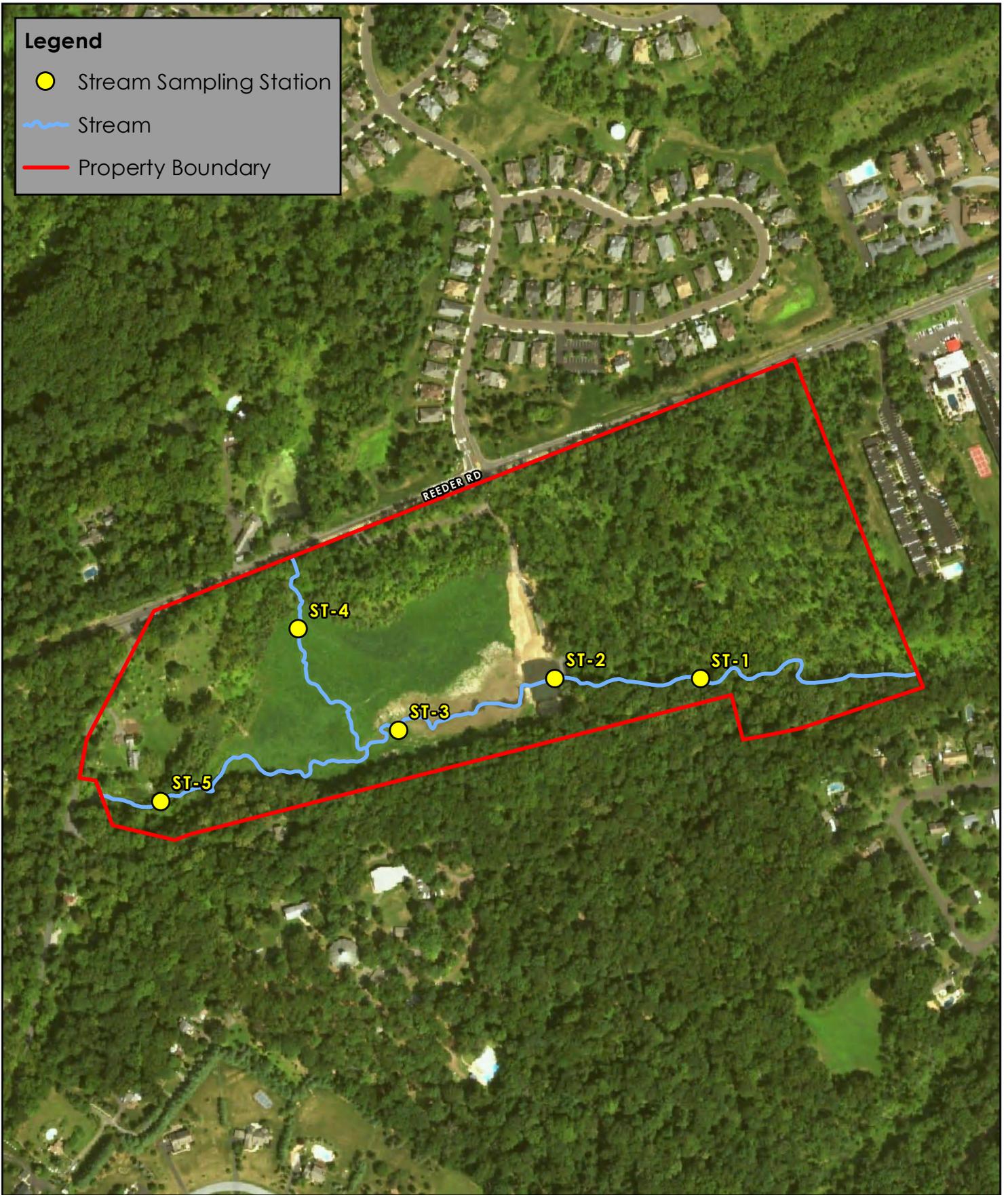
Picture 4. View Up of Creek at ST4.



Picture 5. Down View of Creek at ST5.

**Legend**

- Stream Sampling Station
- ~ Stream
- Property Boundary



File: P:\03888\Projects\03888004\GIS\MXD\Stream\_Sampling\_Station.mxd, 11/6/2017, Drawn by thopper, Copyright Princeton Hydro, LLC.

**STREAM SAMPLING  
STATION MAP**

AQUETONG SPRING PARK  
SOLEBURY TOWNSHIP  
BUCKS COUNTY, PENNSYLVANIA



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**NOTES:**

- 1. Stream sampling station locations are approximate.
- 2. 2015 orthoimagery obtained from the United States Department of Agriculture's (USDA), National Agriculture Imagery Program (NAIP).



Map Projection: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet