# Peters Creek Watershed

## Assessment & Management Plan

April 2014

Peters Creek Watershed Association

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# 1.0 PETERS CREEK WATERSHED BACKGROUND

## 1.1 INTRODUCTION

The Peters Creek Watershed consists of fifty diverse square miles in southern Allegheny and northeastern Washington Counties. Peters Creek covers a sixteen-mile stretch with its headwaters in Thomas, Washington County and drains all or parts of thirteen municipalities as it winds its way to the Monongahela River in Clairton, Allegheny County. The municipalities are listed in table 1.1.

The corridor surrounding the creek, as well as its tributaries, provides many recreation and conservation opportunities. Hunting, fishing, nature study and biking are popular in the valley and along the creeks are many wooded slopes. Peters Creek Watershed encompasses a two thousand acre multi-functional County Park, South Park, approximately twelve of the forty-six mile Montour Trail, and harbors several areas of special biological significance.

| Municipality | Sq Miles | Percent |
|---|---|---|
| **Allegheny County** | **35.49** | **69.0** |
| Baldwin Borough | 1.41 | 2.8 |
| Bethel Park Borough | 7.68 | 14.9 |
| City of Clairton | 1.20 | 2.3 |
| Jefferson Hills Borough | 11.56 | 22.5 |
| Pleasant Hills Borough | 2.79 | 5.4 |
| South Park Township | 9.19 | 17.9 |
| West Mifflin Borough | 1.45 | 2.8 |
| Whitehall Borough | 0.21 | 0.4 |
| **Washington County** | **15.96** | **31.0** |
| Finleyville Borough | 0.13 | 0.3 |
| North Strabane Township | 0.06 | 0.1 |
| Nottingham Township | 2.84 | 5.5 |
| Peters Township | 6.23 | 12.1 |
| Union Township | 6.70 | 13.0 |
| **Peters Creek Watershed** | **51.45** | **100.0** |

**Table 1.1 Watershed Municipalities**

From the heavy industry in the east where Peters Creek flows into the Monongahela River, to the large commercial district along State Route 51 in the northeast, through the densely populated north suburban communities, and the southern agricultural areas under residential development pressure, this watershed is a veritable patchwork of land use types. All of these land use types can pose a potential threat that can negatively impact the watershed if proper management and planning does not occur at the municipal level.

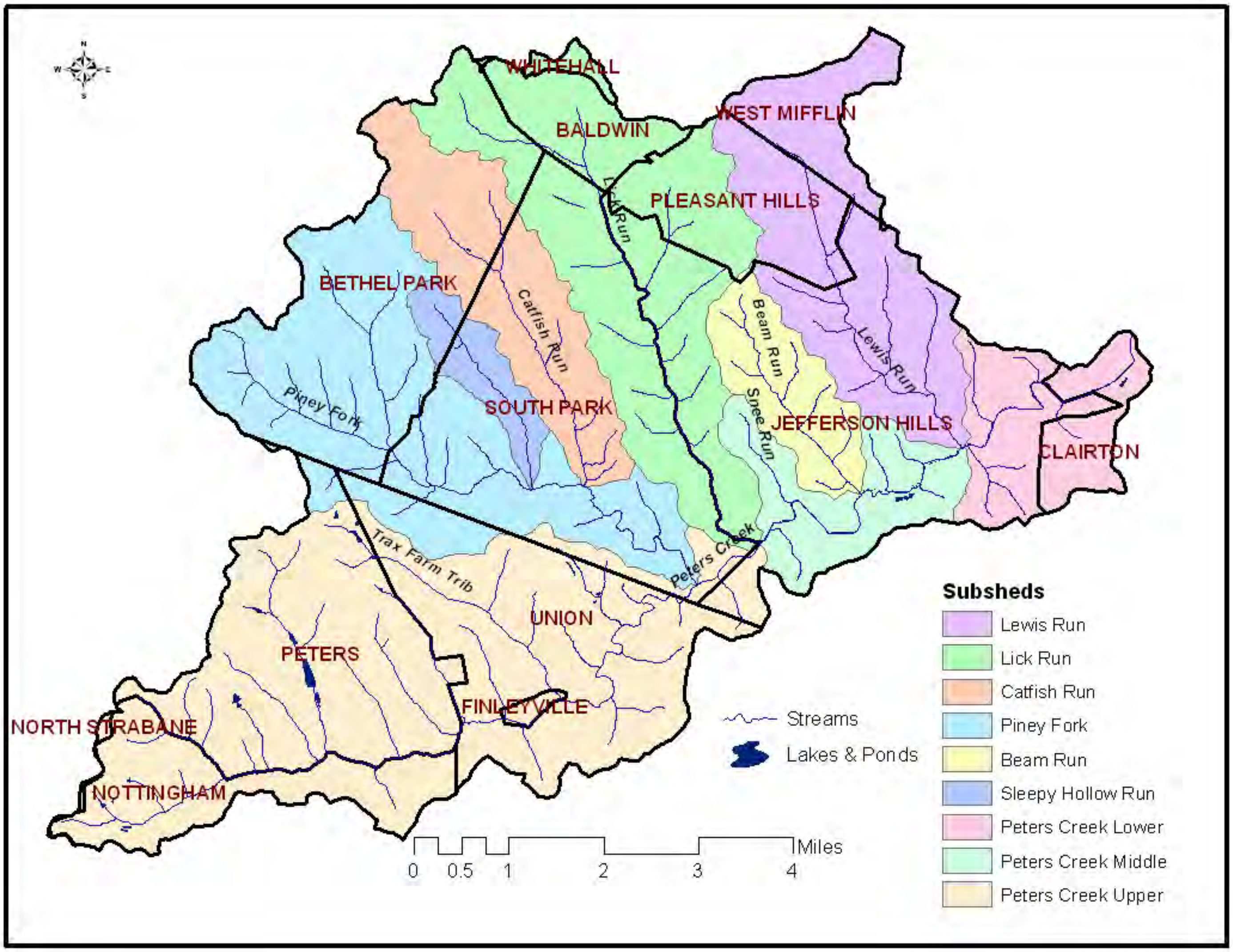



**Figure 1.1 Peters Creek Watershed's Municipalities and Sub-Watersheds**

## 1.2 LAND RESOURCES

The Peters Creek Watershed is within the Pittsburgh Low Plateau Section physiographic province. Physiographic provinces are regions that are united by similar geography. The Pittsburgh Low Plateau is underlain by siltstone, shale, sandstone, conglomerates, and coal. This section consists of a smooth undulating upland surface cut by numerous, narrow, relatively shallow valleys. The uplands are developed on rocks containing the bulk of the significant bituminous coal in Pennsylvania and this can be seen in the landscape through the presence of old mining areas and reclaimed mining areas. The local relief on the uplands is generally less than 200 feet. Local relief between valley bottoms and upland surfaces may be as much as 600 feet. Valley sides are usually moderately steep except in the upper reaches of streams where the side slopes are fairly gentle. Elevations range from 660 to 1,700 feet" (DCNR, 2008).

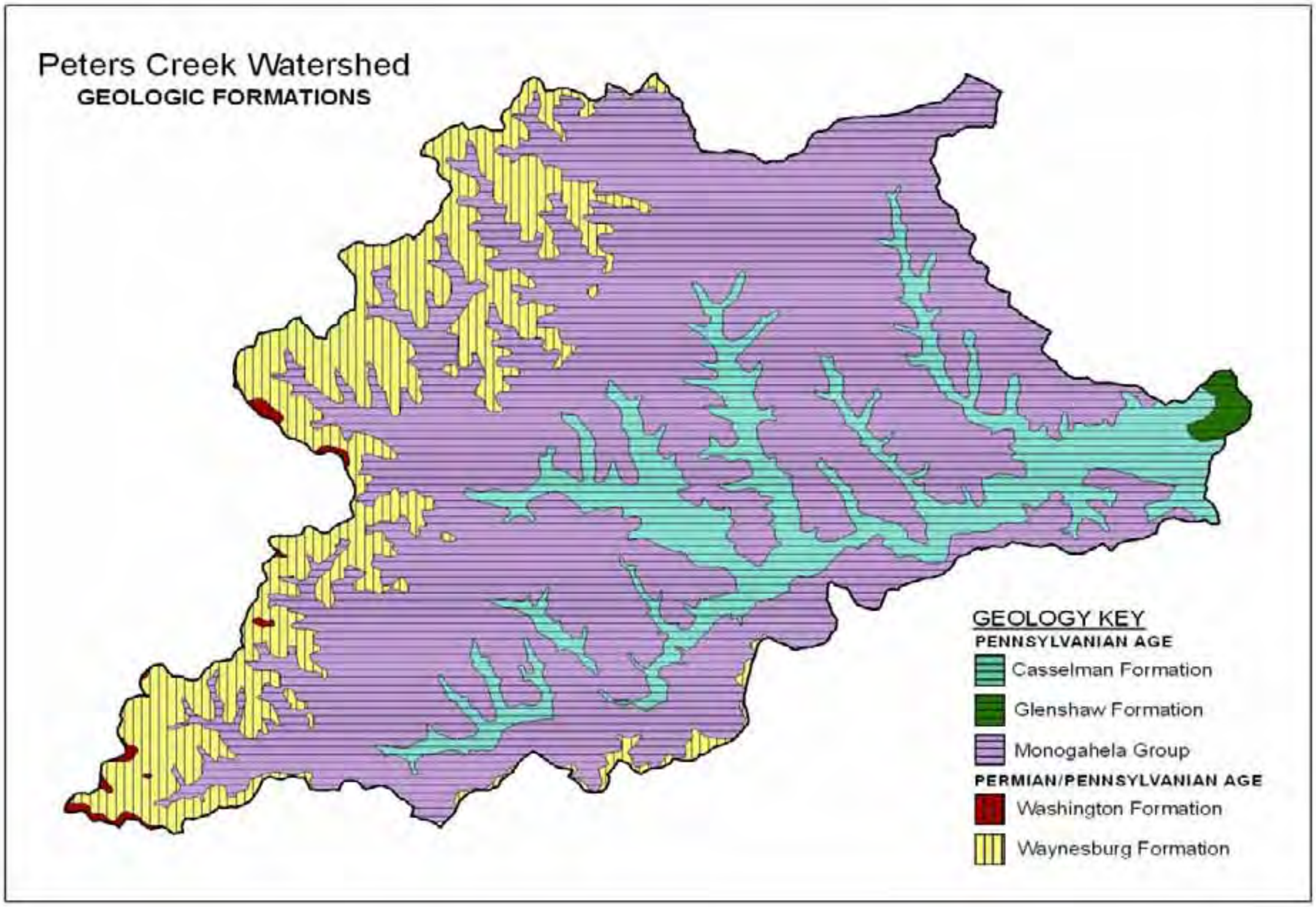



**Figure 1.2 Geologic Formations**

In addition to the watersheds physiography, the area can also be categorized by geologic formations. The geologic formations are areas of contiguous rock units with distinctive characteristics. There are five geologic formations in the Peters Creek Watershed. These formations are shown in Figure 1.2. The most widespread formation is the Monongahela Group, which contains thick mineable coals. The other prevalent formaton is the Casselman Formation, which contains red beds, sandstones, and coal beds. This formation is found along many of the stream valleys in the watershed. The red beds are made up of clay and are an in indicator of the presence of landslide prone soils.

There are also five soil associations found throughout the watershed, as shown on Figure 1.3. Soil associations are made up of two or three major soils and some minor soils. The descriptions of the soil associations of Peters Creek Watershed as defined by the Natural Resource Conservation Service (NRCS) are:

- Culleoka-Weikert-Newark soil association contains shallow and moderately deep, well drained soils underlain by red and gray shale on uplands and is characterized by deep, poorly drained soils within floodplains.

- Strip Mines-Guernsey-Dormont soil association contains deep, moderately well drained soils and strip mines underlain by shale and limestone on uplands.

- Urban Land-Philo-Rainsboro soil association contains deep, moderately well drained soils and urban land on floodplains and terraces.

- Dormont-Guernsey-Culleoka soil association contains moderately deep and deep, well drained and moderately well drained soils underlain by shale and limestone on uplands.

- Urban Land-Dormont-Culleoka soils association contains moderately deep and deep, well drained and moderately well drained soils underlain by shale and limestone on uplands.

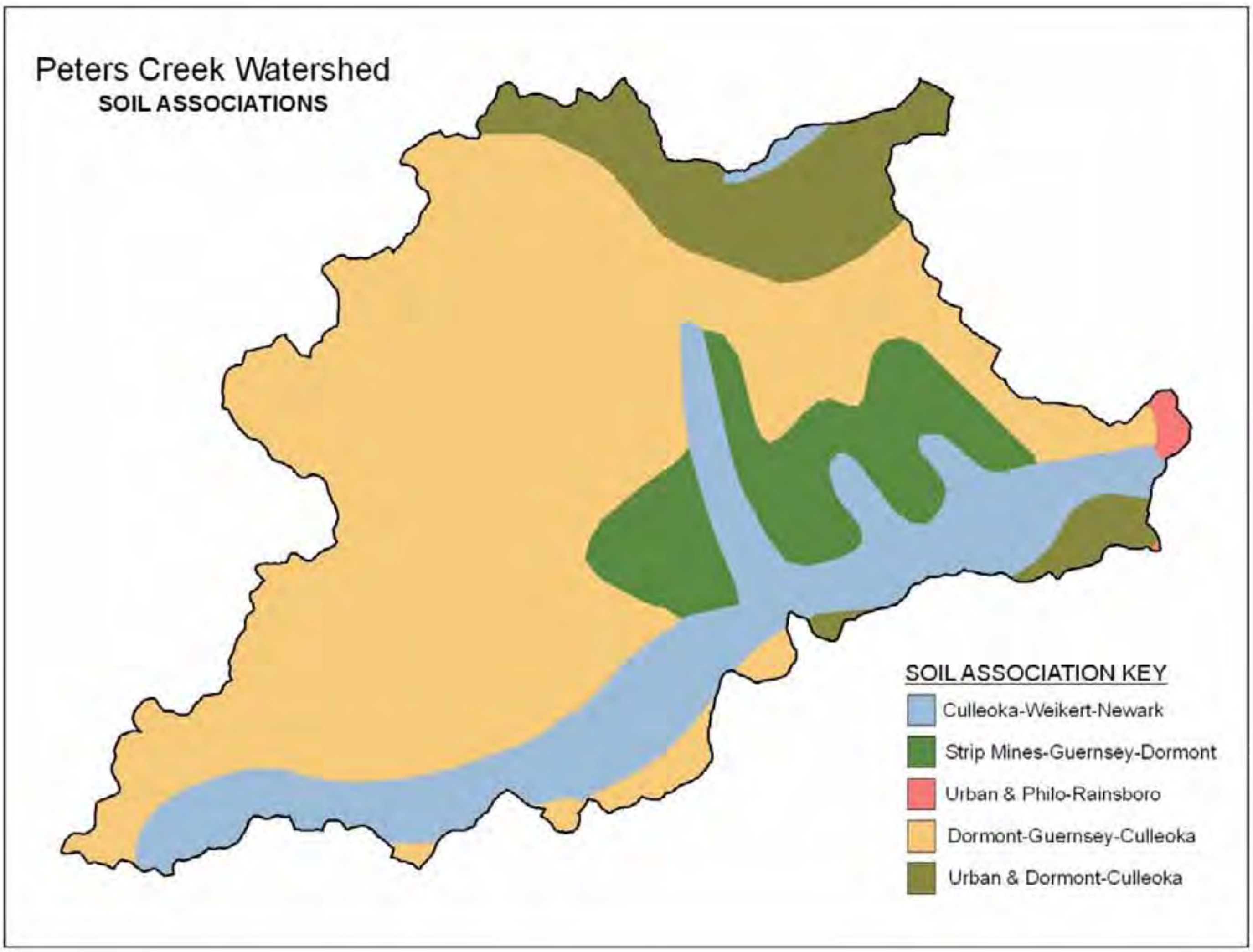



**Figure 1.3 Soil Associations**

## 1.3 WATER RESOURCES

The headwaters of Peters Creek are found in Nottingham Township, Washington County, near Thomas. The stream then flows northeast through Peters Township (creating the border between Peters and Nottingham Townships), Union Township, and Finleyville Borough before entering Allegheny County. In Allegheny County, Peters Creek continues to flow northeast through South Park Township, Jefferson Hills Borough, and into the City of Clairton.

Peters Creek travels approximately 16.2 miles before it outlets into the Monongahela River at the City of Clairton. Its elevation is approximately 1200 feet above sea level at its headwaters and 719 feet where it meets the Monongahela River.

Peters Creek's designated protected use, as stated in the Pennsylvania Code Chapter 93 on Water Quality Standards, is Trout Stocked Fishery (TSF). The TSF rating is issued to protect the aquatic life of the creek. Trout stocking includes maintenance of stocked trout from the middle of February to the end of July, as well as the maintenance and propagation of fish species and additional flora and fauna that are indigenous to a warm water habitat.

The Peters Creek watershed is comprised of numerous tributaries that drain into Peters Creek. Four of these are named tributaries. Piney Fork, a major named tributary to Peters Creek, has two named tributaries that flow directly into it. Tributaries that flow directly into Peters Creek that are un-named comprise the Peters Creek sub-watershed. The Peters Creek sub-watershed is broken into upper, middle and lower sections. Figure 1.1 depicts the location of named sub-watersheds and their relationship to watershed municipalities. Table 1.2 provides the area of named sub-watersheds and their relative contribution to the Peters Creek watershed.

The named tributaries to Peters Creek are:

Lewis Run begins in West Mifflin Borough, Allegheny County, just north of North Lewis Run Rd and flows to PA Route 51 where it meets a tributary that originates just south of Century III Mall that flows along RT51 through Pleasant Hills. Lewis Run then travels along RT51 for approximately 3.6 miles until it meets Peters Creek near the intersection of PA Route 51 and PA Route 43.

Beam Run originates in Jefferson Hills Borough, Allegheny County, near the intersection of Beam Run Road and Gill Hall Road and flows approximately 2.6 miles in a southeasterly direction where it enters Peters Creek to the east of Waterman Road along Peters Creek Road.

Lick Run begins in Bethel Park Borough, Allegheny County, near Millennium Park along Baptist Road, and flows south through Baldwin Borough and then creates the border between South Park Township and Jefferson Hills Borough. The length of Lick Run is approximately 6.7

miles from its headwaters to where it enters Peters Creek just east of the South Park Township neighborhood of Snowden.

Piney Fork originates in Bethel Park Borough, Allegheny County, near Jewel, and travels approximately 7.2 miles in a southeasterly direction through South Park Township until it meets Peters Creek near Snowden. Piney Fork also has two named tributaries, Catfish Run and Sleepy Hollow Run.

Catfish Run begins in Bethel Park Borough, Allegheny County, within South Park, County Park near the five point's intersection of Library Road (State Route 88), Corrigan Drive, South Park Road, and Baptist Road. The stream flows in a southeasterly direction approximately 3.5 miles into South Park Township until it meets Piney Fork, just east of the South Park Township neighborhood known as Piney Fork.

Sleepy Hollow Run originates in Bethel Park Borough, Allegheny County, along Stoltz Road, and flows in a southeasterly direction. The run flows into South Park Township and then through South Park, County Park, for approximately 2.3 miles before entering Piney Fork west of the area known as Piney Fork.

In addition to the named tributaries described above, there are also numerous un-named tributaries draining into them. A number of these officially un-named tributaries have historical or commonly used names that will be used in this study:

- Snee Run – Tributary to Peters Creek
- Trax Farm Trib – Tributary to Peters Creek
- Mineral Run – Tributary to Lick Run
- Jefferson Memorial Trib – Tributary to Lick Run

The total stream length within Peters Creek Watershed is estimated to be approximately 50 miles.

| Sub-watershed | Sq Miles | Percent |
|---|---|---|
| Lower Peters Creek | 2.93 | 5.7 |
| Lewis Run | 5.88 | 11.4 |
| Beam Run | 1.99 | 3.9 |
| Middle Peters Creek | 2.48 | 4.8 |
| Lick Run | 8.58 | 16.7 |
| Piney fork | 8.44 | 16.4 |
| Catfish Run | 4.01 | 7.8 |
| Sleepy Hollow Run | 1.12 | 2.2 |
| Upper Peters Creek | 15.97 | 31.1 |

**Table 1.2 Sub-watersheds**

## 1.4 STREAM CONDITIONS

In the 2012 Pennsylvania Integrated Water Quality Monitoring and Assessment Report, impaired streams, or streams that are not supporting their designated uses, are listed as required in Section 303(d) of the Clean Water Act. The designated use of all streams in the watershed for 2008 Chapter 93, PA Code is Trout Stocked Fishing (TSF).

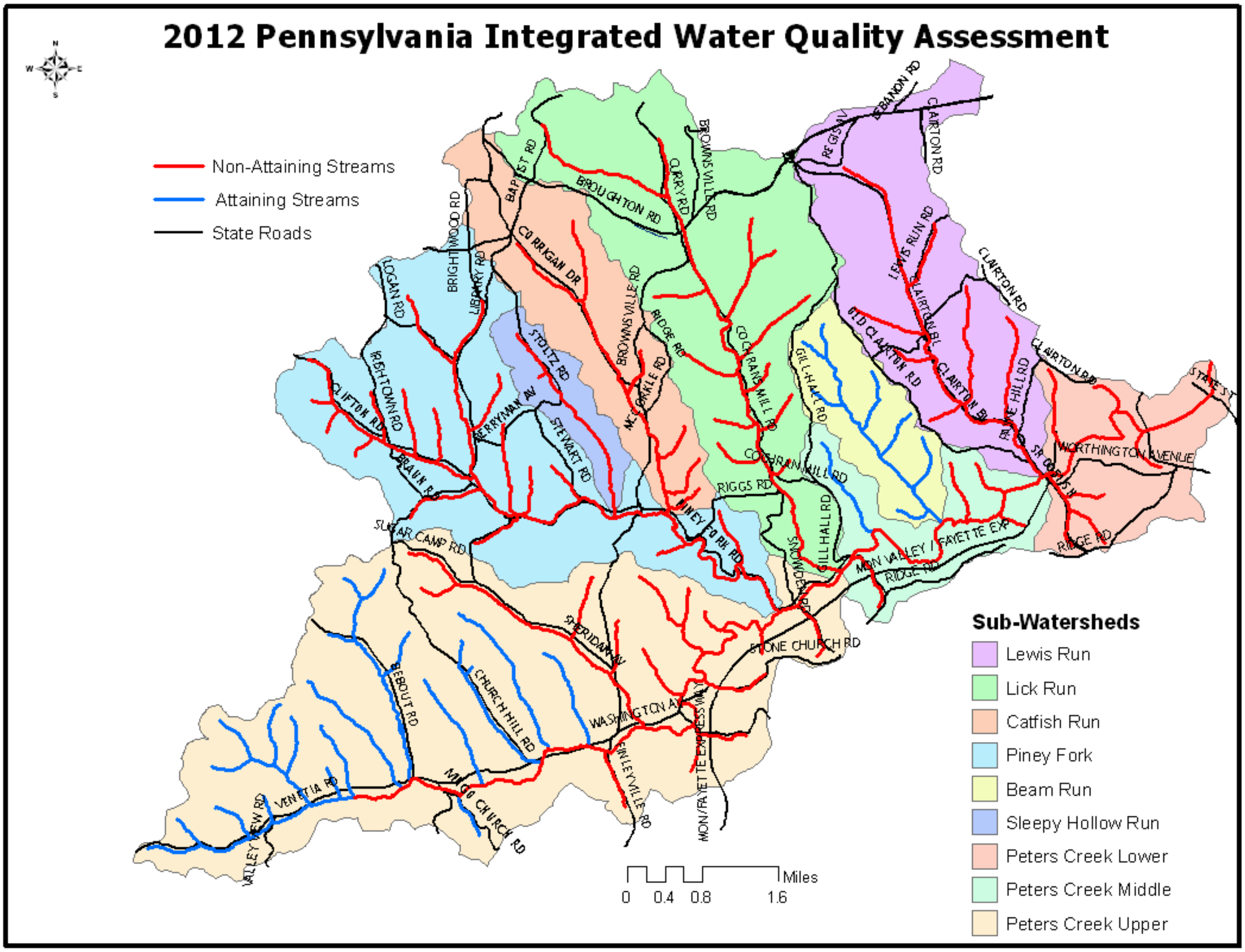



**Figure 1.3 Attaining and Non-Attaining Streams**

The following information was found as to which streams within the Peters Creek Watershed are attaining their designated use. Figure 1.3 illustrates the 2012 status of Peters

Creek watershed streams in reference to whether of not they meet their designated use. Specific causes of failure to meet designate use will be discussed for each sub-watershed in the Visual Assessment section of this report.

**Peters Creek.** The lower section of Peters Creek from Finleyville Borough to the mouth of the Monongahela River and all tributaries except for the Snee Run tributary in Jefferson Hills Borough are listed as Non-Attaining. Tributaries to Peters Creek west of State Route 88 in Finleyville to the headwaters are listed as Attaining but the main stem of Peters Creek from Finleyville to Scenic Ridge Drive in Peters Township is listed as Non-Attaining. From Scenic Ridge Drive to the headwaters the main stem is listed as Attaining.

**Lewis Run.** The entire length of Lewis Run and its tributaries are listed as Non-Attaining.

**Lick Run.** The entire length of Lick Run and its tributaries are listed as Non-Attaining except for a tributary that originates in South Park County Park and flows along Broughton Rd in South Park Township.

**Beam Run.** The entire length of Beam Run is listed as Attaining.

**Piney Fork.** The entire length of Piney Fork and its tributaries are listed as Non-Attaining.

**Catfish Run.** The entire length of Catfish Run and its tributaries are listed as Non-Attaining.

**Sleepy Hollow Run.** The entire length of Sleepy Hollow Run and its tributaries are listed as Non- Attaining.

## 1.5 GENERALIZED LAND USE

The Peters Creek Watershed is characterized by several different land use types spread throughout the watershed. Surrounding land use is a major determinant of water quality within streams.

The National Land Use Database of 2006 and GIS mapping software were utilized to gain a better understand of land use composition and distribution within the Peters Creek watershed. Land use classes for this study include: Industrial/Commercial; Residential; Wooded; Open Water; Barren/Strip Mines; Agriculture/Pasture/Open Space; and Transportation/Other. Composition and distribution of these land use classes throughout the entire Peters Creek watershed as well as for each of the named sub-watersheds was mapped and can be seen in Figure 1.4 below. Quantification of land use class contribution to the total watershed area is displayed in Table 1.3.

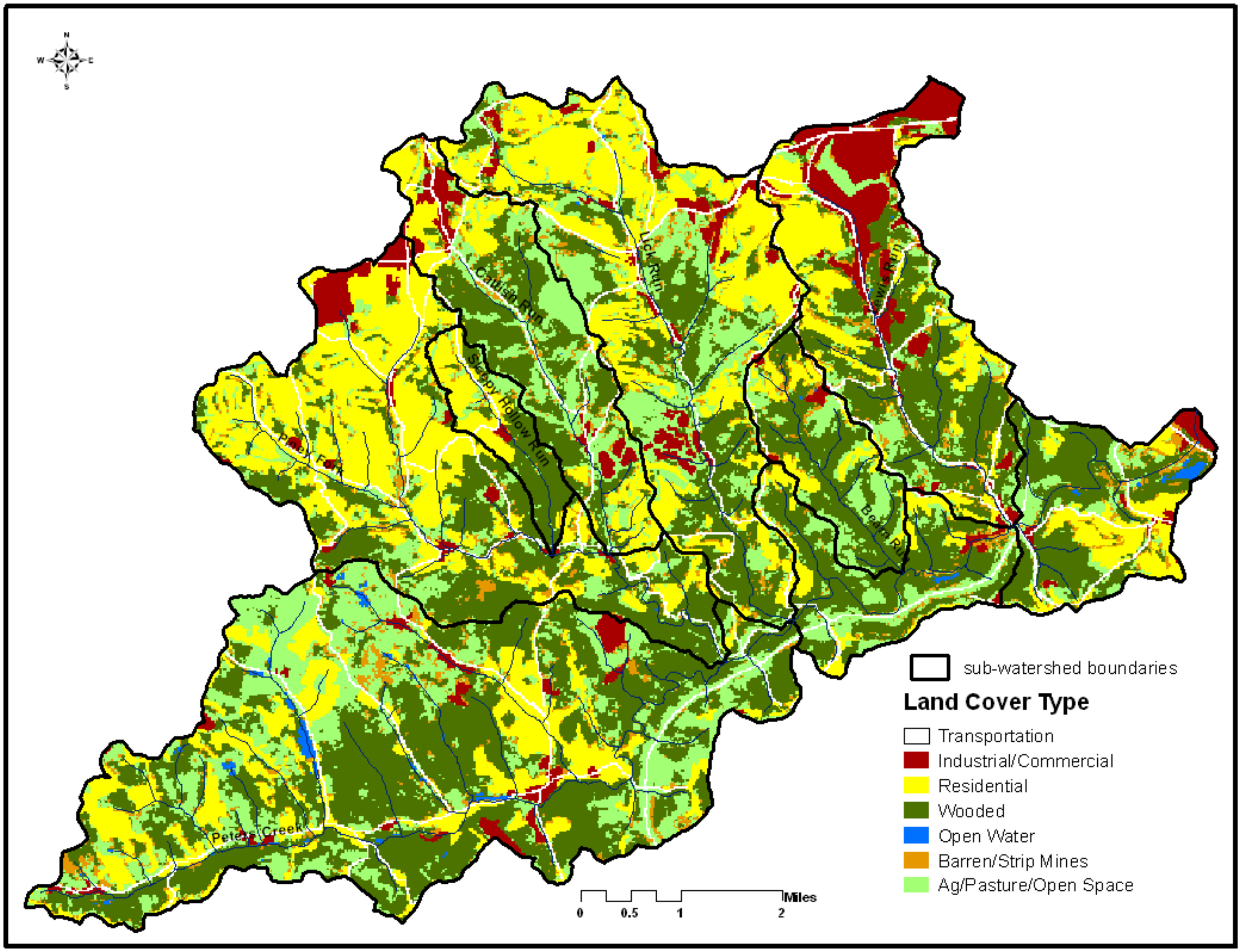
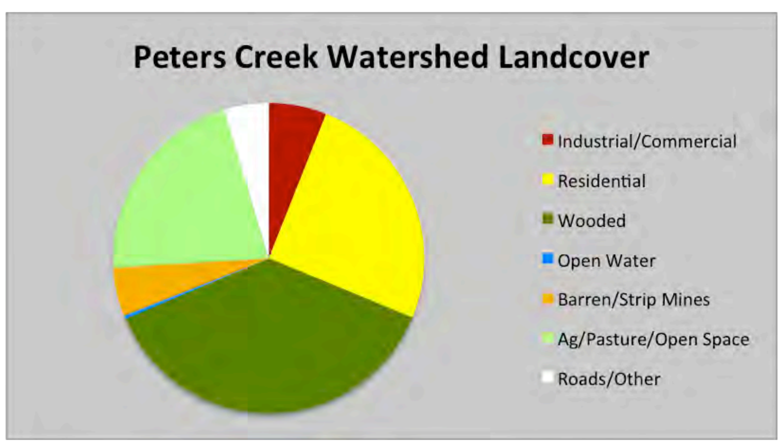



**Figure 1.4 Peters Creek Watershed Land Use**

| Land Use Class | Sq Mi | % |
|---|---|---|
| Industrial/Commercial | 3.09 | 6.0 |
| Residential | 12.97 | 25.2 |
| Wooded | 19.22 | 37.4 |
| Open Water | 0.20 | 0.4 |
| Barren/Strip Mines | 2.59 | 5.0 |
| Ag/Pasture/Open Space | 10.94 | 21.3 |
| Transportation/Other | 2.40 | 4.7 |

**Table 1.3 Land Use Composition**



Dense commercial development found along the Route 51 and Route 88 corridors has a significant impact on water quality within Lewis Run and Catfish Run.  The large impervious surfaced areas of these developments greatly increases the quantity of stormwater runoff entering these streams and contributes additional pollutants including siltation, suspended solids, nutrients and salt during winter months. The excess stormwater also contributes to flooding downstream, especially along Route 51 south of Century III Mall.

**Figure 1.5 Century III Mall along Route 51**

The Peters Creek Watershed is also defined by a number of existing outdoor recreational opportunities including Allegheny County's 2,000 acre multi-purpose South Park County Park. This park is situated in Bethel Park and South Park Township and features ball fields, playgrounds, walking trails, a fair grounds, an action park, and a golf course in addition to other historical and recreational assets.

In addition to South Park, the Montour Trail is also found within the watershed. This non-motorized multi-use recreational trail follows Peters Creek and Piney Fork for approximately 12 miles of its 47 mile course. It connects the local area to the Great Allegheny Passage which is part of a Pittsburgh to Washington D.C. trail. Another connection to the Montour Trail was completed in 2013 that permits access to the Montour Trail from South Park County Park's fairgrounds area.

At the mouth of Peters Creek along the Monongahela River, the dominant land use is industrial. This site is home to the U.S. Steels Clairton Coke Works and to  Koppers Industry's Clairton Plant. These are the only major heavy-industrial plants within the watershed but since the early 1900's they have had a major impact on a large portion of the Peters Creek valley.

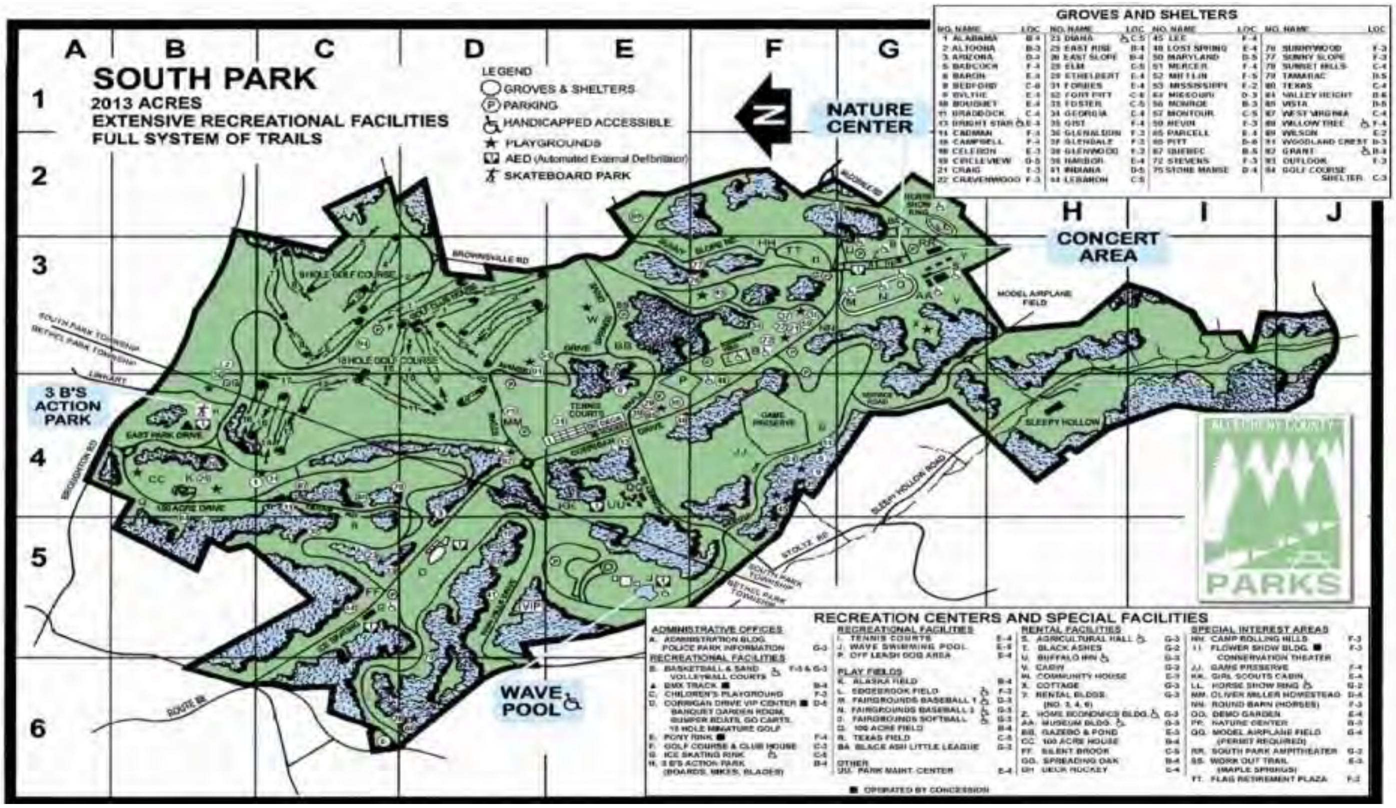


Figure 1.6 South Park County Park Map


Figure 1.7 Clairton Industry

Transportation is also having a major impact on the watershed. The Mon-Fayette Expressway completed construction in 2002 with a terminus in Jefferson Hills along State Route 51 in Large.  The turnpike parallels Peters Creek's southern shore from this terminus to Gastonville. At present, the highway is incomplete, with future plans to extend it to the City of Pittsburgh and to Interstate 376 in Monroeville.

A Southern Beltway is also planned to connect the Mon-Fayette Expressway with the Pittsburgh Airport. This section of highway would run along Peters Creek from Gastonville to the headwaters in Thomas, Washington County.

The completed portion of the Mon-Fayette Expressway degrades the water quality of Peters Creek by contributing large quantities of excess stormwater runoff and by fragmenting and decreasing forested portions of the watershed. It also diminishes the watershed's scenic character.

**Figure 1.8 Mon-Fayette Expressway**

The Washington County portion of the watershed is still characterized by a few commercial farms, including Trax Farm and Simmons Farm. However, residential development has become another dominant characteristic of this portion of the watershed; especially along Venetia Rd in Peters and Nottingham Townships and west of Trax Farm.  It is becoming exceedingly difficult to protect large tracts of farm acreage within the Peters Creek watershed. Increased residential development within the headwaters portion of the watershed can lead to degraded water quality within Peters Creek and further downstream if adequate stormwater controls are not implemented.

**Figure 1.9 Trax Farm**

## 2.0 BIOLOGICAL ASSESSMENT

## 2.1 EXISTING STUDIES

Few studies have been conducted to establish baseline information concerning the status of macroinvertebrate populations within Peters Creek and its major tributaries.

The Three Rivers 2nd Nature Project of the Studio for Creative Inquiry at Carnegie Mellon University sampled fish and macroinvertebrate populations near the mouth of several tributaries to the Monongahela and Allegheny Rivers, including Peters Creek, during 2001-2002.

The Pennsylvania Fish and Boat Commission (PFBC) sampled fish populations at various locations along the main stem of Peters Creek in 1967 (Hesser 1967), 1973 (Weirich et al. 1973), 1974 (Weirich et al. 1974), 1978 (Weirich et al. 1981) and 1997 (Gary Smith and Rick Lorson 1998).

The 1978 PFBC study established four sites on Peters Creek from just below the SR1006 bridge in Gastonville to .42 km below the SR0051 bridge. These 4 sites were then resampled during the 1997 study. Macroinvertebrate data was collected during earlier studies but not as part of the 1997 study. The 1978 study found a total of 5 taxa of pollution tolerant macroinvertebrates at the 4 sampling sites with caddisflies of the family Hydropsychidae present at one site. Water chemistry and physical habitat were also evaluated during these studies.

## 2.2 PURPOSE

The purpose of the 2009 study was to establish baseline data concerning the status of fish and macroinvertebrate populations at sites throughout the Peters Creek watershed on the main stem of Peters Creek and on all major tributaries.

Six sites were selected on the main stem of Peters Creek from near the headwaters to near the confluence with the Monongahela River. The lowest site sampled on Peters Creek was approximately 1300 meters upstream of the confluence in order to avoid the influence of the Clairton Municipal Authority Sewage Plant and the Clairton Coke Works at the confluence. This is the only site within the combined sewer section of Peters Creek. The most upstream main stem site is located above the influence of sewage treatment plants and most abandoned mine drainage. Four of the sites on the main stem of Peters Creek were chosen to coincide with the 1978 and 1997 PFBC sites in order to compare results.

Fish and macroinvertebrates were also sampled on all named tributaries to Peters Creek as well. Sampling sites were chosen near the mouth of the tributaries with the exception of Catfish Run. The Catfish Run site was chosen to be within South Park County Park.

Macroinvertebrate only sites were also sampled on two un-named tributaries, Snee Run and Trax Farm Tributary, and on Peters Creek above the confluence with Piney Fork. Secondary macroinvertebrate only sites were sampled above sewage treatment plants on Lick Run and Piney Fork and on Catfish Run downstream of South Park County Park.

The purpose of the 2013 study was an effort to determine whether changes in fish and macroinvertebrate populations occurred at Peters Creek main stem sites and at selected tributary sites since the 2009 study.

The Piney Fork Sewage Treatment Plant completed an upgrade in late summer of 2007. During installation of this upgrade the plant's trickling filters were offline for at least a year. This resulted in significantly increased pollution levels in Piney Fork. It was hypothesized that results of 2009 biological studies in Piney Fork and Peters Creek downstream of the sewage treatment plant might be negatively influenced by this additional pollution. In addition, the upgraded plant more effectively treated the sewage load than previously and should improve water quality downstream so that by 2013 biological populations within downstream sites might show improvement.

However, in July of 2011 a large water main break under South Park Township's salt storage facility near the confluence of Piney Fork and Peters Creek caused hundreds of tons of salt and millions of gallons of chlorinated water to enter lower Piney Fork and Peters Creek resulting in a large fish kill downstream of the break. The 2013 biological studies are an attempt to quantify the change in status of fish and macroinvertebrate populations at sites downstream of the water main break and to make comparisons with sites not impacted by the break.

## 2.3 FISH SURVEYS

### 2.3.1 2009 FISH SURVEY METHODS

Fish surveys were conducted by the Western Pennsylvania Conservancy on April 23rd, April 24th, and May 8th, 2009 following the electrofishing protocol for single habitat streams described in EPA's *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers*. A Smith-Root LR-24 Electrofisher electrofishing unit was implemented to temporarily immobilize the fish for the purpose of identification. Each fish survey site consisted of a 100 meter stream reach. Fish collected at each site were identified at the end of the reach or when collection buckets were filled to capacity; whichever procedure was most appropriate for a given site. Gary Smith, a Southwest Regional Habitat Biologist for the Pennsylvania Fish and Boat Commission, identified the collected fish specimens. Surveys were conducted at twelve sites within the Peters Creek watershed. Six sites were along the main stem of Peters Creek and six sites were along major named tributaries (Table 2.1).

**Table 2.1 Sites for 2009 and 2013 Fish Surveys**

| Site | Latitude | Longitude | Description |
|---|---|---|---|
| PC1 | 40.30100 | -79.88812 | Peters Creek upstream of CMA sewage plant |
| PC2 | 40.29786 | -79.89993 | Peters Creek 1.4 km downstream of SR0051 bridge (0104)* |
| PC3 | 40.28562 | -79.93406 | Peters Creek 250 m downstream of mouth of Beam Run (0103)* |
| PC4 | 40.27501 | -79.96302 | Peters Creek 150 m downstream of SR3015 bridge (0102)* |
| PC6 | 40.25530 | -79.98584 | Peters Creek 100 m downstream of SR1006 bridge (0101)* |
| PC7 | 40.24368 | -80.03315 | Peters Creek at Wright's Cemetery (Anderson Station)* |
| LR3 | 40.29481 | -79.91859 | Lewis Run near mouth upstream of Old Clairton Rd Bridge |
| BR1 | 40.28559 | -79.93666 | Beam Run near mouth upstream of Peters Creek Rd |
| LR1a | 40.27851 | -79.95807 | Lick Run near mouth upstream of Piney Fork Rd bridge |
| PF1 | 40.27390 | -79.97081 | Piney Fork near mouth upstream of Corvette Tunnel |
| CR1 | 40.30905 | -80.00087 | Catfish Run along Corrigan Drive in South Park County Park |
| SH1 | 40.28759 | -80.00188 | Sleepy Hollow Run near mouth upstream of Brownsville Rd bridge |

** Indicates historical PFBC site. Items in parentheses are PFBC site designations.*

Macroinvertebrate and fish samples were collected over a six day period; April 23rd, 24th, 28th, 29th, 30th and May 8th, 2009. Future macroinvertebrate sampling should occur during a similar time of year in order to provide sampling data that can be compared to the current data.

#### 2.3.2 2013 FISH SURVEY METHODS

Fish surveys were conducted by California University of Pennsylvania professors Dr. David Argent and Dr. William Kimmel on April 25th and May 2nd, 2013. Fish were surveyed at locations PC1, PC2, PC3, PC4, PC6, PC7, and PF1 from Table 2.1. These sites were originally sampled in 2009 by the Western Pennsylvania Conservancy and the PFBC. Each survey site consisted of a 100 meter stream reach. Either one or two backpack electrofishing units were used at a given site depending on the stream width of the survey reach. Large fish were identified onsite and released. Small fish, <100 mm total length, were preserved in 10% formalin and returned to California University of Pennsylvania for identification.

#### 2.3.3 2009 FISH SURVEY RESULTS

A total of 1,663 individuals were collected from 12 sites representing 21 species of fish. Sites with the lowest taxa richness were tributary sites CR1 (Catfish Run), BR1 (Beam Run), and SH1 (Sleepy Hollow Run) with 3 species present. Highest taxa richness was found at PC3 with a total of 13 species recovered. Blacknose Dace, Bluntnose Minnows, Creek Chubs and White Suckers dominated the fish collected comprising 86.5% of the total specimens. Five species of darter were collected and accounted for 5.2% of the specimens recovered. Results for Peters Creek main stem sites and tributary sites are presented in Table 2.2 and Table 2.3 respectively. A physical description of each site along with site water chemistry is provided in the complete report in the Appendix.

### Table 2.2 2009 Fish Survey Peters Creek Main Stem Site Results

| Common Name | Scientific Name | PC1 | PC2 | PC3 | PC4 | PC6 | PC7 |
|---|---|---|---|---|---|---|---|
| **yellow bullhead** | *Ameiurus natalis* | 0 | 0 | 1 | 0 | 0 | 0 |
| **rainbow trout** | *Oncorhynchus mykiss* | 1 | 0 | 5 | 1 | 0 | 0 |
| **brown trout** | *Salmo trutta* | 0 | 0 | 2 | 0 | 0 | 0 |
| **central stoneroller** | *Campostoma anomalum* | 0 | 0 | 2 | 1 | 19 | 22 |
| **goldfish** | *Carassius auratus* | 0 | 0 | 0 | 2 | 0 | 0 |
| **common carp** | *Cyprinus carpio* | 0 | 3 | 10 | 1 | 0 | 0 |
| **emerald shiner** | *Notropis atherinoides* | 3 | 1 | 0 | 0 | 0 | 0 |
| **fathead minnow** | *Pimephales promelas* | 0 | 2 | 0 | 0 | 2 | 0 |
| **bluntnose minnow** | *Pimephales notatus* | 0 | 27 | 15 | 10 | 81 | 3 |
| **blacknose dace** | *Rhinichthys atratulus* | 0 | 51 | 14 | 36 | 9 | 14 |
| **redside dace** | *Clinostomus elongatus* | 0 | 0 | 0 | 0 | 11 | 0 |
| **creek chub** | *Semotilus atromaculatus* | 0 | 4 | 21 | 30 | 57 | 26 |
| **white sucker** | *Catostomus commersoni* | 9 | 6 | 74 | 39 | 63 | 4 |
| **northern hogsucker** | *Hypentelium nigricans* | 0 | 0 | 5 | 0 | 0 | 0 |
| **green sunfish** | *Lepomis cyanellus* | 0 | 0 | 0 | 1 | 0 | 0 |
| **smallmouth bass** | *Micropterus dolomieui* | 0 | 1 | 3 | 0 | 0 | 0 |
| **greenside darter** | *Etheostoma blennoides* | 0 | 1 | 4 | 1 | 0 | 0 |
| **rainbow darter** | *Etheostoma caeruleum* | 0 | 7 | 4 | 0 | 0 | 0 |
| **fantail darter** | *Etheostoma flabellare* | 0 | 0 | 0 | 0 | 0 | 18 |
| **johnny darter** | *Etheostoma nigrum* | 0 | 1 | 0 | 0 | 20 | 5 |
| **log perch** | *Percina caprodes* | 1 | 0 | 0 | 0 | 0 | 0 |
| **unknown** | | 1 | 0 | 0 | 0 | 0 | 0 |
| | **Total # of Species** | **4** | **11** | **13** | **10** | **8** | **7** |
| | **Total # of Specimens** | **15** | **104** | **160** | **122** | **262** | **92** |

### Table 2.3 2009 Fish Survey Tributary Site Results

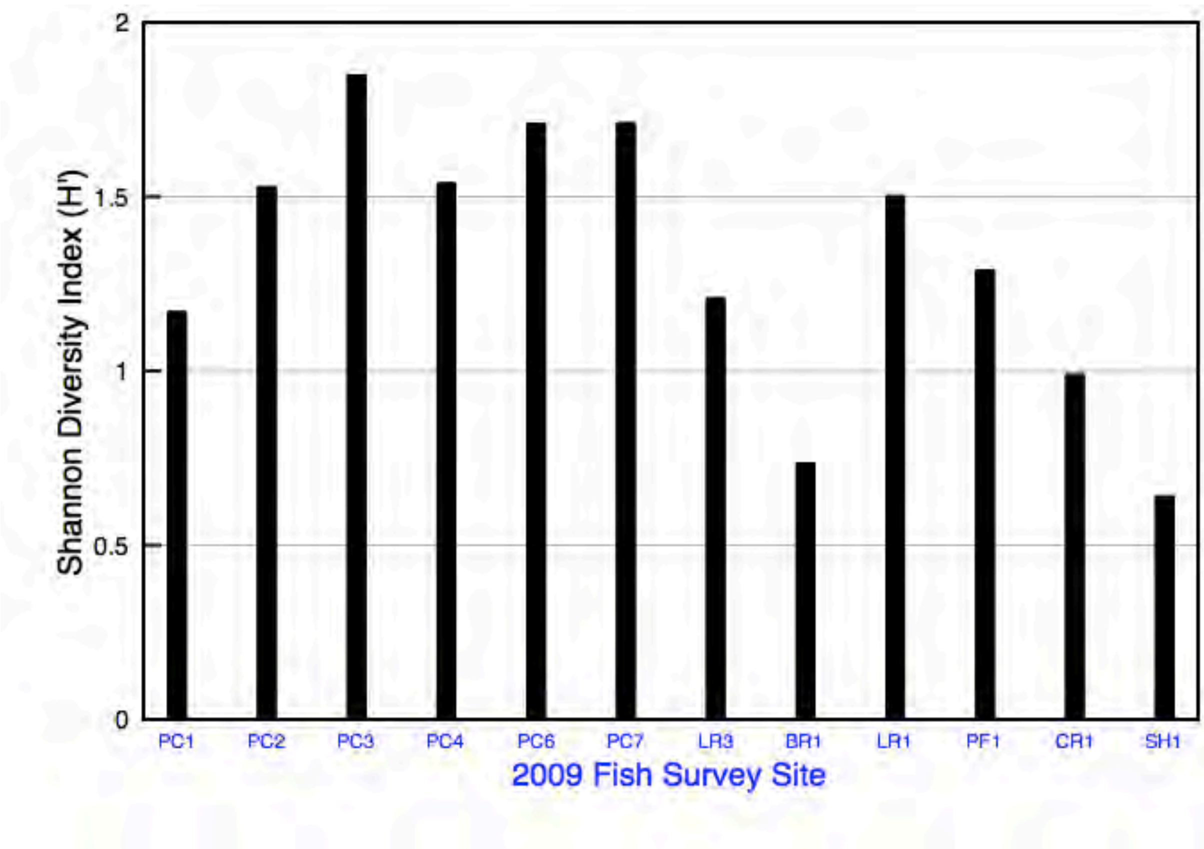
| Common Name | Scientific Name | LR-3 | BR-1 | LR-1 | PF-1 | CR-1 | SH-1 |
|---|---|---|---|---|---|---|---|
| **yellow bullhead** | *Ameiurus catus* | 0 | 0 | 1 | 0 | 0 | 0 |
| **rainbow trout** | *Oncorhynchus mykiss* | 0 | 0 | 0 | 0 | 0 | 0 |
| **brown trout** | *Salmo trutta* | 0 | 0 | 1 | 0 | 0 | 0 |
| **central stoneroller** | *Campostoma anomalum* | 8 | 3 | 21 | 2 | | 1 |
| **goldfish** | *Carassius auratus* | 0 | 0 | 0 | 0 | 0 | 0 |
| **common carp** | *Cyprinus carpio* | 0 | 0 | 0 | 0 | 0 | 0 |
| **emerald shiner** | *Notropis atherinoides* | 0 | 0 | 0 | 0 | 0 | 0 |
| **fathead minnow** | *Pimephales promelas* | 0 | 0 | 1 | 0 | 0 | 0 |
| **bluntnose minnow** | *Pimephales notatus* | 0 | 0 | 0 | 0 | 0 | 0 |
| **blacknose dace** | *Rhinichthys atratulus* | 89 | 39 | 71 | 48 | 68 | 49 |
| **redside dace** | *Clinostomus elongatus* | 0 | 0 | 0 | 0 | 0 | 0 |
| **creek chub** | *Semotilus atromaculatus* | 67 | 79 | 40 | 89 | 66 | 17 |
| **white sucker** | *Catostomus commersoni* | 21 | 0 | 24 | 59 | 20 | 0 |
| **northern hogsucker** | *Hypentelium nigricans* | 0 | 0 | 0 | 0 | 0 | 0 |
| **green sunfish** | *Lepomis cyanellus* | 0 | 0 | 0 | 0 | 0 | 0 |
| **smallmouth bass** | *Micropterus dolomieui* | 0 | 0 | 0 | 0 | 0 | 0 |
| **greenside darter** | *Etheostoma blennoides* | 1 | 0 | 0 | 8 | 0 | 0 |
| **rainbow darter** | *Etheostoma caeruleum* | 4 | 0 | 7 | 3 | 0 | 0 |
| **fantail darter** | *Etheostoma flabellare* | 0 | 0 | 0 | 0 | 0 | 0 |
| **johnny darter** | *Etheostoma nigrum* | 0 | 0 | 1 | 0 | 0 | 0 |
| **log perch** | *Percina caprodes* | 0 | 0 | 0 | 0 | 0 | 0 |
| **unknown** | | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Total # of Species** | **6** | **3** | **9** | **6** | **3** | **3** |
| | **Total # of Specimens** | **190** | **121** | **167** | **209** | **154** | **67** |

Biometrics, including Shannons Diversity Index (H'), were calculated for each site and are displayed in Table 2.4 and Figure 2.1. See the full report in the Appendix for other metrics.

**Table 2.4 2009 Fish Survey Biotic Metrics**

| Biotic Metric | PC1 | PC2 | PC3 | PC4 | PC6 | PC7 | LR3 | BR1 | LR1 | PF1 | CR1 | SH1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # of Species | 5 | 11 | 13 | 10 | 8 | 7 | 6 | 3 | 9 | 6 | 3 | 3 |
| # of Specimens | 15 | 104 | 160 | 122 | 262 | 92 | 190 | 121 | 167 | 209 | 154 | 67 |
| Shannon (H') | 1.17 | 1.53 | 1.85 | 1.54 | 1.71 | 1.71 | 1.21 | 0.74 | 1.50 | 1.29 | 0.99 | 0.64 |

**Figure 2.1 Shannon Diversity Index Plot for 2009 Fish Survey Sites**




## 2.3.4 CONCLUSIONS

Fish distributions in the Peters Creek watershed are heavily influenced by anthropogenic impacts present in this suburban watershed. Numerous sites had high levels of algae that are often an indication of high organic load. Overall, three species dominated the fish community and those taxa are pollution tolerant species: Creek Chubs, Blacknose Dace, and White Suckers. However, five species of darter were collected at several sites and most darters are intolerant of siltation and turbidity and require highly oxygenated water. Several game fish species were also captured including smallmouth bass and hatchery stocked trout species. Peters Creek is heavily utilized as a public fishing resource so restoration projects that would focus on adding more in-stream fish habitat would benefit not only the resource but also people who utilize the resource.

Numerous locations that were sampled could benefit from random boulder placement, multi-log vanes, modified mudsill cribs, and root wad structures to increase macroinvertebrate habitat and fish holding cover.

## 2.3.5 2013 FISH SURVEY RESULTS

A total of 2,016 individuals were collected from 7 sites representing 19 species of fish. Sites with the lowest taxa richness were PC3 and PC1 with 7 species present. Highest taxa richness was found at PC4 and PF1 with a total of 12 species recovered. Blacknose Dace, Bluntnose Minnows, Creek Chubs and White Suckers dominated the fish collected comprising 80.9% of the total specimens. Six species of darter were collected and comprised 12.9% of the total sample. Results for all sites sampled in 2013 are provided in Table 2.5

### Table 2.5 Peters Creek Watershed 2013 Fish Survey Site Results

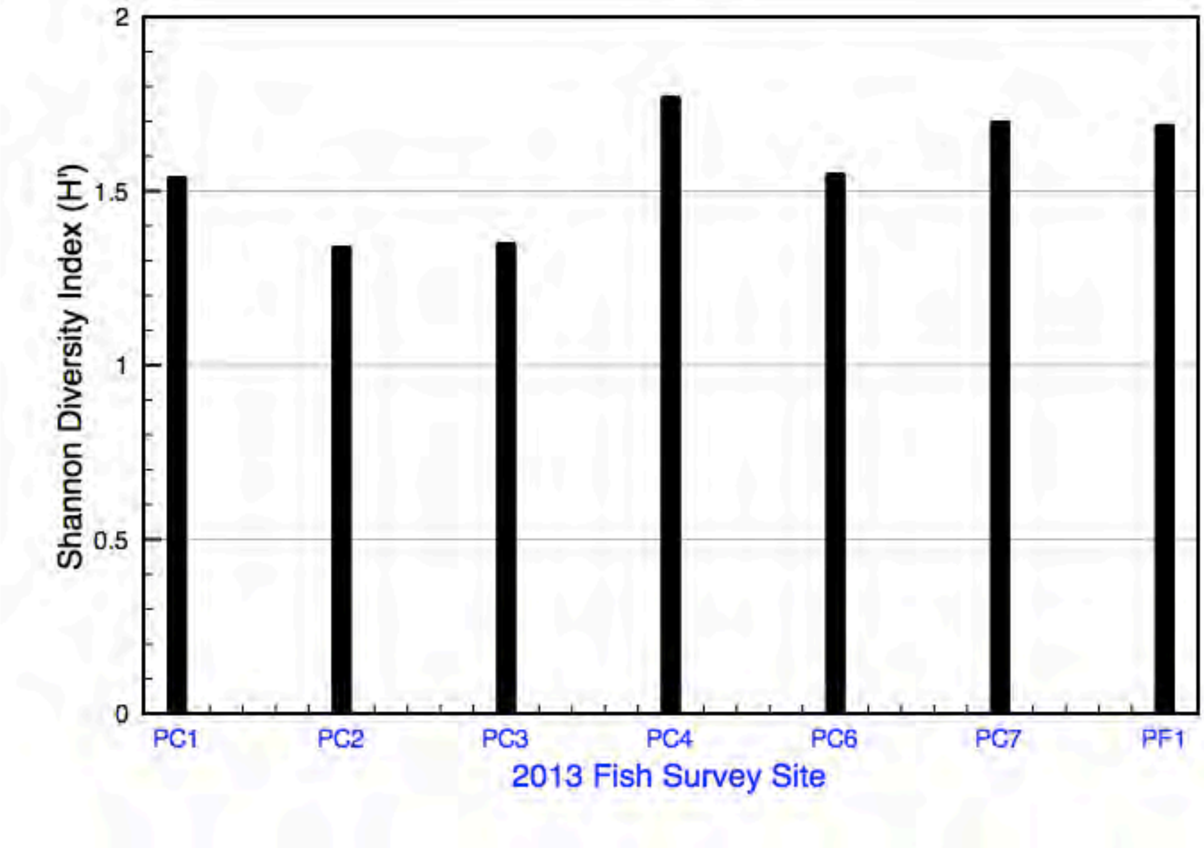
| Common Name | Scientific Name | PC1 | PC2 | PC3 | PC4 | PC6 | PC7 | PF1 |
|---|---|---|---|---|---|---|---|---|
| **yellow bullhead** | *Ameiurus natalis* | 1 | 0 | 0 | 2 | 0 | 0 | 1 |
| **rainbow trout** | *Oncorhynchus mykiss* | 2 | 0 | 0 | 0 | 0 | 0 | 1 |
| **central stoneroller** | *Campostoma anomalum* | 0 | 1 | 0 | 12 | 7 | 44 | 26 |
| **common carp** | *Cyprinus carpio* | 0 | 4 | 0 | 0 | 0 | 0 | 0 |
| **fathead minnow** | *Pimephales promelas* | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| **bluntnose minnow** | *Pimephales notatus* | 3 | 8 | 2 | 4 | 45 | 28 | 6 |
| **blacknose dace** | *Rhinichthys atratulus* | 14 | 82 | 132 | 86 | 11 | 30 | 194 |
| **redside dace** | *Clinostomus elongatus* | 0 | 0 | 0 | 2 | 11 | 0 | 0 |
| **creek chub** | *Semotilus atromaculatus* | 17 | 36 | 83 | 125 | 107 | 85 | 130 |
| **white sucker** | *Catostomus commersoni* | 46 | 48 | 60 | 51 | 52 | 13 | 133 |
| **rock bass** | *Ambloplites rupestris* | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| **pumpkinseed** | *Lepomis gibbosus* | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| **bluegill** | *Lepomis macrochirus* | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| **greenside darter** | *Etheostoma blennoides* | 0 | 1 | 3 | 17 | 0 | 0 | 18 |
| **rainbow darter** | *Etheostoma caeruleum* | 0 | 1 | 29 | 28 | 0 | 0 | 98 |
| **fantail darter** | *Etheostoma flabellare* | 0 | 0 | 0 | 5 | 2 | 7 | 3 |
| **johnny darter** | *Etheostoma nigrum* | 0 | 0 | 0 | 0 | 10 | 21 | 1 |
| **banded darter** | *Etheostoma zonale* | 0 | 0 | 0 | 12 | 0 | 0 | 4 |
| **log perch** | *Percina caprodes* | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | **Total # of Species** | **92** | **181** | **310** | **345** | **245** | **228** | **615** |
| | **Total # of Specimens** | **10** | **8** | **7** | **12** | **8** | **7** | **12** |

Biometrics, including Shannon's Diversity Index (H'), were calculated for each 2013 fish survey site and are displayed in Table 2.6 and Figure 2.2.

### Table 2.6 2013 Fish Survey Biotic Metrics

| Biotic Metric | PC1 | PC2 | PC3 | PC4 | PC6 | PC7 | PF1 |
|---|---|---|---|---|---|---|---|
| **# of Species** | 92 | 181 | 310 | 345 | 245 | 228 | 615 |
| **# of Specimens** | 10 | 8 | 7 | 12 | 8 | 7 | 12 |
| **Shannon Diversity (H')** | 1.54 | 1.34 | 1.35 | 1.77 | 1.55 | 1.70 | 1.69 |

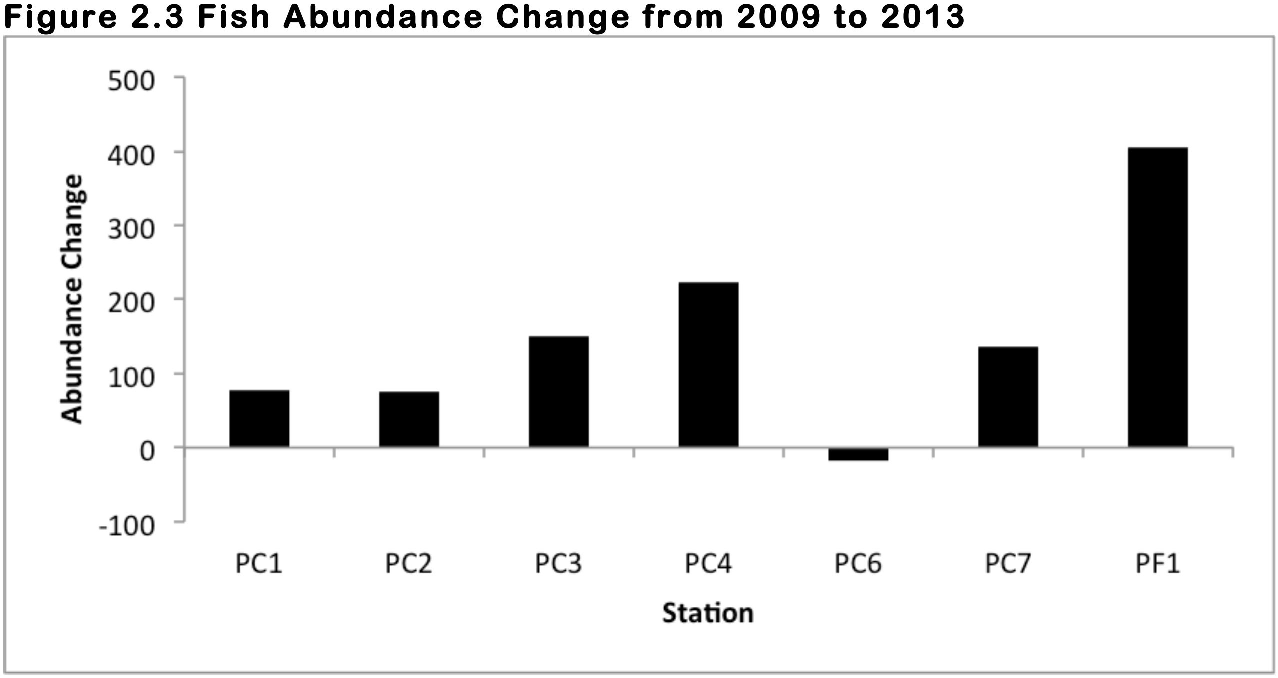
**Figure 2.2 Shannon Diversity Index Plot for 2013 Fish Surveys**




### 2.3.6 2009/2013 FISH SURVEY COMPARISONS

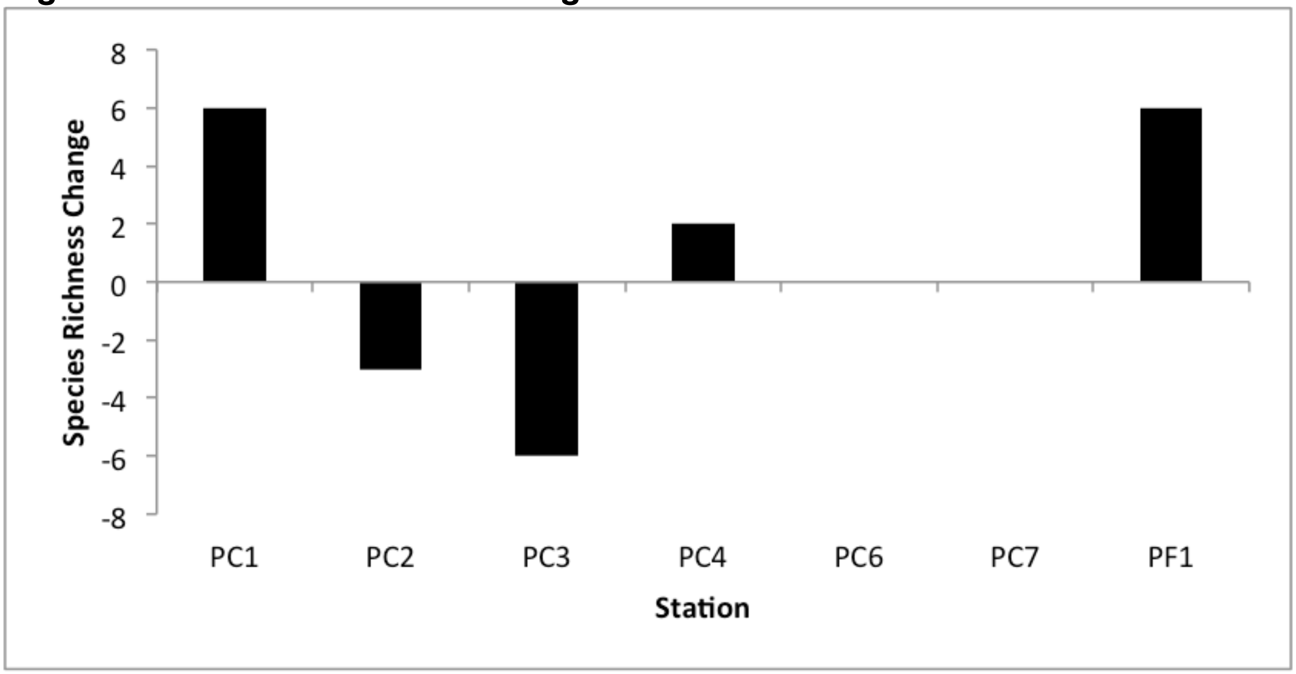
Fish abundance increased dramatically from 2009 to 2013 at the 7 survey sites commonly sampled with over 1000 more specimens recovered in 2013. Figure 2.3 depicts differences in fish abundance for individual sites. Site PF1 experienced the greatest increase in specimens recovered with 406 more found at the site in 2013 as compared to 2009. The only site that experienced a decrease in abundance in 2013 was PC6 with 17 fewer fish sampled in 2013.

**Figure 2.3 Fish Abundance Change from 2009 to 2013**



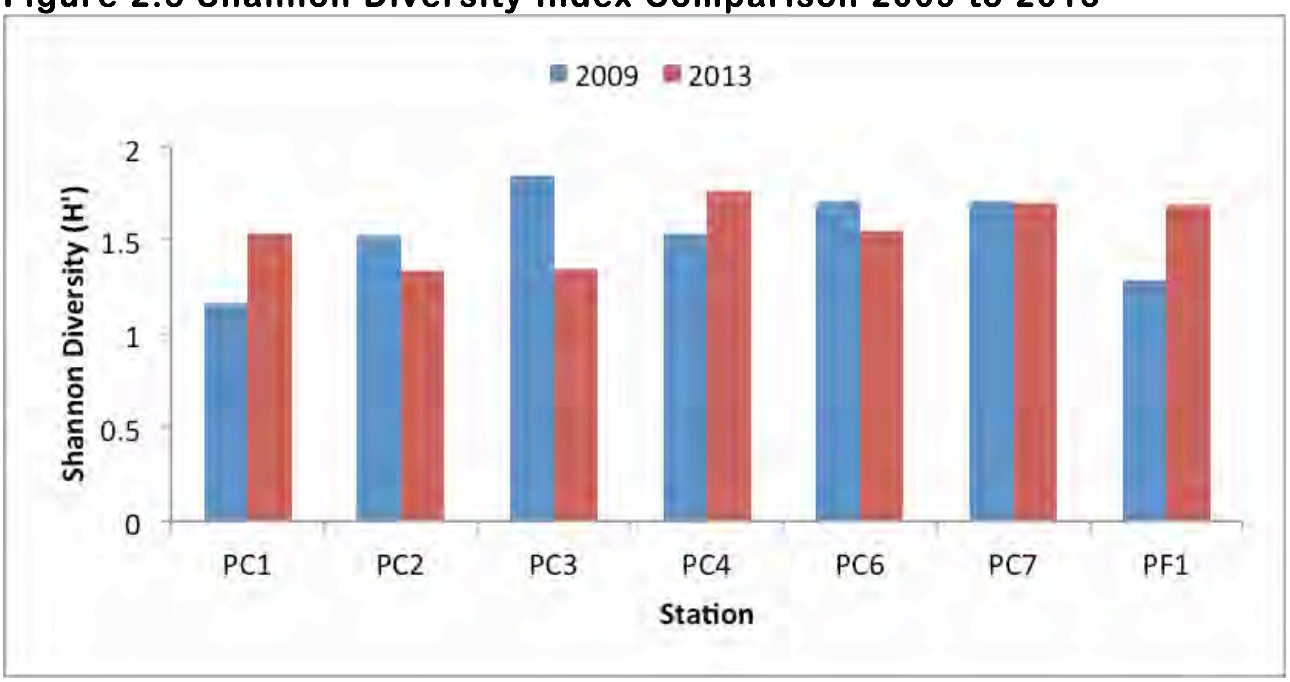
Twenty-one species of fish were recovered at the seven sites in 2009 and 19 species were found in 2013. Six species (goldfish, emerald shiner, northnern hogsucker, brown trout, smallmouth bass) were present in 2009 but absent in 2013. Four species (rock bass, pumpkinseed, bluegill, banded darter) were found in 2013 but not in 2009. Fewer game fish were captured during the 2013 study and those that were captured tended to be smaller than in 2009. Species richness change for individual sites from 2009 to 2013 is presented in Figure 2.4. Sites PC1 and PF1 experienced the greatest increase in taxa richness with each site gaining 6 additional species. Site PC3 had 6 fewer species in 2013 compared to 2009.

**Figure 2.4 Taxa Richness Change from 2009 to 2013**




Shannon's Diversity Index combines information regarding species abundance, taxa richness and species composition at a given site to provide an overall diversity rating for the site. Figure 2.5 depicts the change in Shannon's Diversity Index at individual sites from 2009 to 2013.

**Figure 2.5 Shannon Diversity Index Comparison 2009 to 2013**



Shannon's Diversity comparisons indicate that overall diversity increased at sites PC1, PC4 and PF1 from 2009 to 2013, decreased at sites PC2, PC3 and PC6 and remained virtually unchanged at site PC7.

Numbers of relatively pollution intolerant species, including all darter species and redside dace, increased from 7.5%(72 individuals) of the total sample in 2009 to 13.6%(274 individuals) of the total sample in 2013. The increase in specimens as well as the number of species represented was especially evident at sites PC4 and PF1. Banded Darters were collected at both sites in 2013 but were not found within the watershed in 2009. Redside dace were found at both PC6 and PC4 in 2013 but only at PC6 in 2009.

### 2.3.7 COMPARISON WITH PENNSYLVANIA FISH & BOAT COMMISSION STUDIES

The Pennsylvania Fish & Boat Commission conducted fish surveys at sites PC6, PC4, and PC3 in both 1978 and 1997 and at site PC2 in 1997 only. They identified these sites as 0101, 0102, 0103 and 0104 respectively. Tables 2.7-2.10 present a comparison of species occurrence at each site for these four sampling periods.

Taxa richness increased at each site substantially from 1978 to the 1997 to 2013 sampling period. Three to four species were found in each site in 1978 and this increased to 11-13 species found during the 1997 to 2013 surveys. From 1997 to 2009 species richness either held steady or increased at all sites except at PC4. However, a number of the species found at PC4 during 1997 are game species that would not naturally occur in the headwaters portion of Peters Creek, including largemouth bass, black crappie and rainbow trout. These species were most likely stocked by locals.

**Table 2.7 Species Occurrence at Site PC6 (PFBC 0101)**

| Common Name | Scientific Name | 1978 | 1997 | 2009 | 2013 |
|---|---|---|---|---|---|
| yellow bullhead | *Ameiurus natalis* | | | | |
| rainbow trout | *Oncorhynchus mykiss* | | X | | |
| central stoneroller | *Campostoma anomalum* | | X | X | X |
| common carp | *Cyprinus carpio* | X | | | |
| fathead minnow | *Pimephales promelas* | | | X | |
| bluntnose minnow | *Pimephales notatus* | | X | X | X |
| blacknose dace | *Rhinichthys atratulus* | X | X | X | X |
| redside dace | *Clinostomus elongatus* | | X | X | X |
| creek chub | *Semotilus atromaculatus* | X | X | X | X |
| white sucker | *Catostomus commersoni* | X | X | X | X |
| bluegill | *Lepomis macrochirus* | | X | | |
| largemouth bass | *Micropterus salmoides* | | X | | |
| black crappie | *Poxomis nigromaculatus* | | X | | |
| fantail darter | *Etheostoma flabellare* | | X | | X |
| johnny darter | *Etheostoma nigrum* | | X | X | X |
| | TOTAL SPECIES | **4** | **12** | **8** | **8** |

**Table 2.8 Species Occurrence at Site PC4 (PFBC 0102)**

| Common Name | Scientific Name | 1978 | 1997 | 2009 | 2013 |
|---|---|---|---|---|---|
| yellow bullhead | *Ameiurus natalis* | | | | X |
| brown bullhead | *Ameiurus nebulosus* | | X | | |
| rainbow trout | *Oncorhynchus mykiss* | | | X | |
| central stoneroller | *Campostoma anomalum* | | X | X | X |
| goldfish | *Carassius auratus* | | X | X | |
| common carp | *Cyprinus carpio* | X | X | X | |
| fathead minnow | *Pimephales promelas* | | | | X |
| bluntnose minnow | *Pimephales notatus* | | X | X | X |
| blacknose dace | *Rhinichthys atratulus* | X | X | X | X |
| redside dace | *Clinostomus elongatus* | | | | X |
| creek chub | *Semotilus atromaculatus* | X | X | X | X |
| white sucker | *Catostomus commersoni* | X | X | X | X |
| green sunfish | *Lepomis cyanellis* | | | X | |
| greenside darter | *Etheostoma blennoides* | | | X | X |
| rainbow darter | *Etheostoma caeruleum* | | | | X |
| fantail darter | *Etheostoma flabellare* | | X | | X |
| johnny darter | *Etheostoma nigrum* | | X | | |
| banded darter | *Etheostoma zonale* | | | | X |
| | TOTAL SPECIES | **4** | **10** | **10** | **12** |

**Table 2.9 Species Occurrence at Site PC3 (PFBC 0103)**

| Common Name | Scientific Name | 1978 | 1997 | 2009 | 2013 |
|---|---|---|---|---|---|
| yellow bullhead | *Ameiurus natalis* | | X | X | |
| rainbow trout | *Oncorhynchus mykiss* | | | X | |
| brown trout | *Salmo trutta* | | | X | |
| central stoneroller | *Campostoma anomalum* | | | X | |
| common carp | *Cyprinus carpio* | X | X | X | |
| fathead minnow | *Pimephales promelas* | | | | X |
| bluntnose minnow | *Pimephales notatus* | | | X | X |
| blacknose dace | *Rhinichthys atratulus* | X | X | X | X |
| creek chub | *Semotilus atromaculatus* | | X | X | X |
| white sucker | *Catostomus commersoni* | X | X | X | X |
| northern hogsucker | *Hypentelium nigricans* | | | X | |
| bluegill | *Lepomis macrochirus* | | X | | |
| smallmouth bass | *Micropterus dolomieui* | | | X | |
| freshwater drum | *Aplodinotus grunniens* | | X | | |
| greenside darter | *Etheostoma blennoides* | | | X | X |
| rainbow darter | *Etheostoma caeruleum* | | | X | X |
| johnny darter | *Etheostoma nigrum* | | X | | |
| Sauger | *Stizostedion canadense* | | X | | |
| | TOTAL SPECIES | **3** | **9** | **13** | **7** |

**Table 2.10 Species Occurrence at Site PC2 (PFBC 0104)**

| Common Name | Scientific Name | 1997 | 2009 | 2013 |
|---|---|---|---|---|
| yellow bullhead | *Ameiurus natalis* | X | | |
| central stoneroller | *Campostoma anomalum* | | | X |
| goldfish | *Carassius auratus* | X | | |
| common carp | *Cyprinus carpio* | X | X | X |
| emerald shiner | *Notropis atherinoides* | | X | |
| fathead minnow | *Pimephales promelas* | | X | |
| bluntnose minnow | *Pimephales notatus* | X | X | X |
| blacknose dace | *Rhinichthys atratulus* | X | X | X |
| creek chub | *Semotilus atromaculatus* | X | X | X |
| white sucker | *Catostomus commersoni* | X | X | X |
| bluegill | *Lepomis macrochirus* | X | | |
| smallmouth bass | *Micropterus dolomieui* | | X | |
| greenside darter | *Etheostoma blennoides* | | X | X |
| rainbow darter | *Etheostoma caeruleum* | | X | X |
| johnny darter | *Etheostoma nigrum* | X | X | |
| | TOTAL SPECIES | 9 | 11 | 8 |

## 2.3.8 CONCLUSIONS

The status of fish communities within the main stem of Peters Creek has improved substantially since the 1970's when only 4 species of pollution tolerant fish were found during a survey by the PFBC. This improvement has occurred in spite of the many historic and recent negative anthropogenic influences within this suburban watershed. These influences include abandoned mine drainage, urban and residential runoff, sewage treatment plant outfalls, increased stormwater from a recently completed turnpike section, excess organic load due to a recent sewage plant upgrade, heavy off-road activity within riparian areas and a recent water main break and subsequent salt spill.

The dramatic increase in abundance of specimens collected from 2009 to 2013 could be attributable to the use of a more efficient collection method and/or less predation pressure caused by a decrease of larger piscivores by a major fish kill in 2011.

Fish communities within the main stem of Peters Creek appear to be trending toward more diversity with compositions that include a greater abundance of more pollution intolerant species. The improvements in diversity at sites PC4 and PF1 may also be attributable to improved water quality due to a more efficient sewage treatment plant on Piney Fork.

Improving fish communities within Peters Creek and its tributaries will require cooperation and vigilance at many levels to mitigate old problems like abandoned mine drainage and stormwater runoff and to minimize the contribution from new developments within the watershed.

## 2.4 MACROINVERTEBRATE STUDIES

### 2.4.1 2009 MACROINVERTEBRATE SURVEY METHODS

Macroinvertebrate surveys were conducted by the Western Pennsylvania Conservancy on April 28th, 29th and 30th of 2009 at 18 sites (Table 2.11) in the Peters Creek watershed. Surveys were conducted following the benthic macroinvertebrate protocol for single habitat streams as described in EPA's *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers*.

**Table 2.11 Sites for 2009 and 2013 Macroinvertebrate Survey**

| Site | Latitude | Longitude | Description |
|---|---|---|---|
| PC1 | 40.30100 | -79.88812 | Peters Creek upstream of Clairton sewage plant |
| PC2 | 40.29786 | -79.89993 | Peters Creek 1.4 km downstream of SR0051 bridge (0104)* |
| PC3 | 40.28562 | -79.93406 | Peters Creek 250 m downstream of mouth of Beam Run (0103)* |
| PC4 | 40.27501 | -79.96302 | Peters Creek 150 m downstream of SR3015 bridge (0102)* |
| PC5 | 40.27089 | -79.97020 | Peters Creek upstream of confluence with Piney Fork |
| PC6 | 40.25530 | -79.98584 | Peters Creek 100 m downstream of SR1006 bridge (0101)* |
| PC7 | 40.24368 | -80.03315 | Peters Creek at Wright's Cemetery (Anderson Station)* |
| LR3 | 40.29481 | -79.91859 | Lewis Run near mouth upstream of Old Clairton Rd Bridge |
| BR1 | 40.28559 | -79.93666 | Beam Run near Mouth upstream of Peters Creek Rd |
| SR1 | 40.28603 | -79.95236 | Snee Run near mouth upstream of wetland |
| LR1 | 40.27975 | -79.96436 | Lick Run upstream of Wheeling & Lake Erie Railroad tunnel |
| LR2 | 40.30833 | -79.97672 | Lick Run downstream of McElheny Rd |
| PF1 | 40.27390 | -79.97081 | Piney Fork near mouth upstream of Corvette Tunnel |
| PF2 | 40.28656 | -80.00073 | Piney Fork downstream of confluence with Sleepy Hollow Run |
| CR1 | 40.30905 | -80.00087 | Catfish Run along Corrigan Drive in South Park County Park |
| CR2 | 40.29575 | -79.99304 | Catfish Run upstream of Wallace Rd bridge |
| SH1 | 40.28759 | -80.00188 | Sleepy Hollow Run near mouth upstream of Brownsville Rd bridge |
| SH2 | 40.29722 | -80.00348 | Sleepy Hollow Run downstream of The Academy |
| TF1 | 40.25673 | -79.99892 | Trax Farm Tributary near mouth upstream of Washington Road |

** Indicates historical PFBC site. Items in parentheses are PFBC site designations.*

Each sample site consisted of a 100 meter stream reach. Samples were collected in triplicate with a 0.0625 $m^2$ (25cm x 25 cm) quadrat serber sampler with a mesh size of 500 microns. Following sample collection, all specimens and any accompanying detritus were transferred from the sampler into collection bottles and preserved with 70% alcohol. Preserved samples were delivered to the Watershed Conservation Program's laboratory for processing and identification. Laboratory procedures followed EPA protocols.

Macroinvertebrate samples were carefully examined and organisms were separated from the debris in the laboratory. Site samples were sub-sampled in order to provide an identified sample size of 180-220 individuals for each site if enough specimens were available. To achieve this desired sample size, all specimens from each site were placed into an identification tray divided into quadrants. Specimens within randomly chosen quadrants were identified and then transferred to collection bottles and again preserved with 70% alcohol. Organisms were identified to the family taxonomic level under a dissecting microscope. Quality control procedures included a qualified staff member sorting through a sub-section of the sample to check for missed organisms. All identified samples are accompanied by the corresponding residual sample.

### 2.4.2 2013 MACROINVERTEBRATE SURVEY METHODS

Macroinvertebrate surveys were conducted by California University of Pennsylvania professors Dr. David Argent and Dr. William Kimmel on April 4th and 5th, 2013. Macroinvertebrates were surveyed at locations PC1, PC2, PC3, PC4, PC6, PC7, and PF1 from Table 2.11. Each survey site consisted of a 100 meter stream reach. Three macroinvertebrate samples were collected at each site with a 1 $m^2$ Lamotte® kick-net (500 micron mesh). Collected specimens were preserved in 70% ethyl alcohol and returned to California University of Pennsylvania for identification to the lowest practical taxonomic level.

In addition, the Peters Creek Watershed Association sampled sites SH2 and SR1 on May 7th and May 10th respectively. Samples were collected in triplicate with a 0.0625 $m^2$ (25cm x 25 cm) quadrat serber sampler with a mesh size of 500 microns from 100 meter reaches. Following sample collection, all specimens and any accompanying detritus were transferred from the sampler into collection bottles and preserved with 70% alcohol. Processing included picking macroinvertebrates from these samples and sending preserved site samples to Dr. Kimmel for identification.

All sites were originally sampled in 2009 by the Western Pennsylvania Conservancy and the Pennsylvania Fish & Boat Commission.

### 2.4.3 2009 MACROINVERTEBRATE DATA ANALYSIS

The following metrics were used to analyze the macroinvertebrate data for this study: (1) total number of taxa, (2) number of individuals, (3) percent EPT, (4) percent Chironomidae, (5) Shannon-Wiener Diversity Index (H), (6) pollution tolerance index (PTI), (7) Hilsenhoff Biotic Index(HBI), (8) Evenness, (9) # of Intolerant Taxa.

#### Richness Measures

The total number of taxa or taxa richness is the number of families represented in a given site sample. Total number of individuals is the number of specimens of a given taxa identified from each sample site. Diversity indices are mathematical measures of species diversity at a given site. The Shannon-Wiener Diversity Index provides information about species richness and also takes into account the relative abundances of different species at a site. Community diversity at a site increases as the index value increases.

### Composition Measures

Evenness is a measure of how evenly the individuals are distributed among the different species in a given site sample. It assumes that all species have an equal probability of being collected at a site. A site with all species equally represented within the sample will have an evenness of 1.0. The index decreases as the distribution of species within the sample becomes increasingly unequal.

% EPT is the composite number of individuals of mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera) present in a given sample divided by the total number of specimens in that sample.

% Chironomidae is the total number of individuals of the midge family found at a given site divided by the total number of specimens at the site. Midges are organisms in the Order Diptera. Dipterans are generally more tolerant of pollution than EPT organisms. An abundance of Dipterans at a site usually indicates poorer water quality.

### Tolerance/Intolerance Measures

The Hilsenhoff Biotic Index (HBI) was developed to assess low dissolved oxygen levels caused by organic loading but also identifies impacts from impoundment, thermal pollution, and some types of chemical pollution. Macroinvertebrate species are assigned tolerance values (0-10) depending on their ability to tolerate low levels of dissolved oxygen. Organisms that are most sensitive to low levels of dissolved oxygen are assigned low values and organisms with greater tolerance are assigned higher values. A low HBI at a site signifies the presence of an abundance of intolerant organisms and indicates that the site is not impacted measurably by organic loading. The Hilsenhoff score calculated for this report utilized pollution tolerance values for taxonomic classes, families and genus that were developed by the Pennsylvania DEP to be specific to conditions within Pennsylvania. The Hilsenhoff Biotic Index Score is also referred to as the PA Modified Pollution Tolerance Index or DEP Pollution Tolerance Index.

Number of Intolerant Taxa is the total number of families of mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera) present in a site sample excluding taxa of the caddisfly family of Hydropsychidae. Species of this family are generally tolerant of a significant level of pollution.

## 2.4.4 2009 MACROINVERTEBRATE SURVEY RESULTS

A total of 3,298 individuals were identified from the 18 sites. Fourteen Orders and 28 Families of macroinvertebrates were represented in this combined sample. Site samples were sub-sampled, as previously described, to achieve a sample size of 180-220 identified specimens per site. Thirteen sites (72.2%) had sample sizes above the 183 specimen average and five (27.8%) sites sample sizes were below the average. Three sites, PC5, PC6, and BR1, had sample sizes much lower than the average. Results of the 2009 macroinvertebrate sampling of Peters Creek main stem sites is displayed in Table 2.12 and for tributaries in Table 2.14.

**Table 2.12 Macroinvertebrate 2009 Survey Main Stem Results**

| Class/Order | Family | PC1 | PC2 | PC3 | PC4 | PC5 | PC6 | PC7 |
|---|---|---|---|---|---|---|---|---|
| Ephemeroptera | Siphlonuridae | | | | | | | |
| Plecoptera | Perlodidae | | | | | | | |
| | Chloroperlidae | | | | | | | |
| | Nemouridae | | | | | | | |
| Trichoptera | Hydropsychidae | 29 | 9 | 3 | | 7 | 6 | 27 |
| | Philopotamidae | | | | | | | |
| | Glossosomatidae | | | | 1 | | | |
| | Polycentropodidae | | | | | | | 1 |
| | Brachycentridae | | | | | | | |
| | Ryacophilidae | | | | | | | |
| | Limnephelidae | | | | | | | |
| Diptera | Chironomidae | 190 | 159 | 172 | 191 | 25 | 15 | 60 |
| | Tipulidae | 1 | | 1 | 2 | 7 | 1 | 1 |
| | Empididae | 2 | 2 | 2 | | | 2 | 2 |
| | Muscidae | | | | | | | |
| | Tabanidae | | | | | | | |
| | Stratiomyiidae | | | | | | | |
| | Simulidae | | 6 | 1 | | | | 1 |
| Coleoptera | Elmidae | 1 | | 2 | 1 | 8 | 44 | 62 |
| | Dytiscidae | | | | | | | |
| | Psephenidae | | | | | | | |
| Megaloptera | Corydalidae | | | | | 1 | 1 | |
| Neuroptera | Sisyridae | | | | | | | |
| Odonata | Calopterygidae | | | 1 | | | | |
| | Aeshnidae | | | | | | | |
| Amphipoda | Gammaridae | 2 | 4 | 10 | | 2 | 3 | 5 |
| Decapoda | Cambaridae | | | | | | 1 | 5 |
| Gastropoda | Physidae | | | | | | | |
| Isopoda | Asellidae | | | | | 1 | | 49 |
| Oligachaeta | | 1 | 2 | 2 | | | | 3 |
| Hirudinidae | | | | | | | | |
| Turbellaria | | | | | | | | |
| | **Total Specimens** | **226** | **182** | **194** | **195** | **51** | **73** | **216** |
| | **Total # of Taxa** | **7** | **6** | **9** | **4** | **7** | **8** | **11** |

**Table 2.13 Metrics for Main Stem Sites**

| Biotic Metric | PC1 | PC2 | PC3 | PC4 | PC5 | PC6 | PC7 |
|---|---|---|---|---|---|---|---|
| # of Specimens | 226 | 182 | 194 | 195 | 51 | 73 | 216 |
| # of Taxa | 7 | 6 | 9 | 4 | 7 | 8 | 11 |
| # of Intolerant Taxa | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| % EPT | 12.8 | 4.9 | 1.6 | 0.5 | 13.7 | 8.2 | 13.0 |
| % Chironomidae | 84.1 | 87.4 | 88.7 | 98.0 | 49.0 | 20.6 | 27.8 |
| Evenness | .290 | .314 | .249 | .088 | .754 | .597 | .693 |
| Shannon Diversity | 0.57 | 0.56 | 0.55 | 0.12 | 1.47 | 1.24 | 1.66 |
| Hilsenhoff | 5.86 | 5.95 | 5.90 | 5.94 | 5.33 | 5.16 | 6.04 |

## Table 2.14 Macroinvertebrate 2009 Survey Tributary Results

| Class/Order | Family | LR3 | BR1 | SR1 | LR1 | LR2 | PF1 | PF2 | CR1 | CR2 | SH1 | TF1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ephemeroptera** | **Siphlonuridae** | | | | | | | | 1 | | 1 | |
| **Plecoptera** | **Perlodidae** | | | 2 | | | | | | | | |
| | **Chloroperlidae** | | | 1 | | | | | | | | |
| | **Nemouridae** | | | 96 | | | | | | | | |
| **Trichoptera** | **Hydropsychidae** | 1 | 29 | 24 | 11 | 25 | 1 | 8 | 85 | 68 | 16 | 4 |
| | **Philopotamidae** | | | | | | | | | | | |
| | **Glossosomatidae** | | | | | | | | | | | |
| | **Polycentropodidae** | | | 1 | | 4 | | | 1 | | 1 | |
| | **Brachycentridae** | | | 1 | | | | | | | | |
| | **Ryacophilidae** | | | 7 | | | | | | | | |
| | **Limnephelidae** | | | | | 1 | | | | | | |
| **Diptera** | **Chironomidae** | 196 | 49 | 40 | 168 | 159 | 177 | 150 | 46 | 19 | 112 | 161 |
| | **Tipulidae** | | 3 | 4 | | 3 | | 3 | 8 | 1 | 5 | 1 |
| | **Empididae** | 11 | 1 | 1 | 5 | | | | 4 | 1 | | 1 |
| | **Muscidae** | | | | | | | 1 | | | | |
| | **Tabanidae** | | | | | | | | | | | |
| | **Stratiomyiidae** | | | | | | | | | 1 | | |
| | **Simulidae** | | | | 13 | | | 1 | 6 | | | |
| **Coleoptera** | **Elmidae** | | 3 | | 2 | 16 | | 30 | 16 | 104 | 69 | 2 |
| | **Dytiscidae** | | | | | | | | | | | |
| | **Psephenidae** | | 1 | | | | | | 2 | 4 | | |
| **Megaloptera** | **Corydalidae** | | | | | | | | | | | |
| **Neuroptera** | **Sisyridae** | 1 | | | | | | | | | | |
| **Odonata** | **Calopterygidae** | | | | | | | | 1 | | | |
| | **Aeshnidae** | | | | | | | | 1 | | | |
| **Amphipoda** | **Gammaridae** | 2 | 43 | | 1 | | | | 11 | 17 | | 27 |
| **Decapoda** | **Cambaridae** | | 3 | | | | | | | | 1 | 3 |
| **Gastropoda** | **Physidae** | | | | | | | | 1 | | | |
| **Isopoda** | **Asellidae** | | 5 | 8 | | | | 1 | 14 | | 5 | 2 |
| **Oligachaeta** | | 3 | 1 | | 4 | 6 | 3 | | 1 | 1 | 1 | 4 |
| **Hirudinidae** | | 1 | | | | | | | | | | |
| **Turbellaria** | | | | | | | | | | | | |
| | **Total Specimens** | **215** | **138** | **185** | **204** | **214** | **181** | **194** | **198** | **216** | **211** | **205** |
| | **Total # of Taxa** | **7** | **10** | **11** | **7** | **7** | **3** | **7** | **15** | **9** | **9** | **9** |

## Table 2.15 Metrics for Tributary Sites

| Biotic Metric | LR3 | BR1 | SR1 | LR1 | LR2 | PF1 | PF2 | CR1 | CR2 | SH1 | TF1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **# of Specimens** | 215 | 138 | 185 | 204 | 214 | 181 | 194 | 198 | 216 | 211 | 205 |
| **# of Taxa** | 7 | 10 | 11 | 7 | 7 | 3 | 7 | 15 | 9 | 9 | 9 |
| **# of Intolerant Taxa** | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **% EPT** | 0.5 | 21.0 | 71.3 | 5.4 | 14.0 | 0.6 | 4.1 | 43.9 | 31.5 | 8.6 | 2.0 |
| **% Chironomidae** | 91.2 | 35.5 | 21.6 | 82.4 | 74.3 | 97.8 | 77.3 | 23.2 | 8.8 | 53.1 | 78.5 |
| **Evenness** | .213 | .667 | .601 | .376 | .475 | .108 | .393 | .655 | .593 | .535 | .371 |
| **Shannon Diversity** | 0.42 | 1.54 | 1.44 | 0.73 | 0.93 | 0.12 | 0.77 | 1.77 | 1.30 | 1.18 | 0.81 |
| **Hilsenhoff** | 6.02 | 5.19 | 3.55 | 6.0 | 5.88 | 6.06 | 5.78 | 5.43 | 5.02 | 5.62 | 5.80 |

Biotic metrics described under the Data Analysis section are displayed for Peters Creek main stem sites in Table 2.13 and for tributary sites in Table 2.15.

The percentage of EPT was calculated for each of the 18 sites. Site SR1 had the highest percentage at 71.3%. LR3 and PC4 had the lowest at 0.5%. Ten sites (55.6%) contained significantly below average percentages of EPT, four (22.2%) had near average amounts, and four sites (22.2%) were significantly above average. SR1 was the only site comprised of a variety of EPT taxa. EPT at all other sites was represented almost exclusively by the caddisfly family Hydropsychidae.

The percentage of individuals of the Chironomidae family found in each site sample was also analyzed. Site PC4 contained the highest percentage of Chironomids at 98.0% and CR2 possessed the smallest percentage at 8.8%. The average percentage of Chironomids for all sites was 61.1%. Ten sites (55.6%) possessed above average percentages and eight sites (44.4%) fell below the calculated average.

Site PF1 possessed the lowest Shannon Diversity score of 0.12 and site CR1 scored highest with 1.77. The average score for the sites was 0.95. 44.4%(8) of all sites scored above average, 5.5%(1) scored average, and 50%(10) scored below average.

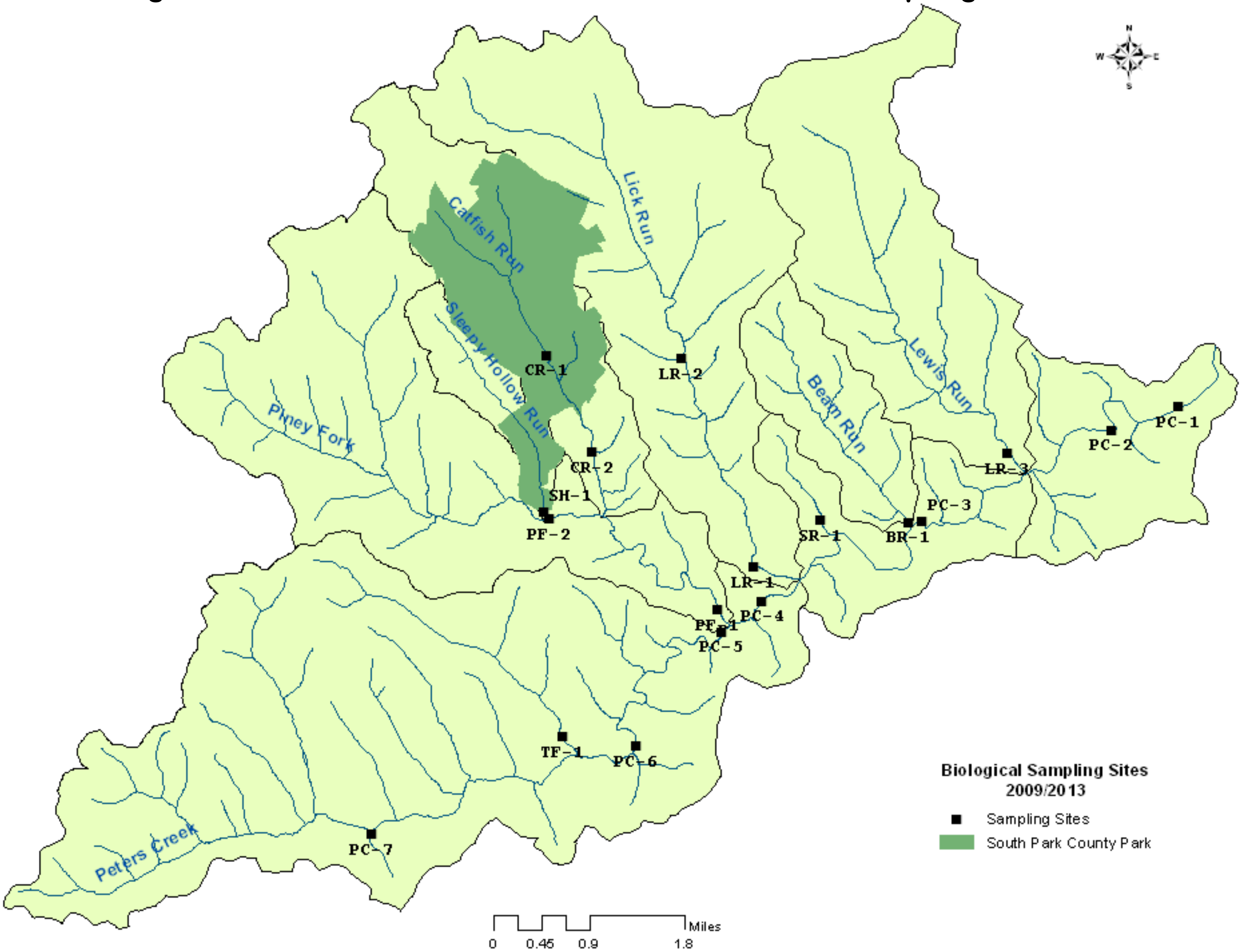
Site PF1 received the highest PA Modified Hilsenhoff Biotic Index score of 6.06. Site SR1 scored the lowest with a 3.55. A PA Modified Hilsenhoff of 3.55 indicates that the site is slightly impaired by pollution stress whereas a score of 6.06 indicates a significant impairment.

Site CR1 received the highest Pollution Tolerance Index (PTI) score of 36 and site PF1 ranked lowest with 6. The average score was a 17.9 .

A Pielou's Evenness score was derived for all 18 sites. The most even site was PC5 with a score of .754. The least even site was PC4 with an extremely low score of .088. The PC4 site sample is characterized by low diversity and is almost exclusively comprised of individuals of the family Chironomidae. The average evenness was .443 with 50% (9) of the sites less even than average and 50% (9) sites more even. It is interesting that the most even site and least even site are within a few hundred meters of each other on the main stem of Peters Creek with the confluence of Piney Fork between them.

A watershed map with location of macroinvertebrate sampling sites is provided in Figure 2.6.

**Figure 2.6 Peters Creek 2009/2013 Fish & Macro Sampling Sites**




## 2.4.5 2013 MACROINVERTEBRATE STUDY RESULTS

A total of 1,127 individuals were identified from the 6 Peters Creek main stem sites and 3 tributary sites sampled in April and May of 2013. Three Classes, 12 Orders and 18 Families of macroinvertebrates were represented in the combined sample. Results of the 2013 macroinvertebrate sampling of Peters Creek main stem sites and tributaries are presented in Table 2.16. Site locations depicted in Figure 2.6 remained the same for the 2013 macroinvertebrate study, however, site SH2 was approximately 0.7 miles upstream of SH1.

## Table 2.16 Macroinvertebrate 2013 Survey Results

| Class/Order | Family | PC1 | PC2 | PC3 | PC4 | PC6 | PC7 | PF1 | SR1 | SH2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Ephemeroptera | Siphlonuridae | | | | | | | | | |
| Plecoptera | Perlodidae | | | | | 3 | 4 | | 9 | |
| | Chloroperlidae | | | | | | | | | |
| | Nemouridae | | | | | | | | 60 | |
| Trichoptera | Hydropsychidae | 4 | 25 | 36 | 49 | 52 | 9 | 3 | 101 | 3 |
| | Philopotamidae | | | | | 1 | | | 10 | |
| | Glossosomatidae | | | | | | | | | |
| | Polycentropodidae | | | | | | | | | 2 |
| | Brachycentridae | | | | | | | | | |
| | Ryacophilidae | | | | | 2 | | | | |
| | Limnephelidae | | | | | | | | 3 | |
| Diptera | Chironomidae | 11 | 84 | 47 | 29 | 52 | 63 | 30 | 34 | 252 |
| | Tipulidae | | 2 | | 1 | 12 | 1 | | 5 | 1 |
| | Empididae | | | | | | | | | |
| | Muscidae | | | | | | | | | |
| | Tabanidae | | | | | | | | 1 | |
| | Stratiomyiidae | | | | | | | | | |
| | Simulidae | | | | | | 2 | | | 10 |
| Coleoptera | Elmidae | | 8 | 4 | | 3 | 2 | | 4 | 5 |
| | Dytiscidae | | | | | | | | 1 | |
| | Psephenidae | | | | | | | | | |
| Megaloptera | Corydalidae | | | | 1 | | | | | |
| Neuroptera | Sisyridae | | | | | | | | | |
| Odonata | Calopterygidae | | | | | | | | 3 | 1 |
| | Aeshnidae | | | | | | | | | |
| Amphipoda | Gammaridae | | | | | 1 | | 3 | | 3 |
| Decapoda | Cambaridae | | | | | | | | | 1 |
| Gastropoda | Physidae | | | | | | | | | |
| Isopoda | Asellidae | | | | | 1 | | | 11 | 1 |
| Oligochaeta | | 49 | 1 | | 4 | | | | | |
| Hirudinea | | | | | 5 | | | 1 | | |
| Turbellaria | | | | 1 | | | | | | |
| | **Total Specimens** | **64** | **120** | **88** | **89** | **127** | **81** | **37** | **242** | **279** |
| | **Total # of Taxa** | **3** | **5** | **4** | **6** | **9** | **6** | **4** | **12** | **10** |

## Table 2.17 Metrics for 2013 Macroinvertebrate Study

| Biotic Metric | PC1 | PC2 | PC3 | PC4 | PC6 | PC7 | PF1 | SR1 | SH2 |
|---|---|---|---|---|---|---|---|---|---|
| # of Specimens | 64 | 120 | 88 | 89 | 127 | 81 | 37 | 242 | 279 |
| # of Taxa | 3 | 5 | 4 | 6 | 9 | 6 | 4 | 12 | 10 |
| # of Intolerant Taxa | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 4 | 0 |
| % EPT | 6.3 | 20.8 | 40.9 | 55.1 | 45.7 | 16.0 | 8.1 | 75.6 | 1.8 |
| % Chironomidae | 17.2 | 70.0 | 53.4 | 32.6 | 40.9 | 77.8 | 81.1 | 14.0 | 90.3 |
| Evenness | .619 | .537 | .643 | .612 | .597 | .461 | .487 | .677 | .216 |
| Shannon Diversity | 0.68 | 0.87 | 0.89 | 1.10 | 1.31 | 0.83 | 0.68 | 1.68 | 0.50 |
| Hilsenhoff | 9.00 | 5.73 | 5.54 | 5.80 | 5.21 | 5.64 | 5.81 | 4.31 | 5.95 |

Biotic metrics described under the Data Analysis section were calculated for all 2013 macroinvertebrate sites and are displayed in Table 2.17.

Site SR1 had the highest taxa richness with 12 taxa present. Site PC1 had the lowest taxa richness with only 3 taxa represented in the sample.

Site SR1 had the highest percentage of EPT at 76.6 percent. Site SH2 had the lowest at 1.8 percent. Caddisflies of the family Hydropsychidae comprised the majority of EPT at all sites. Three sites were represented by more than one taxa of EPT. SR1 had 5 EPT taxa, PC6 had 4 and PC7 had 2.

Sites PC2, PC3, PC7, PF1 and SH2 were all dominated by Chironomids. Samples at two sites were represented by less than 20% midges, SR1 and PC1. However, PC1 was dominated by aquatic worms which are an extremely pollution tolerant taxa.

PC1 received a PA Modified Hilsenhoff Biotic Index score of 9.00 indicating a serious impairment due to pollution stress. SR1 received a score of 4.31 indicating a slight impairment. All other sites received PA Modified Hilsenhoff scores of between 5.0 and 6.0 indicating moderate to significant impairment due to pollution stress.

The Shannon Diversity Index is a community composition metric that measures both taxonomic richness and evenness of individuals across taxa of a sample. SR1 received the highest Shannon Diversity score at 1.68. Site SH2 received the lowest score of 0.50 and was overwhelmingly dominated by midges.

A Pielou evenness score was also calculated and revealed SR1 to be the most even community and SH2 to be the least even.

### 2.4.6 2009/2013 MACROINVERTEBRATE SURVEY COMPARISON

Three Peters Creek main stem sites, PC1, PC3 and PC7, lost 4 or 5 taxa from 2009 to 2013 as illustrated in Figure 2.7. PC1 and PC3, however, increased overall diversity, according to their Shannon Diversity scores (Figure 2.8), due mainly to a decrease in domination of the community by Chironomids in 2013. The Shannon Diversity of PC7, however, did decrease substantially from 2009 due to the combination of loss of taxa richness and an increase in domination by Chironomids in 2013.

Diversity at sites PC4 and PF1 both increased in 2013 but were starting from a very low level. In 2009 %Chironomids at both sites were about 98%. Taxa were added at both sites in 2013 and the communities became somewhat more even. Site PC4 improved more than PF1. PF1 remains one of the least diverse sites sampled within the watershed. SH2 lost diversity in 2013 compared to site SH1 in 2009 due, again, to an extreme domination of the community by Chironomids in 2013. Diversity increased somewhat at all other sites in 2013.

**Figure 2.7 Taxa Richness Change from 2009 to 2013**

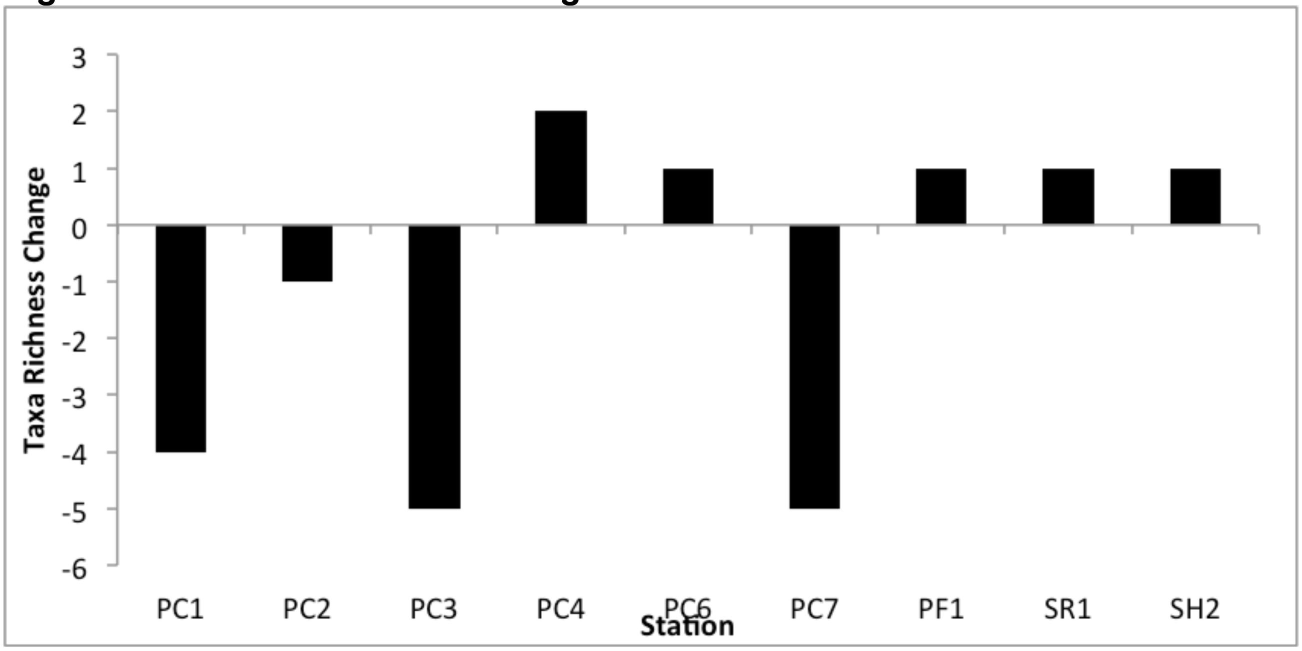
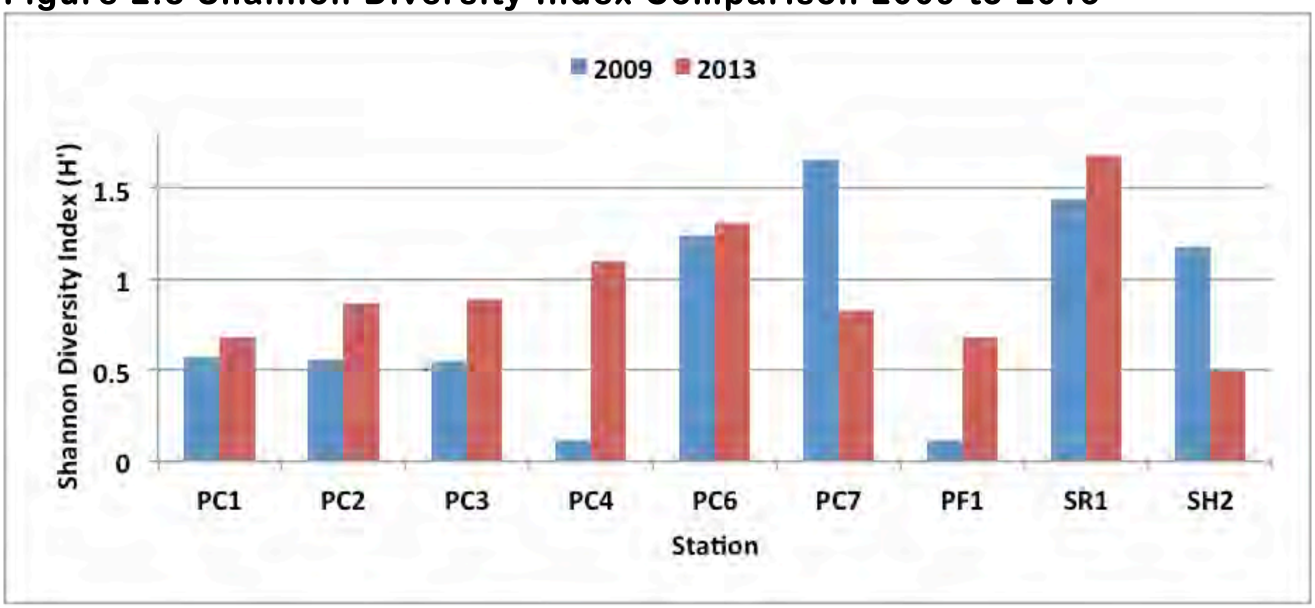



**Figure 2.8 Shannon Diversity Index Comparison 2009 to 2013**

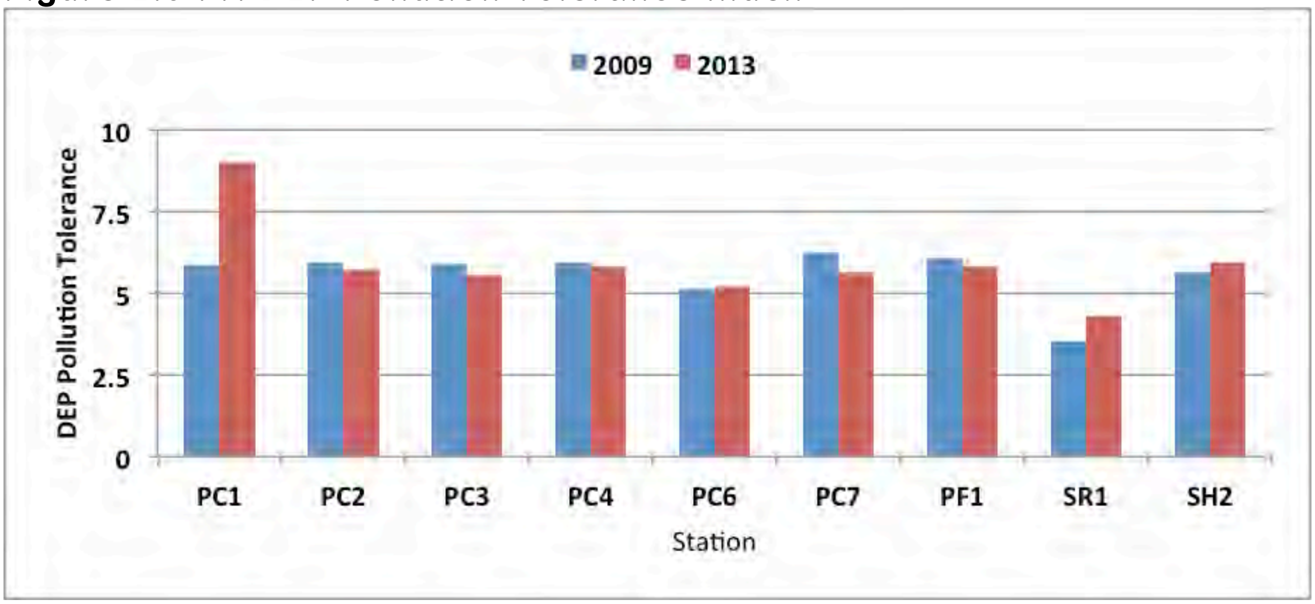



The PA DEP Pollution Tolerance Index at all stations remained fairly consistent from 2009 to 2013 except for site PC1. The community sampled at site PC1 degraded significantly in 2013 and was dominated by sludge worms of the family Tubificidae, a group that can exist in extremely low oxygen environments. A score of 9.00 indicates that the community at the site is severely stressed by pollution.

Scores at most other sites remained between 5.0 and 6.0 indicating moderate to significant stress by pollution.

The Pollution Tolerance Index at site SR1 increased from 3.55 to 4.31 over this period, however, during 2009 samples were only identified to taxonomic family. The SR1 sample for 2013 was identified to genus. For comparison to 2009 data, the 2013 Pollution Tolerance Index for the site was computed only using the family information. Utilizing genus information when calculating the index yields a 2.21 score which indicates improvement at the site and also provides incentive to identify these samples to the genus level. The scores for the SR1 site during 2009 and 2013 indicate that the community is only experiencing little to slight pollution stress.

**Figure 2.9 PA DEP Pollution Tolerance Index**




## 2.4.7 PA MULTI-METRIC INDEX OF BIOLOGICAL INTEGRITY

The only site sampled within the Peters Creek watershed that appears to be little impacted by anthropogenic influences and remains dominated by a number of taxa of pollution intolerant species is the SR1 site on an un-named tributary to Peters Creek that is locally known as Snee Run.

In 2009 the PA DEP established *A Benthic Index of Biotic Integrity for Wadeable Freestone Riffle-Run Streams in Pennsylvania.* This multi-metric index was developed to be a scientifically credible indicator of biological integrity for benthic macroinvertebrate communities in Pennsylvania's wadeable freestone streams and as a measure of the extent to which anthropogenic stressors impair the capability of a stream to support a healthy aquatic community.

This biological indicator was applied to the 2009 and 2013 SR1 sample data in an effort to better understand whether Snee Run is attaining the aquatic life use (ALU) standard and to serve as a baseline for future stream studies.

**Table 2.18 PA Index of Biotic Integrity (IBI) Results for SR1**

| Metric | SR1 2009 | | SR1 2013 | |
|---|---|---|---|---|
| | Observed Metric Value | Adjusted Standardized Metric Score | Observed Metric Value | Adjusted Standardized Metric Score |
| **Total Taxa Richness** | 11 | .333 | 14 | .424 |
| **EPT Taxa Richness** | 5 | .263 | 6 | .316 |
| **Modified Beck's Index** | 8 | .211 | 12 | .316 |
| **Hilsenhoff Biotic Index** | 3.55 | .795 | 2.21 | .961 |
| **Shannon Diversity** | 1.44 | .503 | 1.70 | .594 |
| **% Sensitive Individuals** | 57.8 | .684 | 76.9 | .910 |
| **IBI Score** | **46.4** | | **58.7** | |

It must be noted that the 2009 sample was only identified to family while the 2013 sample was identified to genus. Also, prescribed data collection and processing methods were not exactly followed for 2009 or 2013 so results may be somewhat skewed. This effort, however, provides useful information as to whether a fully compatible study should be conducted at this site in the future.

The results are presented in Table 2.18. SR1 received an IBI score of 46.4 for the 2009 sampling period and a 58.7 score for 2013. The IBI scores along with a decision matrix are utilized to determine whether the site is attaining Aquatic Life Use standards. Snee Run fails to meet ALU standards in both cases, however, especially for the 2013 sample the results are borderline and suggest that a future, totally compliant study, should be conducted.

## 2.4.8 FRESHWATER MUSSELS

Freshwater bi-valves of the family Unionidae were not found in the streams of the Peters Creek watershed but 3 species were found inhabiting the Iron Bridge Ponds. These species are *Pyganodon grandis, Strophitus undulatus and Corbicula fluminea*. Corbicula was by far the most abundant species found. Muskrats are utilizing them as a food source and leaving middens of spent shells on the shoreline. Corbicula is an invasive species. The potential for this species to establish within Peters Creek and the impact it would have on the aquatic community is an outstanding question.

## 2.4.9 CONCLUSIONS

Macroinvertebrate community baseline information was established for 8 tributaries within the Peters Creek watershed and for main stem sites in addition to the 4 previously surveyed PFBC sites.

Macroinvertebrate diversity and quality within the Peters Creek watershed at all sites, except SR1, appears to be substantially influenced by anthropogenic activity present in this suburban watershed. The Hilsenhoff Biotic Index scores of between 5.0 and 6.0 at most sites indicates a moderate to significant pollution stress within watershed streams.

Specimens of the family Chironomidae of the order Diptera dominated the macroinvertebrate communities at more than half of the sites in 2009 and 2013, most likely due to their pollution tolerance.

The lack of a diverse macroinvertebrate community limits fish community diversity as well. Identification and mitigation of the sources of contributing pollutants, such as sewage treatment facilities, private septic systems, abandoned mine drainage and residential, urban or agricultural runoff would help to improve macroinvertebrate communities within this watershed. Maintaining and restoring adequately vegetated riparian buffers along all watershed streams would also help to improve macroinvertebrate communities.

The SR1 site is the exception to the norm in the Peters Creek watershed. The samples of 2009 and 2013 were both dominated by pollution intolerant species of EPT and were characterized by relatively diverse and even communities. Stoneflies and caddisflies were well represented but mayflies were missing. The Hilsenhoff scores suggest that this small stream is little impacted by pollution stress. Gaining a better understanding of how and why this stream is avoiding the brunt of the anthropogenic influences surrounding it might help to preserve this unique watershed resource.

The lack of diversity and numbers of specimens at site PC5 in 2009 was unexpected. PC5 is above the confluence of Piney Fork, upstream of the influence of sewage plant outfalls and at least 1.5 miles downstream of any significant population center. Ascertaining the causes of and mitigating this apparent degradation would be useful.

Macroinvertebrate communities at the two Catfish Run sites sampled in 2009 at CR1 and CR2 were more diverse than most watershed sites and were not dominated by Chironomids but fish diversity within Catfish Run was minimal.

Recently, conductivities measured within the upper reaches of Catfish Run have been found to be unusually and consistently high, often above 3000 μ-siemens/cm in the summer months and in the winter typically above 5000 μ-siemens/cm. This stream is an important natural resource within Allegheny County's South Park County Park. Identifying and mitigating the causes of this high conductivity would improve macroinvertebrate and fish communities within this stream and would permit Catfish Run to support recreational fishing in the future.

The other stream running through South Park County Park, Sleepy Hollow Run, was also found to be significantly stressed by pollution. The 2009 sample from SH1 and the 2013 sample from SH2 were both dominated by Chironomids, contained little EPT and no pollution intolerant taxa of any sort. Identifying and eliminating the sources of pollution in this small sub-watershed would permit Sleepy Hollow Run to become a more valuable resource to the citizens of Allegheny County.

## 2.5 PERIPHYTON STUDIES

Many of the streams within the Peters Creek watershed suffer from an overabundance of algae that can severely limit dissolved oxygen levels within these streams. The Pennsylvania DEP conducted periphyton studies at a number of sites on the main stem of Peters Creek in the summer of 2012. Further study should be conducted to better understand the factors contributing to this phenomena and to develop a mitigation plan.

## REFERENCES

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## 3.0 BACTERIAL ASSESSMENTS

During the summers of 2009, 2010 and 2011 bacterial assessments were completed at 10 sites within the Peters Creek watershed in order to determine recreational use status of watershed streams. This bacterial sampling effort was part of the PA DEP Citizen Volunteer Bacteria Monitoring Study.

## 3.1 METHODS

The studies were conducted in accordance with the Pennsylvania Bacteriological Sampling Protocol. Water samples were analyzed by a PA DEP certified laboratory. Data collection was performed by volunteers of the Peters Creek Watershed Association trained in proper sampling protocol by staff of the PA DEP.

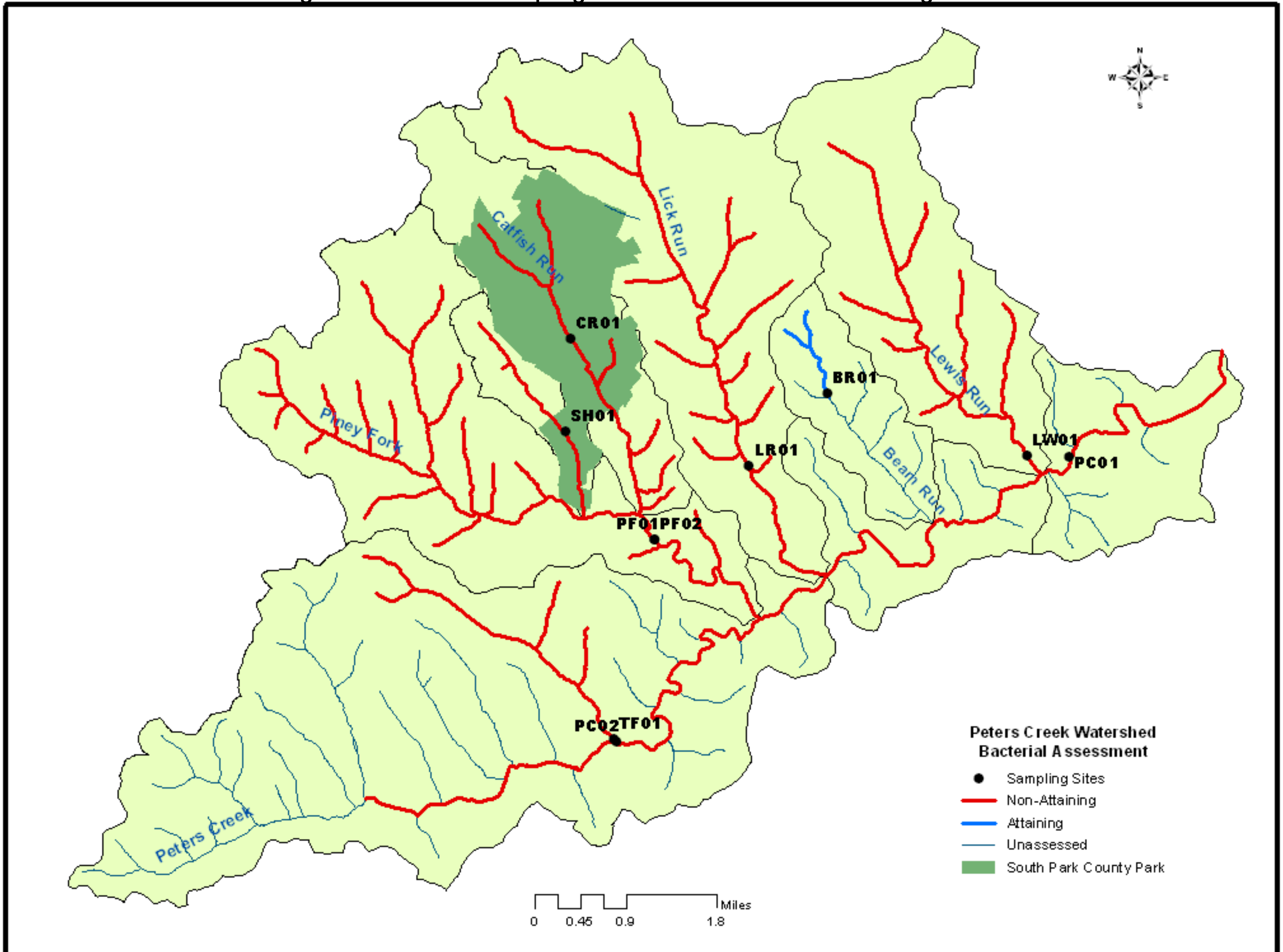
Sampling site information and locations are presented in Table 3.1.

### Table 3.1 Bacterial Assessment Study Sampling Sites

| Site | Longitude | Latitude | Stream | Sampling Year |
|---|---|---|---|---|
| **PC01** | -79.910244 | 40.294461 | Peters Creek | 2009 |
| **PF01** | -79.988417 | 40.283296 | Piney Fork | 2009 |
| **LR01** | -79.970556 | 40.293611 | Lick Run | 2010 |
| **PF02** | -79.988417 | 40.283296 | Piney Fork | 2010 |
| **SH01** | -80.005000 | 40.298889 | Sleepy Hollow Run | 2010 |
| **CR01** | -80.003889 | 40.312222 | Catfish Run | 2010 |
| **PC02** | -79.996111 | 40.254167 | Peters Creek | 2010 |
| **LW01** | -79.918267 | 40.294646 | Lewis Run | 2011 |
| **BR01** | -79.955698 | 40.303963 | Beam Run | 2011 |
| **TF01** | -79.996436 | 40.254541 | Trax Farm Trib | 2011 |

The sampling protocol required that 10 water samples be collected and analyzed for fecal coliform at each site during the summer months between May 1$^{st}$ and September 30$^{th}$. Sample collection was divided into 2 sampling periods of 5 weekly samples each. The 5 samples were required to be collected within 30 days and there was a 1 week hiatus between sampling periods. A sterile water sample and a duplicate sample were also collected once for each site during the summer as a quality assurance measure. Sampling bottles and other necessary equipment were provided by the laboratory. Water samples were kept on ice and immediately transported to the laboratory for analysis. Precautions were taken to assure that samples were not contaminated during collection. The laboratory reported the fecal coliform bacteria results as the number of colony forming units per 100 milliliters (CFU/mL).

**Figure 3.1 Bacterial Sampling Sites and Recreational Use Designation**



## 3.2 RESULTS

Results for this three year sampling effort are provided in Table 3.2a, Table 3.2b and Table 3.2c. Figure 3.1 presents the location of sampling sites within the Peters Creek watershed and recreational use status determination for various sampled stream reaches.

### Table 3.2a Peters Creek Watershed Bacterial Assessment Results

| Peters Creek (PC01) | | Piney Fork (PF01) | | Lick Run (LR01) | | Piney Fork (PF02) | |
|---|---|---|---|---|---|---|---|
| **Date** | **CFU/100mL** | **Date** | **CFU/100mL** | **Date** | **CFU/100mL** | **Date** | **CFU/100mL** |
| 7/06/09 | 636 | 7/06/09 | 1 | 5/19/10 | 164 | 5/19/10 | 673 |
| 7/13/09 | 250 | 7/13/09 | 420 | 5/26/10 | 590 | 5/26/10 | 420 |
| 7/20/09 | 172 | 7/20/09 | 136 | 6/02/10 | 836 | 6/02/10 | 2600 |
| 7/27/09 | 681 | 7/27/09 | 280 | 6/09/10 | 2700 | 6/09/10 | 5500 |
| 8/03/09 | 480 | 8/03/09 | 410 | 6/16/10 | 488 | 6/16/10 | 510 |
| **GeoMean** | **389** | **GeoMean** | **92**<br>**285** | **GeoMean** | **639** | **GeoMean** | **1156** |
| 8/17/09 | 260 | 8/17/09 | 570 | 6/30/10 | 550 | 6/30/10 | 600 |
| 8/24/09 | 240 | 8/24/09 | 210 | 7/07/10 | 570 | 7/07/10 | 3500 |
| 9/03/09 | 164 | 9/03/09 | 109 | 7/14/10 | 5000 | 7/14/10 | 9200 |
| 9/09/09 | 290 | 9/09/09 | 182 | 7/21/10 | 773 | 7/21/10 | 727 |
| 9/16/09 | 1* | 9/16/09 | 45 | 7/28/10 | 410 | 7/28/10 | 320 |
| **GeoMean** | **233** | **GeoMean** | **161**<br>**221** | **Geomean** | **869** | **Geomean** | **1351** |

*Values in red indicate that sample or Geometric Mean exceeds Pennsylvania recreational use standards.*
*Geometric Mean values in orange indicate sampling for this site was inconclusive due to laboratory error.*
** Laboratory error. Sample not included in geometric mean.*

### Table 3.2b Peters Creek Watershed Bacterial Assessment Results

| Sleepy Hollow Run (SH01) | | Catfish Run (CR01) | | Peters Creek (PC02) | |
|---|---|---|---|---|---|
| **Date** | **CFU/100mL** | **Date** | **CFU/100mL** | **Date** | **CFU/100mL** |
| 5/19/10 | 1064 | 5/19/10 | 220 | 5/19/10 | 791 |
| 5/26/10 | 480 | 5/26/10 | 348 | 5/26/10 | 340 |
| 6/02/10 | 480 | 6/02/10 | 300 | 6/02/10 | 936 |
| 6/09/10 | 7500 | 6/09/10 | 2700 | 6/09/10 | 6000 |
| 6/16/10 | 1720 | 6/16/10 | 990 | 6/16/10 | 78 |
| **GeoMean** | **1259** | **GeoMean** | **572** | **GeoMean** | **652** |
| 6/30/10 | 1381 | 6/30/10 | 1546 | 6/30/10 | 755 |
| 7/07/10 | 2000 | 7/07/10 | 1655 | 7/07/10 | 646 |
| 7/14/10 | 15700 | 7/14/10 | 13800 | 7/14/10 | 10900 |
| 7/21/10 | 3400 | 7/21/10 | 3400 | 7/21/10 | 1273 |
| 7/28/10 | 1200 | 7/28/10 | 1318 | 7/28/10 | 700 |
| **GeoMean** | **2816** | **Geomean** | **2753** | **Geomean** | **1365** |

*Values in red indicate that sample or Geometric Mean exceeds Pennsylvania recreational use standards.*

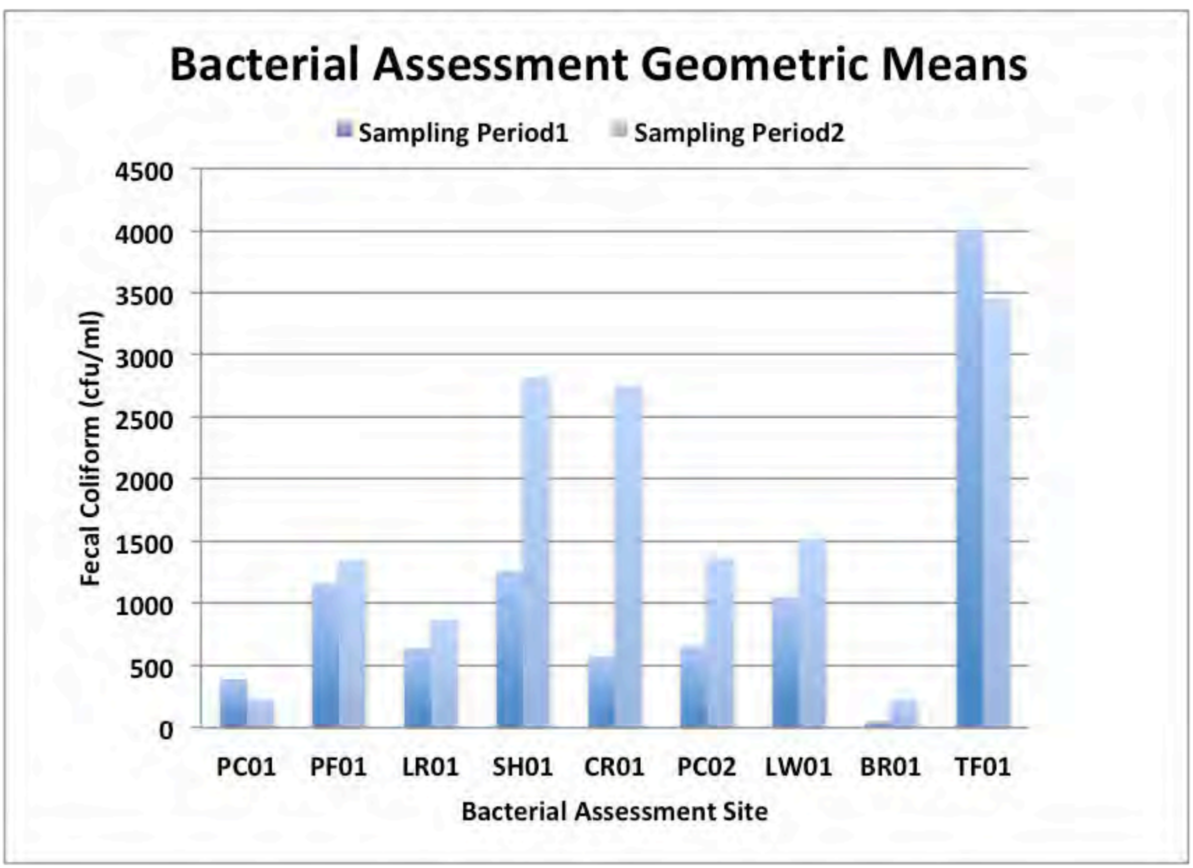
### Table 3.2c Peters Creek Watershed Bacterial Assessment Results

| Lewis Run (LW1) | | Beam Run (BR01) | | Trax Farm Trib (TF01) | |
|---|---|---|---|---|---|
| **Date** | **CFU/100mL** | **Date** | **CFU/100mL** | **Date** | **CFU/100mL** |
| 6/30/11 | 370 | 6/30/11 | 27 | 6/30/11 | >6000 |
| 7/07/11 | 300 | 7/07/11 | 27 | 7/07/11 | 855 |
| 7/14/11 | 330 | 7/14/11 | 27 | 7/14/11 | >6000 |
| 7/19/11 | 6100 | 7/19/11 | 173 | 7/19/11 | >6000 |
| 7/28/11 | 5800 | 7/28/11 | ND | 7/28/11 | 5600 |
| **GeoMean** | **1053** | **GeoMean** | **50** | **GeoMean** | **>4008** |
| 8/11/11 | 390 | 8/11/11 | 36 | 8/11/11 | 1270 |
| 8/18/11 | 727 | 8/18/11 | 82 | 8/18/11 | 8800 |
| 8/25/11 | 3100 | 8/25/11 | 310 | 8/25/11 | 27000 |
| 9/01/11 | 164000 | 9/01/11 | 41000 | 9/01/11 | >6000 |
| 9/09/11 | 56 | 9/09/11 | 15 | 9/09/11 | 270 |
| **GeoMean** | **1518** | **GeoMean** | **224** | **GeoMean** | **>3450** |

*Values in red indicate that sample or Geometric Mean exceeds Pennsylvania recreational use standards.*

The recreational use standard for Pennsylvania requires that a five sample geometric mean (within a 30 day period) for fecal coliform not exceed 200 CFU/100mL. In addition, no more than 10% of the individual samples in a sampling period can exceed 400 CFU/100mL.

### Figure 3.2 Geometric Means for Bacterial Assessment Sites



The only stream segment within the Peters Creek watershed that was determined to be unimpaired for recreational use was the upper reach of Beam Run. All samples for Beam Run were under the statistical threshold value of 400 CFU/100mL except one and that value was deemed to be a result of an extraordinary weather event.

All other sampled stream segments exceeded both the geometric mean criteria and the statistical threshold value criteria. Sleepy Hollow Run exceeded the statistical threshold value on all 10 sampling dates and Lick Run, Piney Fork and the Trax Farm Trib exceeded the threshold on all but one sample date. No other stream segment besides Beam Run came close to meeting recreational standards. The map in Figure 2.1 illustrates what stream segments within the Peters Creek watershed have been determined to be impaired for recreational use, which stream segments are attaining and which stream segments remain to be assessed.

## 3.3 CONCLUSIONS

This study has permitted a determination that many of the streams within the Peters Creek watershed are impaired for recreational use by unknown pathogens but it does not identify the exact cause of this impairment. Possible causes include malfunctioning sewage infrastructure, inefficient sewage treatment, runoff from horse stables and other agricultural operations and from natural causes.

The Pennsylvania DEP has scheduled a Bacterial Total Maximum Daily Load study of the Peters Creek watershed for 2025. This study will identify and quantify the causes of the excess bacterial load within watershed streams in an effort to develop a plan so that watershed streams can meet recreational use standards in the future.

Peters Creek and Piney Fork are heavily utilized fishing resources. Catfish Run and Sleepy Hollow Run flow through South Park County Park and are a regional natural resource for citizens of Allegheny County and beyond. It is imperative that these streams be safe for both children and adults for recreational purposes.

In 2012 the EPA published new recommendations for recreational use criteria for all coastal and inland waters in the United States. The new recommendations for fecal coliform set the geometric mean of 5 samples at 126 CFU/100mL and the statistical threshold value at 410 CFU/100mL to achieve an estimated illness rate of less than 36 per 1000. A second recommendation set the geometric mean at 100 CFU/100mL and a statistical threshold value at 320 CFU/100mL to achieve an illness rate of less than 32 per 1000.

## 4.0 ABANDONED MINE DRAINAGE & GAS WELLS

### 4.1 INTRODUCTION

Peters Creek and a number of its tributaries, both named and un-named, are impaired for metals. This was first made official in 1996 when a segment of Peters Creek was placed on the 1996 Pennsylvania Section 303(d) list of impaired waters as required by the Clean Water Act. Subsequently, additional segments were listed as impaired. The impairments are considered to be a result of drainage from abandoned coalmines.

### 4.2 PETERS CREEK WATERSHED METALS TMDL

The Pennsylvania DEP completed a Total Maximum Daily Load (TMDL) study of the Peters Creek watershed for aluminum, iron, manganese and pH in 2009. The intent of this metals TMDL is to develop a model, specific to the Peters Creek watershed, that specifies a pollution budget in terms of long-term average loadings for aluminum, iron, manganese and pH, that meets state water quality standards and allocates pollutant loads among pollution sources (point and nonpoint) within the watershed. The PA water quality standards applicable to this TMDL are provided in Table 4.1. The complete TMDL report is provided in the Appendix.

**Table 4.1 PA Water Quality Criteria**

| Parameter | Criterion Value (mg/L) | Total Recoverable/Dissolved |
|---|---|---|
| **Aluminum (Al)** | 0.75 | Total Recoverable |
| **Iron (Fe)** | 1.50 | Total Recoverable |
| **Manganese (Mn)** | 1.00 | Total Recoverable |
| **pH** | 6.0-9.0 | N/A |

Development of the Peters Creek TMDL model consisted of assigning load allocations to 4 sites on Peters Creek (PC5, PC4, PC3, PC2), 6 sites on un-named tributaries to Peters Creek (PCTR1-6), one site on Lewis Run (LW1), one site on Lick Run (LR1) and one site on Piney Fork (PF1). A site was also established on Beam Run (BR1).

Sampling data, including metals and acidity concentrations as well as stream flow, were collected at each site at 4 times during 2007 and 2008 at varying seasons in order to calculate a long-term average existing daily metals and acidity load for each site. These loads were expressed in pounds/day.

An allowable long-term average in-stream concentration was also determined at each sample site for metals and acidity. The analysis utilized Monte Carlo simulation techniques and is designed to produce an average value that will be protective of the water quality standard for that parameter 99% of the time. This allowable concentration along with long-term average flow was utilized to calculate allowable daily loads at each site in terms of pounds/day.

A required load reduction in pounds/day was then calculated for each site utilizing the existing daily load and the allowable daily load. The allowable daily load is divided into a waste load allocation and a load allocation for many sites to account for existing waste loads and future waste loads from potential coalmining operations. A margin of safety was implicitly built into these calculations by utilizing conservative assumptions when formulating the model.

The existing loads, allowable loads and required load reductions were then utilized to track metals and acidity loads throughout the Peters Creek watershed, starting at the headwaters. Tracking loads through the watershed provides a picture of how the pollutants are affecting the watershed and where the sources and sinks are located spatially within the watershed. This analysis ensures that water quality standards will be met at all points in Peters Creek.

Table 4.2 provides a summary of the existing metals and acidity loads found at all sampled sites within the Peters Creek watershed for the TMDL study and also the load reductions required at each site in order to meet PA water quality standards for a given parameter. Note that for all Peters Creek main stem sites below PC5 the required load reduction at a given site assumes that all upstream load reductions are met.

Figures 4.1, Figure 4.2 and Figure 4.3 illustrate this summary data individually for aluminum, iron and manganese on a watershed map that helps to provide an important spatial reference. A map was not provided for acidity since it is never out of compliance within the main stem of Peters Creek. Acidity was only found to be out of compliance at PCTR3, the tributary that drains the landfill. The fact that pH remains in the acceptable 6.0–9.0 range throughout the main stem of Peters Creek is an important factor contributing to the ability of this stream to support an improving aquatic community.

The TMDL study provides evidence that excess aluminum is the primary problem throughout the Peters Creek watershed. Existing loads of aluminum were found to exceed standards at every site studied. Iron loads exceeded standards at tributary sites PCTR1 and PCTR3 and at main stem sites PC4, PC3 and PC2. However, no load reduction of iron is required at PC4 as long as excess loads at PCTR1 and PCTR3 are eliminated. Manganese loads were found to exceed standards only at PCTR3 and at PC4 but require no manganese load reduction at PC4.

## 4.3 ABANDONED MINE DISCHARGES

The Peters Creek Watershed Metals TMDL provides a guide toward the development of a plan to bring metal loads within impaired stream segments in the Peters Creek watershed into compliance with PA water quality standards. However, development and implementation of a credible and cost effective long-term plan to achieve this goal requires further information.

As part of the visual assessment portion of this project abandoned mine discharges were identified. Many of these sites were then sampled and analyzed for metals. The results of this analysis are provided in Table 4.3 and site locations are visually provided in Figure 4.4.

A credible long-term remediation plan must prioritize abandoned mine discharge sites according to their potential and feasibility for development of treatment systems. It must identify those discharges that will most cost effectively reduce metal loads, are accessible and have sufficient space for development of a treatment system. Since most of these discharges are on private land it will also require a cooperative landowner as well.

The TMDL study suggests that the PCTR3 tributary and Lick Run are the two most significant contributors to metal loads within Peters Creek. Also, a significant load of aluminum at the most upstream PC5 site suggests that there may be significant abandoned mine discharges in the headwaters portion of Peters Creek. The visual assessment of upper Peters Creek confirmed 2 significant discharges at PCU0086 and at PCU0090.

The assessment found that one discharge in the west branch headwaters of PCTR3 is responsible for the majority of metals loading within this stream. This is in addition to the landfill's permitted discharge.  An OSM abandoned mine land reclamation project was also discovered just west of PCTR3 during the visual assessment. Dangerous highwalls and spoil piles were regraded and vegetated.

Four significant discharges were found along the main stem of Lick Run and a number of discharges are present along Mineral Run, a major tributary to Lick Run. A large coal spoils pile was also found along this tributary.  The surrounding valley has been undergoing significant development over the past 10 years. A resident suggested that old mine workings were uncovered during earth moving operations and created the most significant discharge into Mineral Run.

The above AMD discharge sites as well as others identified during the visual assessment will require further study, including characterization and site evaluations to prioritize them for treatment. These efforts should also take into consideration and be coordinated with other remediation efforts taking place within the Peters Creek watershed when possible.

## 4.4 GAS WELLS

Figure 4.4 provides information concerning the location of gas wells (Marcellus and conventional), recent and current coal mining operations, and abandoned mine lands within the Peters Creek watershed. It also illustrates which stream segments are currently on the metals impaired list.

As of 2013, a number of Marcellus gas wells exist in the headwaters portion of the Trax Farm Tributary. All other gas wells within the watershed are conventional wells. The conventional wells are concentrated mainly in the Beam Run sub-watershed and in the Washington County portion of the watershed.

## 4.5 COAL MINES and ABANDONED MINE LANDS

A *Government Financed Construction Contract* (*GFCC*) coal mining operation was recently completed along Beam Run. Coal was removed from old mine workings that were subsiding. The area was re-graded and re-vegetated.  Water quality information was collected along Beam Run and at a number of adjacent tributaries, impoundments and discharges prior to and during the course of this operation. An effort should be made to gauge the affect of this remediation effort on water quality in Beam Run.

A current refuse reprocessing operation is being conducted on a large spoils pile associated with the old Montour 10 mine in the Piney Fork sub-watershed. The operation is permitted to discharge into a tributary to Piney Fork. A discharge that appears to originate from this spoil pile along Sebolt Rd in South Park Twp (PF62) was found to have the highest concentration of aluminum of any discharge in the watershed.

Abandoned mine lands (AML) and spoil piles are present throughout the Peters Creek watershed. Figure 4.4 locates many of them and provides the priority assigned to the AML. Priority 1 and 2 sites present a danger to human health and safety and include areas of dangerous highwalls, open mine portals, subsidence, hazardous gas releases and underground and surface fires.  An effort should be made to inventory all of the dangerous sites and get them listed.

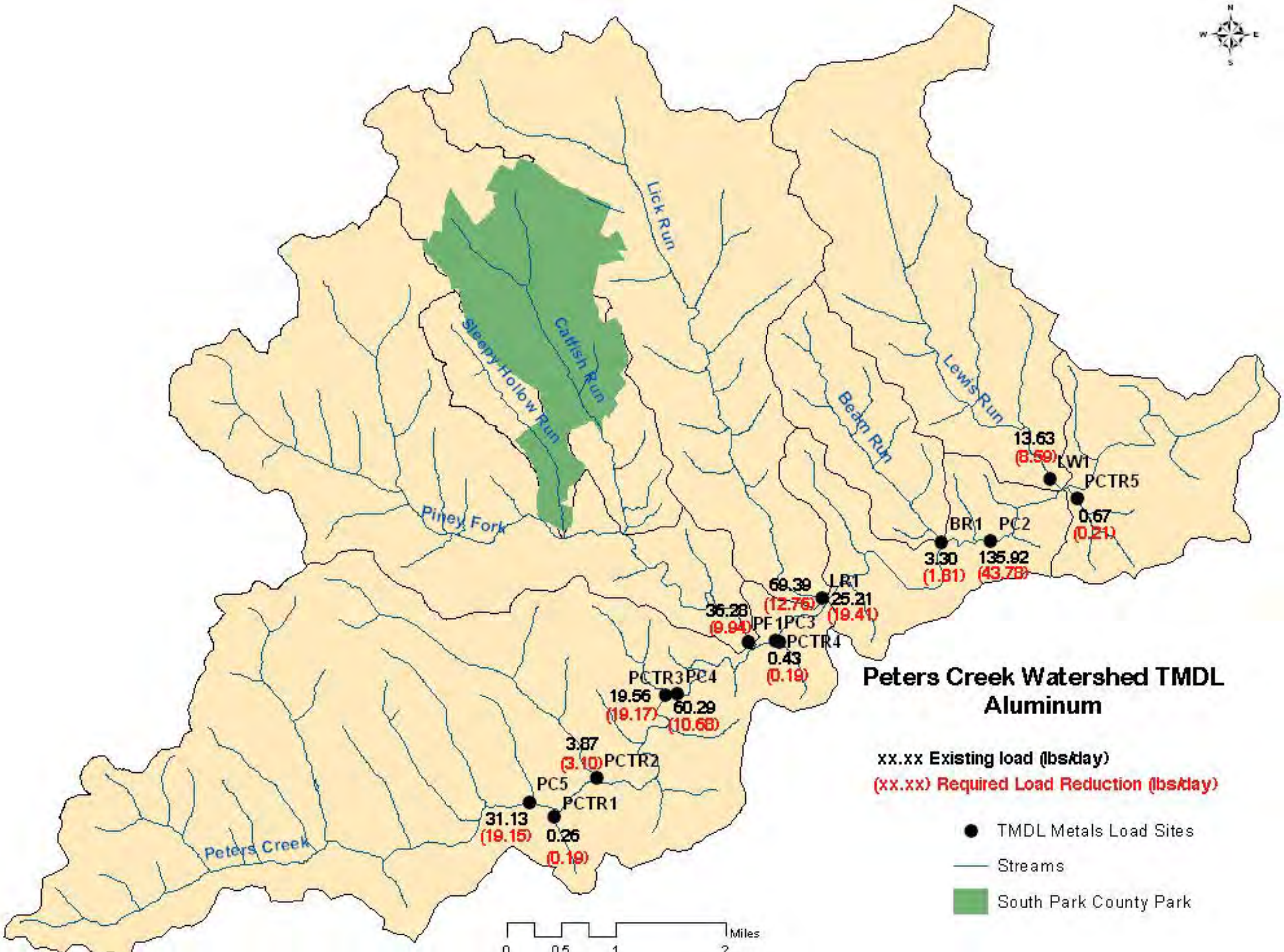
## Table 4.2 Peters Creek Watershed Metals TMDL Site Summary

| Site | Longitude (° West) | Latitude (° North) | Average Flow (gallons/day) | Parameter | Existing Load (lbs/day) | Required Reduction (lbs/day) | % Reduction (lbs/day) |
|---|---|---|---|---|---|---|---|
| **PC5** | 80.008169 | 40.251475 | 3,100,000 | Aluminum | 31.13 | 19.92 | 64% |
| | | | | Iron | | | |
| | | | | Manganese | | | |
| | | | | Acidity | | | |
| **PCTR1** | 80.003794 | 40.249446 | 50,000 | Aluminum | 0.26 | 0.19 | 73% |
| | | | | Iron | 0.21 | 0.06 | 29% |
| | | | | Manganese | | | |
| | | | | Acidity | | | |
| **PCTR2** | 79.996391 | 40.254587 | 610,000 | Aluminum | 3.87 | 3.10 | 80% |
| | | | | Iron | | | |
| | | | | Manganese | 0.95 | 0.11 | 12% |
| | | | | Acidity | | | |
| **PCTR3** | 79.984444 | 40.265451 | 210,000 | Aluminum | 19.56 | 19.17 | 98% |
| | | | | Iron | 3.17 | 2.69 | 85% |
| | | | | Manganese | 4.53 | 3.35 | 74% |
| | | | | Acidity | 273.46 | 156.52 | 99% |
| **PC4** | 79.982223 | 40.265551 | 4,900,000 | Aluminum | 60.29 | 10.68* | 60% |
| | | | | Iron | 17.91 | 0.0* | 0%* |
| | | | | Manganese | 13.43 | 0.0* | 0%* |
| | | | | Acidity | | | |
| **PF1** | 79.969870 | 40.272398 | 10,820,000 | Aluminum | 36.28 | 9.94 | 27% |
| | | | | Iron | | | |
| | | | | Manganese | | | |
| | | | | Acidity | | | |
| **PC3** | 79.965140 | 40.272553 | 11,740,000 | Aluminum | 69.39 | 12.76* | 52%* |
| | | | | Iron | 40.87 | 8.47* | 22%* |
| | | | | Manganese | | | |
| | | | | Acidity | | | |
| **PCTR4** | 79.964547 | 40.272394 | 140,000 | Aluminum | 0.43 | 0.19 | 44% |
| | | | | Iron | | | |
| | | | | Manganese | | | |
| | | | | Acidity | | | |
| **LR1** | 79.957031 | 40.278043 | 5,140,000 | Aluminum | 25.21 | 19.41 | 77% |
| | | | | Iron | | | |
| | | | | Manganese | | | |
| | | | | Acidity | | | |
| **BR1** | 79.936258 | 40.285364 | 1,250,000** | Aluminum | 3.295 | 1.806** | 55%** |
| | | | | Iron | | | |
| | | | | Manganese | | | |
| | | | | Acidity | | | |
| **PC2** | 79.927792 | 40.285319 | 17,520,000 | Aluminum | 135.92 | 43.78* | 75%* |
| | | | | Iron | 72.14 | 51.36* | 61%* |
| | | | | Manganese | | | |
| | | | | Acidity | | | |
| **LW1** | 79.917389 | 40.293490 | 3,610,000 | Aluminum | 13.63 | 8.59 | 63% |
| | | | | Iron | | | |
| | | | | Manganese | | | |
| | | | | Acidity | | | |
| **PCTR5** | 79.912754 | 40.290821 | 230,000 | Aluminum | 0.67 | 0.21 | 31% |
| | | | | Iron | | | |
| | | | | Manganese | | | |
| | | | | Acidity | | | |

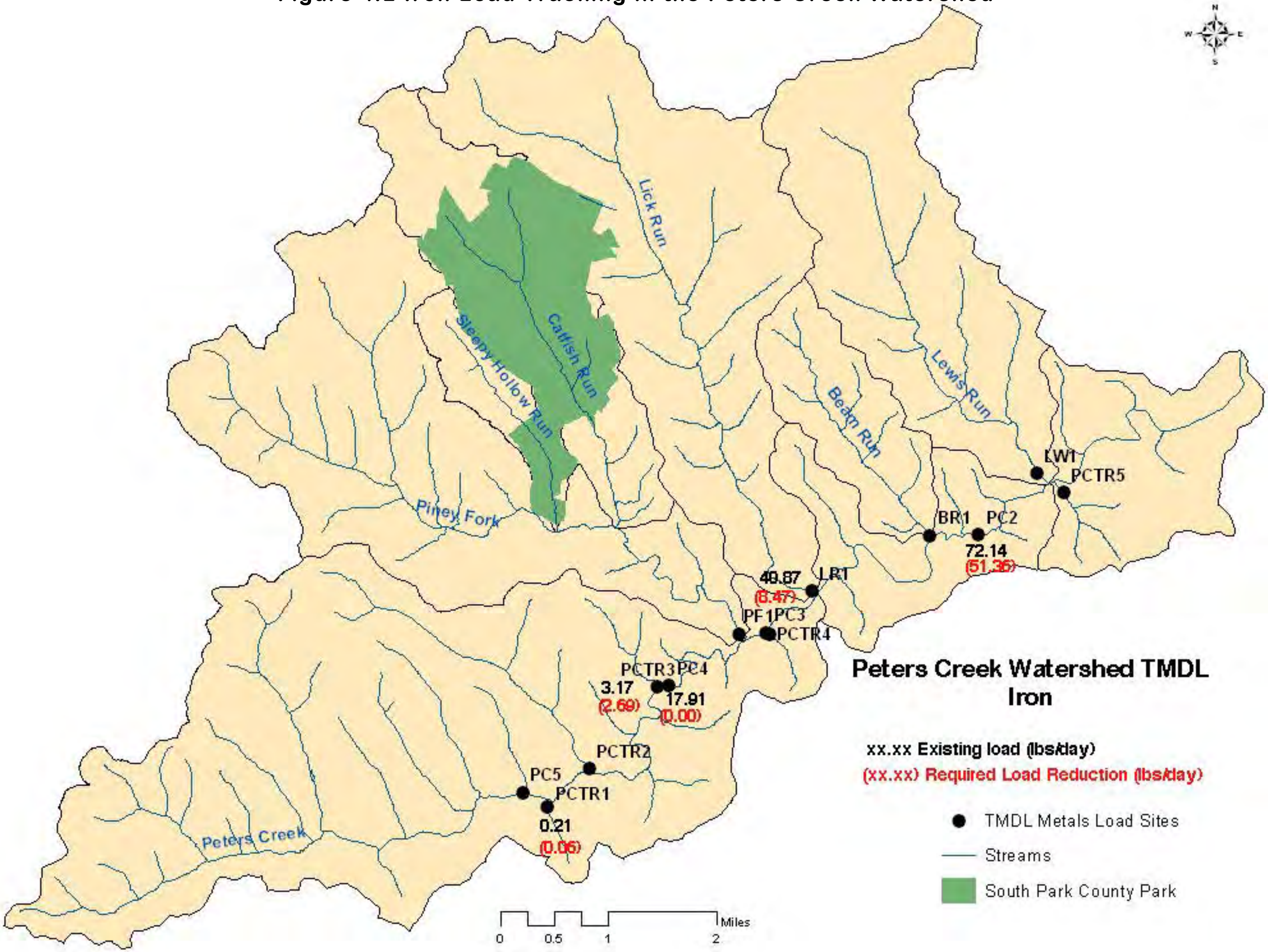
* *Takes into account load reductions from upstream sources*

** BR1 d*ata available for 2 sampling days. Indicates BR1 not meeting PA Water Quality Standards for Aluminum.*

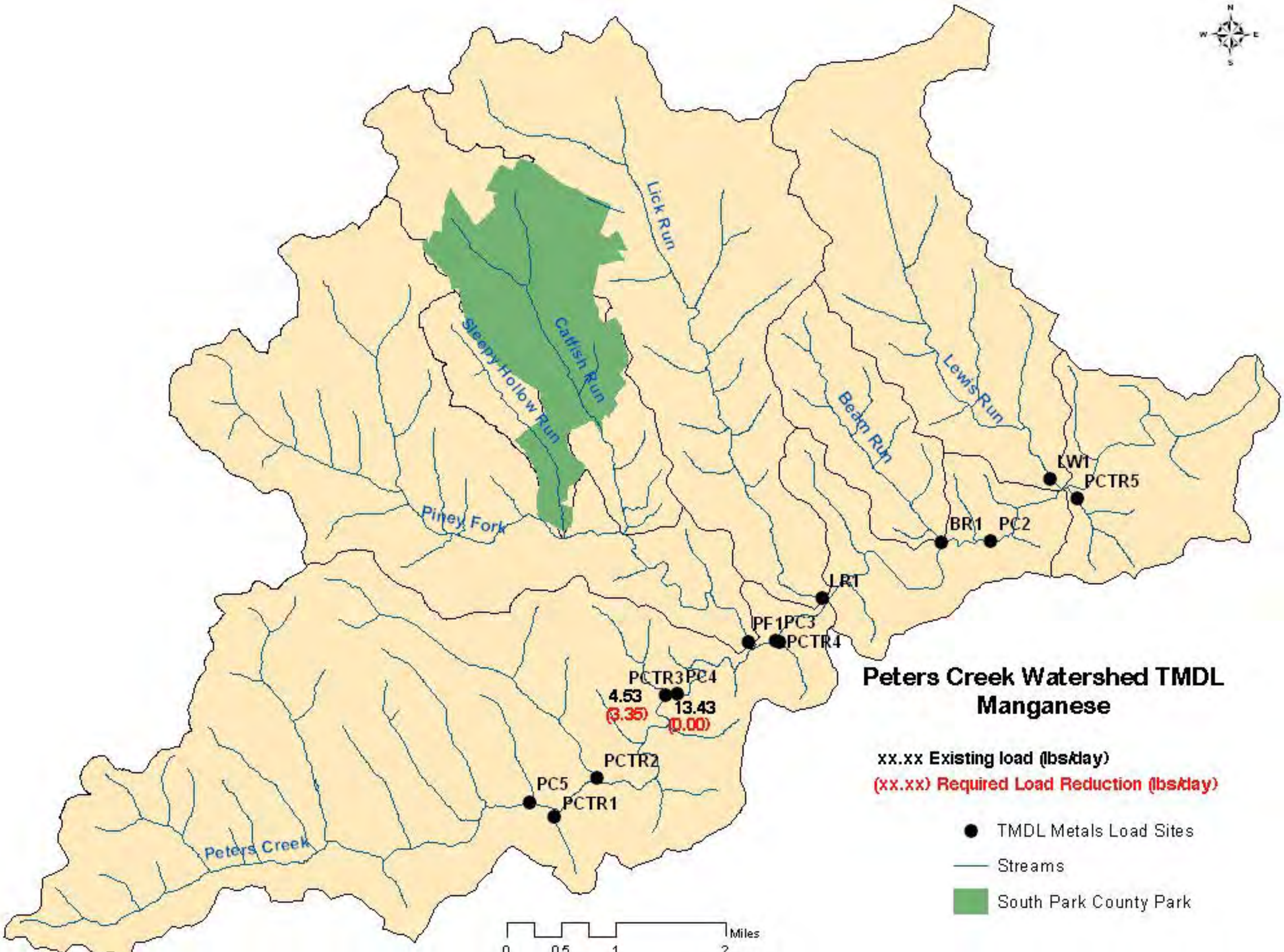
**Figure 4.1 Aluminum Load Tracking in the Peters Creek Watershed**



## Figure 4.2 Iron Load Tracking in the Peters Creek Watershed



## Figure 4.3 Manganese Load Tracking in the Peters Creek Watershed



## Table 4.3 Metals Analysis for Peters Creek Watershed Sites

| Site ID | Longitude | Latitude | Date | Acidity (mg/L) | Alkalinity (mg/L) | Al (mg/L) | Fe (mg/L) | Mn (mg/L) | $SO_4$ (mg/L) | TSS (mg/L) | pH | Cond (μ-S/cm) | Temp (° C) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PCL38** | 79.91008 | 40.29347 | 06/29/07 | -282.4 | 260.4 | <0.50 | <0.30 | <.05 | 180.1 | 32.0 | 11.5 | | 9.0 |
| **LWM** | 79.91569 | 40.29233 | 12/23/08 | <1 | 81 | <0.50 | 0.27 | 0.23 | | 5 | 7.70 | 1766 | 1.3 |
| **LW17** | 79.92816 | 40.30035 | 12/18/08 | 6 | 27 | 3.84 | 3.88 | 3.66 | | 34 | 6.96 | 1535 | 8.5 |
| **LW18** | 79.92865 | 40.30040 | 12/18/08 | 21 | <20 | 2.86 | 0.09 | 0.86 | | 11 | 5.59 | 1509 | 8.9 |
| **LW29** | 79.93837 | 40.31037 | 06/29/07 | 22.4 | 8.2 | 1.27 | <0.30 | 2.33 | 432.3 | 14.0 | 5.0 | | 5.0 |
| **LW29** | 79.93837 | 40.31037 | 12/23/08 | <1 | 43 | <0.50 | 0.19 | 1.70 | | <5 | 7.05 | 1176 | |
| **LW32** | 79.93882 | 40.31429 | 12/23/08 | 70 | <20 | 9.24 | 7.92 | 1.98 | | 49 | 4.83 | 1615 | 2.6 |
| **LW33** | 79.93981 | 40.31644 | 12/23/08 | <1 | 118 | 4.53 | 0.33 | 0.65 | | 17 | 7.28 | 1735 | 1.4 |
| **PCM14** | 79.92478 | 40.28578 | 12/18/08 | <1 | 136 | 1.29 | 1.96 | 0.28 | | 78 | 7.74 | 2049 | 4.5 |
| **BRM** | 79.93560 | 40.28466 | 12/18/08 | <1 | 65 | 0.54 | 0.05 | 0.26 | | <5 | 7.43 | 1178 | 5.0 |
| **BR22** | 79.94166 | 40.29079 | 12/18/08 | <1 | 197 | <0.50 | 2.66 | 0.50 | | 10 | 6.61 | 1745 | 10.2 |
| **BR35** | 79.94821 | 40.29557 | 12/18/08 | 19 | <20 | 1.17 | 0.14 | 0.52 | | <5 | 7.03 | 1177 | 5.6 |
| **BR46** | 79.954986 | 40.302306 | 12/18/08 | 97 | <20 | 8.73 | 0.43 | 1.08 | | 5 | 4.02 | 1745 | 10.5 |
| **BR49** | 79.95578 | 40.30389 | 06/29/07 | 39.6 | 8.8 | 6.02 | .927 | 2.64 | 551.2 | 20.0 | 4.7 | | 4.7 |
| **BR52** | 79.95608 | 40.30506 | 06/29/07 | 99.4 | 0.0 | 8.21 | .957 | 2.10 | 671.6 | 8.0 | 3.5 | | 4.5 |
| **BR52** | 79.95608 | 40.30506 | 12/18/08 | 74 | <20 | 5.12 | 0.21 | 2.14 | | <5 | 4.64 | 1400 | 9.1 |
| **SRM** | 79.94999 | 40.28385 | 12/23/08 | <1 | 88 | <0.50 | 0.13 | 0.03 | | <5 | 7.76 | 1196 | 1.5 |
| **SR11** | 79.95642 | 40.29133 | 12/23/08 | <1 | 95 | <0.50 | 0.71 | 0.12 | | <5 | 6.34 | 1416 | 9.2 |
| **LRM** | 79.95663 | 40.27791 | 11/07/12 | <1 | 152.52 | <0.1* | <0.1* | <0.1* | 177 | 6 | 8.24 | 1297 | 9.27 |
| **LRM** | 79.95663 | 40.27791 | 12/23/08 | <1 | 157 | <0.50 | 0.24 | 0.13 | | 6 | 8.08 | 1326 | 3.5 |
| **LR18** | 79.97005 | 40.29241 | 12/30/08 | 26 | 22 | 7.19 | 0.65 | 1.61 | | 27 | 6.57 | 1373 | 9.1 |
| **LR49** | 79.97827 | 40.31650 | 12/23/08 | <1 | 273 | 1.21 | 0.23 | 0.14 | | <5 | 8.13 | 1668 | |
| **PFM** | 79.96983 | 40.27177 | 12/23/08 | <1 | 131 | <0.50 | 0.14 | 0.19 | | 5 | 7.89 | 1258 | 1.9 |
| **PF22** | 79.97946 | 40.27707 | 12/23/08 | 43 | <20 | 3.12 | 1.79 | 2.78 | | 12 | 5.23 | 1240 | 3.2 |
| **PF36** | 79.99008 | 40.28136 | 06/29/07 | 75.8 | 6.8 | 9.58 | 3.90 | 3.07 | 581.6 | 22.0 | 4.3 | | 4.5 |
| **PF49** | 79.99787 | 40.28704 | 12/30/08 | 32 | <20 | 9.86 | 0.15 | 3.09 | | 39 | 6.51 | 1092 | 5.8 |
| **PF62** | 80.01417 | 40.28591 | 12/30/08 | 86 | <20 | 17.01 | 0.28 | 2.11 | | 36 | 4.74 | 1406 | 8.5 |
| **PF62** | 80.01417 | 40.28591 | 11/07/12 | 139.05 | 1.47 | 8.02* | <0.1* | 1.03* | 541 | 10 | 4.69 | 1886 | 14.12 |
| **PF65** | 80.01454 | 40.28587 | 12/30/08 | <1 | 92 | 2.75 | 0.29 | 0.87 | | 12 | 7.54 | 935 | 8.6 |
| **CR24** | 79.99536 | 40.30072 | 12/30/08 | 109 | <20 | 13.55 | 1.57 | 2.77 | | <5 | 3.76 | 1631 | 7.8 |
| **CR61** | 80.02133 | 40.32967 | 05/24/12 | <1 | 221.3 | <0.1* | <0.1* | .29* | 139 | <2.37 | 7.80 | 3900 | 15.6 |
| **CR61** | 80.02133 | 40.32967 | 11/07/12 | <1 | 8.09 | <0.1* | <0.1* | 0.1* | 146.4 | 4 | 8.09 | 3000 | 11.09 |
| **TFTM** | 79.99636 | 40.25443 | 05/24/12 | <1 | 89.2 | <0.1* | <0.1* | <0.1* | 328 | <2.37 | 7.57 | 1045 | 18.7 |
| **TFTM** | 79.99636 | 40.25443 | 11/07/12 | <1 | 103.17 | <0.1* | <0.1* | 0.25* | 97.3 | 8 | 7.88 | 837 | 7.7 |
| **TFT13** | 80.00283 | 40.26259 | 12/30/08 | 52 | <20 | 2.33 | 0.74 | 1.61 | | <5 | 4.98 | 928 | 10.5 |
| **PCU090** | 80.01057 | 40.25175 | 12/30/08 | 148 | <20 | 14.51 | 2.38 | 2.33 | | <5 | 3.41 | 1621 | 11.4 |

** Measurements are of Dissolved Metals. All others are of Total Recoverable Metals*

Figure 4.4 AMD, AML, Gas Wells and Coal Mines

## 5.0 RIPARIAN BUFFER STUDY

### 5.1 INTRODUCTION

The importance and benefits of maintaining an adequate vegetated buffer within the riparian zone of all streams has been well documented. Studies in Pennsylvania have concluded that the loss of riparian forests in eastern North America is one of the major causes of aquatic ecosystem degradation.

Riparian forest buffers provide many important ecosystem and human benefits in terms of water quality, stream morphology and hydrology, habitat for fish and wildlife, aesthetics and outdoor recreation.

Riparian vegetation has well-known beneficial effects on stream bank stability, biological diversity, and water temperatures of streams. Riparian forests of mature trees are known to effectively reduce nonpoint pollution from agricultural fields.

Compared to other water quality improvement measures, restoration of forested buffers along streams can lead to longer-term improvements in the structure and function of human-dominated landscapes.

The Peters Creek watershed is a human-dominated landscape that has historically and continues to be impacted by numerous anthropogenic influences, many of them detailed in this study. However, water quality within Peters Creek has improved substantially over the past several decades, the stream has become a heavily utilized fishery and the aquatic community within the stream continues to improve. Understanding the reasons for this improving situation is essential in order to develop an effective management plan for the future.

It has been hypothesized that Peters Creek has benefited substantially from three important factors.

- The implementation of the Clean Water Act has required responsible treatment and management of sewage and other pollution loads. Unregulated, these excess pollutants could easily overwhelm an urban/suburban stream like Peters Creek.

- The pH within the main stem of Peters Creek remains between 6.0-9.0 in spite of the excess metals load from ubiquitous abandoned mine drainage. The streams within the Peters Creek watershed are well buffered and this is crucial for the maintenance of a diverse aquatic community.

- A significant portion of the riparian zone along the main stem of Peters Creek and many of its tributaries remains forested. This helps to maintain adequate water temperatures, provides a food source and habitat for aquatic communities, provides pollution mitigation and maintains stream bank stability.

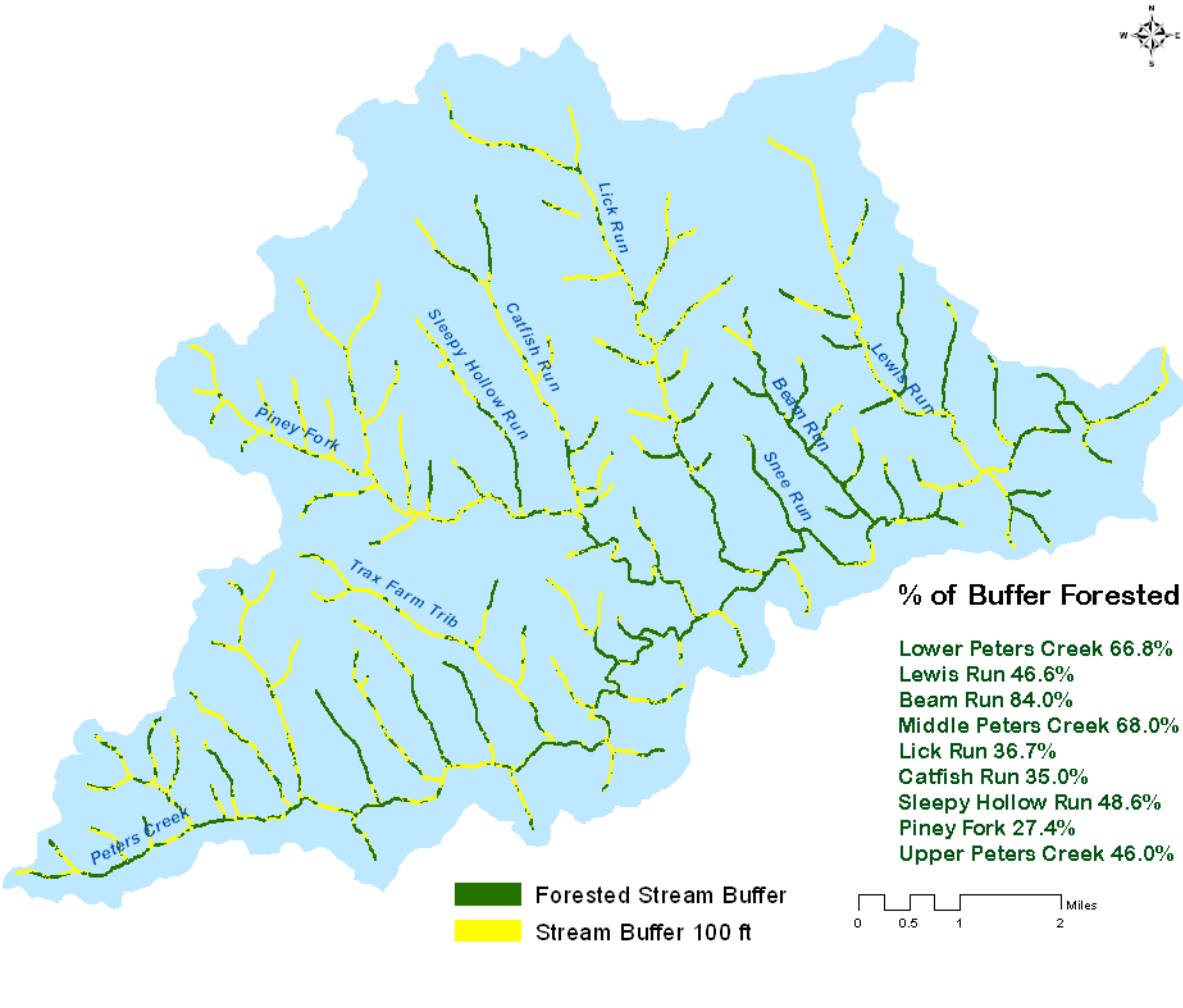
The current status of wooded riparian buffers along the streams of the Peters Creek watershed is an important contributor to water quality status within watershed streams.

Knowledge of this status would also prove useful toward development of a Peters Creek watershed riparian management plan for the future.

## 5.2 METHODS

ARCMAP GIS software and the National Land Cover Database were utilized to study the recent status of riparian buffers along the streams of the Peters Creek watershed. ARCMAP software was used to model 100 foot buffers along both sides of all watershed streams. This buffer layer was then intersected with the 2006 National Land Cover Database to determine how much of the buffer was comprised of forested landcover. The percentage of the area of the stream buffer that was comprised of forested landcover was then determined on a sub-watershed basis. The results of this study are presented in Figure 5.1.

**Figure 5.1 Forested Riparian Buffers along Watershed Streams**



## 5.3 RESULTS

This study helps to quantify and visualize the status of forested riparian buffers within the Peters Creek watershed at a glance. It also helps to identify tributaries within the watershed deserving of further investigation.

Snee Run was found to be exceptional in terms of its macroinvertebrate community which included a number of pollution intolerant stonefly and caddisfly species. This study reveals that nearly 100% of Snee Run's riparian zone is forested. There are a number of other tributaries that are also mostly forested including 3 tributaries to Lewis Run and 2 tributaries to Peters Creek in the headwaters portion of the watershed.  Further investigation of these tributaries is warranted to determine their biological diversity and to prioritize their conservation potential.

The Piney Fork sub-watershed's riparian zone consists of the least amount of forested buffer at 27.4% and Beam Run's consists of the most at 84.0%. Conservation opportunities within this mostly forested valley should be investigated. Forested buffer along Piney Fork is distributed unevenly. The lower portions of the creek from its confluence with Catfish Run downstream to Peters Creek is mostly forested whereas the developed headwaters portion of the sub-watershed is not.  Lick Run is very similar. From Waterman Rd to Peters Creek the riparian zone is almost entirely forested whereas the rest of the sub-watershed riparian zone is sparcely forested.

Little of the riparian zone along the main stem of Lewis Run is forested which is to be expected as this is the State Route 51 corridor.

Surprisingly, only 35% of Catfish Run's riparian zone is forested with little of that within South Park County Park except north of Corrigan Circle. The Allegheny County Parks Comprehensive Master Plan recommends that forested buffers be developed along all park streams. Allegheny County has installed a riparian buffer on the upper portion of Catfish Run upstream of the skating rink. It is clear from this study that other opportunities exist along Catfish Run within the park. Opportunities also exist along Sleepy Hollow Run, the other stream that flows through South Park.

There is very little forested buffer along the Trax Farm Tributary and along the Bebout Road tributary in the headwaters portion of Peters Creek. Water quality within these streams might be greatly improved by riparian restoration projects.

A large percentage of the riparian zone of the main stem of Peters Creek from Finleyville to the streams confluence with the Mon River is forested with a few exceptions. The riparian zone in the headwaters portion of Peters Creek is only about 50% forested but much of the floodplain remains undeveloped and vegetated.

## 5.4 CONCLUSIONS

This preliminary investigation of the percentage of forest within the riparian zone of streams in the Peters Creek watershed provides some useful information but has a number of limitations. It provides no information concerning the quality or sustainability of forests present within the riparian zone. Neither does it provide any information concerning that part of the riparian zone that is not forested. A fully vegetated non-forested wetland within the riparian zone would present quite different consequences for water quality than an impervious parking lot. However, the study does provide a starting point and also suggests areas for further investigation.

The condition of the riparian zone is an important contributor to water quality and it is especially important in a heavily populated suburban watershed with numerous anthropogenic influences. This study found that much of Peters Creek's riparian zone remains forested and essentially intact along much of the streams course. Maintaining this forested buffer and restoring degraded riparian zone along the creek is important if Peters Creek is to remain a viable fishery. Since much of the riparian zone is privately owned this will require landowner cooperation as well as municipal ordinances protective of riparian zones. It will also require further riparian studies that lead to the development of a watershed-wide riparian management strategy.

## 6.0 LAND CONSERVATION

*Unless we practice conservation, those who come after us will have to pay the price of misery, degradation, and failure for the progress and prosperity of our day.* - **Gifford Pinchot**

## 6.1 INTRODUCTION

The Peters Creek valley is a suburban watershed that has historically been and continues to be impacted by numerous anthropogenic influences. Yet, many components of the watershed remain healthy. Nearly 60% of the valley remains either wooded or in vegetated open space and the aquatic community within Peters Creek and other watershed streams has been improving significantly over the past several decades. Both Peters Creek and Piney Fork support a thriving fishery and with 11 miles of the Montour Trail paralleling their shores these streams have become a regional recreational destination for hikers, bikers and walkers.

Allegheny County's South Park County Park is over 1,200 acres of dedicated multi-use open space that is an important regional recreational and conservation resource that is located entirely within the Peters Creek watershed. There are also a number of municipal parks within the watershed that are maintaining open space and providing varied recreational opportunities.

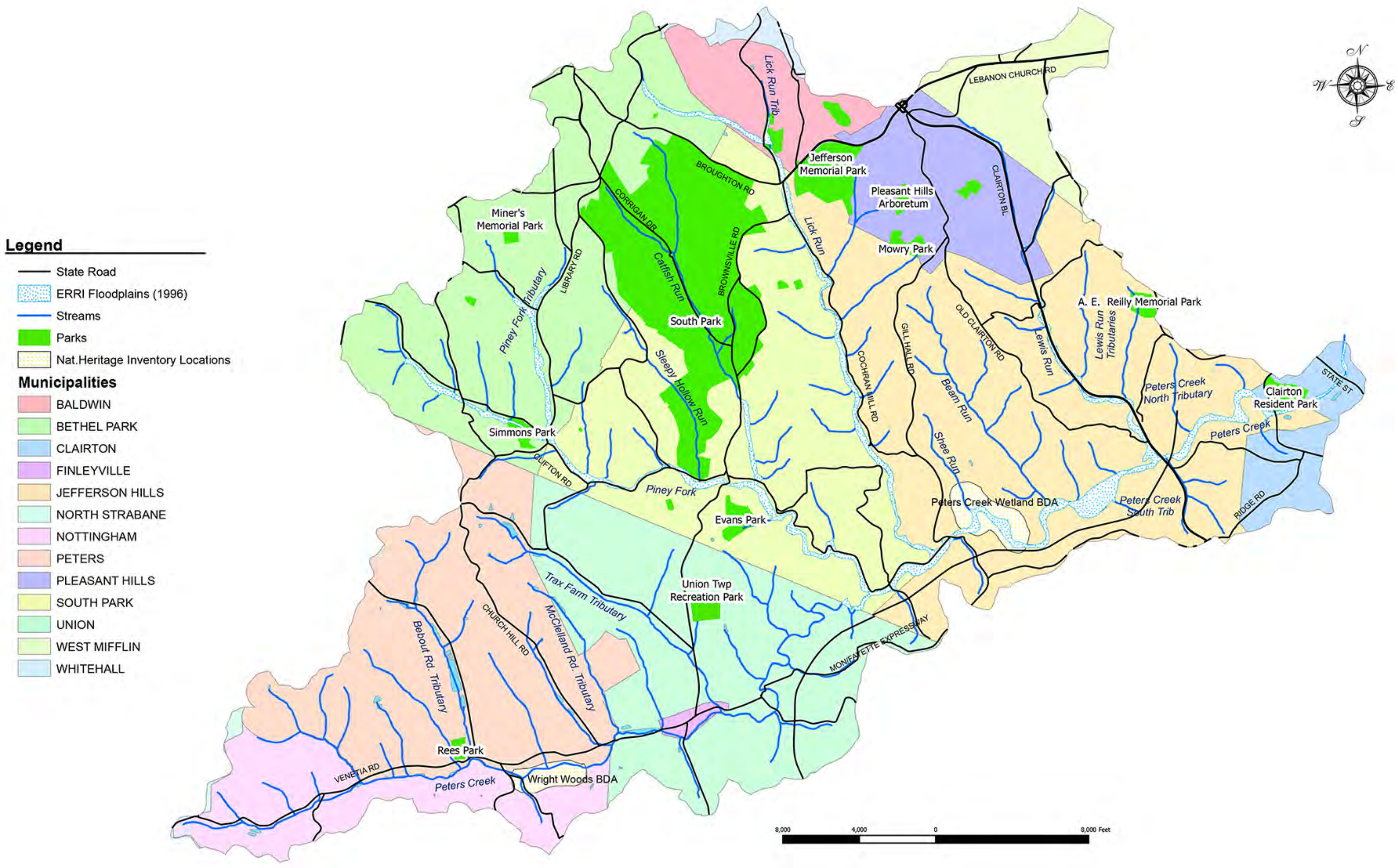
Two areas within the watershed have been recognized for their unique biological diversity by the Natural Heritage Inventory. The location of these biodiversity areas and dedicated open space within the Peters Creek watershed is depicted in Figure 6.1.

The undeveloped forests and other naturally vegetated open space within the watershed are providing a number of valuable beneficial services and functions that often go unrecognized or under-appreciated. These areas of green infrastructure protect water quality within watershed streams. They intercept and filter large quantities of stormwater and mitigate the erosive and polluting effects of flooding. Forested stream banks maintain water temperatures in streams and provide habitat and a food source for aquatic life that helps to support a diverse community of wildlife. Natural wetlands have been shown to mitigate the negative impacts of abandoned mine drainage on streams. Forested areas and other green infrastructure within the watershed provides a vast carbon storage capability, protects aquifer recharge zones, reduces costs of drinking water treatment and reduces vulnerability to invasive species.

In addition, these naturally vegetated areas provide key connections across the landscape for humans, animals and birds, harbors the unique biodiversity of the watershed, helps to maintain recreational opportunities and also provides for the watershed's scenic character.

To a large degree, the green infrastructure of the Peters Creek valley provides an improved quality of life and makes the area unique and livable.

## Figure 6.1 Dedicated Open Space and Natural Areas in the Peters Creek Watershed



## 6.1 PETERS CREEK WATERSHED LAND CONSERVATION PLAN

Inadequately controlled stormwater is the single greatest cause of water quality impairment in urban waterways. The costs associated with this excess stormwater are many, including damage to homes and businesses from flooding, increased infrastructure maintenance costs associated with road and bridge repairs, degradation of stream channels and water quality leading to declining fish populations and increased drinking water treatment costs.

A cost effective means of avoiding these burdensome additional expenses is implementation of a watershed-wide plan that is protective of lands that are contributing significantly to stormwater control. There are many ways of achieving this goal and they all require that these lands be effectively identified and prioritized.

A land conservation plan, or Greenprint, was developed for the Peters Creek watershed through a collaborative effort of the Peters Creek Watershed Association, The Allegheny Land Trust and Chatham University's Department of Landscape Architecture. The purpose of this plan is to identify and prioritize those undeveloped lands within the Peters Creek watershed that are contributing most significantly to stormwater control, biodiversity and the watershed's scenic character.

Geographic Information System (GIS) technology and numerous data sources were utilized to develop this plan. The development process is described below. The full plan as well as a brochure developed for community outreach can be found in the Appendix.

## 6.2 LAND CONSERVATION PLAN DEVELOPMENT PROCESS

**Step 1 –** Identify physical attributes within the watershed that contribute significantly to biodiversity, scenic character and/or water management.

- Wetlands
- Floodplains
- Hydric Soils
- Wooded Riparian Areas
- Wooded Riparian Steep Slopes
- Wooded Steep Slopes
- Woodlands
- Interior Forest
- Farmland

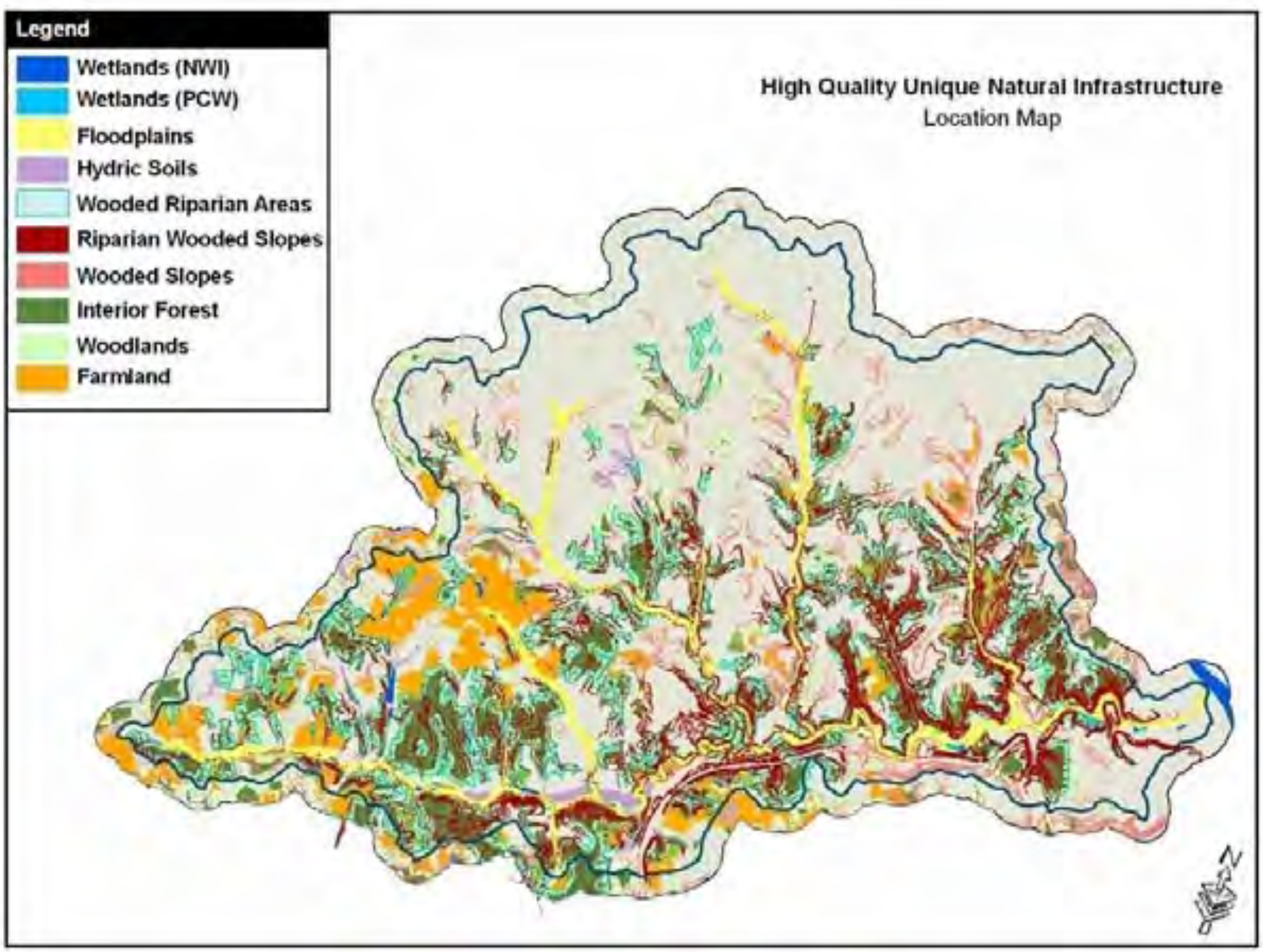
**Step 2 -** Assign scores to each attribute indicating whether the attribute contributes to biodiversity, scenic character and/or water management.

**Table 6.1 Green Infrastructure Scoring**

| Green Infrastructure Type | Water | Scenic | Habitat | Total |
|---|---|---|---|---|
| Wetlands (NWI delineated) | 1 | | 1 | 2 |
| Wetlands (PCWA delineated) | 1 | | 1 | 2 |
| Floodplains | 1 | | 1 | 2 |
| Hydric Soils | 1 | | | 1 |
| Wooded Riparian Areas | 1 | 1 | 1 | 3 |
| Wooded Riparian Steep Slopes | 1 | 1 | 1 | 3 |
| Wooded Steep Slopes | 1 | 1 | 1 | 3 |
| Woodlands | 1 | 1 | 1 | 3 |
| Interior Forest | 1 | 1 | 1 | 3 |
| Farmland | 1 | 1 | | 2 |

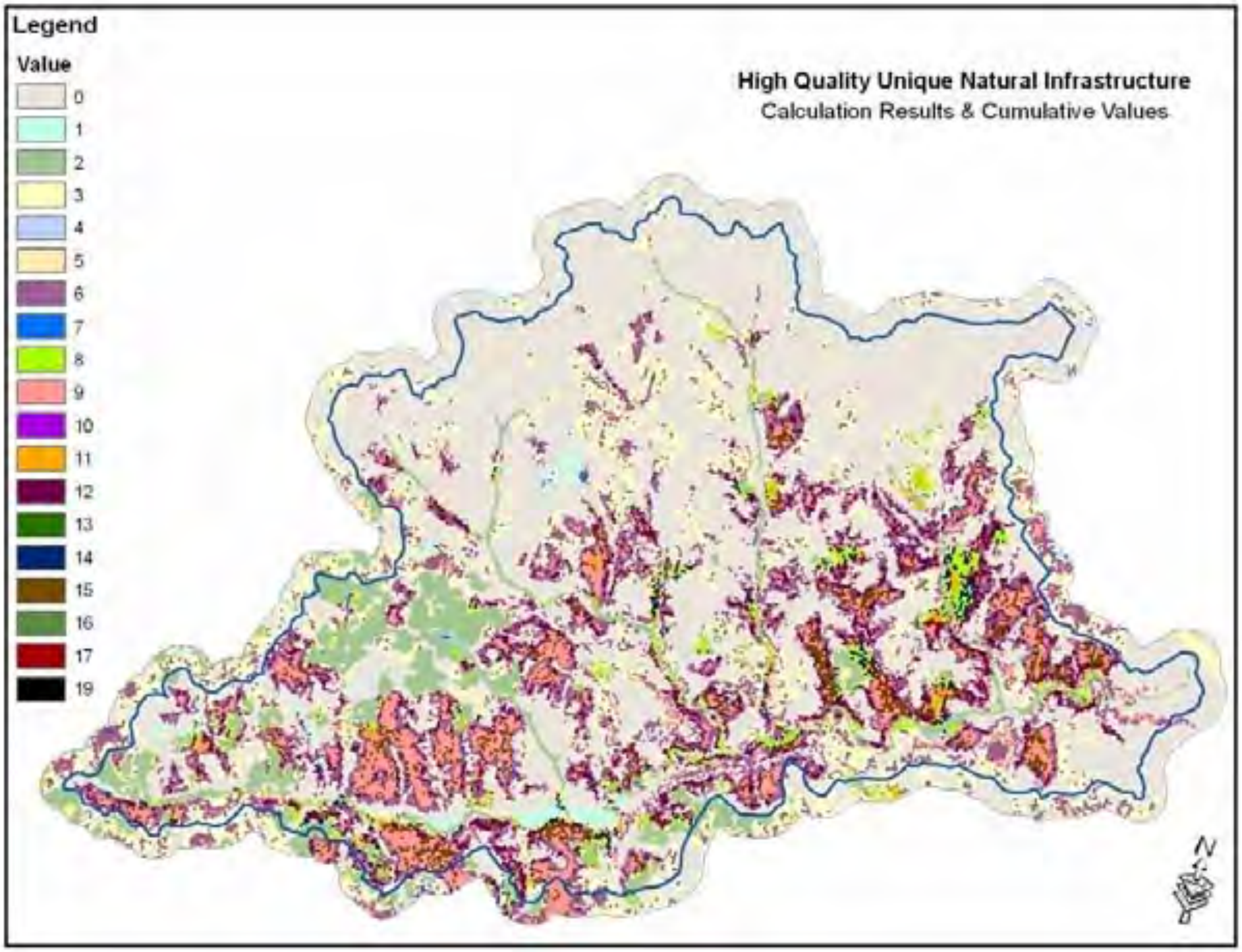
**Step 3 -** Map each attribute on the same equally spaced grid for the entire Peters Creek watershed. Each cell on this grid either exhibits the attribute or it does not. Verify by field observation that the mapping is accurate.

**Figure 6.2 Green Infrastructure Location Map**



**Step 4 -** For each grid cell sum the scores for each attribute exhibited by that grid cell.

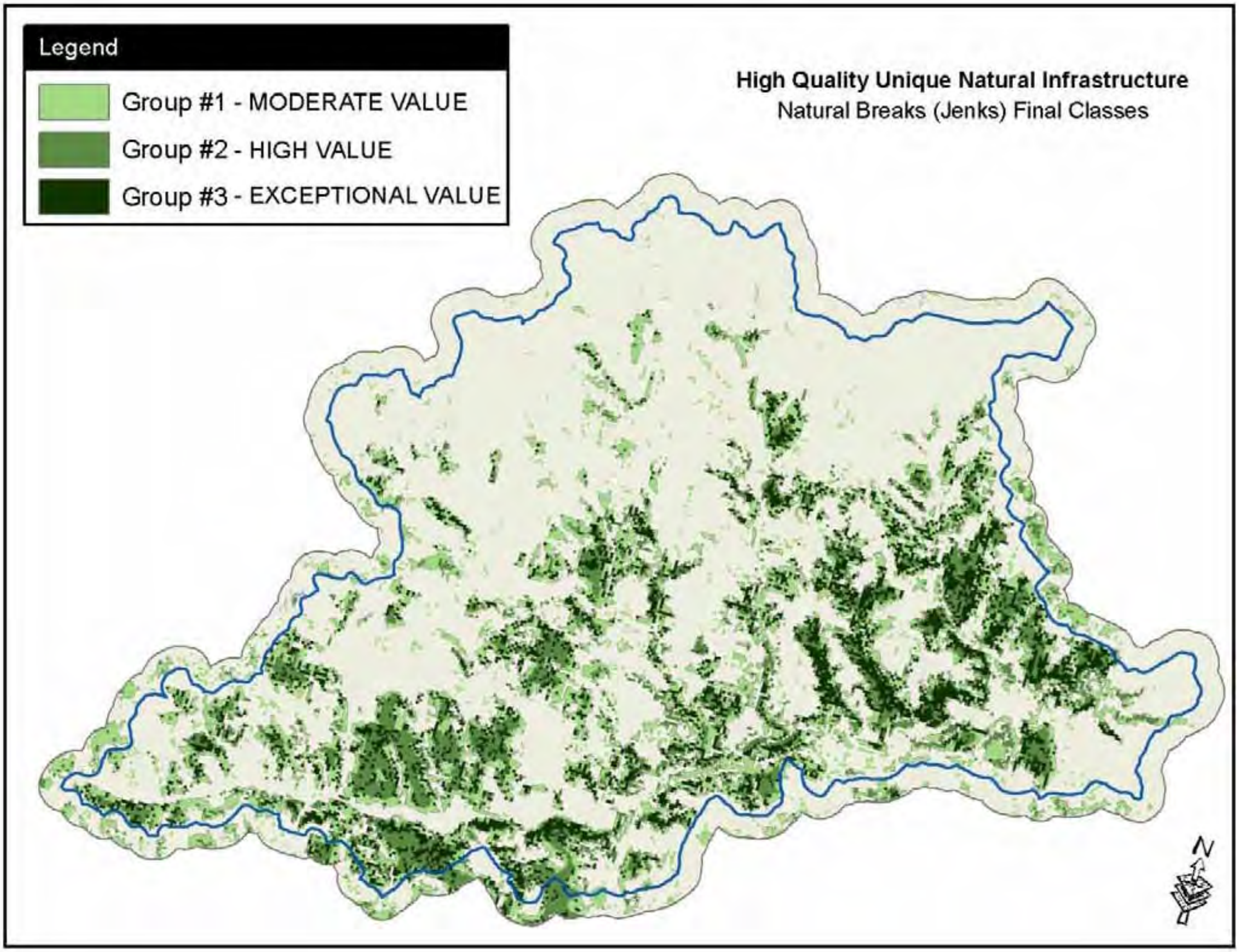
### Figure 6.3 Cumulative Green Infrastructure Scores



**Step 5 –** Create three groups from the resultant grid cell summed values. These are the areas comprising the Peters Creek Watershed Greenprint that should be given special consideration for long-term conservation.

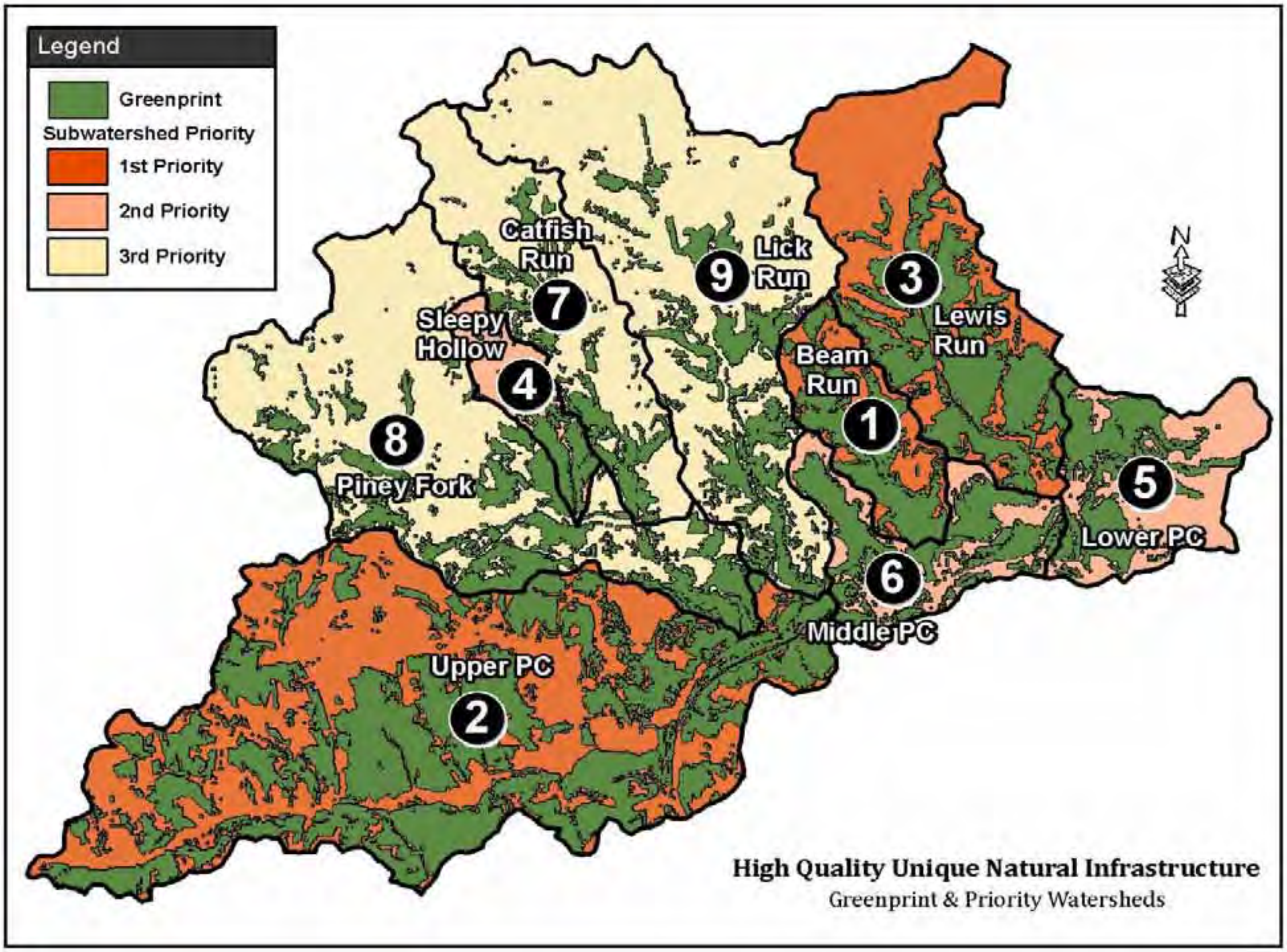
- **Moderate Value** (4-7)
- **High Value** (8-10)
- **Exceptional Value** (11-19)

**Figure 6.4 Peters Creek Watershed Land Conservation Prioritization**



**Step 6 –** Prioritize target areas within the watershed for conservation at the sub-watershed level. Calculate an Average Green Infrastructure Score for each sub-watershed by summing all grid cell values within the sub-watershed and dividing this by the total number of cells within the sub-watershed. Rank sub-watersheds according to this Average Green Infrastructure Score with the sub-watershed with the highest average receiving the highest priority.

**Figure 6.5 Peters Creek Land Conservation Sub-Watershed Priorities**




## 6.3 RESULTS

This land conservation study identified and prioritized undeveloped lands within the Peters Creek watershed that are comprised of highly functional green infrastructure and contributing most significantly to water management, biodiversity and scenic character. The prioritization scheme is weighted toward forested land, especially steeply sloped forested land that is in the riparian zone of streams. These lands provide much of the scenic character of the watershed, are most likely harboring a majority of its unique biodiversity and would be the most prone to severe erosion if deforested. The multitude of benefits provided by forested riparian zones was discussed in the Riparian Buffer Study section of this report.

The results of this study suggest that the Beam Run, Lewis Run and Upper Peters Creek sub-watersheds contain the highest percentage of highly functional green infrastructure and therefore should be a priority for conservation efforts within the Peters Creek watershed. This does not mean that other conservation opportunities should not be pursued but rather provides a guideline for strategic conservation planning.

The methodology can be modified as more information is obtained about specific conservation needs within the Peters Creek watershed.

The focus of priority targeting can be made at a finer scale. Prioritization on the level of individual tributary valleys or on individual parcels could prove useful for conservation planning efforts. Providing a list of priority parcels to municipalities could be useful to their planning efforts.

The conservation plan development process included taking an inventory of pertinent existing planning efforts within the 13 municipalities comprising the Peters Creek watershed. This inventory included Comprehensive Plans, Greenway Plans, Subdivision and Land Development Ordinances, Floodplain Ordinances, Grading Ordinances and Environmental Advisory Councils.

The conservation plan also provides recommendations for effective and successful implementation of the Peters Creek Watershed Greenprint:

- Create a multi-municipal Peters Creek Watershed Environmental Advisory Council to develop and help implement a long-term plan to conserve highly functional green infrastructure throughout the Peters Creek watershed.

- Identify a high priority demonstation parcel for conservation that has a high probability of success and utilize as a model for future conservation efforts.

- Develop an inventory of highly functional green infrastructure throughout the watershed at the parcel level.

- Encourage watershed municipalities to strengthen their ordinances to proactively protect highly functional green infrastructure.

- Encourage watershed municipalities and landowners to utilize all state programs and options provided by the PA Municipal Planning Code to conserve highly functional green infrastructure.

- Encourage Allegheny County and Washington County to implement a state mandated Stormwater Management Plan for the Peters Creek watershed.

- Partner with a land trust organization to maximize conservation of highly functional green infrastructure identified by the Peters Creek Watershed Greenprint.

- Manage and restore highly functional green infrastructure within the riparian zones of all watershed streams.

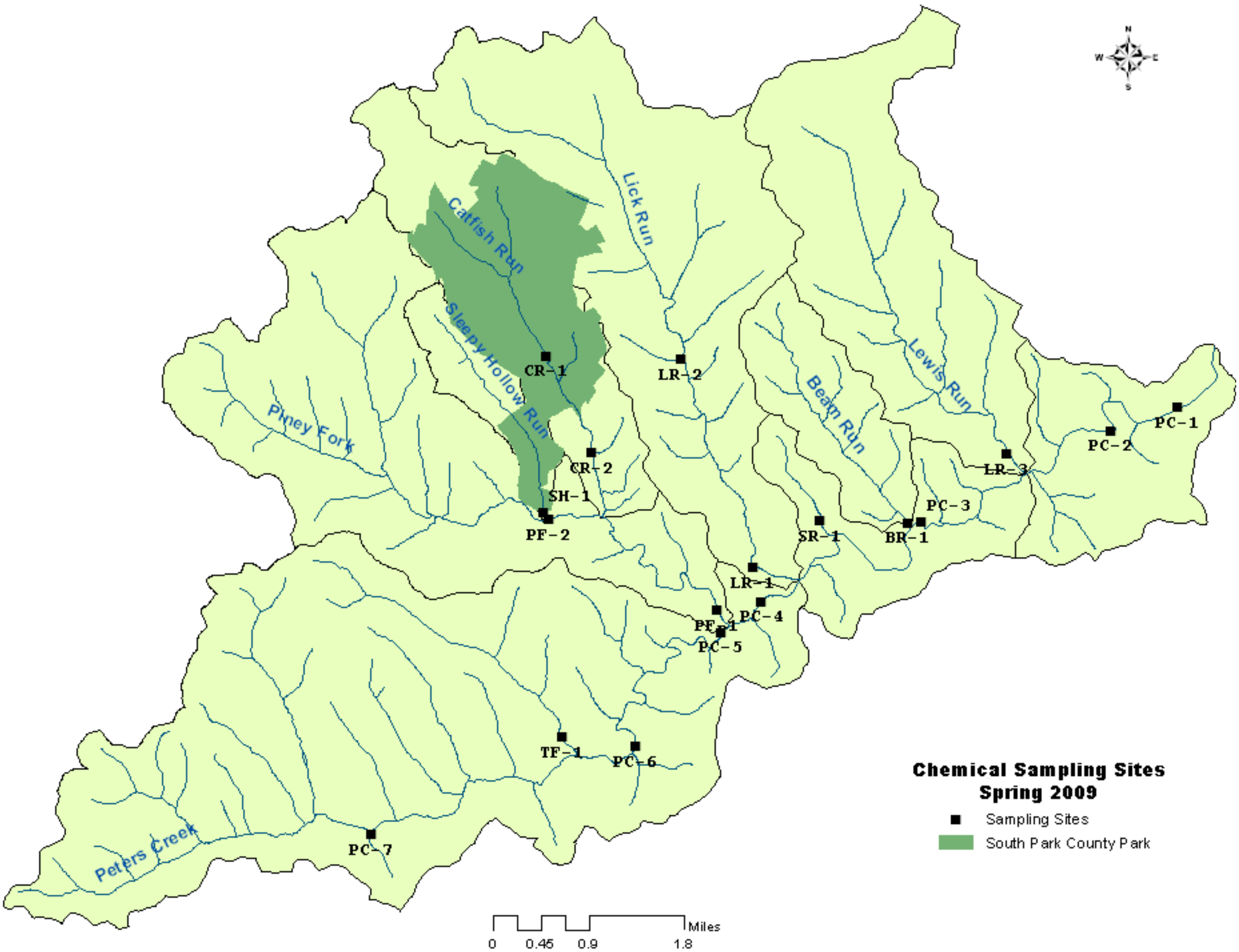
Progress has been made in an effort to implement this plan. The Peters Creek Watershed Association developed a list of priority parcels as part of its land conservation effort. The conservation plan has also been utilized to evaluate parcels that are proposed for donation. In December of 2012 a parcel in the Upper Peters Creek sub-watershed consisting of 14 acres of forested steep slope and floodplain within the riparian zone of Peters Creek with 1200 feet of the creek flowing through it was accepted for donation. This parcel will be managed as a demonstration parcel for conservation and will also be utilized for educational outreach.

# 7.0 WATER CHEMISTRY ASSESSMENTS

## 7.1 HISTORICAL CHEMICAL ASSESSMENTS

The PA Fish & Boat Commission collected chemical data during studies of Peters Creek and its tributaries during 1967, 1974, 1978 and 1997. Unless otherwise noted, all chemical sampling sites refer to locations on the map in Figure 7.1.1 shown below.

### Figure 7.1.1 Peters Creek Watershed Chemical Sampling Sites




A PA Fish & Boat Commission chemical sampling comparison for fish surveys conducted in 1978 and 1993 at Peters Creek main stem sites is displayed in Table 7.1.1. The PFBC noted that conditions in Peters Creek improved significantly from 1978 to 1993 with pHs becoming more neutral and conductivities decreasing at all four sites. They attributed Peters Creek's pollution problems to abandoned mine drainage and sewage.

**Table 7.1.1 Comparison of 1978 and 1993 PFBC Peters Creek Fish Surveys**

| Chemical Parameter | PC-6 | | PC-4 | | PC-3 | | PC-2 | |
|---|---|---|---|---|---|---|---|---|
| | 5/78 | 6/97 | 5/78 | 6/97 | 5/78 | 6/97 | 5/78 | 6/97 |
| Air Temp (deg F) | 69.8 | NA | 68.0 | NA | 57.2 | NA | 64.4 | NA |
| Water Temp (deg F) | 61.7 | 54.5 | 56.8 | 62.6 | 50.0 | 69.8 | 49.1 | 68.9 |
| pH | 8.8 | 7.6 | 8.6 | 7.9 | 8.7 | 8.1 | 7.3 | 7.9 |
| Spec Cond (μ–siemen/cm) | 1900 | 790 | 1250 | 1054 | 1500 | 1278 | 1425 | 1365 |
| Alkalinity (mg/l) | 89 | 128 | 70 | 116 | 72 | 107 | 74 | 97 |
| Hardness (mg/l) | 644 | 384 | 516 | 370 | 528 | 420 | 564 | 464 |
| DO (mg/l) | 13.2 | NA | 12.0 | NA | 13.6 | NA | 9.2 | NA |
| TDS (mg/l) | NA | 528 | NA | 700 | NA | 861 | NA | 920 |

NA – Not Analysed

The newly formed Peters Creek Watershed Association (PCWA) conducted a detailed monthly metals study over the course of 9 months during 1999 at 15 sites along the main stem of Peters Creek and Piney Fork and near the mouth of named tributaries. The following chemical parameters were measured at each site for a given sampling period: Air Temp, Water Temp, pH, Specific Conductance, TSS, Alkalinity as $CaCO_3$, Total Iron, Calcium, Magnesium, Aluminum, Sodium, Manganese, Sulfate, Potassium and Arsenic. Dissolved Oxygen was measured for 2 of the sampling periods.

Table 7.1.2 provides the average value of all samples from a site for a given parameter.

**Table 7.1.2 Site Averages for 1999 PCWA Metals Study**

| Sampling Site | Average | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | pH | Cond | DO | Al | Fe | Mn | $CaCO_3$ | $SO_4$ |
| Peters Creek below State Street Bridge | 7.77 | 947 | NA | 0.91 | 1.97 | 0.31 | 89.9 | 231 |
| Peters Creek below Lewis Run | 8.00 | 890 | 11.3 | 0.52 | 0.43 | 0.17 | 80.6 | 341 |
| Lewis Run before Peters Creek | 7.97 | 977 | 12.0 | 0.79 | 0.78 | 0.25 | 63.9 | 445 |
| Peters Creek above Lewis Run | 7.93 | 800 | 11.4 | 0.68 | 0.79 | 0.15 | 95.5 | 271 |
| Beam Run before Peters Creek | 7.73 | 828 | 11.0 | 0.91 | 0.35 | 0.30 | 57.1 | 425 |
| Peters Creek above Beam Run | 8.11 | 877 | 11.6 | 0.71 | 0.63 | 0.07 | 95.8 | 206 |
| Snee Run before Peters Creek | 7.90 | 832 | 10.1 | 0.38 | 0.74 | 0.27 | 100.2 | 345 |
| Peters Creek above Snee Run | 8.12 | 850 | 11.9 | 0.56 | 0.51 | 0.09 | 100.4 | 221 |
| Lick Run before Peters Creek | 8.19 | 954 | 10.9 | 0.50 | 0.40 | 0.10 | 110.0 | 195 |
| Peters Creek above Lick Run | 8.02 | 880 | 12.0 | 0.90 | 0.61 | 0.13 | 102.4 | 234 |
| Piney Fork before Peters Creek | 8.00 | 895 | 11.6 | 0.74 | 0.43 | 0.13 | 97.6 | 225 |
| Peters Creek above Piney Fork | 8.09 | 763 | 12.0 | 1.82 | 1.52 | 0.25 | 93.3 | 315 |
| Catfish Run before Piney Fork | 8.17 | 967 | 12.2 | 0.47 | 0.27 | 0.07 | 145.2 | 161 |
| Piney Fork Run above Catfish Run | 8.17 | 933 | 11.7 | 0.42 | 0.38 | 0.10 | 134.9 | 215 |
| Sleepy Hollow Run before Piney Fork | 8.21 | 810 | 11.0 | 0.79 | 0.55 | 0.03 | 149.7 | 157 |
| Piney Fork above Sleepy Hollow Run | 8.07 | 970 | 11.2 | 0.91 | 0.41 | 0.27 | 104.0 | 244 |

*All parameters measured in units of mg/l except for Cond which in units of μ-siemen/cm and pH.*

The results of the study indicate that sulfate levels are elevated throughout the Peters Creek watershed, that pH levels within the main stem of Peters Creek are consistently within a suitable range and that dissolved oxygen levels appear to be adequate at all sites though a continuous overnight evaluation would be necessary to assess the temporal effects of algae loading.

The study results also suggest that metals loading occurs intermittently and is most likely associated with significant precipitation events. Further metals studies should include flow measurement so that metal loads can be determined.

## 7.2 CHEMICAL ASSESSMENTS DURING BIOLOGICAL ASSESSMENTS

The Western Pennsylvania Conservancy conducted water chemistry assessments during the biological assessment of the Peters Creek watershed in the spring of 2009. Separate assessments were completed for the macroinvertebrate and fish survey studies. Samples for some parameters were replicated. Twelve sites throughout the watershed were sampled for the fish survey. The fish survey sites plus an additional six sites were sampled for the macroinvertebrate study. Site locations are provided in Figure 7.1.1. The results of the chemical assessments are displayed in Table 7.2.1 and Table 7.2.2 below.

pH was found to be alkaline at all sites and ranged from 7.60 at Beam Run to 8.90 at site PC-4 on Peters Creek. Stream pH levels that are too high (> 9.0) have a negative impact on the aquatic life within a stream. pH levels at some sites are of concern.

Dissolved oxygen levels ranged from 8.61 mg/L at Beam Run to 15.20 mg/L at PC-3 within the main stem of Peters Creek ~ 200 m below Beam Run. Dissolved oxygen levels were within the acceptable range at all sites, however, overnight studies are required to adequately gauge the impact of excess algae on dissolved oxygen levels within watershed streams.

**Table 7.2.1 Peters Creek Watershed Fish Survey 2009 Water Chemistry**

| Site | Date | Latitude | Longitude | pH | DO *mg/L* | Cond | TDS *ppm* | Water Temp (°*F*) |
|---|---|---|---|---|---|---|---|---|
| PC-1 | 4.23.09 | 40.30053 | -79.88765 | 8.25 | NA | 1470 | 1060 | 45.9 |
| PC-2 | 4.23.09 | 40.29794 | -79.89933 | 8.43 | NA | 1450 | 1103 | 48.2 |
| PC-3 | 4.23.09 | 40.28562 | -79.93406 | 8.90 | NA | 1324 | 940 | 56.8 |
| PC-4 | 4.23.09 | 40.27501 | -79.96302 | 8.91 | NA | 1203 | 851 | 52.2 |
| PC-6 | 4.23.09 | 40.25530 | -79.98584 | 8.50 | NA | 1025 | 725 | 49.1 |
| PC-7 | 4.24.09 | 40.24368 | -80.03315 | 8.57 | NA | 751 | 533 | 50.5 |
| LR-3 | 5.08.09 | 40.29473 | -79.91856 | 8.11 | 10.33 | 1630 | 1080 | 58.3 |
| BR-1 | 5.08.09 | 40.28559 | -79.93666 | 7.83 | 9.72 | 920 | 610 | 59.9 |
| LR-1 | 5.08.09 | 40.27851 | -79.95807 | 8.30 | 9.93 | 1330 | 900 | 61.3 |
| PF-1 | 4.24.09 | 40.27390 | -79.97081 | 8.74 | NA | 1338 | 954 | 55.2 |
| CR-1 | 5.08.09 | 40.30905 | -80.00087 | 8.49 | 11.67 | 1330 | 880 | 60.6 |
| SH-1 | 5.08.09 | 40.28759 | -80.00188 | 8.33 | 9.92 | 910 | 600 | 62.6 |

### Table 7.2.2 Peters Creek Watershed Macroinvertebrate Survey 2009 Water Chemistry

| Site | Date | Latitude | Longitude | pH | DO *mg/L* | Cond *µs* | TDS *ppm* | Turb *FAU* | $NO_3$ *mg/L* | $PO_4$ *mg/L* | Water Temp (°F) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PC-1 | 4.28.09 | 40.30100 | -79.88812 | 7.90 | 9.74 | 1330 | 880 | 4 | 4.60 | 0.19 | 63.6 |
| PC-2 | 4.28.09 | 40.29786 | -79.89993 | 8.40 | 12.05 | 1330 | 880 | 5 | 14.30 | 0.99 | 64.5 |
| PC-3 | 4.28.09 | 40.28590 | -79.93446 | 8.90 | 15.20 | 1180 | 780 | 0 | 9.30 | 1.45 | 66.9 |
| PC-4 | 4.29.09 | 40.27490 | -79.96323 | 8.80 | 8.87 | 1170 | 790 | 0 | 1.60 | 1.68 | 60.6 |
| PC-5 | 4.30.09 | 40.27089 | -79.97020 | 8.05 | 10.41 | 980 | 660 | 0 | 0 | 0.12 | 58.0 |
| PC-6 | 4.30.09 | 40.25461 | -79.98636 | 8.26 | 11.68 | 970 | 650 | 0 | 0 | 0.26 | 59.4 |
| PC-7 | 4.30.09 | 40.24377 | -80.03337 | 8.03 | 11.23 | 730 | 490 | 0 | 0 | 0.27 | 60.9 |
| LR-3 | 4.28.09 | 40.29481 | -79.91859 | 8.30 | 10.33 | 1760 | 1170 | 0 | 0 | 0.20 | 65.5 |
| BR-1 | 4.28.09 | 40.28627 | -79.93731 | 7.60 | 8.61 | 1100 | 730 | 7 | 0 | 0.15 | 69.6 |
| SR-1 | 4.28.09 | 40.28603 | -79.95236 | 8.20 | 8.81 | 1300 | 870 | 9 | 3.10 | 0.28 | 67.7 |
| LR-1 | 4.30.09 | 40.29975 | -79.96436 | 7.98 | 10.36 | 1350 | 910 | 3 | 7.60 | 0.34 | 58.1 |
| LR-2 | 4.30.09 | 40.30833 | -79.97672 | 8.29 | 10.80 | 1350 | 900 | 7 | 0 | 0.26 | 62.0 |
| PF-1 | 4.29.09 | 40.27340 | -79.97048 | 8.20 | 11.40 | 1300 | 880 | 5 | 7.40 | 1.35 | 60.3 |
| PF-2 | 4.29.09 | 40.28656 | -80.00073 | 8.52 | 11.14 | 1320 | 890 | 11 | 0.30 | 0.54 | 59.4 |
| CR-1 | 4.29.09 | 40.30994 | -80.00159 | 8.80 | 13.64 | 1470 | 990 | 0 | 5.50 | 0.84 | 58.6 |
| CR-2 | 4.29.09 | 40.29575 | -79.99304 | 8.38 | 11.55 | 1490 | 1010 | 0 | 8.90 | 0.32 | 60.3 |
| SH-1 | 4.29.09 | 40.28838 | -79.00011 | 8.50 | 10.36 | 1110 | 740 | 2 | 1.85 | 0.38 | 59.2 |
| TF-1 | 4.30.09 | 40.25673 | -79.99892 | 8.29 | 10.80 | 1350 | 900 | 7 | 0 | 0.26 | 62.0 |

Specific conductance levels ranged from 730 *μ-siemens/cm* at site PC-7 in the headwaters section of Peters Creek in Washington County to 1760 *μ-siemens/cm* at the Lewis Run site. Conductivity levels are typically high throughout the watershed. Consistent levels below 1000 are only found on Peters Creek's main stem west of Finleyville. This area is less impacted by historic mining activity than the rest of the watershed.

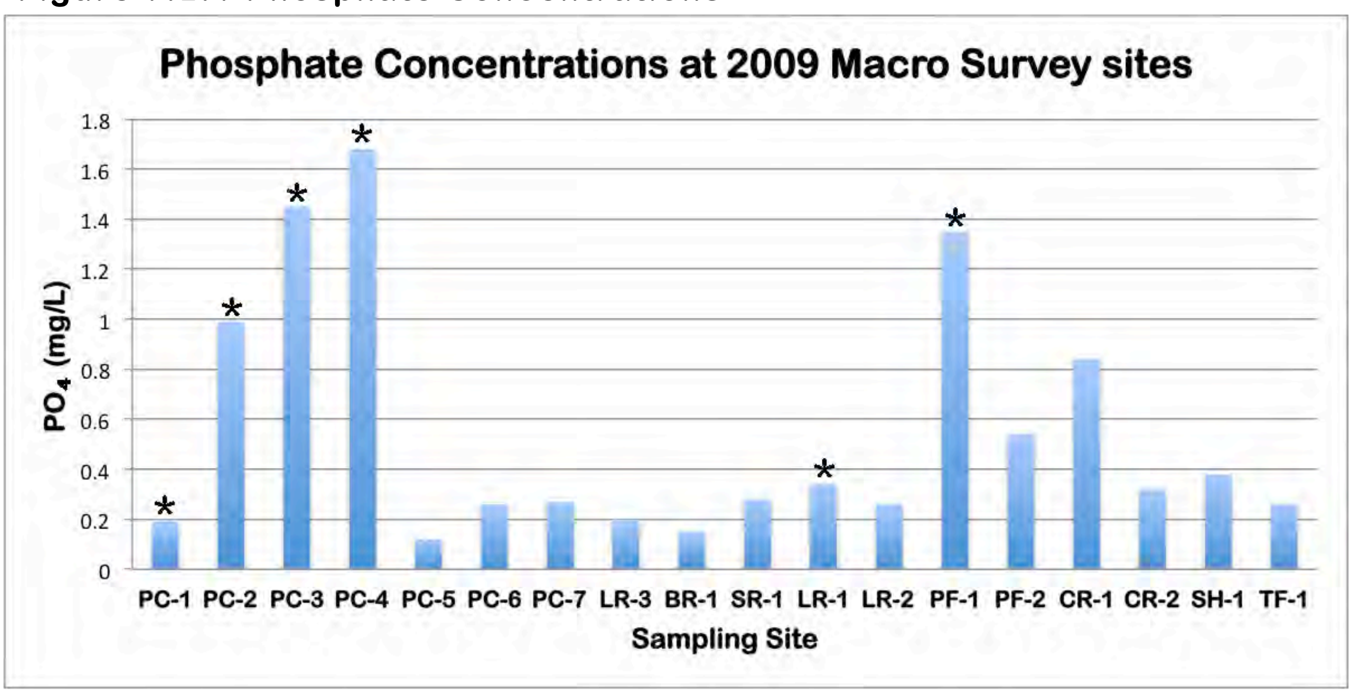
Stream nutrient levels of phosphate and nitrate were assessed at all macroinvertebrate sites.

Phosphate levels ranged from 0.12 mg/L at site PC-5 (Peters Creek just above the Piney Fork confluence) to 1.68 mg/L at site PC-4 just below the Piney Fork confluence. Phosphate levels in Peters Creek below the confluence are clearly influenced strongly by Piney Fork's input.

Phosphate levels at all sites were above what would be considered normal reference levels for our region but levels approaching and exceeding 1.0 mg/L are of concern. Three Peters Creek main stem sites (PC-2, PC-3 and PC-4) fall into this category as do the Piney Fork site (PF-1) and site CR-1 on Catfish Run. All of these sites are below the influence of wastewater treatment plants except for the Catfish Run site.

Wastewater treatment plants appear to be a contributing factor to increased phosphate levels within watershed streams. The source of high phosphate levels within Catfish Run are unknown. Further investigation to identify the sources of excess phosphate is warranted given the high degree to which portions of the watershed are impacted by excess algae.  Availability of phosphate may be the factor limiting plant growth within watershed streams. Further investigation is necessary to adequately identify and understand these factors.

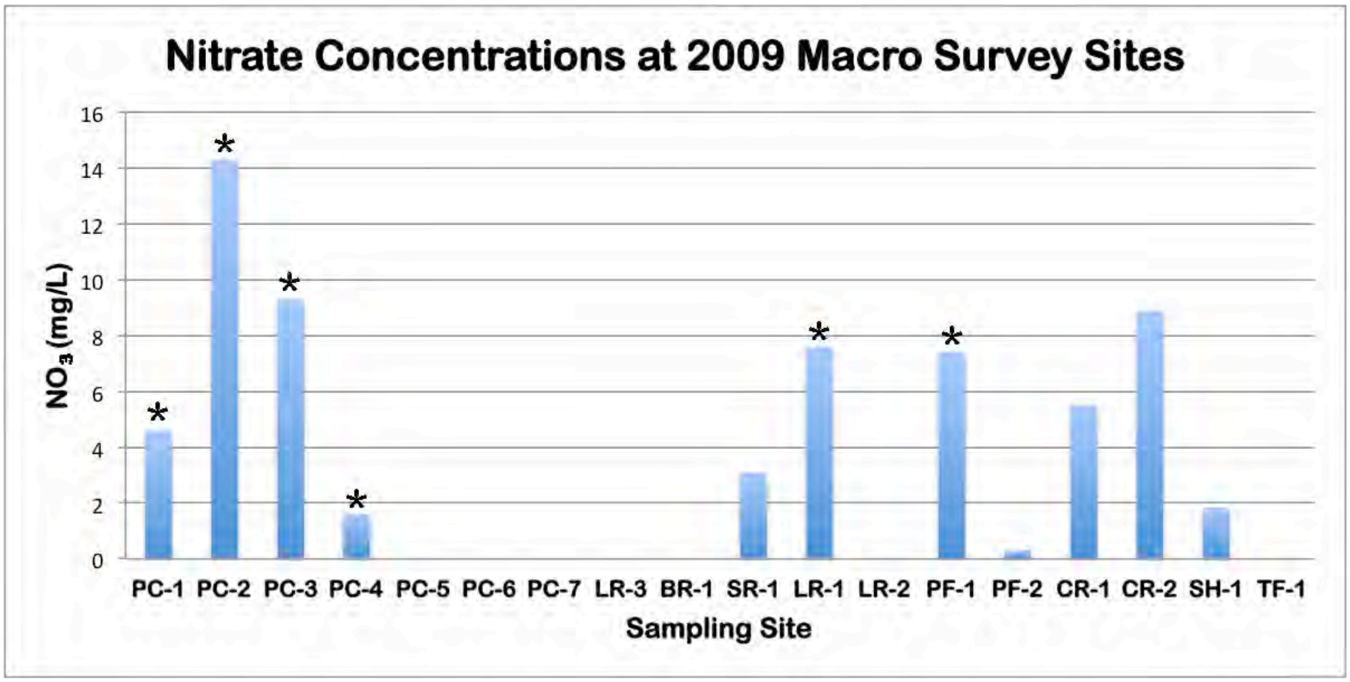
**Figure 7.2.1 Phosphate Concentrations**




** - Indicates site is downstream of wastewater treatment plant outfall(s).*

Nitrate levels ranged from 14.3 mg/L at site PC-2 on Peters Creek to none detected at seven sites (PC-5,PC-6,PC-7,LR-3,BR-1,LR-2,TF-1). All sites with little or no detected nitrates occurred upstream of wastewater treatment plant influence. Total Nitrogen levels of 10 mg/L are of concern. Nitrate is just one component of Total Nitrogen so any nitrate level approaching 10 mg/L is of concern. Seven sites fall into this category (PC-1, PC-2,PC-3,LR-1,PF-1,CR-1,CR-2). Natural reference levels of nitrates within streams in our region do not exceed .5 mg/L, therefore sites SR-1 and SH-1 also appear to be influenced by anthropogenic sources.

### Figure 7.2.2 Nitrate Concentrations




* *- Indicates site is downstream of wastewater treatment plant outfall(s).*

Sources of nitrates related to human activity include wastewater treatment plants, failing sewage infrastructure or septic systems and runoff from livestock operations including horse stables. Further investigation is required to identify actual sources of elevated nitrate levels within watershed streams. Wastewater treatment plants appear to be a contributing factor.

Excess algae levels are especially problematic within the lower reach of Peters Creek downstream of the Piney Fork confluence, in the lower reach of Lick Run and in Catfish Run. Excess algae can lead to depleted oxygen levels that stress or kill aquatic life.

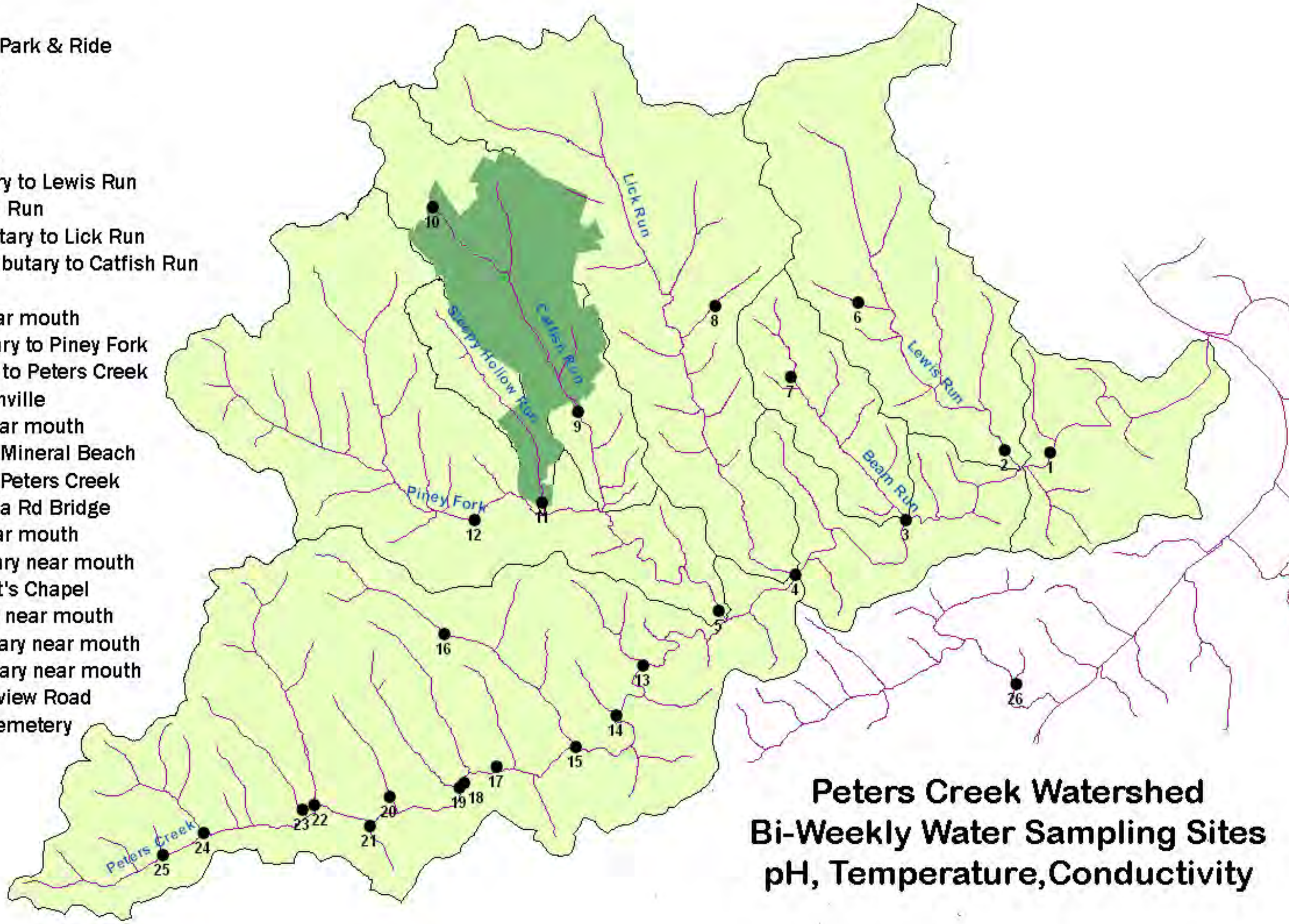
## 7.3 PETERS CREEK WATERSHED BI-WEEKLY WATER SAMPLING

The Peters Creek Watershed Association has implemented a bi-weekly monitoring program to establish year round baseline data for 26 sites throughout the Peters Creek watershed.

**Figure 7.3.1 Bi-Weekly Water Sampling Sites**

## Sampling Site

1 Peters Creek at Large Park & Ride
2 Lewis Run near mouth
3 Beam Run near mouth
4 Lick Run near mouth
5 Piney Fork near mouth
6 Oakwood Road Tributary to Lewis Run
7 AMD Tributary to Beam Run
8 Mineral Run AMD Tributary to Lick Run
9 Brownsville Rd AMD Tributary to Catfish Run
10 Catfish Run at Rt88
11 Sleepy Hollow Run near mouth
12 Sebolt Rd AMD Tributary to Piney Fork
13 Landfill AMD Tributary to Peters Creek
14 Peters Creek at Gastonville
15 Trax Farm Tributary near mouth
16 Trax Farm Tributary at Mineral Beach
17 Finleyville Tributary to Peters Creek
18 Peters Creek at Venetia Rd Bridge
19 Church Hill Rd Trib near mouth
20 Wright's House Tributary near mouth
21 Peters Creek at Wright's Chapel
22 Bebout Road Tributary near mouth
23 McCombs Road Tributary near mouth
24 Bower Hill Road Tributary near mouth
25 Peters Creek at Valleyview Road
26 Lobbs Run at Lobbs Cemetery



Volunteer water monitors are trained by ALLARM, Trout Unlimited and the C-SAW programs. Water Temperature, pH and Specific Conductance are measured at each site and general stream and weather conditions are recorded. The 3 Rivers Quest Program has provided equipment and funding for the project via the Colcom Foundation and has provided for more extensive monitoring at certain sites. Sampling site locations are provided in Figure 7.3.1. Sampling results for all locations can be found in the Appendix.

Graphical results for selected sites are provided below.

**Figure 7.3.2**

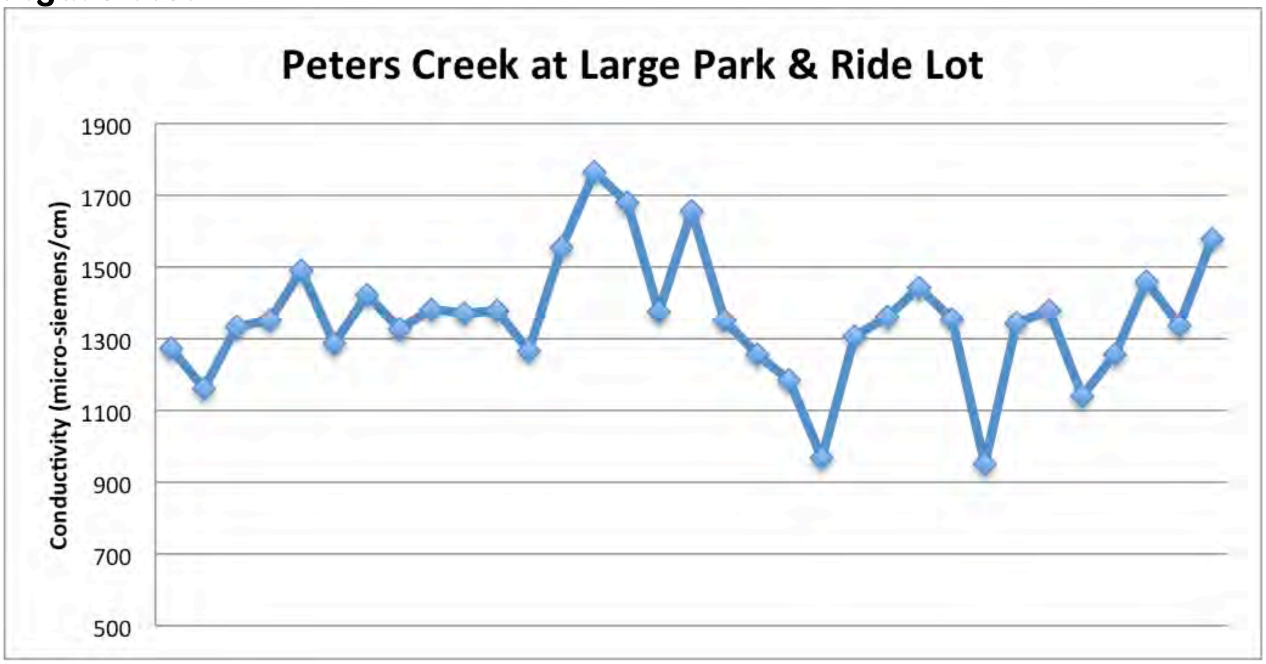



**Figure 7.3.3**

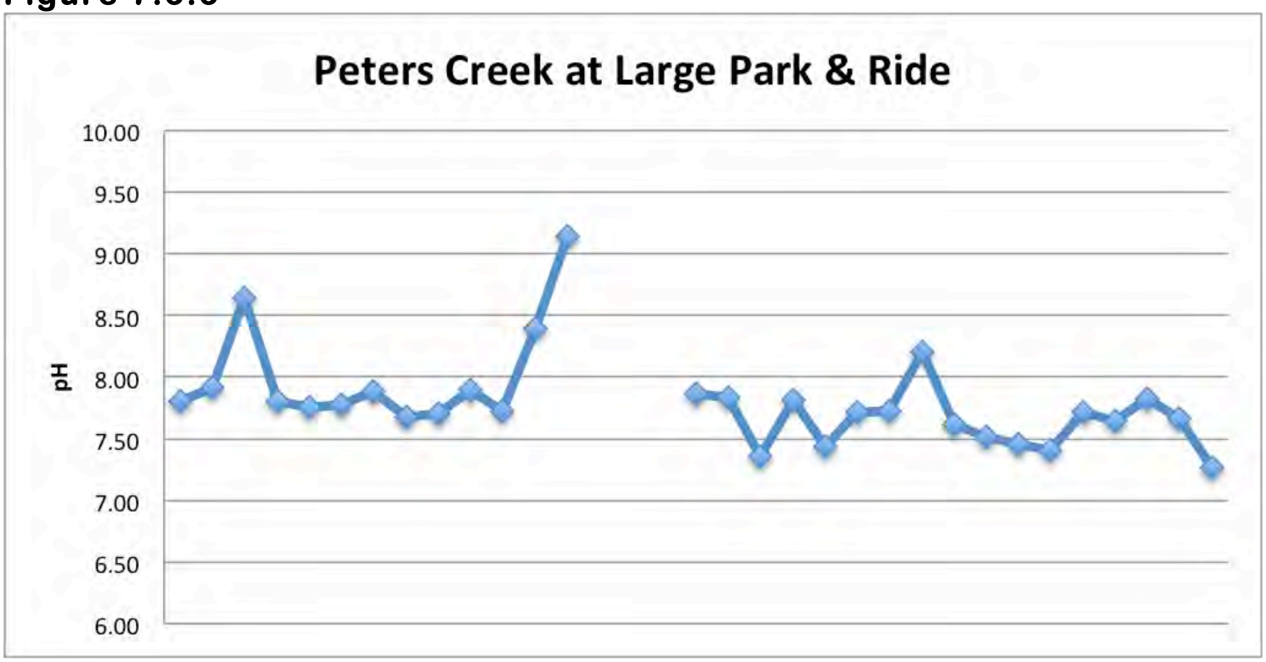
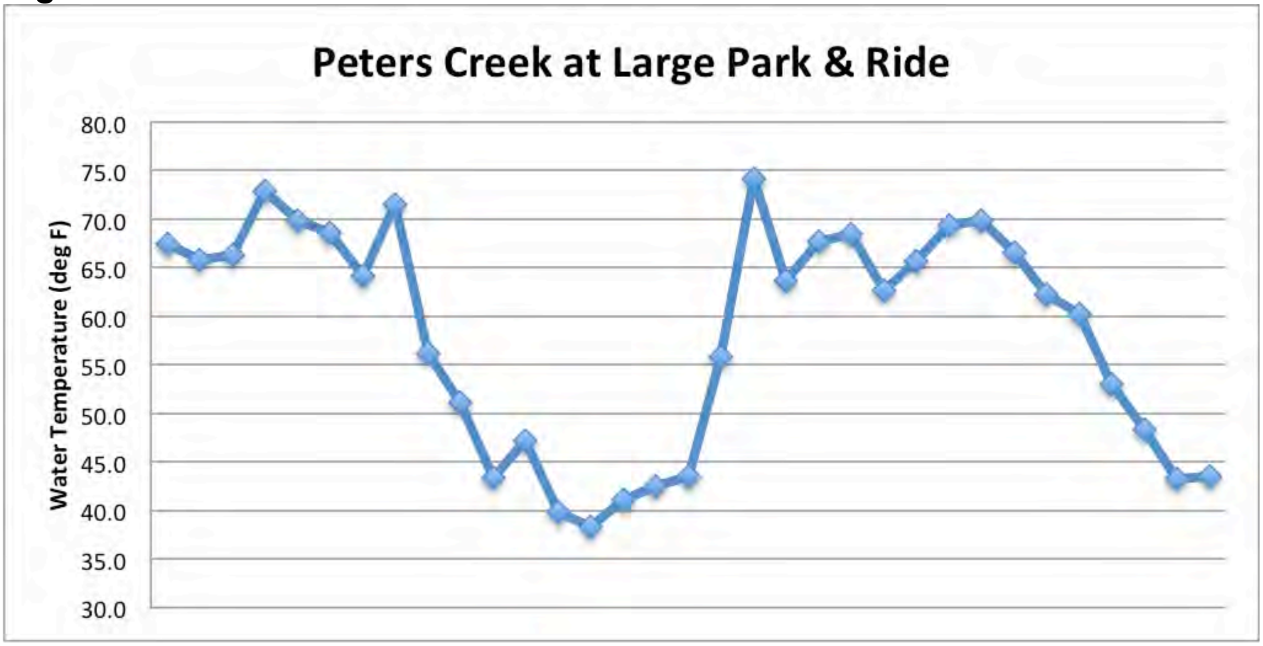


**Figure 7.3.4**




Conductivities at this Peters Creek main stem site ~ 0.4 miles downstream of Route 51 are generally high and quite variable. They range from 900 to 1700 μ-siemens/cm as seen in Figure 7.3.2. pH is always alkaline and remains within the 7.25 to 8.0 range except on a few occasions. Stream temperatures rarely exceed 70 degrees Fahrenheit which is important for a Trout Stocked Fishery.

**Figure 7.3.5**

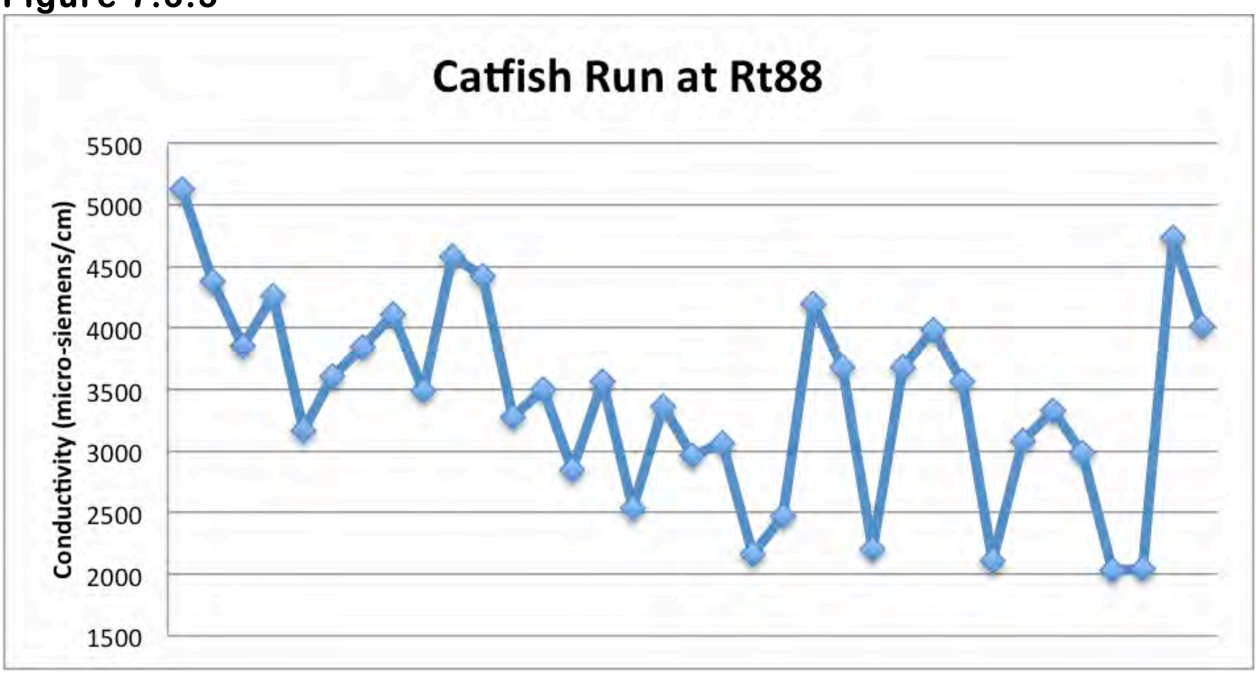


**Figure 7.3.6**

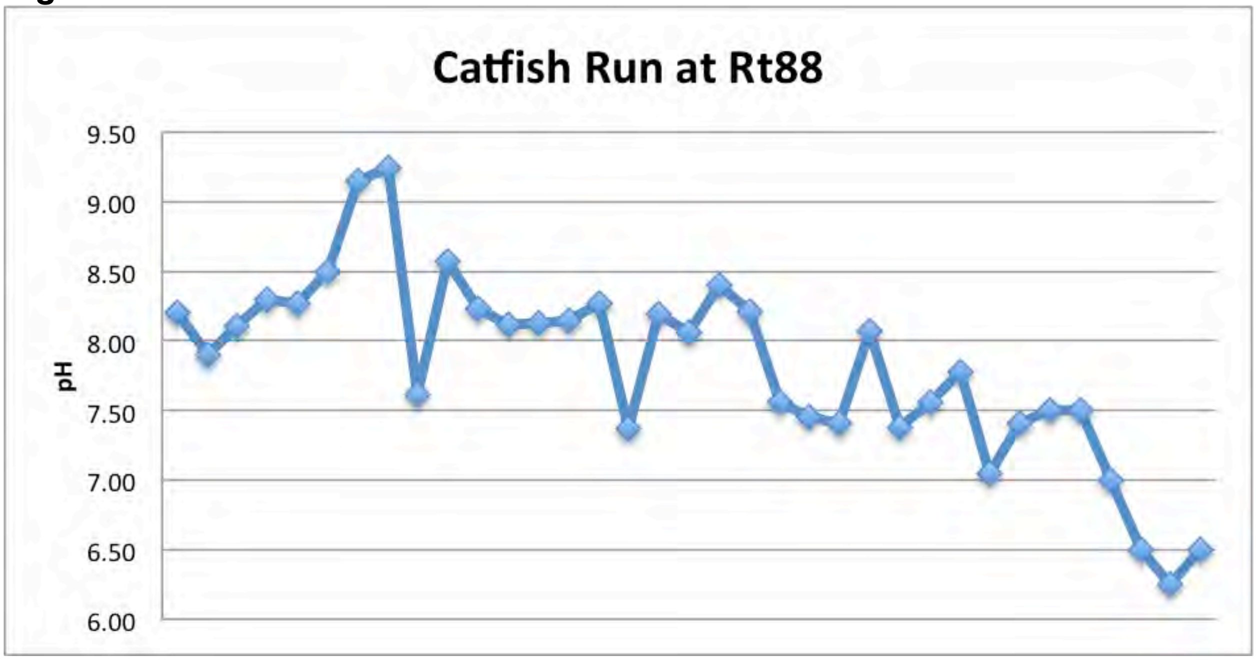
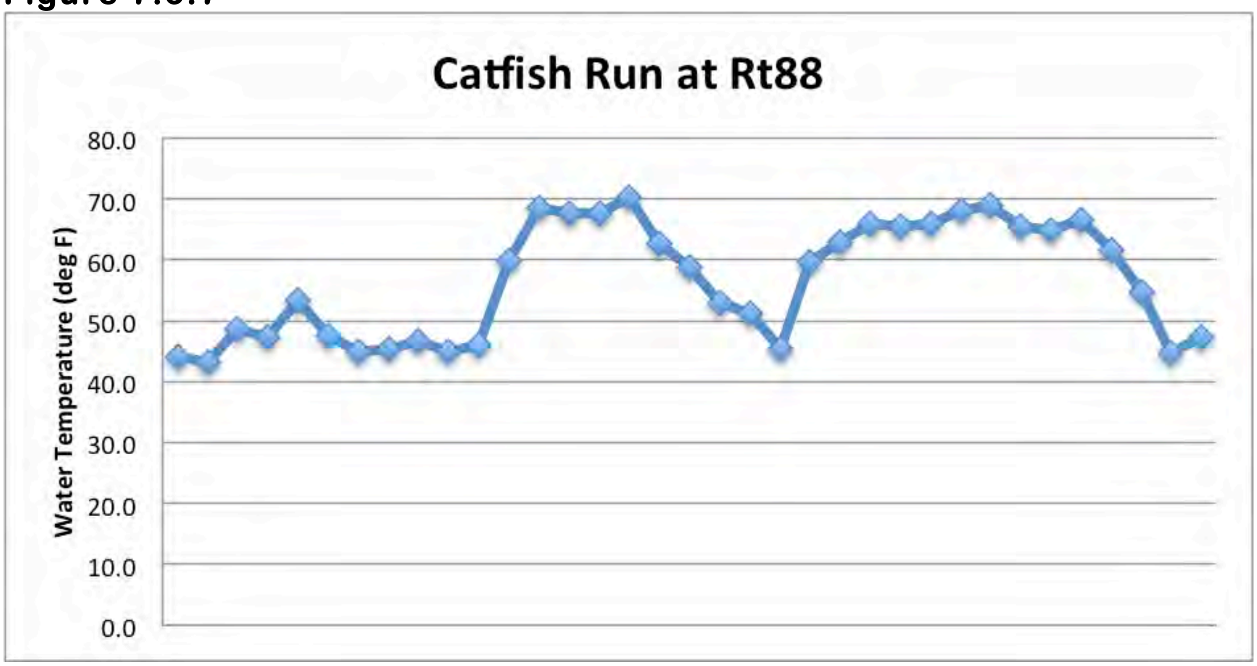



**Figure 7.3.7**




The Catfish Run monitoring site is just downstream of State Route 88 along Corrigan Drive near the northern boundary of South Park County Park. The headwaters of Catfish Run are culverted under a commercial district along Route 88 and accept stormwater and runoff from this area. The monitoring site is just downstream of where Catfish Run is first daylighted.

Conductivities range from 2000 to over 5000 μ-siemens/cm and are over 3000 μ-siemens/cm for ~ 75% of the measurements as seen in Figure 7.3.5. These conductivity readings are by far the highest found within the Peters Creek watershed. Further chemical analysis of this site revealed that this high conductivity is not due to abandoned mine related metals (aluminum, iron, and manganese) but the site was never thoroughly characterized.

Consistent conductivity levels over 3000 μ-siemens/cm have a significant impact on fish and macroinvertebrate diversity within a stream. Further analysis of Catfish Run is necessary to understand and mitigate this high conductivity level. Catfish Run might serve as a productive warm water fishery if this situation is adequately resolved.

pH levels are quite variable but remain mainly alkaline and at times become too alkaline. Water temperatures range between 40 and 70 degrees Fahrenheit.

**Figure 7.3.8**

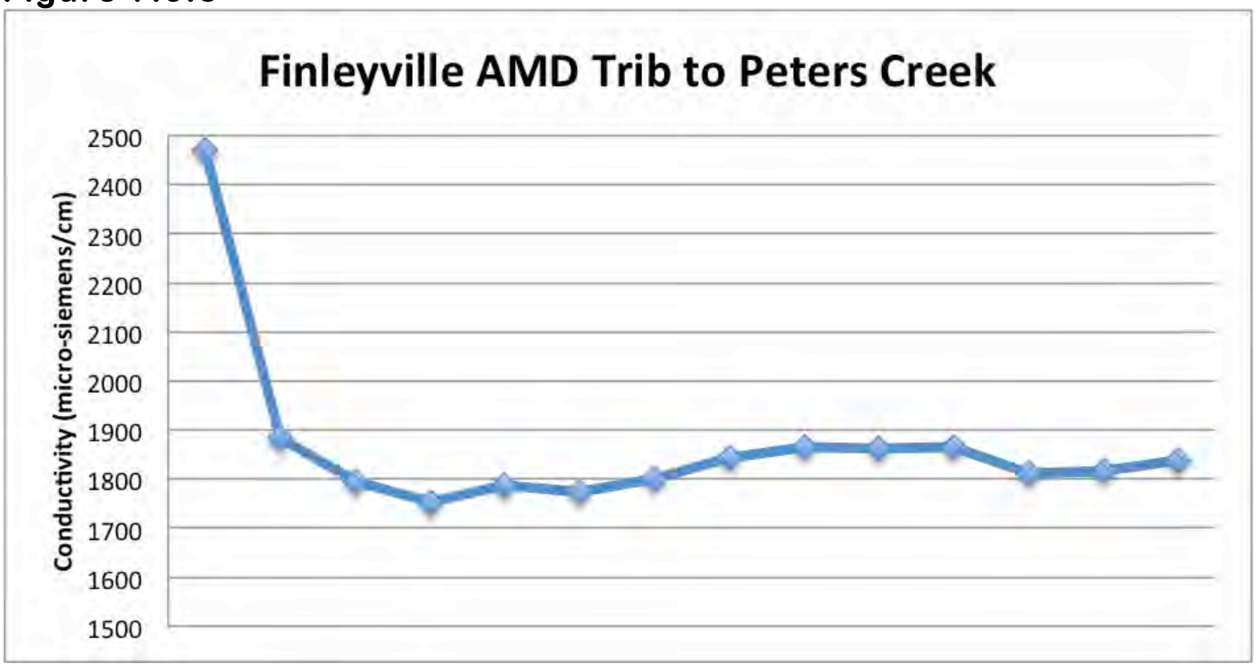



**Figure 7.3.9**

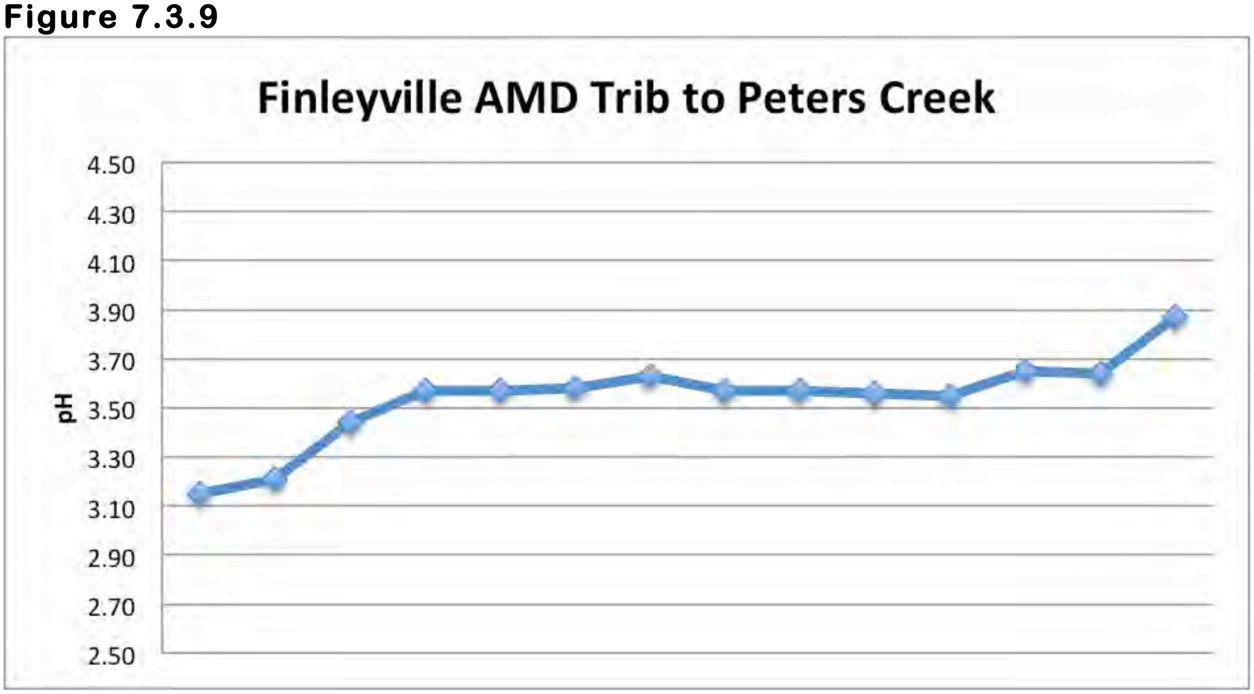
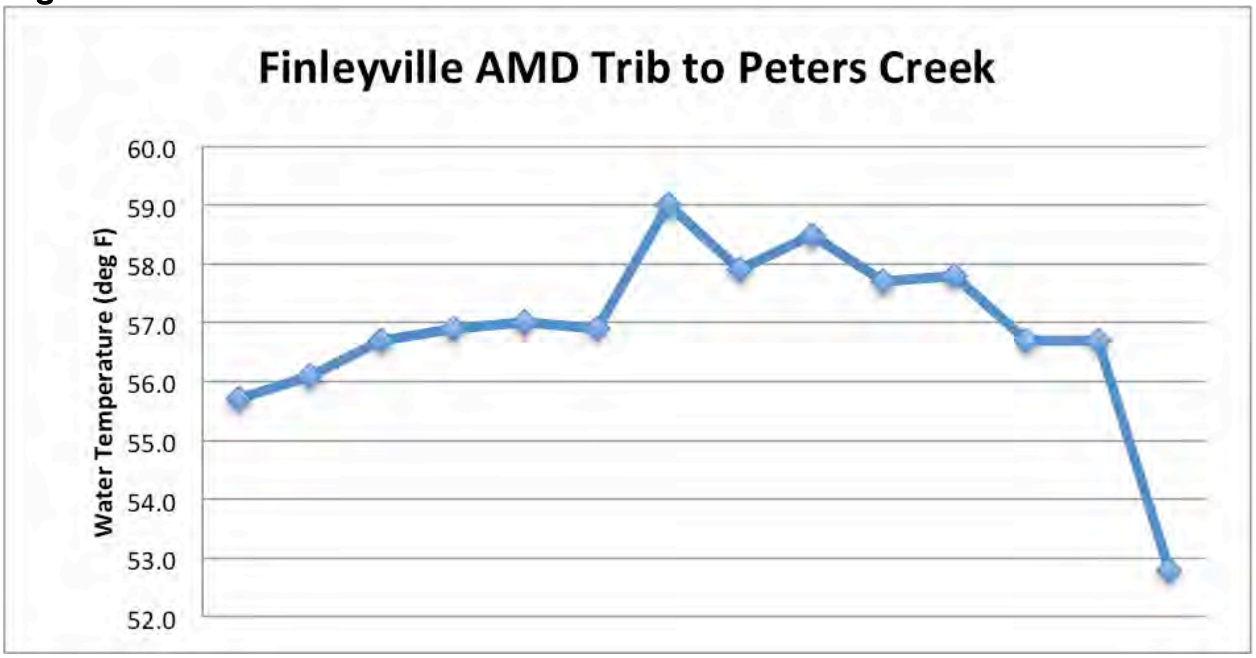


**Figure 7.3.10**




The Finleyville Tributary to Peters Creek is just west of Finleyville along the Allegheny Valley Railroad tracks. The discharge flows off of a hillside behind a residence along Frye Avenue, is culverted under the AVR tracks and enters a floodplain wetland along Peters Creek. The discharge is very consistent in terms of conductivity, pH and water temperature levels and is clearly a spring impacted by AMD. Conductivity typically ranges between 1700 to 1900 μ-siemens/cm. pH levels are from 3.1 to 3.9 and water temperature remains between 52 and 59 degrees Fahrenheit throughout the year. This discharge is most likely amenable to treatment given its location. The metals load contribution to Peters Creek of this discharge should be determined.

**Figure 7.3.11**

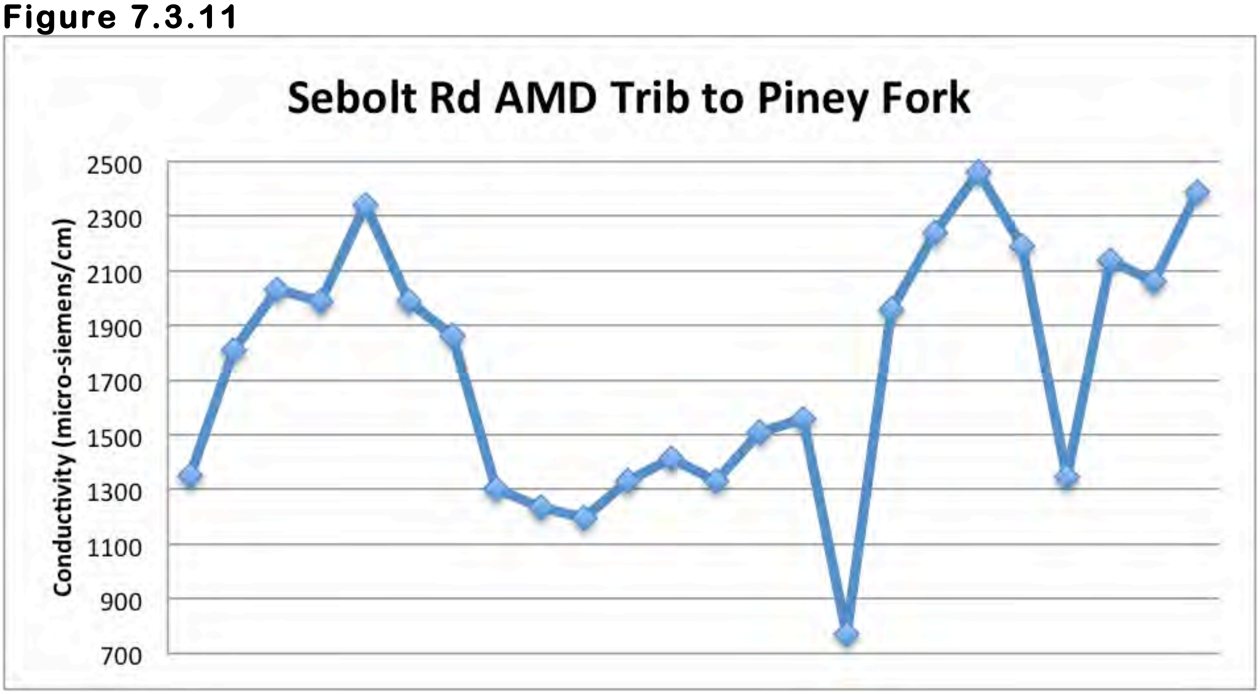


**Figure 7.3.12**

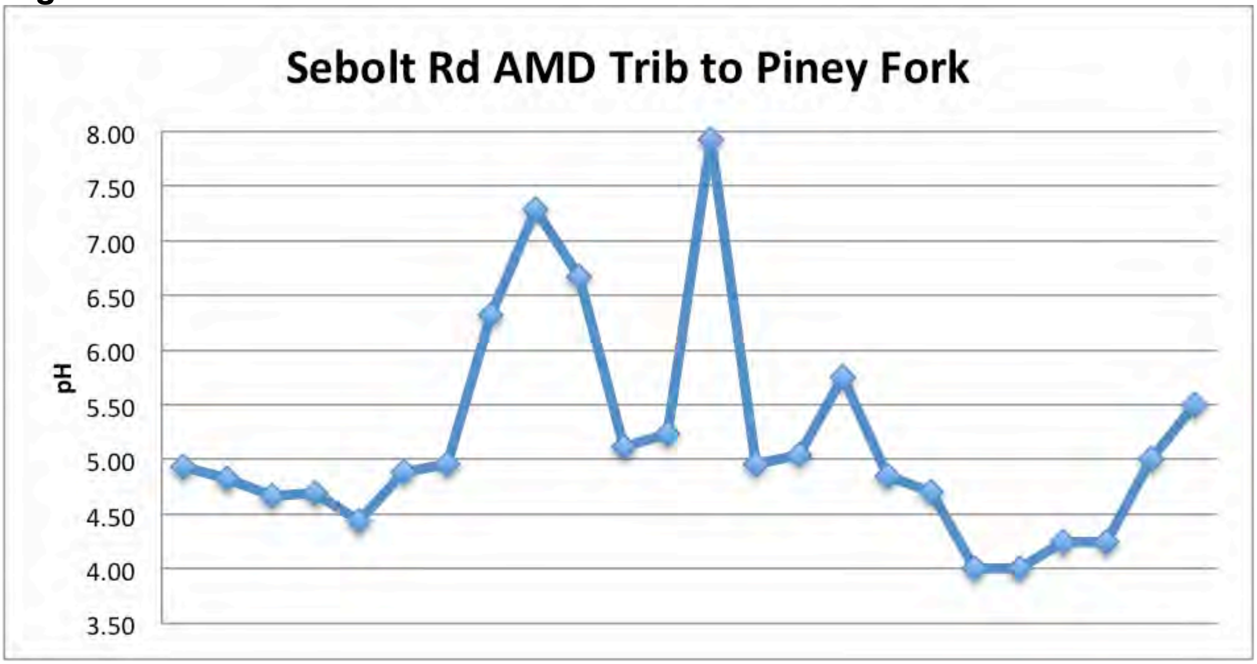
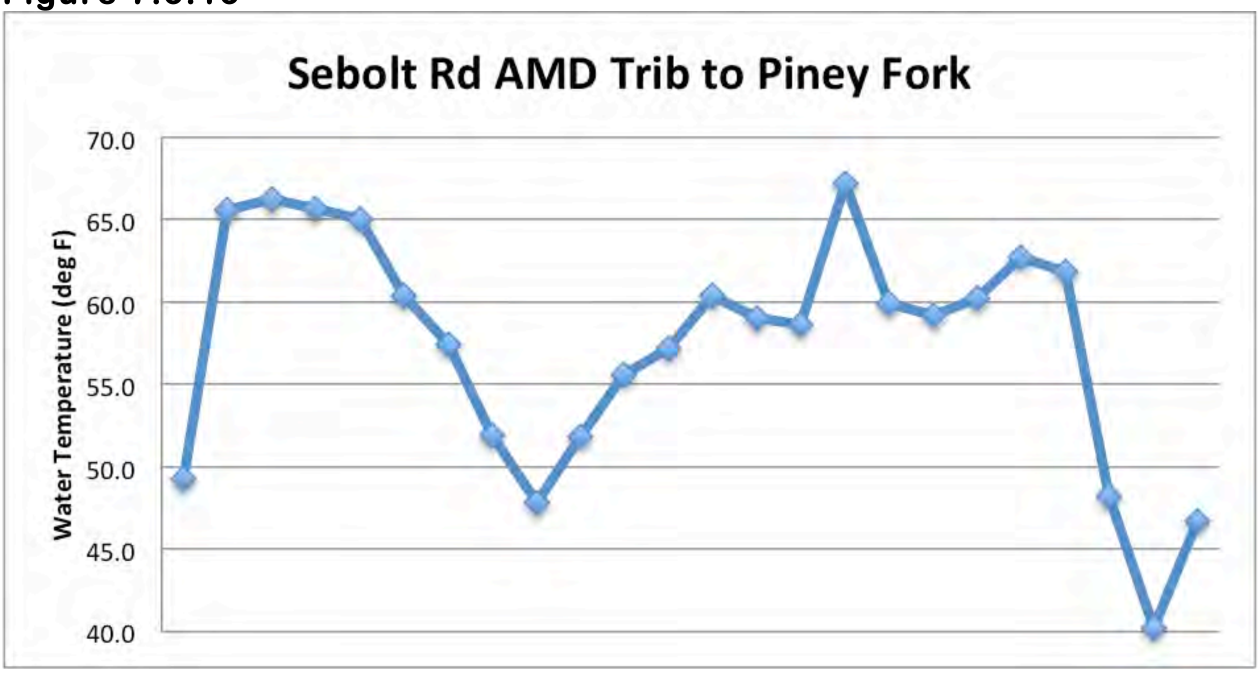



**Figure 7.3.13**




The Sebolt Rd abandoned mine discharge flows from a culvert under a large coal waste pile (Montour 10 mine) along Sebolt Rd. It is then culverted under Sebolt Rd and adds stormwater and possibly other discharges prior to emptying into Piney Fork just north of Brownsville Rd near the Sebolt Rd junction.

The discharge is quite variable in terms of conductivity and pH with conductivities ranging from about 700 µ-siemens/cm to 2500 µ-siemens/cm and the pH ranging from 4.0 to 8.0. Water temperatures of 40 to about 70 degrees Fahrenheit were measured. Further analysis of metals revealed aluminum concentrations of 17 mg/L making this the most aluminum impacted discharge within the Peters Creek watershed. Manganese concentrations of 2.11 mg/L were measured and little iron was present (0.28 mg/L). On occasion, an odor of volatile organic chemicals has been detected at the site during sampling that appears to be associated with the discharge.

A current refuse reprocessing operation on the Montour 10 coal waste pile is permitted to discharge to tributaries to Piney Fork and is not required to control for aluminum load. This may contribute to the large fluctuations of conductivity levels found at the site.

## 7.4 CONTINUOUS MONITORING

Continuous monitoring devices have been installed in Peters Creek in order to obtain a better understanding of temporal changes in water quality within the stream. Monitors have been placed in the Washington County and the Allegheny County portion of the watershed with assistance from the respective Conservation Districts.

The monitors measure conductivity, water level and water temperature on a 15 minute interval. This temporal data provides information that is not available from periodic sampling. Daily fluctuations can be analyzed and event detection is possible. This data also provides information concerning the relationship between conductivity and rainfall events. The combination of stream level and conductivity data can be utilized to better understand metals discharge from mine voids. The stream level data also provides information concerning stream dynamics and can be utilized as a stream gauge if calibrated properly.

A continuous datalogger has been in operation at a Peters Creek site in Gastonville since August of 2011. Raw conductivities, water levels and water temperatures are displayed in Figure 7.3.14 for the month of June 2012. The daily cyclical nature of water temperature is very obvious in the graph as is the influence of water temperature on conductivity (Conductivity is plotted not specific conductance). The inverse relationship between conductivity and water level is clearly displayed on June 1,12 and 18. The water level in Peters Creek rose due to significant precipitation events and the conductivities were lowered significantly. The cyclical water temperature is also altered by these rain events.

Daily means, minimums and maximums are plotted in Figure 7.3.15 for conductivites, water levels and water temperatures for the Gastonville Peters Creek site for June of 2012. These graphs are good for analyzing trends and daily variability. Yearly mean, minimums and maximums for the Gastonville site are plotted in Figure 7.3.16. The yearly cycle of water temperature is obvious and conductivities are quite variable throughout the year ranging from about 300 μ-siemens/cm to over 1000 μ-siemens/cm.

Continuous monitoring has great potential but further work is required.

**Figure7.3.14 Continuous 15 minute data for conductivity, water level and water temperature**

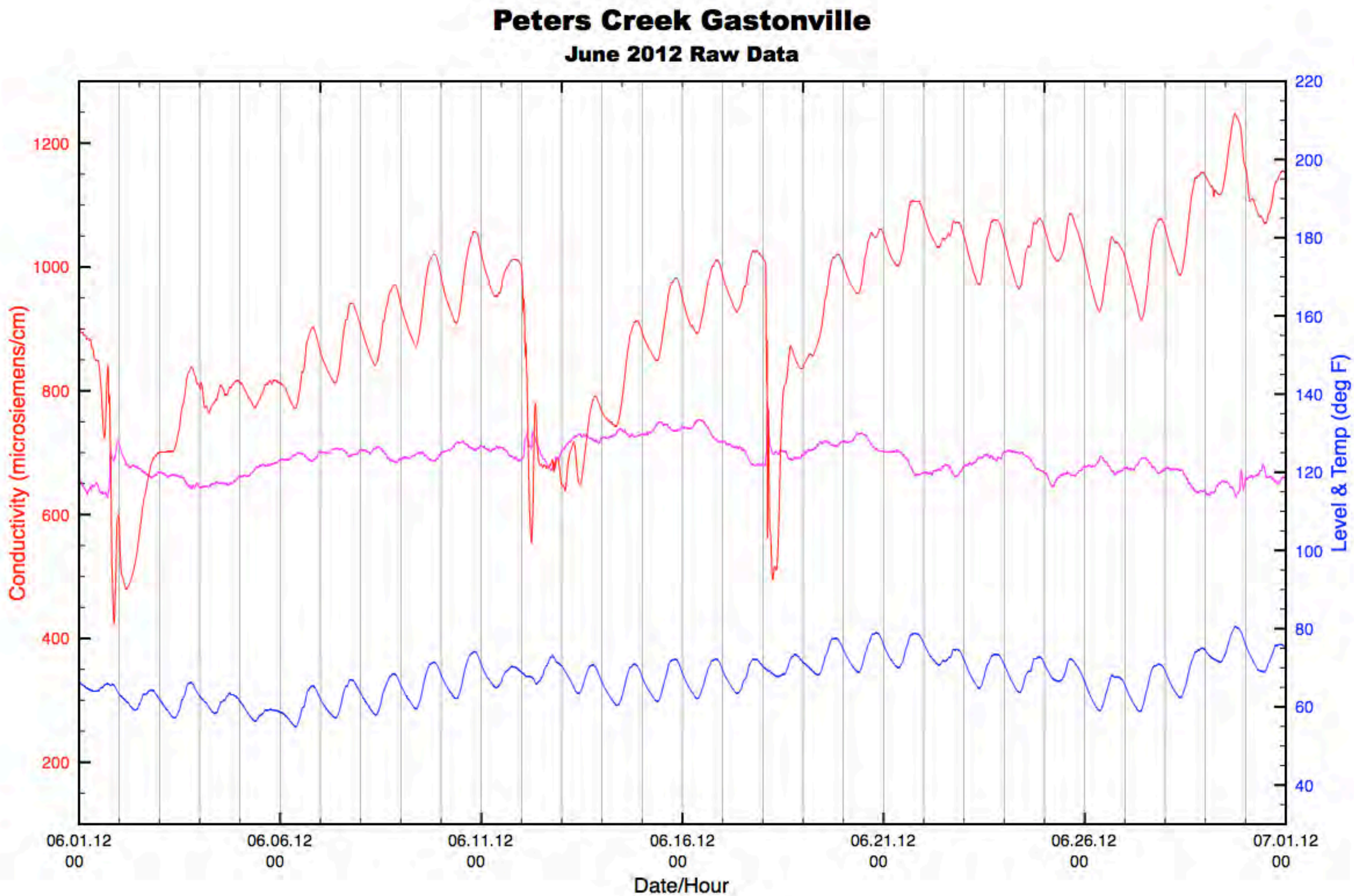


**Figure 7.3.15 Daily means, minimums and maximums for conductivity, water level and water temperature**

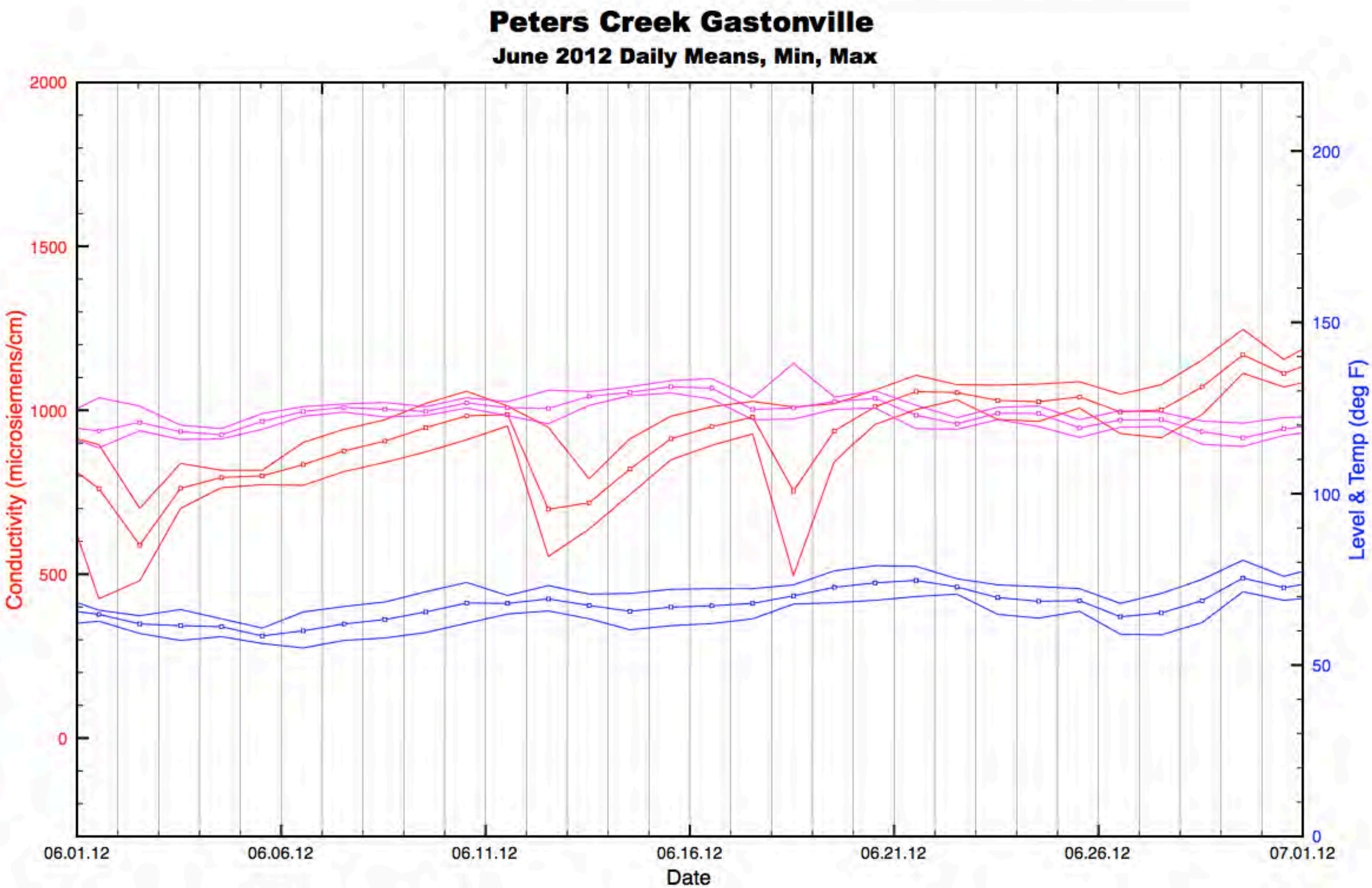
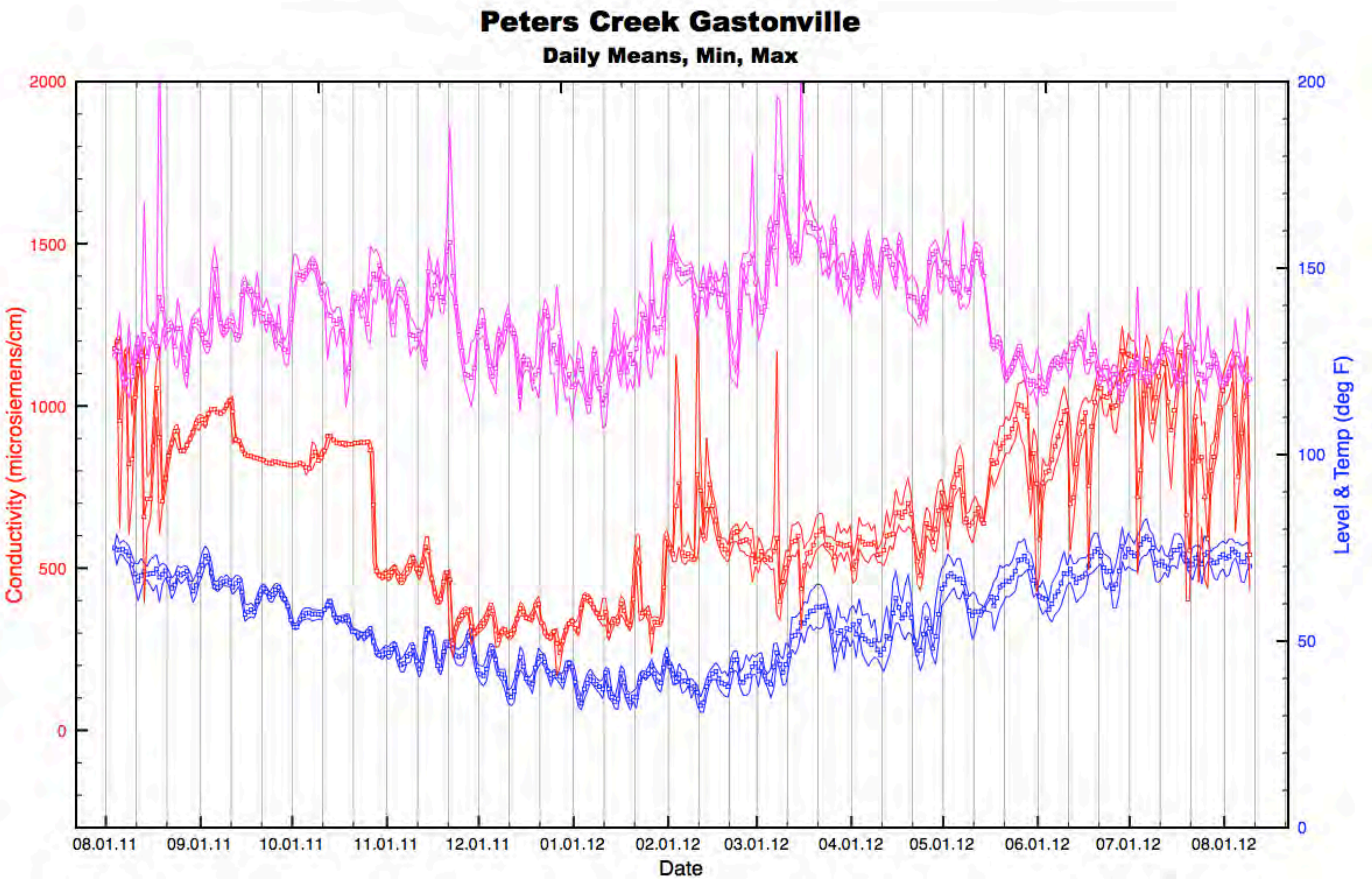


**Figure 7.3.16 Daily means, mins and maxs for Gastonville datalogger from August 2011 to August 2012**



# 8.0 Peters Creek Watershed Visual Assessments
## by sub-watershed

## 8.1 Lower Peters Creek

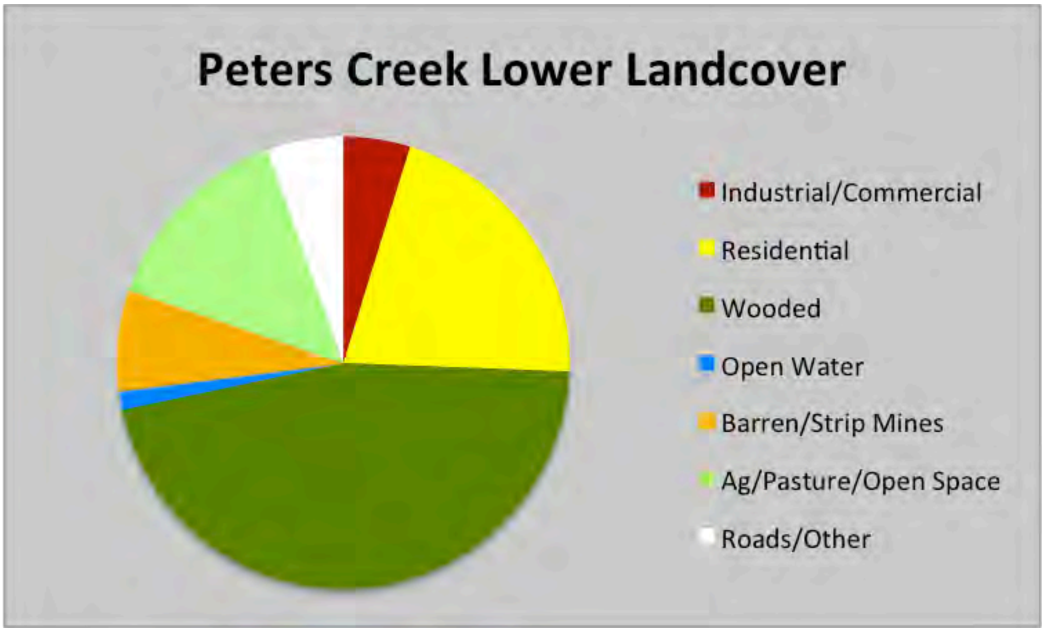
The Lower Peters Creek sub-watershed includes the main stem of Peters Creek from its confluence with the Monongahela River upstream to the State Route 51 bridge crossing of Peters Creek and all lands directly draining to this segment of the stream. The area of this sub-watershed is approximately 2.93 square miles and is comprised of parts of Jefferson Hills Borough and the City of Clairton.

Heavy industry, including US Steel's Clairton Cokes Work and Koppers, Inc, dominate the floodplain of Peters Creek from State Route 837 in Clairton to its confluence with the Monongahela River. The stream is culverted under this industrial complex. Past and present activities of the Clairton Coke Works are a major land feature of the Lower Peters Creek sub-watershed. A 30 acre, 120 foot coal waste pile estimated to be approximately 100 million tons from coal cleaning operations of the Clairton Coke Works from the 1930s to the 1950s is a major feature of the lower valley. Downstream of this gob pile is a large fill operation along the northern floodplain of the creek.

The Clairton Branch of the Wheeling & Lake Erie Railroad parallels the creeks northern bank and the Montour Trail recreational trail parallels the southern bank along what used to be the Pennsylvania Railroad Peters Creek Branch right of way from Route 51 to Route 837. The Clairton Municipal Authority, a large regional sewage treatment plant, is located on Peters Creek's southern bank just west of Route 837 and currently discharges to Peters Creek.

Streams of the Lower Peters Creek sub-watershed are impaired for recreational use by pathogens and for aquatic use by organic enrichment, low dissolved oxygen levels, siltation, metals and priority organics. Combined sewer overflows, abandoned mine drainage, urban runoff, storm sewers, habitat alterations and an industrial and municipal point source are principally responsible for these impairments. (2012 Pennsylvania Integrated Water Quality Monitoring and Assessment)

Land cover within the Peters Creek Lower sub-watershed is depicted in the pie chart below. The dominant land cover types are wooded (46.1%), residential (20.8%) and agricultural/pasture/open space (14.3%). (2006 National Land Cover Database)




A visual assessment of the lower section of Peters Creek and its major tributaries was conducted to better understand the current physical status of the stream channel, water and riparian zone. The stream segments were assessed and scored according to the USDA Visual Assessment Protocol. The results of this assessment are found below.

## Lower Peters Creek Main Stem

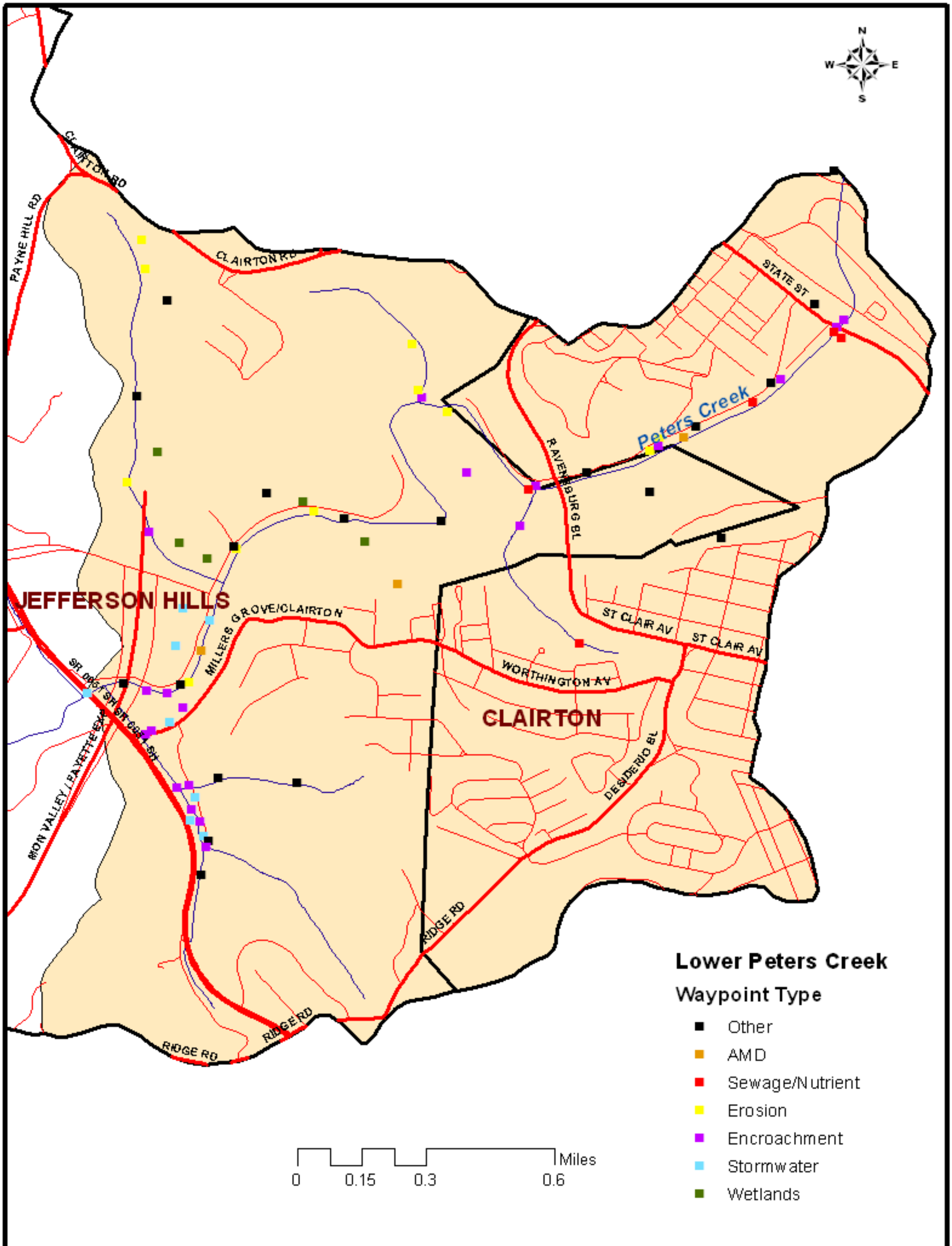
Waypoints: PCL01 – PCL45
Description: Confluence with the Monongahela River to the confluence with Lewis Run
USDA Visual Assessment Protocol Score = 6.80 FAIR

## Scotia Run (State Route 51 Tributary) to Peters Creek

Waypoints: SCR01 – SCR17
Description: Entire length of the Scotia Run Tributary
USDA Visual Assessment Protocol Score = 4.40 POOR

## State Route 885 Tributary to Peters Creek

Waypoints: PCLT01 – PCLT09
Description: Entire length of the Rt885 Tributary
USDA Visual Assessment Protocol Score = 8.70 GOOD


PAYNE HILL RD
CLAIRTON RD
CLAIRTON RD
STATE ST
Peters Creek
RAVENSBURG BL
JEFFERSON HILLS
MILLERS GROVE/CLAIRTON
ST CLAIR AV
ST CLAIR AV
WORTHINGTON AV
CLAIRTON
DESIDERIO BL
MON VALLEY / FAYETTE EX
RIDGE RD
RIDGE RD
RIDGE RD
Lower Peters Creek
Waypoint Type
Other
AMD
Sewage/Nutrient
Erosion
Encroachment
Stormwater
Wetlands
Miles
0
0.15
0.3
0.6
N
S
E
W

# Lower Peters Creek Main Stem PCL01-PCL45

## *Sewage and AMD Impacts*

***PCL07- The Clairton Municipal Authority Sewage Treatment Plant is along Peters Creek's northern shore just west of State Route 837 (State St) in Clairton. The plant currently discharges into Peters Creek at this location. This regional sewage treatment facility serves the City of Clairton, Jefferson Hills, Finleyville, Union Twp, Nottingham Twp and parts of South Park Twp and Peters Twp. The Authority is currently under a consent decree from the PA Department of Environmental Protection to expand wet weather capacity from 18 million gallons per day to 40 million gallons per day, to separate all storm sewers from sanitary sewers and to repair all malfunctioning sewer lines. The sewage plant expansion will require a rerouting of the Montour Trail and will move the discharge from Peters Creek to the Monongahela River. All combined sewer overflows into Peters Creek will also be removed. The plant expansion will eliminate the need for an additional sewage treatment plant along Peters Creek in Union Twp. Expansion upgrades are to be completed by the end of 2015.***

*PCL10 - A Combined Sewer Overflow (CSO) and a milky discharge from a culverted pipe enter Peters Creek's right ascending bank in close proximity. A number of CSO's discharge into Peters Creek from just upstream of Ravensburg Bridge to its confluence with the Mon River. The City of Clairton is the only community within this sewer-shed that does not have a separated sewer system. They are currently under a consent decree to remedy this situation.*

*PCL20 - An intermittent Un-Named Tributary (002032) locally called Dry Run drains the valley between St Clair Ave and Worthington Ave in Clairton and enters Peters Creek's left ascending bank just downstream of the US Steel coal waste pile. The downstream bank is gabion rip-rapped to protect a CSO with a yellow warning sign. The upper reaches of Dry Run are polluted with raw sewage. This stream is little more than an open sewage conveyance channel.*

*PCL38 – An alkaline discharge with pH of 11.5 enters Peters Creek's left ascending bank across from the Large Park & Ride Lot. The discharge is culverted under a deck hockey facility off of Worthington Avenue and under the Wheeling & Lake Erie Railroad tracks prior to entry into Peters Creek.*

*PCL21 – Metals leaching into Peters Creek at toe of US Steel 100 million ton coal waste pile.*

*PCL28 – Ravensburg Wetland is fed by a number of metal-laden tributaries and seeps along the steep slopes to the south of the wetland.*

## *Stream Bank Erosion & Siltation*

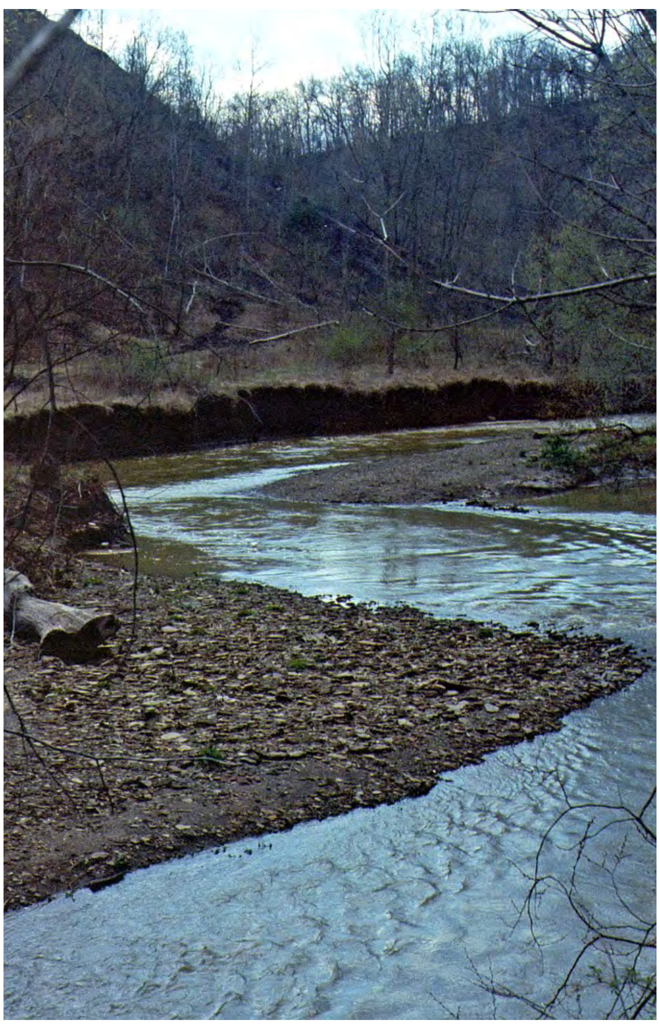
*PCL14 - Large sediment build up in middle of channel alters flow pattern of Peters Creek downstream of Ravensburg Bridge crossing of the stream. The right ascending bank is experiencing increased erosion that is beginning to impact the Montour Trail. Knotweed covered banks downstream do little to stabilize the riparian zone.*

*PCL23 – Pleasant Hills Middle School students help to plant and restore a riparian buffer along Jefferson Hill's first Natural Stream Channel Design stream bank stabilization project. This project helps to protect a sanitary sewer line that crosses Peters Creek at this location.*

*PCL31 - Bank erosion on the right ascending bank of Peters Creek is beginning to undercut the Montour Trail and impact the sewer interceptor under the trail. Jefferson Hills received a PA DEP Growing Greener grant to stabilize the banks and mitigate the problem utilizing Natural Stream Channel Design techniques. This project is scheduled to be completed in 2014.*

*PCL39 – Peters Creek's left ascending bank is being severely undercut just downstream of the pedestrian bridge crossing from Leskers to the Large Park & Ride Lot. The Wheeling & Lake Erie Railroad tracks run immediately adjacent to the left ascending bank from State Route 51 to the Ravensburg Tunnel.*

*PCL33 – Severe erosion along Peters Creek's right ascending bank downstream of the Large Park & Ride Lot is undercutting the Montour Trail and uprooting trees.*

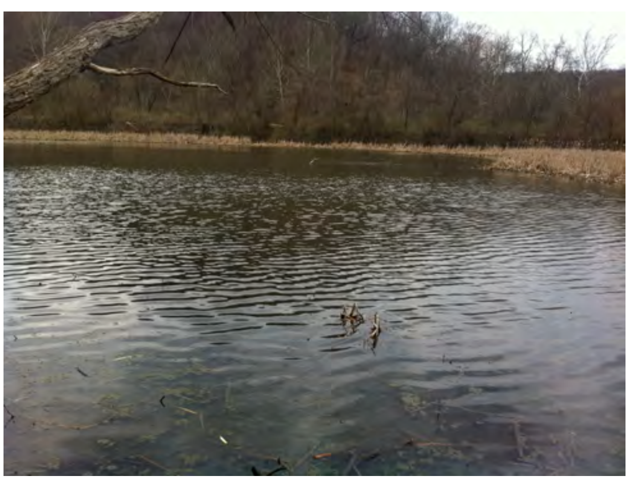


*PCL22 – A tight meander just downstream of the natural stream channel design bank stabilization project with scoured and eroding outer banks. The US Steel coal waste pile is adjacent to and eroding into the floodplain at this location. Coal waste material is eroding into the channel of Peters Creek. Meanders are an important component of stream morphology and help to lessen flow energy within the stream channel. The steep scoured outer banks are often stable enough to provided nesting habitat for animals such as the Belted Kingfisher.*

## *Nutrient Enrichment*

Nutrient enrichment is a problem along the lower reaches of Peters Creek as evidenced by algal blooms, especially in the late winter and early spring. Sources of these excess nutrients are abandoned mine discharges, leachate from coal waste piles, combined sewer overflows and storm water runoff from residential neighborhoods from and along Rt51 and the Mon-Fayette Expressway. A portion of this excess nutrient load is transported from the upstream portions of Peters Creek and its tributaries.

## *Wetlands*



*PCL27 – The Ravensburg wetland is a 10-15 acre Palustrine emergent wetland just southwest of the Ravensburg Railroad Tunnel. The Wheeling & Lake Erie Clairton Branch defines the wetlands northern border and Peters Creek flows just north of the tracks. This wetland is dominated by Cattails (Typhus latifolia) and has a significant open water component. It provides breeding habitat for Wood Ducks and several amphibian species and is considered an Exceptional Value wetland since it provides habitat for at least one Pennsylvania endangered plant species.*

*PCL35 – This 7-acre emergent wetland is north of the Montour Trail and Peters Creek and just east of the Mon-Fayette Expressway terminus and Large Park & Ride Lot. The wetland is fed by the RT885 tributary and provides breeding habitat for the American Woodcock. An invasive plant species, Purple Loosestrife, has recently started to establish itself within the wetland.*

## *Invasive Plants & Floodplain Condition*

There is currently little residential or commercial development within the floodplain of lower Peters Creek from State Route 51 to State Route 837 but the floodplain has definitely been defined and altered by human activity since the area was first settled in the mid-1700s.

Water diverted from Peters Creek provided the power for gristmills in the lower valley during the 1800s. One mill was located on Peters Creek's southern shore downstream of Dry Runs confluence and not far from a historical bridge crossing of Peters Creek (near Gulch Rd) east of the current Ravensburg Bridge.

In the late 1800s railroad tracks were built along the northern shore of Peters Creek to service the numerous coal mines in the middle Peters Creek valley. This would eventually become the Pennsylvania Railroad Peters Creek Branch that was abandoned in 1962 and would become part of the Montour Trail in the early 2000s. In 1902 the Ravensburg Tunnel was bored through a spit of land diverting Peters Creek from its eastward course northward and the West Side Belt Railroad was completed on Peters Creeks southern shore. This railway has changed hands numerous times and is currently part of the Wheeling & Lake Erie Railroad.

The United States Steel Corporation built a steel mill and coking operation on 1000 acres of land along the Monongahela Rivers western shore in the early 1900s that includes Peters Creek's lower floodplain and confluence. That endeavor would become the largest coking operation in the world and would significantly alter much of the lower Peters Creek valley with massive slag dumps and a 30 acre coal waste pile estimated to be approximately 100 million tons in volume.  The coal waste pile was turned over to Jefferson Borough in the 1960s and remains a prominent feature of the lower Peters Creek valley to this day.

*PCL01 – Peters Creek enters the Monongahela River on its right ascending bank from a culvert under the US Steel Clairton Coke Works just upstream of the white building.*

*PCL02 – US Steel Clairton Coke Works and Kopper, Inc. Clairton Plant along the Monongahela River's western shore and Peters Creeks lower floodplain.*

*PCL17 – A massive fill operation in Peters Creek's southern floodplain just east of the Ravensburg Bridge crossing of the stream. Japanese Knotweed and invasive vines infest the riparian zone along this stretch of Peters Creek.*

*View of the lower Peters Creek valley from the top of the US Steel coal waste pile. The Montour Trail follows the northern bank of Peters Creek as it flows at the base of the coal waste pile. Both pass under the Ravensburg Bridge as they head east toward the Clairton Coke Works in the distance. The center of the Ravensburg Bridge is supported by remnants of a slag pile. Gray birch is a pioneer species of tree that is able to grow on the coal waste pile.*

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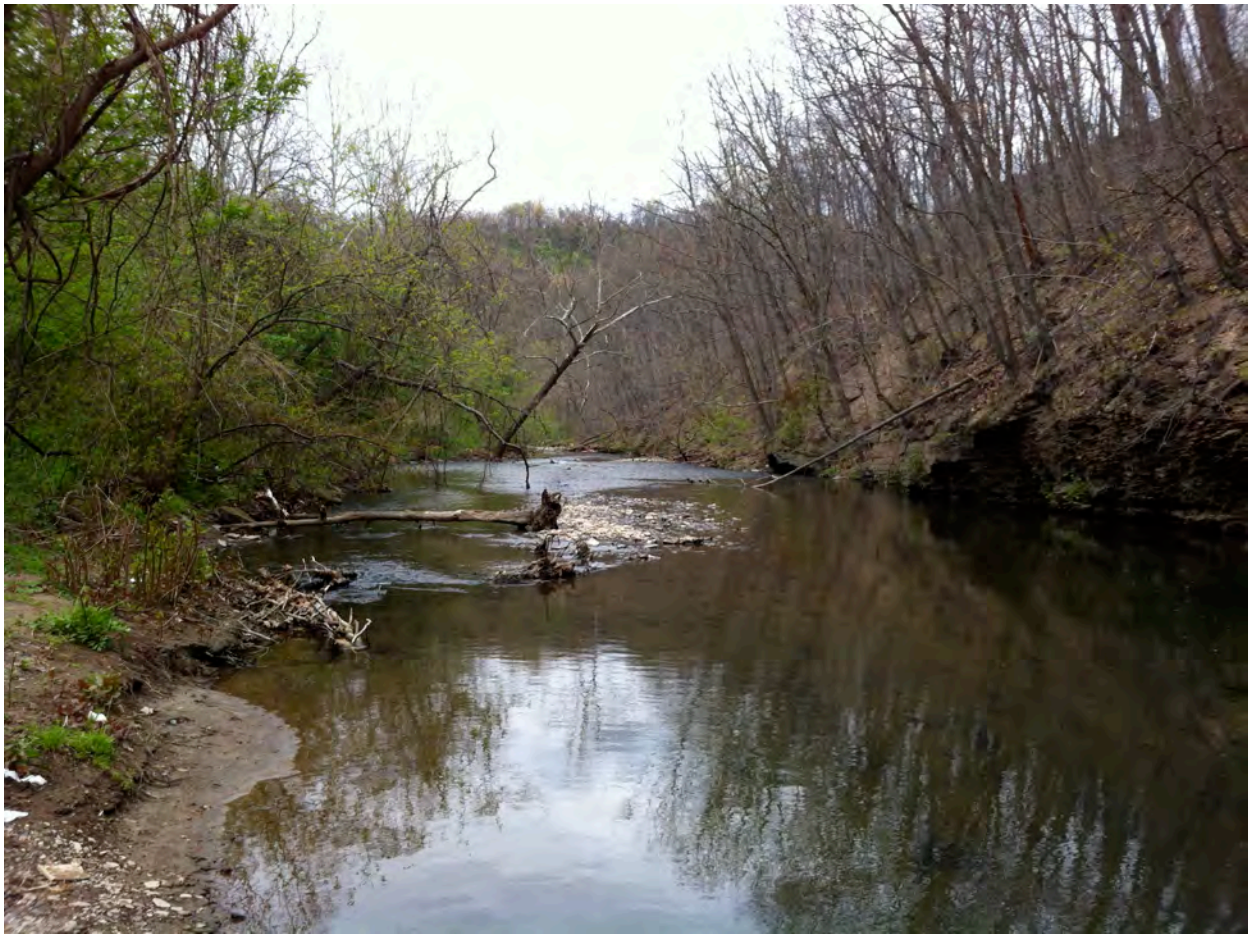
*PCL29 – Japanese Knotweed is a problem along much of the lower reach of Peters Creek's floodplain. A monoculture of knotweed covered approximately two acres of the right ascending bank floodplain between the Montour Trail and the creek. The Peters Creek Watershed Association is working to control knotweed along this section of stream. Lessons learned will be applied to other parts of the Peters Creek watershed.*

*PCL26 – Looking east toward the western portal of the Ravensburg Tunnel from along the Wheeling & Lake Erie Clairton Branch tracks. Peters Creek flows along the tracks to the left and the Ravensburg Wetland is in the valley to the right of the tracks*



*PCL26 – View of lower Peters Creek below the "big bend" at the western portal of the Ravensburg Tunnel. Much of the riparian zone between the Ravensburg Bridge and the Large Park & Ride Lot remains wooded and is steeply sloped. A large portion of the remainder of the floodplain is vegetated and includes wetlands and hydric soils.*

## Stormwater Infrastructure and Issues

Storm water is a significant issue in the lower portion of the Peters Creek watershed even though over 60% of this sub-watershed remains wooded or in vegetated open space. Inadequately controlled runoff enters lower Peters Creek from Rt51 and from Peters Creek and tributaries above Rt51. Storm water is conveyed to the creek via tributaries draining residential and commercial districts and from combined sewer outfalls in the City of Clairton and from the severely eroding US Steel coal waste pile. Peters Creek has topped its banks and flooded the commercial district along Rt 51 as well as much of the Montour Trail downstream twice in the past decade; most recently in July of 2013.

*PCL40 – An approximately six acre park & ride lot with bike lane included (part of Montour Trail) was constructed as part of the Mon-Fayette Turnpike project on Peters Creek's right ascending bank. A one acre constructed wetland detention basin was installed to control storm water runoff from this impervious surface as well as from the expressway on top of the hillside behind the parking area.*

*PCL33 – Damage to the Montour Trail due to Peters Creek exceeding its banks during flooding in July of 2013.*

*PCL23 – Debris jam deposited by floodwaters in July of 2013 dams Peters Creek below Natural Stream Channel Design Project.*

*PCL24 – Large quantities of coal waste were carried by floodwaters from a tributary valley and deposited onto the Montour Trail during flooding in July of 2013. Coal waste and overburden was deposited in this stream valley during strip mining operations prior to modern regulations.*

## *Encroachments*

*PCL04-PCL07 – Last few hundred feet of free-flowing Peters Creek prior to being culverted under US Steel's Clairton Coke Works in the distance. The stream is culverted for approximately 2000 ft before it enters the Monongahela River just upstream of the Clairton-Glassport Bridge. Peters Creek flows under Rt837, receives the discharge from the Clairton Municipal authority on its right ascending bank and a combined sewer overflow on its left ascending bank prior to entering the culvert.*

*PCL19 – Dredge material/coal waste fill illegally dumped on Peters Creeks right ascending bank just upstream of Ravensburg Bridge.*

*PCL21 – This 30 acre, 120 foot coal waste pile of approximately 100 million tons encroaches on Peters Creek's southern shore for nearly 3,000 feet from just upstream of the Ravensburg Bridge to the western portal of the Ravensburg Tunnel. Material from this waste pile erodes into Peters Creek and metals and other chemicals leach into the creek. The waste pile was created by United States Steel Clairton Coke Works as part of a coal cleaning operation. The exact composition is unknown since it was created prior to modern regulations.*

*PCL43 – A collapsing retaining wall that appears to be part of a defunct railroad siding operation encroaches on Peters Creek's left ascending bank across from the Large Park & Ride Lot. The Wheeling & Lake Erie tracks follow and encroach on Peters Creek's southern shore from this point to the western portal of the Ravensburg Tunnel.*

*PCL45 – Peters Creek flows under the State Route 51 Bridge at the head of this sub-watershed. The Mon-Fayette Expressway overpass can be seen in the upper right of the photo.*

## Garbage & Dumps

*PCL08 – Construction debris illegally dumped along Peters Creek's right ascending bank just upstream of the Clairton Municipal Authority Sewage Plant. Much of the garbage and construction material within the floodplain of lower Peters Creek was deposited by floodwaters from upstream locations. Materials are often stored along the creek that should not be.*

*PCL27 - A large number of illegally dumped tires and other debris pollutes the secluded floodplain south of the Ravensburg Wetland. A steeply sloped hillside off of Worthington Avenue provides easy access.*

## *Areas of Historical and/or Conservation Significance*

*PCL03 – Peters Creek Cemetery is one of the oldest burial grounds in western Pennsylvania. The first burial was that of Benjamin Kuykendahl on October 18, 1789. Mr. Kuykendahl was an early settler of the region and inhabited the lower Peters Creek valley from about 1754 until his death. He built and operated a gristmill along Peters Creek not far from its confluence with the Monongahela River. He also was a justice of the Yohogania County, Virginia Court from 1776-1780 prior to this region becoming part of Pennsylvania. The cemetery is located on a knoll above Peters Creek's northern shore between Route 837 and the Clairton Coke Works.*

PCL27 – The Ravensburg Wetland supports a robust population of Wild Hyacinth (Camassia scilloides). This facultative wetland species is listed as endangered within Pennsylvania and thereby provides the wetland with the status of exceptional value wetland. Threats to the population include intrusion of invasives including Garlic Mustard and Multiflora Rose into the area and overbrowsing by the local deer population.

*The "Superintendent Henry J Davis House, U.S. Steel, Clairton Works" is the Tudor mansion on Mitchell Avenue at one of the highest elevations in Clairton. The mansion provided a commanding view of the new Clairton Works for its first superintendent and was built during the first decade of the 1900s. This historically significant structure received designation as a Historical Landmark in 2009 by the Pittsburgh History & Landmarks Foundation.*


*The ornate smokestack of the Large Distillery that once produced Large Monongahela Rye Whiskey; a well known national brand. The distillery was built by Jonathon Large in the mid-1800s and managed successfully by his son Henry Large. Following Prohibition the distillery was bought by the National Distillery Company and the Large name was retired. In 1958 the property was developed as part of a Westinghouse Research Facility. Currently, the area is a commercial district along Route 51. The Mon-Fayette Expressway overpass can be seen in the background.*

# Scotia Run (State Route 51 Tributary) to Peters Creek SCR01-SCR17

The State Route 51 tributary to Peters Creek spends most of its course draining the valleys to the east of RT51s Large Hill but the stream originates west of Rt 51 near the top of this steep hill along Scotia Hollow Road. The stream was historically called Scotia Run.

The upper reaches of Scotia Run and its tributaries are free flowing and drain steeply wooded valleys. But from the top of McGrew Rd to Scotia Run's confluence with Peters Creek the stream is culverted for a good portion of its course. The stream also receives storm water runoff from Rt51 and from along McGrew Rd and Worthington Avenue.

*PCL41 – Scotia Run enters Peters Creek's left ascending bank after being culverted for approximately 250 feet under Kurt J. Lesker's back lot.*

*SCR01 – Scotia Run enters culvert to Peters Creek under Lesker's back lot. Small tributary enters on left ascending bank.*

*SCR02 – Scotia Run flows between Worthington Avenue and Kurt J. Lesker's parking lot. A number of storm water outfalls from Worthington Avenue enter on the left ascending bank. A sanitary sewer line parallels the left bank along this section of Scotia Run as well.*

*SCR03 – Scotia Run flows under Worthington Avenue and then is immediately culverted again for approximately 150 feet between Lesker's parking lot and Worthington Avenue. It then flows freely for a couple of hundred feet before being culverted again.*

*SCR04 - Scotia Run flows under Worthington Avenue. Sediment is being deposited along the right ascending wall of the culvert.*


*SCR05 – Scotia Run exits the culvert under Bowser Auto and storm water enters Scotia Run from the right ascending bank. The stream is culverted for approximately 700 feet under Bowser Auto's building and lot and then immediately flows under Worthington Avenue.*

*SCR07 – Tributary draining wooded valley to east of McGrew Rd is culverted under the road and under the back edge of Bowsers lot. The tributary enters Scotia Run while it is culverted under the lot. The upper reaches of this tributary have been surface mined. This may contribute to the high conductivity levels of Scotia Run.*

*SCR08-SCR09 – The tributary flows through a narrow steeply sloped wooded valley in its lower reaches. A diverse second growth hardwood forest occupies the northern upper slope with an impressive display of spring ephemerals. Further up the valley is a scenic vernal waterfall.*

*SCR11 – Scotia Run is culverted under a pedestrian access trail to a billboard along Route 51. Two culverts are placed one on top of the other. They are incorrectly sized for the given flow during rain events and are causing the trail to erode and are also creating bank erosion upstream.*

*SCR12 - A storm water outfall from Rt51 along the steep hill in the upper part of photo is piped to Scotia Run's right ascending floodplain. It flows across the floodplain in an open drainage channel and enters Scotia Run which flows between the house and McGrew Rd. A number of such outfalls from Rt51 exist along this section of Scotia Run.*


*SCR13 – Scotia Run along McGrew Rd. Storm water from drainage channel on opposite side of road enters Scotia Run in foreground. Scotia Run is culverted under private driveway and pedestrian bridge in middle of photo. Large billboard along Rt51 in upper left. Looks like homeowner has built levee along stream in front of house.*

*SCR15 – The tributary that drains the valley to the southeast of Scotia Run with headwaters near Ridge Rd and flowing along the commercial district along Century Dr is culverted under McGrew Rd and enters Scotia Run's left ascending bank.*

*SCR16 - Scotia Run is culverted under a private driveway. A concrete wall constrains the left ascending bank for a few hundred feet downstream. The stream continues upstream in a southerly direction in a steep narrow wooded valley paralleling Rt51.*

# State Route 885 Tributary to Peters Creek PCLT01 – PCLT09

*PCLT01 – The Rt885 tributary to Peters Creek originates in a woodlot along Rt885 just east of its junction with Payne Hill Rd (upper right in photo). It flows in a southerly direction and crosses the gas line with accompanying ATV trail in the bottom of the valley. The upper reach of this stream is intermittent and is frequently diverted by ATV trails. The area has been plagued by illegal dumping of tires, construction material and refuse of all sorts due to easy access from Rt885. A gate was placed at the Rt885 entrance in 2013 that will, hopefully, help to deter this activity.*

*PCLT01 – The Rt885 tributary passes from right to left under the power transmission lines where it pools in the bottom of the ATV trail that follows the power lines down the valley on a plateau above the streams left ascending bank. The Rt885 tributary then flows toward the woodlot in the left-center of the photo.*

*PCLT02 – A view of the Rochez #2 surface mine while in operation during the winter/spring of 2011. The mine is located along the slope above the Rt885 tributary's right ascending bank not far from the headwaters of the stream. A temporary detention basin was constructed to collect storm water runoff from the site prior to it entering the tributary.*

*PCLT02 – The Rochez #2 mine in late 2013 following reclamation. The Rt885 tributary flows in the valley just to the right of the photo. This area was a thicket prior to mining. The total area disturbed for this mine was approximately 15 acres. Two other recent surface mines, Rochez #1 and Guilli Mine, are on the opposite side of Rt885.*

*PCLT03 – An erosion gully has developed at the western end of the Rochez #2 site. Otherwise, reclamation at the site appears to be going well. The mining did not seem to affect water quality within the Rt885 tributary to a great degree. It appears that some regrading and planting at the site occurred in 2012/2013 to resolve erosion issues. This entire valley would most likely be altered dramatically if the section of the Mon-Fayette Expressway from Jefferson Hills to Pittsburgh/Monroeville is completed.*

*Looking south along the Rt885 tributary valley toward the Peters Creek valley. The stream is intermittent along this section. The steeply sloped right ascending bank remains wooded but the left ascending slope has been logged along this section of stream.*

*PCLT04 – Downstream of this waypoint the RT885 tributary becomes a permanently flowing stream. Much of the riparian area surrounding the creek was surface mined prior to adequate regulations. Spoil piles and high walls are common in this area.*

*PCLT05 – A permanent pond of approximate ½ acre developed within a spoil pile on a bench above the tributaries right ascending bank. This area as well as a number of other smaller ponding areas along ATV trails provides breeding habitat for amphibians including Wood Frogs.*

*PCLT06 - A major drainage erosion gully has developed along the RT885 tributary's steeply sloped left ascending bank from the bench about 100 feet above. Left photo is a view of the entire gully from stream level. Right photo is a view of the gully as you near the bench.*

*PCLT06 – Just upstream of the erosion gully is a large construction debris dump on the left ascending floodplain.*

*PCLT06 – Remnants of fencing installed as part of the Mon-Fayette Expressway project just downstream of the erosion gully. This fencing was placed across the stream channel. The value of this fencing in this location is questionable. The fencing is often vandalized by local off-road enthusiasts. There is little to no maintenance provided following installation and the unintended affects on local wildlife can be quite negative.*

*PCLT07 – A population of Japanese Pachysandra (Pachysandra terminalis) has taken over part of the tributary's left ascending bank. This shade tolerant ornamental groundcover often escapes from cultivation and establishes on riparian floodplains. It provides little in the way of wildlife benefit and is on Pennsylvania's watchlist of invasive species. It has established colonies at a number of locations throughout the Peters Creek watershed.*

*PCLT08 – The RT885 tributary is culverted under an access road to a power line transmission tower prior to entering a seven acre wetland within Peters Creek's right ascending bank floodplain.*

*PCLT09 – The steep slope along the left ascending bank of the RT885 tributary just north of the Mon-Fayette Expressway terminus harbors a number of individual trees, primarily oaks, which most likely qualify for Heritage Tree status. Heritage trees must have circumferences greater than 9.5 feet at breast height.*

*PCL35 – A view of what is locally known as the Timberdoodle Wetland for the American Woodcock (Scolopax minor) that breed there. The RT885 tributary flows through the wetland and crosses under Peters Creek Rd and the Montour Trail prior to entering Peters Creek's right ascending bank. The fill platform behind the wetland in the photo's center left was placed there during the construction of the Mon-Fayette Expressway.*

## Conclusions and Recommendations

A dominant feature of the Lower Peters Creek sub-watershed is the 30 acre, 100 million ton coal waste pile along Peters Creek's southern shore at PCL21.

The coal waste pile was created prior to adequate regulations and therefore the exact composition of this coal waste pile is unknown. The impact that the waste pile has on water quality within Peters Creek is also unknown.

Material from the coal waste pile is eroding into Peters Creek over time, stormwater is leaching waste chemical constituents into Peters Creek and there are a number of locations within Peters Creek along the tow of the coal waste pile where orange and white precipitate are often evident.

The coal waste pile is not listed as a priority abandoned mine land, however, it shares many of the dangerous features of these lands.

A comprehensive study of this coal waste pile should be completed and the impact on Peters Creek's water quality should be determined.

Abandoned mine discharges also exist at PCL12, PCL28 and PCL38. The discharge at PCL38 is an alkaline discharge with pH levels exceeding 11.0. A heavy white precipitate is associated with this discharge, however, aluminum, iron and manganese concentrations are very low. Further investigation to adequately characterize this discharge is necessary.

A number of abandoned mine seeps and discharges feed the Ravensburg Wetland. The main discharge (PCL28) originates in a steep valley north of Worthington Avenue just west of the St. Clare Cemetery. There are also a number of seeps along what appears to be an old mining highwall to the west of this valley. The wetland is helping to mitigate the impact of this abandoned mine water prior to its entry into Peters Creek. This wetland also is a conservation priority within the Peters Creek watershed. Further investigation of the AMD discharges into the Ravensburg wetland should be conducted in order to develop a treatment plan.

Priority 3 abandoned mine lands are listed along the 002026 tributary that drains a steep valley to the east of the Beverly Hills Plan off of Rt885 and empties into Peters Creek near PCL24. Coal refuse was pushed into and is clogging the stream channel at this location and is now being washed out onto the Montour Trail and into Peters Creek during heavy precipitation events. Investigation of potential solutions to this situation should be undertaken.

Priority 3 abandoned mine lands are listed along tributaries 002040 and 002053 to Scotia Run. Abandoned mine lands also exist along the Rt885 tributary (002031) but are not listed as Priority AML, however, a water monitoring well is present at one of these sites. Recent surface mining operations have taken place within the Lower Peters Creek sub-watershed at two locations, one along a Scotia Run tributary (002053) and the other along the Rt885 tributary (002031). A number of gas wells are also present along 002053. The impact of these abandoned and recent surface mining operations should be investigated.

Sewage is a major issue within the lower Peters Creek sub-watershed. The Clairton Municipal Authority Wastewater Treatment Plant discharges into Peters Creek just upstream of the State Route 837 bridge. Combined sewer overflows empty into Peters Creek from just upstream of the Ravensburg Bridge to the confluence with the Monongahela River.

The Dry Run tributary (002032) is also heavily impacted by raw sewage. Sewage issues along this tributary should be further investigated to determine the source and the Allegheny County Health Department should be made aware of the problem.

The Clairton Municipal Authority (CMA) is under a consent order to complete a sewage treatment plant expansion in order to better handle peak flow conditions. This upgrade also includes a biological nutrient removal capability. CMA must also implement a corrective action plan to fix and maintain the collection system within the City of Clairton.

CMA will continue to regionally service the City of Clairton, parts of Jefferson Hills Borough and South Park Township and the Peters Creek Sanitary Authority which services the Peters Creek watershed portions of Finleyville Borough, Union Township, Peters Township and Nottingham Township. This regional approach to wastewater treatment is necessary for Peters Creek to maintain adequate water quality including its designated use as a Trout Stocked Fishery.

Maintaining adequate water quality also requires long-term maintenance of sewage infrastructure within all communities serviced by the CMA.

The Lower Peters Creek sub-watershed experiences excess algal blooms at numerous locations, especially during late winter and early spring. Algal blooms are often associated with excess phosphorus and nitrogen that can come from varied sources. Investigation of the phosphorus and nitrogen load within Peters Creek and identification of its sources is a necessary first step toward remediating the problem.

The Lower Peters Creek sub-watershed is principally impacted by inadequately controlled stormwater from upstream sources and also from runoff from Rt51 and from residential and commercial development within the sub-watershed. There are a number of locations along this segment of Peters Creek that are experiencing significant stream bank erosion that is compromising the Montour Trail and sewage infrastructure paralleling the stream.

Jefferson Hills completed its first natural stream channel design (NSCD) project at PCL23 in 2007 to protect a sewer line crossing Peters Creek. A PA DEP Growing Greener Grant was obtained by Jefferson Hills to implement a NSCD project at PCL31 to be completed in 2014. Natural stream channel design stabilization projects are also required at PCL14, PCL22, PCL33 and PCL39.

Natural stream channel design is preferred over traditional hard-armor methods along this relatively undeveloped section of Peters Creek since it maintains the natural integrity of the corridor, improves sediment transport, maintains riparian habitat and improves fish habitat within the stream.

There is little development along Peters Creek's main stem within the Lower Peters Creek sub-watershed except at the upper and lower ends, however, encroachment issues from human activity create a number of problems along this segment of Peters Creek.

Peters Creek is culverted for approximately 2000 feet under the Clairton Coke Works from State Route 837 to its confluence with the Monongahela River. The stream receives a number of NPDES permitted discharges just prior to being culverted and while culverted. Biological communication between the Mon River and Peters Creek is limited by this situation. Investigation of the current level of biological communication and means of improving it should be undertaken.

The 100 million ton coal waste pile encroaches on Peters Creek's left ascending bank for over one-half mile from PCL20 to about PCL26. The Wheeling & Lake Erie Clairton Branch also encroaches on the left ascending bank at a number of locations and a massive fill operation downstream of the Ravensburg Bridge significantly alters the left ascending floodplain of Peters Creek.

Waste material of some sort is being piled along Peters Creek's right ascending bank at PCL19. This illegally dumped material within the floodplain of Peters Creek will simply wash into the creek during the next heavy precipitation event and cause additional pollution of the stream. This practice should be discontinued and the Allegheny County Conservation District should be made aware of the situation.

A retaining wall along Peters Creeks left ascending bank at PCL43 is encroaching on the stream channel and should be repaired or removed.

Encroachment is also a significant issue along Scotia Run. An inadequately sized culvert at SR11 is creating severe bank erosion upstream and downstream of the culvert and should be replaced an adequately sized culvert or removed. The stream is also culverted for much of its lower reach. Opportunities for daylighting portions of the lower reach should be explored.

Japanese Knotweed is a pervasive issue within the riparian zone of Peters Creek for a large portion of the streams course within the Lower Peters Creek sub-watershed. Monocultures have formed at several locations and have all but eliminated native vegetation from these areas. Invasive vines, including non-native Japanese Honeysuckle and Oriental Bittersweet and native Wild Grape, are compromising forested floodplains and slopes at a number of locations. Maintaining forested floodplains is essential to maintaining a healthy and biologically diverse stream. Development and successful implementation of a riparian management plan is essential for this portion of Peters Creek.

A Knotweed Control Project on a 2 acre monoculture within Peters Creek's right ascending floodplain designed to eradicate knotweed but not other floodplain vegetation was somewhat successful but requires further work. Lessons learned from this endeavor should prove useful in development a watershed-wide riparian management plan for invasives.

Other invasive plant species, including Multiflora Rose, Garlic Mustard, Purple Loosestrife, Tree of Heaven, Barberry and Privet are establishing within Lower Peters Creek's floodplains and wetlands and are a problem at a number of locations. Pachysandra, an ornamental ground cover that is shade tolerant, has established a robust colony along the banks of the Rt885 Tributary and is becoming a problem in other parts of the Peters Creek watershed as well.

Illegal dumping is a problem at a number of locations within this sub-watershed, most notably just north of the Ravensburg Wetland, along the Rt885 Tributary and along an access road to a fill platform at PCL32. The floodplain is also littered with pallets, tires, barrels and other assorted garbage and debris that is transported to the area during flooding events. Jefferson Hills, Kurt J. Lesker employees, and the Tri-Community Anglers sponsor clean-up events and help to keep Peters Creek clean of trash, however, personal responsibility is the only true solution to this pervasive problem.

The Ravensburg Wetland is the largest and one of the best examples of an emergent wetland within the Peters Creek watershed. It provides habitat for a Pennsylvania endangered plant species and for a variety of wildlife. The wetland is also helping to maintain water quality within Peters Creek. This wetland and its surrounding riparian zone should be a long-term conservation priority.  The wetland at PCL35 is providing breeding habitat for the American Woodcock and should also be conserved.

Development of an adequate connection between Clairton Resident Park and the Montour Trail should be investigated. The current off-road trail is utilized for illegal entry of motorized vehicles onto the Montour Trail and is heavily eroded. Great quantities of sediment are transported to Peters Creek and onto the Montour Trail during precipitation events.

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| PCL01 | -79.881873 | 40.309632 | 726 | 7/24/10 | Peters Creek confluence with Mon River |
| PCL02 | -79.881518 | 40.304541 | 727 | 7/24/10 | Koppers Inc Clairton Plant/ US Steel Clairton Coke Works |
| PCL03 | -79.882814 | 40.305091 | 765 | 7/24/10 | Peters Creek Cemetery |
| PCL04 | -79.881503 | 40.304542 | 727 | 7/24/10 | Peters Creek enters culvert under US Steel Clairton Works |
| PCL05 | -79.881838 | 40.304304 | 726 | 7/24/10 | State Route 837 bridge crossing of Peters Creek |
| PCL06 | -79.881941 | 40.304130 | 726 | 7/24/10 | Combined sewer overflow outfall into Peters Creek |
| PCL07 | -79.881615 | 40.303926 | 725 | 7/24/10 | Clairton Municipal Authority outfall |
| PCL08 | -79.884331 | 40.302569 | 731 | 11/9/13 | Construction debris litters northern bank of Peters Creek |
| PCL09 | -79.884781 | 40.302451 | 746 | 10/6/08 | Mainstem pH,Cond,Temp check |
| PCL10 | -79.885619 | 40.301772 | 731 | 7/24/10 | Combined Sewer Overflow and other culverted discharge enter Peters Creek on RAB |
| PCL11 | -79.888120 | 40.301000 | 736 | 7/24/10 | Site PC-1 2009 Fish & Macro Survey |
| PCL12 | -79.888680 | 40.300610 | 731 | 10/6/08 | Iron staining on stream banks |
| PCL13 | -79.889789 | 40.300567 | 741 | 11/9/13 | Gulch Rd from Clairton Resident Park erodes onto Montour Trail. |
| PCL14 | -79.890220 | 40.300190 | 745 | 10/6/08 | Large sediment bar in stream channel. RAB experiencing accelerated erosion. |
| PCL15 | -79.889833 | 40.300333 | 734 | 1/9/12 | Remnants of old bridge crossing. Severe bank erosion on RAB. |
| PCL16 | -79.887075 | 40.297180 | 941 | 7/24/10 | Dumping of construction material over hillside along W&LE Railroad on LAB. |
| PCL17 | -79.890245 | 40.298798 | 765 | 11/9/13 | Massive fill site and operation on Peters Creeks southern bank. |
| PCL18 | -79.893036 | 40.299472 | 750 | 11/9/13 | Large Japanese Knotweed infestation on LAB and invasive vines typical along this section. |
| PCL19 | -79.895278 | 40.299042 | 739 | 11/9/13 | Dredge material and/or fill dumped in floodplain along Peters Creek RAB. |
| PCL20 | -79.895587 | 40.298927 | 739 | 7/24/10 | UNT (Dry Run) enters PC on LAB. Most upstream CSO just downstream on LAB. |
| PCL21 | -79.898354 | 40.299511 | 866 | 7/24/10 | US Steel ~100 million ton, 30 acre, 120ft coal waste pile from coal cleaning operation. |
| PCL22 | -79.899166 | 40.301568 | 747 | 7/24/10 | Eroding stream banks along tight S-bend in stream channel. Erosion along Montour Trail |
| PCL23 | -79.900300 | 40.302073 | 749 | 7/24/10 | Natural stream channel design restoration project. Sewer line crossing creek. |
| PCL24 | -79.900711 | 40.303897 | 870 | 7/24/10 | Stream channel cuts through coal waste overburden in steeply sloped ravine. |
| PCL25 | -79.900431 | 40.302342 | 753 | 7/24/10 | Drainage from tributary under Montour Trail. Severe erosion during rain events. |
| PCL26 | -79.899475 | 40.297885 | 747 | 7/24/10 | Big Bend on Peters Creek. PFBC 0104 Fish Survey site. Ravensburg Tunnel |
| PCL27 | -79.902884 | 40.297188 | 753 | 10/6/08 | Ravensburg wetland (~10 acres). |
| PCL28 | -79.901483 | 40.295739 | 795 | 7/24/10 | AMD impacted tributary to Ravensburg wetland. Several AMD seeps along southern slope. |
| PCL29 | -79.903799 | 40.298010 | 752 | 7/24/10 | Knotweed Riparian Restoration Project. (~5 acres) |
| PCL30 | -79.905608 | 40.298583 | 754 | 7/24/10 | Vernal pond creates breeding habitat for a number of amphibian species. |
| PCL31 | -79.905121 | 40.298248 | 751 | 7/24/10 | Eroding RAB threatening to undercut Montour Trail. Culverted drainage enters on RAB. |
| PCL32 | -79.907218 | 40.298883 | 803 | 7/24/10 | Large fill platform created during development of Mon-Fayette Expressway. |
| PCL33 | -79.908599 | 40.297027 | 758 | 11/9/13 | Severe erosion along Peters Creek RAB starting to compromise Montour Trail. |
| PCL34 | -79.908727 | 40.297086 | 755 | 7/24/10 | Peters Creek UNT( Rt885 trib) culverted under Montour Trail and enters Peters Creek on RAB. |
| PCL35 | -79.909922 | 40.296717 | 765 | 7/24/10 | Floodplain wetland (~7 acres)created by Rt885 trib. Breeding habitat for American Woodcock. |

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| PCL36 | -79.911013 | 40.295009 | 757 | 7/24/10 | Stormwater detention basin for Mon-Fayette Expr and Park&Ride Lot. |
| PCL37 | -79.909855 | 40.294595 | 759 | 7/24/10 | Stormwater culverted from detention basin enters Peters Creek RAB. |
| PCL38 | -79.910247 | 40.293555 | 748 | 7/24/10 | Alkaline discharge (pH 11.5) enters on LAB. Culverted under W&LE Railroad. |
| PCL39 | -79.910777 | 40.292507 | 768 | 7/24/10 | Severe bank erosion on left ascending bank starting to undercut W&LE rail track |
| PCL40 | -79.911332 | 40.293740 | 766 | 7/24/10 | Large impervious Park & Ride Lot developed as part of Mon-Fayette Turnpike Project. |
| PCL41 | -79.911147 | 40.292414 | 761 | 7/24/10 | Scotia Run (05020005002041) enters Peters Creek on left ascending bank. |
| PCL42 | -79.911732 | 40.292156 | 758 | 7/24/10 | Bridge crossing from Park & Ride Lot and Kurt Leskers, Inc. |
| PCL43 | -79.912693 | 40.292225 | 764 | 7/24/10 | Collapsing retaining wall encroaching on LAB. |
| PCL44 | -79.913714 | 40.292506 | 763 | 7/24/10 | Mon Fayette Expressway crosses Peters Creek |
| PCL45 | -79.915288 | 40.292157 | 763 | 7/24/10 | State Route 51 crosses Peters Creek. Subject to flooding during major rain events. |
| Scotia Run (State Route 51 Tributary) | | | | | |
| SCR01 | -79.911042 | 40.291642 | 770 | 1/5/14 | Scotia Run enters culvert under Lesker's back lot to confluence with Peters Creek (~250 ft). |
| SCR02 | -79.911669 | 40.291154 | 766 | 1/5/14 | Sanitary sewer manhole and culverted stormwater from Worthington Ave on Scotia Run's LAB. |
| SCR03 | -79.912491 | 40.290871 | 770 | 11/12/08 | Scotia Run culverted under Kurt J. Leskers parking area (~ 150 ft). |
| SCR04 | -79.912774 | 40.290751 | 771 | 11/12/08 | Scotia Run culverted under Worthington Ave. Excess siltation. |
| SCR05 | -79.912774 | 40.290751 | 771 | 1/5/14 | Scotia Run exits culvert under Bowser Auto (~ 700 ft) |
| SCR06 | -79.911361 | 40.288933 | 793 | 11/12/08 | Scotia Run enters culvert under Bowser Auto/fish impasse. |
| SCR07 | -79.910819 | 40.288991 | 800 | 1/5/14 | Trib to Scotia Run (05020005002040) on LAB culverted under McGrew Rd (~ 5-10 GPM). |
| SCR08 | -79.90954 | 40.289243 | 817 | | Trib to Scotia Run (05020005002040) upstream. Diverse second growth forest on steep slopes. |
| SCR09 | -79.906059 | 40.289055 | 931 | | Trib to Scotia Run (05020005002040) near headwaters. Vernal waterfall. |
| SCR10 | -79.910602 | 40.288594 | 809 | 1/5/14 | Drainage from east side of McGrew Rd culverted under road to Scotia Run's LAB. |
| SCR11 | -79.910723 | 40.288154 | 813 | 1/5/14 | Scotia Run culverted under access to RT51 billboard. Double culvert; sized incorrectly; eroding. |
| SCR12 | -79.910796 | 40.287803 | 824 | 11/12/08 | Stormwater outfall from Route 51 enters Scotia Run's Right ascending bank. |
| SCR13 | -79.910389 | 40.287764 | 817 | 1/5/14 | Scotia Run culverted under private driveway; Pedestrian bridge crossing of stream. |
| SCR14 | -79.910194 | 40.287264 | 822 | 1/5/14 | Storm water culverted from Rt51 in eroded channel enters Scotia Run's RAB. |
| SCR15 | -79.909995 | 40.287078 | 829 | 11/12/08 | Tributary (05020005002053) culverted under McGrew Rd enters Scotia Runs LAB. |
| SCR16 | -79.910098 | 40.286873 | 830 | 11/12/08 | Scotia Run culverted under Private driveway; sized incorrectly; concrete wall along LAB downstream. |
| SCR17 | -79.910332 | 40.285924 | 849 | 1/5/14 | Scotia Run (05020005002056) continues up steeply sloped wooded valley paralleling Rt 51 on RAB. |
| State Route 885 Tributary | | | | | |
| PCLT01 | -79.91263 | 40.30757 | 1052 | 11/12/08 | Headwaters of UNT Rt885 trib (05020005002031) to Peters Creek; ATV trails, erosion, Illegal dumping. |
| PCLT02 | -79.911568 | 40.305473 | 1043 | 12/4/10 | Rochez #2 Surface Mine |
| PCLT03 | -79.912514 | 40.306553 | 1000 | 11/9/13 | Erosion channel in reclaimed Rochez #2 Surface Mine. |
| PCLT04 | -79.912928 | 40.302261 | 936 | 12/4/10 | Upper reach of permanent flow portion of Rt 885 tributary. Intermittent upstream. |
| PCLT05 | -79.912039 | 40.300339 | 941 | 12/4/10 | Permanent pond in coal overburden providing breeding habitat for amphibians. |
| PCLT06 | -79.913414 | 40.29932 | 853 | 12/4/10 | Major erosion channel on LAB; just upstream on LAB bench is large construction debris dump. |

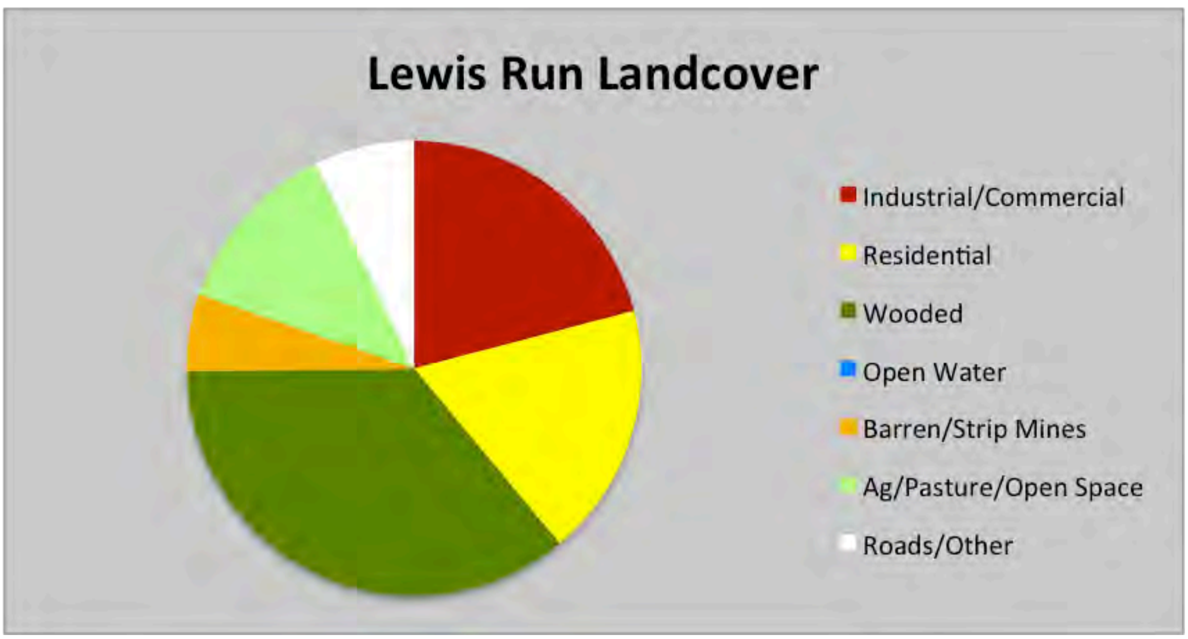
| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| PCLT07 | -79.91245 | 40.29764 | 818 | 12/4/10 | Turnpike fence in crosses stream; old garbage dump; colony of Japanese Pachysandra on LAB floodplain. |
| PCLT08 | -79.911154 | 40.297225 | 797 | 11/12/08 | Stream culverted under access road and enters large floodplain wetland; some wetland above culvert. |
| PCLT09 | -79.913366 | 40.29776 | 900 | 12/4/10 | The steep wooded slope along the streams LAB harbors a number of heritage sized trees, mostly Oaks. |
| Dry Run Tributary | | | | | |
| DRT01 | -79.896 | 40.297667 | 769 | 11/25/12 | UNT to Peters Creek (Dry Run) culverted under W&LE Rail tracks/no flow. |
| DRT02 | -79.893413 | 40.293636 | 810 | 11/25/12 | Tributary severely impacted by sewage. |

## 8.2 Lewis Run

The headwaters of Lewis Run are found along North Lewis Run Rd in Jefferson Hills Borough. The stream flows along and crosses Rt51 numerous times prior to entering Peters Creek just south of the Mon-Fayette Expressway terminus. A tributary to Lewis Run is culverted for most of its length under a large commercial district in West Mifflin and Pleasant Hills and meets Lewis Run at the junction of Lewis Run Rd with Rt 51. This section of Rt51 is subjected to severe flooding during heavy rain events.

The area of the Lewis Run sub-watershed is approximately 5.88 square miles and is comprised of parts of Jefferson Hills Borough, Pleasant Hills Borough and West Mifflin Borough.

Land cover within the sub-watershed is depicted in the pie chart below. The dominant land cover types are wooded (35.9%), industrial/commercial (20.9%) and residential (18.0%). (2006 National Land Cover Database)




Lewis Run is impaired for recreational use by pathogens and is impaired for aquatic use by siltation, suspended solids, oil and grease, nutrients and habitat alterations. These impairments are due to road runoff, bank modifications, vegetation removal and municipal point sources. (2012 Pennsylvania Water Quality Monitoring and Assessment)

A visual assessment of the stream was conducted to better understand the current physical status of the stream channel, water and riparian zone. The stream was broken into 2 segments and was assessed scored according to the USDA Visual Assessment Protocol. The results of this assessment are found below.

## Lewis Run main stem

Waypoints: LW01 – LW30
Description: Confluence with Peters Creek to upstream of Elliot Road.
USDA Visual Assessment Protocol Score = 5.6 POOR

Waypoints: LW31 - LW45
Description: upstream of Elliot Road to headwaters along North Lewis Run Road
USDA Visual Assessment Protocol Score = 4.9 POOR

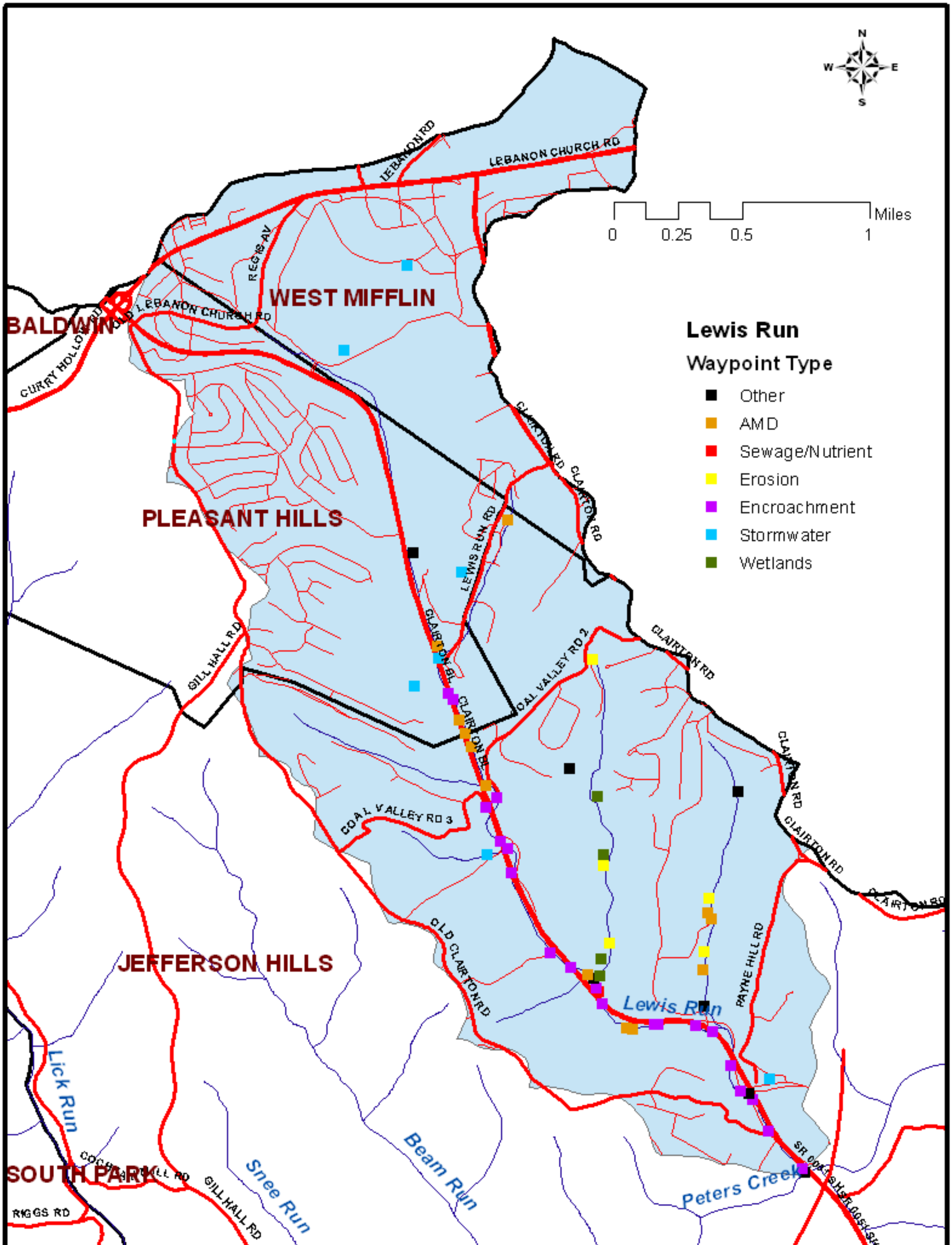
## Wray Large Road Tributary

Waypoints: WLT01 – WLT08
Description: Entire length of the Wray Large Road Tributary
USDA Visual Assessment Protocol Score = 6.7 FAIR

## Jefferson Hospital Tributary

Waypoints: JHT01 – JHT10
Description: Entire length of Jefferson Hospital Tributary
USDA Visual Assessment Protocol Score = 5.5 POOR

The Pleasant Hills Tributary and the Oakwood Road Tributary were not scored.



WEST MIFFLIN
BALDWIN
PLEASANT HILLS
JEFFERSON HILLS
SOUTH PARK
Lewis Run
Waypoint Type
Other
AMD
Sewage/Nutrient
Erosion
Encroachment
Stormwater
Wetlands
0
0.25
0.5
1
Miles
N
S
E
W
LEBANON CHURCH RD
LEBANON RD
REGIS AV
OLD LEBANON CHURCH RD
CURRY HOLLOW RD
CLAIRTON RD
LEWIS RUN RD
CLAIRTON BL
COAL VALLEY RD 2
COAL VALLEY RD 3
GILL HALL RD
OLD CLAIRTON RD
PAYNE HILL RD
Lewis Run
Peters Creek
Lick Run
Snee Run
Beam Run
RIGGS RD

Lewis Run originates along North Lewis Run Road near the border of Jefferson Hills and West Mifflin. This major named tributary to Peters Creek spends most of its course along PA State Rt51 and crosses under this highway nine times before emptying into Peters Creek. It is also constrained by numerous access road bridges and is culverted under a number of commercial lots along RT51.

There are a number of significant tributaries to Lewis Run including one that originates under a large commercial district along Rt51 in West Mifflin and Pleasant Hills. The commercial district is built on top of a reclaimed slag dump that was utilized by US Steel's Clairton Coke Works in the mid-1900s. This tributary is culverted for most of its course from its headwaters to its confluence with Lewis Run at the intersection of N. Lewis Run Rd and RT51. It accepts large quantities of storm water from the mostly impervious surface of the commercial district during rain events and causes severe flooding of Rt51 at this intersection during heavy precipitation.

Tributaries flowing from the west along Oakwood Rd and Elliot Rd in Jefferson Hills are heavily impacted by abandoned mine drainage and add a significant metals load to Lewis Run. A tributary originating near Jefferson Hill's Andrew Reilly Municipal Park along Rt885 is also impacted by AMD. This tributary flows east through a mostly undeveloped steep wooded valley prior to entering Lewis Run near the junction of Wray Large Rd and Rt51. Another tributary flowing from the east through an undeveloped valley originates near Jefferson Regional Medical Center and enters Lewis Run just downstream of the Blue Flame Restaurant; a Jefferson Hills landmark along Rt51. This tributary flows through a large un-reclaimed surface mine that was developed in the 1960s prior to modern regulations. A number of significant wetland areas have developed along this tributary and along a bench above its left ascending bank. Lewis Run is also impacted by a number of other abandoned mine discharges that empty directly into the creek, including one near the headwaters along N Lewis Run Rd. This stream consistently has some of the highest conductivities of any of the major tributaries within the Peters Creek watershed of nearly 2000 micro-siemens/cm except during rain events.

Bank erosion is a significant problem at a number of locations along Lewis Run since it accepts great quantities of storm water and is constrained for much of its course. Road runoff contributes to the streams suspended solids and siltation load. The Pleasant Hills Authority's Lewis Run Pump Station overflows during rain events and is a source of an excess nutrient and bacterial load. Malfunctioning sanitary sewer lines along Lewis Run and many of its tributaries also provide a contribution from time to time. Having a large hospital within the sub-watershed adds a pharmaceutical component to the sanitary waste stream.

## *Sewage and AMD Impacts*

*LW18 – Many of the tributaries to Lewis Run are impacted by abandoned mine discharge. This tributary drains a steep valley behind the Jefferson Hills Municipal Building before entering Lewis Run's left ascending bank and contributes to the streams metal load.*

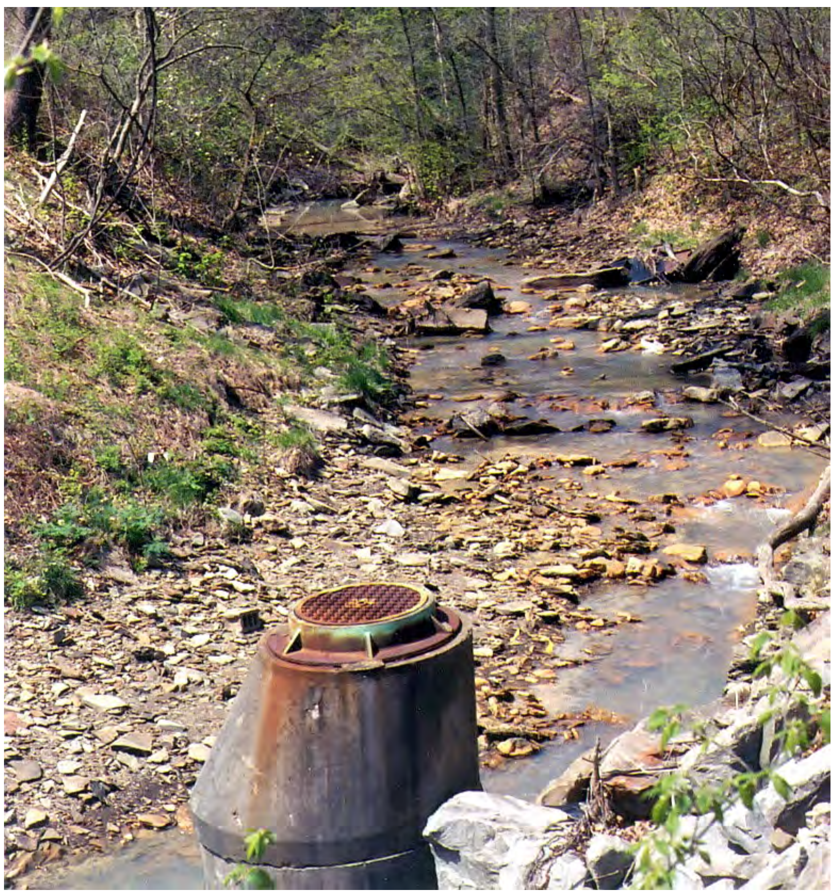
*LW32 – Lewis Run just downstream of its confluence with the Oakwood Rd Tributary. Lewis Run is clearly impacted by the heavy metal load of this stream. Stream bank erosion and a large Japanese Knotweed infestation are also a problem along this section of Lewis Run.*

*LW23 – The AMD impacted tributary in the photo to the left drains the steep valley between Alta Vista Dr and the sports field complex that is behind the Jefferson Elementary School. This tributary is culverted under Rt51 just prior to entering Lewis Run's left ascending bank downstream of the Blue Flame Restaurant.*

*WLT05 – The AMD seep in the photo to the right is one of many that impact the Wray Large Rd Tributary as it flows within the steep valley between Andrew Reilly Park and the streams confluence with Lewis Run.*

*JHT04 – This overflowing sanitary sewer line along the Jefferson Hospital Tributary was dumping its contents directly into the tributary. Sanitary sewer lines often follow tributary valleys and in Jefferson Hills many are in fairly remote locations like this one. They also often end up within the stream channel due to the dynamic nature of streams. Malfunctioning sewers and those in stream channels contribute to the bacterial and nutrient load within Lewis Run.*

The Pleasant Hills Authority Lewis Run Pump Station (LW37) along Rt51 just downstream of the North Lewis Run Road junction is not able to handle capacity during some precipitation events. Raw sewage overflows into Lewis Run and increases the bacterial and nutrient load of the stream. Excess algae is evident in the daylighted upper reaches of Lewis Run along Rt51 but not in the downstream portion of the stream. Lewis Run also failed to meet Pennsylvania recreational standards and is impaired by unknown pathogens. The Pleasant Hills Authority is under a consent order to eliminate overflows at the Lewis Run Pump Station and at the sewage treatment plant on Lick Run in South Park Township.



*LW20 – A sanitary sewer manhole downstream of Lewis Run's confluence with the Jefferson Hospital Tributary is within the streams channel. The sewer contents combine with the stream during high water events.*

## *Stream Bank Erosion & Siltation*

*LW07 – Severe outer bank erosion and inner bank deposition along a tight S-bend near the Mon-Fayette Expressway Rt51 entrance ramp. Stream bank erosion is a problem at numerous locations along the Rt51 portion of the stream due to large quantities of storm water entering Lewis Run from the large commercial district in Lewis Run's headwaters.*

*LW10 – Much of the right ascending bank of Lewis Run downstream of its confluence with the Wray Large Rd tributary is gabion rip-rapped or constrained by concrete retaining wall along the portion of Lewis Run Rd east of RT51. This section of Lewis Run floods nearby homes during severe precipitation events. Also, a pipe crossing the stream at this location creates a fish barrier during normal flow.*

*LW24 – Severe right ascending bank erosion along Lewis Run downstream of the Blue Flame Restaurant.*

*JHT03 – Bank erosion along the lower reaches of the Jefferson Hospital Tributary just prior to the stream entering the Lewis Run floodplain.*

## *Nutrient Enrichment*

The headwaters portion of Lewis Run appears to be impacted by nutrient enrichment with significant algae present, however, the lower portions of the watershed do not appear to be significantly impacted by nutrient overload. Sources of excess nutrients are abandoned mine discharges, residential runoff, a sanitary sewer pump station that overflows during precipitation events and from malfunctioning sanitary sewer lines.

## *Wetlands*

There are few wetland areas along the main stem of Lewis Run, however, there are a number of significant wetlands along the tributaries to Lewis Run.

*JHT05 - This ponding of the Jefferson Hospital Tributary formed between an overburden pile and a mining high wall created by surface mining of the area in the late 1960s prior to modern regulations. There had been a natural pond in the area prior to mining. The outlet of this pond is deeply incised and continues to erode and cut down the streams channel downstream. A number of other wetland areas have formed along the Jefferson Hills Tributary.*

*LW 29 - Impoundment along Elliot Rd Tributary to Lewis Run. The surrounding area was surface mined prior to modern regulations and the impoundment is impacted by abandoned mine drainage. The outlet of this impoundment flows along Elliot Rd and enters Lewis Run via a storm sewer.*

*WLT06 - Numerous seeps, many impacted by AMD, such as the one in the photo to the right form wetland areas along the middle portion of the Wray Large Rd Tributary. There is little to no development along this tributary.*

*Temporary vernal ponds such as the one in the photo to the left along the Jefferson Hospital Tributary provide breeding habitat for many amphibians, especially Eastern American Toads (Anaxyrus americanus) and woodland frogs such as the Wood Frog (Lithobates sylvaticus).Unregulated ATV and mini-bike activity throughout the Peters Creek watershed compromises much of this habitat. Photo inset is American Toad eggs in the temporary pond.*

## *Invasive Plants & Floodplain Condition*

Little naturally vegetated floodplain exists along the RT51 portion of Lewis Run and even the portion along N Lewis Run Rd is culverted under school and commercial lots for much of its course. Almost all of Lewis Run's RT51 Tributary is culverted.  The tributaries within Jefferson Hills remain mostly naturally vegetated, often with steeply wooded slopes along the stream. Offroad vehicle activity is common along many of these tributaries. Invasive plants and vines are definitely present within all of the tributaries watersheds but are not an major issue. Significant patches of Japanese Knotweed have developed at several locations along Lewis Run's Rt51 corridor.


*The Pleasant Hills Tributary along State Route 51 is culverted under a commercial district in West Mifflin that was built on top of a reclaimed slag dump. Reclamation of the slag dump has continued over the past several years with additional commercial development added to the district.*

*LW07 – Significant patches of Japanese Knotweed have developed within the Lewis Run Rt51 floodplain at a number of locations including near the Mon-Fayette Expressway RT51 entrance and upstream of the Coal Valley Rd and RT51 intersection.*

*LW03 – Lewis Run just upstream of the Old Clairton Rd Bridge crossing. Even though the lower section of Lewis Run is constrained by Rt51 and some commercial development there remain a number of areas with some wooded floodplain at least along one side of the stream.*

## *Stormwater Infrastructure and Issues*

Much of the Lewis Run sub-watershed was developed prior to adequate storm water regulations. Excess storm water from the headwaters portion of the sub-watershed create problems along the Rt51 corridor.

*LW40 – This section of Rt51 at its junction with N Lewis Run Rd floods during heavy rain events. Lewis Run meets the RT51 Tributary just to the right of the photo and is immediately culverted under Rt51 and the Sheetz access road.*

*There is inadequate storm water control throughout most of the Lewis Run sub-watershed. This large detention basin is part of the Jefferson Hospital complex. More recent projects including the Mon-Fayette Expressway, newer development along the Rt51 commercial district and recently completed residential developments are implementing storm water controls.*

## *Encroachments*

Lewis Run is all about encroachment. The stream is culverted under RT51 nine times and is culverted at least 13 other times under other public roads, private access roads, commercial districts and school playgrounds. Some of these culverts are quite lengthy including a 900 ft culvert under the Mon-Valley School playground and a 360 ft culvert under Old Clairton Rd. The stream is also constrained by RT51 at a number of locations.


*LW40 – Most upstream crossing of Lewis Run under RT51 just above its junction with N. Lewis Run Rd. The culverted Rt51 Tributary is daylighted on the far side of Rt51 where it enters Lewis Run as Lewis Run exits a 200 ft culvert under the Dean Honda lot. Flooding is a problem at this site.*

*LW01 – Lewis Run passes under its final encroachment, an access driveway bridge to the former Dick Corporation headquarters, and enters Peters Creek along Rt51 in Large, PA.*

## *Garbage & Dumps*

Litter is a problem in the commercial district and at a number of sites along Rt51 but there does not appear to be a major problem with large illegal dumping sites within the Lewis Run sub-watershed.

*Illegally discarded tires and other debris accumulates at a non-functional pipe blocking the channel of the Jefferson Hospital Tributary. There is also an abandoned truck along this section of stream.*

*LW24 – Illegal dumping of construction material and other debris into Lewis Run from a landscape yard along Rt51.*

## Conclusions and Recommendations

Inadequately controlled storm water runoff and abandoned mine drainage are two major factors contributing to degraded water quality within the Lewis Run sub-watershed. A large commercial district and significant residential development within the headwaters portion of the sub-watershed were built prior to implementation of adequate regulations for storm water control. Large areas of impervious surface and channelized culverted streams contribute to flooding problems downstream where Lewis Run is daylighted along Rt51.

The lower portion of the Lewis Run sub-watershed within Jefferson Hills Borough remains mostly wooded and is identified by the Peters Creek Land Conservation Plan as a high priority area for green infrastructure conservation. Most of the commercial development within this section of the watershed exists along the Rt51 corridor. An exception is the Jefferson Regional Medical Center complex along Coal Valley Rd that has been expanding over the past several years. The Jefferson Hills Municipal complex along Old Clairton Rd is currently expanding to include a public works and salt storage facility. This will remove salt storage from the floodplain of Peters Creek to a more upland location away from surface waters.

Future development within this sub-watershed must adequately control storm water runoff so that flooding problems along Rt51 are not exacerbated. Mitigation of current storm water runoff issues within the upper portions of the sub-watershed should be investigated including modeling, possibilities for regional detention and possible green infrastructure options. Existing stormwater detention facilities should be inspected and maintained on a regular basis to assure that that they are functioning as intended. Existing green infrastructure contributing significantly to storm water control should be maintained

Lewis Run consistently has some of highest conductivity readings within the Peters Creek watershed averaging around 2000 μ-siemens/cm. pH readings within Lewis Run, however, remain within the 7.0-8.0 range indicating that the stream is well buffered. Some of the major tributaries to Lewis Run maintain alkaline pH levels and the fact that the Rt51 tributary originates within an old slag pile may actually help to maintain alkaline pH levels in Lewis Run.

The visual assessment revealed that abandoned mine drainage is ubiquitous throughout the Lewis Run sub-watershed. Most of the tributaries are impacted and the headwaters of Lewis Run are also affected. Most of this sub-watershed has been undermined or surface mined prior to the 1970s and modern regulations. Overburden piles and mining highwalls are common throughout the sub-watershed.

The 2009 Peters Creek Metals TMDL determined that Lewis Run requires a significant reduction in aluminum load to bring it into compliance with current regulations. Identifying and treating abandoned mine discharges within the Lewis Run sub-watershed that would help to bring Peters Creek into compliance for metals loading in the most cost effective manner should be investigated. Current efforts to monitor metal loads within the Oakwood Rd Tributary should be continued and expanded. Local residents along Oakwood Rd have expressed interest in treating that discharge and are monitoring conductivity levels within the stream on a bi-weekly basis. Other discharges that should be investigated are the discharge at LW18, discharges along the Wray Large Rd Tributary, the Elliot Rd Tributary and the discharge near the headwaters of Lewis Run.

Lewis Run is impaired for recreational use by pathogens and by excess nutrient loads. The Pleasant Hills Authority Pump station along Rt51 should be modified to mitigate overflow of raw sewage into Lewis Run during precipitation events. This will help to decrease nutrient and bacterial loads within Lewis Run. It is also essential to adequately maintain and inspect sewage infrastructure on a regular basis. This can be difficult in the more remote lower sections of the sub-watershed.

A plan for recreationally connecting neighborhoods, local parks and the Montour Trail should be developed and implemented. This plan should also include a safe means of crossing Rt51.

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| LW01 | -79.915527 | 40.292095 | 763 | 10/3/08 | Mouth of Lewis Run; confluence with Peters Creek |
| LW02 | -79.915690 | 40.292330 | 771 | 10/3/08 | Lewis Run culverted under access bridge to Dick Corp. |
| LW03 | -79.918167 | 40.294461 | 779 | 10/19/10 | Lewis Run culverted under Old Clairton Rd. Debris jam at culvert entrance. |
| LW04 | -79.919330 | 40.296280 | 779 | 10/3/08 | Channel squeezed by Rt51 retaining wall. |
| LW05 | -79.918095 | 40.297469 | 809 | 10/19/10 | Stormwater detention basin. |
| LW06 | -79.919630 | 40.296620 | 783 | 10/3/08 | Tributary enters on left ascending bank (~10GPM) |
| LW07 | -79.920240 | 40.296750 | 786 | 10/3/08 | Stream entering into tight S-Bend. Severe outer bank erosion. Sediment bar in channel. Silt fence in channel. |
| LW08 | -79.920960 | 40.298230 | 797 | 10/3/08 | Retaining wall on right ascending bank; Small culverted trib on right ascending bank (1 GPM); concrete dams. |
| LW09 | -79.921251 | 40.499219 | 803 | 10/19/10 | Lewis Run culverted under Rt51 |
| LW10 | -79.920942 | 40.299973 | 790 | 7/24/13 | Retaining wall/gabioned rip-rap along much of RAB along Lewis Run Rd east of RT51; pipe crossing stream;flooding during severe rain events. |
| LW11 | -79.921533 | 40.300426 | 790 | 7/24/13 | Wray Large Rd Tributary enters on RAB. |
| LW12 | -79.922267 | 40.300156 | 810 | 10/19/10 | Lewis Run culverted under Rt51 |
| LW13 | -79.923528 | 40.300502 | 812 | 10/19/10 | Lewis Run culverted under access bridge to Large VFD Building |
| LW14 | -79.926580 | 40.300590 | 815 | 10/19/10 | Lewis Run culverted under access bridge to abandoned property. |
| LW15 | -79.926311 | 40.300636 | 812 | 10/19/10 | Lewis Run culverted under 2nd access bridge to abandoned property. |
| LW16 | -79.926580 | 40.300590 | 812 | 10/3/08 | Sewer manhole in middle of stream channel |
| LW17 | -79.928160 | 40.300350 | 817 | 10/3/08 | Tributary on left ascending bank (~2 GPM) Reddish stain and aluminum precipitate. |
| LW18 | -79.928650 | 40.300400 | 822 | 10/3/08 | Tributary on left ascending bank (~20 GPM); aluminum precipitate, white staining. |
| LW19 | -79.930423 | 40.301829 | 843 | 10/19/10 | Lewis Run culverted under Rt51 |
| LW20 | -79.930670 | 40.302510 | 830 | 10/3/08 | Strong sewage smell, possibly from concrete manhole; no visible sewage impacts in stream. |
| LW21 | -79.930790 | 40.303005 | 833 | 10/3/08 | Jefferson Hospital Tributary enters Lewis Run on right ascending bank (~10 GPM) |
| LW22 | -79.931010 | 40.303260 | 838 | 10/3/08 | Culverted tributary enters on right ascending bank (~3 GPM) |
| LW23 | -79.931420 | 40.303480 | 844 | 7/24/13 | Tributary draining valley between Alta Vista Dr and West Jefferson Hills sports fields is culverted under RT51 and enters on LAB. |
| LW24 | -79.932719 | 40.303911 | 854 | 10/19/10 | Lewis Run culverted under Rt51. Eroding banks downstream. Illegal dumping over streambank into creek. |
| LW25 | -79.934214 | 40.304733 | 856 | 10/3/08 | Lewis Run culverted under Practice T access Rd. Upstream, downstream retaining wall on right ascending bank. |
| LW26 | -79.937002 | 40.309304 | 879 | 10/19/10 | Lewis Run culverted under Rt51 |
| LW27 | -79.937198 | 40.310685 | 884 | 10/19/10 | Lewis Run culverted under commercial parking area |
| LW28 | -79.937791 | 40.311069 | 889 | 10/19/10 | Lewis Run culverted under Rt 51. Elliot Rd trib enters on left ascending bank just prior to entering culvert. |
| LW29 | -79.938775 | 40.310322 | 914 | 10/19/10 | Impoundment along Elliot Rd. Outlet runs along road and enters storm drain. |
| LW30 | -79.938832 | 40.313016 | 901 | 10/19/10 | Lewis Run culverted for ~ 200 ft under commercial parking lot and Rt51. |
| LW31 | -79.938016 | 40.313547 | 906 | 10/3/08 | Culverted under Coal Valley Rd; Knotweed infestastion on left ascending bank;algae and metals precipitate present. |
| LW32 | -79.938820 | 40.314290 | 901 | 10/3/08 | Tributary culverted under Rt51 enters on left ascending bank (~20GPM), discharge very orange; bank erosion downstream. |
| LW33 | -79.939810 | 40.316440 | 912 | 10/3/08 | Tributary enters on right ascending bank (~5GPM);stream substrate coated grey-green. |
| LW34 | -79.940320 | 40.317240 | 915 | 10/3/08 | Tributary culverted under Rt51 enters on left ascending bank (~5GPM), aluminum precipitate. |
| LW35 | -79.940700 | 40.317990 | 924 | 10/3/08 | Tributary enters on right ascending bank (~10GPM), iron and aluminum precipitate. |
| LW36 | -79.941180 | 40.319170 | 926 | 10/3/08 | Bank erosion on right ascending bank . |
| LW37 | -79.941670 | 40.319149 | 931 | 12/30/13 | Pleasant Hills Authority Lewis Run Pump Station (problems with overflows during wet weather). |
| LW38 | -79.941486 | 40.319509 | 933 | 10/19/10 | Lewis Run Culverted under Rt 51. |
| LW39 | -79.944022 | 40.319955 | 981 | 10/19/10 | Stormwater detention basin. |
| LW40 | -79.942228 | 40.321508 | 942 | 10/19/10 | Lewis Run and Lewis Run Rd trib meet at this point and are immediately culverted under Rt51 and Sheetz access road. |
| LW41 | -79.941768 | 40.321767 | 947 | 12/30/13 | Lewis Run culverted ~ 350 ft under Dean Honda parking lot. Heavy aluminum precipitate. |

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| LW42 | -79.940965 | 40.322248 | 956 | 12/30/13 | Lewis Run culverted under North Lewis Run Rd then immediately under Bowser access road and bridge. |
| LW43 | -79.939908 | 40.323896 | 1011 | 12/30/13 | Lewis Run culverted under Mon Valley School front playground area for ~ 900 ft. |
| LW44 | -79.940401 | 40.326385 | 1111 | 10/19/10 | Stormwater detention basin. |
| LW45 | -79.936950 | 40.329310 | 1055 | 10/3/08 | Headwaters of Lewis Run; Water very cloudy, substrate stained with aluminum precipitate. |
| Pleasant Hills Tributary | | | | | |
| PHT01 | -79.943995 | 40.327464 | 979 | 10/19/10 | Lewis Run RT51 Tributary daylighted for ~ 350 ft; Otherwise culverted from source above Rt51 commercial district. |
| PHT02 | -79.948921 | 40.338986 | 1061 | 10/19/10 | Stormwater detention basin for commercial district. |
| PHT03 | -79.944190 | 40.343754 | 1201 | 10/19/10 | Stormwater detention basin for commercial district. |
| Jefferson Hospital Tributary | | | | | |
| JHT01 | -79.930622 | 40.303217 | 844 | 10/31/08 | Structure in floodplain; some floodplain wetland; stream bank somewhat incised and eroded. |
| JHT02 | -79.930436 | 40.304361 | 922 | 10/19/10 | Large wetland on bench above stream. Small drainage in eroded ATV trail. |
| JHT03 | -79.929780 | 40.305230 | 882 | 10/31/08 | Bank erosion along access trail. |
| JHT04 | -79.930210 | 40.309660 | 936 | 10/31/08 | Deeply incised and eroded channel; exposed gas line; mine spoils on left ascending bank. |
| JHT05 | -79.930182 | 40.310233 | 950 | 10/31/08 | Pond at edge of woods (TDS 1.54). Outlet cutdown and incised. |
| JHT06 | -79.930570 | 40.313540 | 969 | 10/31/08 | Wetland filled with yellow boy. |
| JHT07 | -79.932558 | 40.315133 | 1034 | 10/19/10 | Drainage diverted to create impoundment on bench on left ascending bank. |
| JHT08 | 79.930530 | 40.317023 | 989 | 10/19/10 | Significant wetland area on left ascending bank. Right ascending bank is mining highwall. |
| JHT09 | 79.930675 | 40.320448 | 1039 | 10/19/10 | Small trib enters on left ascending bank from hospital parking area. Channel deeply incised and eroded;stormwater runoff. |
| JHT10 | -79.930750 | 40.321340 | 1013 | 10/31/08 | Exposed sewer pipe in stream channel. |
| Wray Large Rd Tributary | | | | | |
| WLT01 | -79.922459 | 40.300725 | 809 | 7/24/13 | Wray Large Rd Tributary is culverted under Lewis Run Rd. |
| WLT02 | -79.922860 | 40.301590 | 821 | 10/31/08 | Lewis Run trib behind Wray Large Rd. |
| WLT03 | -79.922890 | 40.303700 | 855 | 10/31/08 | AMD Seep from left ascending bank hillside (~2 GPM) |
| WLT04 | -79.922760 | 40.304710 | 876 | 10/31/08 | Stream bed erosion at gas line crossing |
| WLT05 | -79.922230 | 40.306540 | 903 | 10/31/08 | AMD discharge from right ascending bank hillside (~10 GPM) |
| WLT06 | -79.922480 | 40.306910 | 906 | 10/31/08 | AMD discharge from left ascending bank hillside. Old mining high walls. |
| WLT07 | -79.922369 | 40.307704 | 914 | 10/31/08 | Gasline crossing stream; eroding stream banks and severe cut down just down stream; ATV stream crossing upstream. |
| WLT08 | -79.920100 | 40.313720 | 986 | 10/31/08 | Border of Jefferson Hills Andrew Reilly Park. Entire stream reach surrounded by undeveloped steeply wooded slopes. |
| Oakwood Road Tributary | | | | | |
| ORT01 | -79.946257 | 40.315962 | 996 | 10/19/10 | Oakwood Rd Stormwater Detention Basin |
| ORT02 | -79.944856 | 40.315397 | 977 | 10/19/10 | Oakwood Rd AMD discharge daylighted; Stormwater discharge with AMD component |

## 8.3 Middle Peters Creek

The Middle Peters Creek sub-watershed includes Peters Creek from State Route 51 upstream to its confluence with Lick Run and all lands directly draining to Peters Creek. The riparian corridor within this sub-watershed remains principally wooded with a commercial district at the eastern end that was a former “coal patch” for the Pittsburgh Terminal No. 7 coal mine. This large coal operation was active in the early to mid 1900s. Remnants of many coaling endeavors in the form of coal waste piles, high walls and abandoned mine discharges are common along the hillsides of this sub-watershed.

The Wheeling & Lake Erie Railroad Clairton Branch parallels Peters Creek’s southern shore with the Mon-Fayette Expressway on the hillside above it. The Montour Trail shares Peters Creek Rd along the northern shore in what was once the Pennsylvania Railroad’s Peters Creek Branch right of way.

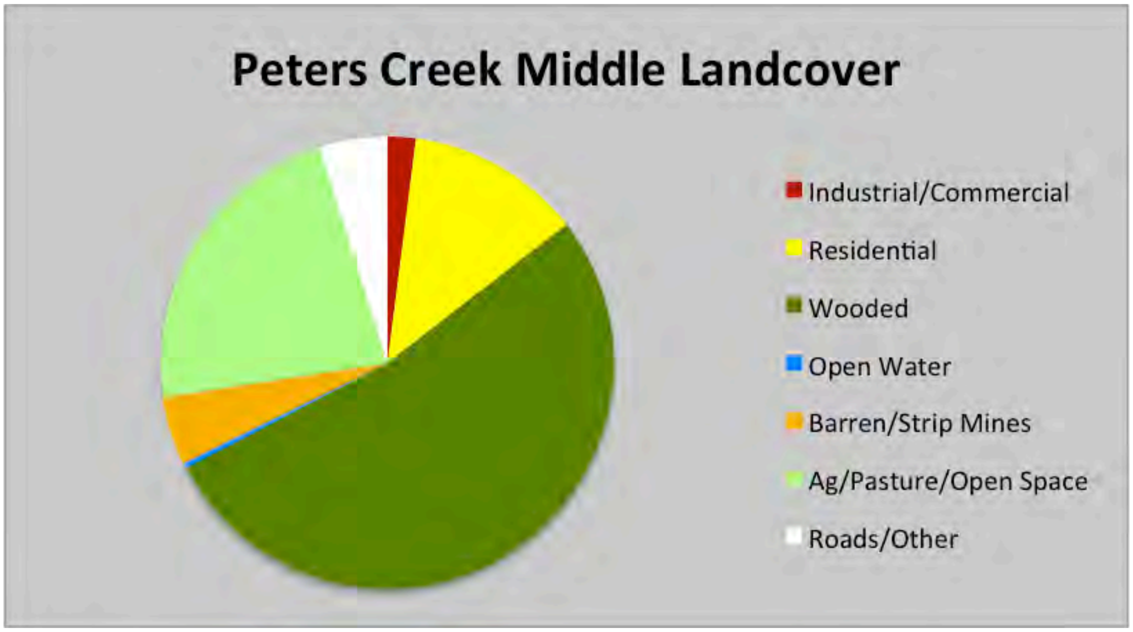
Evidence of a Strategic Mineral Stockpile operated by the federal government from the 1940s to the 2000s can be seen along Peters Creek’s southern shore near the Iron Bridge. Two ponds of approximately 7 acres that now serve a storm water mitigation function were created in this project area during that period and provide fishing opportunities for local residents.

Numerous wetlands are found along this section of Peters Creek, especially along its northern shore. The 1994 Allegheny County Natural Heritage Inventory identified one of these wetlands as an exceptional biodiversity area. The Peters Creek Biodiversity Area is an emergent wetland marsh. It is one of a few such communities left within Allegheny County and provides habitat for a number of Pennsylvania endangered and rare plant and animal species.

The total area of this sub-watershed is approximately 2.48 square miles and is entirely within Jefferson Hills Borough.

The middle portion of Peters Creek is impaired for recreational use by pathogens and for aquatic use by organic enrichment, low dissolved oxygen, siltation, nutrients and metals. This impairment is principally due to urban runoff, storm sewers, small residential runoff, bank modifications, combined sewer overflows and abandoned mine drainage. (2012 Pennsylvania Water Quality Monitoring and Assessment Report)

Land cover within the Middle Peters Creek sub-watershed is depicted in the pie chart below. The dominant land cover types are wooded (52.9%), agricultural/pasture/open space (22.6%) and residential (12.5%). (2006 National Land Cover Database)



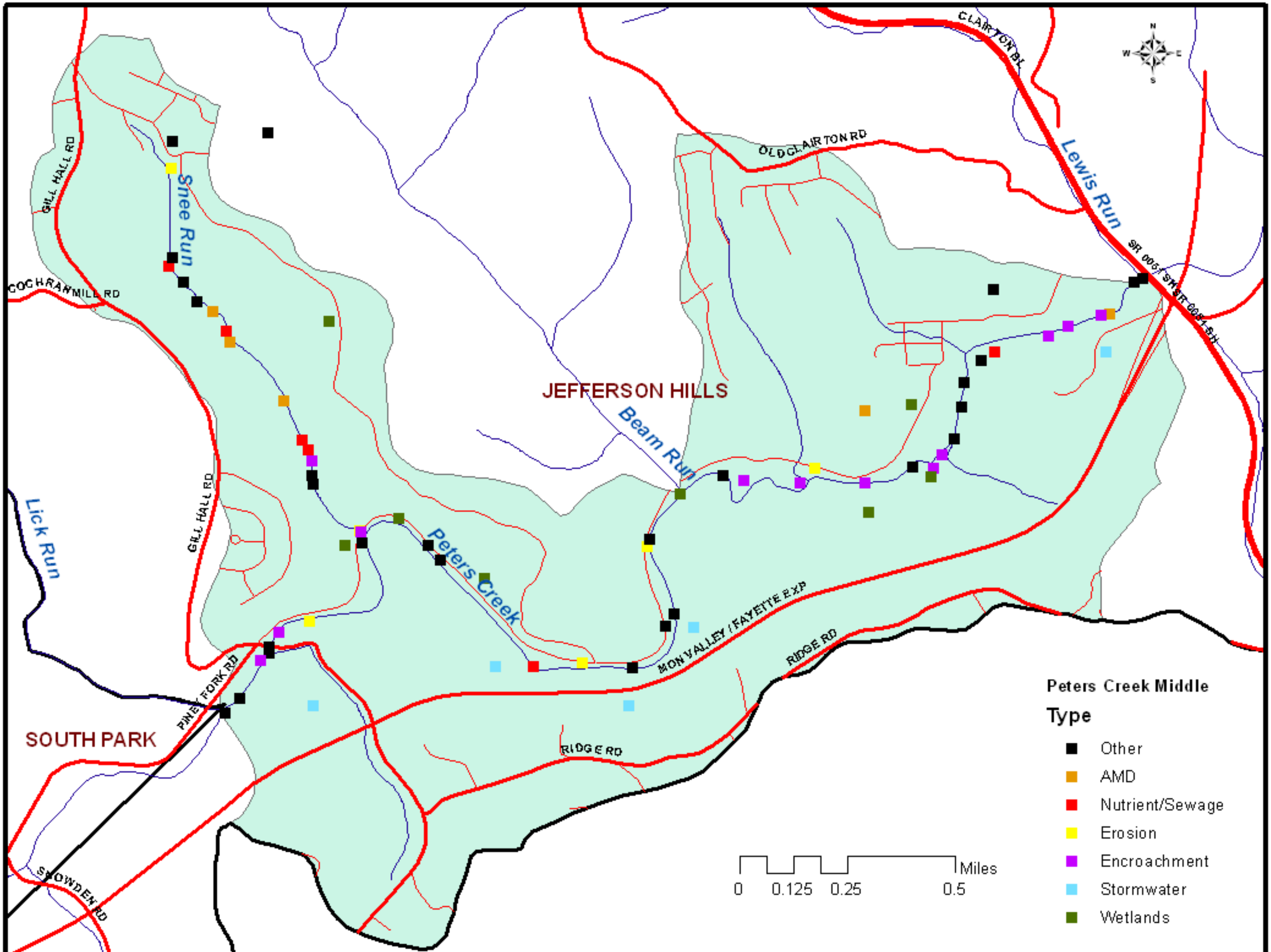

A visual assessment of the stream was conducted to better understand the current physical status of the stream channel, water and riparian zone. The stream segments were assessed scored according to the USDA Visual Assessment Protocol. The results of this assessment are found below.

## Middle Peters Creek

Waypoints: PCM01-PCM28
Description: Peters Creek main stem from Rt51 to just upstream of Beam Run confluence
USDA Visual Assessment Protocol Score = 6.9 FAIR

Waypoints: PCM29-PCM50
Description: Peters Creek main stem from Beam Run confluence to Lick Run confluence
USDA Visual Assessment Protocol Score = 6.8 FAIR

Waypoints: SR01-SR19
Description: Entire length of Snee Run from headwaters to confluence with Peters Creek
USDA Visual Assessment Protocol Score = 8.7 GOOD



JEFFERSON HILLS
SOUTH PARK
Snee Run
Peters Creek
Beam Run
Lewis Run
Lick Run
GILL HALL RD
COCHRAN MILL RD
OLD CLAIRTON RD
CLAIRTON BL
MON VALLEY / FAYETTE EXP
RIDGE RD
PINEY FORK RD
SNOWDEN RD
Miles
0
0.125
0.25
0.5
Peters Creek Middle
Type
Other
AMD
Nutrient/Sewage
Erosion
Encroachment
Stormwater
Wetlands

## *Sewage and AMD Impacts*

There are a number of abandoned mine discharges along this section of Peters Creek and the Snee Run Tributary. The discharges are mainly in the form of seeps but there is a significant discharge into a wetland at PCM21. Many of the discharges are alkaline and do not impact Peters Creeks or Snee Runs pH level which remains in the 7.0-8.0 range. Beam Run also contributes a metals load to Peters Creek.

A treated sewage smell is often evident along this section of Peters Creek. This reach is downstream of sewage treatment outfalls on Lick Run and Piney Fork and often has a significant problem with algal blooms in late winter to spring. The main sanitary sewer interceptor from the headwaters of Peters Creek to the Clairton Municipal Authority Sewage Treatment Plant runs through this valley. A sanitary sewer feeder line also follows the Snee Run valley. There have been problems in the past with a malfunctioning sanitary sewer line backing up and emptying raw sewage into the stream. This segment of Peters Creek is impaired for recreational use by pathogens. The exact source of this impairment is unknown but is most likely caused by a number of factors.

*PCM21 – Abandoned mine discharge flows between a highwall and a gob pile at an old mining surface mining site just west of the "Coal Patch" , flows down a steep hillside and enters a wetland within Peters Creeks right ascending bank floodplain.*

*SR11 – Metals impacted alkaline discharge enters Snee Run's right ascending bank.*

*PCM11 – Dead animals within the stream channel as well as their feces is a natural contribution to the bacterial load of Peters Creek.*

## *Stream Bank Erosion & Siltation*

Stream bank erosion is a major issue within the middle Peters Creek sub-watershed. Most of the inputs contributing to stream bank erosion and siltation within this sub-watershed come from upstream but the recent construction of the Mon-Fayette Expressway along the entire length of Peters Creek's southern shore is also a contributing factor. Most of the tributaries to Peters Creek within this sub-watershed are almost entirely undeveloped and wooded, have few problems with stream bank erosion themselves and contribute minimally to the main stems erosion and siltation issues. The Snee Run valley is almost entirely wooded but this tributary accepts stormwater from residential developments without adequate stormwater controls and does experience erosion issues, especially in its upper reaches. A tributary that is culverted under and accepts stormwater from the "Coal Patch" residential and commercial area also provides a contribution. Beam Run enters Peters Creek within this sub-watershed and also contributes to the problem.

Numerous wetlands within Peters Creek's northern shore floodplain as well as the Iron Bridge Ponds and wetlands south of Peters Creek help to mitigate stream bank erosion and siltation problems along this section of the stream by providing storage for and filtering excess stormwaters. The Mon-Fayette Expressway also provides a number of stormwater detention basins within this sub-watershed to mitigate runoff from the expressway and PA turnpike facilities.

*PCM28 – At a number of locations along Peters Creek Rd in Jefferson Hills the road is pinched between the stream and steep cliffs. Stream bank erosion, especially on outer banks, compromises the road at some of these locations. Jefferson Hills is proactively utilizing natural stream channel design concepts to protect infrastructure while maintaining the natural integrity of the riparian zone, improving transport within the stream channel and increasing habitat for fish and other aquatic organisms. PA DEP Growing Greener Grants are helping to fund these Best Management Practices implementations.*

*PCM28 – This restored section of Peters Creek has become a favorite of fishermen. This photo was taken on Trout opening day 2013. Peters Creek is stocked by Jefferson Hills, South Park Twp and the Tri-Community Anglers.*

*PCM42 – A log vane structure helps to direct the energy of the streams flow toward the center of the channel and away from the eroding bank along the road at Jefferson Hills Phase 2 Natural Stream Channel Design Restoration Project along Peters Creek Rd. A rootwad just downstream provides added protection to the stream bank.*

*PCM22 – Severe stream bank erosion along Peters Creek Rd just upstream of the Iron Bridge and downstream of a retaining wall along Peters Creek at the now closed National Strategic Minerals Site. The streams energy is directed at Peters Creek Rd and is eroding tree roots and beginning to compromise the road. Jefferson Hills recently received a PA DEP Growing Greener Grant to address this problem with a best management practices solution.*

*PCM16 – Stream bank erosion is a natural process, especially on sinuous segments of a stream. The section of Peters Creek depicted above is just downstream of the Iron Bridge south of Peters Creek Rd. The vertical walls of the eroding outer bank are relatively stable and provide nesting habitat for Kingfishers who dig into the upper bank wall to build a nesting burrow.*

*PCM09 – The bottom of Peters Creek is fairly embedded (estimated at 40%-50%) along the entire Middle sub-watershed reach. The stream is silted and carries a heavy sediment load during precipitation events. This silt and embeddedness decreases diversity of aquatic macroinvertebrates*

## *Nutrient Enrichment*

Peters Creek is prominently impacted by nutrient enrichment within the Middle sub-watershed. Substantial algal blooms appear in late winter to early spring and at places can choke the channel. Possible sources of this nutrient enrichment are from residential runoff, abandoned mine drainage, inadequate sewage treatment and sanitary sewer overflows. Much of this input comes from upstream of the Middle sub-watershed. Snee Run also appears to suffer somewhat from nutrient enrichment.

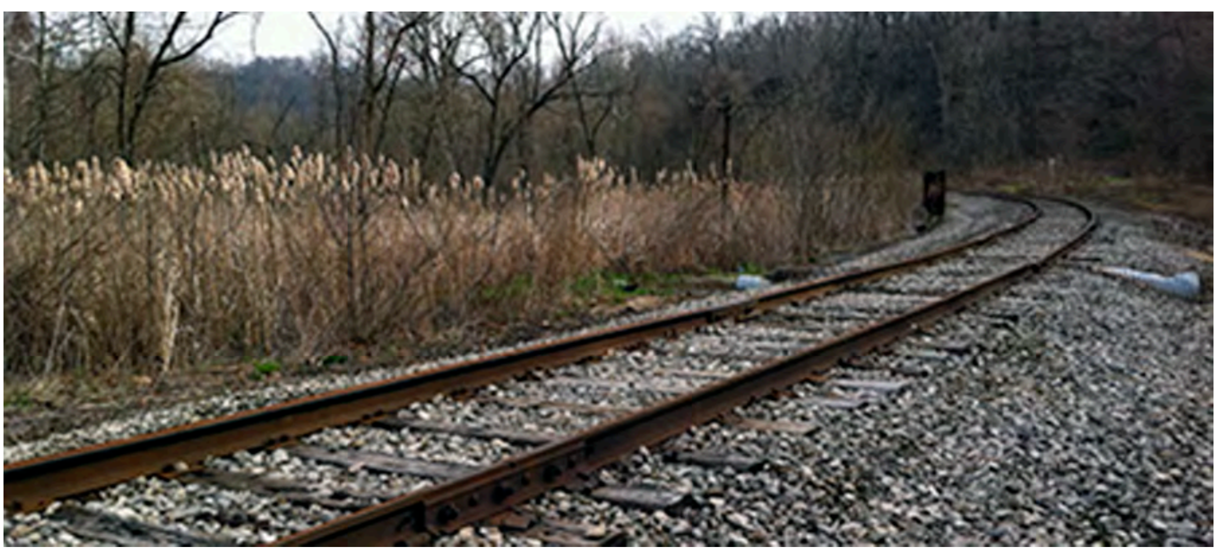
*PCM34 – Filamentous algae covering the left ascending half of Peters Creek's channel just downstream of the Waterman Rd junction with Peters Creek Rd.*

*SR07 – Snee Run also appears to have an excess nutrient load and suffers from an overabundance of algae growing within its channel. The above algal bloom appears to be associated with a sanitary sewer line running through the valley. Other possible sources include runoff from residential development in the headwaters, runoff from a farm in the headwaters and abandoned mine drainage.*

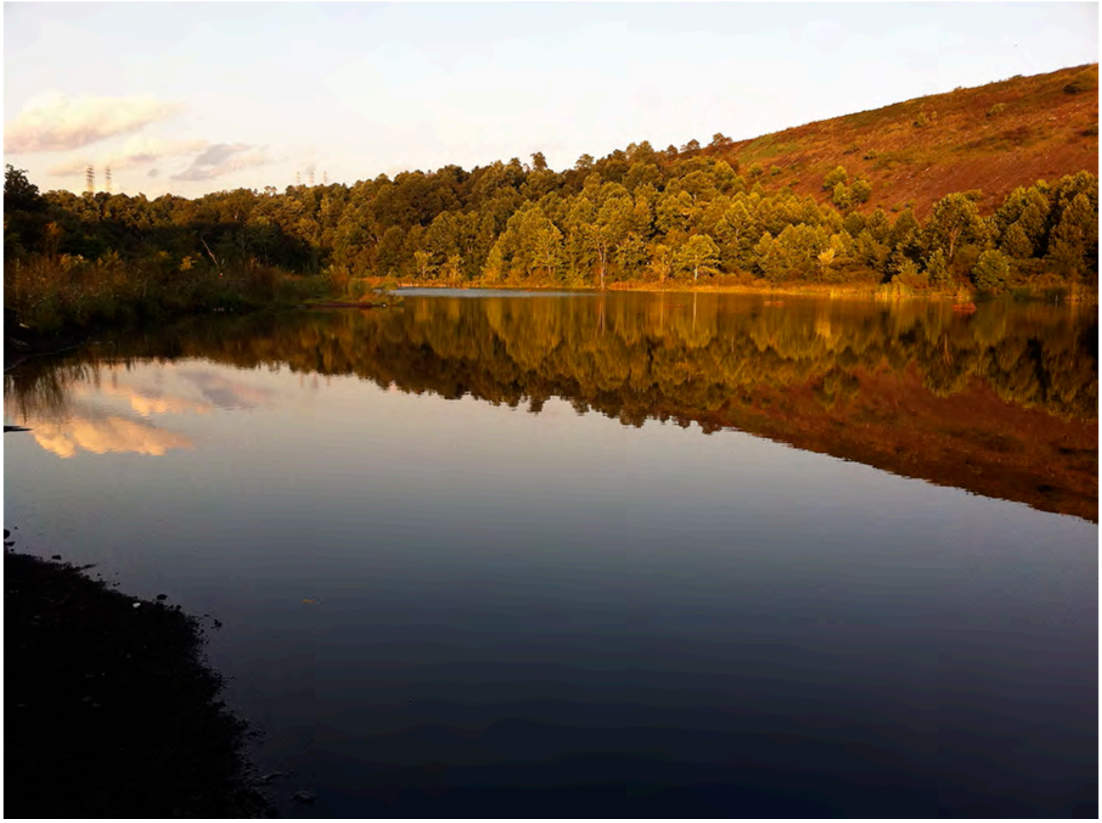
## *Wetlands*

The floodplain north of Peters Creek contains numerous wetlands within the Middle Peters Creek sub-watershed including one that is identified in the Allegheny County Natural Heritage Inventory as a biodiversity area. In addition to the many wetlands within the creeks northern floodplain there are two ponds at the National Strategic Mineral Site south of Peters Creek near the Iron Bridge. These ponds are approximately 7 acres in area, flow through a wetland prior to emptying into Peters Creek and provide a stormwater detention and recreational function.

*PCM19 – Wetlands along the north and south side of Peters Creek Rd just west of the "Coal Patch". Wetlands north of Peters Creek Rd are being compromised by homeowner pushing soil and fill over the hillside into the wetland and redirecting a stream. There are drainage problems in this area along Peters Creek Rd.*



*PCM18 – The outlet of the Iron Bridge Ponds is culverted under the Wheeling & Lake Erie Clairton Branch tracks and flows into a wetland prior to emptying into Peters Creek.*



*PCM18 – The Iron Bridge Ponds are located on the site of the former National Strategic Mineral Stockpile between the Wheeling & Lake Erie Railroad tracks and the recently constructed Mon-Fayette Expressway. There are two ponds of approximately 7 acres in total area. Water quality within the ponds is relatively good and the ponds support a number of fish species as well as freshwater mussels. They also provide breeding habitat for Wood Ducks, a number of species of amphibians, muskrats and beaver. Recent groundwater testing at the site revealed high levels of arsenic.*

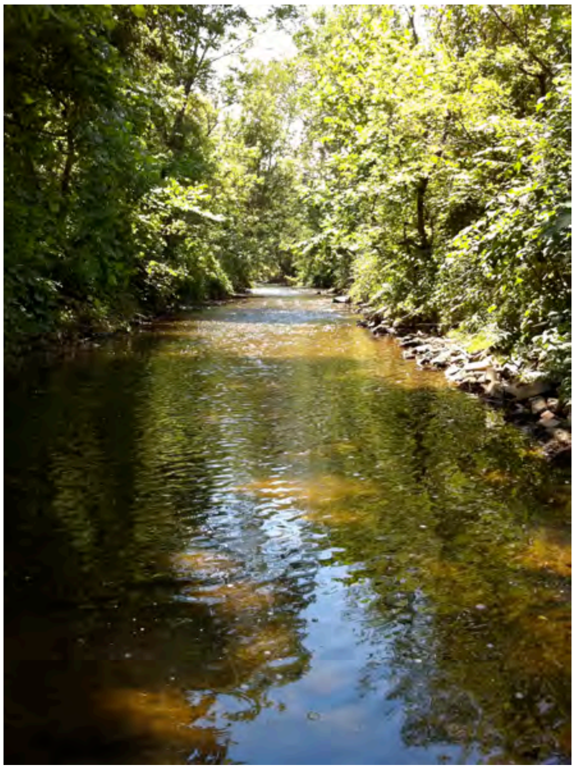
*PCM26 – A wetland is present in the floodplain of Peters Creek and Beam Run north of Peters Creek Rd just east of the confluence of Beam Run. Wetlands are also present across the road from the natural stream channel design Phase 1 project (PCM27); forested wetland east of Waterman Rd junction (PCM32); Vernal wetland just west of Waterman Rd junction (PCM34); forested wetland east of Snee Run confluence (PCM40); emergent wetland in Snee Run's left ascending floodplain just upstream of confluence with Peters Creek.*

*PCM37 – The Peters Creek Wetland Biodiversity Area is an exceptional value wetland identified by the Allegheny County Natural Heritage Inventory as a wetland characterized by a robust emergent marsh community that serves as habitat for a population of a state endangered plant species. The wetland is recognized as both a special species habitat and a community/ecosystem conservation area and is considered of exceptional significance. Since the inventory was completed other species of state significance have been found to be utilizing this wetland and surrounding lands including Snow Trillium (Trillium nivale) and Jefferson's Salamander (Ambystoma jeffersonianum).*

## *Invasive Plants & Floodplain Condition*

Invasive plants are a significant concern in the Middle Peters Creek sub-watershed. Monocultures of Japanese Knotweed (*Fallopia japonica)* have developed at a number of locations within the floodplain of Peters Creek. This noxious invasive is starting to find its way into the Snee Run valley as well. Purple Loosestripe (*Lythrum salicaria)* is working its way into a number of wetlands, especially around the Iron Bridge Ponds. Bamboo *(Phyllostachys sp.)* has escaped from cultivation and is creating monocultures at a number of locations. Garlic mustard *(Alliaria petiolata*) is becoming a significant problem within the floodplain as well and an invasive woody species, Common Buckthorn *(Rhamnus cathartica*), is starting to establish in some of the wetlands. Multiflora Rose *(Rosa multiflora*), Tree of Heaven (*Ailanthus altissima*) and invasive vines such as Oriental Bittersweet *(Celastrus orbiculatus*) and Japanese Honeysuckle *(Lonicera japonica)* are choking out natural diversity at a number of locations and are compromising regeneration of tree species along the floodplain. Wild Grape (*Vitis sp.)* is a native but is also contributing to this problem along Peters Creek.

A majority of the floodplain along Peters Creek within the Middle sub-watershed remains wooded or naturally vegetated. The floodplain is impacted, however, by the above mentioned invasives, the Wheeling & Lake Erie Railroad trackage along the southern shore, Peters Creek Rd along the northern shore, a commercial area within the floodplain along the eastern end, remnants of the National Strategic Mineral Stockpile and significant ATV activity within the southern floodplain, especially from the Iron Bridge Ponds to the Turnpike Maintenance Facility.



*PCM10 – Riparian zone along Peters Creek at the Matthews Bus Garage. Much of the floodplain remains wooded along Peters Creek in the Middle sub-watershed even though there are numerous impacts to the floodplain area.*

*PCM07 – Wheeling & Lake Erie Railroad tracks alter the left ascending bank floodplain and limit vegetative growth in the riparian zone at many locations along the southern side of Peters Creek as seen here in the eastern portion of the Middle sub-watershed.*

*PCM16 – Japanese Knotweed is infesting the riparian zone along Peters Creek at a number of locations within the Middle sub-watershed as it is here just downstream of the Iron Bridge. Purple Loosestrife is colonizing the sediment bar in the middle of the creek. Japanese Hop (Humulus japonicus) has recently made an appearance along Peters Creek. It is a fast growing annual vine that can grow up to 35 feet a year and is found in disturbed habitats such as scoured stream banks. This species outcompetes most native floodplain flora and, in fact, has been known to smother populations of knotweed. Japanese Hop is related to native Hops and the species utilized in beer making but is not useful for that purpose.*

*PCM17 – Heavy off-road use along a gas company access road along Peters Creek's left ascending bank just downstream of the Iron Bridge causes damage to the floodplain and pollution to Peters Creek in the form of sediment-laden runoff. The activity is also compromising a wetland along the stream.*

## *Stormwater Infrastructure and Issues*

Stormwater generated within the Middle Peters Creek sub-watershed does not appear to be a major contributor to the streams erosion and siltation issues. Approximately seventy-five percent of the sub-watershed remains either wooded or in vegetated open space. Excess stormwater within the Middle Peters Creek sub-watershed is primarily due to runoff from the Mon-Fayette Expressway, residential development along Gill Hall Rd, residential development along Ridge Rd and residential/commercial/industrial development in the eastern portion of the sub-watershed.

*PCM36 – Stormwater detention basin for the Mon-Fayette Expressway above Peters Creek's left ascending bank and south of the Wheeling & Lake Erie Railroad Clairton Branch. There are six stormwater detention basins along this section of Peters Creek to detain stormwater from the expressway and recent residential development along Ridge Rd. Note the off-road vehicle tracks through the middle of the detention basin even though the facility is supposedly fenced.*

## *Encroachments*

*PCM05 - Dick Corporation Building encroaches on Peters Creek's channel at the eastern end of the Middle sub-watershed. A number of outfalls also drain from the building directly into the creek.*

*PCM06 – An abutment for what appears to be an old bridge crossing of Peters Creek encroaches on the left ascending bank. Concrete debris within the stream channel and knotweed infesting the bank.*

*PCM14 – A large debris jam filled with garbage encroaches on Peters Creek's channel just downstream of the Iron Bridge Ponds confluence with the stream. An exposed gasline 100 feet downstream of the debris jam was replaced during 2013 with a new one built under the streams channel. Remnants of the old line appear to remain within the channel.*

*PCM17 – Looking upstream at the Iron Bridge. The bridges abutments encroach on the stream channel which is widened and eroded just downstream of the bridge. Peters Creek Rd runs along the creeks right ascending bank and a gas company access road runs along the left ascending bank.*

*PCM23 – A metal retaining wall at the former National Strategic Mineral Stockpile site supported large piles of strategic minerals up until about 2005. The constructed hillside carrying the Mon-Fayette Expressway can be seen in the background.*


*Just downstream of PCM35 the Wheeling & Lake Erie Railroad Clairton Branch tracks severely encroach on Peters Creek's channel on the left ascending bank at the site of a popular fishing hole. Large concrete debris has been placed along the bank to mitigate erosion and ballast erodes into the creek.*

*PCM45/PCM47 – Looking upstream at the Gill Hall Road bridge crossing of Peters Creek with the Wheeling & Lake Erie Railroad Trestle abutments encroaching on Peters Creek's channel just upstream of the bridge in close proximity. Large debris jams form at the trestle abutments and cause severe bank erosion at the site. Downstream of Gill Hall Rd on Peters Creek's right ascending bank Peters Creek Rd is pinched between a steep cliff and the stream along an outside bend. Severe bank erosion is compromising Peters Creek Rd at this location. Jefferson Hills recently received a PA DEP Growing Greener Grant to implement natural stream channel design restoration BMPs at this site.*

## Garbage & Dumps

*Littering and illegal dumping is a persistent problem within the Middle Peters Creek sub-watershed, especially around the Iron Bridge Ponds and along the access road to the Turnpike Maintenance Facility. Severe flooding in July of 2013 added significant amounts of garbage to the banks of Peters Creek from upstream. The Tri-Community Anglers has sponsored a spring and fall clean-up of the trout stocked portions of Peters Creek and Piney Fork since its inception in 1998. Volunteers from many other local groups pitch in to help and Jefferson Hills and South Hills Twp Public Works take care of trash removal. Above is the result of the Fall 2013 effort.*

*PCM10 – Above: Construction debris, discarded tires and other garbage lines the right ascending bank of Peters Creek and encroaches on the channel along what was the back lot of Dick Corporation and now is part of the Matthews Bus Garage.*
*Below.: Large quantities of construction material, sewer pipe, etc. dumped in close proximity to Peters Creek. During severe flooding this debris is often transported into the stream channel and/or carried great distances downstream. Storing materials too close to Peters Creek within the floodplain is a problem at a number of locations along the stream.*

## *Areas of Historical and/or Conservation Significance*

There are a number of areas within the Middle Peters Creek sub-watershed that are unique natural areas and worthy of long-term conservation.

*The Peters Creek Wetland Biodiversity Area (PCWBA) is a diverse emergent wetland community that provides habitat for a number of Pennsylvania listed rare and endangered plant species, an amphibian species of special concern and breeding habitat for the American Woodcock. The hillsides surrounding the wetland are an important contributor to this diversity and should be conserved. There are no other known wetlands within the Peters Creek watershed that support this degree of diversity and these wetlands are unique within Allegheny County. The PCWBA is currently privately owned and therefore the long-term conservation status of this area is at risk.*

*Clockwise from top left: Canada Goose on nest in Peters Creek Wetland Biodiversity Area; White Trout Lily in bloom; Snow Trillium and Hepatica blooming on hillside.*

*The Iron Bridge Ponds area is comprised of 7 acres of surface water that provides recreational opportunities for local residents, breeding habitat for Wood Ducks and herps, and resting habitat for migrating waterfowl. The ponds also serve to mitigate problems with excess stormwater generated by the Mon-Fayette Expressway. Ponds of this size are rare within the Peters Creek watershed and the surrounding region. The house to the west of the ponds is also of some historical significance as it dates back to the mid-1800s and was built by the Bedell family who originally owned most of the surrounding acreage.*

*Snee Run is a tributary to Peters Creek that drains the valley just east of Gill Hall Rd. The valley surrounding Snee Run is steeply sloped and remains mostly wooded with a large floodplain wetland near its confluence with Peters Creek. It is one of very few tributaries within the Peters Creek watershed whose water quality is found to be excellent and continues to support a healthy assemblage of stress intolerant macroinvertebrates including a number of species of stonefly and caddisfly.*

## *Conclusions and Recommendations*

The Peters Creek valley within the Middle Peters Creek sub-watershed is a regional recreational asset.

The Montour Trail follows Peters Creek Rd along Peters Creek's northern shore from Gill Hall Rd to the Iron Bridge and then continues to Rt51 via borough roads along the Patch community of Jefferson Hills. The Montour Trail is part of the Allegheny Passage that permits non-motorized travel between Pittsburgh and Washington, DC. The Montour Trail Council is working to build off-road trail along its entire forty-six mile course from Coraopolis to Clairton. This section within Jefferson Hills presents a challenge.

The section of Peters Creek within this sub-watershed is stocked with trout by a local fishing group, The Tri-Community Anglers, and by Jefferson Hills and South Park Twp. Water quality within the stream is adequate to permit stocked trout to survive throughout the year. The mostly wooded riparian zone surrounding Peters Creek along this section plays an important part in maintaining water temperatures within the stream that are conducive to trout survival. Eleven other species of fish, including Smallmouth Bass, were found in this section of Peters Creek during fish surveys of 2009 and 2013. The Iron Bridge Ponds also provide sportfishing opportunities.

Hunting for deer, turkey and small game remains popular within the valley surrounding this section of Peters Creek and in the adjoining valleys.

This section of the Peters Creek valley is also a destination for joggers, walkers, birdwatchers, herpers and botanists interested in the rare plants and herps found within the Peters Creek Wetland Biodiversity Area.

Most of the PA DCNR approved Peters Creek Greenway lies within the Middle Peters Creek sub-watershed. Many of the recommendations of the Peters Creek Greenway study as well as Jefferson Hill's recently upgraded Comprehensive Plan should be implemented and should be extended to the Snee Run valley as well.

The natural beauty and integrity of the Peters Creek corridor and Snee Run valley should be preserved. Forested floodplain along both streams should be conserved and managed to keep them healthy and diverse. Preservation of the unique wetlands and biologically diverse areas within the Peters Creek and Snee Run corridors should be a priority; especially the Peters Creek Wetland Biodiversity Area. Enhancement of degraded wetlands, floodplains and riparian vegetation, such as the brownfield acreage surrounding the Iron Bridge Ponds, should be implemented where possible. A plan to remediate the water quality issues associated with the former National Strategic Mineral Stockpile Site should be developed and implemented. Abandoned mine drainage entering Peters Creek and Snee Run should be assessed and remediated where applicable. The overburden pile associated with the Pittsburgh Terminal #7 Mine should be remediated and the commercial area at the Patch be made more aesthetically pleasing so as to attract further commercial development. Excessive and destructive off-road activity should be managed and minimized. Efforts should be made to eliminate littering, illegal dumping and storage of materials within the flood zone of Peters Creek. Efforts should also be made to improve water quality within Peters Creek and to maintain water quality within Snee Run.

Non-motorized outdoor recreational activities should be promoted within the corridor and a local trail network should be developed to connect communities along Old Clairton Rd, Gill Hall Rd and Ridge Rd to the Montour Trail. A walking trail system within the corridor should be developed to complement the Montour Trail.

Achieving the above goals will require zoning changes within the Peters Creek corridor to maintain it as a conservation area. It will also require land acquisition of certain parcels and conservation easements for trail building.

A long-term community outreach effort will be required to foster cooperation of volunteer groups and to enlist their help in achieving the above goals. Nature and interpretive programs should be provided within the valley to increase local interest. Local schools should be integrated into this effort and involved in activities to utilize the unique amenities of the Peters Creek corridor as an “Outdoor Classroom” for environmental education.

Jefferson Hills is already actively working to achieve some of the above goals by utilizing natural stream channel design, a best management practice, to remediate degraded segments of streambank and channel along Peters Creek within this sub-watershed. This technique helps to protect local infrastructure while also improving transport within the stream channel, enhancing fish habitat and maintaining the natural integrity of the Peters Creek corridor. Pennsylvania Department of Environmental Protection Growing Greener Grants are helping to fund this effort.

Since many of the water quality issues within this portion of Peters Creek originate upstream of the sub-watershed, regional efforts will have to be implemented to adequately control excess stormwaters, mitigate excess nutrients entering Peters Creek from varied sources and assure that sewage infrastructure and treatment are being adequately maintained. A watershed-wide plan to remediate abandoned mine drainage in a cost effective manner must be developed and implemented in order to bring Peters Creek into compliance with metals standards.

Development should be encouraged within the eastern portion of this sub-watershed from the Patch to Rt51 that maintains and enhances the integrity of the Peters Creek riparian zone and implements smart growth concepts.

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| PCM01 | -79.915505 | 40.292084 | 764 | 7/31/10 | Confluence of Lewis Run with Peters Creek |
| PCM02 | -79.915836 | 40.291976 | 764 | 7/31/10 | pH,Cond,Temp stream check |
| PCM03 | -79.916948 | 40.290901 | 765 | 7/31/10 | Small AMD seep enters Peters Creek on left ascending bank |
| PCM04 | -79.917117 | 40.289611 | 777 | 7/31/10 | Stormwater detention basin for Mon-Fayette Expressway |
| PCM05 | -79.917327 | 40.290854 | 764 | 7/31/10 | Dick Corp building encroaching on stream bank. A number of outfalls associated with building. |
| PCM06 | -79.918775 | 40.290512 | 765 | 7/31/10 | Remnants of old structure, possibly part of old stream crossing, encroaches on stream. |
| PCM07 | -79.919667 | 40.290167 | 760 | 7/31/10 | W&LE Clairton Branch track encroaches and constrains stream and riparian vegetation |
| PCM08 | -79.922007 | 40.289652 | 767 | 7/31/10 | Outfall enters creek. Heavy algal growth in stream along this section of creek. |
| PCM09 | -79.922634 | 40.289382 | 768 | 7/31/10 | Confluence of UNT 05020005002042 with Peters Creek. Culverted under Dick Corp back lot. |
| PCM10 | -79.923374 | 40.288643 | 775 | 7/31/10 | Good deal of construction material trash along this section of creek at Matthews Bus Garage Lot. |
| PCM11 | -79.923509 | 40.287815 | 771 | 7/31/10 | Dead buck in velvet in stream. Natural contributor to stream bacterial load |
| PCM12 | -79.923862 | 40.286744 | 769 | 7/31/10 | Marks downstream point where stream changes character. Very sinuous, tight bends, steep outside banks. |
| PCM13 | -79.924427 | 40.286213 | 772 | 9/29/12 | Small trib enters on left ascending bank just downstream of exposed natural gas line crossing creek. |
| PCM14 | -79.924780 | 40.285780 | 772 | 9/29/12 | Iron Bridge Ponds outlet to Peters Creek on left ascending bank. Large debris jam just downstream. |
| PCM15 | -79.924889 | 40.285470 | 776 | 9/29/12 | Iron Bridge Ponds Outlet culverted under W&LE track and enters floodplain wetland. |
| PCM16 | -79.925682 | 40.285825 | 771 | 7/31/10 | Upstream terminus of highly sinuous section of Peters Creek |
| PCM17 | -79.927810 | 40.285327 | 776 | 7/31/10 | Iron Bridge crossing of Peters Creek. Heavy ATV use and illegal dumping on gas line access road on left ascending bank. |
| PCM18 | -79.927669 | 40.284300 | 779 | 7/31/10 | Iron Bridge Ponds. 2 ponds (~7 acre) on what was National Strategic Mineral Stockpile Site. |
| PCM19 | -79.925734 | 40.287940 | 775 | 7/31/10 | Wetlands along both sides of Peters Creek Rd. Drainage problems. |
| PCM20 | -79.927782 | 40.287728 | 916 | 7/31/10 | Old mining highwall. Abandoned mine discharge feeds wetlands at bottom of slope. |
| PCM21 | -79.927315 | 40.288595 | 874 | 10/19/12 | Hillside being cut away and pushed into wetlands to create bench, stream diverted. Possible landslide risk. |
| PCM22 | -79.930000 | 40.285833 | 787 | 7/31/10 | Severe bank erosion compromising Peters Creek Rd. |
| PCM23 | -79.930667 | 40.285333 | 777 | 7/31/10 | Retaining wall to stabilize stream banks for strategic mineral storage |
| PCM24 | -79.933107 | 40.285459 | 780 | 7/31/10 | Debris jam. Tight S-Bend in stream. |
| PCM25 | -79.934060 | 40.285620 | 782 | 5/8/09 | Pennsylvania Fish & Boat Commission Fish Survey Sampling Site PFBC0103 |
| PCM26 | -79.935930 | 40.285030 | 781 | 10/6/08 | Beam Run confluence. ATV crossing just upstream. Bank erosion. Floodplain wetland on other side of Peters Creek Rd. |
| PCM27 | -79.937405 | 40.283249 | 783 | 10/6/08 | Sediment bar in stream channel. Eroding banks along road. Culvert on right ascending bank draining wetland across road. |
| PCM28 | -79.937333 | 40.283500 | 782 | 4/13/13 | Site of Jefferson Hills Natural Stream Channel Design Stabilization Project Phase I |
| PCM29 | -79.936260 | 40.280990 | 781 | 10/6/08 | Culverted tributary on left ascending bank (~5 GPM) |
| PCM30 | -79.936640 | 40.280570 | 788 | 10/6/08 | Peters Creek pH,Cond,Temp check |
| PCM31 | -79.935395 | 40.280518 | 803 | 7/31/10 | Stormwater detention basin for expressway |
| PCM32 | -79.938129 | 40.279183 | 789 | 10/6/08 | Culvert on left ascending bank; trickle flow |
| PCM33 | -79.938333 | 40.277921 | 837 | 7/31/10 | Stormwater detention basin for Mon-Fayette Expressway |
| PCM34 | -79.940350 | 40.279350 | 794 | 10/6/08 | Eroding right ascending streambanks (undercut) near Waterman Rd East junction. |
| PCM35 | -79.942500 | 40.279270 | 791 | 10/6/08 | Sediment bar in channel/dry trib from turnpike stormwater detention basin. (Former sewage issue) |
| PCM36 | -79.944143 | 40.279276 | 807 | 10/6/08 | Stormwater detention basin for expressway |
| PCM37 | -79.944606 | 40.282234 | 797 | 10/6/08 | Peters Creek Biodiversity Area (Nat Heritage Inventory); Exceptional Value Wetland/PA rare & endangered species |
| PCM38 | -79.946530 | 40.282890 | 798 | 10/6/08 | Culverted trib enters on right ascending bank (~1 GPM) |
| PCM39 | -79.947060 | 40.283390 | 803 | 10/6/08 | Seep off of hillside on right ascending bank (~ 5-10 GPM) |

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| PCM40 | -79.948320 | 40.284320 | 804 | 10/6/08 | Culvert on right ascending bank provides drainage for forest wetland along steep slope. |
| PCM41 | -79.950040 | 40.283890 | 807 | 10/6/08 | Snee Run trib enters on RAB. Stream banks eroding along road. Wetland in Snee Run's LAB floodplain. |
| PCM42 | -79.949948 | 40.283511 | 801 | 4/13/13 | Jefferson Hills Natural Stream Channel Design Phase II. |
| PCM43 | -79.952310 | 40.280890 | 807 | 10/6/08 | 2 ft wide erosion ditch on left ascending bank. Bank littered with sewer pipe. |
| PCM44 | -79.953670 | 40.280500 | 793 | 10/6/08 | Severe bank erosion encroaching on road just below Gill Hall Rd bridge. |
| PCM45 | -79.954095 | 40.280037 | 809 | 7/31/10 | Gill Hall Road crossing Peters Creek. Water line crossing just downstream of bridge. |
| PCM46 | -79.954110 | 40.279810 | 814 | 10/6/08 | Culverted tributary(05020005002079) enters on left ascending bank (~ 2 GPM) |
| PCM47 | -79.954485 | 40.279567 | 807 | 7/31/10 | W&LE Railroad Trestle in Peters Creek. Sever RAB erosion and prone to large debris jam buildup. |
| PCM48 | -79.952212 | 40.278042 | 898 | 7/31/10 | Stormwater detention basin for expressway |
| PCM49 | -79.955411 | 40.278287 | 811 | 7/31/10 | Gas line crossing of Peters Creek and up steep LAB. |
| PCM50 | -79.956060 | 40.277810 | 812 | 10/6/08 | Large sediment bar/back channel below Lick Run confluence. |
| PCM51 | -79.945115 | 40.276619 | 957 | 4/13/13 | Stormwater detention basin for residential development along Ridge Rd. |
| Snee Run | | | | | |
| SR01 | -79.949990 | 40.283850 | 801 | 6/17/08 | Confluence with UNT ,locally Snee Run, on right ascending bank. Snee Run culverted under Peters Creek Rd. |
| SR02 | -79.950689 | 40.283429 | 810 | 7/31/10 | Floodplain wetland fills valley floor for several hundred feet. Obvious coal waste disposal on right and left slopes. |
| SR03 | -79.952100 | 40.285480 | 837 | 6/17/08 | Tributary enters on left ascending bank/dry. |
| SR04 | -79.952150 | 40.285780 | 835 | 6/17/08 | Debris jam/waterfall |
| SR05 | -79.952130 | 40.286280 | 849 | 6/17/08 | Debris jam/waterfall some bank erosion. |
| SR06 | -79.952280 | 40.286660 | 847 | 6/17/08 | Sewer manhole |
| SR07 | -79.952550 | 40.286990 | 858 | 6/17/08 | Sewer manhole, algae in streambed and odors |
| SR08 | -79.953340 | 40.288310 | 877 | 6/17/08 | Tributary enters on right ascending bank; light orange precipitate on rocks; debris jam immediately upstream. |
| SR09 | -79.955650 | 40.290320 | 939 | 6/17/08 | Seep; orange precipitate; odors |
| SR10 | -79.955820 | 40.290660 | 931 | 6/17/08 | Sewer manhole in middle of stream channel; ATV crossing |
| SR11 | -79.956420 | 40.291330 | 952 | 6/17/08 | Tributary enters on right ascending bank (10 GPM); noticeable AMD; very orange |
| SR12 | -79.957080 | 40.291690 | 952 | 6/17/08 | Tributary enters on left ascending bank. |
| SR13 | -79.958340 | 40.292880 | 966 | 6/17/08 | Gas line; bank erosion; large sewer manhole immediately upstream. |
| SR14 | -79.951293 | 40.290954 | 1033 | 2/13/11 | Headwater wetland on working farm. |
| SR15 | -79.957667 | 40.292333 | 955 | 3/15/13 | Snee Run confluence with LAB trib. |
| SR16 | -79.958167 | 40.293167 | 979 | 3/15/13 | Snee Run cuts through coal overburden pile. |
| SR17 | -79.958167 | 40.296167 | 1010 | 3/15/13 | Eroded trib to Snee Run enters on RAB. |
| SR18 | -79.953880 | 40.297337 | 1050 | 3/15/13 | Headwaters of Snee Run off of Waterman Rd. |
| SR19 | -79.958087 | 40.297075 | 1079 | 2/13/11 | Good example of residential natural landscaping. |

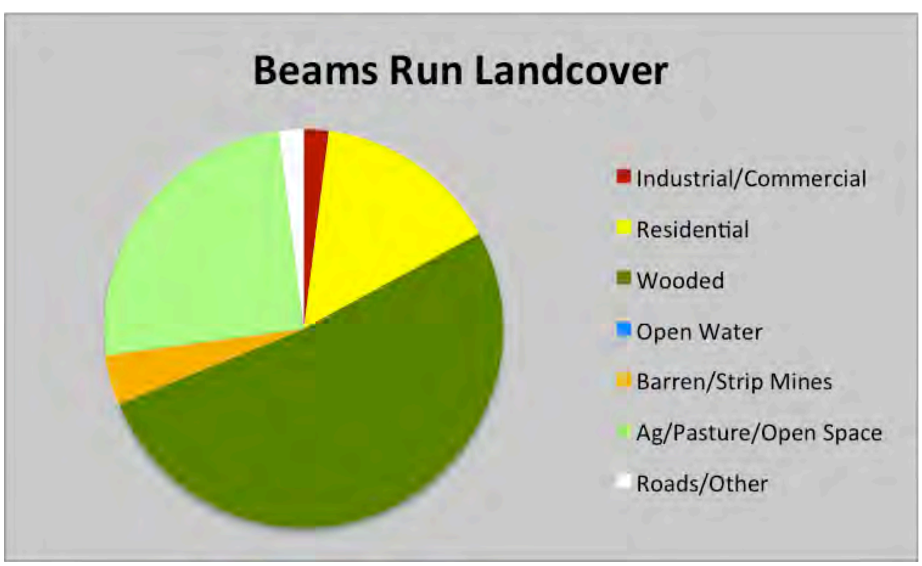
## 8.4 Beam Run

The Beam Run sub-watershed includes an area of approximately 1.99 square miles. The watershed is almost entirely within the municipality of Jefferson Hills Borough. Less than 1% of the headwaters are located within Pleasant Hills Borough.

The middle portion of the sub-watershed below Chamberlain Rd is characterized by a narrow, steeply sloped valley. This, along with the north/south orientation of the stream, provides perfect habitat for a regenerating hemlock forest along the streams eastern slope. This forest habitat type is not common within the watershed. A working farm is also located on the western plateau of this portion of stream. Remaining farmland is especially rare in the Allegheny County portion of the watershed. There are a number of large wetlands along the valley floor from the confluence with Peters Creek to above Chamberlain Road and a couple of significant wetlands on benches above the valley floor.

Beam Run is listed in the 2012 Pennsylvania Integrated Water Quality Monitoring and Assessment Report as attaining for some uses. A bacterial study of Beam Run during the summer of 2011 revealed that the portion of Beam Run above Chamberlain Rd is attaining for recreational use. Much of the stream is also listed as meeting aquatic use standards. However, we have identified a number of abandoned mine discharges within this watershed and have visual evidence of metals precipitate, especially aluminum, covering the substrate of the stream channel in many locations. The 2009 PA DEP Peters Creek Metals TMDL confirms that Beams Run does not meet PA standards for metals. The problem seems to be somewhat intermittent and becomes much more acute following heavy precipitation events.

Land cover within the sub-watershed as of 2006 is depicted in the pie chart below. The dominant land cover types within the sub-watershed are wooded (51.8%), agricultural/pasture/open space (25.1%) and residential (15.1%). The headwater portion of the watershed is where most of the residential development is located while the downstream portion is principally wooded. (2006 National Land Cover Database).

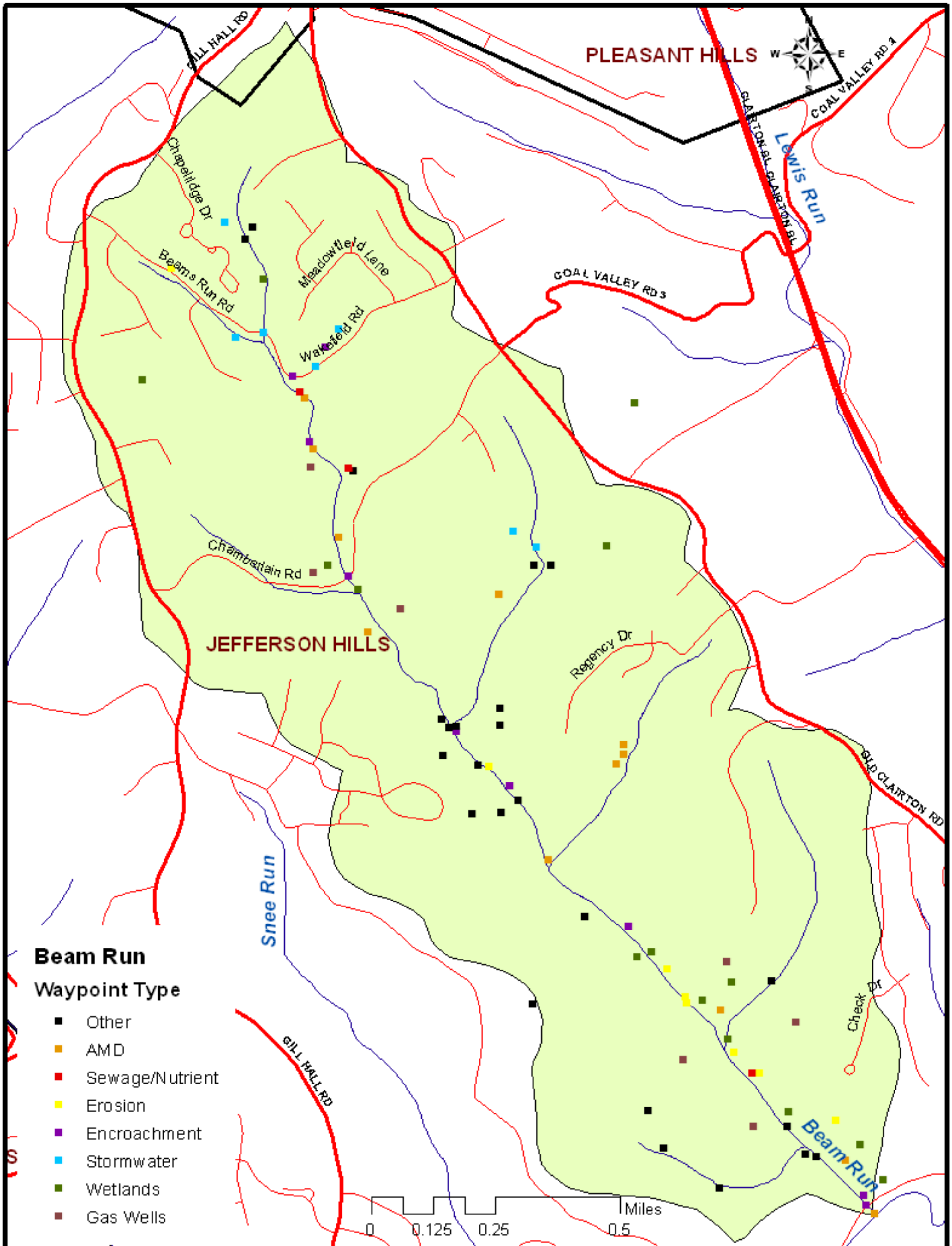


A visual assessment of the stream was conducted to better understand the current physical status of the stream channel, water and riparian zone. The stream was broken into 2 segments and was assessed and scored according to the USDA Visual Assessment Protocol. The results of this assessment are found below.

## Beam Run Main Stem

Waypoints: BR01-BR48
Description: Confluence with Peters Creek to Chamberlain Rd crossing of Beam Run plus all waypoints associated with Zora Reclamation Project
USDA Visual Assessment Protocol Score = 6.45 FAIR

Waypoints: BR49 – BR72
Description: Chamberlain Rd crossing of Beam Run to headwaters
USDA Visual Assessment Protocol Score = 5.8 POOR


PLEASANT HILLS
JEFFERSON HILLS
GILL HALL RD
COAL VALLEY RD 1
COAL VALLEY RD 3
CLAIRTON BL
OLD CLAIRTON RD
Lewis Run
Snee Run
Beam Run
Chapelridge Dr
Beams Run Rd
Meadowfield Lane
Wakefield Rd
Chamberlain Rd
Regency Dr
Check Dr
W
E
S
Beam Run
Waypoint Type
Other
AMD
Sewage/Nutrient
Erosion
Encroachment
Stormwater
Wetlands
Gas Wells
0
0.125
0.25
0.5
Miles

# Beam Run Main Stem

## *Sewage and AMD Impacts*

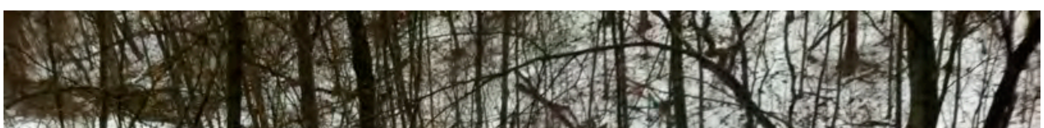
*BR01 – A plume of aluminum precipitate can often be seen at the mouth of Beam Run as it enters Peters Creek. It is intermittent and most prevalent during periods of heavy precipitation.*

*BR05 – There is a bench and high wall from old mining activity along Beam Run's right ascending bank within the lower reach of the stream. A number of abandoned mine drainage seeps and small tributaries emanate from this high wall. One of the largest seeps is found at BR05.*

*BR22 - A 30-40 GPM AMD laden spring with yellow boy covering the channels substrate enters a wetland along Beam Run's right ascending bank at BR22.*

*BR35 – An AMD impacted tributary south of Regency Drive of 40-50 GPM enters Beam Run's right ascending bank. Deep mine discharges MD-1, MD-2 and MD-3 enter this tributary. These discharges were sampled as part of the Zora Mine Reclamation Project.*

*BR42 – The tributary that drains the valley between Old Clairton Road and the Chamberlain Ridge Plan and also the Zora Mine Reclamation Project area is impacted by deep mine discharges MD-4 and MD-5. It also has been impacted by sewage from a malfunctioning sewer line. Regular inspection of sewer infrastructure is essential to avoid pollution; especially in remote areas. Above is a photo of sewage entering this tributary from an overflowing manhole.*



*BR46 - An AMD discharge of ~ 15 GPM north of the Waterman Estates residential neighborhood forms a wetland along Beam Run's left ascending bank. (pH 4.02, Conductivity 1925 µ-s/cm)*

*BR52 –A view of the east branch of an abandoned mine discharge of combined flow of ~ 75 GPM that is heavily impacted by aluminum.  This is the most significant AMD discharge into Beam Run. The water temperature of this spring remains relatively constant throughout the year. The spring flows down a steep slope into a floodplain wetland.*

*BR58 – White AMD precipitate evident on substrate of the main stem of Beam Run just downstream of the confluence of the Wakefield Road Tributary. The stream channel is deeply incised and the stream banks are eroded.*

*BR40 – Zora Mine Reclamation Project while in operation during 2010. Tributary 002034 to Beam Run flows in the bottom of the wooded section of the photo. This reclamation project was associated with Priority 3 abandoned mine lands (AML) and was financed via a Government Financed Construction Contract.*

*BR50 – A view of the gas well just north of the Chamberlain Road crossing of Beam Run. This is one of at least 12 gas wells within the Beam Run valley.*

*BR56 – Sanitary sewer infrastructure runs the entire length of Beam Run to Peters Creek. At a number of locations the infrastructure encroaches on the stream channel as seen above or stream bank erosion has exposed the sewer line as at BR15. Sewer infrastructure within the stream channel often leads to raw sewage within the stream.*

*BR64 – Input into a stormwater detention basin along Beam Run Rd appears to be impacted by sewage.*

## *Stream Bank Erosion & Siltation*

There is little development within the floodplain of Beam Run from Wakefield Road to its confluence with Peters Creek. Along this section of Beam Run erosion is mainly caused by off-road activity within the floodplain and along gas well access roads. Erosion is also caused by encroachment by culverts, sewer lines, pipe crossings and ATV crossings of the stream.

Significant residential development exists within the headwater portion of Beam Run north of Wakefield Rd. A tributary to Beam Run (002025) is culverted for much of its course under a residential development along Beam Run Rd. A tributary to Beam Run that drains a valley along Wakefield Road is deeply incised and eroded. The main stem of Beam Run (001578) flows through a semi-wooded valley between the Jefferson Pointe residential development and a residential neighborhood off of Wakefield Road.

*BR09 – An off-road trail on Beam Run's steep right ascending bank creates an erosion gully.*

*BR25 - Heavy off-road activity along a gas well access road has created a stormwater channel and increased stream sediment load. The road is no longer useable due to these severe erosion gullies.*

*BR29 - An off-road vehicle trail in the floodplain has captured and diverted part of Beam Run's flow.*

*BR44 - This incised and eroding tributary (002034) to Beam Run drains the valley between Old Clairton Road and the Chamberlain Ridge residential development.*

*BR63 – The tributary draining the valley northwest of Wakefield Rd is deeply incised and eroded. It appears to function principally as a stormwater conveyance channel for neighborhoods along Wakefield Rd. These neighborhoods were built prior to stormwater control requirements.*

## *Nutrient Enrichment*

*BR05 - Many of the AMD impacted seeps along an old mining highwall in Beam Run's lower valley are choked with algae which is an Indication of excess nutrient enrichment.*

*BR59 – A tributary to Beam Run just southwest of the Woods of Jefferson neighborhood along Beam Run Road is impacted by excess algae.*

## *Wetlands*

There are a number of significant wetlands along Beam Run's main stem. Emergent and scrub-shrub wetlands occupy a significant portion of the floodplain and a number of emergent wetlands are found on benches above the stream. Off-road activity occurs within many of these wetlands. This activity degrades the wetlands by altering flow patterns, creating significant erosion and siltation and destroying habitat.

*BR04 – Large floodplain emergent wetland along Beam Run's right ascending bank near mouth just above Peters Creek Rd. This wetland is impacted by heavy off-road activity.*

*BR06 – An emergent wetland dominated by cattails on the slopes above Beam Run's right ascending bank drains to this sphagnum wetland just downslope.*

*A large mainly scrub-shrub wetland fills Beam Run's floodplain for 500-600 ft between BR20 and BR24. Willows and cattails dominate but there is also some good diversity within this wetland. The steep slopes on both sides of the valley make it difficult for ATV's to traverse this section of floodplain.*

*BR27 – This emergent wetland on a bench above Beam Run's right ascending bank has provided habitat for beaver. Beaver most likely helped to enhance this wetland.*

*BR31 – Two small tributaries form a wetland on the left ascending bank. One tributary is captured by an erosion gully created by off-road vehicle use.*

*An emergent wetland fills the floodplain of Beam Run both south and north of the Chamberlain Road crossing of the stream. The wetland begins just downstream of an AMD impacted tributary's confluence with Beam Run at BR52 and extends downstream to below tributary 002029's entry into the wetland at BR48. The wetland also receives AMD impacted drainage from seeps along Chamberlain Road.*

*BR66 – Beam Run forms a wetland along the valley floor between Jefferson Pointe and Meadowfield Lane in the headwaters.*

*I-2 – There are a few old farm pond/impoundments within the Beam Run sub-watershed. The impoundment pictured above is located on the Zora parcel just west of the reclamation site.*

## *Invasive Plants & Floodplain Condition*

The Beam Run sub-watershed has moderate problems with invasive species, especially Multiflora Rose and Japanese Stilt Grass. Japanese Knotweed is becoming a problem in certain areas but has not formed a monoculture within the floodplain at any specific location. A significant portion of the riparian zone is forested or comprised of wetland.

Little residential development has occurred within the streams floodplain except along Beam Run Road. Most residential development is on plateaus high above the streams floodplain.

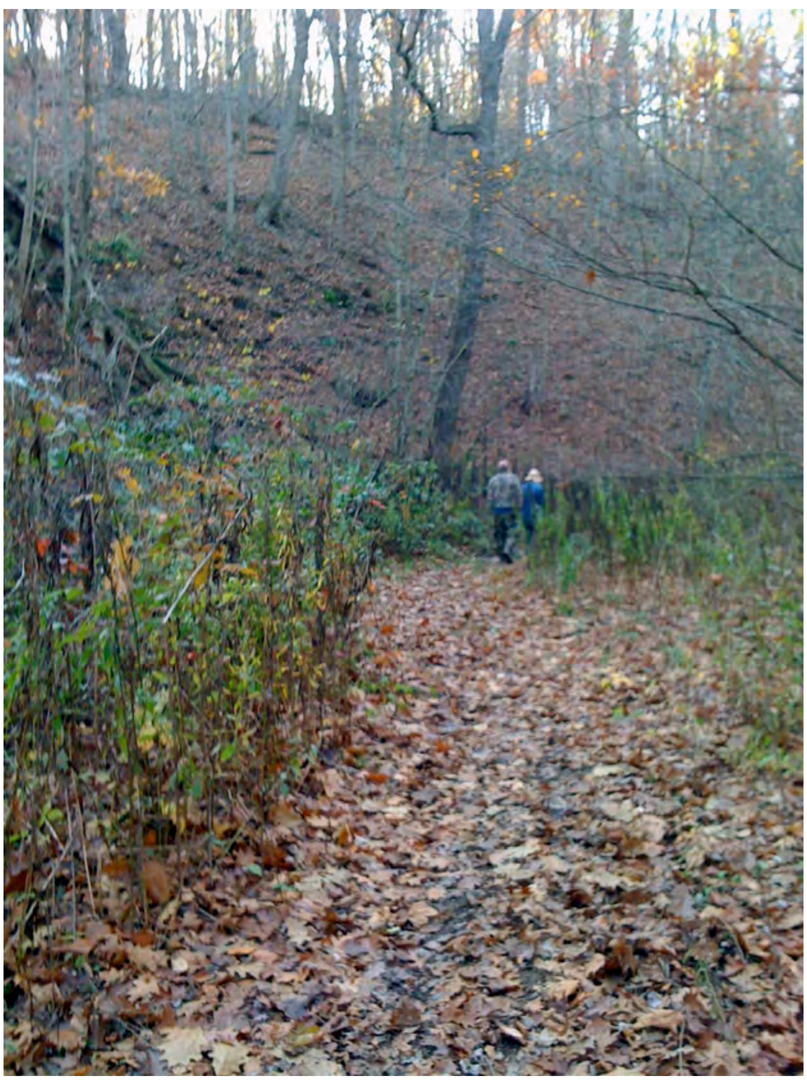
Off-road activity within the floodplain and even within the stream bed is creating a significant environmental impact. Numerous off-road trail crossings of Beam Run as well as its tributaries has caused severe erosion at certain locations and has actually altered flow patterns in a number of places.

*BR26 – An erosion channel created by off-road activity transports stormwater and sediment into Beam Run.*

*BR33 - The floodplain at this location has been altered by human activity in the past, most likely surface mining. Trees of maximum age of 20-30 years old are growing from piles of moved earthen material.*

A typical view of Beam Run and its floodplain in the lower portion of the valley from upstream of the confluence of tributary 002054 to about the confluence of tributary 002039. Multiflora Rose, Japanese stilt Grass and invasive vines are a problem in this part of the sub-watershed. Off-road trails within the right ascending floodplain alter drainage patterns, cause erosion and cause added siltation and sedimentation of the stream.

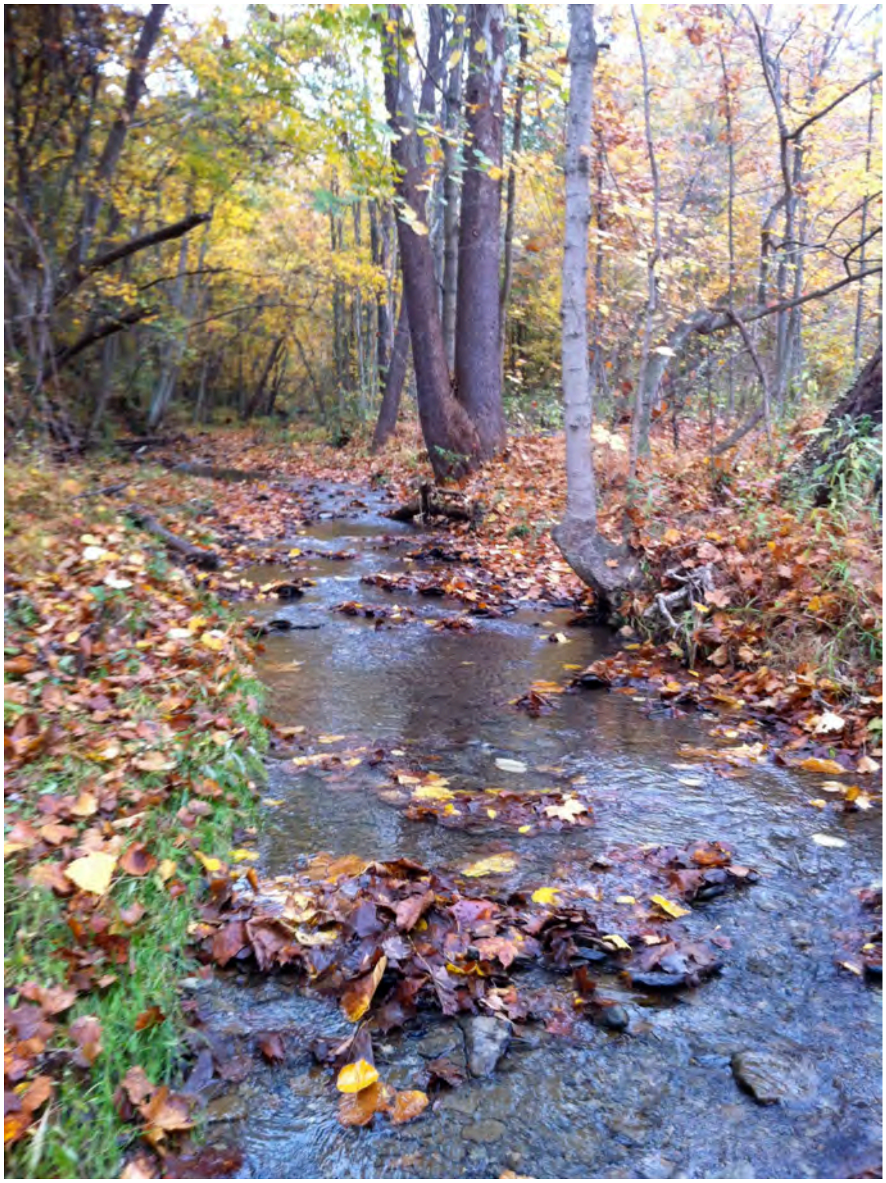
*A wetland completely covers Beam Run's floodplain from just above BR20 to BR24. Steep wooded slopes along both sides of the floodplain force off-road activity onto the slopes in this location and protects the wetland from excessive degradation.*



*Beam Run's floodplain narrows and the wooded slopes steepen from about the confluence of tributary 002034 to just below Chamberlain Road. A regenerating Hemlock woodland covers the steep right ascending slope and a maturing second growth hardwood forest covers the left ascending slope. Invasives are not a major problem in this area.*

*A fairly typical view of Beam Run and its floodplain and wooded slopes between Chamberlain Rd to just below Wakefield Rd. The floodplain broadens and the slopes become less steep along this section of stream.*

*Beam Run's floodplain in the headwaters upstream of Beam Run Road is littered with all manner of garbage, construction material, tires, numerous abandoned vehicles, old machinery and farming equipment. There are also a number of abandoned houses along this section of Beam Run.*



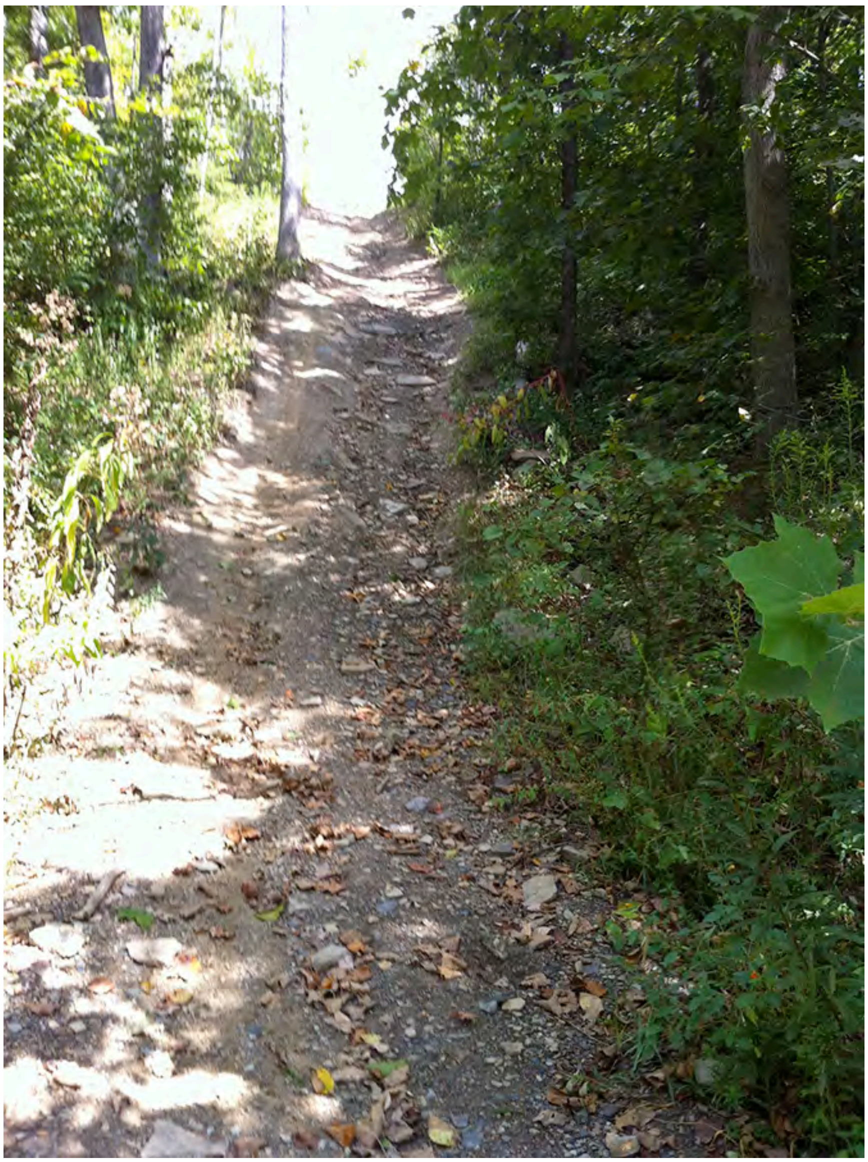
*Beam Run's right ascending bank floodplain below the 002054 tributary is wide and partially comprised of wetland. Beam Run's left ascending bank is steep and wooded along this stream segment. Invasives are not a major problem in this area but heavy off-road activity is degrading the wetland and creating erosion and siltation problems.*

## *Stormwater Infrastructure and Issues*

Stormwater does not appear to be a major problem within the lower portion of the main stem of Beam Run from downstream of Chamberlain Road to the confluence with Peters Creek though there are sections of the stream that are incised and eroded along this segment of stream, most notably between BR19 and BR15. Much of the development in the lower portion of Beam Run has occurred prior to adequate stormwater control requirements. Little stormwater from these developments enters Beam Run directly but is transported to tributaries. Stormwater from the Waterman Estates neighborhood is directed to Snee Run.

Stormwater is a significant issue within Beam Run upstream of Chamberlain Road and especially upstream of Wakefield Road.  Residential neighborhoods along Wakefield Road were built prior to requirements for stormwater controls. A tributary draining these neighborhoods is deeply incised and eroded for its entire length.

The headwaters of Beam Run flow through a valley to the northeast of Beam Run Road The stream is culverted under Beam Run Rd where it meets tributary 002025 which flows under Beam Run Road for its entire length. Beam Run is then daylighted just below where Beam Run Road and Wakefield Road meet. The stream meets the Wakefield Road Tributary a few hundred feet downstream and is severely eroded and incised downstream of this confluence. Newer developments, including The Woods of Jefferson and Jefferson Pointe have stormwater detention basins to mitigate the effects of excess stormwater.



*BR25 – Off-road trails ascending Beam Run's steep valley slopes create stormwater runoff channels that alter drainage patterns, create excess erosion and add to Beam Runs siltation load.*

*BR59 – The Wakefield Road Tributary at its confluence with Beam Run is deeply incised and eroded due to excess stormwater*

*BR64 – Stormwater detention basin accepting stormwater from the Woods of Jefferson residential development along and off of Beam Run Road.*

*BR69 – Stormwater detention basin for the Jefferson Pointe residential townhome development of of Gill Hall Road.*

*BR70 – An unstable slope along Beam Run Road at the Jefferson Pointe residential development creates a number of public and private problems. Inadequate drainage and excess stormwater are most like contributors to the problem.*

<u>*Encroachments*</u>

*BR02 – Beam Run below Peters Creek Rd to Peters Creek. The culvert carrying Beam Run under Peters Creek Road is eroding and appears to be too small for the flow it carries. The stream channel is eroded upstream of the culvert and concrete debris in the channel is obstructing flow. This stream crossing is in need of replacement.*

*BR37 – A number of sanitary sewer sections encroach on Beam Run's channel and create alteration of flow pattern and erosion.*

*BR38 – Pipe crossing of Beam Run creates a plunge pool and totally obstructs the stream channel creating a fish barrier and erosion downstream.*

*BR49 – The culvert carrying Beam Run under Chamberlain Road is either too small or clogged with debris.*

*BR57 – A gas line crossing of the stream creates an obstruction and an old culverted undeveloped road crossing encroaches on the channel. The stream is also impacted by abandoned mine drainage at this location.*

*BR61 – The culvert carrying the Wakefield Road Tributary under Wakefield Road is not adequately sized. Severe erosion occurs both upstream and downstream of the crossing. The 002025 tributary to Beam Run flows within an enclosed channel for its entire length. Its confluence with Beam Run occurs in the culvert as the headwaters of Beam Run are piped under Beam Run Road. Beam Run then emerges from the culvert just downstream of the junction of Beam Run Road and Wakefield Road.*

## *Garbage & Dumps*

*BR10 – Illegal dump site at the top of a tributary along the western slope of Beam Run.*

*BR13 – An illegal dump site along a gas well access road that is heavily eroded by heavy off-road activity near the top of Beam Run's western slope.*

*BR16 – A tree and compostable dumpsite in the foreground and a large fill operation in the distance at the edge and over a ravine at a site off of Waterman Road at the head of a tributary (002054) to Beam Run.*

*BR33 –A rotting, illegally dumped truck encroaching on Beam Run's channel in a remote section of the stream.*

*BR71 – The headwaters of Beam Run upstream of Beam Run Road is one massive dump site with all manner of concrete block, hundreds of tires, numerous rotting abandoned vehicles, old machinery, farm equipment, deteriorating abandoned houses and railroad ties with rusty nails sticking out of them as seen above and below.*

## *Areas of Historical and/or Conservation Significance*

The valley surrounding the main stem of Beam Run from its confluence with Peters Creek to Chamberlain Road is wooded or naturally vegetated with a narrow floodplain and steep surrounding slopes. There is currently no development within the valley itself with little potential for development. Development is confined to the relatively flat plateau areas both east and west of the valley.

From Chamberlain Road to Wakefield Road the valley remains wooded but the floodplain flattens out and widens somewhat.

Most of the Beam Run sub-watershed north of Wakefield Road is residential development with Beam Run flowing through a narrow valley between neighborhoods.

Approximately 75% of the Beam Run sub-watershed remains forested or in open space. About 84% of Beam Run's riparian zone is forested and much of the rest is wetland.

Some of the valley is unique and quite scenic, especially the area just south of Chamberlain Road, with a Hemlock woodland occupying Beam Run's steep eastern slope and a number of heritage class trees in a maturing second growth forest.

Conserving the natural integrity of this valley and utilizing it as a non-motorized connection from the burgeoning neighborhoods along Gill Hall Road to the Montour Trail and to other recreational amenities within Jefferson Hills and Pleasant Hills should be explored.

A new high school for the West Jefferson Hills School District is in the planning stages. The school is to be built on Beam Run's eastern plateau west of Old Clairton Rd and south of Regency Drive. Connections from this facility to the Beam Run valley and utilization of the Beam Run valley as an outdoor classroom should be a part of this effort.

*Jefferson Hill's Environmental Advisory Council exploring the Beam Run valley on a wintry day.*

## *Conclusions and Recommendations*

The Beam Run valley is an important natural amenity for Jefferson Hills with numerous wetlands and extensive wooded slopes.

However, the valley is currently negatively impacted by abandoned mine drainage, erosion created by excessive off-road vehicle use and stormwater issues, gas well maintenance issues, inadequately sized and/or eroding culverts and other stream encroachments and illegal dumping. Recommendation for the watershed follow:

- Investigate potential for treatment of abandoned mine discharges at BR52, BR46 and BR22. The stream segment just downstream of Chamberlain Road has potential for use as a trout hatchery if AMD issues can be resolved. The spring input at BR52 and steep wooded slopes maintains stream water temperatures below 60 degrees F year round.

- Examine the effect of the Zora Reclamation Project on water quality in Beam Run.

- Investigate potential for mitigating stormwater issues in the upper reaches of Beam Run with addition of storage along the Wakefield Road Tributary and by implementing green infrastructure within the neighborhoods within the headwaters.

- Develop and implement a plan for curtailing and managing excessive off-road activity within the valley to minimize damage to Beam Run and floodplain wetlands. Work to mitigate erosion damage and excessive runoff created by it. Installation of adequate gating along gas well access roads should be part of this effort.

- Work with Jefferson Hills Code Enforcement Officer to eliminate illegal dumping within the valley.

- Work to remove/mitigate encroachments impacting the Beam Run stream channel.

- Work to assure that all gas wells and access roads within the valley are being maintained adequately.

- Investigate the input to the stormwater basin at BR64 to determine if it is sewage related.

- Work with the Allegheny County Conservation District Agricultural Technician to investigate and eliminate farm related nutrient enrichment within the Beam Run sub-watershed including the tributary at BR59.

- Develop and implement a riparian management plan for the Beam Run valley to control invasive plants and maintain healthy wetlands and wooded slopes.

- Develop and implement a plan for utilizing the Beam Run valley as a resource for non-motorized recreation and as a connection between neighborhoods and local recreational resources while maintaining the natural integrity of the valley. Integrate the new high school into this plan. Include stakeholders such as the Jefferson Hill’s Environmental Advisory Council, West Jefferson Hills School District, Pittsburgh Trails and Advocacy Group, Montour Trail Council and local scouting groups in this endeavor.

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| BR01 | -79.935882 | 40.285066 | 765 | 5/30/08 | Confluence of Beam Run with Peters Creek; Aluminum precipitate at mouth into main stem. |
| BR02 | -79.936203 | 40.285319 | 765 | 5/30/08 | Bridge over Beam Run along Peters Creek Rd; Stormwater outlet on left ascending bank. Concrete debris in channel |
| BR03 | -79.93629 | 40.28561 | 632 | 5/30/08 | ATV crossing |
| BR04 | -79.935566 | 40.286068 | 811 | 9/5/10 | Floodplain wetland adjacent to right ascending bank; ATV activity |
| BR05 | -79.937000 | 40.286667 | 803 | 3/7/13 | AMD discharge from wetland up slope. |
| BR06 | -79.936438 | 40.287121 | 882 | 3/7/13 | Wetland along old mining high wall leads to slide area covered with spagnum downslope. |
| BR07 | -79.938079 | 40.286758 | 798 | 9/5/10 | Small tributary on right ascending bank from east |
| BR08 | -79.938530 | 40.286840 | 647 | 5/30/08 | Tributary from left ascending bank of of hillside |
| BR09 | -79.937333 | 40.287833 | 915 | 3/7/13 | Mini bike trail use down steep slope creates erosion gully. |
| BR10 | -79.941798 | 40.285873 | 993 | 9/5/10 | Illegal dumpsite on western slope of Beam Run |
| BR11 | -79.939210 | 40.287660 | 673 | 5/30/08 | Small waterfalls coming down stream/fossils on large rock |
| BR12 | -79.939150 | 40.288100 | 653 | 5/30/08 | Wetland/water diverted by ATV trail |
| BR13 | -79.940500 | 40.287667 | 910 | 7/9/11 | Typical Shallow gas well on western slope; access roads utilized by ATVs; illegal dumping |
| BR14 | -79.940231 | 40.289220 | 816 | 9/5/10 | Trib diverted by ATV trail forming erosion gulley/Invasives; stilt grass, muliflora rose |
| BR15 | -79.940535 | 40.289247 | 814 | 9/5/10 | Downstream end of steep cutdown section of Beam Run/Sewage line exposed; sewage smell |
| BR16 | -79.943956 | 40.287060 | 926 | 3/7/13 | Large fill dump site at edge of ravine. |
| BR17 | -79.944500 | 40.288167 | 1143 | 5/10/12 | Deteriorating Stone House and Barn |
| BR18 | -79.938835 | 40.290702 | 962 | 3/7/13 | Shallow Gas Well |
| BR19 | -79.941180 | 40.289857 | 811 | 9/5/10 | Upstream start of steep cutdown section of Beam Run |
| BR20 | -79.941431 | 40.290231 | 831 | 9/5/10 | Large floodplain wetland downstream terminus partially created by trib entering from east; heavy ATV use; gas line crossing |
| BR21 | -79.943150 | 40.289655 | 997 | 3/7/13 | Shallow Gas Well |
| BR22 | -79.941676 | 40.291092 | 829 | 9/5/10 | AMD spring discharge; yellowboy; ~30-40 gal/m entering wetland |
| BR23 | -79.939727 | 40.291940 | 900 | 3/7/13 | Beam Run trib at top of ravine on right ascending bank. |
| BR24 | -79.942385 | 40.291375 | 826 | 9/5/10 | Upstream terminus of floodplain wetland covering entire valley floor with steep slopes both sides |
| BR25 | -79.943000 | 40.291333 | 842 | 3/7/13 | Gasline crossing of Beam Run used heavily by ATVs has created a massive erosion gully. |
| BR26 | -79.943023 | 40.291480 | 831 | 9/5/10 | ATV crossing Beam Run following gas well access road; erosion and runoff gullies |
| BR27 | -79.941285 | 40.291897 | 924 | 3/7/13 | Wetland on bench above Beam Run's right ascending bank. |
| BR28 | -79.941426 | 40.292508 | 1000 | 3/7/13 | Shallow Gas Well |
| BR29 | -79.943700 | 40.292324 | 830 | 9/5/10 | Part of Beam Run diverted from main channel into ATV trail along valley floor |
| BR30 | -79.944323 | 40.292819 | 830 | 9/5/10 | Long shallow open water wetland follows steep eastern slope |
| BR31 | -79.944873 | 40.292703 | 864 | 3/7/13 | Two tribs meet to form wetland on left ascending bank. ATV activity. |
| BR32 | -79.948876 | 40.291340 | 1134 | 3/7/13 | Working farm (~ 140 acres). One of few in Allegheny County portion of watershed. |
| BR33 | -79.945197 | 40.293570 | 838 | 9/5/10 | Floodplain appears to be altered by old mining activity; abandoned truck along stream |
| BR34 | -79.946857 | 40.293869 | 997 | 9/5/10 | Metal drain pipe of unknown purpose on western slope of valley |
| BR35 | -79.948210 | 40.295570 | 851 | 3/7/13 | Tributary entering along right ascending bank draining valley south of Regency Dr (~ 40 GPM); aluminum precipitate |
| BR36 | -79.949355 | 40.297302 | 954 | 9/5/10 | Small drainage along left ascending bank. No flow. |
| BR37 | -79.949637 | 40.297717 | 897 | 5/30/08 | Sanitary sewer sections litter Beam Run channel. |
| BR38 | -79.950426 | 40.298297 | 931 | 9/5/10 | Recently modified pipe crossing Beam Run creating waterfall and erosion below crossing |
| BR39 | -79.952212 | 40.298632 | 1005 | 3/7/13 | ~5-6 acres cleared on bench on Beam Run LAB starting at Orchard Ct. |
| BR40 | -79.950000 | 40.299500 | 961 | 9/5/10 | Zora Mine Reclamation Project Pit Site |
| BR41 | -79.951667 | 40.299333 | 931 | 9/5/10 | Construction vehicle crossing of Beam Run |
| BR42 | -79.951669 | 40.299483 | 875 | 5/30/08 | Confluence with tributary draining Zora Mine Reclamation Project site on right ascending bank |
| BR43 | -79.948000 | 40.304167 | 948 | 2/8/13 | Clearcutting of small trib to stream draining Zora Project Site |
| BR44 | -79.948508 | 40.304712 | 962 | 2/8/13 | Channelized and eroding stream banks of Beam Run trib draining Zora Project Site |
| BR45 | -79.949416 | 40.305174 | 1052 | 3/7/13 | Stormwater detention basin (Chamberlain Ridge) |

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| BR46 | -79.954986 | 40.302306 | 933 | 5/30/08 | Tributary entering Beam Run on left ascending bank creates floodplain wetland (AMD Discharge ~ 15 GPM) |
| BR47 | -79.953728 | 40.302953 | 1029 | 3/7/13 | Shallow Gas Well |
| BR48 | -79.955376 | 40.303519 | 923 | 9/5/10 | Tributary entering along left ascending bank creates floodplain wetland downstream of Chamberlain Road crossing |
| BR49 | -79.955714 | 40.303928 | 959 | 5/30/08 | Stream Crossing under Coal Valley Rd #4/Chamberlain Road. Culvert is either too small or clogged. |
| BR50 | -79.957072 | 40.304063 | 1032 | 3/7/13 | Shallow Gas Well |
| BR51 | -79.956520 | 40.304240 | 986 | 5/30/08 | Downstream boundary of large floodplain wetland above Chamberlain Rd crossing |
| BR52 | -79.956080 | 40.305060 | 982 | 5/30/08 | Confluence with AMD trib on left ascending bank ( ~ 75 GPM); small debris jam |
| BR53 | -79.955500 | 40.307000 | 1002 | 3/7/13 | Small trib draining valley along Chamberlain Rd from TJHS football field enters RAB. Access to pasture along creek. |
| BR54 | -79.955680 | 40.307090 | 987 | 5/30/08 | Bank erosion; septic substrate; drainageway from pasture |
| BR55 | -79.957133 | 40.307144 | 1047 | 3/7/13 | Shallow Gas Well |
| BR56 | -79.957000 | 40.307667 | 999 | 3/7/13 | Debris jam creates 2-3 drop; fish barrier; sewer manhole encroaches on channel; aluminum precipitate present. |
| BR57 | -79.957170 | 40.307880 | 1009 | 5/30/08 | Stream crossing; large culvert carrying old farm road; gas line, wells on western slope |
| BR58 | -79.957333 | 40.309167 | 1013 | 3/7/13 | Stream channel becomes widened and incised (5-8 ft deep) and detached from floodplain; AMD evident on substate. |
| BR59 | -79.957500 | 40.309333 | 1013 | 3/7/13 | Two tribs converge with Beam Run. Wakefield trib on RAB and nutrient impacted trib on LAB. |
| BR60 | -79.957780 | 40.309797 | 1021 | 9/5/10 | Beam Run emerges from culvert (~ 600 ft) under and along Beam Run Rd. |
| BR61 | -79.956882 | 40.310078 | 1028 | 9/5/10 | Beam Run Wakefield trib culverted under Wakefield Rd. Culvert reinforced with gabioned riprap. Heavy erosion. |
| BR62 | -79.956483 | 40.310630 | 1043 | 9/5/10 | Beam Run Wakefield trib culverted under private driveway (Golden Oaks). |
| BR63 | -79.956000 | 40.311167 | 1041 | 3/7/13 | Wakefield trib in valley west of Wakefield Rd;deeply incised (6-10 ft) stormwater conveyence channel. Extremely eroded. |
| BR64 | -79.959950 | 40.310950 | 1050 | 3/7/13 | Stormwater detention basin. (Woods of Jefferson) Two stormwater inlets into basin. One appears impacted by sewage. |
| BR65 | -79.958859 | 40.311095 | 1035 | 3/7/13 | Beam Run enters culvert under Beam Run Rd from valley between Jefferson Pointe and Meadowfield Rd. |
| BR66 | -79.958833 | 40.312667 | 1050 | 3/7/13 | Stream forms wetland along valley floor between Jefferson Pointe and Meadowfield Lane. Powerline traverse valley. |
| BR67 | -79.959500 | 40.313833 | 1051 | 3/7/13 | Captured stream and stormwater from detention basin exit culvert along valley floor. |
| BR68 | -79.959244 | 40.314166 | 1079 | 3/7/13 | Two deteriorating abandoned homes in need of demolition. Great quantities of construction debris and old equipment along valley. |
| BR69 | -79.960291 | 40.314351 | 1079 | 9/5/10 | Stormwater detention basin(Jefferson Pointe) |
| BR70 | -79.962333 | 40.313000 | 1097 | 3/7/13 | Unstable section of steep slope between Beam Run Rd and Jefferson Pointe development. |
| BR71 | -79.316167 | -79.960333 | 1123 | 3/7/13 | Illegal Dump site. Hundreds of tires, Numerous abandoned vehicles filled with junk, old equipment, engines, debris. |
| BR72 | -79.963494 | 40.309755 | 1100 | 9/5/10 | Pond |

**Zora Mine Reclamation Project Water Sampling Sites**

| | | | | | |
|---|---|---|---|---|---|
| C-1 | -79.950000 | 40.296944 | 926 | Multiple | UNT "D" to Beam Run |
| C-2 | -79.952222 | 40.299722 | 916 | Multiple | UNT "C" to Beam Run |
| C-3 | -79.950833 | 40.298333 | 907 | Multiple | Beam Run Below Operation |
| C-4 | -79.951944 | 40.299444 | 914 | Multiple | UNT "A" to Beam Run Below Operation |
| C-5 | -79.951944 | 40.299444 | 914 | Multiple | Beam Run Above Operation |
| C-6 | -79.948611 | 40.304167 | 1004 | Multiple | UNT "C" to Beam Run |
| I-1 | -79.944722 | 40.308889 | 1042 | Multiple | Impoundment- Pittsburgh Pit North of Site |
| I-2 | -79.945833 | 40.304722 | 1039 | Multiple | Impoundment- West of Site |
| MD-1 | -79.945278 | 40.298611 | 949 | Multiple | Deep Mine Drainage- Pittsburgh Southeast of Site |
| MD-2 | -79.945278 | 40.298889 | 969 | Multiple | Deep Mine Drainage- Pittsburgh Southeast of Site |
| MD-3 | -79.945556 | 40.298333 | 957 | Multiple | Deep Mine Drainage- Pittsburgh Southeast of Site |
| MD-4 | -79.950000 | 40.303333 | 1042 | Multiple | Deep Mine Drainage- Pittsburgh West of Site |
| MD-5 | -79.950000 | 40.303333 | 1042 | Multiple | Deep Mine Drainage- Pittsburgh West of Site |
| S-1 | -79.950000 | 40.300000 | 979 | Multiple | Spring West of Site |
| S-2 | -79.951111 | 40.296944 | 924 | Multiple | Seep- Toe of Spoil |

## 8.5 Lick Run

The headwaters of Lick Run are found along Baptist Rd in Bethel Park. The stream serves as the boundary between South Park Twp and Jefferson Hills for much of its course and enters Peters Creek just after passing under the Piney Fork Rd Ext that was constructed as mitigation for the Mon-Fayette Expressway.

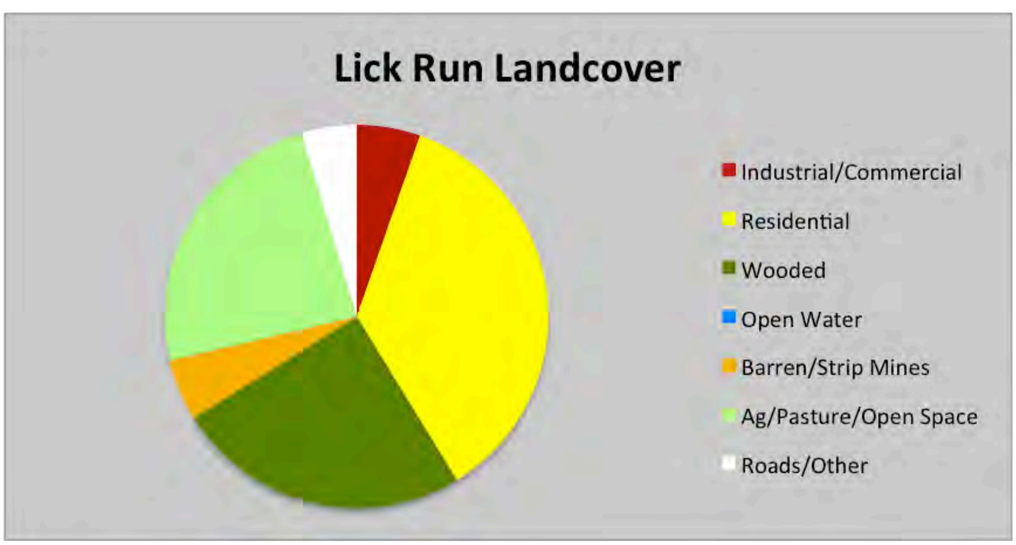
Colewood Creek, an unnamed tributary along Curry Rd in Baldwin Borough, enters Lick Run just northeast of the Wheeling & Lake Erie bridge crossing of Horning Rd. Frequent flooding of homes along this tributary has been mitigated by a recent state sponsored flood control project. However, flooding during significant rain events in the heavily residential headwater portion of the Lick Run sub-watershed remains a problem due to inadequate storm water control infrastructure.

The Wheeling & Lake Erie Railroad and the Allegheny Valley Railroad parallel Lick Run's east and west banks for much of its course from Bruceton Junction along Cochran Mill Rd to its confluence with Peters Creek.

The lower portion of the watershed is experiencing significant residential development in both South Park Twp and Jefferson Hills.

The area of the Lick Run sub-watershed is approximately 8.58 square miles and is comprised of portions of Bethel Park Borough, Baldwin Borough, Whitehall Borough, Pleasant Hills Borough, South Park Township and Jefferson Hills Borough.

Land cover within the Lick Run sub-watershed is depicted in the pie chart below. The dominant land cover types are residential (35.9%), wooded (24.9%) and agricultural/pasture/open space (24.0%). (2006 National Land Cover Database)



Lick Run is impaired for recreational use by pathogens and for aquatic use by metals, organic enrichment and low dissolved oxygen. This impairment is principally due to urban runoff, storm sewers, abandoned mine drainage and municipal point sources. (2012 Pennsylvania Water Quality Monitoring and Assessment Report)

A visual assessment of the stream was conducted to better understand the current physical status of the stream channel, water and riparian zone. The results of this assessment are found below.

## Lick Run Sub-Watershed

Waypoints: LR01-LR20
Description: Lick Run main stem from confluence with Peters Creek to Cochran Mill Rd Bridge
USDA Visual Assessment Protocol Score = 7.5 FAIR

Waypoints: LR21-LR38
Description: Lick Run main stem from Cochran Mill Rd Bridge to McElheny Rd
USDA Visual Assessment Protocol Score = 7.4 FAIR

Waypoints: LR39-LR64
Description: Lick Run main stem from McElheny Rd to Curry Hollow Rd
USDA Visual Assessment Protocol Score = 6.7 FAIR

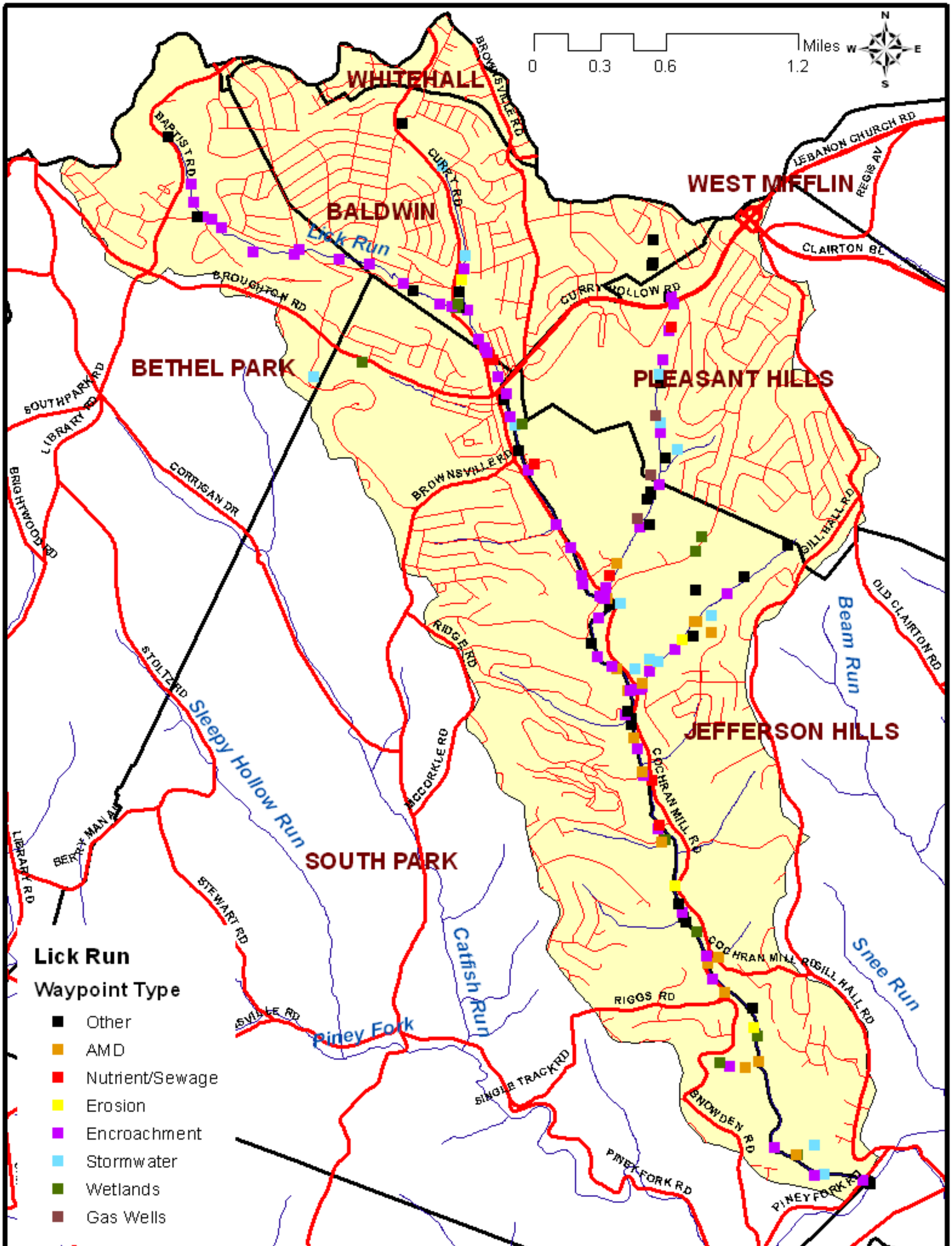
Waypoints: LR65-LR89
Description: Lick Run main stem from Curry Hollow Rd to headwaters along Baptist Rd
USDA Visual Assessment Protocol Score = 6.4 FAIR

Waypoints: CRT01-CRT07
Description: Entire length of Colewood Creek Tributary
USDA Visual Assessment Protocol Score = 4.8 POOR

Waypoints: JMT01-JMT16; JMT26-JMT28
Description: Jefferson Memorial Tributary from confluence with Lick Run to commercial district along Old Curry Hollow Rd
USDA Visual Assessment Protocol Score = 6.5 FAIR

Waypoints: JMT17-JMT25
Description: Jefferson Memorial Tributary from commercial district along Old Curry Hollow Rd to headwaters at Whitehall Tunnel
USDA Visual Assessment Protocol Score = 3.1 POOR

Waypoints: MRT01-MRT23
Description: Entire length of Mineral Run Tributary
USDA Visual Assessment Protocol Score = 5.2 POOR

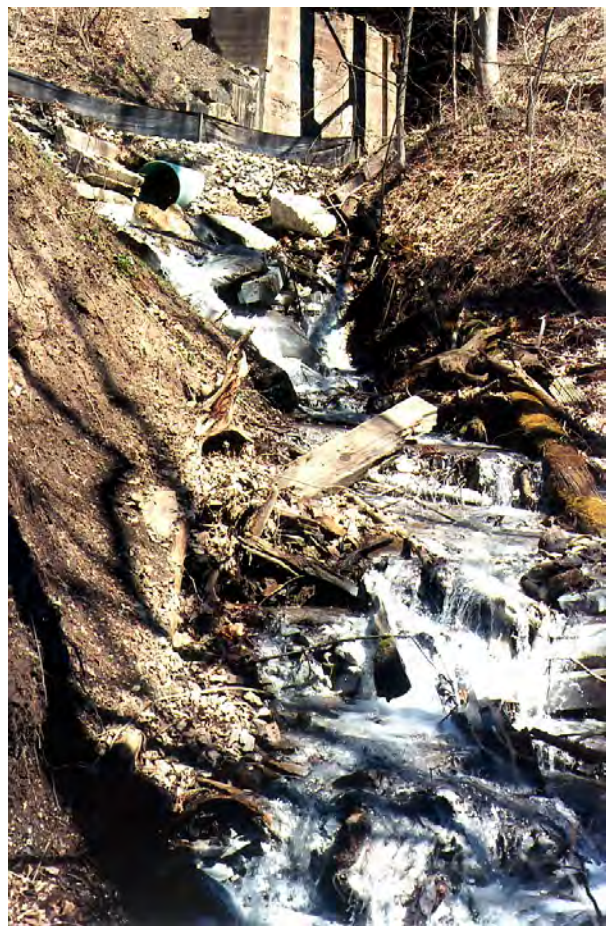


Miles
0
0.3
0.6
1.2
N
E
S
W
WHITEHALL
BALDWIN
WEST MIFFLIN
BETHEL PARK
PLEASANT HILLS
JEFFERSON HILLS
SOUTH PARK
Lick Run
Sleepy Hollow Run
Catfish Run
Piney Fork
Beam Run
Snee Run
BAPTIST RD
CURRY RD
BROWNSVILLE RD
LEBANON CHURCH RD
REGIS AV
CLAIRTON BL
CURRY HOLLOW RD
BROUGHTON RD
SOUTHPARK RD
LIBRARY RD
BRIGHTWOOD RD
CORRIGAN DR
GILL HALL RD
OLD CLAIRTON RD
RIDGE RD
STOLTZ RD
MCCORKLE RD
COCHRAN MILL RD
BERRYMAN AV
STEWART RD
RIGGS RD
SINGLE TRACK RD
SNOWDEN RD
PINEY FORK RD
Lick Run
Waypoint Type
Other
AMD
Nutrient/Sewage
Erosion
Encroachment
Stormwater
Wetlands
Gas Wells

## *Sewage and AMD Impacts*

Lick Run and many if its tributaries are impacted significantly by abandoned mine drainage. A 2009 PA DEP Peters Creek Watershed Metals TMDL study found that the daily aluminum load of Lick Run would require a 77% reduction to bring it into compliance with current standards. Iron and manganese were not found to be out of compliance. Mineral Run, a tributary that drains the valley between Gill Hall Rd and West Bruceton Rd, is severely impacted by abandoned mine drainage and the Jefferson Memorial Tributary also has a number of discharges along its course. Many of the smaller tributaries along Cochran Mill Rd, including the one that drains Riggs Rd, are impacted by heavy loads of aluminum and there are a number of other discharges further south to Lick Run's confluence with Peters Creek.

Sewage related issues are significantly impacting Lick Run. The Pleasant Hills Authority Sewage Treatment Plant discharges into Lick Run just upstream of Wallace Rd. The sewage treatment plant as well as the communities serviced by this treatment plant, including South Park Twp, Baldwin Borough, Whitehall Borough and Pleasant Hills Borough, are under a consent decree to eliminate illegal overflow discharges into streams and to significantly reduce infiltration into sanitary sewer lines feeding the treatment plant. At a number of locations along Lick Run sanitary sewer infrastructure has found its way into Lick Run's low flow channel which can create various problems.



*LR07 – AMD discharge flows along the east side of the Wheeling & Lake Erie railroad tracks in a remnant woodlot along the Patriot Pointe residential development prior to being culverted under an unimproved access road under the tracks. The discharge then flows into a wetland within Lick Run's right ascending bank floodplain. Construction debris and other garbage including industrial grade tires with rims discarded along discharge.*

*LR08 - AMD impacted seep erodes through a coal waste pile on Lick Run's left ascending bank leaving a heavy deposit at its mouth.*

*LR10 – An AMD impacted tributary draining a small, steep valley east of Snowden Rd impounds up against the Allegheny Valley Railroad tracks.*

*LR16 – AMD impacted tributary draining valley along Riggs Rd enters Lick Run's left ascending bank after being culverted under the Cochran Mill Rd tunnel. Severe erosion problems on the streams right ascending bank along the road from Snowden Rd junction to tunnel.*

*LR19 – AMD impacted tributary to Lick Run draining the valley between Klein Rd and the Washington Square residential development in Jefferson Hills creates an impoundment up against the Wheeling & Lake Erie Railroad tracks prior to entering Lick Run's right ascending bank just downstream of the Cochran Mill Rd Bridge.*

*LR28 - A culverted AMD impacted discharge ponds along the Allegheny Valley Railroad tracks just downstream of Wallace Rd prior to entering Lick Run's left ascending bank.*

*LR40 – Mineral Run Tributary enters Lick Run's right ascending bank just west of Cochran Mill Rd near its junction with Stilley Rd. This tributary is impacted by several AMD discharges depicted below.*

*MRT17/MRT16 – An AMD discharge flows from under the gabion rip-rapped retaining wall and enters a wetland just west of Thomas Jefferson Dr and Jefferson Estates. In background is a stormwater detention basin that is impacted by AMD.*

*MRT15 – Discharges from the wetland and detention basin enter Mineral Run's right ascending bank in the valley between Jefferson Estates and West Bruceton Rd.*

*MRT13/MRT05/MRT14 – Several other AMD discharges enter Mineral Run's right ascending bank downstream along a large coal waste pile and further downstream along Stilley Rd.*

*JMT04 – A culverted AMD discharge flows under the Allegheny Valley Railroad tracks and enters the Jefferson Memorial Tributary's right ascending bank at the AVR and W&LE interchange at Bruceton.*

*LR05 – Raw sewage enters Lick Run just upstream of the W&LE overpass as the result of a sanitary sewer manhole malfunction. Sewage infrastructure within the stream channel is often compromised by flooding and debris jams.*

*LR30/LR31 – Pleasant Hills Authority Sewage Treatment Plant outfall into Lick Run just upstream of Wallace Rd bridge. Further upstream a smaller outfall from the sewage plant can be seen entering Lick Run's left ascending bank.*

*JMT01 - Sanitary sewer manhole in Lick Run's channel at confluence of Jefferson Memorial Tributary just downstream of Wilson Rd bridge.*

*JMT10 – A sanitary sewer manhole within the channel of the Jefferson Memorial Tributary along Allegheny Valley Railroad tracks.*

## *Stream Bank Erosion & Siltation*

Stream bank erosion and siltation are plentiful throughout the Lick Run sub-watershed, especially within the heavily developed headwaters section and along the Jefferson Memorial Tributary. This area of the sub-watershed was developed prior to implementation of adequate requirements for stormwater controls. These excess stormwaters continue to create erosion issues along Cochran Mill Rd.

*LR08 to LR09 – Stream bank erosion is a natural process, however, in the lower relatively undeveloped reaches of Lick Run there are sections of erosion that appear to be excessive and unstable.*

*LR55 – Gabioned rip-rap along Lick Run's severely eroding left ascending bank just upstream of bridge crossing of Lick Run under Cochran Mill Rd.*

*JMT17 – Severely eroding right ascending bank of Jefferson Memorial Tributary just downstream of the streams exit from an approximately 700 foot culvert under a commercial district along Old Curry Hollow Rd. Attempts to stabilize this bank have not been successful.*

*MRT06 – Unstable and eroding slope above Mineral Run's left ascending bank that was recently re-graded as part of the Hunters Field residential development along West Bruceton Rd in Jefferson Hills.*

*MRT11 – Eroding right ascending bank of Mineral Run. Remnants of silt fence that is little more than refuse.*

## Nutrient Enrichment

Excess nutrient enrichment is a significant problem within Lick Run, especially downstream of the sewage treatment plant, and within many of its tributaries. Possible sources of this enrichment include numerous instances of abandoned mine drainage, inadequate sewage treatment, malfunctioning sewer infrastructure and stormwater runoff from residential and commercial developments.

*JMT05 – A number of issues are illustrated in this photo taken along the lower reach of the Jefferson Memorial Tributary. An overabundance of algal growth is evident as is encroachment from an old railroad tie wall along the streams left ascending bank, construction debris within the floodplain and concrete debris obstructing the stream channel.*

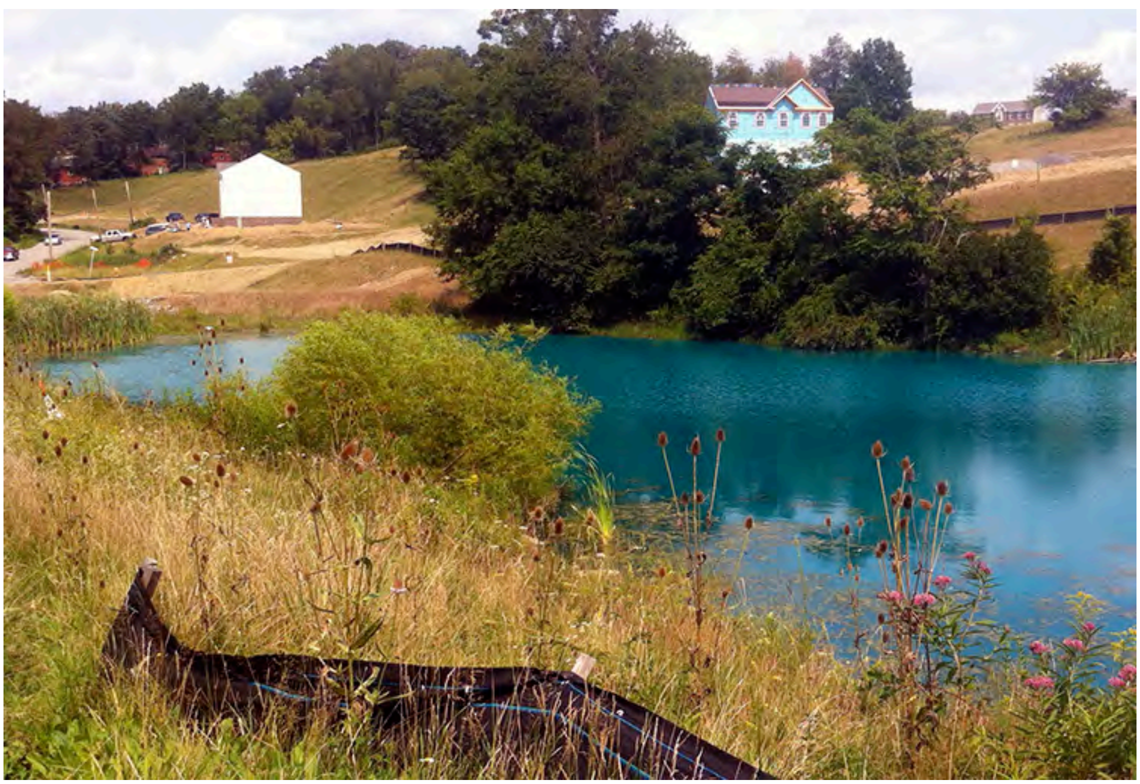
*JMT20 – Numerous discharges of stormwater from the commercial district along Terence Drive enter Jefferson Memorial Tributary just downstream of the Curry Hollow Rd overpass. There are also several discharges upstream of the bridge to the headwaters near Whitehall Tunnel. Many of these discharges are choked with algae as is the stream channel itself.*

## *Wetlands*

The floodplains of Lick Run are not characterized by large wetlands, however, there are a few significant wetlands along the stream as well as a number of smaller ones.

*LR06 - A significant wetland within Lick Run's right ascending floodplain just upstream of the Wheeling & Lake Erie Railroad tunnel, west of the Patriot Pointe residential development in Jefferson Hills and east of South Park Twp's Snowden neighborhood. The wetland is fed by at least one AMD discharge and is most likely helping to mitigate it. Queen Snakes, a species of special concern in Pennsylvania, are inhabiting this wetland.*

*LR13 - Approximately .6 miles upstream another significant wetland exists within Lick Run's left ascending floodplain. There is some off-road erosion and bank erosion in this area. Further upstream just north of the Cochran Mill Rd Bridge at LR21 a landowner is attempting to drain a floodplain wetland with drainage ditches to Lick Run.*



*MRT22 – A view of what used to be the Barati farm pond toward new residential development along West Bruceton Road in 2013. The pond is being maintained as part of the Hunters Field residential development. A chemical has been added to the pond and provides it with a deep aqua tinge. A forebay was also included in the design to help to mitigate siltation problems within the pond.*

*MRT23 – Pond/wetland west of West Bruceton Rd across from current Hunters Field development.*

## *Invasive Plants & Floodplain Condition*

The floodplain condition along the main stem of Lick Run changes quite dramatically from its headwaters to its confluence with Peters Creek.

The headwaters portion of the watershed is highly developed. Lick Run is culverted under a commercial district for several hundred feet along Baptist Rd not far from its source just south of Millenium Park. It is then constrained by Horning Rd and culverted numerous times under private driveways, under the W&LE Railroad, and then again for 600 ft behind a Pennsylvania American Water facility. The stream is then constrained between un-vegetated commercial areas to its confluence with a tributary along Gardenville Rd that drains a residential development that experiences severe flooding issues. There is little natural floodplain left in this area with an inadequate riparian buffer and numerous bank modifications characterizing this section of stream.

From Gardenville Rd to McAnulty Rd the floodplain condition improves. The right ascending floodplain is mostly naturally vegetated and the left ascending bank consists of residential back yards with inadequate riparian buffer in sections.

Downstream of McAnulty to Horning Rd the stream is constrained between un-vegetated commercial areas and residential yards and then between a large coal waste pile and Bloom Engineering which is mostly impervious surface.

Downstream of Horning Rd to the culvert under the Wheeling & Lake Erie Railroad the floodplain is naturally vegetated with wetland and scrubby woodland.

From the Wheeling & Lake Erie Railroad to Curry Hollow Rd Lick Run flows along Horning Rd and then between residential and commercial areas. There are numerous bank modifications, a good deal of debris in the floodplain, a number of culverts and crossings of the stream and an inadequate riparian buffer along much of this section of Lick Run.

The right ascending bank floodplain downstream of Curry Hollow Rd to Hough Rd consists of scrubby woodland and farm field and the left ascending bank is a mixture of commercial and residential development with a good deal of impervious surface and little riparian buffer along Lick Run.

From Hough Rd to Wilson Rd Lick Run flows along and is constrained by Cochran Mill Rd for much of its course. An adequate vegetated buffer exists along the right ascending floodplain until the stream is culverted to the west side of Cochran Mill Rd. The stream then flows through a mixture of commercial and residential areas prior to being culverted under Wilson Road and the Allegheny Valley Railroad tracks. The stream is inadequately buffered along this section.

Lick Run flows along Cochran Mill Rd from Wilson Road to the Cochran Mill Rd bridge. The stream flows through a number of commercial and residential areas and along the Pleasant Hills Authority Wastewater Treatment Plant. It is culverted and crossed numerous times under public and private roads and under the railroad. There are sections that are adequately buffered but there are also numerous areas that are mowed right up to the stream bank with little to no forest left along the stream. Impervious commercial areas, Cochran Mill Rd, the sewage treatment plant and the Allegheny Valley Railroad tracks impinge upon the stream bank at a number of locations. Large infestations of Japanese Knotweed are also present within the floodplain at a number of locations along this section of Lick Run.

From the Cochran Mill Rd Bridge to Lick Run's confluence with Peters Creek the floodplain is mostly naturally vegetated with forest and a number of wetlands. The forest along the floodplain appears to be recovering from old mining activity at a number of locations. Off-road activity is evident and causing erosion at a number of sites and there are significant infestations of Japanese Knotweed within the floodplain.

Just downstream of the Cochran Mill Rd Bridge there is an approximately 7.0 acre site along 1600 feet of Lick Run's right ascending floodplain that is cleared and appears to be utilized for storage of various materials. An inadequate vegetated buffer exists along Lick Run at this location. Cochran Mill Rd constrains the streams left ascending bank along part of this area and there is a serious issue with bank erosion from the Cochran Mill Road bridge to the Allegheny Valley Railroad underpass.

The Mineral Run valley is mostly naturally vegetated but its right ascending bank is constrained by the Jefferson Estates residential development and by a large coal waste pile along its upper reach just downstream of Mowry Park. The steep slope along this area is not adequately vegetated and there are problems with stream bank erosion as well as areas with Japanese

Knotweed along this stream. Pleasant Hills Authority sewer lines run along the streams left ascending bank and new residential development is taking place on the hill top along the streams right ascending bank. A connector road that will cross the stream and connect Jefferson Estates with the Hunters Field development is in the planning stage.

## *Stormwater Infrastructure and Issues*

*CRT06 – Dense residential and commercial development combined with inadequately sized stormwater infrastructure in the headwaters portion of the Lick Run sub-watershed contributes to flooding problems along Colewood Road and within residential areas east of Gardenville Rd. To the left is a view of a 2000 foot concrete flood control channel built along the entire length of Colewood Rd to mitigate flooding problems in the area. These types of projects are un-natural, costly, require long-term maintenance and cause erosion issues downstream of the project. Adequate stormwater control is essential during development to avoid these types of problems. Managing stormwater effectively on site is essential. Retrofitting solutions after the fact is often extremely difficult and costly.*

*JMT24 – Stormwater enters the extreme upper reach of the Jefferson Memorial Tributary from Pleasant Hills and Baldwin Borough neighborhoods east of the Allegheny Valley Railroad near the Whitehall Tunnel. Excess algae is present along this entire section of the stream.*

*JMT11 – A culverted stream that accepts stormwater from a detention pond servicing Pleasant Hills residential neighborhoods west of West Bruceton Rd enters Jefferson Memorial Tributary's right ascending bank. The tributary channel is braided and eroded at this location. The stream appears to have been culverted and the area filled and graded in anticipation of additional commercial development along an extended Terence Drive.*

*A view of a tributary that flows behind Wilson Park and then along one of South Park Township's few remaining farming operations along Wilson Road enters Lick Run at LR45. The tributary is deeply incised and channelized behind the park and appears to be functioning principally as a stormwater conveyance channel for neighborhoods north of Wilson Road.*

*LR03 – A great deal of new development is taking place along the lower reaches of Lick Run. To the right is a view of another deeply incised and channelized tributary to Lick Run that accepts stormwater from the Patriot Pointe development along Gill Hall Road in Jefferson Hills. The tributary is seen exiting a culvert under the Wheeling & Lake Erie Railroad.*

*A stormwater detention basin within the Washington Square residential development along Gill Hall Road, Waterman Road and the Wheeling & Lake Erie Railroad tracks in Jefferson Hills. The lower reach of Lick Run forms the border between Jefferson Hills and South Park Township. Ordinances requiring effective stormwater control are absolutely essential in this rapidly developing sub-watershed. Retaining green infrastructure and stormwater on site and implementation of best management stormwater practices are most likely necessary to be protective of water quality in Lick Run.*

*MRT07 – A stormwater detention basin that is part of the Hunter's Fields development along West Bruceton Road and Mineral Run in Jefferson Hills.*

## *Encroachments*

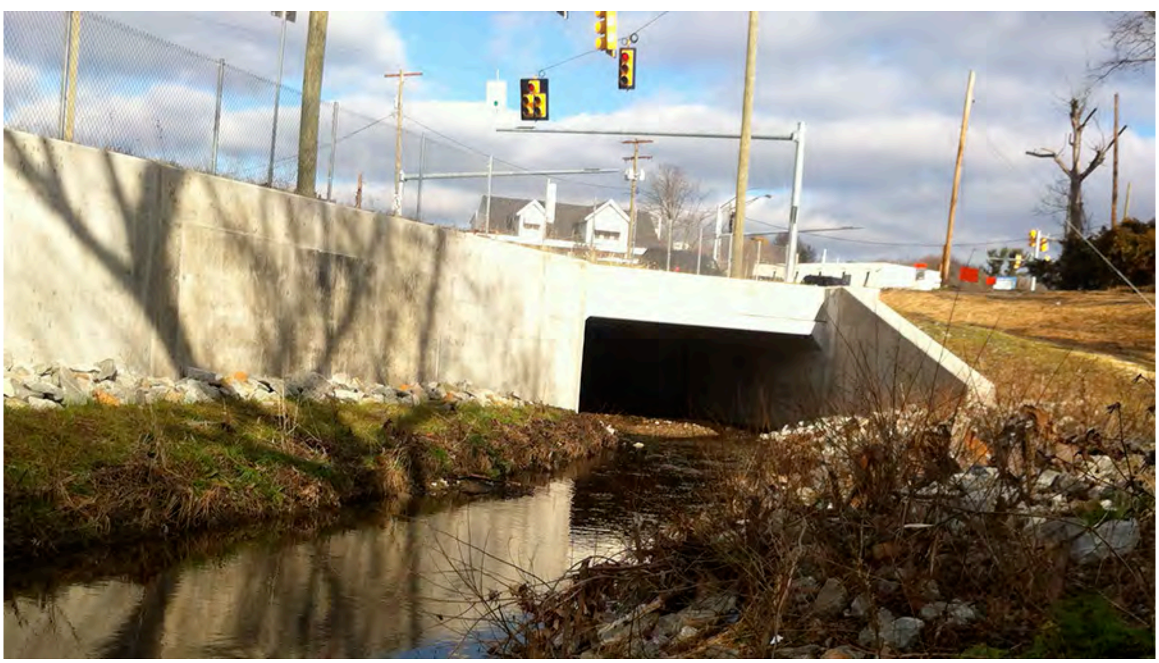
The upper reaches of the main stem of Lick Run are one encroachment after another along Baptist and Horning Road all the way down to the newly replaced bridge that carries Curry Hollow Road. The stream is culverted for several hundred feet under a commercial district on Baptist Rd (LR88) and again under the Pennsylvania American Water Company facility along Horning Road (LR82). The stream also passes under the Wheeling & Lake Erie Railroad at two locations (LR83,LR71) and is squeezed between the W&LE tracks and Bloom Engineering near Curry Road (LR64). In addition, there are several private driveway crossings and pedestrian bridge crossings of Lick Run within the upper reaches of the stream.

There are still numerous encroachments in the form of public and private bridge crossings of the stream downstream of Curry Hollow Road to the historically significant Cochran Mill Road stone bridge at LR20.

Lick Run flows through a mostly undeveloped, wooded valley downstream of the Cochran Mill Road Bridge to its confluence with Peters Creek. The only encroachments in this section are Cochran Mill Road just downstream of LR20 for several hundred feet, the Wheeling & Lake Erie Tunnel at LR05 and the bridge crossing of Piney Fork Road Ext at LR02 near Lick Run's mouth.

The Wheeling & Lake Erie Railroad parallels Lick Run's right ascending bank and the Allegheny Valley Railroad parallels the streams left ascending bank along this segment but neither encroach on the stream channel accept at LR05.

*LR05 – Lick Run flows under the Wheeling & Lake Erie Railroad. A sewer manhole can be seen within the stream channel just upstream of the bridge.*



*LR64 – A downstream view of Lick Run flowing through the recently completed Curry Hollow Road bridge replacement and intersection realignment project near the border of Baldwin Borough, South Park Township, Pleasant Hills Borough and Jefferson Hills Borough.*

*LR33 – A berm dam across Lick Run's channel creates a fish barrier within the stream.*

*LR44 - A homeowner bridge crossing of Lick Run along a section of stream that runs primarily along bedrock. The bridge restricts the stream channel.*

*A debris jam within Lick Run along Cochran Mill Road has formed behind a sewer manhole within the stream channel. This is a common occurrence, compromises sewer infrastructure and often leads to raw sewage within the stream. The debris jam is comprised of assorted debris including litter and construction material.*

*JMT02 - This culvert carries the Jefferson Memorial Tributary under the Wheeling & Lake Erie Railroad tracks and under a commercial area at the corner of Cochran Mill Rd and West Bruceton Rd near the mouth of the stream. The culvert is too small for the flow it must carry during precipitation events which causes erosion both upstream and downstream of the culvert. The obstuctions placed in front of the culvert to keep it from clogging from debris create debris jams across the channel and require regular maintenance.*

*JMT17 - Jefferson Memorial Tributary channel clogged with concrete and other assorted rubble just downstream of its exit from a 700 foot culvert under a commercial district along Old Curry Hollow Road.*

*MRT08 – Homeowner attempt at a stream crossing of Mineral Run obstructs the stream channel, creates erosion issues, is eroding itself and should be removed.*

## *Garbage & Dumps*

*LR11 – Landowner along Snowden Road is pushing concrete construction debris into a tributary to Lick Run. The tributary also is impacted by abandoned mine drainage.*

*JMT05 – Concrete rubble is obstructing the channel of the Jefferson Memorial Tributary. Remnants of a concrete structure forms a low dam across the stream channel and creates a fish barrier at this location.*

*JMT06–JMT07 – Numerous piles of construction debris and rubble within the Jefferson Memorial Tributary's left and right ascending floodplain along this section of stream. Some of the debris piles appear to be recent and some appear to be of some age. It appears that the area has been utilized for illegal dumping for some time.*

*JMT09 – Jefferson Memorial Tributary's wide floodplain is littered with tires and other assorted litter, garbage and debris. The floodplain is also inhabited by numerous Black Walnut saplings and small trees.*

*The floodplain and steep slopes surrounding the tributary along Waterman Road that drains to Lick Run is polluted with numerous tires and assorted garbage and illegally dumped material.*

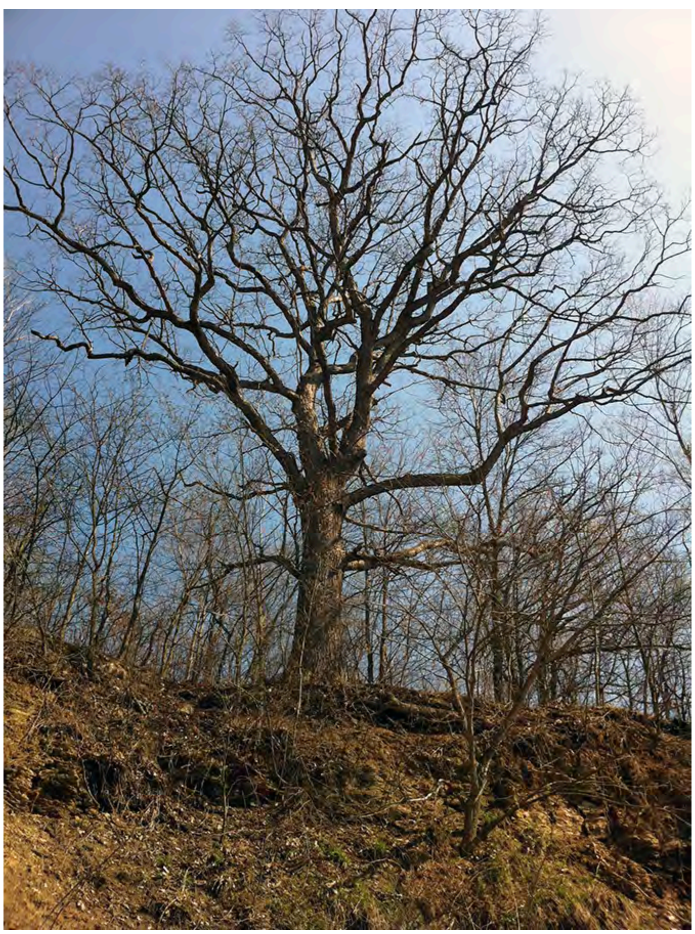
## Areas of Historical and/or Conservation Significance

*The A.W. Robertson Arboretum is a 16 acre virgin woodland and meadow along West Bruceton Road in Pleasant Hills within the Lick Run sub-watershed. The arboretum provides a respite of tranquility within a mostly developed residential neighborhood and is a testament to several generations of wise stewardship. Virgin woodlots are a rarity in Pennsylvania and this is one of few left within the Peters Creek watershed.*

*The Jacob Beam cabin is located within the Jefferson Memorial Park and is an important artifact of the early European settlement of the Peters Creek valley. The cabin is typical of those built by the original European settlers to this region and is one of the few examples that remain in Allegheny County. It has been rebuilt to the exact size of Jacob Beam's cabin using some of the original logs and rafters. He staked out his claim to 160 acres and built his cabin in 1782 near a never failing spring. This is also a reminder of the critical importance of clean water for humans and all living organisms.*

*LR20 – The Cochran Mill Road Bridge is listed as stone arch bridge S-2 in the Pennsylvania Historical and Museum Commission survey of PennDOT bridges that have significant historical value. The structure is described as "segmental arch of high quality rock, faced ashlar construction; voussoirs dressed; parapet finished with curved course." The survey entry reports the date as 1901. Remnants of the the saw and grist mill of Joseph Cochran on Lick Run just upstream from this bridge can be seen in the upper right of the photo. The mill race – the water diverted from the stream to power the mill – ran to the west of the stream, through the mill near the western end of the bridge site.*

*LR06 - An emergent wetland within Lick Run's right ascending floodplain just upstream of the Wheeling & Lake Erie Railroad Tunnel serves a number of functions. It filters abandoned mine waters from a discharge along the W&LE tracks near the Patriot Pointe development in Jefferson Hills prior to its entrance into Lick Run. The wetland also provides habitat for wildlife including the Queen Snake (Regina septemvittata), a species of special concern in Pennsylvania.*



*Heritage class trees occur at a number of locations within the Lick Run sub-watershed. The majestic White Oak pictured to the left is found just south of Waterman Rd along the Wheeling & Lake Erie railroad tracks. Numerous heritage trees are also found within the Jefferson Memorial Park and within the South Park County Park Golf Course.*

## *Conclusions and Recommendations*

The Lick Run sub-watershed is significantly impacted by abandoned mine drainage at numerous locations. The PA DEP Metals TMDL Study of 2009 found that aluminum is out of compliance in Lick Run and would require a 77% reduction in average daily load to bring it into compliance with current standards.

Discharges along Mineral Run (MRT13,MRT14,MRT15) within property controlled by the Jefferson Estates Homeowners Association appear to be the most significant discharges within the sub-watershed. There is also a coal waste pile (MRT12) associated with these discharges as well as a wetland (MRT17) and a stormwater detention basin (MRT16) impacted by AMD. All of these features are part of dedicated open space set aside as part of the Jefferson Estates Planned Residential Development. The possibility of treating these discharges and reclaiming the coal waste pile should be further investigated.

The Mineral Run valley is currently experiencing rapid residential development. Pleasant Hill's Mowry Park is at the head of the Mineral Run Valley. The possibility of maintaining an open space buffer along the stream and utilizing this corridor as a part of a non-motorized connection to other municipal parks and to South Park County Park should be explored.

The abandoned mine discharge along Riggs Road that enters Lick Run at LR16 is heavily impacted by aluminum and should be further investigated for treatment. Abandoned mine discharges along the Wheeling & Lake Erie Railroad tracks at LR10 and LR19 and along the Allegheny Valley Railroad tracks at LR28 may also be treatable and should be investigated further.

The Pleasant Hills Sewage Authority and communities contributing to the sewage plant including Whitehall Borough, Baldwin Borough, Pleasant Hills Borough and South Park Township are currently under a consent decree to decrease infiltration and sewage overflows into Lick Run. This will require facility upgrades to the wastewater treatment plant (LR30) along Lick Run in South Park Township, added storage at Colewood Park (CRT01) in Baldwin Borough and monitoring and corrective maintenance of infrastructure within the municipalities.

Several sewer manholes were found within Lick Run's and the Jefferson Memorial Tributary's low flow channel during the visual assessment. This can lead to many problems including debris jams, damage to sewage infrastructure and additional raw sewage within the stream.

An overabundance of algae was found within the lower reach of Lick Run (LR08) and at numerous locations along the Jefferson Memorial Tributary (JMT03,JMT05,JMT19,JMT24). This excess algae is often an indication of nutrient overload. Abandoned mine drainage, sewage treatment plant outfalls, storm sewers and residential and urban runoff can all be contributing factors. The source of this nutrient overload should be further investigated.

Inadequately controlled stormwater and flooding is a major problem within the headwater portion of the Lick Run sub-watershed. Excessive encroachment and culverting of Lick Run's channel in this portion of the sub-watershed contributes to the problem.

The inadequately controlled stormwater also contributes to problems further downstream including flooding, excess erosion and infrastructure damage along Cochran Mill Road in South Park Township and Jefferson Hills Borough. Stream bank erosion problems are exacerbated by inadequate natural vegetation buffers within the floodplain of Lick Run along the Cochran Mill Road portion of the stream.

A great deal of new residential development is taking place within the lower reach of the Lick Run sub-watershed, especially along Gill Hall Road in Jefferson Hills, however, development is not taking place within the floodplain of Lick Run. The floodplain remains mostly wooded from the Cochran Mill Road Bridge to Lick Run's confluence with Peters Creek. It is imperative to maintain this wooded floodplain and to adequately control stormwater within new development along this section of stream. It is also essential to encourage use of Best Management Practices within these developments to minimize further problems created by additional excess stormwater.

Retrofitting stormwater solutions within the upper portion of the watershed will not be easy, however, opportunities for implementation of green infrastructure solutions including addition of rain gardens, rain barrels, bioswales, riparian buffers and additional storage in this portion of the sub-watershed should be explored.

A number of the tributaries to Lick Run, including Jefferson Memorial Tributary, Mineral Run Tributary, and Wilson Road Tributary, also suffer from excess stormwater. Source reduction opportunities should also be explored within communities contributing to these problems.

The establishment of invasive plants, most notably Japanese Knotweed and invasive vines, is a problem within Lick Run's floodplain at a number of locations. Developing and implementing an effective riparian management plan for the sub-watershed which includes invasive management and riparian plantings of native plants along Lick Run will help to mitigate stream bank erosion and flooding and also help to maintain long-term water quality within Lick Run and its tributaries.

A number of locations along Lick Run and its tributaries would also benefit from natural stream channel design remediation and removal of structures and debris encroaching on the streams channel.

There are also a number of areas within the Lick Run sub-watershed that are worthy of long-term conservation. The emergent wetland (LR06) along Lick Run upstream of the W&LE

tunnel is providing a number of natural services and is also habitat for a Pennsylvania species of special concern.

The wise stewardship of A.W. Robertson and his wife has provided the local area with a unique natural amenity, a virgin woodlot, which now provides some of the only open space within an otherwise built out community. The heritage class oaks and other tree species within this woodlot are protected for perpetuity by the Robertson’s generosity and foresight. This example should be emulated to protect other heritage trees within the Peters Creek watershed.

A number of structures including the Cochran Mill Road Bridge and the Jacob Beam Cabin provide important reminders of our local settlement and history.

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Notes |
|---|---|---|---|---|---|
| LR01 | 40.277722 | -79.956255 | 815 | 6/19/08 | Confluence of Lick Run with Peters Creek |
| LR02 | 40.277968 | -79.956893 | 815 | 4/14/11 | Lick Run culverted under Piney Fork Rd Ext |
| LR03 | 40.278420 | -79.960198 | 820 | 6/19/08 | Tributary enters Lick Run on right ascending bank. Receives stormwater from Patriot Pointe development. |
| LR04 | 40.280302 | -79.960967 | 911 | 4/14/11 | Stormwater detention basin for Patriot Pointe. |
| LR05 | 40.278364 | -79.961004 | 824 | 4/14/11 | Lick Run culverted under Wheeling & Lake Erie Connellsville Branch. Sanitary sewer manhole in stream just upstream. |
| LR06 | 40.279725 | -79.962509 | 830 | 6/19/08 | Large floodplain wetland on right ascending bank, outlet enters Lick Run |
| LR07 | 40.279725 | -79.962600 | 876 | 4/14/11 | AMD discharge is culverted under access road and enters wetland (~40 GMP). Work to stabilize banks along road. |
| LR08 | 40.280160 | -79.964490 | 835 | 6/19/08 | Access road from Patriot Pointe. Equipment to extract water at site. Heavy mats of algae downstream. |
| LR09 | 40.285935 | -79.965745 | 855 | 4/14/11 | Tributary enters on right ascending bank and AMD trib enters on left ascending bank. |
| LR10 | 40.285492 | -79.966923 | 901 | 4/14/11 | AMD impoundment on bench above right ascending bank on other side of CRX tracks. Culverted under rail. |
| LR11 | 40.285642 | -79.968224 | 941 | 4/14/11 | Landowner pushing construction debris, etc. over hillside compromising small AMD impacted trib. |
| LR12 | 40.285878 | -79.969039 | 976 | 4/14/11 | Created pond on private property. |
| LR13 | 40.287570 | -79.965830 | 959 | 6/19/08 | Significant wetland on left ascending bank; ATV trails and some bank erosion. |
| LR14 | 40.288140 | -79.966140 | 866 | 6/19/08 | Tributary enters on left ascending bank; significant erosion on right ascending bank |
| LR15 | 40.289436 | -79.966195 | 870 | 4/14/11 | ~7 acres along 1600ft of Lick Run deforested to Cochran Mill Rd. Inadequate riparian buffer along this section of stream. |
| LR16 | 40.290504 | -79.968608 | 875 | 4/14/11 | AMD impacted trib enters on left ascending bank. Heavy aluminum precipitate. Retaining wall downstream on LAB. |
| LR17 | 40.291421 | -79.969592 | 871 | 4/14/11 | Significant erosion problems along left ascending bank constrained by Cochran Mill Rd. |
| LR18 | 40.292410 | -79.970050 | 870 | 6/19/08 | Tributary enters on right ascending bank. Aluminum precipitate. |
| LR19 | 40.292847 | -79.969123 | 924 | 4/14/11 | Impoundment of small tributary along W&LE tracks. Culverted under tracks. Appears to be impacted by AMD. |
| LR20 | 40.292929 | -79.970160 | 871 | 4/14/11 | Lick Run culverted under historically significant Cochran Mill Rd bridge. Remnants of Cochran's Mill just upstream. |
| LR21 | 40.294515 | -79.970986 | 881 | 4/14/11 | Drainage ditches to drain floodplain wetland. ~500 bank inadequately buffered on right ascending bank. |
| LR22 | 40.295150 | -79.971840 | 890 | 12/9/12 | Tributary enters on right ascending bank. Draining Washington Sq development site in Jefferson Hills. (2012 update) |
| LR23 | 40.295520 | -79.972060 | 883 | 6/24/08 | Tributary/seep on right ascending bank. Sewer manhole on left ascending bank. |
| LR24 | 40.295793 | -79.972170 | 878 | 4/14/11 | Bridge crossing of stream. |
| LR25 | 40.296400 | -79.972490 | 879 | 6/24/08 | Tributary on left ascending bank (~1-2 GPM) |
| LR26 | 40.297590 | -79.972830 | 886 | 6/24/08 | Pipe coming out of stream (large, behind homeowner; erosion on left ascending bank;gravel bar and debris jam upstream. |
| LR27 | 40.300610 | -79.973620 | 905 | 6/24/08 | Wetland on right ascending bank. |
| LR28 | 40.300493 | -79.973840 | 906 | 6/24/08 | AMD pond above AVR tracks on LAB. Culverted under tracks (~10 GPM). RAB riprapped behind commercial lot. |
| LR29 | 40.301399 | -79.974143 | 894 | 4/14/11 | Lick Run culverted under Wallace Rd. |
| LR30 | 40.301640 | -79.974100 | 895 | 6/24/08 | Pleasant Hills Authority discharge into Lick Run on LAB; LAB erosion along plant and Cochran Mill Rd. |
| LR31 | 40.304540 | -79.974700 | 909 | 6/24/08 | Pleasant Hills Authority discharge. (Overflow?) |
| LR32 | 40.304885 | -79.975438 | 911 | 4/14/11 | Lick Run culverted under access road to PH Authority and Federal Government Facilities. |
| LR33 | 40.305110 | -79.975510 | 904 | 6/24/08 | AMD discharge enters on left ascending bank; Concrete berm-dam just upstream. |
| LR34 | 40.306655 | -79.975848 | 909 | 4/14/11 | Homeowner bridge crossing of Lick Run |
| LR35 | 40.307380 | -79.976150 | 911 | 6/24/08 | AMD discharge enters on RAB;Severe bank erosion along RAB, upstream and behind homeowner. |
| LR36 | 40.308300 | -79.976430 | 915 | 6/24/08 | Tributary enters on LAB. |
| LR37 | 40.308670 | -79.976430 | 913 | 6/24/08 | Sandbar in stream channel |

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Notes |
|---|---|---|---|---|---|
| LR38 | 40.308903 | -79.976950 | 923 | 6/24/08 | Lick Run culverted under McElheny Rd. |
| LR39 | 40.309130 | -79.976670 | 916 | 6/24/08 | Inadequate vegetative buffer along stream due to industrial use of floodplain. |
| LR40 | 40.310540 | -79.976710 | 919 | 6/24/08 | Tributary enters on right ascending bank. Historically known as Mineral Run. Heavy AMD load. |
| LR41 | 40.311940 | -79.977580 | 929 | 6/24/08 | Tributary enters on RAB;AMD-yellowboy; Small wetland in floodplain. |
| LR42 | 40.311932 | -79.976010 | 991 | 4/14/11 | Stormwater detention basin for Hunters Fields development Jefferson Hills. |
| LR43 | 40.312147 | -79.978036 | 925 | 4/14/11 | Lick Run culverted under CSX railroad tracks. |
| LR44 | 40.312801 | -79.979222 | 930 | 6/24/08 | Homeowners bridge squeezing channel. |
| LR45 | 40.313660 | -79.979720 | 939 | 6/24/08 | Tributary along Wilson Rd enters on Lick Run's left ascending bank. |
| LR46 | 40.315350 | -79.979060 | 936 | 6/24/08 | Lick Run culverted under CSX tracks; Concrete dump site on right ascending bank. |
| LR47 | 40.316250 | -79.978100 | 943 | 6/24/08 | Tributary enters on right ascending bank |
| LR48 | 40.316329 | -79.977184 | 975 | 11/14/13 | Stormwater detention basin for Hunter's Fields; Bank erosion along RAB at outlet into stream; Retaining wall downstream. |
| LR49 | 40.316616 | -79.978340 | 941 | 6/24/08 | Seep on right ascending bank; aluminum precipitate. |
| LR50 | 40.316658 | -79.978557 | 940 | 4/14/11 | Lick Run culverted under CSX railroad tracks. |
| LR51 | 40.316702 | -79.978756 | 941 | 6/24/08 | Tributary draining valley between Jefferson Memorial and West Bruceton enters on RAB;Sewer manhole in channel. |
| LR52 | 40.316760 | -79.978930 | 944 | 4/14/11 | Lick Run culverted under Wilson Rd. |
| LR53 | 40.317641 | -79.980450 | 949 | 6/24/08 | Owl's Club bridge over Lick Run |
| LR54 | 40.318210 | -79.980550 | 950 | 6/24/08 | Homeowner retaining wall encroaching on Lick Run channel; bridge crossing of stream. |
| LR55 | 40.320007 | -79.981471 | 960 | 4/14/11 | Lick Run culverted under Cochran Mill Rd. Severe bank erosion upstream of bridge on LAB. |
| LR56 | 40.321580 | -79.982680 | 958 | 6/24/08 | Tributary culverted under Cochran Mill Rd enters on LAB. Stream constrained by road. LAB eroding. |
| LR57 | 40.325218 | -79.985068 | 972 | 4/14/11 | Lick Run culverted under Hough Rd. Tributary enters on right ascending bank just upstream. |
| LR58 | 40.325588 | -79.984554 | 974 | 4/14/11 | Hough Rd trib flows through livestock heavy use area prior to entry in Lick Run; No fencing along stream. Working farm. |
| LR59 | 40.326468 | -79.985891 | 970 | 4/14/11 | Culverted trib that drains South Park Golf Course enters on left ascending bank. |
| LR60 | 40.328167 | -79.986167 | 974 | 4/14/11 | Lick Run flows behind commercial district on Brownsville Rd. Stormwater culverted to stream. |
| LR61 | 40.328200 | -79.985502 | 1004 | 4/14/11 | Small wetland at edge of farm field. |
| LR62 | 40.328731 | -79.986533 | 976 | 6/24/08 | Private bridge crossing of Lick Run. |
| LR63 | 40.329887 | -79.987053 | 982 | 4/14/11 | Culverted Broughton Rd trib enters Lick Run on left ascending bank. |
| LR64 | 40.330251 | -79.986798 | 989 | 4/14/11 | Lick Run culverted under Curry Hollow Rd. |
| LR65 | 40.331364 | -79.987554 | 983 | 12/9/08 | Lick Run channel squeezed between commercial area and homes along this section. |
| LR66 | 40.332470 | -79.987950 | 989 | 12/9/08 | Tributary enters on RAB(~5 GPM); concrete dumped in channel; strong smell of sewage. |
| LR67 | 40.332804 | -79.988253 | 987 | 4/14/11 | Lick Run culverted(~35 ft) under access area. Pedestrian bridge crossing just upstream. |
| LR68 | 40.333000 | -79.988450 | 990 | 12/9/08 | Left ascending bank eroding. |
| LR69 | 40.333290 | -79.988720 | 992 | 12/9/08 | Riprap retaining wall on RAB behind home; private bridge crossing and LAB erosion just upstream |
| LR70 | 40.333880 | -79.989200 | 991 | 12/9/08 | Riprap retaining wall and outfall along right ascending bank; No flow |
| LR71 | 40.335780 | -79.990130 | 999 | 12/9/08 | Lick Run culverted under Wheeling & Lake Erie tracks. |
| LR72 | 40.335960 | -79.990830 | 1002 | 12/9/08 | Colewood Rd trib enters on right ascending bank. |
| LR73 | 40.335977 | -79.991203 | 1007 | 4/14/11 | Wetland |
| LR74 | 40.336057 | -79.991473 | 1022 | 4/14/11 | Lick Run culverted under Curry Rd. |

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Notes |
|---|---|---|---|---|---|
| LR75 | 40.336268 | -79.992496 | 1006 | 12/9/08 | Lick Run squeeze in valley between Bloom Engineering Co. and W&LE tracks on top of hill. |
| LR76 | 40.337093 | -79.994834 | 1022 | 12/9/08 | Hillside on left ascending bank is a coal waste pile; probably from Pittsburgh Terminal No 4 Mine(Horning Mine). |
| LR77 | 40.337585 | -79.995662 | 1022 | 4/14/11 | Lick Run culverted under Horning Rd. Automotive junkyard on left ascending bank just downstream. |
| LR78 | 40.338905 | -79.998513 | 1030 | 4/14/11 | Lick Run culverted under McAnulty Rd. |
| LR79 | 40.339291 | -80.001153 | 1032 | 4/14/11 | Lick Run culverted under a private access road to an ~ 1/4 acre impervious pad encroaching on RAB. |
| LR80 | 40.339971 | -80.004633 | 1053 | 4/14/11 | Lick Run culverted under Horning Rd. Gardenville trib enters on RAB just downstream. |
| LR81 | 40.339613 | -80.004993 | 1060 | 4/14/11 | Lick Run culverted under private access road to industrial backlot. |
| LR82 | 40.339849 | -80.008537 | 1066 | 4/14/11 | Lick Run culverted for ~ 600 ft behind PAWC on Horning Rd. Erosion gullies along tow of hill behind plant. |
| LR83 | 40.341427 | -80.011337 | 1093 | 4/14/11 | Lick Run culverted under W&LE tracks; trib enters on LAB then culverted under Horning Rd. |
| LR84 | 40.341969 | -80.012165 | 1094 | 4/14/11 | Culverted under private driveway. Inadequate riparian buffer. |
| LR85 | 40.342145 | -80.012810 | 1097 | 4/14/11 | Culverted under private driveway. Inadequate riparian buffer. |
| LR86 | 40.342194 | -80.013351 | 1099 | 4/14/11 | Trib enter on LAB. Private drive crossing just downstream. Lick Run cuts away from road along nursery supply lot. |
| LR87 | 40.343138 | -80.013652 | 1104 | 4/14/11 | Lick Run culverted under access road to nursery supply back lot. |
| LR88 | 40.344324 | -80.013900 | 1121 | 4/14/11 | Culverted ~ 500 ft upstream under Baptist Rd commercial area. |
| LR89 | 40.347497 | -80.015825 | 1142 | 4/14/11 | Headwaters from spring just below Lowes and Millenium Park on Baptist Rd. |
| Colewood Road Tributary | | | | | |
| CRT01 | 40.336190 | -79.990950 | 1002 | 12/9/08 | Near mouth of Colewood Rd trib;large wetland on Left ascending bank to Curry Rd; Colewood park on RAB. |
| CRT02 | 40.336990 | -79.990790 | 1008 | 12/9/08 | Hillside on LAB littered with garbage; slide. |
| CRT03 | 40.337790 | -79.990650 | 1018 | 12/9/08 | Bank erosion on left ascending bank. |
| CRT04 | 40.338560 | -79.990380 | 1016 | 12/9/08 | outfall on right ascending bank (~10 GPM); concrete debris in stream channel. |
| CRT05 | 40.339450 | -79.990260 | 1024 | 12/9/08 | Outfall on right with large concrete berm behind fence; downstream terminus of flood control channel. |
| CRT06 | 40.345360 | -79.992160 | 1076 | 12/9/08 | Trib enters channel upstream of Hollow Haven Dr; culverted under road; travels~2000 feet in channel. |
| CRT07 | 40.348170 | -79.995590 | 1117 | 12/9/08 | Colewood Rd tributary headwaters. |
| Jefferson Memorial Tributary | | | | | |
| JMT01 | 40.316801 | -79.978686 | 941 | 12/9/08 | Confluence with Lick Run near Wilson Rd, West Bruceton intersection with Cochran Mill Rd.; Manhole in channel at junction. |
| JMT02 | 40.317370 | -79.978443 | 955 | 2/24/13 | Tributary culverted under Cochran Mill Rd, commercial lot and W&LE rail tracks. |
| JMT03 | 40.318167 | -79.978167 | 963 | 12/9/08 | Bank erosion in outer bank; stream meanders; bottom of stream coated with green-grey precipitate and algae. |
| JMT04 | 40.318941 | -79.977475 | 959 | 12/9/08 | Main trib culverted under W&LE and CRX connector track; AMD trib enters on RAB (~10 GPM); Debris jam at culvert inlet. |
| JMT05 | 40.321333 | -79.975500 | 976 | 2/24/13 | Remnants of retaining wall along LAB; concrete rubble in stream; concrete structure in channel creating fish barrier. |
| JMT06 | 40.321500 | -79.974667 | 992 | 2/24/13 | Dump area- tires; number of piles of construction rubble; wood; etc. |
| JMT07 | 40.323167 | -79.974833 | 981 | 2/24/13 | Construction material debris pile; common along this stretch along LAB. |
| JMT08 | 40.323500 | -79.974500 | 984 | 2/24/13 | Debris jam blocking stream channel. |
| JMT09 | 40.323667 | -79.974500 | 984 | 2/24/13 | Floodplain wide and level; stream meanders; walnuts common; water filled channels; garbage throughout. |
| JMT10 | 40.324161 | -79.973726 | 985 | 2/24/13 | Stream culverted under CSX tracks to eastern side of railroad. Sewer manhole in stream channel is common. |
| JMT11 | 40.325846 | -79.973214 | 992 | 2/24/13 | Culverted outfall enters on right ascending bank. Channel wide and braided. |
| JMT12 | 40.326400 | -79.972084 | 1002 | 2/24/13 | Stormwater detention basin |
| JMT13 | 40.327530 | -79.973564 | 1005 | 2/24/13 | Stream culverted under rail tracks to western side of railroad. |

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Notes |
|---|---|---|---|---|---|
| JMT14 | 40.328208 | -79.973557 | 1007 | 2/24/13 | Drainage ditch on easter side of railroad eroded and appears heavily utilized. |
| JMT15 | 40.330834 | -79.973581 | 1022 | 2/24/13 | Yucca infestation along western side of tracks. |
| JMT16 | 40.331428 | -79.973627 | 1016 | 2/24/13 | Outfall from commercial area enters on left ascending bank. |
| JMT17 | 40.332334 | -79.973267 | 1028 | 2/24/13 | Stream exits ~700 ft culvert under commercial district; severe erosion on RAB; rubble in channel. |
| JMT18 | 40.334286 | -79.972765 | 1029 | 2/24/13 | Stream enters culvert. Culvert receives main trib from under tracks and flow on western side of tracks. Unique baffle. |
| JMT19 | 40.334500 | -79.972500 | 1033 | 2/24/13 | Algae coated discharge enters on right ascending bank. |
| JMT20 | 40.336034 | -79.972320 | 1045 | 2/24/13 | Main trib exits culvert under Curry Hollow Rd bridge. Number of other outfalls enter on RAB. |
| JMT21 | 40.336500 | -79.972667 | 1047 | 2/24/13 | Culverted outfall enters drainage on western side of tracks and is culverted under Curry Hollow Rd bridge. |
| JMT22 | 40.336500 | -79.972500 | 1049 | 2/24/13 | A weir restrains flow of main trib just upstream of entrance into culvert under Curry Hollw Rd bridge. |
| JMT23 | 40.338667 | -79.974167 | 1057 | 2/24/13 | Tributary draining ravine on western slopes is culverted under tracks to eastern side. |
| JMT24 | 40.338825 | -79.974087 | 1056 | 2/24/13 | Culverted outfall enters on eastern side of rail line. Excess algae along this entire section. |
| JMT25 | 40.340334 | -79.973975 | 1061 | 2/24/13 | Seeps and runoff from steep hillsides along both sides of CSX rail line from Whitehall Tunnel form headwaters. |
| JMT26 | 40.324739 | -79.974490 | 1015 | 2/24/13 | Jefferson Memorial Gas Well(Shallow) |
| JMT27 | 40.328692 | -79.974029 | 1008 | 2/24/13 | Jefferson Memorial Gas Well(Shallow) |
| JMT28 | 40.321932 | -79.975650 | 988 | 2/24/13 | Jefferson Memorial Gas Well(Shallow) |
| Mineral Run Tributary | | | | | |
| MRT01 | 40.310545 | -79.976430 | 920 | 12/9/12 | UNT trib to Lick Run historically called Mineral Run bridge crossing near confluence. Fish barrier. |
| MRT02 | 40.310626 | -79.975986 | 927 | 12/9/12 | Mineral Run culverted under Cochran Mill Rd. |
| MRT03 | 40.310598 | -79.975636 | 930 | 12/9/12 | Mineral Run culverted under W&LE tracks. |
| MRT04 | 40.310786 | -79.975435 | 932 | 12/9/12 | Retaining wall along Stilley Rd just before entering culvert under W&LE trackage. |
| MRT05 | 40.310976 | -79.975383 | 934 | 12/9/12 | Culverted AMD discharge enters on right ascending bank (~ 5 GPM). |
| MRT06 | 40.312263 | -79.974666 | 970 | 12/9/12 | Unstable slope sliding due to regrading for Hunters Fields development. |
| MRT07 | 40.312575 | -79.974759 | 1002 | 12/9/12 | Stormwater detention basin for Hunters Fields development. |
| MRT08 | 40.311752 | -79.974768 | 935 | 12/9/12 | Homeowner attempt at stream crossing. Failing, fish barrier. Should be removed. |
| MRT09 | 40.312446 | -79.974036 | 942 | 12/9/12 | Stream along floodplain homeowner. Complaints of more frequent flooding. |
| MRT10 | 40.313234 | -79.972540 | 951 | 12/9/12 | Debris jam with construction material as part of collection. |
| MRT11 | 40.313866 | -79.971896 | 957 | 12/9/12 | Significant bank erosion on RAB. Nonfunctional silt fence little more than litter. |
| MRT12 | 40.314076 | -79.970959 | 1030 | 12/9/12 | Coal waste pile as dedicated open space for Jefferson Hills Estates Planned Residential Development. |
| MRT13 | 40.315000 | -79.970833 | 972 | 12/9/12 | AMD discharge from broken culvert under coal waste pile on right ascending bank. |
| MRT14 | 40.315038 | -79.970630 | 972 | 12/9/12 | AMD discharge off of coal waste pile on right ascending bank. |
| MRT15 | 40.315500 | -79.970167 | 974 | 12/9/12 | Main AMD discharge enters RAB from detention basin and wetland (~ 50 GPM) |
| MRT16 | 40.315396 | -79.969334 | 1011 | 12/9/12 | Stormwarer detention basin for Jefferson Hills Estates filled with aluminum precipitate. |
| MRT17 | 40.314307 | -79.969339 | 1017 | 12/9/12 | AMD discharge into wetland; retaining wall. |
| MRT18 | 40.317121 | -79.970750 | 1007 | 12/9/12 | Tributary that drains West Bruceton Rd ponds.  Illegally dumped tires and other garbage in ravine. |
| MRT19 | 40.316833 | -79.968000 | 990 | 12/9/12 | Stream bank erosion along Mineral Run. Drainage tubing from Gill Hall Estates. |
| MRT20 | 40.318000 | -79.966500 | 1020 | 12/9/12 | Steep, unnatural slope created along Mineral Run for Gill Hall Estates. Inadequate vegetation. |
| MRT21 | 40.320031 | -79.962694 | 1024 | 12/9/12 | Mineral Run first daylighted at culvert just below Mowry Park. |

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Notes |
|---|---|---|---|---|---|
| MRT22 | 40.319667 | -79.970667 | 1042 | 12/9/12 | Old farm pond on east side of West Bruceton Rd. Severely silted from construction activity. |
| MRT23 | 40.320681 | -79.970165 | 1041 | 12/9/12 | Pond and wetland on western side of West Bruceton Rd. |
| Broughton Road Trib | | | | | |
| BRT01 | 40.331509 | -80.003494 | 1146 | 12/9/12 | Stormwater Detention Basin at Headwaters of Broughton Rd Trib in South Park County Park |
| BRT02 | 40.332473 | -79.999296 | 1099 | 12/9/12 | Floodplain wetland along Broughton Rd |

## 8.6 Piney Fork

The Piney Fork sub-watershed includes the main stem of Piney Fork from its headwaters along Clifton Rd near its junction with McMurray Rd in Bethel Park to its confluence with Peters Creek near Snowden in South Park Twp and all unnamed tributaries that drain directly to Piney Fork. Two named streams, Sleepy Hollow Run and Catfish Run, drain to Piney Fork but are considered as their own sub-watersheds for this study.

The headwaters portion of the Piney Fork sub-watershed is essentially built-out with a mix of residential and commercial development. Much of this development occurred prior to the institution of regulations for the adequate control of storm waters. A commercial district along Industrial Blvd was built on the reclaimed lands of the Pittsburgh Terminal No. 8 Coverdale Mine that operated from the 1920s-1940s. There are also commercial districts along South Park Rd and along the Library Rd Corridor downstream to Library in South Park Twp.

The Allegheny County Port Authority T Light Rail Transit tracks follow Piney Fork from its terminus in Library to the T-crossing of State Route 88 and then follow Piney Fork's Library Rd tributary to the top of the sub-watershed at South Park Rd.

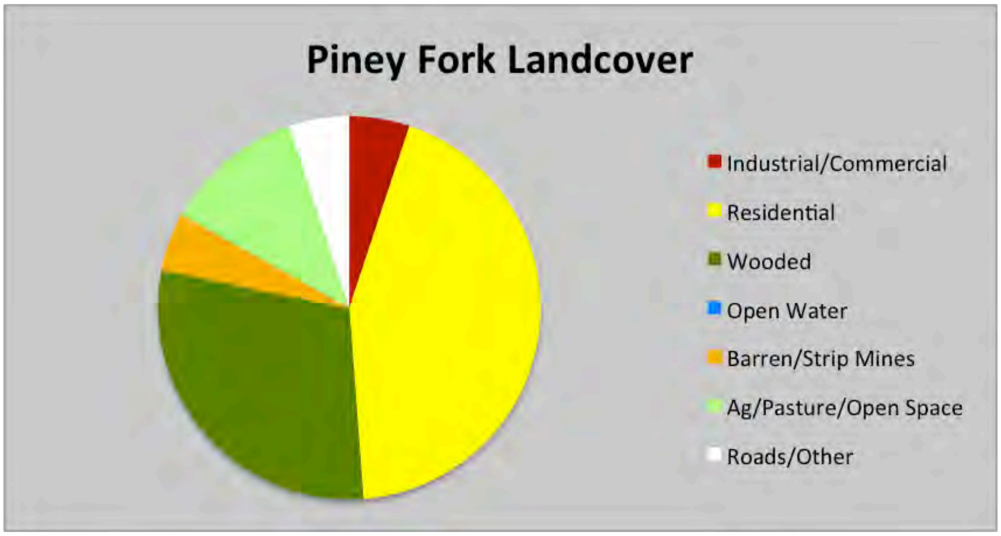
The middle portion of the Piney Fork sub-watershed is dominated by the remnants of the Montour No. 10 Mine.  A coal waste pile along Cardox Rd is being reclaimed and is permitted to discharge to tributaries of Piney Fork. Significant aluminum loads are being conveyed to Piney Fork from two tributaries near Sebolt Rd. The Bethel Park Municipal Authority Piney Fork Wastewater Treatment Plant discharges into Piney Fork along Piney Fork Rd in South Park Twp.

The eastern portion of the sub-watershed remains primarily wooded with steep slopes along Piney Fork, a significant wetland east of Triphammer Rd and reminders of the coal mining era in the form of numerous coal waste piles and abandoned mine discharges.  Heavy off-road activity along Piney Fork's northern shore in this section is causing significant erosion and degradation of the riparian zone. The southern, Washington County portion of the sub-watershed remains mainly an area of open space and agriculture.

The Montour Trail follows the abandoned Montour Railroad Library Branch right of way along Piney Fork. A section of Montour Trail east of Triphammer Rd was completed in 2013.

The total area of the Piney Fork sub-watershed is approximately 8.44 square miles and is comprised of portions of Bethel Park Borough, South Park Twp, Union Twp and Peters Twp.

Land cover within the watershed is depicted in the pie chart below. The dominant land cover types within the sub-watershed are residential (43.7%), wooded (29.4%) and agricultural/pasture/open space (11.9%).  (2006 National Land Cover Database)




Piney Fork is impaired for recreational use by pathogens and for aquatic use by siltation. These impairments are principally due to urban runoff and storm sewers. (2012 Pennsylvania Water Quality Monitoring and Assessment Report)

A visual assessment of Piney Fork was conducted to better understand the current physical status of the stream channel, water and riparian zone. The results of this assessment are found below.

## Piney Fork Mainstem

Waypoints: PF01 – PF40
Description: Piney Fork main stem from mouth at Peters Creek to Catfish Run confluence
USDA Visual Assessment Protocol Score = 7.0 FAIR

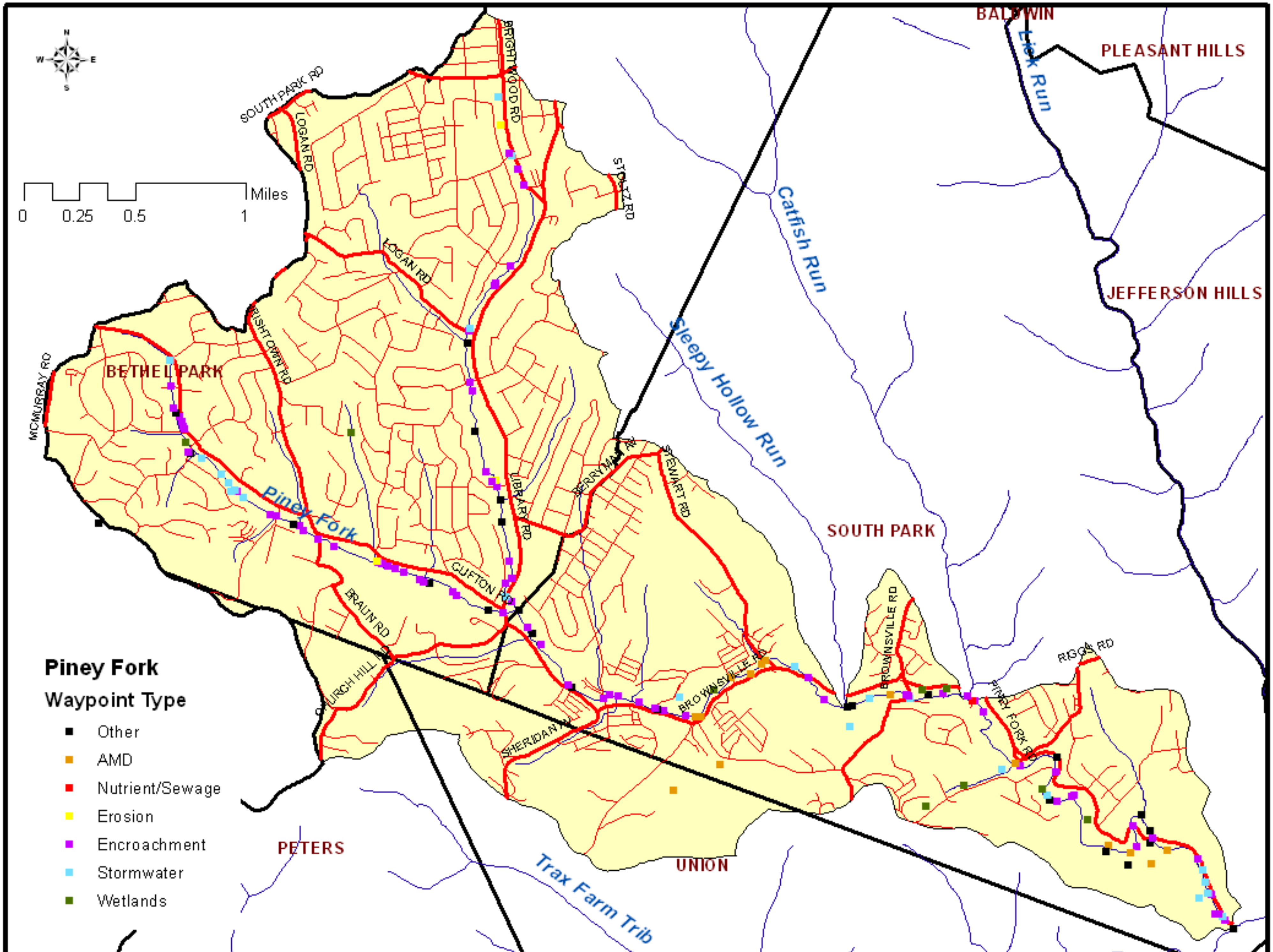
Waypoints: PF41 – PF60
Description: Piney Fork main stem from Catfish Run confluence to Wood Street bridge
USDA Visual Assessment Protocol Score = 6.1 FAIR

Waypoints: PF61 – PF81
Description: Piney Fork main stem from Wood St bridge to confluence of Clifton Rd branch and Brightwood Rd branch just below Rt88 bridge
USDA Visual Assessment Protocol Score = 6.9 FAIR

## Piney Fork Clifton Road Branch

Waypoints: CRB01 – CBR15
Description: Clifton Rd branch of Piney Fork from confluence with Brightwood Rd branch to Irishtown Rd bridge
USDA Visual Assessment Protocol Score = 7.5 GOOD

Waypoints: CRB16 – CRB40
Description: Clifton Road branch from Irishtown Rd bridge to headwaters at top of Clifton Rd
USDA Visual Assessment Protocol Score = 6.6 FAIR


Miles
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BALDWIN
PLEASANT HILLS
JEFFERSON HILLS
BETHEL PARK
SOUTH PARK
PETERS
UNION
Lick Run
Catfish Run
Sleepy Hollow Run
Piney Fork
Trax Farm Trib
SOUTH PARK RD
LOGAN RD
BRIGHTWOOD RD
STOLTZ RD
BRIGHTWOOD RD
MCMURRAY RD
LIBRARY RD
STEWART RD
CLIFTON RD
BRAUN RD
CHURCH HILL RD
SHERIDAN AV
BROWNSVILLE RD
RIGGS RD
PINEY FORK RD
Piney Fork
Waypoint Type
Other
AMD
Nutrient/Sewage
Erosion
Encroachment
Stormwater
Wetlands

## Piney Fork Brightwood Rd Branch

**Waypoints: BRB01 – BRB26**
**Description: Brightwood Rd branch of Piney Fork from confluence with Clifton Rd branch to headwaters at South Park Rd**
**USDA Visual Assessment Protocol Score = 6.8 FAIR**

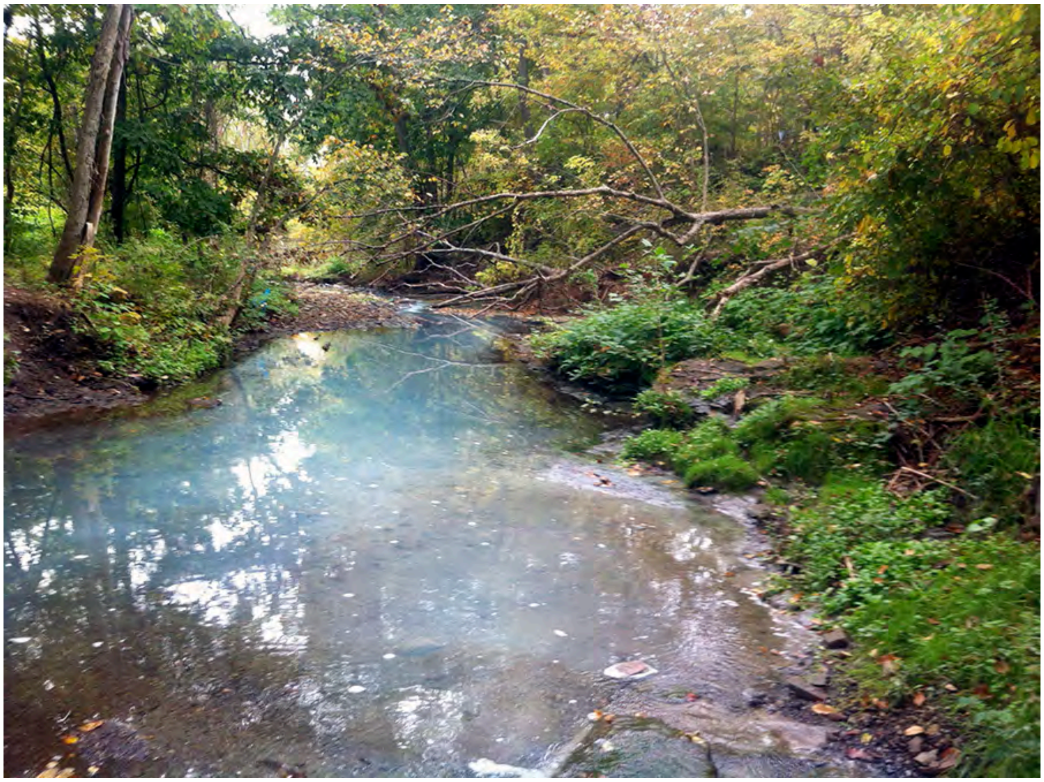
### *Sewage and AMD Impacts*

Piney Fork is not listed as impaired for metals, however, there are a number of abandoned mine discharges (AMD) and numerous abandoned mine lands (AML) along the lower reaches of Piney Fork from its confluence with Peters Creek to the community of Library. AMD discharges to Piney Fork and AML lands were found at:

- PF12 - AMD impacted spring on plateau above Piney Forks left ascending bank associated with abandoned mine lands.
- PF21 – Coal waste piles along approximate ¼ mile of Piney Fork's left ascending bank.
- PF20 – AMD seep with small associated wetland.
- PF22 – AMD discharge captured by off-road trail enters Piney Fork's left ascending bank.
- PF28 – Culverted AMD discharge enters Piney Fork's left ascending bank just downstream of new Montour Trail bridge east of Triphammer Rd.
- PF34 – AMD discharge that originates in South Park Township's Evans Park and is associated with the old Knothole Mine enters Piney Fork's left ascending bank.
- PF35 – Coal waste piles associated with the old Knothole Mine along Triphammer Rd.
- PF49 – AMD discharge is culverted under the Montour Trail and enters Piney Fork's left ascending bank just west of the Brownsville Rd Ext bridge crossing of the stream.
- PF62 – AMD discharge with highest concentration of aluminum of any discharge within the watershed enters Piney Fork's left ascending bank at Sebolt Rd.
- PF63 – AMD discharge from base of coal waste pile associated with old Montour 10 mine that enters Piney Fork at PF62.
- PF64 - Coal waste pile associated with the old Montour 10 mine along Sebolt and Cardox Rd is site of a refuse reprocessing operation that is permitted to discharge to Piney Fork.
- PF65 – AMD discharge enters Piney Fork just upstream of Sebolt Rd discharge at about Cardox Rd junction with Brownsville Rd on left ascending bank of Piney Fork.

*PF12-PF13 – An AMD impacted spring originates at PF12 on a plateau above Piney Fork's left ascending bank. It then flows over the hillside along the old Montour Railroad Right of Way just west of the recently installed section of Montour Trail along Piney Fork Rd, crosses the ROW and enters Piney Fork at PF13. This spring is associated with abandoned mine lands that exend along this section of Piney Fork for approximately ¼ mile.*

*PF35 – An abandoned mine discharge impacted tributary flows along the base of a large, steeply sloped coal waste pile along Triphammer Rd just downstream of Evans Park. The discharge originates in Evans Park at PF37 and enters Piney Fork at PF34. The discharge and coal waste pile are associated with the old Knothole Mine.*



*PF62 – An abandoned mine discharge associated with the old Montour 10 coal mine waste pile enters Piney Fork at Sebolt Rd in South Park Township. This discharge originates along Sebolt Rd at PF63 and is culverted along and under Sebolt Rd and Brownsville Rd prior to entering Piney Fork. A strong odor of volatile organic compounds has also been detected while sampling at this site.*

*PF57 – Heavy aluminum precipitate covers Piney Fork's substrate at the Stewart Rd bridge crossing at about ½ mile downstream of the Sebolt Rd discharge into Piney Fork.*

*PF65 – An abandoned mine discharge enters Piney Fork just upstream of the Sebolt Rd discharge. This discharge appears to be culverted under Cardox Rd. A debris jam of tires and other assorted garbage has formed at the streams confluence with Piney Fork.  Very little indication of AMD was found along Piney Fork upstream of this discharge.*

*PF64 – Looking across the Piney Fork valley toward part of the Montour 10 coal waste pile on the right side of photo. Part of this coal waste pile is in Allegheny County and part is in Washington County. A refuse reprocessing operation is currently working on the coal waste pile in Washington County.*

The Piney Fork Wastewater Treatment Plant is a “very large sewage treatment facility on a very small stream.” This is the assessment of a PA DEP water quality official. This sewage treatment plant is a significant factor influencing water quality in Piney Fork from its location just downstream of the confluence of Catfish Run along Piney Fork Rd downstream to where Piney Fork empties into Peters Creek in Snowden.

The treatment plant has had problems with hydraulic overloads (sewage overflow into Piney Fork) during precipitation events, has been a contributing factor in fish kills along Piney Fork and has created a severe nutrient overload within the stream during a recent upgrade.

The sewage treatment plant is currently accepting leachate from the Southhill’s Landfill on a regular basis. This landfill accepts waste from Marcellus well drilling operations. This waste stream contributes a number of unique chemicals to the treatment plant’s waste stream including strontium, barium and radium-226.

Water quality within the lower portion of Piney Fork appears to be improving since the completion of the plant upgrade. However, development within the Peters Towship and South Park Township portions of the Piney Fork sewershed will most likely increase the sewage load to this treatment plant in the future. The stream often has a treated sewage odor downstream of the plant and there are a number of locations downstream that experience problems with excess algae that is often an indication of nutrient overload.

*PF40 –The Piney Fork Wastewater Treatment Plant outfall into Piney Fork just downstream of Catfish Run’s confluence with Piney Fork. The sewage treatment plant serves approximately two-thirds of Bethel Park and a portion of South Park Township. A small portion of Peters Township has also expressed interest in utilizing the facility.*

*PF40 – A view of Piney Fork just downstream of the Piney Fork Wastewater Treatment Plant outfall. The Tri-Community Anglers and South Park Township stock this portion of stream with trout.  Part of the upgrade to the treatment plant can be seen in the right of the photo.*

## *Stream Bank Erosion & Siltation*

*PF05 – A view of Piney Fork's left ascending floodplain from the Montour Railroad right of way. Heavy off-road use of this floodplain has created severe erosion, soil compaction, stream bank alterations and excess siltation from numerous stream crossings, destruction of the floodplain understory and alteration of drainage patterns into Piney Fork.*

*PF05 – One of numerous off-road stream crossings of Piney Fork just upstream of Corvette tunnel. These severe bank alterations are a conduit for stormwater and lead to excess siltation and increased erosion of the banks of Piney Fork. They also contribute to alteration of flow patterns within the stream channel.*

*PF08 – Severe bank erosion along Piney Forks left ascending bank just downstream of a deeply incised stormwater channel. The stream is becoming increasingly detached from the floodplain along this section and the erosion is undercutting trees and adding to the sediment load of the stream.*

*PF26 – The beginnings of a stream bank stabilization project along Piney Fork's right ascending bank along the Montour Trail east of Triphammer Rd. This project appears to be as much about waste disposal as it does about streambank stabilization.*

*PF26 – Unsized rubble from a tunnel demolition project in Peters Township was thrown along approximately 800 feet of Piney Fork's right ascending bank and at sites downstream. Little was done to protect trees along the bank and rubble ended up within the low flow stream channel and continues to slide into the channel during high water events. PA DEP Growing Greener Grants have been utilized successfully to implement Natural Stream Channel Design (NSCD) Projects along Peters Creek in Jefferson Hills. A stream stabilization project designed by an engineer trained in NSCD along this portion of Piney Fork would have maintained the natural integrity of the corridor and enhanced fish habitat along this stocked portion of Piney Fork while also achieving the necessary bank stabilization.*

*PF27 – An eroding section of Piney Fork's left ascending bank just downstream of the Montour Trail bridge just east of Triphammer Rd is riprapped to protect it and a sewer line from further erosion.*

*CRC28 – Grouted riprap applied to the eroding left ascending bank of the Clifton Rd Branch of Piney Fork just upstream of the Havengate Street crossing of the stream.*

*The banks of the upper reach of the Brightwood Road Branch of Piney Fork are eroding and detached from the floodplain. The stream appears to be functioning principally as a stormwater conveyance channel along this section of stream.*

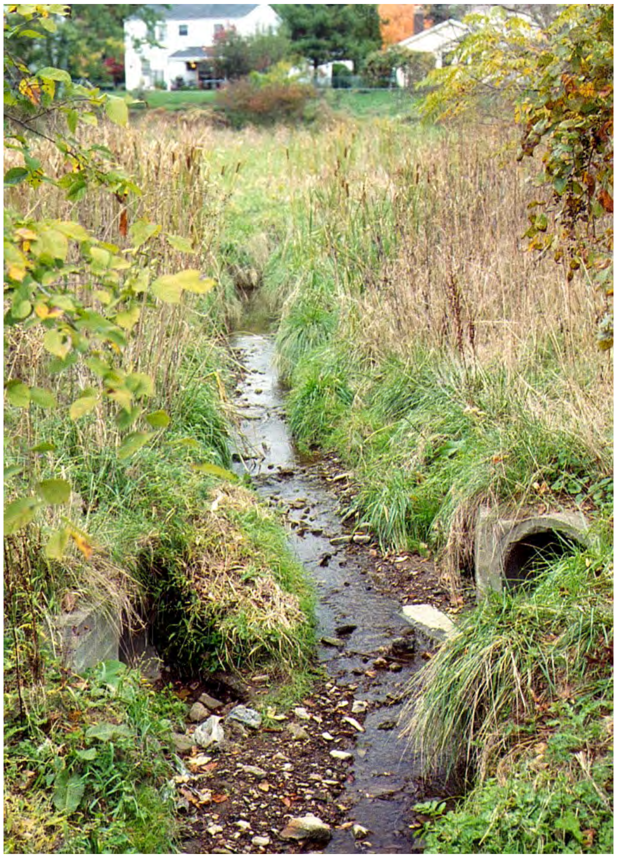
## *Nutrient Enrichment*

*PF05 – Excess algae growing on Piney Fork's substrate is a problem at a number of locations downstream of the sewage plant outfall. In this photo a Northern Water Snake basks on an algae-laden rock just upstream of Corvette Tunnel.*

## *Wetlands*

*PF24 – This wetland/pond in the valley south of Piney Fork Rd near its junction with Connor Rd also runs along the Montour Trail. Montour Railroad crews referred to the pond as Washing Machine Lake. Illegal dumping over steep slopes must not be a new idea. A regenerating Hemlock woods occupies the ponds steep northern slope. The pond provides habitat for varied wildlife including Wood Ducks, herons and a number of species of turtles and amphibians.*

*PF30 – Skunk Cabbage (Symplocarpus foetidus) blooming in a wetland on Piney Fork's left ascending bank just downstream of the recently installed Montour Trail bridge east of Triphammer Road.*



*CRB32 – This wetland along the Clifton Road Branch of Piney Fork northwest of the junction of Clifton and Rocky Ridge Roads also serves an important stormwater detention function by providing storage during precipitation events. Retaining this wetland is an example of good planning during development.*

Wetlands are also found at Evans Park, along the Montour Trail near the Piney Fork Wastewater Treatment Plant, along the Stewart Rd Tributary and within Piney Fork's right ascending bank floodplain upstream of Wood Street. In addition, a functional wetland has developed in the stormwater detention basin at King's School Village.

## *Invasive Plants & Floodplain Condition*

*PF05 – Piney Fork's left ascending bank floodplain is wide and heavily impacted by off-road vehicle use upstream of the Corvette Tunnel near the confluence with Peters Creek. Piney Fork Rd parallels Piney Fork within the right ascending bank floodplain along this section stream. Japanese Knotweed infests the right ascending bank between the stream and the road.*

*PF11 – Gabioned riprap creates right ascending bank of Piney Fork with Piney Fork Rd nearby. Japanese Knotweed infests the entire length of the gabioned riprap. Bank erosion at the head of the riprap.*

*PF15 - Much of Piney Fork's stream bank is wooded and steeply sloped from the confluence of Peters Creek to the Piney Fork Wastewater Treatment Plant. Invasive plants within the floodplain, especially Japanese Knotweed, are a problem at a number of locations. The photo above depicts Piney Fork below the most downstream bridge crossing of Piney Fork Road. A local Cub Scout Pack is helping with stocking the creek with trout in the spring of 2013.*

*PF23 – Stands of Hemlocks are found at a number of locations along Piney Fork's steep slopes within the lower section of the stream.*

*PF81 – Piney Fork at the confluence of the Brightwood Rd branch and the Clifton Rd branch just downstream of State Route 88. The floodplain is vegetated in this area but Japanese knotweed is becoming prevalent.*

*CRB06 – The Clifton Rd branch of Piney Fork at Simmon's Park. Much of the stream bank is modified within the park and the stream is detached from the floodplain.*

*CRB37 – Piney Fork flows through front and back yards of residences along Clifton Rd. The stream is also culverted at a number of locations along Clifton Rd.*

*CRB40 – A woodlot along Clifton Rd where the Clifton Road branch of Piney Fork is first daylighted provides habitat and a corridor for deer to travel from one woods to another.*

*BRB25 – The upper reach of the Brightwood Road branch of Piney Fork along the Allegheny County Light Transit tracks to the left in the photo. The banks are eroding along this section of stream with little natural vegetation within the floodplain, numerous stream crossings, bank modifications and mowing right up to the stream.*

# *Stormwater Infrastructure and Issues*

*PF08 – A deeply incised tributary that conveys excessive quantities of stormwater from the old Montour Railroad right of way through Piney Fork's left ascending floodplain to the stream. This creates severe bank erosion downstream. Heavy off-road activity along the right of way and lack of understory vegetation within the floodplain has exacerbated the problem.*

*PF52 – A new stormwater detention basin off of Brownsville Road Ext discharges to a small tributary that is culverted under the Montour Trail and enters Piney fork's left ascending bank across from Georges Supply.*

*PF71 – Piney Fork, seen here channelized along the Library T-station, flooded on July 10, 2013 and inundated the station and adjacent Park & Ride Lot with 2-3 feet of water during a severe precipitation event. The infrastructure along the lower section of Piney Fork near Greenman Tunnel also incurred flood damage as a result of the storm. Piney Fork's channel was also significantly altered in this section by the flood.*


*CRB14 – Two large over-engineered stormwater detention basins along the King's School Village community in Bethel Park serve a regional stormwater function. The extra capacity of these basins helps to protect homes and infrastructure downstream during severe flooding events. The detention ponds did not overflow during the flooding of September 2004 due to remnants of Hurricane Ivan as seen above. Adequate stormwater controls are especially essential within the steeply sloped upper reaches of the Clifton Road branch of Piney Fork.*

*BRB26 – The Brightwood Road branch of Piney Fork is first daylighted just south of South Park Road. The stream appears to be culverted under a heavily developed older section of Bethel Park north of South Park Road and takes on great quantities of excess stormwater during precipitation events. The upper reaches of the daylighted stream are deeply incised and eroded. The stream continues to be impacted far downstream.*

## *Encroachments*

*PF02 – Piney Fork channelized along Piney Fork Road through Corvette Tunnel near the streams confluence with Peters Creek. The tunnel carries the Allegheny Valley Railroad. Japanese Knotweed infests Piney Fork's right ascending floodplain just downstream of tunnel.*

*PF15 – Piney Fork passes under a bridge at the end of an entrenched meander along Piney Fork Rd near PennMont. PennMont was the interchange of the Pennsylvania Railroad and the Montour Railroad. Just upstream of the bridge are abutment remnants of a railroad crossing of the stream. Another bridge crossing of Piney Fork is located a few hundred feet upstream near the head of the meander.*

*PF25 – Landowner pushing concrete rubble and other assorted debris into a wetland along the Montour Trail downstream of the new Montour Trail bridge crossing of Piney Fork east of Triphammer Rd.*

*PF65 – a low dam across Piney Fork just below an AMD discharge near Cardox Road's junction with Brownsville Rd. The dam is most likely remnants of infrastructure associated with the Montour 10 Mine.*

*Allegheny County's Light Rail Transit tracks parallel Piney Fork and the Brightwood Road branch of Piney Fork for approximately 3 ¼ miles. The tracks encroach on the stream at a number of locations especially along the Brightwood Road branch with numerous crossings and culverts.*

*CRB03 – The Clifton Road branch of Piney Fork is channelized for approximately 120 feet at the lower end of Simmons Park. Severe bank erosion occurs downstream of the culvert.*

*PF07 – A concrete access ramp across the Clifton Road branch of Piney Fork at Simmon's Park obstructs the stream channel, creates a fish barrier in the stream and accelerates erosion downstream of the structure. The left ascending bank of Piney Fork is gabion riprapped downstream of the ramp.*

*CRB16 – The Irishtown bridge over the Clifton Road branch of Piney Fork obstructs the stream channel and creates a fish impasse.*

*CRB28 – The Clifton Road branch of Piney Fork is channelized downstream of the culvert carrying Havengate Street over the stream. Severe erosion is occurring downstream of the channel and upstream of the culvert as well indicating that the culvert may be inadequately sized.*

***BRB14 – A debris jam along a 2000 foot long free flowing section of the Brightwood Road branch of Piney Fork through a woodlot downstream of the King's School Road crossing creates ponding and sediment build up.***

## *Garbage & Dumps*

*Illegal dumping of appliances, vehicles and all manner of garbage is a significant problem along the undeveloped portion of the Montour Railroad right of way from its junction with the Allegheny Valley Railroad tracks to the recently completed section of the Montour trail. Illegal dumping is also a problem along many of the off-road trails and ravines west of the right of way and along Piney Fork's left ascending floodplain upstream of Corvette Tunnel. The Tri-Community Anglers and South Park Township sponsor clean-up days during the year to keep the stream banks and local roads clear of trash. These have been quite successful and attract volunteers from a number of local organizations.*

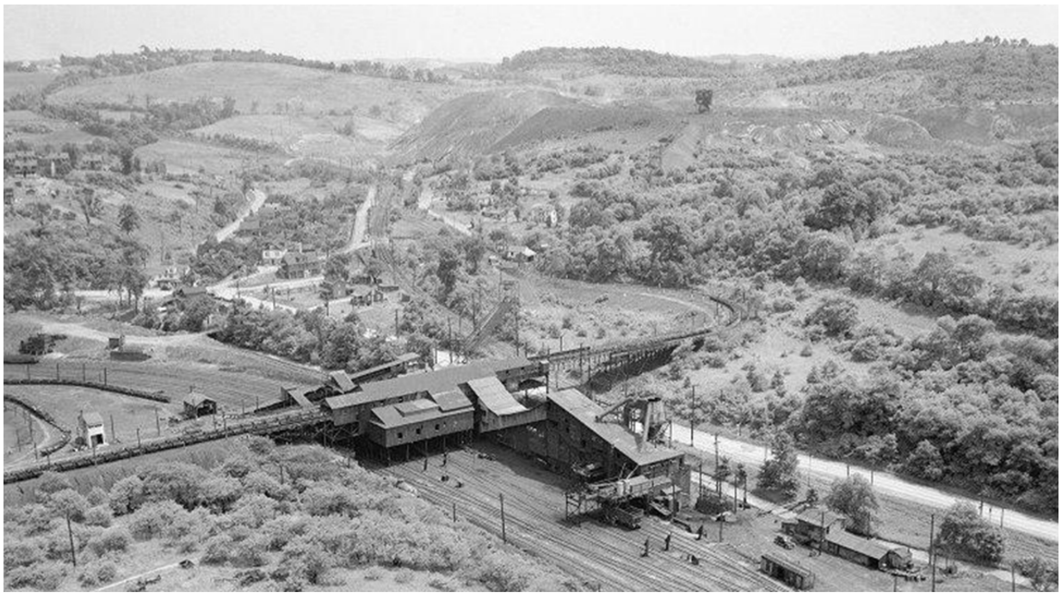
*Illegal dumping of vehicles and other assorted garbage can also be found in the vicinity of Evans Park. Illegal dumping and littering occurs throughout the Piney Fork sub-watershed but appears to be a localized problem. Volunteers of the Montour Trail Council help to keep litter minimized along the trail which parallels Piney Fork for several miles from its confluence with Peters Creek to Library.*

## *Areas of Historical and/or Conservation Significance*

*PF24 – The ox-bow lake affectionately known as Washing Machine Lake, as well as the surrounding hillsides along Piney Fork Road, provide unique wildlife habitat and scenic character along the Montour Trail. Piney Fork's left ascending floodplain and hillside, from the lake to the new Montour Trail bridge, harbors biodiversity not common in other parts of the Peters Creek watershed.*

*The undeveloped right of way of the Montour Railroad from its junction with what is now the Allegheny Valley Railroad to the newly completed section of the Montour Trail along Piney Fork Road is owned by Allegheny County. The right of way parallels Piney Fork's left ascending floodplain, is undeveloped woodland and is severely eroded by heavy off-road use. The area is very scenic and could be developed as a natural and recreational community amenity if off-road use in the area were adequately managed.*

The history of much of the Piney Fork sub-watershed is intertwined with coal mining operations including the Montour Railroad; a short-line railroad that primarily serviced coal mines. Large and small coal mines were found throughout the sub-watershed from the Montour No. 10 Mine in the Library community of South Park Township to the reclaimed commercial area surrounding Industrial Blvd in Bethel Park that was once the Pittsburgh Terminal No. 8 Coverdale Mine to coal waste piles and tipple remnants of the Knothole Mine that now surround South Park Township's Evans Park along Triphammer Road.



*A1946 view of the Montour No.10 Mine operation in Library along Piney Fork. The railroad tracks run under the tipple. Piney Fork and Brownsville Rd are to the right of the tipple and pass under tracks that lead to the coal waste pile.*

*(Photo by Chris Dellamea, www.coalcampusa.com, ©2012)*
*A current view of miner's homes that were built as part of the Coverdale Mining operation in Bethel Park.*

The South Park Historical Society (SPHS) and the Montour Railroad Historical Society (MRHS) are two local groups that are actively working to preserve the rich coal mining history of the Piney Fork sub-watershed and beyond.

The SPHS currently operates a museum in the Montour No. 10 Freight House at the Library T-station. The MRHS researches varied aspects of the Montour Railroad's operations as well as operations of mines serviced by the railroad. The society works to educate the public concerning the coal mining history of the local area by erecting educational signs along the Montour Trail.

## *Conclusions and Recommendations*

There are a number of abandoned mine discharges along the main stem of Piney Fork from its mouth to the community of Library. The most significant discharges are found at Sebolt Rd (PF62) and at Evans Park (PF36), both in South Park Township. Aluminum is the major problem at the Sebolt Rd discharge with very little iron present but a significant load of manganese. The Evans Park discharge has significant concentrations of aluminum, iron and manganese. Both discharges should be studied further as the possibility of developing a treatment system at both sites is good.

There are also numerous abandoned mine lands (AML) within the Piney Fork sub-watershed. The Montour No. 10 coal waste pile is ranked as a priority 2 AML which means that it poses a threat to public health, safety, and general welfare from the adverse effects of past mining operations that do not constitute an extreme danger. There are also a number of priority 3 AMLs within the sub-watershed. Priority 3 AMLs do not pose a danger to public health but are lands that are environmentally damaged by past coal mining operations. A refuse reprocessing operation at the Montour No. 10 coal waste site is currently permitted to discharge to un-named tributaries to Piney Fork. The impact of this discharge on water quality in Piney Fork should be investigated.

Excess algae is present within the main stem of Piney Fork from its confluence with Peters Creek to the community of Library but is especially a problem downstream of the Piney Fork Wastewater Treatment Plant. Excess algae is usually an indication of nutrient enrichment which can come from varied sources. Further investigation is required to better understand the specific cause of the algae overload.

The entire length of Piney Fork is impaired for recreational use by unknown pathogens. This also requires further investigation.

Excess stormwater, encroachment and bank modifications are a significant problem in this urbanized sub-watershed, especially in the upper reaches of the Clifton Road branch and the Brightwood Road branch of Piney Fork. These problems continue down the main stem of Piney

Fork to below Library. They combine to create excess erosion and siltation along these stream segments and contribute to erosion further downstream.

Efforts to maintain wetlands and to provide excess storage along the Clifton Road branch helps to mitigate some of these issues. It is especially important to manage stormwater adequately along this portion of Piney Fork with development on the steep slopes near the headwaters of this stream segment. Opportunities exist at Simmons Park to naturalize the stream bank in areas, remove the stream from the channel where possible and reintegrate the stream into the park.

The Brightwood Road branch of Piney Fork appears to suffer from great quantities of excess stormwater generated in a culverted section of the stream along and north of South Park Rd. Opportunities for mitigating the effects of this excess stormwater should be investigated including addition of green infrastructure to this urbanized area.

The Brightwood Road branch is culverted, encroached upon and effectively channelized for much of its course to the confluence with the Clifton Road branch south of Route 88. One exception to this is an approximately 2000 foot section of the stream south of King School Rd. This free flowing section of stream and surrounding woodlot most likely help to mitigate excess stormwater problems downstream and should be a priority for conservation.

Encroachment continues to be an issue downstream of Library but not to the degree that it is in the headwaters. A low dam at PF65 near Cardox Rd is most likely remnants of the Montour 10 mining operation. This concrete structure creates a fish barrier and should be removed.

Extremely heavy off-road vehicle activity within the lower portion of Piney Fork within its left ascending floodplain and along the undeveloped section of the Montour Railroad right of way is contributing to severe bank erosion, bank and stream channel modifications and floodplain damage. This activity also creates drainage pattern alterations that increases Piney Fork's stormwater and siltation load. Off-road activity needs to be effectively managed along this section of Piney Fork. Stream bank and floodplain remediation is definitely needed along the lower portion of Piney Fork.

Japanese Knotweed is a severe problem at a number of locations along Piney Fork, especially along the lower portion of the stream from the Piney Fork Wastewater Treatment Plant to its confluence with Peters Creek. This species has established monocultures along the lower section of Piney Fork along Piney Fork Rd and is well established along portions of the recently completed section of the Montour Trail to Triphammer Road. Disturbed stream banks and land adjacent to this new section of trail will become Japanese Knotweed monocultures if not adequately managed.

Invasive species, including Multiflora Rose and invasive vines, are an issue along the banks of Washing Machine Lake. A plan should be developed to manage riparian vegetation along this wetland. The South Hills Friends of the Montour Trail are working to keep Japanese Knotweed under control along the Montour Trail. The Student Conservation Association of Pittsburgh has also helped with invasives removal along Piney Fork. A riparian management plan that includes a coordinated program of invasives control should be developed for the Piney Fork sub-watershed.

There are also a number of conservation opportunities within the Piney Fork sub-watershed that should be explored.

The area surrounding Washing Machine Lake (PF24) including Piney Fork's riparian zone and steep wooded slopes from the wetland upstream to the Montour Trail bridge are contributing significantly to the watersheds biodiversity and scenic character and should be conserved as open space.

The woodlands and floodplain surrounding the undeveloped portion of the Montour Railroad right of way are also scenic and should be managed in a manner that is protective of water quality within Piney Fork and as a resource to be enjoyed by all local residents.

A number of other woodlots along Piney Fork and its headwater tributaries are helping to provide wildlife corridors and are mitigating the adverse effects of excess stormwater. A riparian management plan should be developed to identify and maintain the effectiveness of these natural areas.

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| PF01 | -79.968813 | 40.271601 | 828 | 7/17/08 | Confluence of Piney Fork with Peters Creek; significant algal bloom at mouth. |
| PF02 | -79.969479 | 40.272118 | 830 | 11/18/11 | Piney Fork channelized through "Corvette Tunnel" along with Piney Fork Rd under Allegheny Valley Railroad tracks.. |
| PF03 | -79.969720 | 40.272367 | 831 | 11/18/11 | Stormwater discharge on RAB at northern tunnel entrance. |
| PF04 | -79.970075 | 40.272508 | 829 | 11/18/11 | Large tree down across channel impeding flow and causing debris to build up. |
| PF05 | -79.970350 | 40.272510 | 836 | 7/17/08 | Heavy ATV use on LAB floodplain; Severe bank erosion due to numerous crossings; Little understory left in floodplain; drainage pattern alterations. |
| PF06 | -79.970683 | 40.273793 | 832 | 7/17/08 | Debris jam; bank erosion; knotweed infestation along Piney Fork Rd on RAB. |
| PF07 | -79.971714 | 40.273624 | 885 | 11/18/13 | Deeply incised ATV trail from floodplain to old Montour Railroad right of way has become a stormwater conveyance channel. |
| PF08 | -79.970931 | 40.273926 | 834 | 11/4/13 | Deeply incised tributary enters Piney Fork on LAB; Tires and other debris in channel; stormwater conveyance channel. |
| PF09 | -79.971165 | 40.274620 | 835 | 11/4/13 | Stormwater culvert on Piney Fork's RAB from residence on far side of Piney Fork Rd. |
| PF10 | -79.971371 | 40.275462 | 837 | 11/4/13 | Stormwater culvert enters on RAB from residence on far side of Piney Fork Rd. |
| PF11 | -79.971733 | 40.276133 | 841 | 11/4/13 | Approximately 300 ft of gabioned rip-rap on Piney Fork's RAB from this point upstream; knotweed infestation along project area. |
| PF12 | -79.974380 | 40.276720 | 850 | 7/17/08 | Bank erosion on RAB; Sediment deposition in channel; AMD impacted tributary enters on LAB. |
| PF13 | -79.975742 | 40.275908 | 975 | 11/4/13 | AMD impacted spring (~30-40 GPM) reaches surface at this location, crosses Montour RR ROW and enter Piney Fork at previous waypoint. |
| PF14 | -79.975834 | 40.277254 | 860 | 11/4/13 | Recently completed section of Montour Trail Bike Trail. Reasonable forested buffer left along Piney Fork during construction; new plantings of native trees. |
| PF15 | -79.975657 | 40.277568 | 854 | 11/4/13 | Piney Fork crosses Piney Fork Road; abutments of old PRR Peters Creek bridge crossing just upstream. |
| PF16 | -79.975846 | 40.278051 | 855 | 11/4/13 | Tributary enters Piney Fork on RAB. |
| PF17 | -79.976532 | 40.279098 | 861 | 11/4/13 | Tributary enters Piney Fork on RAB; drains valley west of Barnsley Dr, culverted under Connor Dr and flowing to Piney Fork east of Connor Dr. |
| PF18 | -79.977226 | 40.278366 | 865 | 11/4/13 | Piney Fork flows under Piney Fork Rd bridge; Construction yard upstream on RAB; large quantity of materials stored right up to stream bank slope. |
| PF19 | -79.977029 | 40.277048 | 868 | 11/4/13 | Piney Fork flows under Montour Trail bridge; Unsized rubble pushed over stream bank just upstream of bridge; Natural stand of Hemlock; Excess algae. |
| PF20 | -79.977506 | 40.276635 | 870 | 7/17/08 | AMD impacted seep enters on LAB. |
| PF21 | -79.977772 | 40.275841 | 1024 | 11/4/13 | Large deposits of coal waste deposited on ridge above Piney Forks LAB; extend for ~ 1/4 mile. |
| PF22 | -79.979336 | 40.277107 | 872 | 7/17/08 | AMD impacted tributary enters Piney Fork's LAB just upstream of bridge crossing creek; unsized rubble pushed over RAB. |
| PF23 | -79.979632 | 40.276735 | 904 | 11/18/11 | Small tributary to Piney Fork captured by ATV trail creating severe erosion gullies on steep LAB; re-generating Hemlock woods along slope upstream. |
| PF24 | -79.981158 | 40.278798 | 884 | 11/18/11 | Wetland affectionately dubbed "Washing Machine Lake" by Montour RR crews provides breeding habitat numerous species; Illegal dumping; invasives; hemlock. |
| PF25 | -79.982220 | 40.280428 | 887 | 7/15/12 | Landowner pushing construction debris and worse in wetland along Montour Trail. |
| PF26 | -79.982448 | 40.280377 | 884 | 7/17/08 | Severe bank erosion on Piney Fork RAB; update 11/18/11 Unsized rubble and worse thrown along ~ 800 ft of Piney Fork as means of bank stabilization. |
| PF27 | -79.983786 | 40.280004 | 887 | 11/4/13 | Eroding LAB of Piney Fork covered with rock armour to protect from further erosion and sewer line running along bank; continued erosion downstream. |
| PF28 | -79.984350 | 40.280090 | 887 | 7/17/08 | AMD impacted discharge from pipe on Piney Fork's LAB; RAB consists of construction debris, etc. in this section to bridge. |
| PF29 | -79.984579 | 40.280459 | 889 | 11/4/13 | Stormwater culverted from Montour Trail enters on Piney Fork's RAB; Excess algae along this section of stream. |
| PF30 | -79.984941 | 40.280869 | 890 | 7/15/12 | Recently installed Montour Trail bridge crosses Piney Fork; Wetland on LAB floodplain just downstream; Culverted tributary enters on LAB just upstream. |
| PF31 | -79.983808 | 40.281997 | 893 | 11/18/11 | Piney Fork culverted under single lane stone arch bridge (1902) carrying Triphammer Rd. |
| PF32 | -79.983714 | 40.282896 | 895 | 11/18/11 | Tributary draining from Ridge Rd crosses Single Track Rd and enters Piney Fork's RAB. |
| PF33 | -79.986875 | 40.282412 | 899 | 11/18/11 | Montour Trail bridge crossing of Piney Fork; Tributary enters on LAB; Bank erosion on LAB just upstream; Unsized rubble used for bank stabilization. |
| PF34 | -79.987239 | 40.282533 | 899 | 7/17/08 | AMD impacted tributary draining Evans Park along Triphammer Rd enters Piney Forks LAB. |
| PF35 | -79.988436 | 40.282121 | 944 | 11/18/11 | Large coal waste piles along Triphammer Rd associated with the old Knothole Mine. |
| PF36 | -79.991713 | 40.281175 | 984 | 11/18/11 | Wetland in Evans Park along Triphammer Rd with associated AMD impacted tributary; Stormwater also culverted into wetland from sports fields. |
| PF37 | -79.994967 | 40.279791 | 1036 | 11/18/11 | Wetland in Evans Park associated with headwaters of AMD impacted tributary to Piney Fork. |
| PF38 | -79.989923 | 40.285947 | 900 | 11/18/11 | ~ 200 ft of LAB of Piney Fork constrained by recent upgrade to sewage plant; knotweed infestation has developed along this section. |
| PF39 | -79.990686 | 40.286643 | 902 | 11/18/11 | Piney Fork culverted under sewage plant access road. |
| PF40 | -79.990843 | 40.286667 | 905 | 7/17/08 | Sewage plant discharge into Piney Fork on LAB. |
| PF41 | -79.991226 | 40.286962 | 903 | 11/18/11 | Confluence of Catfish Run with Piney Fork on RAB; LAB of Piney Fork constrained by sewage plant retaining wall just downstream. |
| PF42 | -79.993380 | 40.287158 | 907 | 11/18/11 | Piney Fork's LAB constrained for ~ 100 ft by sewage plant retaining wall; just downstream appears to be overflow for underground storage on LAB. |
| PF43 | -79.993024 | 40.287516 | 909 | 7/13/12 | Wetland between Montour Trail and Piney Fork Rd. |
| PF44 | -79.994605 | 40.287098 | 908 | 7/13/12 | Small tributary enters on Piney Fork's LAB after passing through marshy area. |
| PF45 | -79.995095 | 40.287448 | 913 | 7/13/12 | Wetland between Montour Trail and Piney Fork Rd. |
| PF46 | -79.996174 | 40.286871 | 910 | 7/13/12 | Combination of culverted stormwater and small tributary enter Piney Fork's RAB. |
| PF47 | -79.996325 | 40.287020 | 910 | 7/13/12 | Piney Fork flows under recently renovated Brownsville Rd Ext bridge. |
| PF48 | -79.996504 | 40.287142 | 910 | 7/13/12 | Montour Trail bridge crossing of Piney Fork; Recent sanitary sewer line work on LAB just upstream; knotweed infestation. |
| PF49 | -79.997902 | 40.287108 | 912 | 7/17/08 | AMD impacted tributary culverted under Montour Trail and enters Piney Fork on LAB; Aluminum precipitate on channel substrate. |
| PF50 | -79.999620 | 40.286865 | 914 | 7/13/12 | Channel conveys stormwater gathered from along Brownsville Rd to Piney fork's RAB. |
| PF51 | -80.001165 | 40.286409 | 915 | 7/13/12 | Tributary culverted under Montour Trail enters Piney Fork on LAB; Materials storage area on RAB floodplain to road; Inadequate riparian buffer on RAB. |
| PF52 | -80.001317 | 40.285079 | 997 | 7/13/12 | Stormwater detention basin drains to Piney Fork tributary. |

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| PF53 | -80.001577 | 40.286357 | 917 | 7/17/08 | Confluence of Sleepy Hollow Run with Piney Fork on RAB; Sleepy Hollow Run inadequately buffered from Brownsville Rd to Piney Fork. |
| PF54 | -80.003523 | 40.286878 | 920 | 7/13/12 | Drainage culverted under Montour Trail enters on Piney Fork's LAB; ~ 1/4 mile of RAB occupied by Georges Landscape Supply; Inadequate buffer. |
| PF55 | -80.004856 | 40.288338 | 924 | 7/13/12 | Piney Fork flows under Brownsville Rd bridge. |
| PF56 | -80.006022 | 40.289037 | 927 | 7/13/12 | Piney Fork culverted under Montour Trail; Recently completed Montour Trail South Park Connector above slope on RAB; Stormwater culverted into Piney Fork. |
| PF57 | -80.008479 | 40.289471 | 932 | 7/13/12 | Piney fork culverted under Stewart Rd; ~ 500 ft of Piney Fork's LAB inadequately buffered just downstream; Heavy aluminum precipitate on substrate. |
| PF58 | -80.008800 | 40.289189 | 933 | 7/17/08 | Tributary draining Stewart Rd enters on RAB; Concrete dumped in stream channel; 7/13/12 update: Piney Fork substrate covered with heavy aluminum precipitate. |
| PF59 | -80.009816 | 40.288622 | 941 | 7/17/08 | AMD impacted seep enters Piney Fork on LAB. |
| PF60 | -80.011489 | 40.288358 | 942 | 7/13/12 | Piney Fork flows under Wood St bridge; Channel substrate covered with heavy aluminum precipitate; water visibly cloudy. |
| PF61 | -80.012920 | 40.287590 | 986 | 7/22/08 | ~ 1 acre wetland on Piney Fork's RAB floodplain. |
| PF62 | -80.014122 | 40.285862 | 948 | 7/22/08 | AMD impacted tributary culverted along Sebolt Rd and under Brownsville Rd enters Piney Fork's LAB; heavy aluminum precipitate. |
| PF63 | -80.012500 | 40.282667 | 990 | 7/13/12 | AMD impacted discharge from Montour #10 coal waste pile exits culvert and is immediately culverted again along Sebolt Rd. |
| PF64 | -80.016418 | 40.281056 | 1127 | 7/13/12 | Massive coal waste pile from the former Montour #10 Mine; Current reclamation site; permitted to discharge to UNTs to Piney Fork. |
| PF65 | -80.014540 | 40.285870 | 951 | 7/22/08 | AMD tributary culverted along Cardox Rd/under Brownsville Rd enters on LAB; Tire jam at confluence; Concrete dam crossing Piney Fork just downstream. |
| PF66 | -80.015341 | 40.285904 | 950 | 7/22/08 | Debris jam; Piney Fork channel upstream clogged with large chunks of concrete debris. |
| PF67 | -80.017220 | 40.286240 | 955 | 7/22/08 | Steam beam laying across Piney Fork channel; other dam-like obstructions upstream. |
| PF68 | -80.017698 | 40.286347 | 956 | 7/22/08 | Tributary enters on Piney Fork's RAB. |
| PF69 | -80.015860 | 40.287113 | 986 | 7/13/12 | Stormwater detention basin for Consol Energy Research facility. |
| PF70 | -80.017913 | 40.286407 | 958 | 7/13/12 | Piney Fork flows under access road bridge to Consol Energy Research facility. |
| PF71 | -80.019345 | 40.286813 | 958 | 7/13/12 | Piney Fork flows under access road bridge to Library T Station parking area; Bank erosion and sediment deposits just downstream of bridge. |
| PF72 | -80.021045 | 40.287233 | 960 | 7/13/12 | Piney Fork flows under pedestrian access bridge between parking area and T-station tracks; Stream constrained between tracks and parking area for ~ 700 ft. |
| PF73 | -80.021865 | 40.287310 | 962 | 7/13/12 | Piney Fork flows under T-tracks. |
| PF74 | -80.022341 | 40.287094 | 963 | 7/13/12 | Piney Fork flows under Pleasant St bridge. |
| PF75 | -80.025090 | 40.287820 | 966 | 7/22/08 | Small tributary culverted under Rt 88 enters on Piney Fork's LAB(~ 2 GPM; No noticeable AMD). |
| PF76 | -80.025375 | 40.288000 | 966 | 7/13/12 | Piney Fork flows under access road bridge to asphalted parking area. |
| PF77 | -80.289587 | 80.026349 | 970 | 7/13/12 | Piney Fork flows under old Montour Railroad Library Viaduct. |
| PF78 | -80.027650 | 40.290640 | 973 | 7/22/08 | Tributary culverted under Rt 88 business district enters LAB (~5 GPM; No AMD); Piney Fork constrained between T-tracks and business district for ~ 1100 ft. |
| PF79 | -80.028390 | 40.291370 | 975 | 7/22/08 | Tributary draining valley between Montour Trail and Church Hill Rd is culverted under church parking lot and RT 88 and enters on Piney Fork's LAB. |
| PF80 | -80.028736 | 40.291812 | 975 | 7/13/12 | Piney Fork constrained between T-tracks and concrete parking areas for ~ 400 ft along Rt 88 business and residential district. |
| PF81 | -80.029521 | 40.292964 | 979 | 7/13/12 | Confluence of Clifton Rd branch of Piney Fork and South Park Rd branch of Piney Fork. |
| Clifton Road Branch of Piney Fork | | | | | |
| CRB01 | -80.030794 | 40.292800 | 981 | 7/13/12 | Piney Fork Clifton Rd branch culverted under Rt88 at junction with Clifton Rd; Bank erosion on LAB just upstream along concreted parking area. |
| CRB02 | -80.032063 | 40.292984 | 985 | 7/13/12 | Small tributary enters on LAB; Sediment buildup in center of channel just downstream. |
| CRB03 | -80.034768 | 40.293936 | 992 | 7/13/12 | Clifton Rd branch of Piney Fork channelized for ~ 120 ft just downstream of retaining wall; severe bank erosion just below channelized section. |
| CRB04 | -80.035160 | 40.294210 | 997 | 7/13/12 | Approximately 600 ft of retaining wall along RAB of stream in Simmons Park along ball fields and parking area. |
| CRB05 | -80.037040 | 40.294790 | 999 | 7/22/08 | Culverted tributary enters on Clifton Rd Branch Piney Fork RAB in Simmons Park. |
| CRB06 | -80.037593 | 40.294819 | 1000 | 7/13/12 | Pedestrian bridge crossing of stream from parking area to pavilion in Simmons Park. |
| CRB07 | -80.037889 | 40.294973 | 1001 | 7/22/08 | Concrete access road crossing within stream channel for access from parking area to pavilion in Simmons Park; stream channelized upstream by stabilization. |
| CRB08 | -80.039241 | 40.295530 | 1006 | 7/9/12 | Homeowner bridge crossing of Clifton branch of Piney Fork; Homeowner bank stabilization (channelization); sediment deposition in upstream stream channel. |
| CRB09 | -80.040012 | 40.295753 | 1007 | 7/9/12 | Homeowner bridge crossing of stream; bank erosion downstream of bridge. |
| CRB10 | -80.040612 | 40.295927 | 1009 | 7/9/12 | Homeowner bridge crossing of stream; bank erosion downstream of crossing; stabilization upstream with shed on stream bank; little buffer. |
| CRB11 | -80.041205 | 40.296090 | 1011 | 7/9/12 | Homeowner bridge crossing of stream. |
| CRB12 | -80.041455 | 40.296156 | 1012 | 7/9/12 | Homeowner bridge crossing of stream; bank stabilization. |
| CRB13 | -80.041548 | 40.296197 | 1012 | 7/9/12 | Confluence of tributary draining King School Rd with Clifton Rd branch of Piney Fork; bank erosion just upstream on RAB; numerous encroachments downstream. |
| CRB14 | -80.043630 | 40.304651 | 1081 | 7/9/12 | Double stormwater detention basin along King School Village serves a regional stormwater control function; Nice wetland developed in basin. |
| CRB15 | -80.045174 | 40.297256 | 1025 | 7/22/08 | Clifton Rd branch of Piney Fork constrained on RAB by small commercial district along Clifton Rd. |
| CRB16 | -80.046576 | 40.297682 | 1031 | 8/7/08 | Stream culverted under Irishtown Rd; Fish impasse. |
| CRB17 | -80.047853 | 40.298253 | 1033 | 8/7/08 | Bank erosion; Homeowner created log dam |
| CRB18 | -80.048086 | 40.298588 | 1035 | 8/7/08 | Tributary flowing along Irishtown Rd enters on RAB; stream constrained by retaining wall for a couple of hundred feet upstream. |
| CRB19 | -80.048634 | 40.298692 | 1037 | 8/7/08 | Tributary enters on LAB. |
| CRB20 | -80.050099 | 40.299249 | 1042 | 7/9/12 | Clifton Rd branch of Piney Fork flows under Brush Run Rd bridge. |
| CRB21 | -80.050640 | 40.299330 | 1042 | 8/7/08 | Stream culverted under private lane; 3 culverts; should not have been permitted. |
| CRB22 | -80.052919 | 40.300516 | 1049 | 8/7/08 | Stormwater outfall enters on LAB. |

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| CRB23 | -80.053443 | 40.300868 | 1052 | 7/9/12 | Stream culverted again under private lane with 3 culverts. |
| CRB24 | -80.053630 | 40.301020 | 1053 | 8/7/08 | Stormwater detention basin outflow enters on LAB; Stormwater outfall on RAB. |
| CRB25 | -80.053990 | 40.300864 | 1064 | 7/9/12 | Stormwater detention basin above LAB. |
| CRB26 | -80.065280 | 40.298887 | 1362 | 7/9/12 | Highest elevation in Peters Creek watershed on Rocky Ridge. |
| CRB27 | -80.054137 | 40.301427 | 1055 | 8/7/08 | Culverted stormwater outfall on LAB. |
| CRB28 | -80.054803 | 40.302015 | 1060 | 8/7/08 | Stream culverted under Havengate Rd;Fish impasse; RAB retained downstream; bank concreted upstream on LAB; a number of small outfalls. |
| CRB29 | -80.056470 | 40.303080 | 1067 | 8/7/08 | Stormwater outfall on RAB. |
| CRB30 | -80.057410 | 40.303400 | 1071 | 8/7/08 | Culverted tributary enters on LAB (~10 GPM) |
| CRB31 | -80.057589 | 40.303468 | 1074 | 7/9/12 | Clifton Rd branch of Piney Fork flows under Rocky Ridge Rd bridge. |
| CRB32 | -80.057829 | 40.304122 | 1074 | 8/7/08 | Wetland and flood control area. |
| CRB33 | -80.057913 | 40.305047 | 1080 | 7/9/12 | Clifton Rd branch enters culvert and is culverted for ~ 250 ft under Clifton Rd and Thunderwood Dr to wetland south of Thunderwood Dr. |
| CRB34 | -80.057965 | 40.305149 | 1082 | 7/9/12 | Stream is culverted under private driveway. |
| CRB35 | -80.058098 | 40.305494 | 1083 | 7/9/12 | Clifton Rd Branch of Piney Fork exits culvert on east side of Clifton Rd; Rip-rap bank stabilization and a few cattails downstream. |
| CRB36 | -80.058322 | 40.305841 | 1085 | 7/9/12 | Stream enters culvert and is culverted ~ 150 ft from west to east under Clifton Rd. |
| CRB37 | -80.058564 | 40.306030 | 1087 | 7/9/12 | Clifton Rd branch of Piney Fork exits culvert under private driveway and flows through front yard toward Clifton Rd. |
| CRB38 | -80.058779 | 40.306364 | 1088 | 7/9/12 | Stream enters culvert for ~150 ft under driveway and front yard of private residence. |
| CRB39 | -80.059036 | 40.307801 | 1099 | 7/9/12 | Clifton Rd branch of Piney Fork culverted under Manoah Dr; relatively well buffered and free flowing for ~ 500 ft downstream. |
| CRB40 | -80.059024 | 40.309486 | 1108 | 7/9/12 | Clifton Rd branch of Piney Fork daylighted for first time; accepts stormwater from Dashwood Rd on RAB; flows through woodlot downstream. |
| Brightwood Road Branch of Piney Fork | | | | | |
| BRB01 | -80.030113 | 40.293494 | 982 | 7/9/12 | Brightwood Rd branch constrained between T station parking area on RAB and concrete commercial area on LAB from confluence with Clifton Rd branch to Rt88. |
| BRB02 | -80.030612 | 40.293797 | 985 | 7/9/12 | Brightwood Rd branch of Piney Fork flows under Library Rd (RT88) bridge; Stormwater outfall enters on RAB. |
| BRB03 | -80.030586 | 40.294675 | 985 | 8/7/08 | Concrete retaining wall along ~ 100 ft of LAB. |
| BRB04 | -80.030072 | 40.295017 | 987 | 7/9/12 | Brightwood branch flows from east to west under T-tracks. |
| BRB05 | -80.030288 | 40.296162 | 992 | 8/7/08 | Stormwater outfall from apartment complex on RAB; stream essentially channelized for ~ 600 ft by T-tracks on LAB and concreted apartment complex on RAB. |
| BRB06 | -80.030894 | 40.298746 | 997 | 8/7/08 | Tributary culverted under T-tracks enters on LAB. |
| BRB07 | -80.030905 | 40.300165 | 1001 | 7/9/12 | Tributary draining valley between McPherson Rd and Wallace Rd enters Brightwood Rd branch on RAB. |
| BRB08 | -80.031292 | 40.301072 | 1002 | 8/7/08 | Brightwood branch of Piney Fork flows under Beagle Dr bridge; sediment bar in channel under bridge. |
| BRB09 | -80.031360 | 40.301420 | 1003 | 8/7/08 | Bank erosion on bend. |
| BRB10 | -80.031616 | 40.301380 | 1004 | 7/9/12 | Stream flows under T-tracks from west to east. |
| BRB11 | -80.032210 | 40.302030 | 1006 | 8/7/08 | Bank erosion on LAB just downstream of retaining wall placed by homeowner at bend to keep stream from flowing through their property. |
| BRB12 | -80.033057 | 40.304627 | 1014 | 7/9/12 | Brightwood Rd branch travels through woodlot for ~ 2000 ft and is unconstrained; rare for this branch. |
| BRB13 | -80.033298 | 40.307329 | 1022 | 8/7/08 | Tributary enters Brightwood Rd branch on LAB; Bank erosion. |
| BRB14 | -80.033442 | 40.307902 | 1023 | 7/9/12 | Brightwood Rd branch of Piney Fork flows under King School Rd bridge. |
| BRB15 | -80.033666 | 40.310392 | 1036 | 7/9/12 | Tributary draining Logan Rd valley enters on LAB. |
| BRB16 | -80.033478 | 40.311235 | 1042 | 8/7/08 | Stream passes under Logan Rd bridge. |
| BRB17 | -80.033417 | 40.311354 | 1041 | 8/7/08 | Culverted tributary/outfall enters on RAB from under T-tracks. |
| BRB18 | -80.031303 | 40.314212 | 1056 | 8/7/08 | Small tributary enters on LAB; Stream constrained by T-tracks on RAB and apartment complex on LAB for ~ 1300 ft. |
| BRB19 | -80.031109 | 40.314347 | 1058 | 7/9/12 | Brightwood Rd branch flows from east to west under T-tracks; Concrete structure on west side LAB bank to direct flow and protect end of Hartman Ln. |
| BRB20 | -80.029915 | 40.315465 | 1066 | 8/7/08 | Stream passes under Sarah St bridge; Retaining wall on RAB above bridge; pH, conductivity reading just upstream. |
| BRB21 | -80.028660 | 40.320692 | 1092 | 7/9/12 | Brightwood Rd branch of Piney fork culverted under Latimer T-Station access walkway from Brightwood Rd. |
| BRB22 | -80.029149 | 40.321781 | 1105 | 7/9/12 | Brightwood Rd branch culverted between T-tracks and Brightwood Rd for ~ 750 ft. |
| BRB23 | -80.029662 | 40.322646 | 1105 | 7/9/12 | Stream flows under T-tracks; Concrete wall along RAB and gabioned rip-rap on LAB to culvert downstream; step-down to culvert; fish impasse; stormwater outfall. |
| BRB24 | -80.029888 | 40.322813 | 1107 | 7/9/12 | Stream culverted under W Munroe St; Concrete walls along stream above culvert |
| BRB25 | -80.030556 | 40.324676 | 1125 | 7/9/12 | Stream flows through back yards of residences on Florida Ave for ~ 1400 ft; little riparian buffer; eroding banks; bank modifications; stormwater issues. |
| BRB26 | -80.030810 | 40.326490 | 1132 | 7/9/12 | Brightwood Rd branch of Piney Fork is daylighted from culvert from commercial district upstream; heavy stormwater impact; deeply incised channel. |

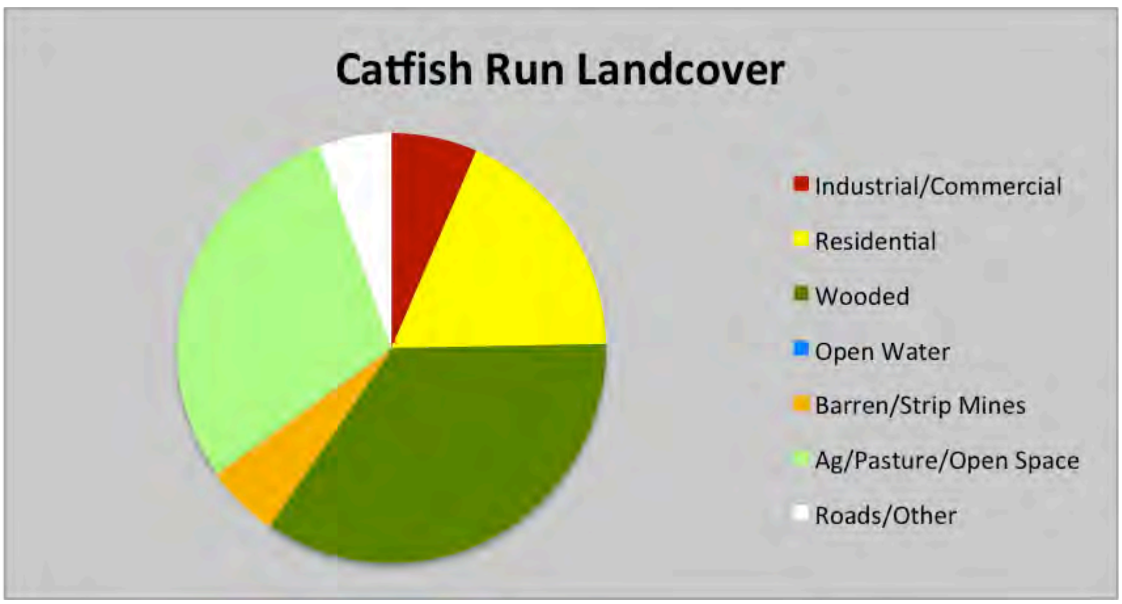
## 8.7 Catfish Run

The headwaters of the Catfish Run sub-watershed are culverted under a commercial district along Library Rd (State Route 88) in Bethel Park Borough. The stream is first daylighted as it enters South Park County Park along Corrigan Dr and spends approximately half of its course within the park. A tributary draining the valley between One Hundred Acre Drive and East Park Drive enters Catfish Run just north of Stone Manse Drive. This area of South Park County Park is historically significant as it contains The Oliver Miller Homestead as well as remnants of the Vale of Cashmere and The Cascades.

Catfish Run exits the county park just south of the Fairgrounds and enters a culvert under a small commercial area along Brownsville Rd. An abandoned mine discharge combines with Catfish Run immediately upon exiting the culvert. Catfish Run enters Piney Fork just south of Piney Fork Rd and immediately upstream of the outfall of the Bethel Park Municipal Authority Piney Fork Sewage Treatment Plant.

The area of the Catfish Run sub-watershed is approximately 4.01 square miles and is comprised of portions of Bethel Park Borough and South Park Twp. A large portion of this sub-watershed falls within the jurisdiction of Allegheny County's South Park County Park.

Land cover within the watershed is depicted in the pie chart below. The dominant land cover types are wooded (34.9%), agricultural/pasture/open space (29.4%) and residential (18.2%). (2006 National Land Cover Database)




Catfish Run is impaired for recreational use by pathogens and for aquatic use by siltation due to urban runoff and storm sewers. (2012 Pennsylvania Water Quality Monitoring and Assessment Report)

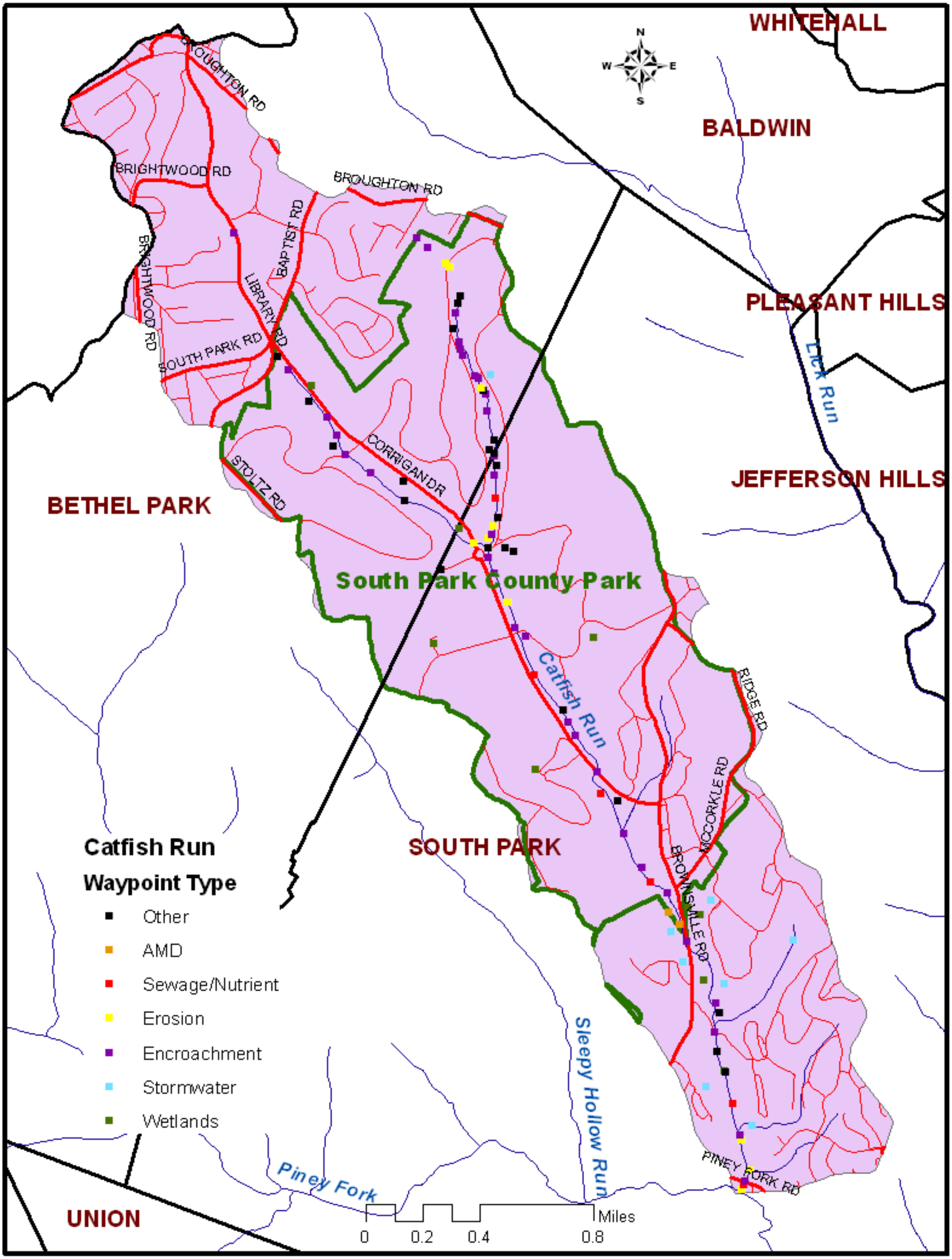
A visual assessment of Catfish Run was conducted to better understand the current physical status of the stream channel, water and riparian zone. The stream was broken into 3 segments and was scored according to the USDA Visual Assessment Protocol. The results of this assessment are found below.

## Catfish Run

Waypoints: CR01-CR27
Description: Confluence with Piney Fork to South Park County Park Fairgrounds
USDA Visual Assessment Protocol Score = 6.9 FAIR

Waypoints: CR28-CR62
Description: South Park County Park Fairgrounds to headwaters along Corrigan Drive
USDA Visual Assessment Protocol Score = 6.6 FAIR

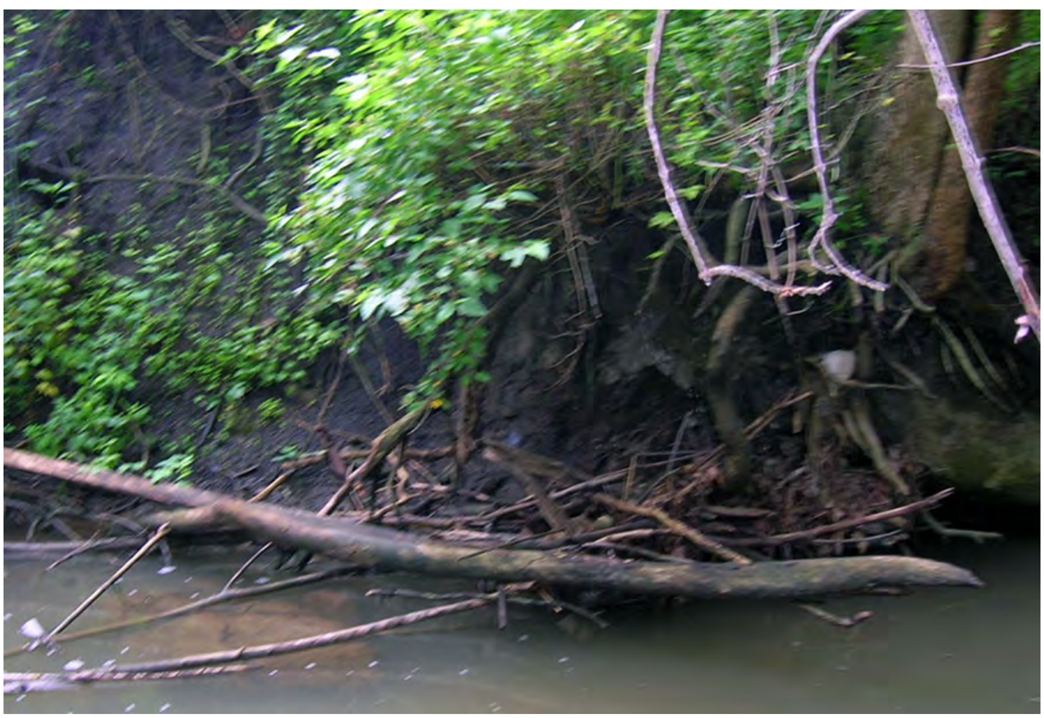
Waypoints: CRT01-CRT30
Description: Entire East Branch Tributary along Hundred Acre Drive
USDA Visual Assessment Protocol Score = 7.2 FAIR



WHITEHALL
BALDWIN
PLEASANT HILLS
JEFFERSON HILLS
BETHEL PARK
SOUTH PARK
UNION
South Park County Park
BROUGHTON RD
BRIGHTWOOD RD
BAPTIST RD
LIBRARY RD
SOUTH PARK RD
STOLTZ RD
CORRIGAN DR
RIDGE RD
MCCORKLE RD
BROWNSVILLE RD
PINEY FORK RD
Catfish Run
Lick Run
Sleepy Hollow Run
Piney Fork
N
S
E
W
Catfish Run
Waypoint Type
Other
AMD
Sewage/Nutrient
Erosion
Encroachment
Stormwater
Wetlands
0
0.2
0.4
0.8
Miles

## *Sewage and AMD Impacts*

*CR24 – The only significant abandoned mine discharge into Catfish Run starts in the very southern end of South Park County Park behind the fairgrounds and flows for approximately 600 feet behind the small commercial district immediately adjacent to the park along Brownsville Rd. A number of seeps and two significant discharges contribute to the flow prior to its entrance into Catfish Run just south of where Catfish Run exits the culvert under the commercial district.*



*CR05 - Coal waste is being eroded into Catfish Run. The Gould Mine of the Bertha Consumers Fuel Company operated in the lower Catfish Run valley during the early part of the 20th century and created two large coal waste piles along the stream.*

*CRT06 – Catfish Run was found to be impaired for recreational use during a 2010 bacterial study. The bacteria level exceeded PA standards on 7 of the 10 samples retrieved during the summer sampling period. The exact cause of this impairment remains unknown and may be due to a number of factors. Excess algal build up was present in proximity to this sanitary sewer manhole along the East Branch Tributary of Catfish Run along East Park Drive. Another sanitary manhole is located within the channel of Catfish Run at Schoonmaker Hall (CR26) in the fairgrounds of South Park County Park.*

## Stream Bank Erosion & Siltation

*CR42 - Stream bank erosion is a recurring theme for Catfish Run along Corrigan Drive and along the East Branch Tributary as well. The stream is culverted under numerous roads and often the culverts are not sized correctly leading to severe bank erosion just downstream of the culvert. Gabioned rip-rap is utilized to protect the stream banks at many locations including the one depicted in the photo above at the Deck Hockey facility. This method of treating the symptoms of the problem has many shortcomings. It is aesthetically unappealing, often creates bank erosion downstream of the rip-rapped area, becomes undercut and requires long-term maintenance.*

*CRT17 – Severe bank erosion and undercutting along the East Branch of Catfish Run just downstream of the road connecting East Park Drive and Hundred Acre Drive. A small tributary in a deeply incised channel enters the East Branch on its right ascending bank (left foreground in photo). The channel carries excess storm water from the South Park Golf Course during precipitation events.*

*CR35 - Bank erosion downstream of a historically significant pedestrian bridge crossing Catfish Run between the soccer fields and Corrigan Dr. Catfish Run is effectively channelized along Corrigan Drive from the circle to the fairgrounds and is not permitted to meander as a stream normally would. Stream meanders dissipate energy during severe rain events and mitigate erosion. Inset shows bank erosion just upstream of the bridge.*

*CR28 – Severe bank erosion along the channelized portion of Catfish Run at the fairgrounds has eroded away part of the retaining wall.*

## *Nutrient Enrichment*

Catfish Run appears to be impacted by excess nutrients at a number of locations along its course. The exact source of this enrichment is unknown. Possible sources include abandoned mine drainage, runoff from off-leash dog park, runoff from pony ride area and police horse stable area and malfunctioning sanitary sewer lines. A Nutrient Management Plan was recently completed for South Park that should help mitigate nutrient enrichment problems within the stream.

*CR29 - Runoff from animal use areas and manure storage facilities along streams can increase the nutrient load within the stream especially when animals have access to the stream and the facilities are not maintained adequately. This animal use area is along Catfish Run at the fairgrounds along the channelized portion of the stream.*

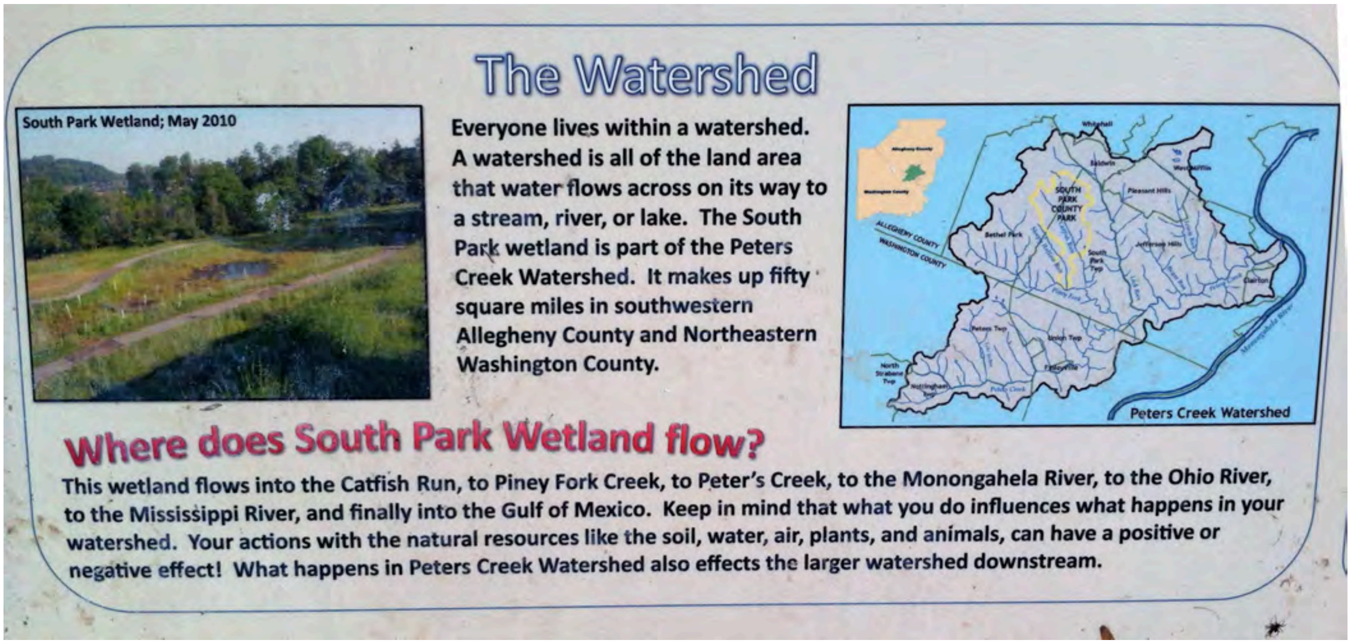
## *Wetlands*

There are a number of wetlands within the floodplain of the main stem of Catfish Run but few if any along the East Branch Tributary. The largest and most significant wetland is just downstream of Catfish Run's crossing under Wallace Rd. Wetlands also occur along the upper part of Corrigan Drive not far from the northern park entrance. Another wetland occurs within Catfish Run's right ascending floodplain just upstream of the Corrigan Circle. There are also wetlands outside of the parks southern boundary along Brownsville Rd. A created wetland was developed on the property of South Park High School as mitigation for natural wetlands destroyed when the new school was built. The successful implementation of this wetland is questionable.

There are also a number of ponds with or without associated wetlands within the Catfish Run sub-watershed; notably along  Maple Springs Rd and McConkey Rd.

*CR38 – Maple Springs Rd pond with small associated wetland in South Park County Park.*

***CR17 – A small wetland within Catfish Run's left ascending bank floodplain south of South Park County Park along Brownsville Rd. Floodplain drains to Catfish Run via a drainage ditch and the remainder of the floodplain is mowed with little wooded buffer along Catfish Run along this secton.***




*CR20 – A sign developed as outreach by students at South Park High School for the mitigation wetland created on the South Park High School property. Insets on the sign include a view of the wetland and a map of the Peters Creek watershed.*

*CR09 – Large floodplain wetland occupies approximately 350 feet of Catfish Run' right ascending bank from Wallace Rd downstream.*

## *Invasives and Floodplain Condition*

***CR62 – The headwaters of Catfish Run's main stem are culverted under this commercial district along State Rt88 in Bethel Park. The stream is first daylighted in South Park County Park along Corrigan Drive.***

***CR61 - Catfish Run exits the culvert near the South Park County Park's northern entrance. This photo was taken in approximately 2006. Subsequently, a riparian buffer was installed along 1200 feet of Catfish Run from the culvert to near the ice skating rink.***

*CR61 – This is a recent photo illustrating how well the riparian buffer is developing. This buffer helps to mitigate stream bank erosion during high water events and helps to maintain water quality within the stream. A recommendation of the Allegheny County Parks Comprehensive Master Plan of 2002 was to develop and maintain vegetated riparian buffers along all park streams. This provides a good start for South Park County Park. There are a number of other areas in the park that would benefit from installation of adequate vegetated buffers along both Catfish Run and Sleepy Hollow Run.*

*CRT29 – A fairly typical view of the East Branch Tributary and surrounding floodplain north of Hundred Acre Rd. The floodplain is choked with invasive plants and vines and the stream banks are eroding.*

*CRT12 - A majority of the riparian zone surrounding the East Branch Tributary is wooded. The remnants of the Vale of Cashmere are located in a wooded section of the East Branch within the streams left ascending floodplain. The inset illustrates how this location looked when the structure was initially completed.*

*CRT05 - There are a number of areas along the East Branch of Catfish Run that have inadequate vegetative buffers such as this riparian zone along Grant Grove just north of the Oliver Miller Homestead.*

*CRT27 – Catfish Run's East Branch Tributary is culverted for approximately 700 feet under this asphalted parking area and the Haunted House facility. A structure holding a natural spring can be seen to the right of the parking area. The spring flows into the East Branch under the culvert. The East Branch initially enters the culvert just north of Hundred Acre Drive.*

*CR50 – Typical view of the main stem of Catfish Run's right ascending floodplain from the Corrigan Circle north to the VIP Zone. The riparian zone is naturally vegetated along this reach of Catfish Run. The right ascending floodplain is mostly wetland and the left ascending bank is comprised of wooded slope. The left ascending bank remains wooded to the ice skating rink and the right ascending bank becomes approximately 8 acres of impervious parking and recreational area.*

The main stem of Catfish Run flows for approximate .9 miles along the east side of Corrigan Drive from Stone Manse Drive to where it is culverted to the west of Corrigan Drive just north of the fairgrounds. It is culverted under three roads along this section and is often squeezed between Corrigan Drive and recreational areas with little opportunity to meander and with an inadequate vegetative buffer at a number of locations. Most tributaries enter Catfish Run from culverts with the exception of the Maple Springs Rd tributary which is free flowing. West of

**Corrigan Drive Catfish Run flows between a 1.5 acre impervious parking/playground area and the pony ride concession then between an access road to the fairgrounds and the Round Barn Stable area prior to being channelized along the fairgrounds fields.**

***CR43 – A view of Catfish Run's right ascending floodplain from the Deck Hockey parking area toward Old Manse Drive. Catfish Run flows along the left side of the photo immediately behind the light poles. The Oliver Miller Homestead area is above the floodplain to the upper right. The tennis courts were recently removed from the floodplain to another part of the park. It appears that asphalt millings are being installed over the old tennis court area. The tennis courts encroached on Catfish Run and created problems with erosion. Now that they are gone the vegetated buffer along Catfish Run's right ascending bank should be improved and a thoughtful plan developed for this area that adequately buffers the Oliver Miller Homestead from incompatible activities.***

***CR28 - Catfish Run is channelized for approximately 1000 feet along the fairgrounds fields and then is immediately culverted for 225 ft under a parking area. Recent plans to upgrade the fairgrounds area include options to naturalize Catfish Run along this area. The riparian zone is clearly in need of improvement.***

*CR25 – Catfish Run exits South Park County Park via a 550 foot culvert under a commercial district just to the south of the park. Prior to entering the culvert the stream flows along and is constrained by Schoonmaker Hall then passes through a small wooded area behind the fairgrounds buildings. The wooded area has some issues with invasives as well as abandoned mine drainage on the slope above Catfish Run's left ascending bank. The right ascending bank in this area is steep and has some erosion issues.*

*CR13 – Upon exiting the culvert at CR23 Catfish Run flows for 400 feet along the west side of Brownsville Rd and then is culverted to the east side of the road. It then flows between a steep slope along the western side of South Park High School and a commercial and residential area along Brownsville Rd. In this area the wooded buffer along Catfish Run would benefit from widening. The stream would also benefit from foresting the entire steep slope along the high school. From about CR13 to Wallace Rd, Catfish Run meanders through a naturally vegetated area. There are some issues with invasive plants at this location. South of Wallace Rd Catfish Run flows for approximately ½ mile through a naturally vegetated valley with steep forested slopes along the left ascending bank and wetland along the right ascending bank with a townhouse development at the top of the slope. Evidence of an old mining operation is present in the lower valley just north of Piney Fork Rd. South of Piney Fork Rd Catfish Run flows under the Montour Trail prior to entering Piney Fork Run just upstream of the Piney Fork Sewage Treatment Plant outfall.*

## *Stormwater Infrastructure and Issues*

Catfish Run definitely suffers from excess storm water runoff from a number of sources. The large area of impervious surface in the commercialized and culverted headwater portion of the main stem of Catfish Run along Rt88 creates problems during heavy rain events. The vegetated buffer along the first 1200 feet of Catfish Run when first daylighted along Corrigan Drive helps to mitigate this problem but is not enough to alleviate it. Approximately 8 acres of impervious surface along Catfish Run's right ascending bank from the ice skating rink to the VIP Zone exacerbates the problem.

The East Branch Tributary also suffers from runoff near its headwaters from a residential area along Broughton Rd developed prior to adequate storm water controls and from storm water runoff from a portion of the South Park Golf Course.

The two branches of Catfish Run meet at Stone Manse Drive and for the rest of Catfish Run's course within South Park County Park the stream is either constrained between recreational areas and Corrigan Dr, channelized or culverted for most of its course. None of these permit Catfish Run to dissipate the storm waters excess energy and actually can increase it.

Catfish Run is again culverted as it leaves South Park but then is permitted to meander between Brownsville Rd and Wallace Rd within a vegetated riparian zone. South of Wallace Rd the stream flows through a mostly vegetated valley with wetlands and wooded slopes within the riparian zone. Much of the development within the lower Catfish Run valley was required to implement storm water controls in the form of storm water detention basins. These include the new South Park High School and Elementary School, the Greenbriar development, Parkford Rd development and newer development along Wallace Rd.

*CRT19 – This is a drainage channel from the South Park Golf Course. The channel has become incised and delivers large quantities of storm water runoff to the East Branch of Catfish Run.*

*CR53 – Catfish Run flows along the bottom of this 4.5 acre asphalted parking lot between the South Park Ice Skating Rink and the VIP Zone. There is little vegetated buffer between the asphalt and the stream. Storm water runoff from this lot and from the adjoining impervious surface (~ 3.5 acres) of the VIP Zone during heavy precipitation events contributes to Catfish Run's storm water problems.*


*CR48 - Inadequate control of storm water leads to excess erosion downstream and damage to infrastructure such as this culvert headwall and wing wall at Stone Manse Drive.*

*CR64 – A view of the stormwater detention basin associated with the Parkford Apartments off of Brownsville Rd. Catfish Run flows at the bottom of the steep wooded hillside behind the detention basin.*

## Encroachments

*CRT13 – Fallen tree creating a debris jam that is encroaching on the stream channel of the East Branch of Catfish Run.*

*CRT03 – Improperly sized culvert at the access road to Grant Grove within the East Branch of Catfish Run is causing severe bank erosion both upstream and downstream of the culvert. This is a common problem at a number of crossings of the East  Branch.*

*CRT16 - Remnants of an old concrete and metal structure along the right ascending bank of the East Branch of Catfish Run is creating bank erosion.*

*At a number of locations along the Corrigan Rd portion of the main stem of Catfish Run large concrete debris of various forms is found within the channel of Catfish Run. This particular culvert and headwall fragment is located near the off-leash dog park.*

*CR26 – Remnants of a nonfunctional bridge crossing of Catfish Run behind the fairgrounds buildings encroaches on the stream channel and is constantly creating debris jams that flood the surrounding area during heavy precipitation. Schoonmaker Hall and a sanitary sewer manhole also encroach on Catfish Run just upstream of this location.*

## *Garbage & Dumps*

Litter and illegal dumping is a persistent problem within the Catfish Run sub-watershed but does not appear to be a major problem within the floodplain area except at a few locations. The Friends of South Park County Park sponsors two park cleanups per year and South Park Twp has done a tremendous job at organizing volunteers to keep township roads clean.

*CRT26 – The area surrounding the Haunted House facility along Hundred Acre Drive near the headwaters of the East Branch of Catfish Run is one problem area. Significant trash and construction debris, some of it posing a hazard to the public, is present around the building.*

*CRT29 - The headwaters area near the residential area also has a good bit of garbage present. Here a discarded picnic table is within the channel of the East Branch of Catfish Run. This tends to be a common problem in parts of the watershed near to residential development.*

## *Areas of Historical and/or Conservation Significance*

There are several areas or structures within the Catfish Run sub-watershed that are of historical significance. The Oliver Miller Homestead is of national significance for its relationship to the Whiskey Rebellion.

Remnants of many rock structures designed by landscape architect Paul B. Riis following the tenets of the naturalistic school of park design remain but are in need of maintenance and/or restoration. Some of these structures include The Vale of Cashmere, The Cascades and the stone pavilion associated with it, The Edgebrook Bridge and a number of other stone pavilions. Some of these structures no longer exist, the most significant being the unique naturalistic swimming pool along Corrigan Drive. The swimming pool bathhouse does remain, however, but is altered.

There are also a number of houses of historical interest including the Maits House, the farmhouse and old barn on McConkey Rd and the farmhouse at the South Park Game Preserve. A number of structures at the fairgrounds, including the Museum Building, are also of historical significance.

The valley to the west of the Girl Scout area off of Corrigan Circle is an area worthy of long-term conservation. There are also a number of large, heritage grade trees, within South Park County Park including a number at or along the South Park Golf Course.

*CR45 – The Oliver Miller Homestead at the corner of Corrigan and Stone Manse Drive is a national Whiskey Rebellion Site. The first shots of the Whiskey Rebellion occurred at this location. The Oliver Miller Homestead Associates offer public programs concerning the Whiskey Rebellion and other aspects of early American life.*

*CR44 – Remnants of The Cascades and a stone pavilion designed by landscape architect Paul B. Riis and built when South Park County Park was first opened.*

## *Conclusions and Recommendations*

Inadequately controlled stormwater appears to be responsible for the majority of Catfish Run's problems, especially within the upper portion of the sub-watershed within South Park County Park. Most of the excess stormwater comes from areas upstream of the park but the South Park Golf Course and a large impervious parking and recreation area along Corrigan Drive are also contributing factors.

Most of the residential and commercial development on Catfish Run and the East Branch of Catfish Run upstream of South Park County Park occurred prior to implementation of requirements for control of storm waters. Exploration of the possibility of retrofitting these areas with regional stormwater facilities and/or green infrastructure controls would help to mitigate the stormwater problems in the park.

Within the park the problem is exacerbated by a significant number of culverts, some of them lengthy and many of them undersized. The stream is also constrained, channelized and/or encroached upon at a number of locations. This provides little opportunity for dissipation of the excess stormwater's energy and leads to more severe bank erosion and increased deterioration of infrastructure. Installing and maintaining an adequate vegetated buffer along the upper reach of the main stem of Catfish Run helps to dissipate some of the stormwaters energy but is not nearly enough to control the quantities of stormwater being produced by the large commercial district along Rt88. Providing storage in the upper portion of both the main stem and the East Branch of Catfish Run may be necessary to fully mitigate the problem. Green infrastructure solutions may prove useful as a means of mitigating excess stormwater from the golf course and parking/recreation area along Corrigan Drive. Adding and maintaining adequate vegetated buffers along the entire length of Catfish Run and the East Branch would also be helpful.

Establishing a program to identify and remove debris jams and other materials encroaching on the stream channel would help to alleviate problems with localized erosion. Perhaps local groups, such as The Friends of South Park and PTAG, could be enlisted to help with this effort.

The lower portion of Catfish Run downstream of South Park County Park flows primarily through a naturally vegetated valley with little development within the floodplain. Newer developments along this section of Catfish Run have implemented stormwater controls. It is imperative that these facilities are monitored in the long-term to assure that they are and continue to provide adequate stormwater control.

Catfish Run was found to be impaired for recreational use by pathogens during a 2010 bacterial study. The source of this impairment is not known. It is important to identify the source and to eliminate it if possible since the stream is a regional recreational resource as it flows through South Park County Park. Regular inspection and maintenance of sanitary sewer infrastructure both within and upstream of South Park is imperative in order to mitigate bacterial load within the stream.

The main stem of Catfish Run consistently has the highest conductivity readings of any major tributary within the Peters Creek watershed. Conductivity levels regularly exceed 3000 µ–siemens/cm even during the summer months. Samples are taken just downstream of the culvert where Catfish Run is first daylighted in the northern part of the park along Corrigan Drive. Winter readings can exceed 5000 µ–siemens/cm due to the additional salt load. Further analysis has revealed that these conductivity readings do not appear to be AMD metals related but the source and exact composition is not known. Consistent conductivity levels exceeding 3000 µ–siemens/cm can be detrimental to the diversity of aquatic life within the stream. Further analysis should be provided to better understand and eliminate this excessive level of conductivity.

Invasive herbaceous plants and vines are a problem at a number of locations throughout the Catfish Run sub-watershed. Developing a plan to manage them within the floodplain of Catfish Run is a worthy goal. Enlisting the help of local groups such as the Friends of South Park County Park to carry out regular invasives removal activities along Catfish Run would help to maintain a healthy riparian zone that would contribute to long-term stormwater control.

One major abandoned mine discharge exists within the Catfish Run sub-watershed at the southern end of South Park County Park and just outside of the park. Treating this discharge would improve water quality and aquatic life diversity within the lower portion of Catfish Run and within Piney Fork as well.

A long-term conservation plan for the natural and forested parts of South Park County Park, including the valley west of the Girl Scout area, should be developed and implemented. The Field

Project, which decreases mowing of fields within the park that are not utilized for recreation should be continued and expanded in appropriate areas. Efforts to identify and treat large oak and ash trees that are being compromised by Oak Wilt and the Emerald Ash Borer should be continued. Trees that would qualify for Heritage Tree status should be identified and protected.

A South Park Fairgrounds Master Plan was completed in 2011. The plan was developed over the course of a number of years and involved a good deal of community input. The final recommendations included a long-term plan to decrease the impervious surface area of the Fairgrounds and to return it to a more natural state while maintaining the same amount of area for ball fields. The plan also recommends removing Catfish Run from the channel and returning the stream to a free-flowing state. These recommendations should be implemented.

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Notes |
|---|---|---|---|---|---|
| CR01 | -79.991299 | 40.286936 | 904 | 6/26/08 | Confluence with Piney Fork just upstream of sewage plant outfall; severe bank erosion. |
| CR02 | -79.991127 | 40.287212 | 907 | 6/26/08 | Catfish Run culverted under Montour Trail. |
| CR03 | -79.991035 | 40.287365 | 905 | 6/26/08 | Catfish Run under Brownsville Rd Bridge. |
| CR04 | -79.990699 | 40.287950 | 908 | 6/26/08 | Bank erosion and debris jam |
| CR05 | -79.991270 | 40.289480 | 912 | 6/26/08 | 15-20 ft.. Bank Eroding/coal waste material |
| CR06 | -79.990526 | 40.290230 | 922 | 3/22/12 | Stormwater detention basin |
| CR07 | -79.991351 | 40.289742 | 911 | 6/26/08 | Debris jam/tributary enters on right ascending bank. |
| CR08 | -79.991750 | 40.291340 | 914 | 6/26/08 | Massive debris jam/algae;nutrient enrichment |
| CR09 | -79.992300 | 40.293050 | 921 | 6/26/08 | Wetland on right ascending bank from here upstream to Wallace Rd stream crossing. |
| CR10 | -79.992230 | 40.292960 | 920 | 6/26/08 | Tributary enters on left ascending bank |
| CR11 | -79.992760 | 40.294030 | 921 | 6/26/08 | Small tributary enters on right ascending bank/little to no flow. |
| CR12 | -79.992929 | 40.295010 | 930 | 6/26/08 | Stream culverted under Wallace Rd. |
| CR13 | -79.992640 | 40.295970 | 934 | 6/26/08 | Small tributary enters on right ascending bank upstream of Wallace Rd. |
| CR14 | -79.992827 | 40.296507 | 927 | 6/26/08 | Debris jam |
| CR15 | -79.992231 | 40.297491 | 979 | 3/22/12 | Storm Water Detention basin for South Park HS |
| CR16 | -79.994978 | 40.298629 | 970 | 3/22/12 | Stormwater detention area for Greenbriar Development |
| CR17 | -79.993655 | 40.297655 | 936 | 3/22/12 | Small wetland on left ascending bank. Drainage ditch to stream. Rest of floodplain mowed. |
| CR18 | -79.995777 | 40.300134 | 997 | 3/22/12 | Stormwater detention basin for Greenbriar development. |
| CR19 | -79.994715 | 40.299629 | 938 | 3/22/12 | Catfish Run culverted under Brownsville Rd |
| CR20 | -79.993830 | 40.301009 | 978 | 3/22/12 | 1.7 acre mitigation wetland fed by stormwater detention basin. |
| CR21 | -79.993114 | 40.301714 | 1012 | 3/22/12 | Stormwater detention basin for South Park High School. |
| CR22 | -79.994602 | 40.301397 | 962 | 3/22/12 | Natural wetlands. |
| CR23 | -79.995200 | 40.300528 | 942 | 3/22/12 | Catfish Run exits culvert under South Park Club House lot. AMD discharge enters stream on left ascending bank. |
| CR24 | -79.995932 | 40.301141 | 968 | 6/26/08 | AMD Discharge along tow of hill entire length of SP Club House lot and extending into South Park. |
| CR25 | -79.995944 | 40.302151 | 952 | 3/22/12 | Catfish Run exits South Park County Park and enters culvert under small commercial district. |
| CR26 | -79.997067 | 40.302717 | 956 | 3/22/12 | Schoonmaker Hall encroaches on stream; Sewer manhole in channel; old bridge creates debris jams. |
| CR27 | -79.997643 | 40.303424 | 966 | 6/26/08 | Catfish Run culverted under Museum Building parking lot. |
| CR28 | -79.998813 | 40.305151 | 970 | 7/16/08 | Catfish Run channelized along Fairgrounds track. Retaining wall failing. Step down pools create fish barrier. |
| CR29 | -79.999232 | 40.306859 | 973 | 1/1/14 | Round Barn County Police Horse Stable |
| CR30 | -80.000370 | 40.307250 | 992 | 7/16/08 | Horse pen by stream/small < 1/2 acre. |
| CR31 | -80.000527 | 40.308316 | 983 | 3/22/12 | Catfish Run culverted under Corrigan Dr. |
| CR32 | -80.001983 | 40.310191 | 987 | 7/16/08 | Stream culverted under access road to soccer field parking lot. Major erosion problem below crossing. |
| CR33 | -80.004660 | 40.308484 | 1052 | 1/1/14 | Game Preserve Pond |
| CR34 | 80.004329 | 40.310225 | 1103 | 1/1/14 | Buffalo Grazing Pasture |
| CR35 | -80.002446 | 40.310911 | 983 | 3/22/08 | Bank erosion along soccer field reach threatening historical bridge crossing. |
| CR36 | -80.002760 | 40.311490 | 985 | 7/16/08 | Tributary enters on right ascending bank. |
| CR37 | -80.004680 | 40.313340 | 992 | 7/16/08 | Culvert in stream channel; dog off-leash area adjacent to stream on right ascending bank. |

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Notes |
|---|---|---|---|---|---|
| CR38 | -80.000709 | 40.315227 | 1031 | 1/1/14 | Maple Springs Rd Pond |
| CR39 | -80.005224 | 40.315277 | 1006 | 3/22/12 | Catfish Run culverted under Maple Springs Rd. |
| CR40 | -80.011353 | 40.314956 | 1092 | 1/1/14 | McConkey Rd Pond at Allegheny County Maintenance Facility |
| CR41 | -80.005962 | 40.315733 | 1005 | 1/1/14 | McConkey Rd Tributary enters Catfish Run's LAB after being culverted for several hundred feet along McConkey Rd. |
| CR42 | -80.006403 | 40.317041 | 1005 | 1/1/14 | Eroding Gabian Rip-Rapped stream banks below access road to parking area for Deck Hockey. |
| CR43 | -80.007276 | 40.318557 | 1013 | 7/16/08 | Tennis Courts encroach on stream; bank erosion, debris jams and inadequate riparian buffer along this reach. |
| CR44 | -80.005964 | 40.319631 | 1057 | 1/1/14 | Remnants of The Cascades at Oliver Miller Homestead. |
| CR45 | -80.006510 | 40.319830 | 1036 | 1/1/14 | Spring House at Oliver Miller Homestead |
| CR46 | -80.010818 | 40.318744 | 1045 | 1/1/14 | Remnants of spring house along Girl Scout Area access road. |
| CR47 | -80.007636 | 40.319352 | 1013 | 1/1/14 | Oliver Miller Homestead spring enters Catfish Run's RAB and Girl Scout area spring enters on LAB. |
| CR48 | -80.007690 | 40.319830 | 1015 | 7/16/08 | Confluence of Catfish Run East trib. Stream culverted under Stone Manse Dr. Severe erosion problems at culvert exit. |
| CR49 | -80.008588 | 40.320100 | 1025 | 7/16/08 | Stream culverted under Corrigan Dr.; Steeply cut left ascending eroding bank just upstream. No vegetative buffer. |
| CR50 | -80.009591 | 40.320848 | 1022 | 3/22/12 | Large wetland occupies floodplain on right ascending bank. Drainage to stream. Left ascending bank forested. |
| CR51 | -80.013180 | 40.322290 | 1041 | 7/16/08 | Tributary enters on left descending bank. |
| CR52 | -80.013235 | 40.323272 | 1049 | 1/1/14 | Remnants of Corrigan Road Pool Bath House and pool area. |
| CR53 | -80.015464 | 40.323709 | 1043 | 3/22/12 | Impervious amusement area/asphalt parking lot occupy right ascending floodplain. Runoff problem. Inadequate buffer. |
| CR54 | -80.017091 | 40.324678 | 1049 | 3/22/12 | Catfish Run culverted under Hundred Acre Drive. |
| CR55 | -80.017897 | 40.325095 | 1060 | 1/1/14 | Remnants of the Maits House. |
| CR56 | -80.017629 | 40.325688 | 1052 | 3/22/12 | Culverted under Ice Skating Rink access road. Inadequate vegetative buffer along stream. |
| CR57 | -80.018290 | 40.326564 | 1060 | 3/22/12 | Catfish Run culverted for ~ 300ft between ice skating rink and Corrigan Dr. |
| CR58 | -80.019468 | 40.327429 | 1060 | 3/22/12 | Culverted trib enters on right ascending bank. Pooling area along creek. |
| CR59 | -80.019295 | 40.328208 | 1074 | 3/22/12 | Wetland area and tributary along Corrigan Dr. |
| CR60 | -80.020862 | 40.329008 | 1069 | 3/22/12 | Culverted trib enters Catfish Run on right ascending bank. |
| CR61 | -80.021540 | 40.329722 | 1079 | 3/22/12 | Catfish Run daylighted from culvert. ~1200 ft riparian buffer restoration planting from culvert to ice skating rink. |
| CR62 | -80.024358 | 40.336048 | 1146 | 3/22/12 | Headwaters of Catfish Run culverted under this large commercial district along Rt88 in Bethel Park. |
| CR63 | -79.987659 | 40.299662 | 1042 | 1/1/14 | Stormwater detention basin for South Park Elementary School |
| CR64 | -79.993537 | 40.292227 | 1022 | 1/1/14 | Stormwater detention basin for Parkford Apartments |
| Catfish Run East Drive Tributary | | | | | |
| CRT01 | -80.007667 | 40.319833 | 1018 | 2/12/13 | Confluence of Catfish Run with east branch trib at Corrigan Rd. Circle. Stone Manse Rd culvert immediately downstream. |
| CRT02 | -80.007667 | 40.320333 | 1020 | 2/12/13 | Left ascending bank eroding, detached from floodplain; inadequate riparian buffer along stream reach. |
| CRT03 | -80.007439 | 40.320499 | 1021 | 2/12/13 | Improperly sized culvert creates erosion issues downstream and upstream of this vehichle crossing. |
| CRT04 | -80.007283 | 40.320948 | 1022 | 2/12/13 | Debris jam creating erosional problems along recreational fields. |
| CRT05 | -80.007008 | 40.321340 | 1024 | 2/12/13 | Inadequate vegetative buffer along stream. |
| CRT06 | -80.007167 | 40.322333 | 1030 | 2/12/13 | Sewer manhole in stream channel. Excess algae downstream of manhole. |
| CRT07 | -80.007167 | 40.323500 | 1039 | 2/12/13 | Deteriorating stream crossing culvert in need of rehab or replacement. |
| CRT08 | -80.007000 | 40.324000 | 1043 | 2/12/13 | Small trib on right ascending bank in need of better solution as it crosses bike trail. |
| CRT09 | -80.007167 | 40.324500 | 1047 | 2/12/13 | A well thought out stream crossing that has little impact on stream. |

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Notes |
|---|---|---|---|---|---|
| CRT10 | -80.007167 | 40.324667 | 1047 | 2/12/13 | Tributary enters on right ascending bank |
| CRT11 | -80.007500 | 40.324833 | 1057 | 2/12/13 | Old channel and remnants of crossing of Vale of Cashmere diversion channel. Most downstream remnants. |
| CRT12 | -80.007167 | 40.325333 | 1051 | 2/12/13 | Remnants of one of the main pools of Vale of Cashmere. |
| CRT13 | -80.007667 | 40.326833 | 1068 | 2/12/13 | Appears to be point where water was diverted from stream for Vale of Cashmere. Debris jam caused by fallen trees. |
| CRT14 | -80.007667 | 40.327667 | 1070 | 2/12/13 | Rusting culvert in stream channel. |
| CRT15 | -80.007833 | 40.327833 | 1071 | 2/12/13 | Tributary enters on left ascending bank. |
| CRT16 | -80.008000 | 40.328000 | 1075 | 2/12/13 | Remnants of structure along right ascending bank combined with small trib entry causing severe erosion. |
| CRT17 | -80.008397 | 40.328609 | 1089 | 2/12/13 | Perched culvert with plunge pool and exposed pipe crossing. Creating erosion issues downstream of bridge crossing. |
| CRT18 | -80.008167 | 40.328500 | 1088 | 2/12/13 | Highly incised trib entering on right ascending bank right below culvert. Trib drains part of South Park Golf Course. |
| CRT19 | -80.007333 | 40.328667 | 1101 | 2/12/13 | Culvert not functioning as intended as trib exits culvert at edge of South Park Golf Course. |
| CRT20 | -80.009167 | 40.329667 | 1088 | 2/14/13 | Improperly sized culvert causes erosion problems at culvert exit and downstream due to increased stream velocity. |
| CRT21 | -80.009333 | 40.330000 | 1091 | 2/14/13 | Debris jam causing ponding of stream in floodplain; inadequate vegetative buffer along stream. |
| CRT22 | -80.009415 | 40.330372 | 1095 | 2/14/13 | Improperly sized culvert; trib entering on left ascending bank just upstream of bridge with construction debris in channel. |
| CRT23 | -80.009833 | 40.331000 | 1109 | 2/14/13 | Deteriorating culvert no longer appears to be functioning. |
| CRT24 | -80.009667 | 40.331833 | 1110 | 2/14/13 | Eroding stream banks; stream detached from floodplain; inadequate vegetative buffer on left descending bank. |
| CRT25 | -80.009500 | 40.332333 | 1117 | 2/14/13 | Stream exits culvert under Haunted Manor. Small trib enters on right ascending bank. |
| CRT26 | -80.009333 | 40.332667 | 1121 | 2/14/13 | Significant trash present at Haunted Manor facility. Presents danger to public. |
| CRT27 | -80.010000 | 40.334167 | 1130 | 2/14/13 | Culvert appears to be damaged under parking lot. Would cause erosion problems upstream during significant rain events. |
| CRT28 | -80.010252 | 40.334358 | 1129 | 2/14/13 | Upstream entry of tributary into culvert under Hundred Acre Dr, parking lot and Haunted Manor facility. |
| CRT29 | -80.011500 | 40.335167 | 1146 | 2/14/13 | Old picnic table in stream channel. Typical view of state of vegetation in this woodlot north of Hundred Acre Dr. |
| CRT30 | -80.012167 | 40.335667 | 1153 | 2/14/13 | Catfish Run east trib as it is first daylighted from culvert along Sansue Dr. Bethel Park |

## 8.8 Sleepy Hollow Run

The Sleepy Hollow Run watershed includes an area of approximately 1.12 square miles. The watershed is comprised of parts of Bethel Park Borough and South Park Township. Allegheny County also has jurisdiction within the watershed as South Park County Park comprises a significant portion.

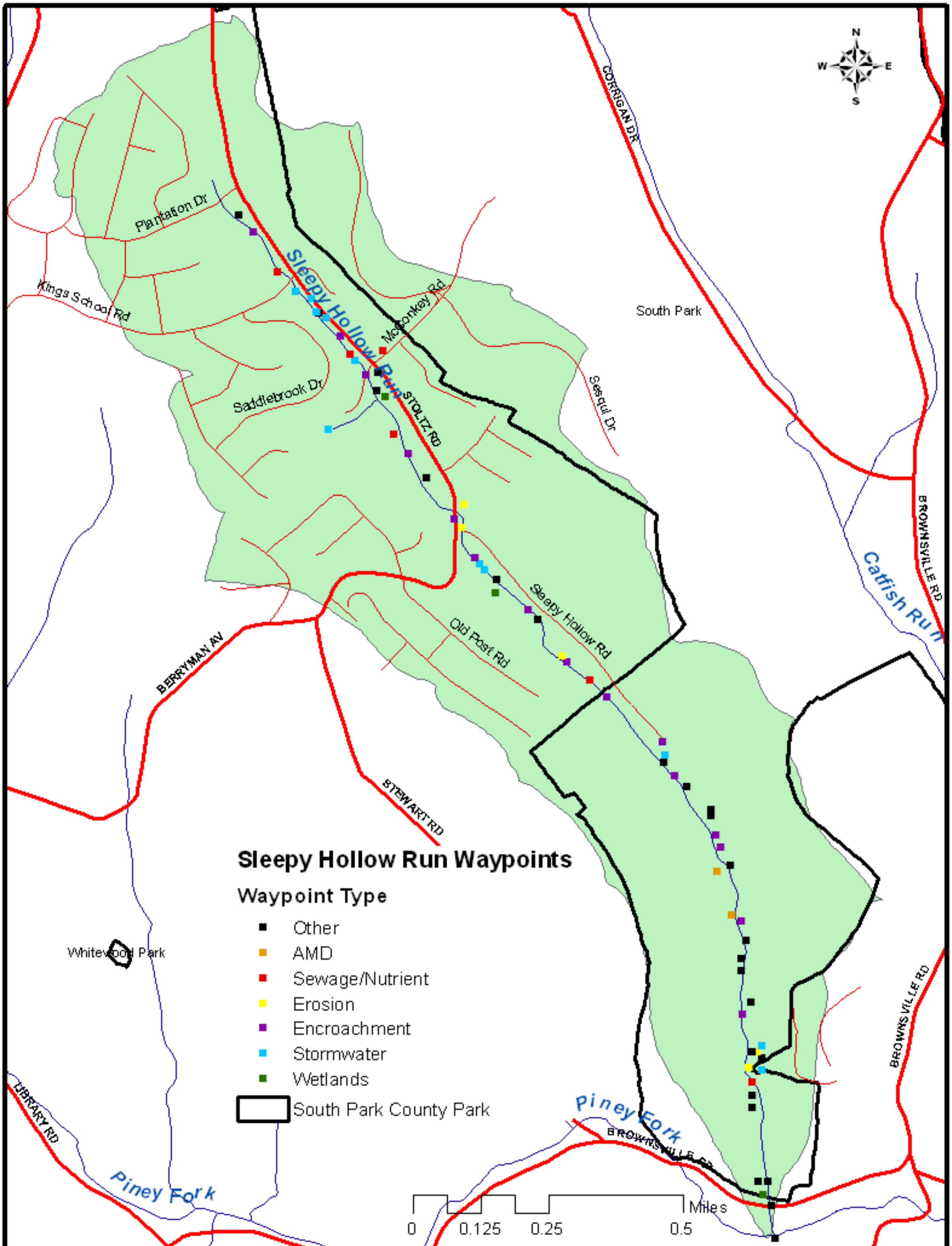
Land cover within the watershed as of 2006 is depicted in the pie chart below. The dominant land cover types within the watershed are wooded (44.6%), residential (33.9%) and agricultural/pasture/open space (12.5%). The headwater section of the watershed is mainly residential while the downstream portion is within the county park and is mostly wooded. (2006 National Land Cover Database)


Sleepy Hollow Run is impaired for recreational use by pathogens and is impaired for aquatic use mainly by urban runoff. A visual assessment of the stream was conducted to better understand the current physical status of the stream channel, water and riparian zone.

The stream was broken into 2 segments and was assessed scored according to the USDA Visual Assessment Protocol. The results of this assessment are found below.

Waypoints: SH01-SH31
Desription: Confluence with Piney Fork Run to bridge at South Park Academy.
USDA Visual Assessment Protocol Score = 6.25 FAIR

Waypoints: SH32-SH70
Description: Bridge at South Park Academy to headwaters where stream is first daylighted downstream of Plantation Drive.
USDA Visual Assessment Protocol Score = 5.73 POOR



Sleepy Hollow Run Waypoints
Waypoint Type
Other
AMD
Sewage/Nutrient
Erosion
Encroachment
Stormwater
Wetlands
South Park County Park
Sleepy Hollow Run
Plantation Dr
Kings School Rd
McConkey Rd
Saddlebrook Dr
STOLTZ RD
Sleepy Hollow Rd
Old Post Rd
CORRIGAN DR
South Park
Sesqui Dr
BROWNSVILLE RD
Catfish Run
BERRYMAN AV
STEWART RD
Whitewood Park
LIBRARY RD
Piney Fork
Piney Fork
BROWNSVILLE RD
BROWNSVILLE RD
Miles
0
0.125
0.25
0.5
N
S
E
W

# Sleepy Hollow Run – SH01 – SH31

## *Sewage and AMD Impacts*

*SH08 – Sewer manhole in stream channel. Creates excess erosion, widening of channel and debris jams. Sewage enters stream during heavy rain events.*

*SH20-SH23 – 2 AMD tributaries and approximately 500 ft of right ascending bank floodplain filled with AMD seeps. No other AMD noticeable in the Sleepy Hollow Run watershed.*

## *Stream Bank Erosion & Siltation*

*SH09 - Severe erosion on left ascending bank adjacent to trail. There is a 2-3 ft drop here onto a bedrock slide. Attempts are being made to stabilize bank with concrete.*

*SH12 - Severely eroding right ascending bank through what appears to be some type of fill.*

*SH30 – Bank erosion and a floodplain detached from the stream along an approximately 400 ft reach within South Park County Park that has an inadequate riparian buffer. This section would benefit from a reforestation effort.*

## *Nutrient Enrichment*

*SH27 – Excess algae covers the streambed just downstream of the South Park Academy.*

## *Wetlands*

There is a small wetland area at SH03 on the right ascending bank just upstream of Brownsville Rd. This wetland area is filled with invasive species and is being overtaken by vines. There are also AMD seeps and pooling areas in the floodplain on the right ascending bank from SH20 to SH25.

## *Invasive Plants & Floodplain Condition*

Multiflora Rose is a problem in the lower part of this reach and Japanese stilt grass is overtaking large sections of floodplain. In the upper part of the reach (SH25-SH29) vines, invasive and otherwise, are compromising floodplain trees, especially on the left ascending bank as seen in the photo below.

## *Stormwater Infrastructure and Issues*

*SH10 & SH15 – Inadequate stormwater controls have created deeply incised, eroding stormwater drainage channels from an apartment complex on Shelley Dr.*

## *Encroachments*

Bridges cross Sleepy Hollow Run at Brownsville Rd (SH02) and at the South Park Academy (SH31) with a pipe crossing of the stream and an impervious parking area immediately adjacent to the streams right ascending bank. A trail crossing is imminent at SH16 as the Montour Connector Trail is currently under construction and should be completed by fall of 2013. A gas line crosses at SH13 with another pipe crossing of some sort at SH22. The Montour Connector Trail encroaches on the stream at a number of locations.

## *Garbage & Dumps*

A number of old dump sites exist along this segment of Sleepy Hollow Run. There is an old dump site on a bench along the streams left ascending bank at SH14. A large dump site filled with glass and other assorted garbage and debris exists at SH24. A section of non-functional snow fencing is found along Sleepy Hollow Run at SH29 and old cinder block and other debris is found along the stream in the stream channel and within the floodplain just downstream of the Academy.

*SH24 – A large old dump site on the left ascending bank that extends from the trail down almost to the stream. This dump site has a great deal of glass in it. Trail users have implemented safe passage for bikes and children.*

## *Conclusions and Recommendations*

This segment of Sleepy Hollow Run received a visual assessment score of 6.25; indicating the segment is in Fair condition according to the scoring system provided by the USDA visual assessment protocol. This segment has problems with acid mine drainage, stream bank erosion, high embeddedness, debris jams, nutrient enrichment, and fish barriers.

Two small tributary discharges along with a number of floodplain seeps impacted by acid mine drainage (AMD) were found flowing into this segment of Sleepy Hollow Run. Monitoring and sampling should be done on these AMD discharges. AMD abatement measures should be implemented after determining water chemistry and flow rates from these discharges.

There are a number of areas with severe stream bank erosion. A significant portion of the stream in this reach is flowing over bedrock. In these areas compensation from excess stormwater leads to increased bank erosion and widening of the channel.

The channel has a high degree of embeddedness, which is the degree of fine sediment covering the channel bottom. The high amount of fine sediment in the channel is a result of the stream bank erosion. Areas with stream bank erosion should be stabilized or stream channel restoration work could direct the flow into the middle of the channel and away from the stream banks. Stream channel restoration can reduce the stream bank erosion, reduce sediment deposition in the channel, reduce the formation of sand bars and enhance fish habitat.

A number of significant debris jams were found on this segment of Sleepy Hollow Run. These debris jams accelerate the rate of stream bank erosion and should be removed.

Invasive plants and vines within the floodplain should be managed in order to keep the floodplain forested in the long term. Efforts should be made to reforest the portion of floodplain at the South Park Academy, to plant trees on eroding banks and improve the condition of the floodplain forest where possible.

Inadequate stormwater controls from impervious surfaces are impacting this segment of Sleepy Hollow Run. Excess stormwater is a major contributor to increased erosion and sedimentation of this stream. Providing adequate stormwater controls is essential.

## Sleepy Hollow Run – SH32 – SH70

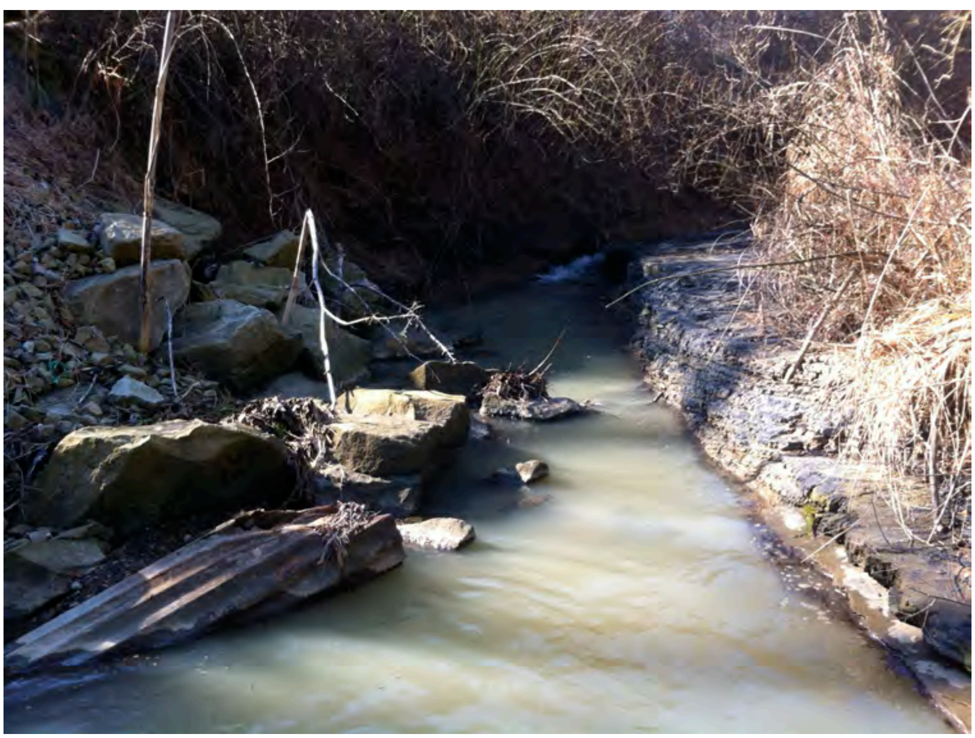
### *Sewage and AMD Impacts*

There were no visible AMD impacts or discharges found along this segment of Sleepy Hollow Run. A sewage line runs along the entire length of this section of the stream but is not in the stream channel. The Sleepy Hollow Run sampling site for the bacterial study was near the bottom of this reach near SH32. Sleepy Hollow Run was determined to be impaired by pathogens according to PA standards for recreational use. It was not in compliance on any of the 10 sampling dates during the summer of 2010. A number of horse farms are located along Stoltz Rd within this reach. Runoff from horse manure piles at SH58 and SH49 as well as horse access to the stream at SH68 are probably contributing to this impairment.

*SH58 - Horse manure storage pile along McConkey Road. During rain events manure is washed into catch basin, across Stoltz Rd and into Sleepy Hollow Run.*

## *Stream Bank Erosion & Siltation*

*SH35 - Section of Sleepy Hollow Run near county park border has a severely eroding left ascending bank. Old piece of culvert along stream channel creates problems of its own.*



*SH38 – Stream cutting through coal bed with severe erosion on left ascending bank. Stream severely silted but cause is unknown. The stream channel is clogged by garbage and boulders.*

*SH46 - One side of the double culvert under Sleepy Hollow Rd is clogged. Severe erosion is occurring on the left ascending bank below this culvert and on the right ascending bank above the culvert. A large section of gabioned riprap is being used to protect the bank above the culvert from eroding.*

*SH49 – Erosion in high use area of horse farm pasture along Stoltz Rd sends sediments and pollution to the creek.*

## *Nutrient Enrichment*

***Excess algae covers stream substrate from about SH35 to SH40 and is especially bad at SH36. Also problems with excess algae in channel at SH52.***

## *Wetlands*

***SH42 – Wetland at the tennis club complex along Sleepy Hollow Rd. Wetlands are located between Tennis Courts and building and behind tennis courts.***

*SH54 – A 1-2 acre wetland between Stoltz Rd and Sleepy Hollow Run just downstream of McConkey Rd.*

## *Invasive Plants & Floodplain Condition*

**The lower section of this reach along Sleepy Hollow Rd to its junction with Stoltz Rd has a significant invasive problem within the floodplain and along the stream. Multiflora rose is taking over in some places. Profuse vines are compromising floodplain trees as well. Little Japanese Knotweed exists within the floodplain currently. From McConkey Rd to the headwaters vines are a problem. This section also suffers from a large section of floodplain that could benefit from reforestation as well as a steep slope along the left ascending bank that is inadequately vegetated.**

## *Stormwater Infrastructure and Issues*

***SH53 – A large detention basin helps to control stormwater runoff from Saddlebrook Dr. The basin is at left center of photo behind the pine tree. The outflow travels downslope toward right of photo behind red barn.***

***SH62 – The erosion along this section of stream above McConkey Road is the effect of too much stormwater entering the stream too quickly. The lack of trees on the steep slope along the left ascending bank also contributes to this problem.***

*SH67 – A stormwater culvert in need of maintenance and an undersized culvert carrying Sleepy Hollow Run under Kings School Rd meets a debris jam at culvert exit and results in excess erosion both downstream and upstream of the culvert.*

## *Encroachments*

There are four public road crossings of Sleepy Hollow Run, 3 private road crossings and a livestock crossing of the creek.

*SH37 – A structure crossing Sleepy Hollow Run is being protected and reinforced by concrete. This structure creates a fish barrier and bank erosion at the site.*

*SH40 – Sleepy Hollow Run is culverted for approximately 400 ft at the tennis club along Sleepy Hollow Rd. There is a debris jam that is blocking about ¼ of the entrance to the culvert and causing pooling behind it. Sleepy Hollow Run is seen exiting the culvert.*

*SH45 – A debris jam that is blocking the entire channel increases probability of flooding the adjacent parking lot and commercial buildings during significant rain events.*

## *Garbage & Dumps*

*SH34 – Central Air Conditioner Compressor dumped within South Park County Park along Sleepy Hollow Run. There are also a few other large pieces of equipment dumped in the general vicinity and piles of construction debris along this segment of creek. Otherwise litter along Stoltz Rd is a problem and some illegally dumped tires.*

## *Conclusions and Recommendations*

This segment of Sleepy Hollow Run received a visual assessment score of 5.73, indicating the segment is in Poor condition according to the scoring system provided by the USDA visual assessment protocol. This segment has problems with stream bank erosion, debris jams, nutrient enrichment, fish barriers, livestock manure, stormwater runoff and invasive plants within the floodplain.

Excess stormwater is an important issue along this segment of Sleepy Hollow Run. It contributes to many of the erosion, sedimentation and channel alteration problems seen along this reach. The headwater portion of the Sleepy Hollow watershed was developed prior to the advent of stormwater controls now required for residential developments. Sleepy Hollow Run takes on a great deal more runoff during heavy rain events than its channel can handle and it has had to adjust to those flows by becoming incised in places and channelized. In many areas the floodplain has become detached from the stream. A number of debris jams along this stretch of stream in addition to numerous culverts and a few stream crossing encroachments contribute to the problem. Finding long-term cost effective solutions to this problem is essential.

This segment of Sleepy Hollow Run has also been found to be impaired by pathogens and is impacted by nutrient enrichment as well. The horse farms along this segment are a contributing factor, however, it is important to identify all major sources contributing to this problem. Only then can an effective plan be developed to remedy this impairment. Sleepy Hollow Run is an important recreational resource to surrounding communities and it is important that it be safe for children to explore. This valley will get more visitors when the Montour Trail Connector is completed in the fall of 2013.

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| SH01 | -80.001588 | 40.286301 | 923 | 2/19/13 | Confluence of Sleepy Hollow Run with Piney Fork. |
| SH02 | -80.001716 | 40.287195 | 926 | 2/19/13 | Sleepy Hollow Run culverted under bridge on Brownsville Rd. |
| SH03 | -80.002000 | 40.287500 | 926 | 2/19/13 | Wetland area on left ascending bank on western side of connector trail. Invasive species present in wetland. |
| SH04 | -80.001833 | 40.287833 | 926 | 2/19/13 | Metal and concrete structure on left ascending bank near Sleepy Hollow Run (SHR) |
| SH05 | -80.002167 | 40.287833 | 928 | 2/19/13 | Montour connector trail cuts up left ascending slope westward toward Montour Trail. |
| SH06 | -80.002333 | 40.289833 | 938 | 2/19/13 | Debris jam causing significant erosion on downstream right ascending bank. Trail adjacent to LAB. |
| SH07 | -80.002333 | 40.290167 | 942 | 2/19/13 | Debris jam immediately adjacent to trail on LAB. Creates 2-3 ft drop. Plunge pool. Pooling upstream. |
| SH08 | -80.002333 | 40.290500 | 946 | 2/19/13 | Sewer manhole in stream channel creating erosion and debris jams. Unnatural topography on RAB just upstream. |
| SH09 | -80.002464 | 40.290914 | 950 | 2/19/13 | 2-3 ft stream drop onto bedrock slide. Severe erosion on LAB; concrete stabilization; within gas line vegetation cut. |
| SH10 | -80.002000 | 40.290833 | 969 | 2/19/13 | Deeply incised stormwater drainage channel from development on right ascending bank. |
| SH11 | -80.002000 | 40.291167 | 963 | 2/19/13 | Bench on RAB above stream with trib running through and many pooling areas. Receives stormwater runoff. |
| SH12 | -80.002167 | 40.291333 | 955 | 2/19/13 | Severely eroding right ascending bank of unnatural mounded soil, material. |
| SH13 | -80.002333 | 40.291333 | 954 | 2/19/13 | Gas line crosses stream channel 3-4 ft above water level; old foot bridge along bank; culverts in channel just downstream. |
| SH14 | -80.002333 | 40.291333 | 956 | 2/19/13 | Old dump site on bench on left ascending bank. |
| SH15 | -80.002000 | 40.291500 | 963 | 2/19/13 | Another incised, eroding stormwater drainage channel from development. |
| SH16 | -80.002667 | 40.292333 | 960 | 2/19/13 | Future stream crossing of Sleepy Hollow Run by Montour Trail Connector. |
| SH17 | -80.002333 | 40.292667 | 985 | 2/23/13 | View upstream of Sleepy Hollow Run valley from RAB slope. Wide floodplains both sides; meandering; stable banks. |
| SH18 | -80.002667 | 40.293500 | 968 | 2/23/13 | Stream cuts through large bedrock boulders. Debris jam just downstream. |
| SH19 | -80.002667 | 40.293833 | 969 | 2/23/13 | SHR passes through power line cut. Stormwater erosion on right ascending bank. LAB steep with trail along top of bank. |
| SH20 | -80.002500 | 40.294333 | 973 | 2/23/13 | AMD trib enters SHR on right ascending bank. (~ 2-3 GPM) Orange precipitate. |
| SH21 | -80.002667 | 40.294833 | 974 | 2/23/13 | AMD laden seeps along ~500 ft of Sleepy Hollow Run's RAB. ATV activity in area. |
| SH22 | -80.003000 | 40.295000 | 975 | 2/23/13 | Old pipe of some sort crossing stream channel and creating fish barrier. |
| SH23 | -80.002667 | 40.294833 | 977 | 2/23/13 | AMD trib (~ 5 GPM) enters Sleepy Hollow Run on RAB. |
| SH24 | -80.003500 | 40.296167 | 988 | 2/23/13 | Large old garbage dump site on LAB. Crosses trail and extends down bank toward creek. Lots of glass. |
| SH25 | -80.003000 | 40.296333 | 981 | 2/23/13 | Some pools in floodplain. Floodplain forest being compromised by vines. Small trib enters on RAB. |
| SH26 | -80.003333 | 40.296833 | 986 | 2/23/13 | Nonfunctional metal culvert along right ascending bank. |
| SH27 | -80.003500 | 40.297167 | 990 | 2/23/13 | Remnants of wooden structure encroaches on LAB; excess algae in stream; RAB appears to be coal waste. |
| SH28 | -80.003667 | 40.297667 | 996 | 2/23/13 | Culvert on right ascending bank. |
| SH29 | -80.003659 | 40.297844 | 997 | 2/23/13 | Nonfunctional snow fencing along trail and right ascending bank. |
| SH30 | -80.004509 | 40.298451 | 993 | 2/23/13 | ~ 450 ft of Sleepy Hollow Run inadequately buffered with vegetation. Drainage culvert enters on LAB. |
| SH31 | -80.004930 | 40.298775 | 998 | 2/23/13 | Creek culverted under bridge; ~ 1/5 acre impervious parking area upstream on RAB; pipe crossing just upstream. |
| SH32 | -80.005301 | 40.299116 | 998 | 2/25/13 | Debris jam causing erosion on left ascending bank. |
| SH33 | -80.005266 | 40.299314 | 1000 | 2/25/13 | Stormwater drainage channel from Sleepy Hollow Rd. |
| SH34 | -80.005333 | 40.299667 | 1000 | 2/25/13 | Riparian floodplain full of invasive plants and vines; few trees; dump site (central air conditioner compresser, etc.) |
| SH35 | -80.007276 | 40.300883 | 1009 | 2/25/13 | Old metal culvert section by stream channel near park border; stream channelized; floodplain detached from stream. |
| SH36 | -80.007856 | 40.301359 | 1014 | 2/25/13 | Substrate covered with thick mat of algae along this section of reach. |
| SH37 | -80.008667 | 40.301833 | 1017 | 2/25/13 | Appears to be stream crossing by some utility protected by concrete (~2-3 ft drop); fish barrier. |

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| SH38 | -80.008833 | 40.302000 | 1019 | 2/25/13 | Stream cutting through coal layer; LAB eroding; boulders and debris in channel; water heavily silted. |
| SH39 | -80.009667 | 40.303000 | 1025 | 2/25/13 | Stormwater culvert on left ascending bank; crumbling concrete from culvert structure in stream channel. |
| SH40 | -80.010013 | 40.303265 | 1033 | 2/25/13 | Sleepy Hollow Run exits an ~ 400 ft culvert at tennis club. |
| SH41 | -80.011116 | 40.304073 | 1035 | 2/25/13 | Debris jam partially blocking culvert entrance; fish barrier; creating pooling and erosion upstream. |
| SH42 | -80.011134 | 40.303737 | 1045 | 2/25/13 | Wetland along and behind tennis courts. |
| SH43 | -80.011500 | 40.304333 | 1041 | 2/25/13 | Stormwater culvert enters left ascending bank from under tennis courts. |
| SH44 | -80.011667 | 40.304500 | 1039 | 2/25/13 | Stormwater culvert on LAB; stormwater drainage from parking lot on RAB; debris in channel; bank erosion. |
| SH45 | -80.011833 | 40.304667 | 1038 | 2/25/13 | Large debis jam blocking channel; increased risk of flooding commercial area during heavy rain events. |
| SH46 | -80.011833 | 40.304667 | 1042 | 2/25/13 | SHR culverted under Sleepy Hollow Rd; one side of culvert blocked; can't function as designed during heavy rain. |
| SH47 | -80.012294 | 40.305503 | 1048 | 2/25/13 | Right ascending bank just upstream of culvert protected by gabioned riprap. Private driveway adjacent to stream. |
| SH48 | -80.012559 | 40.305701 | 1048 | 2/25/13 | Sleepy Hollow Run culverted under Stoltz Rd |
| SH49 | -80.012235 | 40.306119 | 1068 | 2/26/13 | Erosion through heavy use pasture area along Stoltz Rd. |
| SH50 | -80.013500 | 40.306833 | 1053 | 2/26/13 | Trib enters SHR on RAB; culverted under Stoltz Rd; comprised of captured stream & runoff from apartment complex. |
| SH51 | -80.014167 | 40.307500 | 1057 | 2/26/13 | Sleepy Hollow Run culverted under crossing that appears little used. |
| SH52 | -80.014667 | 40.308000 | 1061 | 2/26/13 | Creek culverted under private bridge crossing. Bridge encroaches on LAB. Excess algae in stream. |
| SH53 | -80.016958 | 40.308170 | 1096 | 2/26/13 | Stormwater detention basin which captures a trib culverted under development |
| SH54 | -80.014940 | 40.309031 | 1067 | 2/26/13 | Wetland along Sleepy Hollow Runs right ascending bank and Stoltz Rd. (~1-2 acres) |
| SH55 | -80.015230 | 40.309177 | 1069 | 2/26/13 | Trib from detention basin enters on left ascending bank. |
| SH56 | -80.015167 | 40.309667 | 1081 | 2/26/13 | Small trib along McConkey Rd east of Stoltz Rd is culverted under Stoltz Rd and enters wetland. |
| SH57 | -80.015597 | 40.309608 | 1080 | 2/26/13 | Sleepy Hollow Run is culverted under McConkey Rd |
| SH58 | -80.015008 | 40.310249 | 1095 | 2/26/13 | Manure pile along McConkey Rd. During rain events manure is washed into catch basin and ends up in SHR. |
| SH59 | -80.016000 | 40.310000 | 1088 | 2/26/13 | Stormwater culvert enters on left ascending bank. |
| SH60 | -80.016167 | 40.310167 | 1083 | 2/26/13 | Erosion down steep left ascending bank where sewer line descends slope; bank erosion just downstream. |
| SH61 | -80.016500 | 40.310667 | 1086 | 2/26/13 | For ~ 200 ft from this waypoint upstream left ascending bank consists of stacked boulder ledge. |
| SH62 | -80.017000 | 40.311167 | 1090 | 2/26/13 | Typical view this reach; eroding LAB; invasives in floodplain; stormwater into stream; unforested steep slope on LAB. |
| SH63 | -80.017226 | 40.311289 | 1089 | 2/26/13 | Industrial tires creating debris jam in stream. |
| SH64 | -80.017333 | 40.311333 | 1093 | 2/26/13 | Stormwater drain into creek on LAB; severe RAB erosion right along Stoltz Rd just downstream. |
| SH65 | -80.017500 | 40.311667 | 1098 | 2/26/13 | Stormwater culverted under Stoltz Rd into Sleepy Hollow Run. |
| SH66 | -80.018015 | 40.311879 | 1094 | 2/26/13 | Yet another stormwater culvert entering on Sleepy Hollow Run's left ascending bank. Unforested floodplain and slopes. |
| SH67 | 80.018327 | 40.312096 | 1095 | 2/26/13 | Sleepy Hollow Run culverted under King School Rd. Stormwater culvert also enters along LAB; needs some maintenance. |
| SH68 | -80.018668 | 40.312402 | 1099 | 2/26/13 | Livestock stream crossing in horse pasture. No fencing to keep animals out of stream. Inadequate riparian vegetation. |
| SH69 | -80.019513 | 40.313477 | 1116 | 2/26/13 | Sleepy Hollow Run culverted under private driveway. |
| SH70 | -80.019994 | 40.313946 | 1123 | 2/26/13 | Sleepy Hollow Run emerges from culvert at headwaters. |

## 8.9 Upper Peters Creek

The Upper Peters Creek sub-watershed includes Peters Creek from its confluence with Lick Run to its headwaters in Nottingham Twp and all lands draining unnamed tributaries to Peters Creek. The eastern end of this sub-watershed is mostly wooded with little development from the eastern boundary to Gastonville.

The Mon-Fayette Expressway and the Wheeling & Lake Erie Railroad parallel Peters Creeks southern shore along this section to Gastonville then head south away from the Peters Creek watershed. A proposed Southern Beltway, if developed, would continue the turnpike along Peters Creek from Gastonville to its headwaters. The Allegheny Valley Railroad parallels Peters Creek's northern shore for most of its course in this sub-watershed.

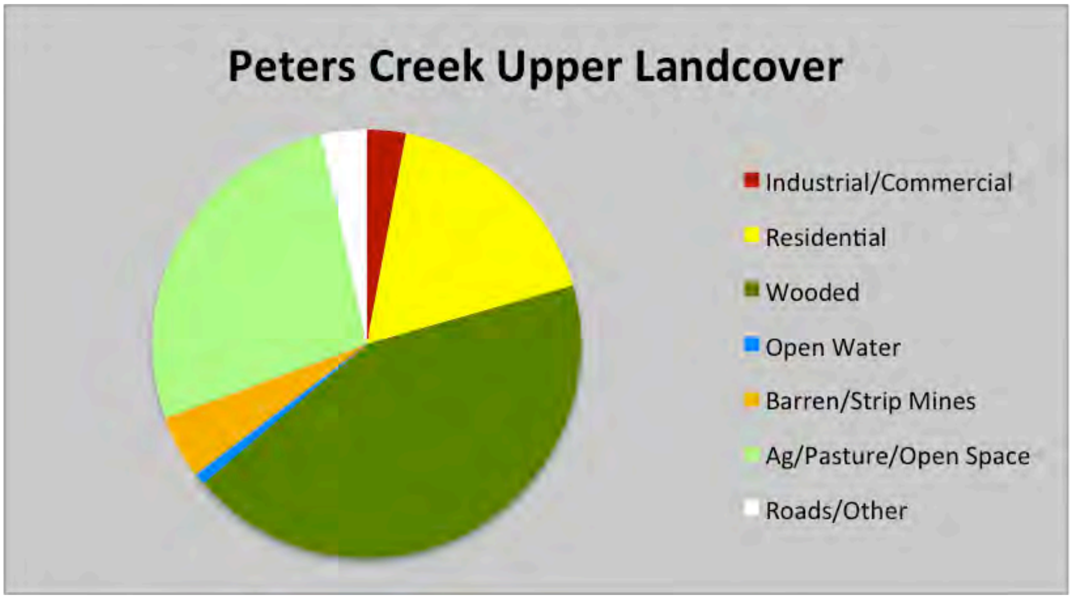
A large landfill in South Park Twp and Union Twp northeast of Gastonville is drained by an unnamed tributary to Peters Creek that is impacted by abandoned mine drainage. This landfill has been accepting waste from Marcellus shale drilling operations since January of 2012. The area to the east of the landfill is heavily utilized by ATV enthusiasts and is known as "The Finleyville Dumps". A fly ash landfill for the Mitchell Power Plant is located to the south of Peters Creek in the Hackett portion of Nottingham Twp. This landfill is permitted to discharge to Peters Creek.

The Upper Peters Creek sub-watershed is, in general, sparcely populated but significant residential development is taking place north of Venetia Rd in Peters Twp and Nottingham Twp. A number of commercial farming operations remain in this part of the sub-watershed as well.

The total area of the Upper Peters Creek sub-watershed is approximately 15.97 square miles and is comprised of portions of South Park Township and Jefferson Hills Borough in Allegheny County and Peters Twp, Nottingham Twp, Union Twp, North Strabane Twp and Finleyville Borough in Washington County.

Land cover within the Upper Peters Creek sub-watershed is depicted in the pie chart below. The dominant land cover types within the watershed are wooded (43.1%), agricultural/pasture/open space (27.2%) and residential (17.6%). (2006 National Land Cover Database)

Part of the Upper Peters Creek sub-watershed is impaired for recreational use by pathogens and for aquatic use by organic enrichment, low dissolved oxygen, siltation and metals. This impairment is mainly due to urban runoff, storm sewers, combined sewer overflows, crop related agriculture, bank modifications, vegetation removal, upstream impoundments and abandoned mine drainage. (2012 Pennsylvania Water Quality and Assessment Report)




A visual assessment of the stream was conducted to better understand the current physical status of the stream channel, water and riparian zone. The streams were assessed and scored according to the USDA Visual Assessment Protocol. The results of this assessment are found below.

## Peters Creek Upper Main Stem

Waypoints: PCU001 – PCU025
Description: Confluence of Lick Run to confluence of Piney Fork
USDA Visual Assessment Protocol Score = 6.90 FAIR

Waypoints: PCU026 – PCU060
Description: Confluence of Piney Fork to SR1006 bridge in Gastonville
USDA Visual Assessment Protocol Score = 7.00 FAIR

Waypoints: PCU061 – PCU085
Description: SR1006 bridge in Gastonville to just downstream of Rankintown bridge in Finleyville
USDA Visual Assessment Protocol Score = 8.30 GOOD

Waypoints: PCU086 – PCU104
Description: Rankintown Rd Bridge in Finleyville to Wright's House tributary confluence off of Venetia Rd in Peters Twp
USDA Visual Assessment Protocol Score = 7.10 FAIR

Waypoints: PCU105 – PCU107
Description: Wright's House tributary confluence to Wright's Chapel tributary confluence
USDA Visual Assessment Protocol Score = 8.10 GOOD

Waypoints: PCU108 – PCU121
Description: Wright's Chapel tributary confluence to bridge crossing at Lynch Lane
USDA Visual Assessment Protocol Score = 6.40 FAIR

Waypoints: PCU122 – PCU146
Description: Bridge crossing at Lynch Lane to west branch and north branch source in Thomas
USDA Visual Assessment Protocol Score = 6.60 FAIR

## Trax Farm Tributary

Waypoints: TFT01 – TFT32
Description: Confluence with Peters Creek to Walter Long Rd crossing
USDA Visual Assessment Protocol Score = 4.90 POOR

Waypoints: TFT33 – TFT56
Description: Walter Long Rd crossing to source along Turkeyfoot Rd. west of Trax Farm Market
USDA Visual Assessment Protocol Score = 3.90 POOR

## McClelland Road Tributary

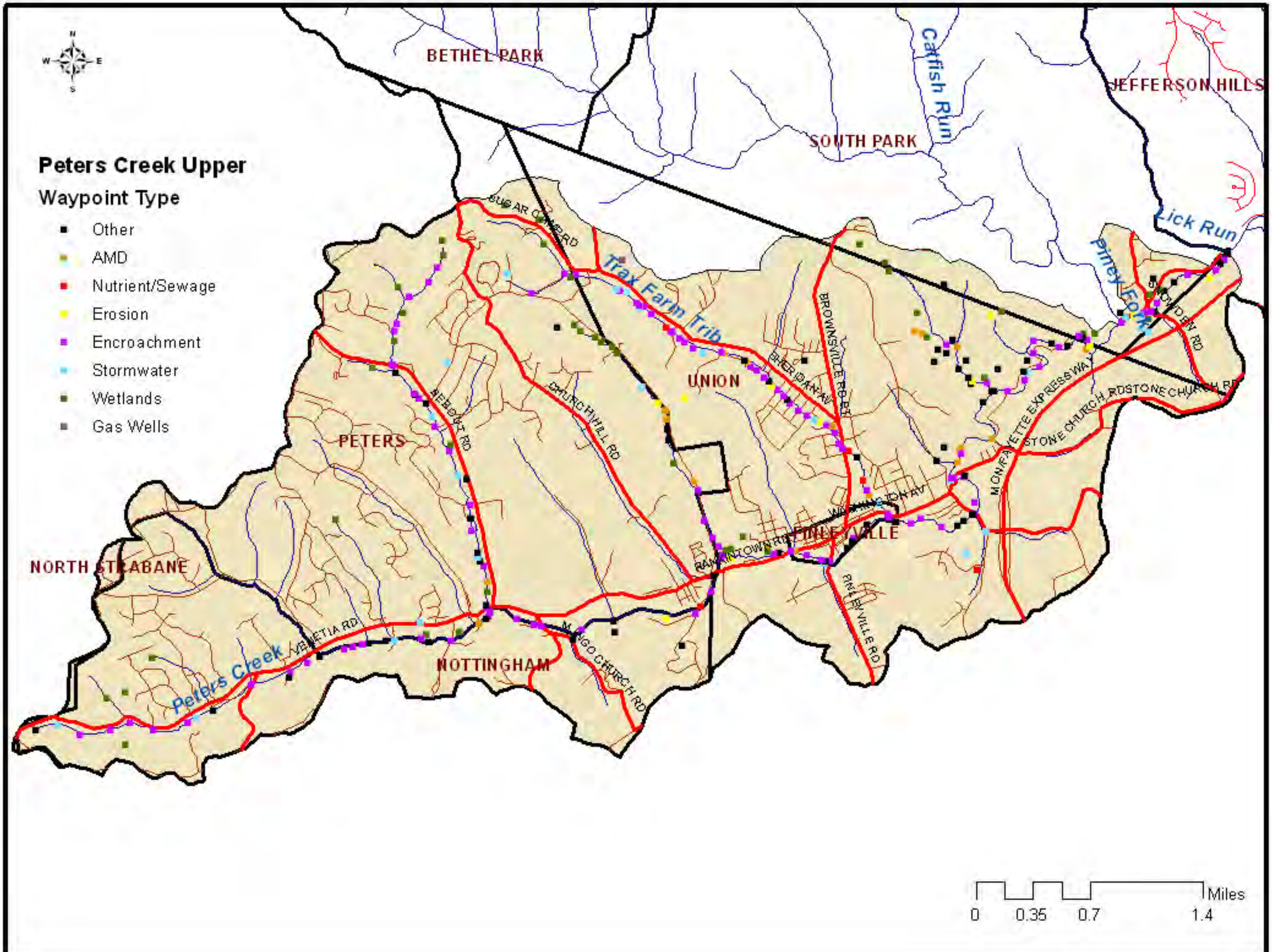
Waypoints: MRT01 – MRT23
Description: Entire length of McClelland Rd tributary
USDA Visual Assessment Protocol Score = 6.20 FAIR

## Bebout Road Tributary

Waypoints: BRT01 – BRT37
Description: Entire length of Bebout Rd tributary
USDA Visual Assessment Protocol Score = 6.80 FAIR

## Landfill Tributary

Waypoints: LT01 – LT24
Description: Entire length of tributary except for east branch within enclosed portion of landfill.
USDA Visual Assessment Protocol Score = 5.55 POOR



Peters Creek Upper
Waypoint Type
Other
AMD
Nutrient/Sewage
Erosion
Encroachment
Stormwater
Wetlands
Gas Wells
BETHEL PARK
SOUTH PARK
JEFFERSON HILLS
NORTH STRABANE
PETERS
UNION
NOTTINGHAM
FINLEYVILLE
Catfish Run
Lick Run
Piney Fork
Trax Farm Trib
Peters Creek
BROWNSVILLE RD
CHURCHILL RD
MINGO CHURCH RD
VENETIA RD
MON FAYETTE EXPRESSWAY
STONE CHURCH RD
WASHINGTON AV
SHERIDAN AV
PINEY FORK RD
Miles
0
0.35
0.7
1.4

## *Sewage and AMD Impacts*

Abandoned mine drainage is an important issue in the Upper Peters Creek sub-watershed. Most of the significant discharges occur along the main stem from just east of Gastonville in Union Township to the Peters Township border. Two culverted discharges at PCU049 and PCU050 flow directly into Peters Creek east of Gastonville.

There appear to be few discharges west of Church Hill Rd. This is the only part of the Peters Creek watershed where main stem conductivities are consistently less than 1000 μ–siemen/cm and usually within the 600-700 μ–siemen/cm range.

Abandoned mine discharges are also found along many of the tributary streams, the most notable being on the west branch (002087) of the Landfill Tributary (002086). The Trax Farm Tributary (001594) has a number of discharges at TFT05, TFT13 (002106), TFT29 and TFT31. The discharge at TFT29 also has a strong sewage odor. The McClelland Rd Tributary (001595) has a number of AMD impacted seeps flowing into it and the Bebout Rd Tributary (001598) is also impacted by an AMD seep in its lower reaches.

The tributary (002121) that empties into Peters Creek just downstream of the Rankintown Rd bridge in Finleyville is impacted with AMD. Another significant discharge is located approximately 1000 ft upstream along the Allegheny Valley Railroad tracks at PCU090. This discharge flows into a floodplain wetland occupying Peters Creek's northern shore. The McChain Rd Tributary (002109) also is impacted by a discharge that is culverted under McChain Rd. The most downstream main stem AMD discharge is located approximately ¼ mile upstream of the confluence of Peters Creek and Piney Fork and just downstream of the Allegheny Valley Railroad tunnel. This discharge could be contributing to the degraded condition of the macroinvertebrate community found at PC5 and requires further investigation.

There are a number of identified abandoned mine lands (AML) and numerous coal waste piles and dangerous highwalls within the Upper Peters Creek sub-watershed.

A coal waste pile from the old Thompson Mine forms the steep left ascending bank of Peters Creek approximately 1/5 of a mile up from the confluence of Lick Run. Little vegetation is present on this steep, unstable coal waste slope. Material from the pile is eroding into Peters Creek.

The most significant abandoned mine lands are within the vicinity of the Southhills Landfill. There are a number of highwalls and other dangerous features associated with these AML. An OSM reclamation project has recently been completed on lands south of the landfill but much of the AML remains un-reclaimed.

In the upper reaches of Peters Creek there is a significant coal waste pile forming Peters Creeks left ascending bank along Railroad Street just west of the Finleyville Airport. South of this is a fly ash dump site associated with the Mitchell Power Plant. There is also an AML south of Peters Creek just east of Valleyview Rd and a number of AMLs were found north of Peters Creek from between Bebout Rd to State Rt 88.

Sewage issues are also an important concern in the Upper Peters Creek sub-watershed. The Peters Creek Sanitary Authority (PCSA) is responsible for sewage infrastructure in most of the Upper Peters Creek sub-watershed. The main interceptor carries sewage down the Peters Creek corridor to the Clairton Municipal Authority (CMA) for treatment near the mouth of Peters Creek.

Recently, the PCSA proposed building a new sewage treatment facility along Peters Creek in a sparcely populated Union Twp section of the sub-watershed instead of having it treated by the Clairton facility. A sewage outfall in the headwaters portion of Peters Creek would definitely have created another negative impact on water quality within the stream.

It was eventually decided that the best course of action would be to continue treatment of sewage at CMA. This option creates little additional impact on Peters Creek as long as sewage infrastructure is maintained properly. The outfall of the CMA facility will be moved from Peters Creek to the Mon River as part of the upgrade. They are also required to remove combined sewer overflows that are currently impacting the lower reach of Peters Creek.

*PCU005 – Coal waste pile from old Thompson Mine (circa. 1910–1915) forms left ascending bank of Peters Creek and is eroding into Peters Creek. Little will grow on steep embankment though Japanese Knotweed is attempting to establish on lower slope.*

*PCU048 – Culverted AMD discharge heavy with aluminum enters Peters Creek just east of Gastonville.*

*PCU053 – Tributary impacted by AMD discharge along McChain Rd enters Peters Creek's right ascending bank. Landowner has thrown concrete along bank of Peters Creek and tributary.*

*PCU090 – AMD discharge culverted under Allegheny Valley Railroad tracks just west of Finleyville enters floodplain wetland on Peters Creek's right ascending bank.*

*LT18 – Ponding of an AMD discharge on the west branch of the Landfill Tributary just below discharge source.*

*LT11 – Confluence of the AMD impacted west branch of the Landfill Tributary with the outflow of the east branch pond from the left of photo. Heavy precipitation of aluminum and iron downstream of confluence.*

*LT07 – Typical view of the steeply sloped, undeveloped valley through which the AMD impacted Landfill Tributary flows downstream of the confluence of east and west branches.*

*LT10 – This abandoned mining site just east of the enclosed Southhills Landfill is heavily utilized by off-road vehicles and is characterized by a number of dangerous features. The area is also utilized for illegal dumping.*

*TFT05 – Culverted AMD discharge to Trax Farm Tributary in the lower reach of the stream.*

*PCU029 – Peters Creek takes on an extremely murky appearance often during late winter/early spring (assumed to be AMD related). It was especially bad during the early spring of 2011 as seen here as the stream exits the Allegheny Valley Railroad underpass near the Allegheny County/Washington County border.*

## *Stream Bank Erosion & Siltation*

Much of the riparian zone along the main stem of Peters Creek from Lick Run to the headwaters in Thomas remains undeveloped and wooded or naturally vegetated. Stream bank erosion does not appear to be a major problem along this section of Peters Creek except in localized areas.

Siltation is a major problem, however, especially along tributaries near more developed areas. Heavy off-road activity within the riparian zone of Peters Creek, especially from the confluence with Piney Fork to Gastonville, adds to the erosion and siltation problems. Stormwater from the turnpike that is captured by offroad trails also adds to the siltation load of Peters Creek.

*PCU021 – Peters Creek's eroding right ascending bank consists of approximately 150 feet of gabioned rip-rap along Piney Fork Road in South Park Township just downstream of the Piney Fork confluence. The purpose of the rip-rap is to prevent the stream from undercutting the road. The stream is undercutting the rip-rap as the erosive force of the stream migrates upstream. Eddy currents downstream of the project are also eroding the right ascending bank downstream of the rip-rap. Asphalt was applied from the road to the rip-rap along this section. The purpose of this is unknown and most likely counterproductive. Japanese Knotweed has taken hold along this section of stream bank.*

*TFT10 – Stream bank erosion along the Trax Farm Tributary. The stream is detached from the floodplain. The landowner is contributing to organic enrichment by dumping grass clippings into the stream channel.*

*PCU025 – Heavy off-road activity along Peters Creek's left ascending bank near the Piney Fork confluence erodes the stream bank and adds to the streams siltation load.*

*PCU032 – Off-road activity within Peters Creek's right ascending floodplain just west of the Allegheny Valley Railroad tunnel alters the flow pattern of a tributary to Peters Creek, creates excessive erosion and siltation and damages a floodplain wetland.*

*PCU040 – Heavy off-road vehicle use at the head of a tributary east of the Landfill Tributary is causing severe erosion and siltation within the tributary.*

*PCU020 – Silted runoff from a Turnpike stormwater detention basin enters an already heavily silted Peters Creek during a precipitation event. This detention basin stormwater is captured by an off-road vehicle trail prior to entering the stream. This causes the runoff to capture an added silt load and creates additional erosion within Peters Creek's left ascending floodplain.*

## *Nutrient Enrichment*

Excessive nutrient enrichment appears to be a localized problem within the Upper Peters Creek sub-watershed. Most of the main stem of Peters Creek within this sub-watershed is above the influence of sewage treatment plants. Excessive algal blooms in this part of the stream do not appear to be the problem that they are in the Lower and Middle Peters Creek sub-watersheds.

There are two heavy animal use areas that are contributing to Peters Creek's nutrient load. One impacts a tributary (002119) to Peters Creek at PCU064 in Gastonville and the other is at PCU100 along Railroad St in Nottingham Twp.

Runoff from a farming operation, recent residential development near the headwaters of the Bebout Road Tributary and a large flock of Canadian Geese at a stormwater detention pond along Bebout Rd are contributing to the nutrient and bacterial load of the stream.

There are also a number of sites along the Trax Farm Tributary that are impacted by excess algae. Runoff from the large farm operation and recent development in the headwater portion of the Trax Farm Tributary most likely contribute to this problem.

Heavy mats of filamentous algae were also present at the mouth of the Trax Farm Tributary as it enters Peters Creek.

*LT24 – Pond in the headwaters of the west branch of the Landfill Tributary is silted and filled with excess algae indicating a nutrient overload.*

## *Wetlands*

There are numerous wetlands, ponds, impoundments and lagoons within the Upper Peters Creek sub-watershed. Many of these wetlands perform a stormwater detention function, provide wiidlife habitat and help to maintain the aesthetics of the area.

The largest pond in the Peters Creek watershed is Lake JoAnn (~ 15 acres) along Bebout Rd. Other impoundments along the Bebout Rd Tributary (001598) serve as farming irrigation ponds, stormwater detention ponds and as water features for a golf course in the headwaters of the stream. Many of these ponds also provide habitat for assorted wildlife and serve as migration habitat for many bird species. The small, secluded lagoons just north of Lake Joann serve as breeding habitat for Wood Ducks. There are also a number of impoundments and wetlands found along Peters Creeks tributaries in the Upper Peters Creek sub-watershed at these locations:

- Headwaters of the McClelland Rd Tributary (001595)
- Headwaters of the Trax Farm Tributary (001594)
- Headwaters of the east (002086) and west branches (002087) of the Landfill Tributary
- Along the Church Hill Rd Tributary (001596)
- Headwaters of the tributary draining Scenic Ridge Drive (001602)
- Headwaters of the tributary just east of Dyers Stone Drive (002149)
- Headwaters of the north branch of Peters Creek (002152)

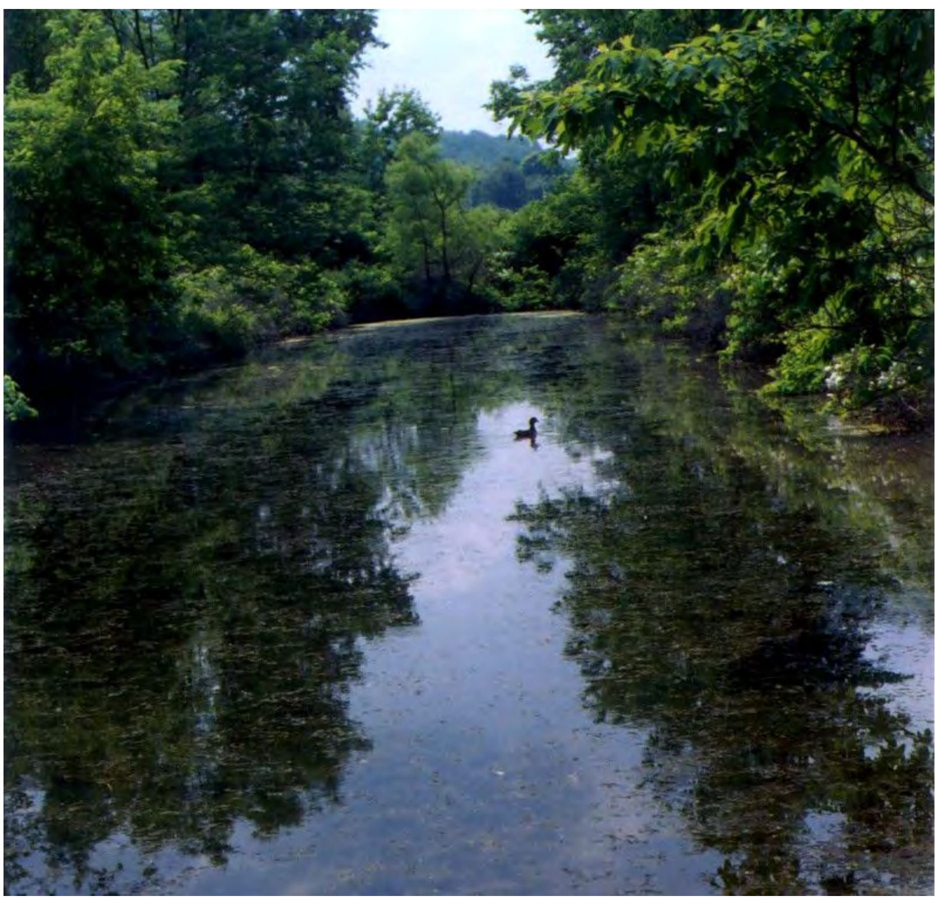
There are emergent wetlands (~ 5 acres) within Peters Creek's right ascending bank floodplain at PCU010. These wetlands were created partly as mitigation for the Mon-Fayette Expressway and are known as the Snowden Wetlands. There are also a number of other smaller wetlands located just north and west of the Snowden Wetlands.

Significant emergent wetlands are also found within Peters Creek's right ascending floodplain just west of the Allegheny Valley Railroad tunnel at PCU030 and PCU032 and along Peters Creek's right ascending bank just west of Finleyville along the Allegheny Valley Railroad tracks at PCU091 and PCU093. A small pond is present at PCU092. Emergent wetlands are not common along Peters Creek in the headwaters portion of the stream along Venetia Rd but one does exist just east of Lutes Rd within Peters Creek's right ascending bank floodplain at PCU115.

*PCU010 – Snowden wetland within Peters Creek's right ascending bank floodplain just east of Snowden Rd. Part of this wetland was created as mitigation for construction of the Mon-Fayette Expressway.*

*BRT13 – Lake JoAnn, located along Bebout Rd in Peters Twp, is the largest surface water body within the Peters Creek watershed at approximately 15 acres.*

*PCU122 – Impoundment at the head of a tributary that drains Scenic Ridge Drive in Peters Twp.*



*BRT16 - Female Wood Duck on secluded, wooded lagoon just north of Lake JoAnn on Bebout Rd in Peters Twp.*

*LT23 – Ponding of the west branch of the Landfill Tributary just west of the enclosed portion of the Southhills Landfill.*

**LT03 – Sphagnum wetland at the site of an AMD seep along the steep eastern slope of the Landfill Tributary.**

## *Invasive Plants & Floodplain Condition*

A good bit of the floodplain of Peters Creek's main stem is wooded from the confluence of Lick Run to the headwaters in Thomas. Much of what is not wooded remains vegetated. There is little development within Peters Creek's floodplain from Lick Run's confluence to Gastonville.

The southern bank of Peters Creek through Gastonville and Finleyville is steep, wooded and undeveloped. The northern bank floodplain is somewhat protected from encroaching development by the Allegheny Valley Railroad.

Peters Creek's floodplain remains fairly natural west of State Route 88 to the Peters Township border but is encroached on by commercial and residential development at a number of locations.

Peters Creek's floodplain from the eastern border of Peters Township to Sugar Run Road remains mostly naturally vegetated except for a farming operation along Railroad St within Peters Creeks northern bank floodplain and a large coal waste pile on the southern bank. The remnants of Wright's Woods Biodiversity Area, one of the best examples of old growth oak forest in Washington County (logged about 2008), is along Peters Creek's southern shore just east of Wright's Chapel Cemetery. This biodiversity area consisted of a number of oak trees that were estimated to be over 200 years old and is now being overrun by invasives.

There is a good bit of commercial and residential development within Peters Creek's floodplain from Sugar Run Rd to the headwaters in Thomas. The Allegheny Valley Railroad runs within the floodplain along this entire section and constricts the stream at a number of locations. Still, approximately 50% of the floodplain remains vegetated along this section.

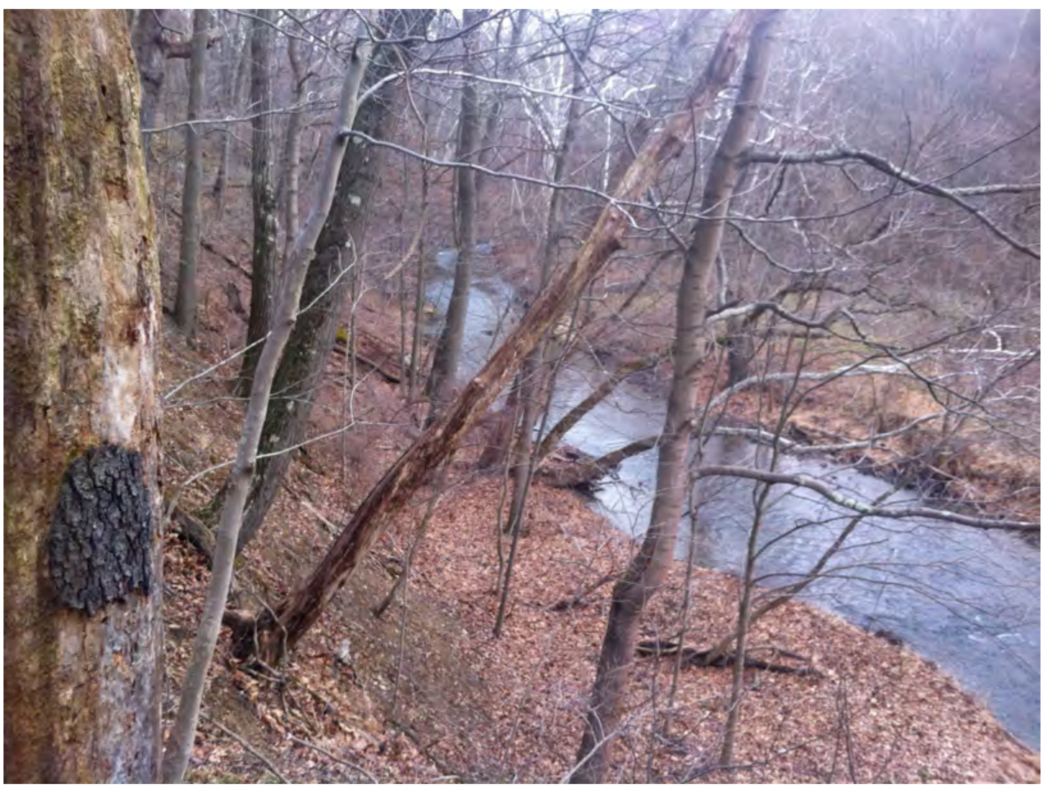
Little of the floodplain of the Trax Farm Tributary, the Bebout Rd Tributary, the Churchhill Rd Tributary, the McChain Rd Tributary and the McCombs Rd Tributary remains naturally vegetated. The floodplains of a number of the other tributaries within the Upper Peters Creek watershed, however, do remain mostly wooded or naturally vegetated, especially the tributary draining the valley between Bebout Rd and Churchhill Rd.

Invasives are a problem locally within the Upper Peters Creek sub-watershed. Japanese Knotweed has started to establish monocultures at a number of locations within Peters Creek's floodplain from the Lick Run confluence to the Allegheny Valley Railroad tunnel. Purple Loosestrife has established in part of the Snowden Wetland. Garlic mustard, Japanese Stiltgrass and Multiflora Rose present a problem at a number of locations. Invasive vines, including Japanese Honeysuckle and Oriental Bittersweet, are problems within floodplain forests throughout the sub-watershed.

*PCU003 – Steeply wooded slope on Peters Creek's left ascending bank covered with White Trillium just upstream of the confluence with Lick Run.*

*PCU010 – Purple Loosestrife, an invasive wetland species from Eurasia, is becoming established within the Snowden Wetland. This invasive provides very little wildlife value and out-competes most other wetland species. Subsequent to this photo Beaver flooded this portion of the wetland and it helped to control the Purple Loosestrife.*

*PCU022 – Piney Fork Rd in Peters Creeks floodplain near Greenman Tunnel. Japanese Knotweed establishing monoculture along road in lower left of photo. Dead trees within floodplain were killed by a water main break and salt spill from Greenman Tunnel in July of 2011.*



*PCU037 – Fairly typical view of Peters Creek from the confluence of Piney Fork to Gastonville but minus the illegally dumped garbage, abandoned vehicles and erosion due to excessive off-road activity within the floodplain.*

*PCU100 – Livestock pasture in Peters Creek's right ascending floodplain in Peters Township along Railroad St. Providing fencing to keep livestock out of the creek, as seen here, is important for maintaining water quality within the stream.*

*TFT39 – Trax Farm Tributary mowed right up to the stream with little natural vegetation left within the floodplain. This is a too typical occurrence along the Trax Farm Tributary and many other tributaries within the Upper Peters Creek sub-watershed.*

*PCU010 – Student Conservation Association of Pittsburgh helping to remove a Japanese Knotweed infestation from the banks of Peters Creek behind the Snowden Wetland.*

## *Stormwater Infrastructure and Issues*

Adequate control of stormwater in the headwaters portion of Peters Creek is an essential component of maintaining a healthy stream in the downstream portion of the watershed. This is not always a simple task and must be a coordinated effort. Handling stormwater on a developing parcel and maintaining infiltration and groundwater recharge is the desired goal if possible but is seldom achieved nor often even considered the objective.

Numerous lakes and impoundments along headwater streams in Peters and Nottingham Townships helps to mitigate flooding downstream and also provides wildlife habitat and aesthetics. Intelligent implementation and management of these features is required if the streams they are located on are to maintain biological integrity.

Much of the development within the Upper Peters Creek sub-watershed occurred prior to the requirement of stormwater controls. The objective was to channel excess stormwaters to the nearest stream as fast as possible. This policy along with the ease of development within the floodplain of many streams has led to flooding problems in low-lying parts of the sub-watershed including along the Trax Farm Tributary and along Peters Creek in Finleyville.

The recent addition of the Mon-Fayette Expressway along Peters Creek's southern shore from Jefferson Hills to Gastonville has added an additional load of stormwater to Peters Creek along with its numerous contaminants.

*PCU020 – A deeply incised stormwater channel created by runoff from a Mon-Fayette Expressway stormwater detention basin at PCU019.*

*PCU020 – The stormwater runoff from the Mon-Fayette Expressway is captured by an off-road vehicle trail within Peters Creek's left ascending floodplain; creating more erosion and accumulating more sediment prior to entering Peters Creek.*

*PCU019 – Stormwater detention basin accepting stormwater from the Mon-Fayette Expressway and conveying it to Peters Creek near Snowden in South Park Township.*

*TFT45 – Stormwater detention pond along the Trax Farm Tributary just downstream of Trax Farm Market. The detention pond is filling with sediment which diminishes the basins capacity. Stormwater detention ponds require regular maintenance in order to perform the function they were intended for.*

*PCU146 – Stormwater runoff from Thomas Field and surrounding parkland along Linden Rd in Nottingham Township is culverted under a church lot and enters the extreme headwaters of Peters Creek's west branch.*

## *Encroachments*

Encroachment of Peters Creek's main stem is not a major issue from the Lick Run confluence to Gastonville. The stream is permitted to flow freely within a mostly undeveloped valley with a wide floodplain.

There are a few exceptions. Remnants of an old mining operation, the Thomspon Mine, including concrete abutments of an incline and a coal waste pile encroach on the stream channel at PCU004 and PCU005. A Wheeling & Lake Erie Connellsville Branch Trestle abutment is within the wetted stream channel at PCU006. The SR3016 bridge creates a large debris jam at PCU014. Piney Fork Rd encroaches on the stream at PCU021. Heavy off-road activity encroaches on and within the stream channel from below the SR3016 bridge to above the Allegheny Valley Railroad Tunnel at PCU029. The stream is channelized through this tunnel. From the tunnel to Gastonville there are a number of bridge and gas line crossings of the stream channel.

Encroachment becomes a more important issue from Gastonville to the headwaters of the main stem of Peters Creek. There are a number of debris jams along this section, telephone poles in the stream channel, numerous bridge crossings, both public and private pedestrian bridges. There are a number of locations where commercial development has occurred right up to the stream bank and where homeowners mow to the stream and leave little vegetated buffer. The stream gets pinched between commercial development and the Allegheny Valley Railroad crossing at a few locations and there are a number of inadequately sized culverts cause water to pool.

Many of the tributaries to Peters Creek in this sub-watershed are severely impacted by excess encroachment.

Most notable is the Trax Farm Tributary. Much development has occurred within the floodplain of this stream. The stream is culverted under many roads. There are numerous bank modifications and the stream is channelized at a number of spots. The stream is culverted for approximately ¼ of a mile under the Trax Farm Market and again for hundreds of feet downstream of Mineral Beach. There are few reaches of this stream that remain natural. An exception is from the Washington Road bridge crossing to the Route 88 bridge crossing along the lower section of stream. Much of this section remains natural and wooded.

The Bebout Road Tributary is also encroached upon, culverted and impounded at many locations along its course from its headwaters in a golf course to its confluence with Peters Creek.

*PCU002 – Formation of debris jams along streams is a natural process. This large debris jam is along a part of Peters Creek where the floodplain is wide and undeveloped. The debris jam is creating a pool along a section of stream that is mostly shallow run. Debris jams help to create diverse habitat within the stream. It is important to allow them to exist where the potential of flooding property does not exist.*

*PCU006 – The Wheeling & Lake Erie Connellsville Branch Railroad Trestle abutment is within Peters Creeks channel and causes stream bank erosion at and downstream of the trestle crossing.*

*PCU029 – Peters Creek is channelized through a tunnel under the Allegheny Valley Railroad at the Allegheny and Washington County border. An undeveloped road runs along side the stream.*

*PCU037 – Homeowner bridge crossing of Peters Creek. Concrete poured along stream eroding into creek. Non-functional vehicles and other debris within floodplain of stream.*

PCU126 – Fallen telephone pole creates a debris jam within Peters Creeks channel near headwaters of stream.

*TFT38 – Inadequately sized culvert on a private drive creates erosion downstream of culvert. Piping running across the channel creates a debris jam. Stream mowed right up to stream. Upstream structures built within feet of the stream encroach on the stream.*

## *Garbage & Dumps*

Illegal dumping is a serious problem in parts of the Upper Peters Creek sub-watershed. It is a consistent problem from the SR3016 bridge in Snowden within Peters Creek's floodplain to the TR844 bridge in Union Township just west of Gastonville. The Allegheny Valley Railroad tracks are utilized as access for illegal dumping along and adjacent to the tracks between Snowden and Gastonville. The property to the east of the enclosed portion of the Southhills Landfill known as the "Finleyville Dumps" off-road area also experiences persistent illegal dumping.

Illegal littering is a persistent problem within the Peters Creek floodplain and along the Montour Trail from the Lick Run confluence to the Piney Fork confluence. The Tri-Community Anglers sponsor two stream clean-ups along this section of stream each year and have done so since 1998. Other groups, including the Montour Trail Association, the Peters Creek Watershed Association and various local Boy Scout and Girl Scout groups help with this effort. South Park Twp and Jefferson Hills dispose of the collected garbage; including numerous tires. A significant portion of the garbage within the floodplain is carried to the area from upstream during heavy rain events.

*PCU016 - Illegal dumping becomes a serious problem within Peters Creek's left ascending bank floodplain directly behind and to the west of the SR3016 bridge when the bridge gate is not locked. Vandals often cut locks off of this gate to obtain off-road access to the area.*

*PCU030 - Peters Creek's right ascending bank floodplain wetland just west of the Allegheny Valley Railroad tunnel is littered with numerous 55 gallon drums and other assorted garbage and debris.*

*PCU041 – Illegal dump site in a ravine along Peters Creek's right ascending bank along Snee Rd east of the TR844 bridge.*

*PCU029 – Large pile of illegally dumped shingles along the Allegheny Valley Railroad tracks near the Allegheny Valley Railroad tunnel.*

*PCU040 – Large illegal dumping site north of Snee Rd. east of the TR844 bridge.*

*PCU044 – One of many illegal dump sites on the plateau north of Peters Creek and east of the enclosed Southhills Landfill area. The area is locally known as the "Finleyville Dumps" and is heavily impacted by off-road vehicle use.*

*A legal compost landfill site south of the enclosed section of the Southhills Landfill. A great deal of illegally discarded compostable material such as tree trimmings, landscaping shrubs, discarded Christmas trees, etc. ends up dumped along Peters Creek. Much of that material should end up at a site like this. The hillside behind the site was recently reclaimed as part of an OSM abandoned mines land project.*

## *Areas of Historical and/or Conservation Significance*

There are a number of areas of conservation and historical significance within the Upper Peters Creek sub-watershed.


James Chapel or The Old Stone Church as it is locally known is a Methodist Episcopal Church that was first erected in 1817 on an acre of land donated by Robert James. The church was built on a high point above Peters Creek with an expansive view of surrounding lands at a place that would be defendable given an Indian attack. The church sits near the southern divide of the Peters Creek watershed. The adjoining cemetery harbors many of the areas original settlers including Revolutionary War soldiers. An excellent view of the watershed can be had from the cemetery behind the church.

In 1764 James and Joshua Wright first came upon the Peters Creek Valley during an expedition to Ohio. They patented 800 acres in the valley that was then part of the State of Virginia. They cleared the land and built and lived in log cabins.

The house below, which is along Venetia Road just west of Hackett, was built by Joshua's son Enoch Wright in about 1815. The house is now owned and operated by The Peters Creek Historical Society. Their mission is to preserve local history for future generations.


In the early 1800's Enoch Wright set aside land in Venetia and built Wright's Chapel. When the church was later bequeathed to the United Methodists a stipulation was included that Wright's Chapel was "to be used as a place of worship by all evangelical denominations…and never should any defense or advocacy of human slavery be permitted within its walls." Today, only a foundation and cemetery remain at the site in Nottingham Township along Mingo Church Rd and Peters Creek.

The Wright's Woods Biodiversity Area is just to the east of the Wright's Chapel Cemetery. The 1994 Natural Heritage Inventory of Washington County describes Wright's Woods as a "section of old growth oak forest - one of the best and last remaining examples in the county." The community growing in this forest was classified as a Mesic Central Forest, was considered of high diversity and was dominated by large oaks.

A scientific investigation of Wright's Woods by James S. Rentch, etal. published in Forest Science in 2003 found some of the white oaks in Wright's Woods to date back to the early 1800's. He concluded that "Because of their antiquity, the old-growth stands of this study provide a valuable source of long-term data on individual tree and stand dynamics of oak forests of this region. Our results have implications for the management of oak-dominated old-growth forests, as well as for oak silviculture in general."

In about 2008 the Wright's Woods were clearcut. Little remains of what was a unique and priceless natural amenity. In 2010 Steve Hallow of the Eastern Native Tree Society visited Wright's Woods. Here are his observations concerning the Wright's Woods that he found.

*"I could tell that the site had been clear cut, probably 2 or 3 years ago. Since the site was not posted, I elected to walk into it along a logging road to see how much damage was done. I walked back a couple hundred yards and can confirm that it's pretty much gone. There are only a few thin sugar maples, black cherry and hickory left. I must say that it was extremely disappointing to see this. Such disrespect for the environment and generations of good forest stewardship."*

*One of Wright's Woods large white oak prior to clearcutting .*

The steep slopes and ravines surrounding Peters Creek in this sub-watershed most likely are harboring pockets of biodiversity that is currently unknown. In 2011 a substantial population of a PA state listed rare species, Snow Trillium (*Trillium nivale),* was first discovered in a small ravine just feet from a well travelled path.

## *Conclusions and Recommendations*

Abandoned mine drainage is an extremely important issue in the Upper Peters Creek sub-watershed. The 2009 PA DEP Metals TMDL Study of the Peters Creek watershed identified the Landfill Tributary as a significant contributor to metals loading in Peters Creek. This stream did not meeting standards for aluminum, iron, manganese and pH.  The major discharge appears to be at LT20 along the west branch of the Landfill Tributary but there is also contribution from a permitted discharge from the Southhills Landfill.

There are also a number of other significant discharges into Peters Creek from west of the Landfill Tributary confluence to Gastonville (PCU048,PCU049,PCU053) and two others just west of

Finleyville (PCU086,PCU090). These 5 discharges along with the discharge at LT20 should be investigated further in order to prioritize their potential for treatment.

A seemingly small abandoned mine discharge approximately ½ mile upstream of the confluence of Peters Creek with Piney Fork at PCU027 also requires further investigation. It appears that this discharge may contribute significantly to metals loading only during heavy precipitation events and may be a contributing factor to the lack of macroinvertebrate diversity and numbers found at site PC5 during the 2009 macroinvertebrate study.

There are also a number of abandoned mine lands within the Upper Peters Creek sub-watershed, especially in proximity to the Landfill Tributary. A recent OSM reclamation project addressed a number of Priority 2 AML to the west of the Landfill Tributary. Dangerous highwalls remain east of the Landfill Tributary and there are also a number of Priority 3 AMLs in this area. An effort should be made to have all dangerous AML within the Peters Creek watershed officially listed.

Sewage is transported from much of the Upper Peters Creek sub-watershed via a sewage interceptor along Peters Creek to the Clairton Municipal Authority for treatment. This regional approach to wastewater treatment is protective of Peters Creek's Trout Stocked Fishery aquatic use designation.

Few problems were noted concerning sewage infrastructure within this sub-watershed. Proper long-term maintenance of sewage infrastructure is essential to maintain water quality within Peters Creek and to minimize treatment costs.

Nutrient enrichment appears to be a localized problem within the Upper Peters Creek sub-watershed except along the Trax Farm Tributary, which appears to be consistently impacted by excess algae at numerous locations. A sampling program should be developed to identify the source of nutrient enrichment load within the Trax Farm Tributary and at other locations that appear impacted by nutrient overload. The Conservation District agricultural technician should be consulted to explore remedies if the impacts are farm related.

Excessive off-road vehicle activity within the floodplain of Peters Creek creates bank erosion, alters drainage flow patterns, degrades wetlands and adds a significant siltation load to the stream at numerous locations along Peters Creek's course within the Upper Peters Creek sub-watershed.

The impact is especially problematic from just below the SR3016 bridge crossing in Snowden to above the Allegheny Valley Railroad Tunnel at the Allegheny County/Washington County border.

Stormwater from the Mon-Fayette Expressway contributes to the problem along this section of Peters Creek. Managing off-road activity effectively along Peters Creek is essential if the stream is to maintain its designated aquatic life use as a Trout Stocked Fishery.

Flooding is a problem during major storm events in a number of low-lying sections of the sub-watershed, especially within portions of Finleyville and Venetia and along the Trax Farm Tributary. Excessive encroachment in the form of culverts, crossings, bank modifications, riparian vegetation removal and channelization of the stream exacerbate flooding conditions and increase stream bank erosion and siltation.

A stream bank stabilization and riparian planting project along the Trax Farm Tributary at Pleasant Stream Park in Union Township would help to improve water quality within the stream and serve as an example of good stewardship for the community. Other opportunities for riparian habitat improvement include areas along the RT88 tributary in Finleyville and several locations along Bebout Road and Church Hill Road.

Much of the floodplain of Peters Creek's main stem remains wooded or naturally vegetated within the Upper Peters Creek sub-watershed. This is not the case for many of the major tributaries to Peters Creek within the sub-watershed.

Adequately wooded buffers along Peters Creek and its tributaries, especially in the headwaters, is an important factor helping this stream to maintain adequate water quality and to achieve its aquatic life use as a Trout Stocked Fishery. Maintenance and enhancement of this buffer is essential.

Infestations of invasive plants and vines, excessive off-road vehicle use and illegal dumping are serious problems within the floodplain for a large part of this sub-watershed. Development of a riparian management plan that effectively addresses these issues is essential if Peters Creek is to continue to achieve its aquatic use designation.

This plan should also include a robust community outreach program. Involvement of the community in restoration of degraded floodplain forests and in green infrastructure projects along tributary streams will help to reinforce a positive stewardship culture within the community.

This portion of the watershed has a rich history dating back to the mid-1700s. The Peters Creek Historical Society is working to preserve this history and to educate the public concerning life in the local area from the European settlement to the present day.

Unfortunately, the sub-watershed's only Biodiversity Area, Wright's Woods Biodiversity Area, has been destroyed. Two hundred year old oak trees can not be replaced. The remains of this woodlot should be adequately and professionally managed so that it does not become an invasive plant infestation and degrade water quality within Peters Creek.

There are also a number of mostly wooded tributaries within this sub-watershed that should be investigated in terms of their conservation potential.

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| PCU001 | -79.956228 | 40.277664 | 812 | 12/18/12 | Confluence of Lick Run with Peters Creek |
| PCU002 | -79.9567 | 40.27709 | 815 | 10/17/08 | Large silt bar in middle of stream; Trees down creating large debris jam. |
| PCU003 | -79.957183 | 40.276733 | 815 | 12/18/12 | Water quality sampling location on PCWA's newly acquired 14 acre parcel. |
| PCU004 | -79.95774 | 40.27617 | 815 | 12/18/12 | Remnants of incline from Thompson Mine on RAB of Peters Creek. Other concrete remnants in floodplain. |
| PCU005 | -79.958472 | 40.275474 | 860 | 12/18/12 | Coal waste pile from Thompson Mine makes up approximately 100 ft of Peters Creek's LAB. Material eroding into stream. |
| PCU006 | -79.960995 | 40.275842 | 817 | 12/18/12 | W&LE Railroad Trestle crosses Peters Creek. Abutment encroaches on LAB. LAB eroding just below abutment. RAB erosion just upstream. |
| PCU007 | -79.964981 | 40.275522 | 831 | 12/18/12 | Active fill site across Piney Fork Ext from Snowden wetland. Inadequate protection of surrounding wetlands. |
| PCU008 | -79.962666 | 40.27511 | 824 | 10/17/08 | Small tributary draining floodplain wetland (~5 GPM) enters on right ascending bank. |
| PCU009 | -79.963782 | 40.274425 | 824 | 12/18/12 | Gabion rip-rapped section of Peters Creek's RAB creating bank erosion and a pool just downstream of rip-rap. |
| PCU010 | -79.964273 | 40.274514 | 823 | 10/17/08 | Wetland floodplain (Snowden Wetland) on Peters Creek's right ascending bank (~5-10 acres). Partially created as part of Mon-Fayette Exp development. |
| PCU011 | -79.96464 | 40.27328 | 825 | 10/17/08 | Large sediment bar on LAB causing bank erosion on RAB. |
| PCU012 | -79.964984 | 40.272558 | 824 | 12/18/12 | Tributary draining Snowden Rd enters on LAB. ATV crossing immediately downstream. |
| PCU013 | -79.965429 | 40.274128 | 830 | 12/18/12 | Wetland on northern side of Piney Fork Rd and east of Snowden Rd |
| PCU014 | -79.96539 | 40.272504 | 826 | 10/17/08 | Snowden Rd bridge (SR3016) crosses Peters Creek; Culverted discharge enters on RAB just upstream; Debris jam created by bridge. |
| PCU015 | -79.966669 | 40.272279 | 825 | 12/18/12 | Wetland north of Piney Fork Rd and west of Snowden Rd |
| PCU016 | -79.965645 | 40.271867 | 829 | 12/18/12 | Wetland providing breeding habitat for amphibians in floodplain along LAB beside fill site. Old soil mining operation and heavy ATV use within this section of LAB floodplain. |
| PCU017 | -79.9661 | 40.272477 | 829 | 12/18/12 | Concrete slab and culverted discharge into Peters Creek on RAB along unimproved parking area for access to Montour Trail. |
| PCU018 | -79.966669 | 40.272279 | 825 | 12/18/12 | Stormwater channel enters Peters Creek's RAB. |
| PCU019 | -79.965729 | 40.270696 | 902 | 12/18/12 | Stormwater detention basin built as part of Mon-Fayette Expressway. |
| PCU020 | -79.966567 | 40.270971 | 875 | 12/18/12 | Deeply incised stormwater channel culverted under W&LE tracks from detention basin drains onto Peters Creek's LAB floodplain. |
| PCU021 | -79.967432 | 40.272224 | 828 | 12/18/12 | ~ 150 ft of gabioned rip-rap on RAB along Piney Fork Rd being undercut at head of project. Knotweed infestation and asphalt on bank from rd to rip-rapped bank. |
| PCU022 | -79.968334 | 40.272004 | 831 | 12/18/12 | Most trees within RAB floodplain dead along this section of Peters Creek to Piney Fork tunnel. |
| PCU023 | -79.968331 | 40.272048 | 829 | 12/18/12 | Stormwater culverted under Piney Fork Rd enters Peters Creek's via a channel on RAB. |
| PCU024 | -79.968912 | 40.272438 | 843 | 12/18/12 | Abandoned tunnel from Penn Railroad Peters Creek Branch (Greenman's Tunnel) currently owned by South Park Twp and used for salt storage. 48" water main flows under tunnel. |
| PCU025 | -79.968851 | 40.271604 | 828 | 10/17/08 | Piney Fork enters on Peters Creek's RAB. Heavy ATV use on LAB creating erosion drainage into stream. ATV crossing immediately above confluence. |
| PCU026 | -79.971967 | 40.270585 | 910 | 12/18/12 | Small woodland pond on edge of Allegheny Railroad tracks above Peters Creek's RAB floodplain provides breeding habitat for amphibians. |
| PCU027 | -79.973019 | 40.269205 | 839 | 10/17/08 | AMD impacted tributary enters on LAB. (~3 GPM) |
| PCU028 | -79.97261 | 40.269516 | 841 | 12/18/12 | Part of RAB floodplain deforested. Heavy ATV use on RAB along this section of stream. Illegal dumping. |
| PCU029 | -79.97294 | 40.27013 | 840 | 12/18/12 | Peters Creek channelized through tunnel under AVR tracks. |
| PCU030 | -79.973314 | 40.270675 | 844 | 3/17/12 | Steeply wooded slope just west of tunnel on RAB. Wetland floodplain littered with junk & debris. |
| PCU031 | -79.973437 | 40.270344 | 840 | 5/6/09 | pH, Conductivity check |
| PCU032 | -79.973866 | 40.270386 | 840 | 5/6/09 | Heavily utilized ATV crossing of stream. Damage to wetland and erosion in RAB floodplain. Altered drainage patterns. |
| PCU033 | -79.975115 | 40.269571 | 844 | 5/6/09 | Junkyard on RAB floodplain, junk coming down hillside on LAB from tracks (Misc scrap piles from homeowner in clearing on RAB scattered throughout woods.) |
| PCU034 | -79.976147 | 40.269404 | 845 | 3/17/12 | Homeowner bridge crossing Peters Creek to residence on RAB in clearing. |
| PCU035 | -79.977073 | 40.269811 | 847 | 5/6/09 | Tributary enters on RAB (low flow, trickle) (11.9C, 425 S, 646 TDS) |
| PCU036 | -79.979182 | 40.270078 | 850 | 5/6/09 | Debris jam in bend; wildflowers; heron; deep pool; tributary enters on RAB (~10GPM); some bank erosion on RAB just upstream of confluence. (12.1 C, 441 S, 673 TDS) |
| PCU037 | -79.979172 | 40.268943 | 858 | 5/6/09 | Vehicle bridge crossing of Peters Creek. Clearing with scrap and junk. Dirt road up right ascending bank to Snee Rd. |
| PCU038 | -79.978492 | 40.26769 | 861 | 5/6/09 | Large debris jam obstructing entire channel of Peters Creek creating waterfall. |
| PCU039 | -79.979906 | 40.267139 | 863 | 5/6/09 | Tributary crosses Snee Rd, flows down steep RAB and enters Peters Creek. |
| PCU040 | -79.98 | 40.268333 | 908 | 3/22/11 | Illegal dump site north of Snee Rd. |
| PCU041 | -79.980436 | 40.267337 | 897 | 4/1/11 | Illegal dump site into ravine off of Snee Rd. |
| PCU042 | -79.980213 | 40.266494 | 862 | 3/17/12 | pH, Conductivity check; Gas Line crossing of Peters Creek. Utilized by ATVs to get from AVR tracks to Finleyville Dumps area. |
| PCU043 | -79.982279 | 40.265601 | 868 | 3/17/12 | Snee Rd (TR844) crossing of Peters Creek. TR844 is a dirt & gravel road. Concrete debris on RAB just up from bridge. Farmfields on LAB. Little riparian forested buffer on LAB. |
| PCU044 | -79.983333 | 40.2675 | 985 | 3/22/11 | Illegal dump site on plateau north of Peters Creek.; Erosion due to heavy off-road vehicle use at head of tributary to Landfill Trib causing excessive siltation in stream. |
| PCU045 | -79.984099 | 40.265571 | 876 | 5/6/09 | Tributary enters on RAB. Drains South Hills Landfill. (~40 GPM, 3'W) (14.7 C, 491 S, 728 TDS) |
| PCU046 | -79.985131 | 40.264547 | 874 | 3/17/12 | Gas Line crossing of Peters Creek. |
| PCU047 | -79.984171 | 40.261248 | 881 | 5/6/09 | Tributary enters on LAB under bridge over Snee Rd immediately after the road exits tunnel for AVR trackage. (13 C, 798 S, 1,170 TDS) |
| PCU048 | -79.987802 | 40.260515 | 904 | 3/23/11 | Culverted flow impacted by AMD enters Peters Creeks RAB. |
| PCU049 | -79.98789 | 40.26025 | 899 | 3/23/11 | Culverted flow impacted by AMD enters Peters Creeks RAB. |
| PCU050 | -79.990696 | 40.259384 | 952 | 3/23/11 | AMD impacted discharge culverted under McChain Rd enters tributary to Peters Creek. |
| PCU051 | -79.989779 | 40.260524 | 992 | 3/23/11 | Large accumulation of old vehicles, junk, concrete sewer pipe and various fill areas. |
| PCU052 | -79.987851 | 40.259993 | 889 | 3/23/11 | Homeowner bridge crossing of Peters Creek. |
| PCU053 | -79.988236 | 40.259248 | 891 | 3/23/11 | Tributary impacted by AMD draining McChain & Aquila Lane enters on RAB. Concrete debris thrown over bank. |
| PCU054 | -79.989114 | 40.257642 | 894 | 3/23/11 | Stormwater channel from culverted flow under Stone Church Rd enters on RAB. |
| PCU055 | -79.988926 | 40.257772 | 895 | 3/23/11 | Homeowner bridge crosses Peters Creek. |
| PCU056 | -79.988651 | 40.257814 | 896 | 3/23/11 | Stone Church Rd bridge crossing of Peters Creek. |
| PCU057 | -79.98756 | 40.257882 | 896 | 3/23/11 | Allegheny Valley Railroad bridge crossing of Peters Creek. |
| PCU058 | -79.987429 | 40.25797 | 906 | 3/23/11 | Garbage coming down ravine behind homeowner towards Peters Creek's LAB. |

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| PCU059 | -79.986228 | 40.255609 | 907 | 5/6/09 | Automotive junkyard behind auto body shop on right ascending floodplain. |
| PCU060 | -79.986315 | 40.254617 | 910 | 3/23/11 | SR1006 bridge crossing of Peters Creek. |
| PCU061 | -79.986493 | 40.254503 | 905 | 7/21/09 | Tributary enters on RAB just upstream of SR 1006 bridge via a channel created as part of Mon-Fayette Expressway. (19.5 C, 345 S, 514 TDS) |
| PCU062 | -79.985075 | 40.252904 | 926 | 3/23/11 | Confluence of Patterson Rd trib and Elrama-Finleyville Rd tributary. Stormwater control structure built as part of Mon-Fayette Expressway. |
| PCU063 | -79.987387 | 40.251034 | 1028 | 3/23/11 | Stormwater detention basin built to control runoff from Tuscany Estates Plan. |
| PCU064 | -79.98613 | 40.249528 | 983 | 7/12/13 | Heavy use agricultural area along Patterson Rd most likely impacting water quality in tributary flowing through property. |
| PCU065 | -79.986533 | 40.254521 | 904 | 7/21/09 | Main stream channel (17.9 C, 427 S, 634 TDS). Shale stream bottom. Silty bottom. Steep slope on right, shale outcrops. |
| PCU066 | -79.987589 | 40.253958 | 908 | 7/21/09 | Makeshift mining operation. Cave dug 30 ft into hllside on LAB. |
| PCU067 | -79.988385 | 40.253523 | 910 | 7/21/09 | Gravel bar on left ascending side of stream channel. |
| PCU068 | -79.990211 | 40.253411 | 913 | 7/21/09 | Bank erosion on right ascending bank. |
| PCU069 | -79.992623 | 40.254198 | 918 | 7/21/09 | Eroded bank on left. (18.4 C, 439 S, 649 TDS) |
| PCU070 | -79.993764 | 40.253815 | 918 | 7/21/09 | Debris jam at site of power line crossing Peters Creek. ~ 70 ft of bank on both sides of stream cleared for line crossing. |
| PCU071 | -79.99564 | 40.253926 | 925 | 7/21/09 | Tributary enters Peters Creek on LAB. (20 C, 211 S, 317 TDS). |
| PCU072 | -79.995543 | 40.253944 | 923 | 7/21/09 | pH, conductivty check in Peters Creek below confluence. (20.8 C, 442 S, 654 TDS) |
| PCU073 | -79.996402 | 40.254233 | 923 | 7/21/09 | Trax Farm tributary enters Peters Creek on RAB. (19.2 C, 405 S, 600 TDS, ~60 gpm). |
| PCU074 | -79.99635 | 40.254188 | 922 | 7/21/09 | pH, Conductivity check in Peters Creek below tributary confluence. (19.3 C, 408 S, 607 TDS) |
| PCU075 | -79.9989 | 40.253668 | 929 | 7/21/09 | Mulch on streambank behind Rusmin Trucking. No riparian buffer on RAB. |
| PCU076 | -80.000494 | 40.252494 | 929 | 7/21/09 | Debris/log jam. |
| PCU077 | -80.000697 | 40.2522 | 939 | 7/21/09 | Culverted discharge from 18 inch corregated metal pipe (CMP). (20.6 C, 740 S, 1060 TDS). |
| PCU078 | -80.000697 | 40.2522 | 941 | 7/21/09 | Culverted discharge from 18 inch reinforced concrete pipe (RCP). (19.4 C, 618 S, 900 TDS). |
| PCU079 | -80.001255 | 40.251647 | 941 | 7/21/09 | Culverted discharge from 32 inch RCP and 12 inch CMP. (20.5 C, 460 S, 666 TDS). |
| PCU080 | -80.003274 | 40.250358 | 934 | 7/21/09 | Tributary enters on LAB just downstream of Rte 88 bridge (18.4 C, 393 S, 584 TDS). |
| PCU081 | -80.003394 | 40.250486 | 938 | 7/12/13 | Route 88 bridge crosses Peters Creek. |
| PCU082 | -80.003996 | 40.250194 | 949 | 7/12/13 | Stormwater detention basin for Finleyville Giant Eagle. |
| PCU083 | -80.003932 | 40.25049 | 934 | 7/21/09 | Outfall from stormwater basin enters on LAB. (19.1 C, 618 S, 901 TDS). |
| PCU084 | -80.004327 | 40.250564 | 939 | 7/21/09 | Large tank and bike in stream. |
| PCU085 | -80.006058 | 40.251062 | 940 | 7/21/09 | Undercut bank. Approx. 75 feet undercut. |
| PCU086 | -80.007421 | 40.251401 | 938 | 10/22/08 | Culverted tributary impacted by AMD enters Peters Creek on RAB just downstream of bridge; small tributary enters on LAB. |
| PCU087 | -80.007805 | 40.251432 | 938 | 7/12/13 | Rankintown Rd crosses Peters Creek. |
| PCU088 | -80.00931 | 40.25132 | 941 | 10/22/08 | Trash over road hillside on left ascending bank. |
| PCU089 | -80.00992 | 40.25116 | 941 | 10/22/08 | Large sediment bar and debris jam in stream channel. |
| PCU090 | -80.01057 | 40.25175 | 952 | 10/22/08 | AMD impacted tributary exits culvert north of AVR tracks, is culverted under tracks, flows into floodplain wetland and enters on RAB. (~40 GPM) |
| PCU091 | -80.0106 | 40.251396 | 947 | 7/12/13 | Floodplain wetland along Peters Creeks RAB. |
| PCU092 | -80.013474 | 40.252715 | 995 | 7/12/13 | Pond/impoundment as part of an agricultural operation north of AVR tracks off of Frye Ave. |
| PCU093 | -80.014896 | 40.251606 | 951 | 7/12/13 | Significant wetland on northern side of AVR tracks. |
| PCU094 | -80.01493 | 40.25082 | 947 | 10/22/08 | Erosion on LAB behind residence; channel braided by sediment bars. |
| PCU095 | -80.01591 | 40.25111 | 938 | 10/22/08 | Tributary draining McClelland Rd is culverted under AVR tracks and enters Peters Creeks RAB. |
| PCU096 | -80.01607 | 40.25077 | 949 | 10/22/08 | ATV crossing; significant bank erosion on LAB just downstream. |
| PCU097 | -80.249694 | 40.249694 | 951 | 7/12/13 | Single lane bridge crosses Peters Creek. Bridge slated for replacement in 2014. |
| PCU098 | -80.01687 | 40.24924 | 951 | 10/22/08 | Tributary draining Churchill Rd is culverted under AVR tracks and Railroad St then enters Peters Creek on RAB. |
| PCU099 | -80.017312 | 40.247803 | 953 | 10/31/13 | New gas line crosses Peters Creek. |
| PCU100 | -80.018552 | 40.246508 | 933 | 10/22/08 | Heavy use agricultural area for cow pasturing along Peters Creek's RAB to Railroad St. |
| PCU101 | -80.019145 | 40.245883 | 960 | 10/31/13 | Nicholas Lane bridge crossing of Peters Creek. |
| PCU102 | -80.02256 | 40.245454 | 1006 | 10/22/08 | Large coal waste pile on Peters Creeks LAB; farm operation on RAB. |
| PCU103 | -80.020729 | 40.243012 | 1024 | 10/31/13 | Mitchell Power Plant Fly Ash Disposal Site Lagoon. |
| PCU104 | -80.028787 | 40.245244 | 968 | 10/22/08 | Small tributary draining wooded valley behind Wright's House enters Peters Creeks RAB. |
| PCU105 | -80.02857 | 40.244295 | 1061 | 7/12/13 | What had been Wright's Woods Biodiversity Area (Natural Heritage Inventory), one of Washington County's best examples of old growth Oak forest has been severely logged on Peters Creeks LAB. |
| PCU106 | -80.03249 | 40.2445 | 971 | 10/22/08 | Debris jam. |
| PCU107 | -80.033554 | 40.243677 | 975 | 10/22/08 | Dry tributary channel enters on Peters Creek's LAB near parking area for Wright's Chapel Cemetery. |
| PCU108 | -80.037181 | 40.244944 | 978 | 7/12/13 | Sugar Run Rd bridge crossing of Peters Creek. |
| PCU109 | -80.038099 | 40.245003 | 979 | 7/12/13 | Homeowner bridge crossing Peters Creek. |
| PCU110 | -80.040119 | 40.245651 | 980 | 10/23/08 | Allegheny Valley Railroad bridge crossing of Peters Creek; Erosion on LAB. |
| PCU111 | -80.043241 | 40.246161 | 985 | 10/23/08 | Tributary draining Bebout Rd enters on Peters Creeks RAB (~10 GPM). |
| PCU112 | -80.043353 | 40.245817 | 986 | 7/12/13 | Allegheny Valley Railroad bridge crossing Peters Creek. |
| PCU113 | -80.04368 | 40.24561 | 988 | 10/23/08 | Tributary enters Peters Creek on RAB. Tributary draining McCombs Rd? |
| PCU114 | -80.044556 | 40.245197 | 989 | 10/23/08 | Peters Creek culverted under private driveway; two large culverts; red precipitate on stream channel substrate. |
| PCU115 | -80.046889 | 40.244479 | 994 | 10/23/08 | Large floodplain wetland on RAB. (appears dry) |
| PCU116 | -80.047823 | 40.24372 | 995 | 10/23/08 | Peters Creek culverted under Lutes Rd. |

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| PCU117 | -80.0504 | 40.24365 | 1002 | 10/23/08 | Tributary enters on RAB (dry). |
| PCU118 | -80.050758 | 40.244224 | 1008 | 7/12/13 | Small impoundment of tributary up against AVR tracks. |
| PCU119 | -80.051479 | 40.245401 | 1041 | 7/12/13 | Stormwater detention basin. |
| PCU120 | -80.05123 | 40.243925 | 1002 | 10/23/08 | Allegheny Valley Railroad bridge crossing of Peters Creek to north of tracks;ponding of water upstream of tracks. |
| PCU121 | -80.054482 | 40.243749 | 1006 | 7/12/13 | Peters Creek bridge crossing of Lynch Lane. Tributary enters RAB just upstream of bridge. Erosion and pooling below bridge. |
| PCU122 | -80.061181 | 40.254715 | 1163 | 7/12/13 | Impoundment at headwaters of this tributary that drains Scenic Ridge Dr. |
| PCU123 | -80.05552 | 40.2437 | 1009 | 10/23/08 | Stream channel dry just upstream of Lynch Landscaping. |
| PCU124 | -80.05744 | 40.2436 | 1013 | 10/23/08 | Tributary enters on Peters Creeks RAB. (dry) |
| PCU125 | -80.05814 | 40.24348 | 1013 | 10/23/08 | Debris jam. |
| PCU126 | -80.05928 | 40.24324 | 1015 | 10/23/08 | Debris jam caused by telephone pole and wires in stream channel. Bank erosion on LAB. |
| PCU127 | -80.0604 | 40.24306 | 1018 | 10/23/08 | Debris jam caused by telephone pole in stream channel. |
| PCU128 | -80.06328 | 40.24243 | 1022 | 10/23/08 | Tributary that drains Bower Hill Rd enters Peters Creek on RAB. |
| PCU129 | -80.06465 | 40.2419 | 1027 | 10/23/08 | Peters Creek squeezed(3 ft wide) between AVR tracks and Joe Buck's Landscaping yard for several hundred ft. Inadequate buffer in this section. |
| PCU130 | -80.06675 | 40.24095 | 1039 | 10/23/08 | Rock stabilization along AVR tracks on LAB. |
| PCU131 | -80.066775 | 40.240527 | 1056 | 7/12/13 | Large coal waste deposit south of AVR tracks. |
| PCU132 | -80.07128 | 40.239936 | 1049 | 7/12/13 | Peters Creek bridge crossing of Valley View Rd. Culverted tributary enters Peters Creeks LAB just upstream. |
| PCU133 | -80.07573 | 40.237685 | 1063 | 10/23/08 | Tributary draining valley between Dyerstone Dr and Greenleaf Court enters on RAB (~10 GPM). |
| PCU134 | -80.077837 | 40.236981 | 1071 | 10/23/08 | Drainage channel enters Peters Creeks RAB. |
| PCU135 | -80.082822 | 40.242479 | 1151 | 7/12/13 | Impoundment at headwaters of stream valley between Dyerstone Dr and Greenleaf Ct. |
| PCU136 | -80.07886 | 40.23661 | 1086 | 10/23/08 | Channel pinched and fill in stream channel. |
| PCU137 | -80.07886 | 40.23661 | 1091 | 7/12/13 | Peters Creek crosses to south side of AVR tracks. |
| PCU138 | -80.08279 | 40.235936 | 1105 | 7/12/13 | Peters Creek culverted under AVR tracks to north side of tracks across Venetia Rd from Miserable Hill Rd. |
| PCU139 | -80.085549 | 40.236673 | 1112 | 7/12/13 | North branch of Peters Creek culverted under this bus storage area and meets with the east branch of Peters Creek here. |
| PCU140 | -80.088244 | 40.238904 | 1150 | 7/12/13 | Large impoundment at headwaters of north branch of Peters Creek. |
| PCU141 | -80.086124 | 40.239341 | 1153 | 7/12/13 | Impoundment near headwaters of north branch of Peters Creek. |
| PCU142 | -80.086067 | 40.234675 | 1204 | 7/12/13 | Two impoundment lagoons on hill south of AVR tracks. (possibly associated with old mining activity) |
| PCU143 | -80.08786 | 40.23594 | 1127 | 10/23/08 | Peters Creek stream channel crosses to north of AVR tracks. |
| PCU144 | -80.091468 | 40.235574 | 1146 | 7/12/13 | West branch of Peters Creeks culverted from north to south of AVR Railroad tracks. |
| PCU145 | -80.093934 | 40.236455 | 1173 | 7/12/13 | Culverted runoff from church parking area and park combines with a small spring to form Peters Creek west branch. |
| PCU146 | -80.096552 | 40.236097 | 1210 | 7/12/13 | Drainage from this ball field and park form the extreme headwaters of Peters Creeks west branch. |
| Trax Farm Tributary | | | | | |
| TFT01 | -79.99649 | 40.25467 | 923 | 8/13/08 | Confluence of UNT(Trax Farm Trib) with Peters Creek; Heavy siltation and algal growth near mouth; garbage in stream channel. |
| TFT02 | -79.996403 | 40.254362 | 927 | 11/8/11 | Allegheny Valley Railroad bridge crosses stream. |
| TFT03 | -79.99642 | 40.254577 | 928 | 11/8/11 | Washington Rd bridge crosses Trax Farm Trib. |
| TFT04 | -79.99749 | 40.25553 | 933 | 8/13/08 | Stormwater outfall enters on RAB. |
| TFT05 | -79.998591 | 40.256315 | 943 | 8/13/08 | Culverted AMD discharge on LAB (~5-10 GPM); stream channel substrate is bedrock |
| TFT06 | -79.99895 | 40.25679 | 948 | 8/13/08 | Debris jam; ATV crossing of creek. |
| TFT07 | -79.999343 | 40.25773 | 954 | 8/13/08 | Debris jam; Sanitary Sewer manhole on RAB. |
| TFT08 | -79.99994 | 40.25977 | 978 | 8/13/08 | Deep pool; waterfall |
| TFT09 | -80.001035 | 40.260337 | 985 | 8/13/08 | Terra cotta stormwater outfall from residence; black algae. |
| TFT10 | -80.001651 | 40.260522 | 990 | 11/8/11 | Stream culverted under Rt88; Eroding LAB above culvert. |
| TFT11 | -80.002179 | 40.260984 | 997 | 11/8/11 | pH, Conductivity check; Stream culverted under Treva St; eroding banks downstream; grass clippings dumped on streambank. |
| TFT12 | -80.0026 | 40.261982 | 1000 | 11/8/11 | Trax Farm Trib culverted under Jack Street. |
| TFT13 | -80.00283 | 40.26259 | 948 | 11/8/11 | Tributary enters Trax Farm Trib on RAB; tributary culverted under Chevy Chase and Rt88 prior to entering TFT. |
| TFT14 | -80.003579 | 40.262651 | 1007 | 11/8/11 | Trax Farm Trib exits Union Twp park and is culverted under Jason Drive. |
| TFT15 | -80.004462 | 40.262948 | 1013 | 11/8/11 | Union Twp park (Pleasant Street Park); Two pedestrian bridge crossings of creek; inadequate riparian buffer; eroding stream banks at lower end; possible project area. |
| TFT16 | -80.00502 | 40.26309 | 1012 | 8/13/08 | Railroad tie wall behind residences constraining RAB ; Stormwater outfall. |
| TFT17 | -80.005791 | 40.263552 | 1013 | 11/8/11 | Trax Farm Trib culverted under Union Avenue. |
| TFT18 | -80.00684 | 40.264065 | 1016 | 11/8/11 | Trax Farm Trib culverted under Keystone Avenue. |
| TFT19 | -80.007759 | 40.264681 | 1018 | 11/8/11 | Trax Farm Trib culverted under Shady Avenue. |
| TFT20 | -80.00816 | 40.26504 | 1020 | 8/13/08 | Tributary enters Trax Farm Trib on RAB. |
| TFT21 | -80.006024 | 40.26852 | 1065 | 11/8/11 | Illegal dump site at head of tributary off of Hilltop Drive. |
| TFT22 | -80.008596 | 40.265357 | 1022 | 11/8/11 | Trax Farm Trib culverted under Highland Drive. |
| TFT23 | -80.009264 | 40.265944 | 1021 | 11/8/11 | Trax Farm Trib culverted under Ridge Drive. |
| TFT24 | -80.00999 | 40.26628 | 1023 | 8/13/08 | Stream bank erosion; debris jam; Great Blue Heron spotted in this location; good riparian buffer. |
| TFT25 | -80.01028 | 40.26671 | 1039 | 8/13/08 | Tributary enters Trax Farm Trib on RAB. |
| TFT26 | -80.010847 | 40.267063 | 1025 | 11/8/11 | Trax Farm Trib culverted under Morgan Ln |
| TFT27 | -80.011696 | 40.267657 | 1029 | 11/8/11 | Trax Farm Trib culverted under Engels Ln |

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| TFT28 | -80.012417 | 40.268049 | 1030 | 11/8/11 | Homeowner's pedestrian bridge over Trax Farm Trib; Inadequate riparian buffer. |
| TFT29 | -80.012816 | 40.268444 | 1030 | 8/13/08 | AMD discharge pipe enters on RAB (DEP placed pipe from homeowner as mitigation); aluminum precipitate; very orange substrate; strong sewage odor. |
| TFT30 | -80.013106 | 40.268549 | 1030 | 11/8/11 | Tributary that drains through Dupree's Greenhouse enters on RAB; Excess algae in tributary. |
| TFT31 | -80.01547 | 40.26929 | 1033 | 8/13/08 | AMD impacted discharge enters on LAB(5-10 GPM). |
| TFT32 | -80.015857 | 40.269364 | 1034 | 8/13/08 | Trax Farm Trib culverted under Walter Long Rd; Plunge pool on downside of culvert. |
| TFT33 | -80.017874 | 40.269229 | 1041 | 8/13/08 | Stormwater discharge pipe on LAB. |
| TFT34 | -80.019049 | 40.269723 | 1046 | 8/13/08 | Trax Farm Trib culverted for ~350 ft just downstream of Mineral Beach. |
| TFT35 | -80.020023 | 40.270245 | 1045 | 11/8/11 | Little to no riparian buffer along Trax Farm Trib for ~1100 ft upstream. RAB asphalted for ~ 100 ft at this location. Stream constrained by Mineral Beach Pool and Parking area. |
| TFT36 | -80.020699 | 40.270651 | 1046 | 11/8/11 | Trax Farm Trib culverted under Mineral Beach Pool access road. |
| TFT37 | -80.02149 | 40.271178 | 1047 | 11/8/11 | Trax Farm Trib culverted under Beach St. |
| TFT38 | -80.021691 | 40.27132 | 1050 | 11/8/11 | Trax Farm Trib culverted under residence driveway. |
| TFT39 | -80.022179 | 40.271655 | 1052 | 8/13/08 | Strong sewage smell; Wood shavings out of sawmill near right ascending stream bank. |
| TFT40 | -80.023904 | 40.272857 | 1060 | 11/8/11 | Trax Farm Trib culverted under residential driveway. |
| TFT41 | -80.024747 | 40.27354 | 1066 | 11/8/11 | Commercial materials storage/staging area on RAB for ~300 ft. |
| TFT42 | -80.025277 | 40.273348 | 1067 | 11/8/11 | Stormwater detention basin on LAB floodplain. |
| TFT43 | -80.025273 | 40.273604 | 1064 | 8/13/08 | Trax Farm Trib culverted under access lane. |
| TFT44 | -80.025668 | 40.273827 | 1071 | 11/8/11 | Trax Farm Trib culverted under residential driveway; little or no riparian buffer for ~ 400 ft along this section. |
| TFT45 | -80.026736 | 40.274796 | 1075 | 8/13/08 | Stormwater detention basin associated with Trax Farm Market; Basin silted in. |
| TFT46 | -80.027651 | 40.274981 | 1075 | 11/8/11 | Trax Farm Trib culverted under farm field access road. |
| TFT47 | -80.027984 | 40.275035 | 1074 | 8/13/08 | Trax Farm Trib enters stormwater detention pond immediately following being culverted for 1/4 of a mile under Farm Market. |
| TFT48 | -80.027352 | 40.277659 | 1157 | 8/30/12 | Marcellus Gas Well Pad. |
| TFT49 | -80.032746 | 40.276409 | 1093 | 11/8/11 | Trax Farm Trib enters 1/4 mile culvert under Trax Farm Market. |
| TFT50 | -80.033367 | 40.27618 | 1102 | 11/8/11 | Trax Farm impoundment. |
| TFT51 | -80.034118 | 40.276573 | 1107 | 11/8/11 | Trax Farm Trib north branch meets west branch after being culverted under Turkeyfoot Rd. |
| TFT52 | -80.036478 | 40.279228 | 1137 | 11/8/11 | Impoundment along with associated wetland forms headwaters of north branch of Trax Farm Trib. |
| TFT53 | -80.036829 | 40.281409 | 1165 | 11/8/11 | Impoundment between farm fields and recent development in headwaters of north branch of Trax Farm. |
| TFT54 | -80.040929 | 40.282724 | 1191 | 11/8/11 | Impoundment outflow culverted under Sugar Camp Rd and drains to lower impoundment and wetlands. |
| TFT55 | -80.037898 | 40.274792 | 1144 | 11/8/11 | West Branch of Trax Farm Trib is culverted under Turkeyfoot Rd and flows along southern side of road to Trax Farm Market. |
| TFT56 | -80.040831 | 40.276589 | 1195 | 8/30/12 | Stormwater detention basin associated with new development along Turkeyfoort Rd empties into headwaters of west branch of Trax Farm Trib. |
| McClelland Rd Tributary | | | | | |
| MRT01 | -80.0159 | 40.251111 | 953 | 8/19/08 | McClelland Rd Trib (UNT) culverted under Allegheny Valley Railroad tracks and immediately into Peters Creek. |
| MRT02 | -80.01548 | 40.2515 | 951 | 8/19/08 | Wetland on McClelland Rd Trib's RAB floodplain. |
| MRT03 | -80.01635 | 40.25184 | 954 | 8/19/08 | McClelland Rd Trib culverted under homeowner access road. Culvert inadequately sized. |
| MRT04 | -80.01701 | 40.25264 | 959 | 8/19/08 | ATV crossing of stream; Debris jam. |
| MRT05 | -80.017956 | 40.254227 | 971 | 8/19/08 | McClelland Rd Trib passes from west to east under McClelland Rd; culvert consists of 3 corrogated pipes; fish impasse. |
| MRT06 | -80.018742 | 40.256948 | 986 | 8/19/08 | Stream culverted under access drive to large open area on LAB used for materials storage; inadequate buffer; homeowner flood control; animal grazing area. |
| MRT07 | -80.01918 | 40.25769 | 992 | 8/19/08 | Seep on LAB, possibly impacted by AMD (aluminum precipiate) culverted under road. |
| MRT08 | -80.02148 | 40.25944 | 1005 | 8/19/08 | Wetland on LAB floodplain. |
| MRT09 | -80.02214 | 40.26151 | 1018 | 8/19/08 | Garbage dumped over hillside between road and stream on RAB. |
| MRT10 | -80.02223 | 40.26245 | 1033 | 8/19/08 | Tributary to McClelland Rd Trib culverted under McClelland Rd and enters on RAB. |
| MRT11 | -80.020161 | 40.265187 | 1165 | 10/31/13 | Severe erosion from large fill area that appears to contain coal waste; pile on divide between McClelland Rd Trib and Trax Farm Trib. |
| MTR12 | -80.022325 | 40.263321 | 1035 | 8/19/08 | AMD impacted seep enters on RAB from McClelland Rd. |
| MRT13 | -80.0224 | 40.264099 | 1042 | 8/19/08 | AMD impacted seep culverted under McClelland Rd enters main tributary on RAB. |
| MRT14 | -80.023274 | 40.264789 | 1048 | 8/19/08 | Stream culverted under farm field access road. |
| MRT15 | -80.02516 | 40.266291 | 1061 | 8/19/08 | McClelland Rd Trib exits culvert from stormwater detention pond ~ 800 upstream; stream culverted under concrete commercial area and mowed field. |
| MRT16 | -80.02516 | 40.266291 | 1085 | 10/31/13 | Stormwater detention pond with aeration. Little natural vegetation surrounding pond. |
| MRT17 | -80.027913 | 40.269316 | 1091 | 10/31/13 | Pond/Impoundment. |
| MRT18 | -80.028584 | 40.269935 | 1101 | 10/31/13 | Pond/Impoundment. |
| MRT19 | -80.029789 | 40.270411 | 1106 | 10/31/13 | Pond/Impoundment. |
| MRT20 | -80.030526 | 40.270805 | 1116 | 10/31/13 | Pond/Impoundment. |
| MRT21 | -80.032234 | 40.271332 | 1138 | 10/31/13 | Highest pond/impoundment in McClelland Rd Trib drainage basin. |
| MRT22 | -80.032916 | 40.271899 | 1147 | 10/31/13 | Headwaters of McClelland Rd Trib flow through wetland prior to entering first impoundment. |
| MRT23 | -80.035022 | 40.271687 | 1238 | 10/31/13 | Recent residential development on plateau above streams LAB. Steep slopes stabilized with plantings. |
| Bebout Rd Trib | | | | | |
| BRT01 | -80.043263 | 40.246174 | 984 | 6/11/11 | Confluence of Bebout Rd Trib (UNT) with Peters Creek. Homeowner pedestrian bridge crossing just upstream of confluence. |
| BRT02 | -80.04363 | 40.246671 | 988 | 6/11/11 | Venetia Rd bridge crosses Bebout Rd Trib. |
| BRT03 | -80.04367 | 40.24688 | 988 | 8/19/08 | Inadequate riparian buffer on RAB; homeowner cuts grass up to stram bank; Peters Twp Park (Rees Park) on LAB; old piles of garbage on LAB floodplain. |
| BRT04 | -80.04347 | 40.2481 | 991 | 8/19/08 | Section of stream ponding in floodplain; Aquatic vegetation growing in channel; amphibian breeding habitat. |

| Waypoint | Longitude | Latitude | Elevation (feet) | Date | Description |
|---|---|---|---|---|---|
| BRT05 | -80.04344 | 40.24894 | 993 | 8/19/08 | AMD impacted seep(orange precipitate) on RAB. |
| BRT06 | -80.043958 | 40.250416 | 999 | 6/11/11 | Bebout Rd Trib culverted under residential driveway. |
| BRT07 | -80.04436 | 40.25079 | 1001 | 8/19/08 | pH, Conductivity check |
| BRT08 | -80.04462 | 40.25119 | 1003 | 8/19/08 | Stormwater outfall enters Bebout Rd Trib. |
| BRT09 | -80.04458 | 40.25158 | 973 | 8/19/08 | Floodplain; back channel area. |
| BRT10 | -80.04527 | 40.25361 | 1024 | 8/19/08 | Rip-rap retaining wall behind remodelled/ new home. |
| BRT11 | -80.045403 | 40.254694 | 1015 | 6/11/11 | Overflow spillway from stormwater impoundment enters tributary on RAB. |
| BRT12 | -80.04532 | 40.25584 | 1053 | 8/19/08 | Outflow from Lake JoAnn is culverted under Lake Colony Dr; bank erosion upstream and downstream of culvert; little riparian buffer. |
| BRT13 | -80.046828 | 40.258512 | 1033 | 6/11/11 | Lake JoAnn; largest lake/pond within Peters Creek Watershed. |
| BRT14 | -80.04582 | 40.25823 | 1034 | 8/19/08 | Tributary culverted under Bebout Rd enters Lake JoAnn on right ascending shoreline. |
| BRT15 | -80.047822 | 40.260752 | 1033 | 6/11/11 | Bebout Rd Trib flows under bridge and enters Lake JoAnn; just upstream outflow from lagoons enters tributary. |
| BRT16 | -80.047597 | 40.261303 | 1035 | 6/11/11 | Series of secluded wooded lagoons and wetlands provide breeding habitat for amphibians and Wood Ducks. |
| BRT17 | -80.049384 | 40.262916 | 1037 | 6/11/11 | Outflow from stormwater impoundment culverted under Timberlake Dr; tributary enters Bebout Rd Trib on RAB just downstream. |
| BRT18 | -80.049747 | 40.263869 | 1043 | 8/19/08 | Timber Lake housing development stormwater impoundment; too many Canada Geese leads to bacterial and nutrient problems; ponds aerated. |
| BRT19 | -80.050356 | 40.264987 | 1043 | 8/19/08 | Tributary travels along Turkeyfoot Rd, is culverted under Bebout Rd and enters impoundment on right ascending shoreline; silting in upper pond. |
| BRT20 | -80.047909 | 40.268653 | 1078 | 6/11/11 | Stormwater detention basin associated with recent development along Turkeyfoot Rd. |
| BRT21 | -80.05127 | 40.2655 | 1046 | 8/19/08 | Stream culverted under walking path bridge. |
| BRT22 | -80.05171 | 40.2658 | 1061 | 8/19/08 | Tributary enters on Bebout Rd Trib left ascending bank; Great Blue Heron in cornfield upstream. |
| BRT23 | -80.051797 | 40.265903 | 1047 | 6/11/11 | Bebout Rd Trib culverted under farm field access road; upstream for ~ 1200 ft Bebout Rd Trib flows between farm fields; Inadequate buffer along this section. |
| BRT24 | -80.053974 | 40.267858 | 1055 | 6/11/11 | Outflow from impoundment enters Bebout Rd Trib on LAB. |
| BRT25 | -80.056702 | 40.268296 | 1083 | 6/11/11 | Farm impoundment for irrigation. |
| BRT26 | -80.054235 | 40.268423 | 1059 | 6/11/11 | Bebout Rd Trib culverted under Bebout Rd; irrigation related piping follows or is in stream channel downstream and through culvert then heads up LAB to farm field. |
| BRT27 | -80.05438 | 40.2686 | 1065 | 8/19/08 | pH, conductivity check; old concrete dam or bridge blocking Bebout Rd Trib. |
| BRT28 | -80.054096 | 40.270714 | 1070 | 6/11/11 | Wetland area along RAB. |
| BRT29 | -80.05401 | 40.271578 | 1073 | 6/11/11 | Bebout Rd Trib culverted under private driveway off of Oak Ridge Dr. |
| BRT30 | -80.053765 | 40.272199 | 1077 | 6/11/11 | Bebout Rd Trib culverted under golf course access road. |
| BRT31 | -80.053074 | 40.273191 | 1093 | 6/11/11 | Impoundment as water feature of Scenic Valley Golf Course on bench above Bebout Rd Trib RAB. |
| BRT32 | -80.05234 | 40.27465 | 1100 | 6/11/11 | East branch of Bebout Rd Trib culverted under golf course access road; East and west branches meet just downstream in wooded valley. |
| BRT33 | -80.053511 | 40.275546 | 1100 | 6/11/11 | Impoundment of west branch of Bebout Rd Trib; just downstream culverted under golf course access road; stream continues west in valley between farm fields; sparsely buffered. |
| BRT34 | -80.050014 | 40.275967 | 1123 | 6/11/11 | Bebout Rd Trib east branch culverted under golf course access road; no buffer along stream for ~ 400 ft along this section. |
| BRT35 | -80.048932 | 40.27723 | 1131 | 6/11/11 | East Branch Bebout Rd Trib culverted under fairway for ~ 100 ft. |
| BRT36 | -80.048226 | 40.278263 | 1147 | 6/11/11 | Impoundment that appears to be filling in; just downstream exits culvert and is culverted under golf course access road. |
| BRT37 | -80.048314 | 40.2796 | 1159 | 6/11/11 | Impoundment constitutes uppermost headwaters of Bebout Rd Trib east branch. |
| Landfill Trib | | | | | |
| LT01 | -79.983908 | 40.265529 | 857 | 4/4/13 | Confluence of Landfill Trib (UNT) and Peters Creek. |
| LT02 | -79.984642 | 40.266381 | 891 | 4/4/13 | ATV crossing of Landfill Trib; bank erosion; Gasline crossing just upstream; downcutting just downstream. |
| LT03 | -79.985 | 40.266833 | 955 | 4/4/13 | Spagnum wetland at site of AMD seep on plateau above RAB. |
| LT04 | -79.986498 | 40.266305 | 914 | 4/4/13 | Tributary to Landfill Trib flows in valley on LAB. |
| LT05 | -79.986355 | 40.266455 | 904 | 4/4/13 | Tributary on LAB is captured by ATV trail and follows trail. |
| LT06 | -79.986811 | 40.266858 | 907 | 4/4/13 | Structure carries gasline over Landfill Tributary |
| LT07 | -79.987968 | 40.267572 | 917 | 4/4/13 | Tributary enters on Landfill Trib LAB. |
| LT08 | -79.987059 | 40.268343 | 1058 | 4/4/13 | Coal waste highwall from old mining activity above Landfill Trib extends along much of RAB in this section. |
| LT09 | -79.982889 | 40.272694 | 1081 | | Impoundment below dangerous mining highwall; Wetland vegetation on edges of impoundment; decent water quality; breeding habitat for amphibians. |
| LT10 | -79.984171 | 40.272436 | 1112 | 4/4/13 | Extremely heavy ATV use area commonly known as "The Finleyville Dumps" on South Hills Landfill property east of and outside fenced area. |
| LT11 | -79.988157 | 40.26955 | 941 | 4/4/13 | Confluence of east and west branches of Landfill Trib; heavy orange and white precipitate downstream of confluence. |
| LT12 | -79.988601 | 40.270278 | 968 | 3/24/11 | Impoundment of east branch of Landfill Trib; outflow via 2 corregated pipes under access road in valley 20 ft below pond. |
| LT13 | -79.989531 | 40.27516 | 1119 | 3/24/11 | Fenced main operations area of the South Hills Landfill; East branch of Landfill Trib is along eastern side of fenced area. |
| LT14 | -79.99041 | 40.269342 | 999 | 3/24/11 | Leachate impoundment for South Hills Landfill. |
| LT15 | -79.98941 | 40.269055 | 999 | 3/24/11 | Leachate impoundment for South Hills Landfill. |
| LT16 | -79.990835 | 40.268288 | 1005 | 3/24/11 | Appears to be compostable dump site for South Hills Landfill. |
| LT17 | -79.989328 | 40.269805 | 987 | 3/24/11 | West branch of Landfill Trib culverted under landfill access road. |
| LT18 | -79.992233 | 40.270757 | 1015 | 3/24/11 | Ponding of a tributary to Landfill west branch trib; appears heavily impacted by AMD. |
| LT19 | -79.991692 | 40.27051 | 1012 | 3/24/11 | Marshy, wetland area where tributary and west branch Landfill Trib meet. |
| LT20 | -79.993046 | 40.270981 | 1034 | 3/24/11 | Possible location of old mine entry with discharge below. |
| LT21 | -79.992745 | 40.272687 | 1044 | 3/24/11 | Small wetland associated with west branch Landfill Trib. |
| LT22 | -79.99604 | 40.276443 | 1062 | 3/24/11 | Marshy, wetland area. |
| LT23 | -79.996433 | 40.277246 | 1059 | 3/24/11 | Pond, impoundment. |
| LT24 | -79.999373 | 40.278922 | 1095 | 3/24/11 | Pond and associated wetland in headwaters of drainage; Pond overloaded with algae. |

# Appendix A

**Peters Creek Watershed Biological Assessment 2009**

# Peters Creek Watershed Biological Assessment

**April-May 2009**

## Macroinvertebrate Sampling

Macroinvertebrate surveys were conducted following the benthic macroinvertebrate protocol for single habitat streams as described in *EPA's Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers*. Each sample site consists of a 100 meter stream reach at locations previously selected by Mr. Tim Schumann of the Peters Creek Watershed Association. Samples were collected in triplicate with a 0.0625 $m^2$ (25cm x 25 cm) quadrat serber sampler with a mesh size of 500 microns. Following sample collection all specimens and any accompanying detritus were transferred from the sampler into collection bottles and preserved with 70% alcohol. Preserved samples were delivered to the Watershed Conservation Program's laboratory for processing and identification. Laboratory procedures followed EPA protocols.

Samples were taken at eighteen sites within the Peters Creek watershed. Site names and descriptions are included in the individual analysis section. A watershed map indicating sample site locations is included with this document (Figure 1).

Macroinvertebrate samples were carefully examined and organisms were separated from the debris in the laboratory. Site samples were sub-sampled in order to provide an identified sample size of 180-220 individuals for each site if enough specimens were available. To achieve this desired sample size, all specimens from each site were placed into an identification tray divided into quadrants. Specimens within randomly chosen quadrants were identified and then transferred to collection bottles and again preserved with 70% alcohol. Organisms were identified to the family taxonomic level under a dissecting microscope. Quality control procedures included a qualified staff member sorting through a sub-section of the sample to check for missed organisms. All identified samples are accompanied by the corresponding residual sample.

## Fish Sampling

Fish surveys were conducted following the electrofishing protocol for single habitat streams described in *EPA's Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers*. A Smith-Root LR-24 Electrofisher electrofishing unit was implemented to temporarily immobilize the fish for the purpose of identification. Each fish sampling site consisted of a 100 meter stream reach at locations selected by Mr. Tim Schumann of the Peters Creek Watershed Association and Blazosky & Associates. Fish collected at each site were identified at the end of the reach or when collection buckets were filled to capacity; whichever procedure was most appropriate for a given site. Specimens were identified by Mr. Gary Smith, Southwest Regional Habitat Biologist for the Pennsylvania Fish and Boat Commission (PFBC). Surveys were conducted at twelve sites within the Peters Creek watershed. Six sites were along the mainstem of Peters Creek and six sites were along major named tributaries(Figure 2).

Macroinvertebrate and fish samples were collected over a six day period; April 23$^{rd}$, 24$^{th}$, 28$^{th}$, 29$^{th}$, 30$^{th}$ and May 8$^{th}$, 2009. Future macroinvertebrate sampling should occur during a similar time of year in order to provide sampling data that can be compared to the current data.

## Data Analysis

The following metrics were used to analyze the macroinvertebrate data for this study:
(1) total number of taxa, (2) number of individuals, (3) percent EPT, (4) percent Chironomidae, (5) Shannon-Wiener Diversity Index (H), (6) pollution tolerance index (PTI), (7) Hilsenhoff Biotic Index(HBI), (8) Evenness, (9) # of Intolerant Taxa and (10) Total N .

### Richness Measures

The total number of taxa or taxa richness is the number of families represented in a given site sample. Total number of individuals is the number of specimens of a given taxa identified from each sample site. Diversity indices are mathematical measures of species diversity at a given site. The Shannon-Wiener Diversity Index provides information about species richness and also takes into account the relative abundances of different species at a site. Community diversity at a site increases as the index value increases. Total N refers to the total number of individuals available for final analysis at a site.

### Composition Measures

Evenness is a measure of how evenly the individuals are distributed among the different species in a given site sample. It assumes that all species have an equal probability of being collected at a site. A site with all species equally represented within the sample will have an evenness of 1.0. The index decreases as the distribution of species within the sample becomes increasingly unequal.

% EPT is the composite number of individuals of mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera) present in a given sample divided by the total number of specimens in that sample.

% Chironomidae is the total number of individuals of the midge family found at a given site divided by the total number of specimens at the site. Midges are organisms in the Order Diptera. Dipterans are generally more tolerant of pollution than EPT organisms. An abundance of Dipterans at a site usually indicates poorer water quality.

### Tolerance/Intolerance Measures

The Hilsenhoff Biotic Index (HBI) was developed to assess low dissolved oxygen levels caused by organic loading but also identifies impacts from impoundment, thermal pollution, and some types of chemical pollution. Only arthropods that require dissolved oxygen for respiration are used in the calculation of the HBI. Macroinvertebrate species are assigned tolerance values (0-10) depending on their ability to tolerate low levels of dissolved oxygen. Organisms that are most sensitive to low levels of dissolved oxygen are assigned low values and organisms with greater tolerance are assigned higher values. A low HBI at a site signifies the presence of an abundance of intolerant organisms and indicates that the site is not impacted measurably by organic loading.

The Pollution Tolerance Index (PTI) is based on the concept of indicator organisms and tolerance levels. Indicator organisms are those organisms sensitive to water quality changes and their presence or absence indicates the condition of the water in which they live. Pollution-intolerant organisms include mayflies, stoneflies, caddisflies, riffle beetles, and water pennies. Pollution-tolerant organisms include tubifex worms, midges, pouch snails, and leeches.

Number of Intolerant Taxa is the total number of families of mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera) present in a site sample excluding taxa of the caddisfly family of Hydropsychidae. Species of this family are generally tolerant of a significant level of pollution.

## Macroinvertebrate Results

### *Overview*

Macroinvertebrate surveys were completed at 18 pre-determined sites in the Peters Creek watershed on April 28$^{th}$, 29$^{th}$, and the 30$^{th}$ of 2009 by Western Pennsylvania Conservancy staff and AmeriCorps interns (Figure 1). A total of 3,298 individuals were identified from the 18 sites. Fourteen Orders and 28 Families of macroinvertebrates were represented in this combined sample.

Site samples were sub-sampled, as previously described, to achieve a sample size of 180-220 identified specimens per site. Thirteen sites (72.2%) had sample sizes above the 183 specimen average and five (27.8%) sites sample sizes were below the average. Three sites, PC-5, PC-6, and BR-1, had sample sizes much lower than the average.

The percentage of EPT was calculated for each of the 18 sites. Site SR-1 had the highest percentage at 71.3%. LR-3 and PC-4 had the lowest at 0.5%. Ten sites (55.6%) contained significantly below average percentages of EPT, four (22.2%) had near average amounts, and four sites (22.2%) were significantly above average. SR-1 was the only site comprised of a variety of EPT taxa. EPT at all other sites was represented almost exclusively by the caddisfly family Hydropsychidae.

The percentage of individuals of the Chironomidae family found in each site sample was also analyzed. Site PC-4 contained the highest percentage of Chironomids at 98.0% and CR-2 possessed the smallest percentage at 8.8%. The average percentage of Chironomids for all sites (61.1%) . Ten sites (55.6%) possessed above average percentages and eight sites (44.4%) fell below the calculated average.

The Shannon-Wiener Diversity Index showed site PF-1 possessing the lowest richness and relative abundance with a score of 0.119, site CR-1 scored highest with 1.774 which results in high relative abundance and richness (Table x). The average score for the sites was 0.954. 44.4%(8) of all sites scored above average, 5.5%(1) scored average, and 50%(10) scored below average.

The Hilsenhoff Index revealed site PC-4 with the highest score of 6.022 which resulted in a “Fairly Poor” ranking which means the site is significantly impaired by organic pollutants. Site SR-1 scored the lowest with a score of 3.276 which resulted in an “Excellent” ranking which means the site is little impaired by organic pollutants. The average score was 5.385 which results in a ranking of “Fair” indicating overall fairly significant organic pollutant impairment. Twelve (66.7%) of all sites are above average indicating relatively high to high impairment and six sites (33.3%) showed below average scoring which results in little to moderate organic pollutant impairment.

The Pollution Tolerance Index (PTI) showed site CR-1 ranking highest with a 36 and an “Excellent” rating. Site PF-1 ranked lowest with 6 and a “Poor” ranking (Figure x). The average score was a 17.89 which translates to an overall Good ranking. Three sites (16.7%) received an Excellent ranking, 7 (38.9%) a Good ranking, 5 (27.7%) a Fair ranking and 3 (16.7%) a Poor ranking.

A Pielou's Evenness score was derived for all 18 sites. The most even site was PC-5 with a score of .754. The least even site was PC-4 with an extremely low score of .088. The PC-4 site sample is characterized by low diversity and is almost exclusively comprised of individuals of the family Chironomidae. The average evenness was .443 with 50% (9) of the sites less even than average and 50% (9) sites more even. It is interesting that the most even site and least even site are within a few hundred meters of each other on the mainstem of Peters Creek with the confluence of Piney Fork between them.

Individual site descriptions are included below and detail the above listed categories of analyses for each individual site. They also provide a site description and commentary on water chemistry as well as other information.

## Site Level Descriptions, Metric Summaries & Analysis

### Mainstem Sites

### Site 1: PC-1 Peters Creek upstream of Clairton Sewage Plant

PC-1 is located approximately 1300 meters upstream from Peters Creek's confluence with the Monongahela River. It is the lowest sampling site within the watershed and is the only site within the combined sewer section of the creek. The site is not too far downstream of a combined sewer overflow. PC-1 is also just downstream of a coal waste pile that is 120 ft tall, 50 acres in area and estimated to be comprised of approximately 100 million tons. Leachate from this pile most likely impacts water quality at PC-1.

PC-1 had a pH of 7.90, dissolved oxygen of 9.74 mg/L, conductivity of 1330 μ-siemens/cm, elevated nitrates of 4.60 mg/L and phosphates of 0.19 mg/L on the day of sampling.

The site sample is dominated by specimens of the family Chironomidae(midges). Other families represented at the site include: Hydropsychidae(netspinner caddisfly), Tipulidae (craneflies), Empididae(dance flies), Elmidae(riffle beetles), Gammaridae(freshwater scuds) and specimens of the Subclass Oligochaeta(worms).

Physical characteristics include an equal distribution of pool and riffle habitat with some obvious anthropogenic influences in and around the site.

| Table 1: Summary of Biotic Metrics for Site PC-1<br>Peters Creek upstream of Clairton Sewage Plant<br>GPS: 40.30100 N -79.88812 W | | | |
|---|---|---|---|
| Category | Metric | Value | Rank |
| Richness Measures | Taxa Richness | 7 | 6 |
| | Total Individuals | 226 | |
| | Shannon Diversity | 0.565 | 13 |
| Composition Measures | Evenness | 0.290 | 14 |
| | % EPT | 12.8 | 8 |
| | % Chironomidae | 84.1 | 13 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 0 | |
| | Pollution Tolerance Index | 16 | 7 |
| | Hilsenhoff | 5.717 | 12 |

Table 1 above is a summary of the biotic metrics including watershed rank for PC-1. These metrics reveal a macroinvertebrate community of less than average diversity that is dominated by a pollution tolerant family and is impacted fairly significantly by pollutants.

## Site 2: PC-2 Peters Creek at Ravensburg Tunnel (PFBC Site 0104)

Site PC-2 coincides with Pennsylvania Fish & Boat Commission Site 0104. The bottom of this reach is just upstream of a deep pool and the western portal of the Wheeling & Lake Erie Railroad's Ravensburg Tunnel. The railroad follows the reach on the left ascending bank. The right ascending bank is a relatively undisturbed forested floodplain.

PC-2 had a pH of 8.40, dissolved oxygen of 12.05 mg/L, conductivity of 1330 μ-siemens/cm, highly-elevated nitrates of 14.30 mg/L and phosphates of 0.99 mg/L on the day of sampling.

The site sample was dominated by specimens of the family Chironomidae(midges). Other families represented at the site include: Hydropsychidae(netspinner caddisfly), Empididae (dance flies), Simulidae(black flies), Gammaridae(freshwater scuds) and specimens of the Subclass Oligochaeta(worms).

PC-2 begins with a single riffle at the bottom of the reach that changes into a large expanse of flat water that is approximately 0.6 m in-depth upstream until the end of the 100 m survey.

| Table 2: Summary of Biotic Metrics for Site PC-2<br>Peters Creek at Ravensburg Tunnel (PFBC Site 0104)<br>GPS: 40.29786 N -79.89993 W | | | |
|---|---|---|---|
| Category | Metric | Value | Rank |
| Richness Measures | Taxa Richness | 6 | 7 |
| | Total Individuals | 182 | |
| | Shannon Diversity | 0.562 | 14 |
| Composition Measures | Evenness | 0.314 | 13 |
| | % EPT | 4.9 | 12 |
| | % Chironomidae | 87.4 | 14 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 0 | |
| | Pollution Tolerance Index | 11 | 10 |
| | Hilsenhoff | 5.879 | 14 |

## Site 3: PC-3 Peters Creek downstream of Beam Run (PFBC Site 0103)

Site PC-3 is located along Peters Creek Road just downstream of the confluence of Beam Run and coincides with Pennsylvania Fish and Boat Commission Fish Survey Site 0103. There is a good deal of ATV crossing activity just above the Beam Run confluence and along the left ascending floodplain.

PC-3 had a pH of 8.90, dissolved oxygen of 15.20 mg/L, conductivity of 1180 µ-siemens/cm, highly-elevated nitrates of 9.30 mg/L and elevated phosphates of 1.45 mg/L on the day of sampling.

The site sample is dominated by specimens of the family Chironomidae (midges). Other families represented at the site include: Hydropsychidae (netspinner caddisfly), Tipulidae (craneflies), Empididae (dance flies), Simulidae(blackflies), Elmidae(riffle beetles), Calopterygidae(broad-winged damselflies), Gammaridae(freshwater scuds) and specimens of the Subclass Oligochaeta(worms).

PC-3 has a nice riffle, some root wad structures, over hanging trees and a depositional bar in its 100 m reach. The channel is on average 14 m wide with some slight erosion on the left descending bank.

**Table 3: Summary of Biotic Metrics for Site PC-3**
**Peters Creek downstream of Beam Run (PFBC Site 0103)**
**GPS: 40.28562 N -79.93406 W**

| Category | Metric | Value | Rank |
|---|---|---|---|
| Richness Measures | Taxa Richness | 9 | 4 |
| | Total Individuals | 194 | |
| | Shannon Diversity | 0.547 | 15 |
| Composition Measures | Evenness | 0.249 | 15 |
| | % EPT | 1.6 | 15 |
| | % Chironomidae | 88.7 | 15 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 0 | |
| | Pollution Tolerance Index | 21 | 3 |
| | Hilsenhoff | 5.856 | 13 |

## Site 4: PC-4 Peters Creek downstream of SR3015 Bridge (PFBC Site 0102)

Site PC-4 is located a few hundred meters downstream of the confluence of Piney Fork with Peters Creek. It is adjacent to a constructed wetland created by the Pennsylvania Turnpike Commission as mitigation for development of the Mon-Fayette Expressway. PC-4 coincides with Pennsylvania Fish & Boat Commission Fish Survey Site 0102.

PC-4 had a pH of 8.80, dissolved oxygen of 8.87 mg/L, conductivity of 1170 μ-siemens/cm, -elevated nitrates of 1.60 mg/L and elevated phosphates of 1.68 mg/L on the day of sampling.

The site sample is dominated by specimens of the family Chironomidae (midges) and characterized by low diversity. Other families represented at the site include: Glossosomatidae(saddle case-maker caddisfly), Tipulidae (craneflies), Elmidae(riffle beetles) .

PC-4 has a nice riffle that runs into a slightly undercut bank that offers nice habitat. In the main channel there is a depositional island that indicates upstream erosion that could be restored through a number of in-stream restoration techniques.

**Table 4: Summary of Biotic Metrics for Site PC-4**
**Peters Creek downstream of SR3015 Bridge (PFBC Site 0102)**
**GPS: 40.27501 N -79.96302 W**

| Category | Metric | Value | Rank |
|---|---|---|---|
| Richness Measures | Taxa Richness | 4 | 8 |
| | Total Individuals | 195 | |
| | Shannon Diversity | 0.121 | 17 |
| Composition Measures | Evenness | 0.088 | 18 |
| | % EPT | 0.5 | 17 |
| | % Chironomidae | 98.0 | 18 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 1 | |
| | Pollution Tolerance Index | 13 | 9 |
| | Hilsenhoff | 5.933 | 16 |

## Site 5: PC-5 Peters Creek upstream of confluence with Piney Fork

Site PC-5 is located a few hundred meters upstream of the confluence of Piney Fork with Peters Creek and thus avoids the influence of any sewage plant outfalls.

PC-5 had a pH of 8.05, dissolved oxygen of 10.41 mg/L and a conductivity of 980 μ-siemens/cm and phosphates of 0.12 mg/L. No nitrates were detected at this site on the day of sampling.

Families represented at the site include: Chironomidae (midges), Hydropsychidae (netspinner caddisfly), Tipulidae (craneflies), Elmidae(riffle beetles), Corydalidae(dobsonflies), Gammaridae(freshwater scuds) and Asellidae(sowbug).

The site is being impacted by extensive ATV use of the floodplain in this vicinity as well as numerous stream crossings. This is causing sedimentation and bank erosion; severe in some cases. It must also be noted that this site has habitat potential with riffles present as well as large woody debris found in the stream.

**Table 5: Summary of Biotic Metrics for Site PC-5**
**Peters Creek upstream of confluence with Piney Fork**
**GPS: 40.27089 N -79.97020 W**

| Category | Metric | Value | Rank |
|---|---|---|---|
| Richness Measures | Taxa Richness | 7 | 6 |
| | Total Individuals | 51 | |
| | Shannon Diversity | 1.466 | 4 |
| Composition Measures | Evenness | 0.754 | 1 |
| | % EPT | 13.7 | 6 |
| | % Chironomidae | 49.0 | 7 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 0 | |
| | Pollution Tolerance Index | 23 | 2 |
| | Hilsenhoff | 4.961 | 5 |

The total number of individuals within the identified sub-sample at this site was 51 individuals. This is well below the watershed average of 183 and is noteworthy as adequate habitat certainly exists at this site. More research will be required to understand the lack of macroinvertebrates found here. The validity of certain parameters, especially PTI are questionable when adequate numbers of individuals do not exist in the sample.

## Site 6: PC-6  Peters Creek at SR1006 Bridge Gastonville (PFBC Site 0101)

Site PC-6 is located just downstream of the SR1006 bridge on the Finleyville-Elrama Rd just out of Gastonville. The site coincides with Pennsylvania Fish & Boat Commission Fish Survey Site 0101.

PC-6 had a pH of 8.26, dissolved oxygen of 11.68 mg/L and a conductivity of 970 μ-siemens/cm and phosphates of 0.26 mg/L.  No nitrates were detected at this site on the day of sampling.

More than half of the site sample was comprised of specimens of the family Elmidae(riffle beetles). Other families represented at the site include: Hydropsychidae (netspinner caddisfly), Tipulidae (craneflies), Empididae (dance flies), Chironomidae(midges), Corydalidae(Dobson flies), Gammaridae(freshwater scuds) and Cambaridae(crayfish).

Physical appearance of this site includes numerous anthropogenic impacts ranging from streambank armoring with rip-rap, a buried gas line that is exposed and crossing the stream, a major road crossing with associated impacts, and a house built in the floodplain. Conductivity, nitrates and phosphate values were all low at this site compared to other sites in the watershed.

| Table 6: Summary of Biotic Metrics for Site PC-6<br>Peters Creek at SR1006 Bridge Gastonville (PFBC Site 0101)<br>GPS: 40.25530 N -79.98584 W | | | |
|---|---|---|---|
| Category | Metric | Value | Rank |
| Richness Measures | Taxa Richness | 8 | 5 |
| | Total Individuals | 73 | |
| | Shannon Diversity | 1.242 | 7 |
| Composition Measures | Evenness | 0.597 | 6 |
| | % EPT | 8.2 | 9 |
| | % Chironomidae | 20.6 | 2 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 0 | |
| | Pollution Tolerance Index | 20 | 4 |
| | Hilsenhoff | 5.014 | 6 |

The total number of individuals within the identified sub-sample at this site was 73 individuals which is well below the average of 183. Lack of adequate habitat may be a factor at this site.

## Site 7: PC-7 Peters Creek at Wright's Cemetery

PC-7 is the highest mainstem site in this Peters Creek watershed study. It is located off of Mingo Church Rd at the site of Wright's Cemetery. Just east and downstream of the site is the remains of Wright's Woods; a Washington County Natural Heritage Inventory Biodiversity Area. This old growth woodland was one of the few remaining old growth sites in Washington County and contained a number of trees over 200 years of age.

PC-7 had a pH of 8.03, dissolved oxygen of 11.23 mg/L and a conductivity of 730 µ-siemens/cm and phosphates of 0.27 mg/L. No nitrates were detected at this site on the day of sampling.

This site was one of the most diverse and even in the watershed including representatives of 11 families: Hydropsychidae (netspinner caddisfly), Polycentropodidae(trumpetnet caddisflies), Chironomidae(midges), Tipulidae (craneflies), Empididae (dance flies), Simulidae(blackflies), Elmidae(riffle beetles), Gammaridae(freshwater scuds), Cambaridae(crayfish), Asellidae(sowbugs) and specimens of the Subclass Oligochaeta (worms).

The stream is narrower here with less impact from anthropogenic sources, especially sewage treatment plants and abandoned mine drainage discharges, which are common for many downstream sites. This site contains a variety of habitat including pools, riffles, boulders, and an ample floodplain. Unfortunately, all of the old growth timber that was in the floodplain south of the stream was logged off within the last six months (T. Schumann, pers. comm.).

| Table 7: Summary of Biotic Metrics for Site PC-7<br>Peters Creek at Wright's Cemetery<br>GPS: 40.24368 N -80.03315 W | | | |
|---|---|---|---|
| Category | Metric | Value | Rank |
| Richness Measures | Taxa Richness | 11 | 2 |
| | Total Individuals | 211 | |
| | Shannon Diversity | 1.666 | 2 |
| Composition Measures | Evenness | 0.695 | 2 |
| | % EPT | 13.3 | 7 |
| | % Chironomidae | 28.4 | 5 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 0 | |
| | Pollution Tolerance Index | 21 | 3 |
| | Hilsenhoff | 5.403 | 7 |

## Tributary Sites

### Site 8: LR-3 Lewis Run near mouth upstream of Old Clairton Rd Bridge

Site LR-3 is located just upstream of the Old Clairton Rd Bridge intersection with State Route 51.

LR-3 had a pH of 8.30, dissolved oxygen of 10.33 mg/L, a conductivity of 1760 μ-siemens/cm and phosphates of 0.27 mg/L. No nitrates were detected at this site on the day of sampling.

This site sample was dominated by specimens of the family Chironomidae(midges). Other families represented include : Hydropsychidae(netspinner caddisfly), Empididae(dance flies), Sisyridae(spongeflies), Gammaridae(freshwater scuds), specimens of the Subclass Oligochaeta (worms) and Hirudinidae(leeches).

LR-3 is one of the most altered sites surveyed in the Peters Creek watershed. It is bound by a major roadway (Route 51) on the right ascending bank and has numerous significant in-stream alterations including rip rap and poured concrete structures. The stream is culverted under Route 51 just downstream of the site. The substrate consists of partially embedded cobble that results in little habitat cover with the exception of some overhanging riparian vegetation. Conductivity readings were highest in the watershed 1760 μ-siemens/cm but little organic pollution was apparent. Restoration would be almost impossible at this site due to the proximity of the highway on the right ascending bank and an almost vertical bank on the left.

**Table 8: Summary of Biotic Metrics for Site LR-3**
**Lewis Run near mouth upstream of Old Clairton Rd Bridge**
**GPS: 40.29481 N -79.91859 W**

| Category | Metric | Value | Rank |
|---|---|---|---|
| Richness Measures | Taxa Richness | 7 | 6 |
| | Total Individuals | 215 | |
| | Shannon Diversity | 0.415 | 16 |
| Composition Measures | Evenness | 0.213 | 16 |
| | % EPT | 0.5 | 17 |
| | % Chironomidae | 91.2 | 16 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 0 | |
| | Pollution Tolerance Index | 11 | 10 |
| | Hilsenhoff | 6.009 | 17 |

## Site 9: BR-1 Beam Run near mouth upstream of Peters Creek Road

The site BR-1 is located on Beam Run a few hundred meters above the streams crossing of Peters Creek Road. Beam Run is a small tributary (4 m wide) that drains into Peters Creek just upstream of Peters Creek site PC-3.

BR-1 had a pH of 7.60, dissolved oxygen of 8.61 mg/L, conductivity of 1100 μ-siemens/cm, and phosphates of 0.15 mg/L. No nitrates were detected on the day of sampling.

The site sample is comprised of specimens from 10 families: Hydropsychidae(netspinner caddisfly), Chironomidae(midges), Tipulidae(craneflies), Empididae(dance flies), Elmidae(riffle beetles), Psephenidae(water penny beetles), Gammaridae(freshwater scuds), Cambaridae(crayfish), Asellidae(sowbugs) and specimens of the Subclass Oligochaeta(worms).

Physical conditions at this site include good riparian vegetation and minimal fish holding cover. Water quality parameters at this site were poor with low dissolved oxygen, high turbidity, and little organic impact with low nitrate and phosphate numbers (Table x). This site could benefit from a variety of proven restoration techniques that would increase fish and macroinvertebrate habitat.

**Table 9: Summary of Biotic Metrics for Site BR-1**
**Beam Run near mouth upstream of Peters Creek Road**
**GPS: 40.28559 N -79.93666 W**

| Category | Metric | Value | Rank |
|---|---|---|---|
| Richness Measures | Taxa Richness | 10 | 3 |
| | Total Individuals | 138 | |
| | Shannon Diversity | 1.536 | 3 |
| Composition Measures | Evenness | 0.667 | 3 |
| | % EPT | 21.0 | 4 |
| | % Chironomidae | 35.0 | 6 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 0 | |
| | Pollution Tolerance Index | 23 | 2 |
| | Hilsenhoff | 4.844 | 4 |

## Site 10: SR-1 Snee Run near mouth upstream of wetland

Site SR-1 is located on an UNT to Peters Creek, locally called Snee Run, above a wetland and approximately x meters upstream of the streams crossing of Peters Creek Rd. Snee Run drains a small valley that is almost entirely forested and undeveloped.

SR-1 had a pH of 8.20, dissolved oxygen of 8.81 mg/L, conductivity of 1300 µ-siemens/cm, elevated nitrates of 3.10 mg/L and phosphates of 0.28 mg/L on the day of sampling.

This is the only site sampled in the watershed that is dominated by a good diversity of EPT. Five intolerant taxa were present in the sample which included specimens of: Perlodidae(perlodid stoneflies), Chloroperlidae(green stoneflies), Nemouridae(spring stoneflies), Hydropsychidae(netspinner caddisfly), Polycentropodidae(trumpetnet caddisflies), Brachycentridae(humpless casemaker caddisflies), Ryacophilidae(free-living caddisflies), Chironomidae(midges), Tipulidae(craneflies), Empididae(dance flies) and Asellidae(sowbugs).

Snee Run is 1.7 meters in width at site SR-1. The site possesses positive habitat qualities with the presence of large woody debris, partially submerged stumps and riffles located on either side of an in-stream herbaceous vegetated island. A natural gas pipeline parallels the stream on the right ascending bank. Water chemistry revealed a lower than average dissolved oxygen level, an elevated turbidity level and a high conductivity reading. It must be noted that conductivity levels throughout the watershed are elevated except in the headwaters. SR-1's conductivity is a relatively average reading for this watershed.

| Table 10: Summary of Biotic Metrics for Site SR-1<br>Snee Run near mouth upstream of wetland<br>GPS: 40.28603 N -79.95236 W | | | |
|---|---|---|---|
| Category | Metric | Value | Rank |
| Richness Measures | Taxa Richness | 11 | 2 |
| | Total Individuals | 185 | |
| | Shannon Diversity | 1.441 | 5 |
| Composition Measures | Evenness | 0.601 | 5 |
| | % EPT | 71.3 | 1 |
| | % Chironomidae | 21.6 | 3 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 5 | |
| | Pollution Tolerance Index | 16 | 7 |
| | Hilsenhoff | 3.276 | 1 |

## Site 11: LR-2 Lick Run above sewage plant downstream of McElheny Rd

Site LR-2 is located along Cochran Mill Rd just downstream of the McElheny Rd bridge crossing and upstream of the Pleasant Hills Authority sewage outfall. This site is just downstream of an UNT to Lick Run, historically known as Mineral Run, that is significantly impacted by AMD.

LR-2 had a pH of 8.29, dissolved oxygen of 10.80 mg/L, a conductivity of 1350 µ-siemens/cm and phosphates of 0.26 mg/L. No nitrates were detected at this site on the day of sampling.

This site sample was dominated by specimens of the family Chironomidae(midges). Other families represented include: Hydropsychidae(netspinner caddisfly), Polycentripodidae(trumpetnet caddisflies), Limnephelidae(northern caddisflies), Tipulidae(craneflies), Elmidae(riffle beetles), and specimens of the Subclass Oligochaeta (worms).

Lick Run is approximately 8.80 meters wide at the LR-2 site. This site has an erosion issue resulting from a highly eroding right ascending bank which is approximately 3 meters high. Otherwise, herbaceous floodplains are present at this site. Water chemistry analysis showed the presence of aluminum, an absence of nitrates, a low level of phosphates and high conductivity.

**Table 11: Summary of Biotic Metrics for Site LR-2**
**Lick Run above sewage plant downstream of McElheny Rd**
**GPS: 40.30833 N -79.97672 W**

| Category | Metric | Value | Rank |
|---|---|---|---|
| Richness Measures | Taxa Richness | 6 | 6 |
| | Total Individuals | 214 | |
| | Shannon Diversity | 0.925 | 9 |
| Composition Measures | Evenness | 0.475 | 9 |
| | % EPT | 14.0 | 5 |
| | % Chironomidae | 74.3 | 9 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 0 | |
| | Pollution Tolerance Index | 13 | 9 |
| | Hilsenhoff | 5.696 | 9 |

## Site 12: LR-1 Lick Run upstream of Wheeling & Lake Erie RR tunnel

The LR-1 site is just upstream of the tunnel that carries the Wheeling & Lake Erie RR over Lick Run. This site is approximately 700 meters from the mouth of this 11 km mostly urbanized stream.

LR-1 had a pH of 7.98, dissolved oxygen of 10.36 mg/L, a conductivity of 1350 µ-siemens/cm, phosphates of 0.34 mg/L and highly-elevated nitrates of 7.60 mg/L on the day of sampling.

This site sample was dominated by specimens of the family Chironomidae(midges). Other families represented include: Hydropsychidae(netspinner caddisfly), Empididae(dancing flies), Simulidae(black flies), Elmidae(riffle beetles), Gammaridae(freshwater scuds) and specimens of the Subclass Oligochaeta (worms).

Lick Run is a major tributary that enters Peters Creek approximately 400 m downstream of PC-4. This site has numerous important microhabitats including boulders, large woody debris and a nice riffle/glide that contains important cover. A large wetland is adjacent to and downstream of this site on the streams left descending bank.

**Table 12: Summary of Biotic Metrics for Site LR-1**
**Lick Run upstream of Wheeling & Lake Erie RR tunnel**
**GPS: 40.27975 N -79.96436 W**

| Category | Metric | Value | Rank |
|---|---|---|---|
| Richness Measures | Taxa Richness | 7 | 6 |
| | Total Individuals | 204 | |
| | Shannon Diversity | 0.732 | 12 |
| Composition Measures | Evenness | 0.376 | 11 |
| | % EPT | 5.4 | 11 |
| | % Chironomidae | 82.4 | 12 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 0 | |
| | Pollution Tolerance Index | 15 | 8 |
| | Hilsenhoff | 5.912 | 15 |

## Site 13: CR-1   Catfish Run along Corrigan Drive in South Park County Park

Site CR-1 is located in South Park County Park along Corrigan Drive across from where Sesqui Drive junctions with Corrigan.

CR-1 had a pH of 8.80, dissolved oxygen of 13.64 mg/L, a conductivity of 1470 μ-siemens/cm, elevated phosphates of 0.84 mg/L and highly-elevated nitrates  of 5.50 mg/L on the day of sampling.

This site was the richest in the watershed in terms of taxa with fifteen families represented. The sample included no intolerant taxa. A relatively pollution tolerant caddisfly family, Hydropsychidae(netspinner caddisfly), comprised almost half of the sample. Other families represented include: Siphlonuridae(primitive minnow mayflies), Polycentripodidae(trumpetnet caddisflies), Chironomidae(midges), Tipulidae(craneflies), Empididae(dance flies), Simulidae(black flies), Psephenidae(water penny beetle), Elmidae(riffle beetles), Calopterygidae(broad-winged damselflies), Aeshnidae(darner dragonflies), Gammaridae(freshwater scuds), Physidae(pouch snails), Asellidae(sowbugs) and specimens of the Subclass Oligochaeta (worms).

Catfish Run is a medium sized tributary to Piney Fork that enters approximately 1200 m downstream of Sleepy Hollow Run's confluence with Piney Fork and just above the Bethel Park/South Park Sewage Plant outfall. Piney Fork is a major Peters Creek tributary; entering Peters Creek just downstream of PC-5. There is an island in the middle of the channel with a 1.2 m wide back channel, large woody debris, and a collapsed under-cut bank along this section of Catfish Run. This site (as well as many others in the park) could benefit from restoration projects to stabilize collapsed, eroding banks along the stream. New riparian planting would also help to stabilize the highly erodible soils.

**Table 13: Summary of Biotic Metrics for Site CR-1**
**Catfish Run along Corrigan Drive in South Park County Park**
**GPS: 40.30905 N -80.00087 W**

| Category | Metric | Value | Rank |
|---|---|---|---|
| Richness Measures | Taxa Richness | 15 | 1 |
| | Total Individuals | 198 | |
| | Shannon Diversity | 1.774 | 1 |
| Composition Measures | Evenness | 0.655 | 4 |
| | % EPT | 43.9 | 2 |
| | % Chironomidae | 23.2 | 4 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 0 | |
| | Pollution Tolerance Index | 36 | 1 |
| | Hilsenhoff | 4.808 | 3 |

## Site 14: CR-2 Catfish Run upstream of Wallace Rd Bridge

Site CR-2 is located just upstream of the Wallace Rd bridge and about 1.2 km below an acid mine discharge along Brownsville Rd.

CR-2 had a pH of 8.38, dissolved oxygen of 11.55 mg/L, a conductivity of 1490 µ-siemens/cm, phosphates of 0.32 mg/L and highly-elevated nitrates of 8.90 mg/L on the day of sampling.

The majority of this sample was comprised of specimens of the families Elmidae(riffle beetles) and Hydropsychidae(netspinner caddisfly). Other families represented include: Chironomidae(midges), Tipulidae(craneflies), Empididae(dance flies), Stratiomyidae(soldier flies), Psephenidae(water penny beetles), Gammaridae(freshwater scuds) and specimens of the Subclass Oligochaeta (worms).

Catfish Run is 5.8 meters wide at site CR-2 and has active erosion at the site. Primary erosion results from a highly eroded left ascending bank that is approximately 11.7 meters in length. However, there are areas where good habitat and cover are present. These are provided by a collapsed undercut bank and large woody debris within the channel. This site contains an island with a backchannel. Samples were collected in the main channel between this island and the right ascending bank. Water chemistry revealed high nitrates and high conductivity.

**Table 14: Summary of Biotic Metrics for Site CR-2**
**Catfish Run upstream of Wallace Rd Bridge**
**GPS: 40.29575 N -79.99304 W**

| Category | Metric | Value | Rank |
|---|---|---|---|
| Richness Measures | Taxa Richness | 9 | 4 |
| | Total Individuals | 216 | |
| | Shannon Diversity | 1.303 | 6 |
| Composition Measures | Evenness | 0.593 | 7 |
| | % EPT | 31.5 | 3 |
| | % Chironomidae | 8.8 | 1 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 0 | |
| | Pollution Tolerance Index | 20 | 4 |
| | Hilsenhoff | 4.690 | 2 |

## Site 15: SH-1 Sleepy Hollow Run upstream of Brownsville Rd Bridge

Site SH-1 is near the mouth of Sleepy Hollow Run just upstream of the Brownsville Rd Bridge and within an undeveloped section of Allegheny County's South Park County Park.

SH-1 had a pH of 8.50, a dissolved oxygen of 10.36 mg/L, a conductivity of 1110 μ-siemens/cm, phosphates of 0.38 mg/L and elevated nitrates of 1.85 mg/L on the day of sampling.

The majority of this sample was comprised of specimens of the families Elmidae(riffle beetles) and Chironomidae(midges). Other families represented include: Siphlonuridae(primitive minnow mayflies), Hydropsychidae(netspinner caddisflies), Polycentripodidae(trumpetnet caddisflies), Tipulidae(craneflies), Empididae(dance flies), Cambaridae(crayfish), Asellidae(sowbugs) and specimens of the Subclass Oligochaeta (worms).

Sleepy Hollow Run is a narrow (2.5 m) tributary to Piney Fork. Piney Fork drains into Peters Creek just downstream of PC-5. Very little fish habitat exists at this site and little to no habitat diversity (pools, riffles, root wads, etc). A number of horse farms are located along Sleepy Hollow Run upstream of the county park (T. Schumann, personal comm.).

**Table 15: Summary of Biotic Metrics for Site SH-1**
**Sleepy Hollow Run upstream of Brownsville Rd Bridge**
**GPS: 40.28759 N -80.00188 W**

| Category | Metric | Value | Rank |
|---|---|---|---|
| Richness Measures | Taxa Richness | 9 | 4 |
| | Total Individuals | 211 | |
| | Shannon Diversity | 1.176 | 8 |
| Composition Measures | Evenness | 0.535 | 8 |
| | % EPT | 8.6 | 9 |
| | % Chironomidae | 53.1 | 8 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 0 | |
| | Pollution Tolerance Index | 20 | 4 |
| | Hilsenhoff | 5.462 | 8 |

## Site 16: PF-1 Piney Fork near mouth upstream of Corvette Tunnel

Site PF-1 is located along Piney Fork Road upstream of the CSX railroad tunnel locally known as Corvette Tunnel. This tunnel carries both Piney Fork Road and Piney Fork. Greenman's Tunnel is just downstream and across the road from PF-1 and is utilized by South Park Twp for salt storage.

PF-1 had a pH of 8.20, dissolved oxygen of 11.40 mg/L, a conductivity of 1300 µ-siemens/cm, elevated phosphates of 1.35 mg/L and highly-elevated nitrates of 7.40 mg/L on the day of sampling.

This site is the least diverse of all sites sampled in the watershed and is comprised almost exclusively of specimens of the family Chironomidae(midges). One specimen of Hydopsychidae(netspinner caddisflies) and 3 specimens of Subclass Oligochaeta (worms) complete the sample.

Piney Fork is a major tributary to Peters Creek that drains a significant portion (~ 26 %) of the middle of the watershed. This site contains riffle habitat that is bound by a depositional bar and stabilized by a Sycamore tree. An area of approximately 998 $m^2$ was surveyed at this site; which is about average for this study. Heavy algal growth was present along with elevated nitrate and phosphate readings. The left ascending bank as well as the adjacent floodplain is heavily eroded by heavy ATV usage and numerous stream crossings.

| Table 16: Summary of Biotic Metrics for Site PF-1<br>Piney Fork near mouth upstream of Corvette Tunnel<br>GPS: 40.27390 N -79.97081 W | | | |
|---|---|---|---|
| Category | Metric | Value | Rank |
| Richness Measures | Taxa Richness | 3 | 9 |
| | Total Individuals | 181 | |
| | Shannon Diversity | 0.119 | 18 |
| Composition Measures | Evenness | 0.108 | 17 |
| | % EPT | 0.6 | 16 |
| | % Chironomidae | 97.8 | 17 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 0 | |
| | Pollution Tolerance Index | 6 | 11 |
| | Hilsenhoff | 6.022 | 18 |

A fish kill occurred on Piney Fork on October 7, 2007. The fish kill affected at least two stream miles of Piney Fork; from just above the sewage plant to its confluence with Peters Creek. On October 9, 2007 DEP Water Pollution Biologist Marc Maestra performed chemical and biological sampling at the PC-1 site. The results of his sampling are as follows: Eight different genuses were collected at this site with more than 85% being either Tubificidae or Chironomidae (highly tolerant midges). The water chemistry was: temperature 21.28°C, conductivity 940 µs/cm, dissolved oxygen 4.24 mg/l, and pH 7.35.

## Site 17: PF-2 Piney Fork downstream of confluence with Sleepy Hollow Run

Site PF-2 is located a few hundred meters upstream of the Brownsville Rd Ext bridge crossing of Piney Fork and just downstream of the streams confluence with Sleepy Hollow Run. The Montour Trail parallels the site along the top of the left ascending bank which is quite steep. A large landscape supply occupies the right ascending floodplain just upstream of the site. This site is above the influence of the sewage plant outfall.

PF-2 had a pH of 8.52, dissolved oxygen of 11.14 mg/L, conductivity of 1320 µ-siemens/cm, nitrates of 0.30 mg/L and phosphates of 0.54 mg/L on the day of sampling.

The site sample is dominated by specimens of the family Chironomidae(midges). Other families represented at the site include: Hydropsychidae(netspinner caddisfly), Tipulidae (craneflies), Muscidae(house flies & kin), Simulidae(black flies), Elmidae(riffle beetles) and Asellidae(sowbugs).

Piney Fork is 6.8 meters wide at site PF-2, possesses low slope, little current, and minute gradient. The site contains poor substrate conditions in the riffle segment where samples were collected. A discharge pipe is culverted under the trail and is emptying into Piney Fork. The site has a prolific population of Japanese Knotweed on both banks. Located within and behind the knotweed on the right ascending bank is an illegal dumpsite. Water chemistry is typical for the Peters Creek watershed.

**Table 17: Summary of Biotic Metrics for Site PF-2**
**Piney Fork downstream of confluence with Sleepy Hollow Run**
**GPS: 40.28656 N -80.00073 W**

| Category | Metric | Value | Rank |
|---|---|---|---|
| Richness Measures | Taxa Richness | 7 | 6 |
| | Total Individuals | 194 | |
| | Shannon Diversity | 0.765 | 11 |
| Composition Measures | Evenness | 0.393 | 10 |
| | % EPT | 4.1 | 13 |
| | % Chironomidae | 77.3 | 10 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 0 | |
| | Pollution Tolerance Index | 18 | 6 |
| | Hilsenhoff | 5.716 | 11 |

## Site 18: TF-1 Trax Farm Tributary near mouth upstream of Washington Rd

Site TF-1 is located a few hundred meters upstream of the Washington Rd bridge crossing of this UNT to Peters Creek that is locally called the Trax Farm Tributary. The site is due east of the St Francis of Assisi Ballfields on Rt 88.

TF-1 had a pH of 8.29, dissolved oxygen of 10.80 mg/L, conductivity of 1350 μ-siemens/cm and phosphates of 0.26 mg/L on the day of sampling. No nitrates were detected.

The site sample is dominated by specimens of the family Chironomidae(midges). Other families represented at the site include: Hydropsychidae(netspinner caddisfly), Tipulidae (craneflies), Empididae(dance flies), Elmidae(riffle beetles), Gammaridae(freshwater scuds), Cambaridae(crayfish), Asellidae(sowbugs) and specimens of the Subclass Oligochaeta(worms).

This UNT to Peters Creek has its origins near Trax Farm and drains into Peters Creek just east of Finleyville. The stream is 3.4 meters in width at site TF-1 and possesses bedrock steps, riffles and pools. This sample site is optimal for this specific watershed. It possesses large woody debris in the channel and is vegetated with trees on both banks. Water chemistry values are better than at most sites within the Peters Creek watershed. However, dissolved oxygen measurements were low compared to other sites. The site is located just downstream of a small farming operation that permits its livestock access to the creek (T. Schumann, pers. comm.).

**Table 18: Summary of Biotic Metrics for Site TF-1**
**Trax Farm Tributary near mouth upstream of Washington Rd**
**GPS: 40.25673 N -79.99892 W**

| Category | Metric | Value | Rank |
|---|---|---|---|
| Richness Measures | Taxa Richness | 9 | 4 |
| | Total Individuals | 205 | |
| | Shannon Diversity | 0.814 | 10 |
| Composition Measures | Evenness | 0.371 | 12 |
| | % EPT | 2.0 | 14 |
| | % Chironomidae | 78.5 | 11 |
| Tolerance/Intolerance Measures | # Intolerant Taxa | 0 | |
| | Pollution Tolerance Index | 19 | 5 |
| | Hilsenhoff | 5.709 | 10 |

## Conclusions

Macroinvertebrate diversity and quality within the Peters Creek watershed are heavily influenced by anthropogenic impacts present in this suburban watershed. Numerous sites possess high algal loads that are often an indication of a high organic load. This is also indicated by the following analyses: Hilsenhoff , PTI scores, and Total N. Specimens of the family Chironomidae of the order Diptera dominated the macroinvertebrate community at more than half of the sites, most likely due to their pollution tolerance. The lack of diversity and the small percentage of EPT species may have an impact on the availability and presence of fish species that require macroinvertebrates as a primary food resource or rely on other species of fish that require macroinvertebrates as their primary food source. This could have financial repercussions for an area that relies on recreational fishing. Investigation and identification of the source of contributing organic pollutants, such as sewage treatment facilities, private septic systems, or agriculture would prove useful.

# Fish Sampling Results

## Fish Results

*Overview*

Fish surveys were conducted at 12 pre-determined sites in the Peters Creek watershed on April 23rd, 24th, and May 8th, 2009 with help from Blazosky Associates, members of the Peters Creek Watershed Association, WPC staff, and Gary Smith from Pennsylvania Fish and Boat Commission. All surveys utilized back pack electroshockers to temporarily immobilize fish for identification and enumeration in the field. Site locations, water quality information, reach size, number of individuals and species can be found in Appendix 1. A total of 1,663 individuals were collected from 12 sites representing 21 species of fish. Diversity levels fluctuated dramatically between sites with the lowest diversity of three species being found at sites CR-1(Catfish Run), BR-1(Beam Run), and SH-1(Sleepy Hollow Run). Highest diversity was found at PC-3 with a total of 13 species being recovered. Blacknose Dace, Bluntnose Minnows, Creek Chubs and White Suckers dominated the fish collected comprising 86.5% of the total fish collected. In addition, four species of darters were collected along with a single logperch specimen. Individual site descriptions below detail total number of species found, percent of total taxa collected and a physical site description. Univariate statistics were calculated for all fish sites and included Margalef's Index, Shannon-Wiener Index, and evenness.

## Site Level Results

## Mainstem Sites

PC-1 GPS: N 40.30100 W -79.88812

This site is located approximately 1,300 meters upstream from the Monongahela River confluence. Physical characteristics include an equal distribution of pool and riffle habitat with some obvious anthropogenic influences in and around the site. Only five species were collected here, with one being classified as unknown by Gary Smith. Total area surveyed was ~ 988 $m^2$ with only 15 individuals captured. As a result the univariate statistics for this site were low. The most common species collected was the White Sucker which represented 60% of the total fish collected.

PC-2 (PFBC 0104) GPS: N 40.29786 W -79.89993

PC-2 begins with a single riffle at the bottom of the reach that changes into a large expanse of flat water that is approximately 0.6 m in depth and continues upstream until the end of the 100 m survey. Total area surveyed was ~ 1,582 $m^2$. There is a high wall on the right descending bank adjacent to the only riffle in this stretch. An obvious ATV trail is present that crosses the stream that could be contributing to erosion issues. A total of 11 species were collected here represented by 104 individuals. The fish community at this site was diverse with a Shannon-Wiener score of 2.204. The sample was slightly dominated by Blacknose Dace and Bluntnose Minnows which compromised 75% of the individuals collected. This is also reflected in the lower than average 0.638 evenness value. A special note for this site was the presence of three species of darters which often indicates good water quality.

PC-3 (PFBC 0103) GPS: N 40.28562 W -79.93406

This site has a nice riffle, some root wad structures, over hanging trees and a depositional bar in its 100 m reach. The channel is on average 14 m wide with some slight erosion on the left descending bank. Total area surveyed was approximately 1,400 $m^2$. PC-3 has the highest fish diversity found in Peters Creek watershed according to the Shannon-Wiener score (2.667) and its Margalef's Index of 2.364. The fish community found at this site has representatives from the coldwater (trout), coolwater (Smallmouth Bass), and warmwater fisheries (carp) present in varying numbers. In addition to the large bodied fishes there are also several cyprinid species that are common (Blacknose Dace and Bluntnose Minnow). White Suckers are the most dominant fish at this site comprising 46.25% of the total individuals collected. This site has a variety of fish holding structures that helps to explain the high speciation found here.

PC-4 (PFBC 0102) GPS: N 40.27501 W -79.96302

PC-4 has a nice riffle that runs into a slightly undercut bank that offers nice habitat for fish species. In the main channel there is a depositional island that indicates upstream erosion that could be restored thru a number of in-stream restoration techniques. An area of approximately 988 $m^2$ was surveyed at this site. Fish diversity was higher than at most other survey locations on Peters Creek. A total of 10 species were recovered. The fish community at this site was dominated by the three most common fish found during this survey of the watershed. Blacknose Dace, Creek Chubs and White Suckers comprised 70% of the total individuals collected. The Shannon-Wiener score of 2.220 reflects the diversity found at the site and the less than average Evenness score of 0.669 reflects a slightly dominated community.

PC-6 (PFBC 0101) GPS: N 40.25530 W -79.98584

Physical appearance of this site includes numerous anthropogenic impacts ranging from streambank armoring with rip-rap, a buried gas line that is exposed crossing the stream, a major road crossing with associated impacts and a house built in the floodplain. An area of approximately 660 $m^2$ was surveyed at this site Surprisingly, this site contained a well distributed fish population that contained 262 individuals represented by eight species. Conductivity, nitrate and phosphate values were all low at this site compared to other surveyed watershed sites. This improved water chemistry could provide a positive influence on the sites fish community. A Shannon-Wiener Index of 2.467 and above average Evenness of .822 indicate a balanced community with high diversity and little dominance by prolific pollution tolerant taxa.

PC-7 (PFBC Anderson Station) GPS: N 40.24368 W -80.03315

This location was the highest mainstem site in the Peters Creek watershed to be surveyed. It is near the historical Pennsylvania Fish & Boat Commission Anderson Station sampling site. The stream is narrower, with less input from anthropogenic sources including sewage treatment plants that are common on the lower reaches. An area of approximately 553 $m^2$ was surveyed at this site. PC-7 contains a variety of fish habitat including pools, riffles, boulders, and ample floodplain. Diversity at this site was average with seven species recovered. Central Stonerollers and Fantail Darters were found in high numbers along with

Creek Chubs and Blacknose Dace. A Shannon-Wiener Index of 2.469 and Evenness score of 0.880 show this site to be an even community with no one species significantly dominating the taxa collected.

## Tributary Sites

### PF-1 Piney Fork GPS: N 40.27390 W -79.97081

Piney Fork is a major tributary to Peters Creek that drains a significant portion of the middle watershed. The fish survey site contains riffle habitat that is bound by a depositional bar stabilized by a Sycamore tree. An area of approximately 998 $m^2$ was surveyed at this site which is average in this watershed for the tributaries surveyed. This site contained heavy algae growth and elevated nitrate and phosphate readings of 7.4 mg/L and 1.35 mg/L respectively. A total of six species were collected including Rainbow Darters and Greenside Darters. Blacknose Dace, Creek Chubs, and White Suckers dominated the total taxa collected and comprised 94% of the sample. Univariate indices show a slightly dominated site with an evenness value of 0.719 and a depressed diversity with a Shannon-Wiener score of 1.859.

### LR-3 Lewis Run GPS: N 40.29481 W -79.91859

This site is one of the most altered sites surveyed in the Peters Creek watershed. It is bound by a major roadway(Route 51) on the left descending bank and has numerous significant in-stream alterations including rip rap and poured concrete structures. The stream is culverted under Old Clairton Rd at this roads junction with Rte 51. The sites substrate was partially embedded cobble with little fish holding cover except for some overhanging riparian vegetation. An area of approximately 644 $m^2$ was surveyed at this site. Six species were identified with Blacknose Dace, White Suckers and Creek Chubs dominating the community at 93% of the total individuals identified. Rainbow Darters and Greenside Darters were also found along with eight Central Stonerollers. LR-3 had little detected organic pollution but had the highest conductivity readings at survey sites in the watershed at 1760 μ-siemens/cm. Restoration would be almost impossible at this site due to the proximity of the highway on the left descending bank and an almost vertical right descending bank.

### BR-1 Beam Run GPS: N 40.28559 W -79.9666

Beam Run is a small tributary(4 m wide) that drains into Peters Creek just above PC-3. Physical conditions at this site include good riparian vegetation and minimal fish holding cover. Water quality parameters were poor with low dissolved oxygen(9.72 mg/L) and high turbidity(7 FAU) but little organic impact from nitrates(0.0 mg/L) and phosphates(0.15 mg/L). An area of approximately 402 $m^2$ was surveyed at this site. Only three species were recovered with Creek Chubs dominating Blacknose Dace and Central Stonerollers at 65% of the total individuals recovered. This site could benefit from a variety of proven restoration techniques that would increase fish and macroinvertebrate habitat.

LR-1a Lick Run GPS: N 40.27851 W -79.95807

Lick Run is a tributary that empties into Peters Creek approximately 400 m downstream of PC-4. This site has numerous important fish microhabitats including boulders, large woody debris and a nice riffle/glide that contains important reproductive cover for a variety of fish species. An area of approximately 795 $m^2$ was surveyed at this site. Fish diversity was the highest for any tributary in the Peters Creek watershed with nine species recovered including Rainbow Darters and Johnny Darters. A single Brown Trout was captured that was approximately 40 cm(16 inches) in length. Fish distributions were slightly uneven with Creek Chubs, Blacknose Dace and White Suckers comprising 81% of all specimens collected at the site. A Shannon-Wiener Index of 2.166 and Evenness score of 0.683 reveal this site to be slightly more diverse and slightly less even than average for the watershed.

CR-1 Catfish Run GPS: N 40.30905 W -80.00087

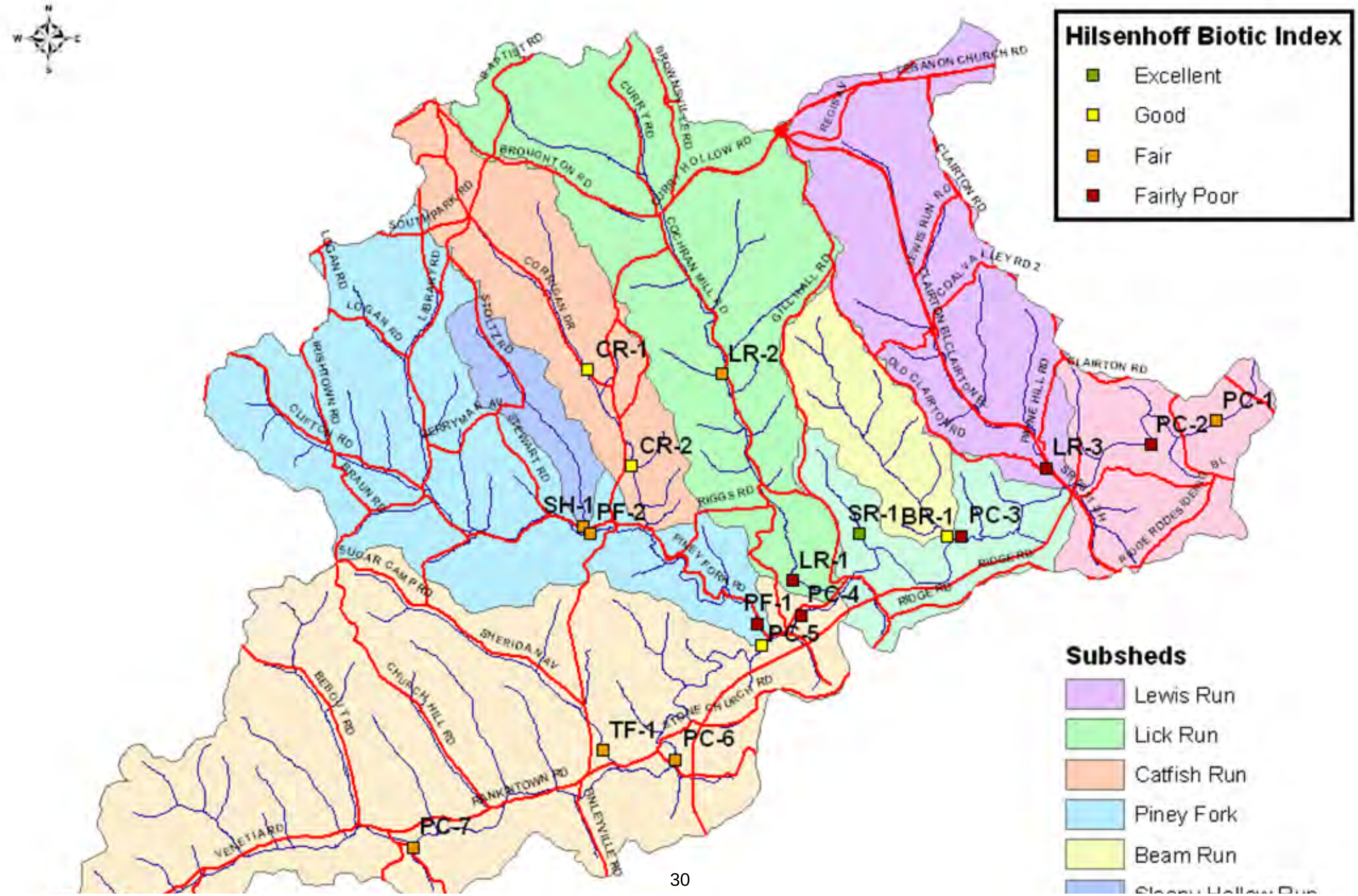
Catfish Run is a medium sized tributary that flows into Piney Fork approximately 1200 m downstream of Sleepy Hollow Run and just upstream of the South Park sewage plant outfall. Piney Fork drains into Peters Creek just downstream of PC-5. Site CR-1 is located along Corrigan Drive in South Park County Park. An area of approximately 474 $m^2$ was surveyed at this site. Fish diversity was low with only three species being recovered; Blacknose Dace, Creek Chubs and White Suckers, however macroinvertebrate diversity at CR-1 was the best of all sites sampled in the watershed. The section of Catfish Run in South Park County Park is isolated by an approximately 300 m culvert and acid mine discharge immediately downstream of Catfish Run's exit from the park. A Shannon-Wiener Index of 1.427 marks this as one of the least diverse fish survey sites in the watershed. This site, as well as many areas along Catfish Run in South Park County Park, could benefit from several restoration projects to stabilize collapsed, eroding banks. New riparian planting would also help to stabilize the highly erodible stream bank soils.

SH-1 Sleepy Hollow Run GPS: N 40.28759 W -80.00188

SH-1 is a narrow (2.5 m) tributary to Piney Fork that drains an undeveloped part of South Park County Park. The site has very little fish habitat and little habitat diversity (pools, riffles, root wads, etc). A small undercut bank held the majority of the individuals collected. This site had elevated nitrates(1.85 mg/L) which could be the result of horse farms located upstream of the sample reach (T. Schumann, pers. comm.). An area of approximately 451 $m^2$ was surveyed at this site. Blacknose Dace dominated this reach comprising 73% of the total individuals collected. This site had a low Shannon-Wiener Index of 0.923 and the lowest Evenness score recorded for the watershed at 0.582. This site could benefit from restoration of the reach by adding fish habitat but only if the upstream agricultural impacts are mitigated.

## Conclusions

Fish distributions in the Peters Creek watershed are heavily influenced by anthropogenic impacts present in this suburban watershed. Numerous sites had high levels of algae that are often an indication of high organic load. Overall, three species dominated the fish community and those taxa are pollution tolerant species: Creek Chubs, Blacknose Dace, and White Suckers. However, 4 species of darter were collected at several sites as well as a logperch. Most darters are intolerant of siltation and turbidity and require highly oxygenated water. Several game fish species were also captured including smallmouth bass and hatchery stocked trout species. Peters Creek is heavily utilized as a public fishing resource so restoration projects that could focus on adding more in-stream fish habitat would benefit not only the resource but also people who utilize the resource. Numerous locations that were sampled could benefit from random boulder placement, multi-log vanes, modified mudsill cribs, and root wad structures to increase macroinvertebrate habitat and fish holding cover.


Hilsenhoff Biotic Index
Excellent
Good
Fair
Fairly Poor
Subsheds
Lewis Run
Lick Run
Catfish Run
Piney Fork
Beam Run
CR-1
CR-2
LR-1
LR-2
LR-3
SH-1
PF-1
PF-2
SR-1
BR-1
PC-1
PC-2
PC-3
PC-4
PC-5
PC-6
PC-7
TF-1
BAPTIST RD
BROUGHTON RD
SOUTH PARK RD
LOGAN RD
LIBRARY RD
CORRIGAN DR
STOLTZ RD
COCHRAN MILL RD
GILL HALL RD
CLAIRTON RD
LEWIS RUN RD
OLD CLAIRTON RD
RIGGS RD
PINEY FORK RD
SUGAR CAMP RD
SHERIDAN AV
CHURCH HILL RD
RIDGE RD
STONE CHURCH RD
VENETIA RD

## Table 19 Peters Creek Watershed Macroinvertebrate Survey Raw Results 2009

| Order | Family | PC-1 | PC-2 | PC-3 | PC-4 | PC-5 | PC-6 | PC-7 | LR-3 | BR-1 | SR-1 | LR-1 | LR-2 | PF-1 | PF-2 | CR-1 | CR-2 | SH-1 | TF-1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ephemeroptera | Siphlonuridae | | | | | | | | | | | | | | | 1 | | 1 | |
| Plecoptera | Perlodidae | | | | | | | | | | 2 | | | | | | | | |
| | Chloroperlidae | | | | | | | | | | 1 | | | | | | | | |
| | Nemouridae | | | | | | | | | | 96 | | | | | | | | |
| Trichoptera | Hydropsychidae | 29 | 9 | 3 | | 7 | 6 | 27 | 1 | 29 | 24 | 11 | 25 | 1 | 8 | 85 | 68 | 16 | 4 |
| | Glossosomatidae | | | | 1 | | | | | | | | | | | | | | |
| | Polycentropodidae | | | | | | | 1 | | | 1 | | 4 | | | 1 | | 1 | |
| | Brachycentridae | | | | | | | | | | 1 | | | | | | | | |
| | Ryacophilidae | | | | | | | | | | 7 | | | | | | | | |
| | Limnephelidae | | | | | | | | | | | | 1 | | | | | | |
| Diptera | Chironomidae | 190 | 159 | 172 | 191 | 25 | 15 | 60 | 196 | 49 | 40 | 168 | 159 | 177 | 150 | 46 | 19 | 112 | 161 |
| | Tipulidae | 1 | | 1 | 2 | 7 | 1 | 1 | | 3 | 4 | | 3 | | 3 | 8 | 1 | 5 | 1 |
| | Empididae | 2 | 2 | 2 | | | 2 | 2 | 11 | 1 | 1 | 5 | | | | 4 | 1 | | 1 |
| | Muscidae | | | | | | | | | | | | | | 1 | | | | |
| | Stratiomyiidae | | | | | | | | | | | | | | | | 1 | | |
| | Simulidae | | 6 | 1 | | | | 1 | | | | 13 | | | 1 | 6 | | | |
| Coleoptera | Elmidae | 1 | | 2 | 1 | 8 | 44 | 62 | | 3 | | 2 | 16 | | 30 | 16 | 104 | 69 | 2 |
| | Psephenidae | | | | | | | | | 1 | | | | | | 2 | 4 | | |
| Megaloptera | Corydalidae | | | | | 1 | 1 | | | | | | | | | | | | |
| Neuroptera | Sisyridae | | | | | | | | 1 | | | | | | | | | | |
| Odonata | Calopterygidae | | | 1 | | | | | | | | | | | | 1 | | | |
| | Aeshnidae | | | | | | | | | | | | | | | 1 | | | |
| Amphipoda | Gammaridae | 2 | 4 | 10 | | 2 | 3 | 5 | 2 | 43 | | 1 | | | | 11 | 17 | | 27 |
| Decapoda | Cambaridae | | | | | | 1 | 5 | | 3 | | | | | | | | 1 | 3 |
| Gastropoda | Physidae | | | | | | | | | | | | | | | 1 | | | |
| Isopoda | Asellidae | | | | | 1 | | 49 | | 5 | 8 | | | | 1 | 14 | | 5 | 2 |
| Oligachaeta | | 1 | 2 | 2 | | | | 3 | 3 | 1 | | 4 | 6 | 3 | | 1 | 1 | 1 | 4 |
| Hirudinidae | | | | | | | | | 1 | | | | | | | | | | |
| **Total Specimens** | | 226 | 182 | 194 | 195 | 51 | 73 | 216 | 215 | 138 | 185 | 204 | 214 | 181 | 194 | 198 | 216 | 211 | 205 |
| **Total # of Taxa** | | 7 | 6 | 9 | 4 | 7 | 8 | 11 | 7 | 10 | 11 | 7 | 7 | 3 | 7 | 15 | 9 | 9 | 9 |

## Table 20 Peters Creek Watershed 2009 Macroinvertebrate Survey Biotic Metric Summary

| Biotic Metric | PC-1 | PC-2 | PC-3 | PC-4 | PC-5 | PC-6 | PC-7 | LR-3 | BR-1 | SR-1 | LR-1 | LR-2 | PF-1 | PF-2 | CR-1 | CR-2 | SH-1 | TF-1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # of Specimens | 226 | 182 | 194 | 195 | 51 | 73 | 216 | 215 | 138 | 185 | 204 | 214 | 181 | 194 | 198 | 216 | 211 | 205 |
| # of Taxa | 7 | 6 | 9 | 4 | 7 | 8 | 11 | 7 | 10 | 11 | 7 | 7 | 3 | 7 | 15 | 9 | 9 | 9 |
| # of Intolerant Taxa | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Ephemeroptera | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 0 | 0.5 | 0 |
| % Plecoptera | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 53.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| % Tricoptera | 12.8 | 4.9 | 1.6 | 0.5 | 13.7 | 8.2 | 13.0 | 0.5 | 21.0 | 17.8 | 5.4 | 14.0 | 0.6 | 4.1 | 43.4 | 31.5 | 8.1 | 2.0 |
| % EPT | 12.8 | 4.9 | 1.6 | 0.5 | 13.7 | 8.2 | 13.0 | 0.5 | 21.0 | 71.3 | 5.4 | 14.0 | 0.6 | 4.1 | 43.9 | 31.5 | 8.6 | 2.0 |
| % Chironomidae | 84.1 | 87.4 | 88.7 | 98.0 | 49.0 | 20.6 | 27.8 | 91.2 | 35.5 | 21.6 | 82.4 | 74.3 | 97.8 | 77.3 | 23.2 | 8.8 | 53.1 | 78.5 |
| Evenness | .290 | .314 | .249 | .088 | .754 | .597 | .693 | .213 | .667 | .601 | .376 | .475 | .108 | .393 | .655 | .593 | .535 | .371 |
| Shannon Diversity | 0.565 | 0.562 | 0.547 | 0.121 | 1.466 | 1.242 | 1.662 | 0.415 | 1.536 | 1.441 | 0.732 | 0.925 | 0.119 | 0.765 | 1.774 | 1.303 | 1.176 | 0.814 |
| Hilsenhoff | 5.717 | 5.879 | 5.856 | 5.933 | 4.961 | 5.014 | 5.417 | 6.009 | 4.844 | 3.276 | 5.912 | 5.696 | 6.022 | 5.716 | 4.808 | 4.690 | 5.462 | 5.709 |
| Hilsenhoff Rank | Fair | Fairly Poor | Fairly Poor | Fairly Poor | Good | Fair | Fair | Fairly Poor | Good | Excellent | Fairly Poor | Fair | Fairly Poor | Fair | Good | Good | Fair | Fair |
| Pollution Tolerance | 16 | 11 | 21 | 13 | 23 | 20 | 21 | 11 | 23 | 16 | 15 | 13 | 6 | 18 | 36 | 20 | 20 | 19 |
| PTI Rank | Fair | Poor | Good | Fair | Excellent | Good | Good | Poor | Excellent | Fair | Fair | Fair | Poor | Good | Excellent | Good | Good | Good |

**Table 21 Peters Creek Watershed 2009 Macroinvertebrate Survey Site Rank Summary**

| Watershed Rank (Best to Worst) | Richness | Evenness | % EPT (high to low) | % Chironomidae (low to high) | Shannon Index | Hilsenhoff Index | PTI |
|---|---|---|---|---|---|---|---|
| 1 | CR-1 | PC-5 | SR-1 | CR-2 | CR-1 | SR-1 | CR-1 |
| 2 | PC-7 | PC-7 | CR-1 | PC-6 | PC-7 | CR-2 | PC-5 |
| 3 | SR-1 | BR-1 | CR-2 | SR-1 | BR-1 | CR-1 | BR-1 |
| 4 | BR-1 | CR-1 | BR-1 | CR-1 | PC-5 | BR-1 | PC-7 |
| 5 | SH-1 | SR-1 | LR-2 | PC-7 | SR-1 | PC-5 | PC-3 |
| 6 | TF-1 | PC-6 | PC-5 | BR-1 | CR-2 | PC-6 | PC-6 |
| 7 | CR-2 | CR-2 | PC-7 | PC-5 | PC-6 | PC-7 | CR-2 |
| 8 | PC-3 | SH-1 | PC-1 | SH-1 | SH-1 | SH-1 | SH-1 |
| 9 | PC-6 | LR-2 | SH-1 | LR-2 | LR-2 | LR-2 | TF-1 |
| 10 | PC-5 | PF-2 | PC-6 | PF-2 | TF-1 | PF-2 | PF-2 |
| 11 | LR-2 | LR-1 | LR-1 | TF-1 | PF-2 | PF-2 | SR-1 |
| 12 | PF-2 | TF-1 | PC-2 | LR-1 | LR-1 | PC-1 | PC-1 |
| 13 | LR-3 | PC-2 | PF-2 | PC-1 | PC-1 | PC-3 | LR-1 |
| 14 | LR-1 | PC-1 | TF-1 | PC-2 | PC-2 | PC-2 | PC-4 |
| 15 | PC-1 | PC-3 | PC-3 | PC-3 | PC-3 | LR-1 | LR-2 |
| 16 | PC-2 | LR-3 | PF-1 | LR-3 | LR-3 | PC-4 | PC-2 |
| 17 | PC-4 | PF-1 | PC-4 | PF-1 | PC-4 | LR-3 | LR-3 |
| 18 | PF-1 | PC-4 | LR-3 | PC-4 | PF-1 | PF-1 | PF-1 |

**Table 22 Peters Creek 2009 Macroinvertebrate Survey Site Chemistry Results**

| Site | Date | Latitude | Longitude | pH | DO mg/L | Cond µs | TDS ppm | Turb FAU | NO3 mg/L | PO4 mg/L | Water Temp °F |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PC-1 | 4.28.09 | 40.30100 | -79.88812 | 7.90 | 9.74 | 1330 | 880 | 4 | 4.60 | 0.19 | 63.6 |
| PC-2 | 4.28.09 | 40.29786 | -79.89993 | 8.40 | 12.05 | 1330 | 880 | 5 | 14.30 | 0.99 | 64.5 |
| PC-3 | 4.28.09 | 40.28590 | -79.93446 | 8.90 | 15.20 | 1180 | 780 | 0 | 9.30 | 1.45 | 66.9 |
| PC-4 | 4.29.09 | 40.27490 | -79.96323 | 8.80 | 8.87 | 1170 | 790 | 0 | 1.60 | 1.68 | 60.6 |
| PC-5 | 4.30.09 | 40.27089 | -79.97020 | 8.05 | 10.41 | 980 | 660 | 0 | 0 | 0.12 | 58.0 |
| PC-6 | 4.30.09 | 40.25461 | -79.98636 | 8.26 | 11.68 | 970 | 650 | 0 | 0 | 0.26 | 59.4 |
| PC-7 | 4.30.09 | 40.24377 | -80.03337 | 8.03 | 11.23 | 730 | 490 | 0 | 0 | 0.27 | 60.9 |
| LR-3 | 4.28.09 | 40.29481 | -79.91859 | 8.30 | 10.33 | 1760 | 1170 | 0 | 0 | 0.20 | 65.5 |
| BR-1 | 4.28.09 | 40.28627 | -79.93731 | 7.60 | 8.61 | 1100 | 730 | 7 | 0 | 0.15 | 69.6 |
| SR-1 | 4.28.09 | 40.28603 | -79.95236 | 8.20 | 8.81 | 1300 | 870 | 9 | 3.10 | 0.28 | 67.7 |
| LR-1 | 4.30.09 | 40.29975 | -79.96436 | 7.98 | 10.36 | 1350 | 910 | 3 | 7.60 | 0.34 | 58.1 |
| LR-2 | 4.30.09 | 40.30833 | -79.97672 | 8.29 | 10.80 | 1350 | 900 | 7 | 0 | 0.26 | 62.0 |
| PF-1 | 4.29.09 | 40.27340 | -79.97048 | 8.20 | 11.40 | 1300 | 880 | 5 | 7.40 | 1.35 | 60.3 |
| PF-2 | 4.29.09 | 40.28656 | -80.00073 | 8.52 | 11.14 | 1320 | 890 | 11 | 0.30 | 0.54 | 59.4 |
| CR-1 | 4.29.09 | 40.30994 | -80.00159 | 8.80 | 13.64 | 1470 | 990 | 0 | 5.50 | 0.84 | 58.6 |
| CR-2 | 4.29.09 | 40.29575 | -79.99304 | 8.38 | 11.55 | 1490 | 1010 | 0 | 8.90 | 0.32 | 60.3 |
| SH-1 | 4.29.09 | 40.28838 | -79.00011 | 8.50 | 10.36 | 1110 | 740 | 2 | 1.85 | 0.38 | 59.2 |
| TF-1 | 4.30.09 | 40.25673 | -79.99892 | 8.29 | 10.80 | 1350 | 900 | 7 | 0 | 0.26 | 62.0 |

## Table 23 Peters Creek Watershed Fish Survey 2009 Raw Site Results

| Common Name | Scientific Name | PC-1 | PC-2 | PC-3 | PC-4 | PC-6 | PC-7 | LR-3 | BR-1 | LR-1 | PF-1 | CR-1 | SH-1 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Blacknose Dace | *Rhinichthys atratulus* | | 51 | 14 | 36 | 9 | 14 | 89 | 39 | 71 | 48 | 68 | 49 | 488 |
| Bluntnose Minnow | *Pimephales notatus* | | 27 | 15 | 10 | 81 | 3 | | | | | | | 136 |
| Brown Trout | *Salmo trutta* | | | 2 | | | | | | 1 | | | | 3 |
| Carp | *Cyprinus carpio* | | 3 | 10 | 1 | | | | | | | | | 14 |
| Central Stoneroller | *Campostoma anomalum* | | | 2 | 1 | 19 | 22 | 8 | 3 | 21 | 2 | | 1 | 79 |
| Creek Chub | *Semotilus atromaculatus* | | 4 | 21 | 30 | 57 | 26 | 67 | 79 | 40 | 89 | 66 | 17 | 496 |
| Emerald Shiner | *Notropis atherinoides* | 3 | 1 | | | | | | | | | | | 4 |
| Fantail Darter | *Etheostoma flabellare* | | | | | | 18 | | | | | | | 18 |
| Fathead Minnow | *Pimephales promelas* | | 2 | | | 2 | | | | 1 | | | | 5 |
| Goldfish | *Carassius auratus* | | | | 2 | | | | | | | | | 2 |
| Green Sunfish | *Lepomis cyanellus* | | | | 1 | | | | | | | | | 1 |
| Greenside Darter | *Etheostoma blennoides* | | 1 | 4 | 1 | | | 1 | | | 8 | | | 15 |
| Johnny Darter | *Etheostoma nigrum* | | 1 | | | 20 | 5 | | | 1 | | | | 27 |
| Log Perch | *Percina caprodes* | 1 | | | | | | | | | | | | 1 |
| Northern Hogsucker | *Hypentelium nigricans* | | | 5 | | | | | | | | | | 5 |
| Rainbow Darter | *Etheostoma caeruleum* | | 7 | 4 | | | | 4 | | 7 | 3 | | | 25 |
| Rainbow Trout | *Oncorhynchus mykiss* | 1 | | 5 | 1 | | | | | | | | | 7 |
| Redside Dace | *Clinostomus elongatus* | | | | | 11 | | | | | | | | 11 |
| Smallmouth Bass | *Micropterus dolomieui* | | 1 | 3 | | | | | | | | | | 4 |
| unknown | | 1 | | | | | | | | | | | | 1 |
| White Sucker | *Catostomus commersoni* | 9 | 6 | 74 | 39 | 63 | 4 | 21 | | 24 | 59 | 20 | | 319 |
| Yellow Bullhead | *Ameiurus catus* | | | 1 | | | | | | 1 | | | | 2 |
| | Total # of species | 5 | 11 | 13 | 10 | 8 | 7 | 6 | 3 | 9 | 6 | 3 | 3 | 22 |
| | Total # of Specimens | 15 | 104 | 160 | 122 | 262 | 92 | 190 | 121 | 167 | 209 | 154 | 67 | 1663 |

## Table 24 Peters Creek Watershed Fish Survey 2009 Chemistry & Site Summary

| Site | Date | Latitude | Longitude | Area $m^2$ | Effort sec | pH | DO mg/L | Cond µs | TDS ppm | Water Temp °F | Species | Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PC-1 | 4.23.09 | 40.30053 | -79.88765 | 988.0 | | 8.25 | | 1470 | 1060 | 45.9 | 5 | 15 |
| PC-2 | 4.23.09 | 40.29794 | -79.89933 | 1582.0 | 1189 | 8.43 | | 1450 | 1103 | 48.2 | 11 | 104 |
| PC-3 | 4.23.09 | 40.28562 | -79.93406 | 1400.0 | 1366 | 8.90 | | 1324 | 940 | 56.8 | 13 | 160 |
| PC-4 | 4.23.09 | 40.27501 | -79.96302 | 988.0 | 1425 | 8.91 | | 1203 | 851 | 52.2 | 8 | 119 |
| PC-6 | 4.23.09 | 40.25530 | -79.98584 | 660.0 | 1382 | 8.50 | | 1025 | 725 | 49.1 | 8 | 262 |
| PC-7 | 4.24.09 | 40.24368 | -80.03315 | 553.4 | 606 | 8.57 | | 751 | 533 | 50.5 | 7 | 92 |
| LR-3 | 5.08.09 | 40.29473 | -79.91856 | 644.3 | 1155 | 8.11 | 10.33 | 1630 | 1080 | 58.3 | 6 | 190 |
| BR-1 | 5.08.09 | 40.28559 | -79.93666 | 402.2 | 776 | 7.83 | 9.72 | 920 | 610 | 59.9 | 3 | 121 |
| LR-1 | 5.08.09 | 40.27851 | -79.95807 | 795.2 | 1598 | 8.30 | 9.93 | 1330 | 900 | 61.3 | 9 | 167 |
| PF-1 | 4.24.09 | 40.27390 | -79.97081 | 998.0 | 1309 | 8.74 | | 1338 | 954 | 55.2 | 6 | 209 |
| CR-1 | 5.08.09 | 40.30905 | -80.00087 | 474.2 | 975 | 8.49 | 11.67 | 1330 | 880 | 60.6 | 3 | 154 |
| SH-1 | 5.08.09 | 40.28759 | -80.00188 | 370.8 | 451 | 8.33 | 9.92 | 910 | 600 | 62.6 | 3 | 67 |

## Table 25 Peters Creek Watershed Fish Survey 2009 Biotic Metric Summary

| Biotic Metric | PC-1 | PC-2 | PC-3 | PC-4 | PC-6 | PC-7 | LR-3 | BR-1 | LR-1 | PF-1 | CR-1 | SH-1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # of Species | 5 | 11 | 13 | 10 | 8 | 7 | 6 | 3 | 9 | 6 | 3 | 3 |
| # of Specimens | 15 | 104 | 160 | 122 | 262 | 92 | 190 | 121 | 167 | 209 | 154 | 67 |
| Margalef's Index | 1.477 | 2.153 | 2.364 | 1.873 | 1.257 | 1.327 | 0.953 | 0.417 | 1.563 | 0.936 | 0.397 | 0.476 |
| Evenness | 0.727 | 0.638 | 0.721 | 0.669 | 0.822 | 0.880 | 0.674 | 0.669 | 0.683 | 0.719 | 0.900 | 0.582 |
| Shannon Diversity Index (H') | 1.17 | 1.53 | 1.85 | 1.54 | 1.71 | 1.71 | 1.21 | 0.74 | 1.50 | 1.29 | 0.99 | 0.64 |

# Appendix B

## Peters Creek Watershed Metals TMDL

# PETERS CREEK WATERSHED TMDL
## Allegheny and Washington Counties

For Mine Drainage Affected Segments

Prepared by:

Pennsylvania Department of Environmental Protection

January 6, 2009

## TABLE OF CONTENTS



## TABLES



## ATTACHMENTS

**TMDL[1]**
**Peters Creek Watershed**
**Allegheny and Washington Counties, Pennsylvania**

## Introduction

This report presents the Total Maximum Daily Loads (TMDLs) developed for segments in the Peters Creek Watershed (Attachment A). These were done to address the impairments noted on the 1996 Pennsylvania Section 303(d) list of impaired waters, required under the Clean Water Act, and covers one segment on that list and additional segments on later lists/reports. Peters Creek was listed as impaired for metals. All impairments resulted from drainage from abandoned coalmines. The TMDL addresses the three primary metals associated with abandoned mine drainage (iron, manganese, aluminum) and pH.

| **Table 1. 303(d) Listed Segments** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| State Water Plan (SWP) Subbasin: 19C | | | | | | | | | | |
| HUC: 05020005 Lower Monongahela River | | | | | | | | | | |
| Year | Miles | Use Designation | Assessment ID | Segment ID | DEP Stream Code | Stream Name | Desig-nated Use | Data Source | Source | EPA 305(b) Cause Code |
| 1996 | 22.3 | * | * | Not in GIS. | 39425 | Peters Creek | TSF | 305(b) Report | RE | Metals |
| 1998 | 22.3 | * | * | Not in GIS. | 39425 | Peters Creek | TSF | SWMP | AMD | Metals |
| 2008 | 6.72<br><br>0.41 | Aquatic Life | 3481<br><br>4348 | *<br><br>* | | Lick Run | TSF | SWMP | AMD | Metals<br><br>Metals pH |
| 2008 | 0.28 | Aquatic Life | 3481 | * | 39452 | Lick Run, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.58 | Aquatic Life | 3481 | * | 39453 | Lick Run, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.55 | Aquatic Life | 3481 | * | 39454 | Lick Run, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.47 | Aquatic Life | 3481 | * | 39455 | Lick Run, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.44 | Aquatic Life | 3481 | * | 39456 | Lick Run, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.66 | Aquatic Life | 3481 | * | 39457 | Lick Run, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 1.04 | Aquatic Life | 3481 | * | 39458 | Lick Run, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 1.15 | Aquatic Life | 3481 | * | 39459 | Lick Run, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.32 | Aquatic Life | 3481 | * | 39460 | Lick Run, Unt | TSF | SWMP | AMD | Metals |

[1] Pennsylvania's 1996, 1998, and 2002 Section 303(d) lists and the 2004 and 2006 Integrated Water Quality Report were approved by the Environmental Protection Agency (EPA). The 1996 Section 303(d) list provides the basis for measuring progress under the 1997 lawsuit settlement of *American Littoral Society and Public Interest Group of Pennsylvania v. EPA.*

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 2008 | 0.59 | Aquatic Life | 3481 | * | 39461 | Lick Run, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.63 | Aquatic Life | 3481 | * | 39462 | Lick Run, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 3.85<br><br>3.81 | Aquatic Life | 3909<br><br>3913 | * | 39425 | Peters Creek | TSF | SWMP | AMD | Metals<br><br>Metals |
| 2008 | 0.55 | Aquatic Life | 3911 | * | 39426 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.45 | Aquatic Life | 3911 | * | 39427 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 1.01 | Aquatic Life | 3911 | * | 39428 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.86 | Aquatic Life | 3911 | * | 39429 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.45 | Aquatic Life | 3911 | * | 39430 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.55 | Aquatic Life | 3911 | * | 39431 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.49 | Aquatic Life | 3911 | * | 39439 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.32 | Aquatic Life | 3911 | * | 39440 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.69 | Aquatic Life | 3911 | * | 39441 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.73 | Aquatic Life | 3911 | * | 39450 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.67 | Aquatic Life | 3901 | * | 39463 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.25 | Aquatic Life | 3910 | * | 39489 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.33 | Aquatic Life | 3910 | * | 39490 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 1.19 | Aquatic Life | 3910 | * | 39491 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.40 | Aquatic Life | 3910 | * | 39492 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.74 | Aquatic Life | 3910 | * | 39493 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.71 | Aquatic Life | 3910 | * | 39494 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.54 | Aquatic Life | 3910 | * | 39495 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.54 | Aquatic Life | 3910 | * | 39496 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 3.76 | Aquatic Life | 3856 | * | 39497 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.63 | Aquatic Life | 3856 | * | 39498 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.72 | Aquatic Life | 3856 | * | 39499 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 3.32 | Aquatic Life | 3856 | * | 39500 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |
| 2008 | 0.64 | Aquatic Life | 3910 | * | 39501 | Peters Creek, Unt | TSF | SWMP | AMD | Metals |

Resource Extraction=RE
Trout Stocked Fish = TSF
Surface Water Monitoring Program = SWMP
Abandoned Mine Drainage = AMD
See Attachment D, *Excerpts Justifying Changes Between the 1996, 1998, and 2002 Section 303(d) Lists and the 2004 and 2006 Integrated Water Quality Report.* The use designations for the stream segments in this TMDL can be found in PA Title 25 Chapter 93.

## Directions to the Peters Creek Watershed

The Peters Creek Watershed is located in Allegheny and Washington Counties in southwestern Pennsylvania. The watershed can be accessed by traveling Route 70 west from New Stanton until its intersection with Route 51 north. Route 51 crosses Peters Creek upstream of its mouth. Additional access is provided by a number of smaller roads including Route 88, SR3014, SR3015, SR3017, and SR1007.

## Watershed Characteristics

The Peters Creek Watershed is located in southwestern Allegheny County and northeastern Washington County in Southwestern Pennsylvania. The watershed is located on the U.S. Geological Survey maps covering portions of the Bridgeville, Glassport, Monongahela and Hackett 7.5 minute quadrangles. The area within the watershed encompasses approximately 50 $miles^2$. The political subdivisions represented in the watershed include Baldwin, Bethel Park, Clairton, Jefferson Hills, Pleasant Hills, South Park Township, West Mifflin and Whitehall Borough in Allegheny County and Finleyville, Nottingham Township, North Strabane, Peters Township and Union Township in Washington County. South Park County Park is a 2000 acre multi-use park located entirely within the watershed. This park is managed by Allegheny County and is comprised of parts of Bethel Park and South Park Township. Land use in the watershed includes forestland, cropland, rural residential, low density urban, and abandoned mine land uses.

Most of the Peters Creek Watershed is underlain with high-quality, easily-mined coal deposits that outcrop on the slopes of many of the stream valleys. The close proximity of these valuable deposits to the many Pittsburgh area coke ovens and steel mills has led to extensive mining throughout the watershed. The Pittsburgh coal bed has been mined since the early 1900's by underground methods and has resulted in many parts of the watershed being prone to surface subsidence. The Redstone coal bed, which overlies the Pittsburgh coal bed, was mined subsequently by surface methods before environmental laws were enacted requiring reclamation of mined lands. The resulting spoil piles have remained largely un-reclaimed and are scattered throughout the watershed.

Despite the impact of mining and mine drainage, areas of high biodiversity in the watershed remain. Two areas in the watershed have been identified as significant biodiversity areas by the Natural Heritage Inventory: the Peters Creek Wetland Biodiversity Area in Jefferson Hills (one of the few remaining robust emergent marsh communities in Allegheny County) and the Wrights Woods Biodiversity Area in Nottingham Township.

**Segments addressed in this TMDL**

Peters Creek is affected by pollution from AMD. This pollution has caused high levels of metals in the watershed. The TMDLs will be expressed as long-term, average loadings. Due to the nature and complexity of mining effects on the watershed, expressing the TMDL as a long-term average gives a better representation of the data used for the calculations. See Table 3 for TMDL calculations and see Attachment C for TMDL explanations.

This AMD TMDL document contains one or more future mining Waste Load Allocations (WLA). These WLAs were requested by the Greensburg District Mining Office (DMO) to accommodate one or more future mining operations. The District Mining Office determined the number of and location of the future mining WLAs. This will allow speedier approval of future mining permits without the time-consuming process of amending this TMDL document. All comments and questions concerning the future mining WLAs in this TMDL are to be directed to the appropriate DMO. Future wasteload allocations are calculated using the method described for quantifying pollutant load in Attachment C.

The following are examples of what is or is not intended by the inclusion of future mining WLAs. This list is by way of example and is not intended to be exhaustive or exclusive:

1. The inclusion of one or more future mining WLAs is not intended to exclude the issuance of future non-mining NPDES permits in this watershed or any waters of the Commonwealth.
2. The inclusion of one or more future mining WLAs in specific segments of this watershed is not intended to exclude future mining in any segments of this watershed that does not have a future mining WLA.
3. The inclusion of future mining WLAs does not preclude the amending of this AMD TMDL to accommodate additional NPDES permits.

**Clean Water Act Requirements**

Section 303(d) of the 1972 Clean Water Act requires states, territories, and authorized tribes to establish water quality standards. The water quality standards identify the uses for each waterbody and the scientific criteria needed to support that use. Uses can include designations for drinking water supply, contact recreation (swimming), and aquatic life support. Minimum goals set by the Clean Water Act require that all waters be “fishable” and “swimmable.”

Additionally, the federal Clean Water Act and the Environmental Protection Agency’s (EPA) implementing regulations (40 CFR Part 130) require:

- States to develop lists of impaired waters for which current pollution controls are not stringent enough to meet water quality standards (the list is used to determine which streams need TMDLs);

- States to establish priority rankings for waters on the lists based on severity of pollution and the designated use of the waterbody; states must also identify those waters for which TMDLs will be developed and a schedule for development;

- States to submit the list of waters to EPA every two years (April 1 of the even numbered years);

- States to develop TMDLs, specifying a pollutant budget that meets state water quality standards and allocate pollutant loads among pollution sources in a watershed, e.g., point and nonpoint sources; and

- EPA to approve or disapprove state lists and TMDLs within 30 days of final submission.

Despite these requirements, states, territories, authorized tribes, and EPA had not developed many TMDLs. Beginning in 1986, organizations in many states filed lawsuits against the EPA for failing to meet the TMDL requirements contained in the federal Clean Water Act and its implementing regulations. While EPA has entered into consent agreements with the plaintiffs in several states, other lawsuits still are pending across the country.

In the cases that have been settled to date, the consent agreements require EPA to backstop TMDL development, track TMDL development, review state monitoring programs, and fund studies on issues of concern (e.g., AMD, implementation of nonpoint source Best Management Practices (BMPs), etc.).

These TMDLs were developed in partial fulfillment of the 1997 lawsuit settlement of *American Littoral Society and Public Interest Group of Pennsylvania v. EPA.*

**Section 303(d) Listing Process**

Prior to developing TMDLs for specific waterbodies, there must be sufficient data available to assess which streams are impaired and should be on the Section 303(d) list. With guidance from the EPA, the states have developed methods for assessing the waters within their respective jurisdictions.

The primary method adopted by the Pennsylvania Department of Environmental Protection (DEP) for evaluating waters changed between the publication of the 1996 and 1998 Section 303(d) lists. Prior to 1998, data used to list streams were in a variety of formats, collected under differing protocols. Information also was gathered through the Section 305(b)[2] reporting process. DEP is now using the Statewide Surface Waters Assessment Protocol (SSWAP), a modification of the EPA's 1989 Rapid Bioassessment Protocol II (RBP-II), as the primary mechanism to assess Pennsylvania's waters. The SSWAP provides a more consistent approach to assessing Pennsylvania's streams.

[2] Section 305(b) of the Clean Water Act requires a biannual description of the water quality of the waters of the state.

The assessment method requires selecting representative stream segments based on factors such as surrounding land uses, stream characteristics, surface geology, and point source discharge locations. The biologist selects as many sites as necessary to establish an accurate assessment for a stream segment; the length of the assessed stream segment can vary between sites. All the biological surveys included kick-screen sampling of benthic macroinvertebrates and habitat evaluations. Benthic macroinvertebrates are identified to the family level in the field.

After the survey is completed, the biologist determines the status of the stream segment. The decision is based on habitat scores and a series of narrative biological statements used to evaluate the benthic macroinvertebrate community. If the stream is determined to be impaired, the source and cause of the impairment is documented. An impaired stream must be listed on the state's Section 303(d) list with the source and cause. A TMDL must be developed for the stream segment and each pollutant. In order for the process to be more effective, adjoining stream segments with the same source and cause listing are addressed collectively, and on a watershed basis.

**Basic Steps for Determining a TMDL**

Although all watersheds must be handled on a case-by-case basis when developing TMDLs, there are basic processes or steps that apply to all cases. They include:

1. Collection and summarization of pre-existing data (watershed characterization, inventory contaminant sources, determination of pollutant loads, etc.);
2. Calculating the TMDL for the waterbody using EPA approved methods and computer models;
3. Allocating pollutant loads to various sources;
4. Determining critical and seasonal conditions;
5. Public review and comment and comment period on draft TMDL;
6. Submittal of final TMDL; and
7. EPA approval of the TMDL.

**AMD Methodology**

A two-step approach is used for the TMDL analysis of AMD impaired stream segments. The first step uses a statistical method for determining the allowable instream concentration at the point of interest necessary to meet water quality standards. This is done at each point of interest (sample point) in the watershed. The second step is a mass balance of the loads as they pass through the watershed. Loads at these points will be computed based on average annual flow.

The statistical analysis described below can be applied to situations where all of the pollutant loading is from non-point sources as well as those where there are both point and non-point sources. The following defines what are considered point sources and non-point sources for the purposes of our evaluation; point sources are defined as permitted discharges or a discharge that has a responsible party, non-point sources are then any pollution sources that are not point sources. For situations where all of the impact is due to non-point sources, the equations shown below are applied using data for a point in the stream. The load allocation made at that point will be for all of the watershed area that is above that point. For situations where there are point-source impacts alone, or in combination with non-point sources, the evaluation will use the point-source data and perform a mass balance with the receiving water to determine the impact of the point source.

Allowable loads are determined for each point of interest using Monte Carlo simulation. Monte Carlo simulation is an analytical method meant to imitate real-life systems, especially when other analyses are too mathematically complex or too difficult to reproduce. Monte Carlo simulation calculates multiple scenarios of a model by repeatedly sampling values from the probability distribution of the uncertain variables and using those values to populate a larger data set. Allocations were applied uniformly for the watershed area specified for each allocation point. For each source and pollutant, it was assumed that the observed data were log-normally distributed. Each pollutant source was evaluated separately using @Risk[3] by performing 5,000 iterations to determine the required percent reduction so that the water quality criteria, as defined in the *Pennsylvania Code. Title 25 Environmental Protection, Department of Environmental Protection, Chapter 93, Water Quality Standards,* will be met instream at least 99 percent of the time. For each iteration, the required percent reduction is:

PR = maximum {0, (1-Cc/Cd)} where (1)

PR = required percent reduction for the current iteration

Cc = criterion in mg/l

Cd = randomly generated pollutant source concentration in mg/l based on the observed data

Cd = RiskLognorm(Mean, Standard Deviation) where (1a)

Mean = average observed concentration

Standard Deviation = standard deviation of observed data

The overall percent reduction required is the 99th percentile value of the probability distribution generated by the 5,000 iterations, so that the allowable long-term average (LTA) concentration is:

LTA = Mean * (1 – PR99) where (2)

LTA = allowable LTA source concentration in mg/l

Once the allowable concentration and load for each pollutant is determined, mass-balance accounting is performed starting at the top of the watershed and working down in sequence. This mass-balance or load tracking is explained below.

[3] @Risk – Risk Analysis and Simulation Add-in for Microsoft Excel, Palisade Corporation, Newfield, NY, 1990-1997.

Load tracking through the watershed utilizes the change in measured loads from sample location to sample location, as well as the allowable load that was determined at each point using the @Risk program.

There are two basic rules that are applied in load tracking; rule one is that if the sum of the measured loads that directly affect the downstream sample point is less than the measured load at the downstream sample point it is indicative that there is an increase in load between the points being evaluated, and this amount (the difference between the sum of the upstream and downstream loads) shall be added to the allowable load(s) coming from the upstream points to give a total load that is coming into the downstream point from all sources. The second rule is that if the sum of the measured loads from the upstream points is greater than the measured load at the downstream point this is indicative that there is a loss of instream load between the evaluation points, and the ratio of the decrease shall be applied to the load that is being tracked (allowable load(s)) from the upstream point.

Tracking loads through the watershed gives the best picture of how the pollutants are affecting the watershed based on the information that is available. The analysis is done to insure that water quality standards will be met at all points in the stream. The TMDL must be designed to meet standards at all points in the stream, and in completing the analysis, reductions that must be made to upstream points are considered to be accomplished when evaluating points that are lower in the watershed. Another key point is that the loads are being computed based on average annual flow and should not be taken out of the context for which they are intended, which is to depict how the pollutants affect the watershed and where the sources and sinks are located spatially in the watershed.

For pH TMDLs, acidity is compared to alkalinity as described in Attachment B. Each sample point used in the analysis of pH by this method must have measurements for total alkalinity and hot acidity. Statistical procedures are applied, using the average value for total alkalinity at that point as the target to specify a reduction in the acid concentration. By maintaining a net alkaline stream, the pH value will be in the range between six and eight. This method negates the need to specifically compute the pH value, which for streams affected by low pH from AMD may not be a true reflection of acidity. This method assures that Pennsylvania's standard for pH is met when the acid concentration reduction is met.

Information for the TMDL analysis performed using the methodology described above is contained in the "TMDLs by Segment" section of this report.

## TMDL Endpoints

One of the major components of a TMDL is the establishment of an instream numeric endpoint, which is used to evaluate the attainment of applicable water quality. An instream numeric endpoint, therefore, represents the water quality goal that is to be achieved by implementing the load reductions specified in the TMDL. The endpoint allows for a comparison between observed instream conditions and conditions that are expected to restore designated uses. The endpoint is based on either the narrative or numeric criteria available in water quality standards.

Because the pollution sources in the watershed are nonpoint sources, the TMDLs' component makeup will be load allocations (LAs) with waste load allocations (WLAs) for permitted discharges. All allocations will be specified as long-term average daily concentrations. These long-term average concentrations are expected to meet water-quality criteria 99% of the time as required in PA Title 25 Chapter 96.3(c). The following table shows the applicable water-quality criteria for the selected parameters.

**Table 2. Applicable Water Quality Criteria**

| ***Parameter*** | ***Criterion Value (mg/l)*** | ***Total Recoverable/Dissolved*** |
|---|---|---|
| Aluminum (Al) | 0.75 | Total Recoverable |
| Iron (Fe) | 1.50 | Total Recoverable |
| Manganese (Mn) | 1.00 | Total Recoverable |
| pH * | 6.0-9.0 | N/A |

*The pH values shown will be used when applicable. In the case of freestone streams with little or no buffering capacity, the TMDL endpoint for pH will be the natural background water quality.

## TMDL Elements (WLA, LA, MOS)

$$TMDL = WLA + LA + MOS$$

A TMDL equation consists of a waste load allocation (WLA), load allocation (LA), and a margin of safety (MOS). The waste load allocation is the portion of the load assigned to point sources. The load allocation is the portion of the load assigned to non-point sources. The margin of safety is applied to account for uncertainties in the computational process. The margin of safety may be expressed implicitly (documenting conservative processes in the computations) or explicitly (setting aside a portion of the allowable load). The TMDL allocations in this report are based on available data. Other allocation schemes could also meet the TMDL.

## Allocation Summary

These TMDLs will focus remediation efforts on the identified numerical reduction targets for each watershed. The reduction schemes in Table 3 for each segment are based on the assumption that all upstream allocations are implemented and take into account all upstream reductions. Attachment D contains the TMDLs by segment analysis for each allocation point in a detailed discussion. As changes occur in the watershed, the TMDLs may be re-evaluated to reflect current conditions. An implicit MOS based on conservative assumptions in the analysis is included in the TMDL calculations.

The allowable LTA concentration in each segment is calculated using Monte Carlo Simulation as described previously. The allowable load is then determined by multiplying the allowable concentration by the average flow and a conversion factor at each sample point. The allowable load is the TMDL at that point.

Waste load allocations have also been included at some points for future mining operations. The difference between the TMDL and the WLA at each point is the load allocation (LA) at the point. The LA at each point includes all loads entering the segment, including those from upstream allocation points. The percent reduction is calculated to show the amount of load that needs to be reduced from nonpoint sources within a segment in order for water quality standards to be met at the point.

In some instances, instream processes, such as settling, are taking place within a stream segment. These processes are evidenced by a decrease in measured loading between consecutive sample points. It is appropriate to account for these losses when tracking upstream loading through a segment. The calculated upstream load lost within a segment is proportional to the difference in the measured loading between the sampling points.

**Table 3. Peters Creek Watershed Summary Table**

| Parameter | Existing Load (lbs/day) | TMDL Allowable Load (lbs/day) | WLA (lbs/day) | LA (lbs/day) | NPS Load Reduction (lbs/day) | NPS % Reduction |
|---|---|---|---|---|---|---|
| **PC5 – Peters Creek at bridge upstream of Finleyville** | | | | | | |
| **Aluminum (lbs/day)** | 31.13 | 11.21 | *0.56* | 10.65 | 19.92 | 64% |
| **Iron (lbs/day)** | 20.12 | 20.12 | *2.25* | NA | NA | NA |
| **Manganese(lbs/day)** | 13.52 | 13.52 | *1.50* | NA | NA | NA |
| **Acidity (lbs/day)** | -2517.51 | -2517.51 | NA | NA | NA | NA |
| **PCTR1 – Unnamed tributary to Peters Creek Stoneybridge Drive near Giant Eagle in Finleyville** | | | | | | |
| **Aluminum (lbs/day)** | 0.26 | 0.07 | - | 0.07 | 0.19 | 73% |
| **Iron (lbs/day)** | 0.21 | 0.15 | - | 0.15 | 0.06 | 29% |
| **Manganese(lbs/day)** | 0.02 | 0.02 | NA | NA | NA | NA |
| **Acidity (lbs/day)** | -94.26 | -94.26 | NA | NA | NA | NA |
| **PCTR2 – Unnamed tributary to Peters Creek at Norfolk Southern Railroad bridge crossing in Gastonville** | | | | | | |
| **Aluminum (lbs/day)** | 3.87 | 0.77 | - | 0.77 | 3.10 | 80% |
| **Iron (lbs/day)** | 1.98 | 1.98 | NA | NA | NA | NA |
| **Manganese(lbs/day)** | 0.95 | 0.84 | - | 0.84 | 0.11 | 12% |
| **Acidity (lbs/day)** | -354.75 | -354.75 | NA | NA | NA | NA |
| **PCTR3 – Unnamed tributary to Peters Creek from mined area upstream of PC4** | | | | | | |
| **Aluminum (lbs/day)** | 19.56 | 0.39 | 0.28 | 0.11 | 19.17 | 98% |
| **Iron (lbs/day)** | 3.17 | 0.48 | 0.56[4] | 0 | 2.69 | 85% |
| **Manganese(lbs/day)** | 4.53 | 1.18 | 0.75 | 0.43 | 3.35 | 74% |
| **Acidity (lbs/day)** | 273.46 | 2.73 | - | 2.73 | 156.52 | 99% |

[4] The waste load allocation for total iron is calculated assuming discharges at PA Chapter 93 water quality criteria of 1.5 mg/L. Maintaining this discharge concentration assures that the discharge will not contribute to water quality impairment in downstream segments.

| Parameter | Existing Load (lbs/day) | TMDL Allowable Load (lbs/day) | WLA (lbs/day) | LA (lbs/day) | NPS Load Reduction (lbs/day) | NPS % Reduction |
|---|---|---|---|---|---|---|
| **PC4 – Peters Creek downstream of TR644 bridge** | | | | | | |
| **Aluminum (lbs/day)** | 60.29 | 7.23 | *0.56* | 6.67 | 10.68* | 60%* |
| **Iron (lbs/day)** | 17.91 | 15.76 | *2.25* | 13.51 | 0* | 0%* |
| **Manganese(lbs/day)** | 13.43 | 12.08 | *1.50* | 10.58 | 0* | 0%* |
| **Acidity (lbs/day)** | -3560.59 | -3560.59 | NA | NA | NA | NA |
| **PF1 – Piney Fork upstream of railroad underpass on Piney Fork Road** | | | | | | |
| **Aluminum (lbs/day)** | 36.28 | 26.88 | *0.56* | 26.32 | 9.94 | 27% |
| **Iron (lbs/day)** | 21.03 | 21.03 | *2.25* | NA | NA | NA |
| **Manganese(lbs/day)** | 24.93 | 24.93 | *1.50* | NA | NA | NA |
| **Acidity (lbs/day)** | -9168.30 | -9168.30 | NA | NA | NA | NA |
| **PC3 – Peters Creek downstream of abandoned bridge on Old Snowden Road** | | | | | | |
| **Aluminum (lbs/day)** | 69.39 | 11.80 | *0.56* | 11.24 | 12.76* | 52%* |
| **Iron (lbs/day)** | 40.87 | 30.25 | *2.25* | 28.00 | 8.47* | 22%* |
| **Manganese(lbs/day)** | 18.18 | 18.18 | *1.50* | NA | NA | NA |
| **Acidity (lbs/day)** | -13392.63 | -13392.63 | NA | NA | NA | NA |
| **PCTR4 – Unnamed tributary to Peters Creek at Old Snowden Road** | | | | | | |
| **Aluminum (lbs/day)** | 0.43 | 0.24 | - | 0.24 | 0.19 | 44% |
| **Iron (lbs/day)** | 0.31 | 0.31 | NA | NA | NA | NA |
| **Manganese(lbs/day)** | 0.09 | 0.09 | NA | NA | NA | NA |
| **Acidity (lbs/day)** | -111.01 | -111.01 | NA | NA | NA | NA |
| **LR1 – Lick Run upstream of Piney Fork Road crossing** | | | | | | |
| **Aluminum (lbs/day)** | 25.21 | 5.80 | *0.56* | 5.24 | 19.41 | 77% |
| **Iron (lbs/day)** | 8.30 | 8.30 | *2.25* | NA | NA | NA |
| **Manganese(lbs/day)** | 5.60 | 5.60 | *1.50* | NA | NA | NA |
| **Acidity (lbs/day)** | -3635.09 | -3635.09 | NA | NA | NA | NA |
| **PC2 – Peters Creek at open metal grate bridge downstream of Beam Run** | | | | | | |
| **Aluminum (lbs/day)** | 135.92 | 14.95 | *0.56* | 14.39 | 43.78* | 75%* |
| **Iron (lbs/day)** | 72.14 | 33.19 | *2.25* | 30.94 | 51.36* | 61%* |
| **Manganese(lbs/day)** | 18.95 | 18.95 | *1.50* | NA | NA | NA |
| **Acidity (lbs/day)** | -13457.29 | -13457.29 | NA | NA | NA | NA |
| **LW1 – Lewis Run downstream of bridge on Old Clairton Road at Route 51 intersection** | | | | | | |
| **Aluminum (lbs/day)** | 13.63 | 5.04 | *0.56* | 4.48 | 8.59 | 63% |
| **Iron (lbs/day)** | 7.61 | 7.61 | *2.25* | NA | NA | NA |
| **Manganese(lbs/day)** | 5.17 | 5.17 | *1.50* | NA | NA | NA |
| **Acidity (lbs/day)** | -1245.71 | -1245.71 | - | NA | NA | NA |
| **PCTR5 – Unnamed tributary to Peters Creek at bridge on Peters Creek Road** | | | | | | |
| **Aluminum (lbs/day)** | 0.67 | 0.46 | - | 0.46 | 0.21 | 31% |
| **Iron (lbs/day)** | 0.72 | 0.72 | NA | NA | NA | NA |
| **Manganese(lbs/day)** | 0.14 | 0.14 | NA | NA | NA | NA |
| **Acidity (lbs/day)** | -384.44 | -384.44 | NA | NA | NA | NA |

NA = not applicable ND = not detected

* Takes into account load reductions from upstream sources.

## Recommendations

Watershed-Specific Remediation Efforts

The Peters Creek Watershed Association (PCWA) is active in the watershed and has a number of projects planned and underway to address issues in the watershed.

### Watershed Assessment & Protection Plan

- PCWA applied for a 2006 Growing Greener Grant from the Pennsylvania Department of Environmental Protection to perform a Watershed Assessment and develop a Watershed Protection & Restoration Plan.

- PCWA received a $3,500.00 grant from The Western Pennsylvania Watershed Program to support comprehensive watershed planning for the Peters Creek watershed.

### Environmental Education

- PCWA was awarded a 2006 Water Resources Education Network Watershed Protection Grant from the Pennsylvania League of Women Voters in the amount of $4,600.00. These funds will be used to:

- Develop a pamphlet that promotes a watershed perspective, educates about non-point source pollution and provides simple ways that citizens can decrease their contribution to the problem.

- Partner with Jefferson Hills and Gateway Engineers to place an educational sign along The Montour Trail near the site of a natural stream bank stabilization project completed in 2005. Fluvial Geomorphology (FGM) design was utilized instead of a traditional hard-armor technique to protect the borough's sewer line while maintaining the natural aesthetics of the area.

- Partner with Jennifer Cramer, 7th grade science teacher at the Pleasant Hills Middle School, to develop web-based materials to educate her students about non-point source pollution.

### Macroinvertebrate Sampling

- PCWA received a grant from the Washington County Community Foundation via the Washington County Watershed Alliance to purchase equipment to be used to initiate a water quality sampling program.

### Remediation

- PCWA is supporting Jefferson Hills efforts to obtain a 2006 Growing Greener Grant using FGM to rehabilitate a section of Peters Creek downstream of the 2005 site.

- PCWA is also working with the Pennsylvania Resource Council to develop a riparian buffer of native plants along the banks of Peters Creek at the site of the recent stabilization project.

<u>Statewide Remediation Efforts</u>

Since the 1960s, Pennsylvania has been a national leader in establishing laws and regulations to ensure mine reclamation and well plugging occur after active operation is completed. Mine reclamation and well plugging refer to the process of cleaning up environmental pollutants and safety hazards associated with a site and returning the land to a productive condition, similar to PADEP's Brownfields Program. Pennsylvania is striving for complete reclamation of its abandoned mines and plugging of its orphan wells. These concepts include legislative, policy, and land management initiatives designed to enhance mine operator/volunteer/PADEP reclamation efforts.

Various methods to eliminate or treat pollutant sources provide a reasonable assurance that the proposed TMDLs can be met. These methods include PADEP's primary efforts to improve water quality through reclamation of abandoned mine lands (for abandoned mining) and through the National Pollution Discharge Elimination System (NPDES) permit program (for active mining). Funding sources that are currently being used for projects designed to achieve TMDL reductions include the USEPA 319 grant program and Pennsylvania's Growing Greener Program. Federal funding is through the Department of the Interior's Office of Surface Mining (OSM) for reclamation and mine drainage treatment through the Appalachian Clean Streams Initiative and through Watershed Cooperative Agreements.

The PADEP Bureau of District Mining Operations (DMO) administers an environmental regulatory program for all mining activities, including mine subsidence regulation, mine subsidence insurance, and coal refuse disposal. PADEP DMO also conducts a program to ensure safe underground bituminous mining and protect certain structures from subsidence; administers a mining license and permit program; administers a regulatory program for the use, storage, and handling of explosives; and provides for training, examination, and certification of applicants' blaster's licenses. In addition, PADEP Bureau of Mining & Reclamation administers a loan program for bonding anthracite underground mines and for mine subsidence, the Small Operator's Assistance Program (SOAP), and the Remining Operator's Assistance Program (ROAP).

Regulatory programs are assisting in the reclamation and restoration of Pennsylvania's land and water. PADEP has been effective in implementing the NPDES program for mining operations throughout the Commonwealth. This reclamation was done through the use of remining permits that have the potential for reclaiming abandoned mine lands, at no cost to the Commonwealth or the federal government. Long-term agreements were initialized for facilities/operators that need to assure treatment of post-mining discharges or discharges they degraded. These agreements will provide for long-term treatment of discharges. According to OSM, "PADEP is conducting a program where active mining sites are, with very few exceptions, in compliance with the approved regulatory program." Acidity loads from abandoned discharges have been observed to decrease by an average of 61 percent when remined (Smith, Brady, and Hawkins, 2002.

“Effectiveness of Pennsylvania’s remining program in abating abandoned mine drainage: water quality impacts” in Transactions of the Society for Mining, Metallurgy, and Exploration, Volume 312, p. 166-170).

PADEP BAMR, which administers the program to address the Commonwealth’s abandoned mine reclamation program, has established a comprehensive plan for abandoned mine reclamation throughout the Commonwealth to prioritize and guide reclamation efforts for throughout the state to make the best use of valuable funds (www.dep.state.pa.us/dep/deputate/minres/bamr/complan1.htm). In developing and implementing a comprehensive plan for abandoned mine reclamation, the resources (both human and financial) of the participants must be coordinated to insure cost-effective results. The following set of principles is intended to guide this decision making process:

- Partnerships between the PADEP, watershed associations, local governments, environmental groups, other state agencies, federal agencies, and other groups organized to reclaim abandoned mine lands are essential to achieving reclamation and abating acid mine drainage in an efficient and effective manner.

- Partnerships between AML interests and active mine operators are important and essential in reclaiming abandoned mine lands.

- Preferential consideration for the development of AML reclamation or AMD abatement projects will be given to watersheds or areas for which there is an approved rehabilitation plan (guidance is given in Attachment G).

- Preferential consideration for the use of designated reclamation moneys will be given to projects that have obtained other sources or means to partially fund the project or to projects that need the funds to match other sources of funds.

- Preferential consideration for the use of available moneys from federal and other sources will be given to projects where there are institutional arrangements for any necessary long-term operation and maintenance costs.

- Preferential consideration for the use of available moneys from federal and other sources will be given to projects that have the greatest worth.

- Preferential consideration for the development of AML projects will be given to AML problems that impact people over those that impact property.

- No plan is an absolute; occasional deviations are to be expected.

A detailed decision framework is included in the plan that outlines the basis for judging projects for funding, giving high priority to those projects whose cost/benefit ratios are most favorable and those in which stakeholder and landowner involvement is high and secure.

The Commonwealth is exploring all identified options to address its abandoned mine problem. During 2000-2006, many new approaches to mine reclamation and mine drainage remediation have been explored and projects funded to address problems in innovative ways. These include:

- Awards of grants for: (1) proposals with economic development or industrial application as their primary goal and which rely on recycled mine water and/or a site that has been made suitable for the location of a facility through the elimination of existing Priority 1 or 2 hazards; and (2) new and innovative mine drainage treatment technologies that provide waters of higher purity that may be needed by a particular industry at costs below conventional treatment costs as in common use today or reduce the costs of water treatment below those of conventional lime treatment plants. Eight contracts totaling $4.075 M were awarded in 2006 under this program.

- Projects using water from mine pools in an innovative fashion, such as the Shannopin Deep Mine Pool (in southwestern Pennsylvania), the Barnes & Tucker Deep Mine Pool (the Susquehanna River Basin into the Upper West Branch Susquehanna River), and the Wadesville Deep Mine Pool (Exelon Generation in Schuylkill County).

Candidate or federally-listed threatened and endangered species may occur in or near the watershed. While implementation of the TMDL should result in improvements to water quality, they could inadvertently destroy habitat for candidate or federally-listed species. TMDL implementation projects should be screened through the Pennsylvania Natural Diversity Inventory (PNDI) early in their planning process, in accordance with the Department's policy titled Policy for Pennsylvania Natural Diversity Inventory (PNDI) Coordination During Permit Review and Evaluation (Document ID# 400-0200-001).

**Public Participation**

Public notice of the draft TMDL was published in the *Pennsylvania Bulletin* on October 25, 2008 to foster public comment on the allowable loads calculated. The public comment period on this TMDL was open from October 25, 2008 to December 26, 2008. A public meeting was held on October 29, 2008 at California District Mining Office to discuss the proposed TMDL.

**Future TMDL Modifications**

In the future, the Department may adjust the load and/or wasteload allocations in this TMDL to account for new information or circumstances that are developed or discovered during the implementation of the TMDL when a review of the new information or circumstances indicate that such adjustments are appropriate. Adjustment between the load and wasteload allocation will only be made following an opportunity for public participation. A wasteload allocation adjustment will be made consistent and simultaneous with associated permit(s) revision(s)/reissuances (i.e., permits for revision/reissuance in association with a TMDL revision will be made available for public comment concurrent with the related TMDLs availability for public comment). New information generated during TMDL implementation may include, among other things, monitoring data, BMP effectiveness information, and land use information. All changes in the TMDL will be tallied and once the total changes exceed 1% of the total original TMDL allowable load, the TMDL will be revised. The adjusted TMDL, including its LAs and WLAs, will be set at a level necessary to implement the applicable WQS and any adjustment increasing a WLA will be supported by reasonable assurance demonstration that load allocations will be met. The Department will notify EPA of any adjustments to the TMDL within 30 days of its adoption and will maintain current tracking mechanisms that contain accurate loading information for TMDL waters.

**Changes in TMDLs That May Require EPA Approval**

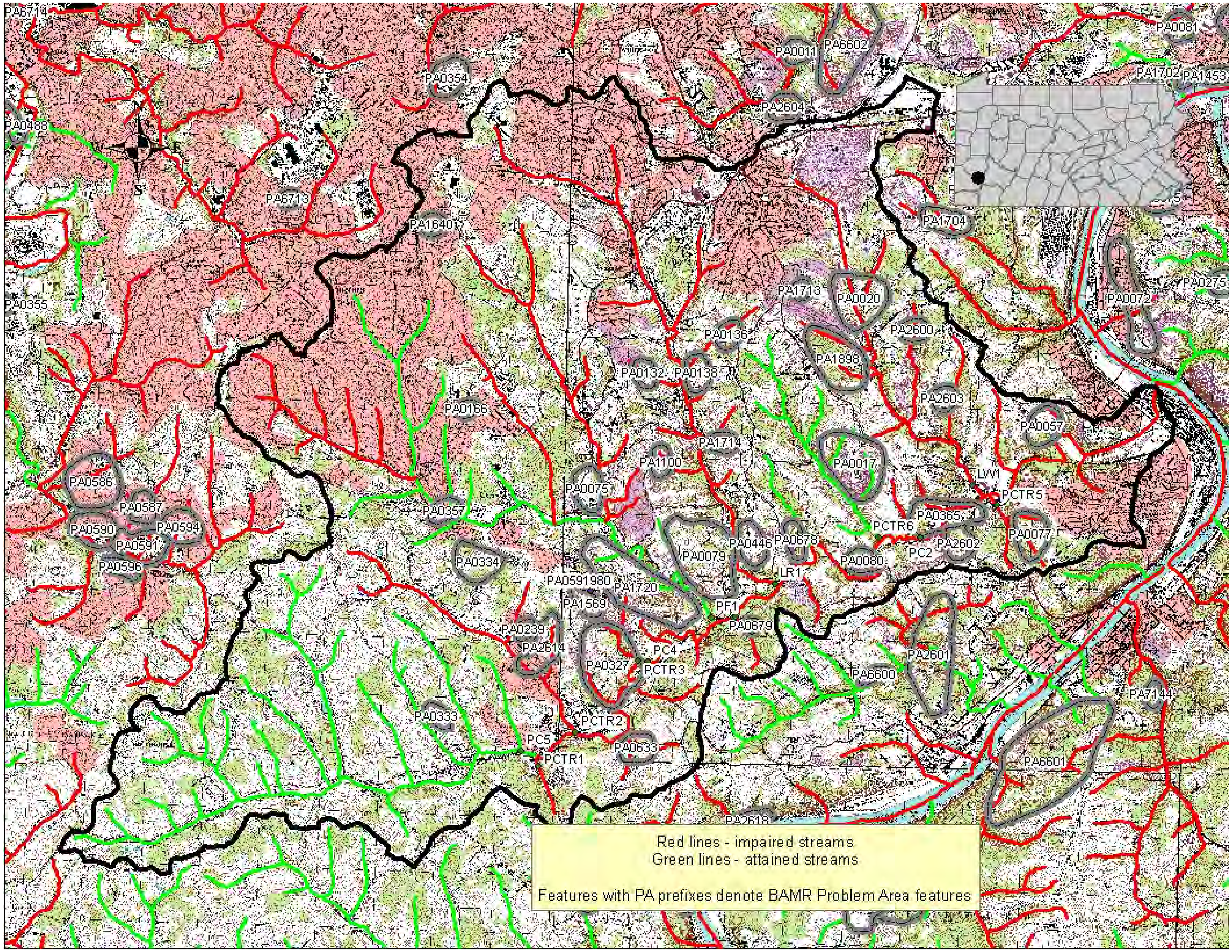
- Increase in total load capacity.
- Transfer of load between point (WLA) and nonpoint (LA) sources.
- Modification of the margin of safety (MOS).
- Change in water quality standards (WQS).
- Non-attainment of WQS with implementation of the TMDL.
- Allocations in trading programs.

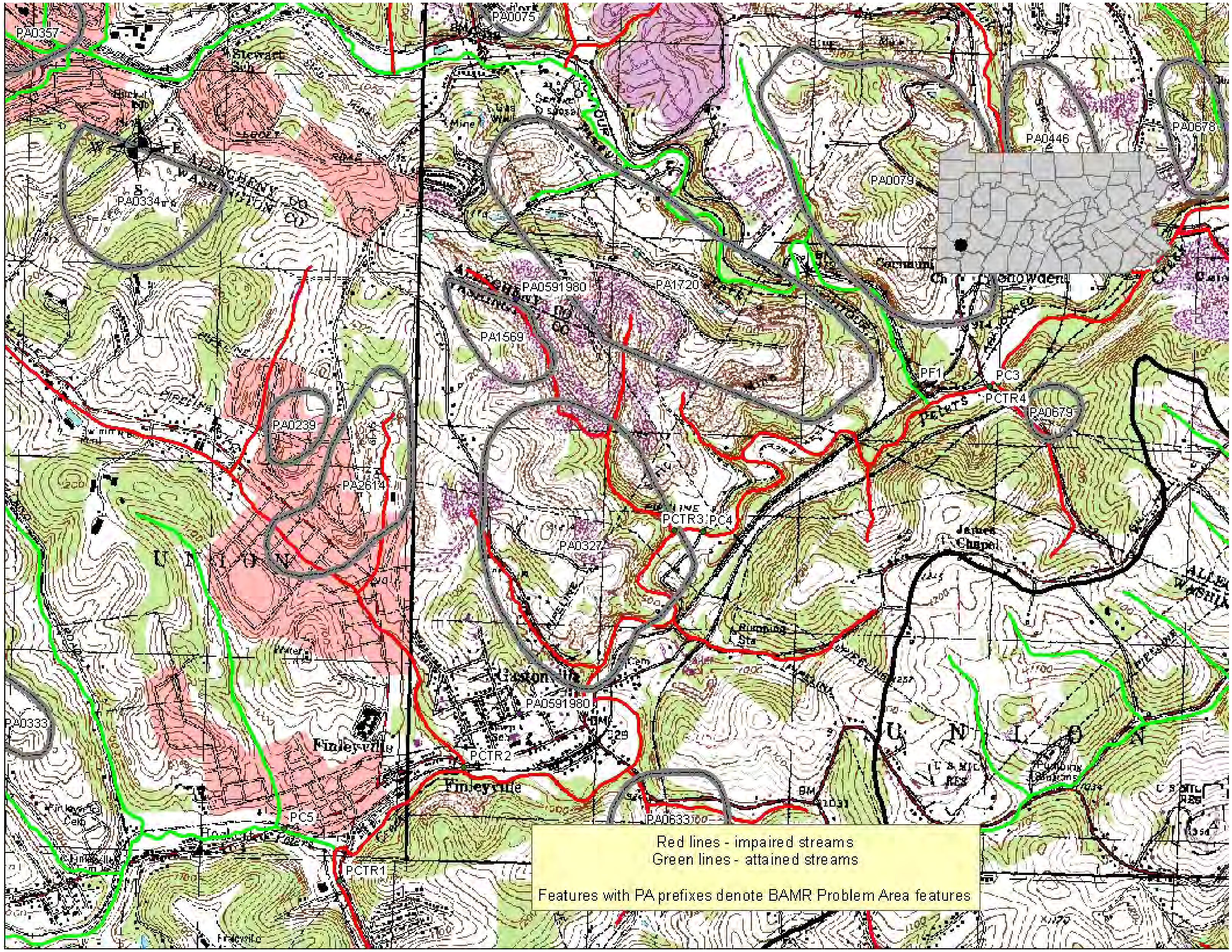
**Changes in TMDLs That May Not Require EPA Approval**

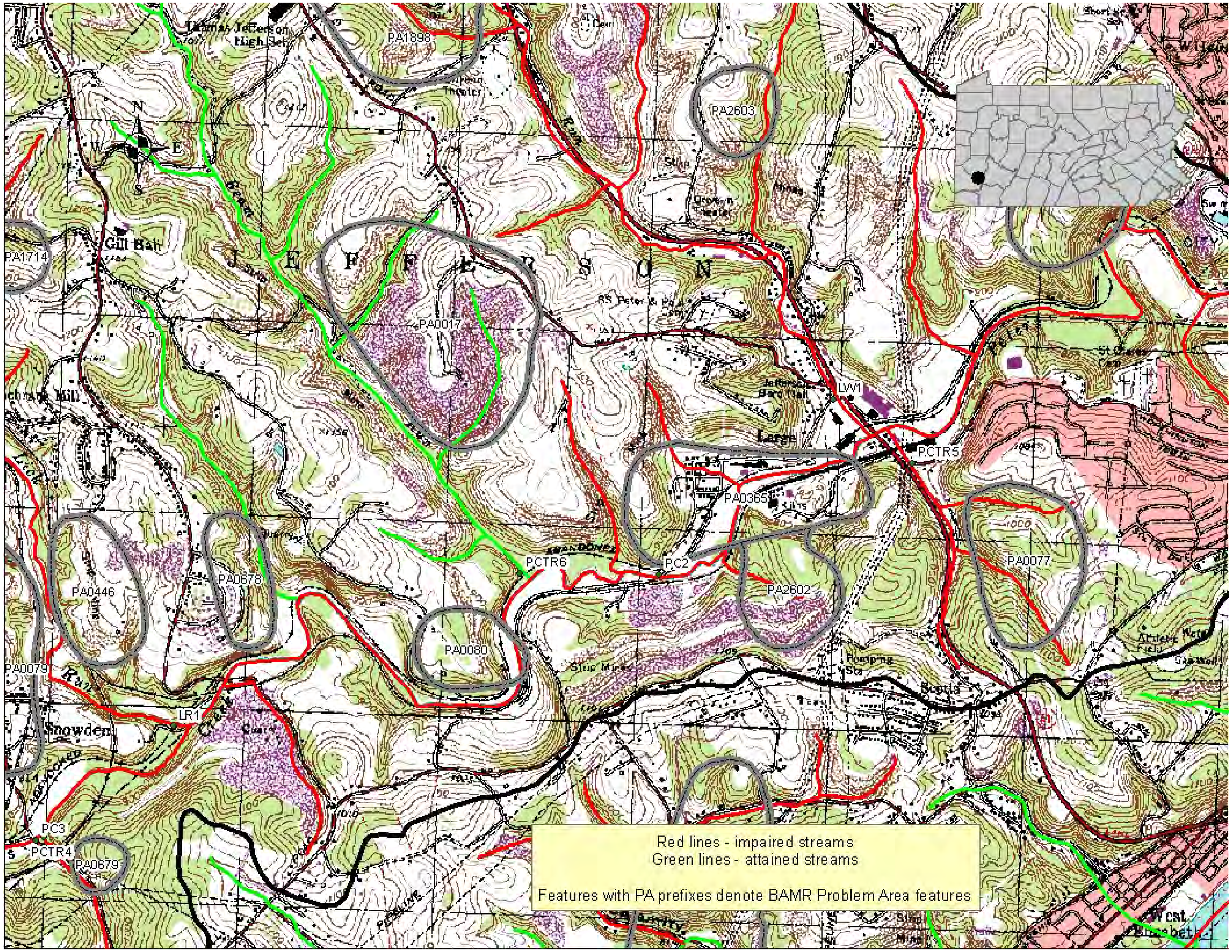
- Total loading shift less than or equal to 1% of the total load.
- Increase of WLA results in greater LA reductions provided reasonable assurance of implementation is demonstrated (a compliance/implementation plan and schedule).
- Changes among WLAs with no other changes; TMDL public notice concurrent with permit public notice.
- Removal of a pollutant source that will not be reallocated.
- Reallocation between LAs.
- Changes in land use.

# Attachment A

**Peters Creek Watershed Maps**


Red lines - impaired streams
Green lines - attained streams
Features with PA prefixes denote BAMR Problem Area features
PA0354
PA0011
PA6602
PA2604
PA6713
PA1640
PA1704
PA1713
PA0020
PA2600
PA0136
PA1898
PA0132
PA0138
PA2603
PA0166
PA0057
PA1714
PA1100
PA0017
PA0075
LW1
PCTR5
PA0357
PA0365
PCTR6
PA0446
PA0678
PA2602
PA0077
PA0079
PC2
PA0080
PA0334
LR1
PA0591980
PA1720
PA1569
PF1
PA0239
PA0679
PA2614
PC4
PA2601
PA0327
PCTR3
PA6600
PA7144
PA0333
PCTR2
PC5
PA0633
PCTR1
PA6601
PA2618
PA0586
PA0587
PA0590
PA0594
PA0591
PA0596
PA0355
PA0488
PA0081
PA1702
PA1453
PA0275
PA0072


Red lines - impaired streams
Green lines - attained streams
Features with PA prefixes denote BAMR Problem Area features
PA0357
PA0075
PA0446
PA0678
PA0079
PA0334
PA0591980
PA1720
PA1569
PF1
PC3
PCTR4
PA0679
PA0239
PA2614
PCTR3
PC4
PA0327
PA0591980
PA0333
PCTR2
PC5
PA0633
PCTR1
Finleyville


PA1898
PA2603
PA1714
PA0017
LW1
PCTR5
PA0365
PCTR6
PC2
PA2602
PA0077
PA0446
PA0678
PA0080
PA0079
LR1
Snowden
PC3
PCTR4
PA0679
Red lines - impaired streams
Green lines - attained streams
Features with PA prefixes denote BAMR Problem Area features

# Attachment B

## Method for Addressing Section 303(d) Listings for pH

# Method for Addressing Section 303(d) Listings for pH

There has been a great deal of research conducted on the relationship between alkalinity, acidity, and pH. Research published by the Pa. Department of Environmental Protection demonstrates that by plotting net alkalinity (alkalinity-acidity) vs. pH for 794 mine sample points, the resulting pH value from a sample possessing a net alkalinity of zero is approximately equal to six (Figure 1). Where net alkalinity is positive (greater than or equal to zero), the pH range is most commonly six to eight, which is within the USEPA's acceptable range of six to nine and meets Pennsylvania water quality criteria in Chapter 93.

The pH, a measurement of hydrogen ion acidity presented as a negative logarithm, is not conducive to standard statistics. Additionally, pH does not measure latent acidity. For this reason, and based on the above information, Pennsylvania is using the following approach to address the stream impairments noted on the 303(d) list due to pH. The concentration of acidity in a stream is at least partially chemically dependent upon metals. For this reason, it is extremely difficult to predict the exact pH values, which would result from treatment of abandoned mine drainage. When acidity in a stream is neutralized or is restored to natural levels, pH will be acceptable. Therefore, the measured instream alkalinity at the point of evaluation in the stream will serve as the goal for reducing total acidity at that point. The methodology that is applied for alkalinity (and therefore pH) is the same as that used for other parameters such as iron, aluminum, and manganese that have numeric water quality criteria.

Each sample point used in the analysis of pH by this method must have measurements for total alkalinity and total acidity. The same statistical procedures that have been described for use in the evaluation of the metals is applied, using the average value for total alkalinity at that point as the target to specify a reduction in the acid concentration. By maintaining a net alkaline stream, the pH value will be in the range between six and eight. This method negates the need to specifically compute the pH value, which for mine waters is not a true reflection of acidity. This method assures that Pennsylvania's standard for pH is met when the acid concentration reduction is met.

Reference: *Rose, Arthur W. and Charles A. Cravotta, III 1998. Geochemistry of Coal Mine Drainage. Chapter 1 in Coal Mine Drainage Prediction and Pollution Prevention in Pennsylvania. Pa. Dept. of Environmental Protection, Harrisburg, Pa.*

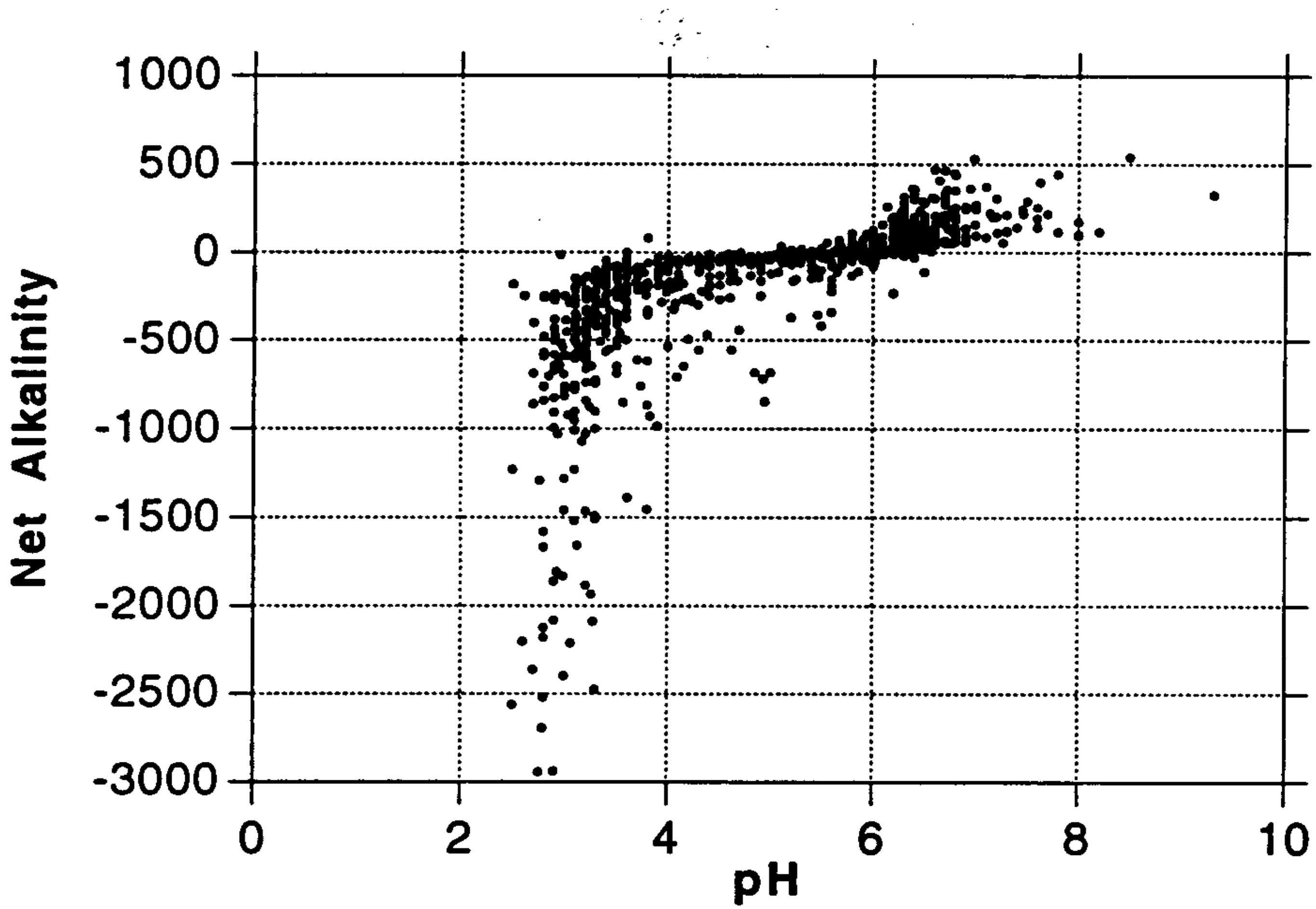



**Figure 1**. Net Alkalinity vs. pH. Taken from Figure 1.2 Graph C, pages 1-5, of Coal Mine Drainage Prediction and Pollution Prevention in Pennsylvania

# Attachment C

## Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines

**Method to Quantify Treatment Pond Pollutant Load**

Calculating Waste Load Allocations for Active Mining in the TMDL Stream Segment.

The end product of the TMDL report is to develop Waste Load Allocations (WLA) and Load Allocations (LA) that represent the amount of pollution the stream can assimilate while still achieving in-stream limits. The LA is the load from abandoned mine lands where there is no NPDES permit or responsible party. The WLA is the pollution load from active mining that is permitted through NPDES.

In preparing the TMDL, calculations are done to determine the allowable load. The actual load measured in the stream is equal to the allowable load plus the reduced load.

Total Measured Load = Allowed Load + Reduced Load

If there is active mining or anticipated mining in the near future in the watershed, the allowed load must include both a WLA and a LA component.

Allowed Load (lbs/day) = WLA (lbs/day) + LA (lbs/day)

The following is an explanation of the quantification of the potential pollution load reporting to the stream from permitted pit water treatment ponds that discharge water at established effluent limits.

Surface coalmines remove soil and overburden materials to expose the underground coal seams for removal. After removal of the coal the overburden is replaced as mine spoil and the soil is replaced for revegetation. In a typical surface mining operation the overburden materials is removed and placed in the previous cut where the coal has been removed. In this fashion, an active mining operation has a pit that progresses through the mining site during the life of the mine. The pit may have water reporting to it, as it is a low spot in the local area. Pit water can be the result of limited shallow groundwater seepage, direct precipitation into the pit, and surface runoff from partially regarded areas that have been backfilled but not yet revegetated. Pit water is pumped to nearby treatment ponds where it is treated to the required treatment pond effluent limits. The standard effluent limits are as follows, although stricter effluent limits may be applied to a mining permit's effluent limits to insure that the discharge of treated water does not cause in-stream limits to be exceeded.

Standard Treatment Pond Effluent Limits:
Alkalinity > Acidity
6.0 <= pH <= 9.0
Fe < 3.0 mg/l
Mn < 2.0 mg/l

Discharge from treatment ponds on a mine site is intermittent and often varies as a result of precipitation events. Measured flow rates are almost never available. If accurate flow data are available, they can be used to quantify the WLA. The following is an approach that can be used to determine a waste load allocation for an active mining operation when treatment pond flow rates are not available. The methodology involves quantifying the hydrology of the portion of a surface mine site that contributes flow to the pit and then calculating waste load allocation using NPDES treatment pond effluent limits.

The total water volume reporting to ponds for treatment can come from two primary sources: direct precipitation to the pit and runoff from the unregraded area following the pit's progression through the site. Groundwater seepage reporting to the pit is considered negligible compared to the flow rates resulting from precipitation.

In an active mining scenario, a mine operator pumps pit water to the ponds for chemical treatment. Pit water is often acidic with dissolved metals in nature. At the treatment ponds, alkaline chemicals are added to increase the pH and encourage dissolved metals to precipitate and settle. Pennsylvania averages 41.4 inches of precipitation per year (Mid-Atlantic River Forecast Center, National Weather Service, State College, PA, 1961-1990, http://www.dep.state.pa.us/dep/subject/hotopics/drought/PrecipNorm.htm). A maximum pit dimension without special permit approval is 1500 feet long by 300 feet wide. Assuming that 5 percent of the precipitation evaporates and the remaining 95 percent flows to the low spot in the active pit to be pumped to the treatment ponds, results in the following equation and average flow rates for the pit area.

41.4 in. precip./yr x 0.95 x 1 ft./12/in. x 1500'x300'/pit x 7.48 gal/ft$^3$ x 1yr/365days x 1day/24hr. x 1hr./60 min. =

= 21.0 gal/min average discharge from direct precipitation into the open mining pit area.

Pit water can also result from runoff from the unregraded and revegetated area following the pit. In the case of roughly backfilled and highly porous spoil, there is very little surface runoff. It is estimated that 80 percent of precipitation on the roughly regarded mine spoil infiltrates, 5 percent evaporates, and 15 percent may run off to the pit for pumping and potential treatment (Jay Hawkins, Office of Surface Mining, Department of the Interior, Personal Communications 2003). Regrading and revegetation of the mine spoil is conducted as the mining progresses. DEP encourages concurrent backfilling and revegetation through its compliance efforts and it is in the interest of the mining operator to minimize the company's reclamation bond liability by keeping the site reclaimed and revegetated. Experience has shown that reclamation and revegetation is accomplished two to three pit widths behind the active mining pit area. DEP uses three pit widths as an area representing potential flow to the pit when reviewing the NPDES permit application and calculating effluent limits based on best available treatment technology and insuring that in-stream limits are met. The same approach is used in the following equation, which represents the average flow reporting to the pit from the unregraded and unrevegetated spoil area.

41.4 in. precip./yr x 3 pit areas x 1 ft./12/in. x 1500'x300'/pit x 7.48 gal/ft$^3$ x 1yr/365days x 1day/24hr. x 1hr./60 min. x 15 in. runoff/100 in. precipitation =

= 9.9 gal./min. average discharge from spoil runoff into the pit area.

The total average flow to the pit is represented by the sum of the direct pit precipitation and the water flowing to the pit from the spoil area as follows:

Total Average Flow = Direct Pit Precipitation + Spoil Runoff

Total Average Flow = 21.0 gal./min + 9.9 gal./min. = 30.9 gal./min.

The resulting average waste load from a permitted treatment pond area is as follows.

Allowable Iron Waste Load Allocation:
30.9 gal./min. x 3 mg/l x 0.01202 = 1.1 lbs./day

Allowable Manganese Waste Load Allocation:
30.9 gal./min. x 2 mg/l x 0.01202 = 0.7 lbs./day

Allowable Aluminum Waste Load Allocation:
30.9 gal./min. x 0.75 mg/l x 0.01202 = 0.3 lbs./day

(Note: 0.01202 is a conversion factor to convert from a flow rate in gal/min. and a concentration in mg/l to a load in units of lbs./day.)

There is little or no documentation available to quantify the actual amount of water that is typically pumped from active pits to treatment ponds. Experience and observations suggest that the above approach is very conservative and overestimates the quantity of water, creating a large margin of safety in the methodology. County specific precipitation rates can be used in place of the long-term state average rate, although the margin of safety is greater than differences from individual counties. It is common for many mining sites to have very “dry” pits that rarely accumulate water that would require pumping and treatment.

Also, it is the goal of DEP’s permit review process to not issue mining permits that would cause negative impacts to the environment. As a step to insure that a mine site does not produce acid mine drainage, it is common to require the addition of alkaline materials (waste lime, baghouse lime, limestone, etc.) to the backfill spoil materials to neutralize any acid-forming materials that may be present. This practice of ‘alkaline addition’ or the incorporation of naturally occurring alkaline spoil materials (limestone, alkaline shale or other rocks) may produce alkaline pit water with very low metals concentrations that does not require treatment. A comprehensive study in 1999 evaluated mining permits issued since 1987 and found that only 2.2 percent resulted in a post-mining pollution discharge (Evaluation of Mining Permits Resulting in Acid Mine Drainage 1987-1996: A Post Mortem Study, March 1999). As a result of efforts to insure that acid mine drainage is prevented, most mining operations have alkaline pit water that often meets effluent limits and requires little or no treatment.

While most mining operations are permitted and allowed to have a standard, 1500’ x 300’ pit, most are well below that size and have a corresponding decreased flow and load. Where pit dimensions are greater than the standard size or multiple pits are present, the calculations to define the potential pollution load can be adjusted accordingly. Hence, the above calculated

Waste Load Allocation is very generous and likely high compared to actual conditions that are generally encountered. A large margin of safety is included in the WLA calculations.

The allowable load for the stream segment is determined by modeling of flow and water quality data. The allowable load has a potential Waste Load Allocation (WLA) component if there is active mining or anticipated future mining and a Load Allocation (LA). So, the sum of the Load Allocation and the Waste Load Allocation is equal to the allowed load. The WLA is determined by the above calculations and the LA is determined by the difference between the allowed load and the WLA.

Allowed Load = Waste Load Allocation + Load Allocation
Or
Load Allocation = Allowed Load – Waste Load Allocation

This is an explanation of the quantification of the potential pollution load reporting to the stream from permitted pit water treatment ponds that discharge water at established effluent limits. This allows for including active mining activities and their associated Waste Load in the TMDL calculations to more accurately represent the watershed pollution sources and the reductions necessary to achieve in-stream limits. When a mining operation is concluded its WLA is available for a different operation. Where there are indications that future mining in a watershed may be greater than the current level of mining activity, an additional WLA amount may be included in the allowed load to allow for future mining.

# Attachment D

**TMDLs By Segment**

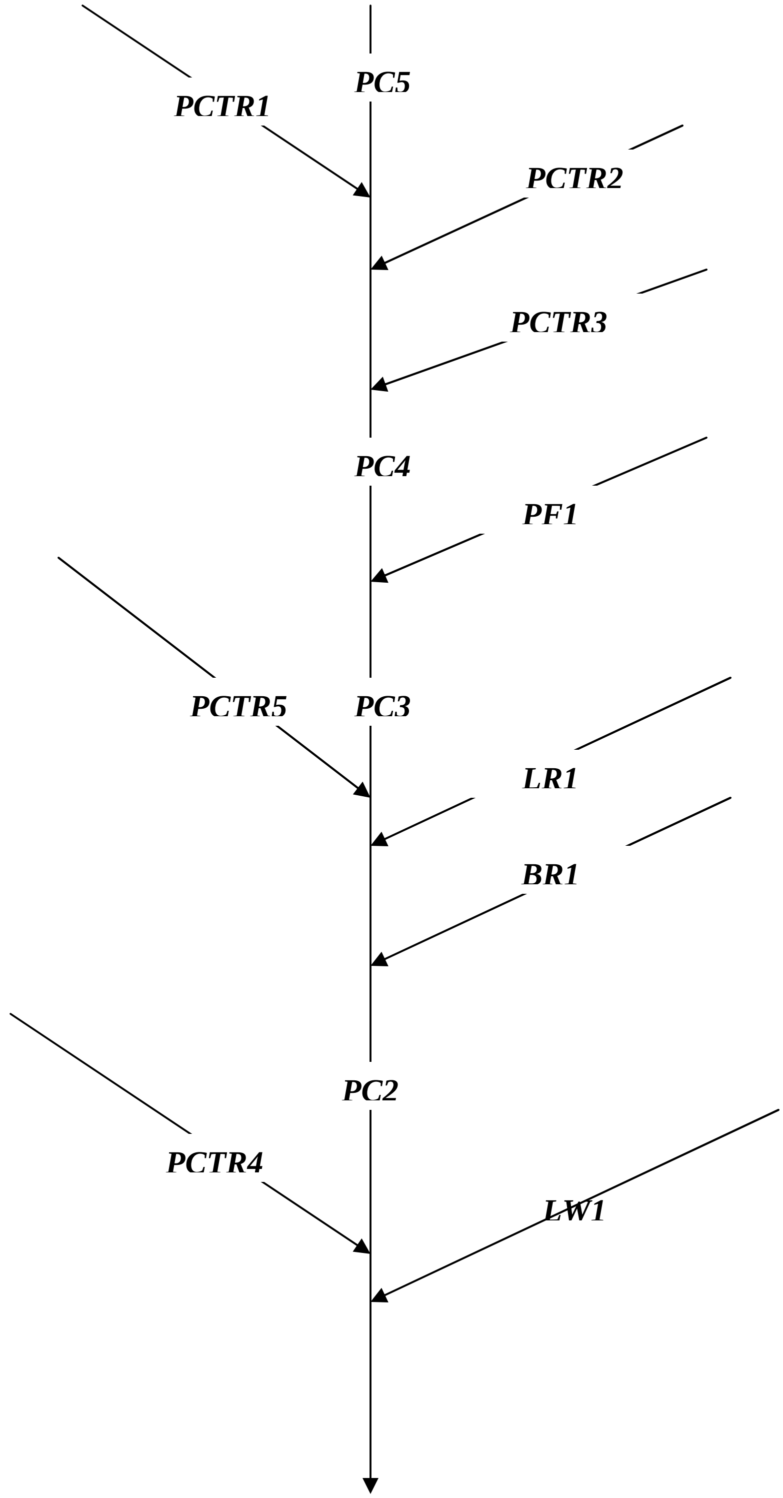
## Peters Creek

The TMDL for Peters Creek consists of load allocations to four sampling sites on Peters Creek (PC5, PC4, PC3 and PC2), six sites on unnamed tributaries to Peters Creek (PCTR1-6), one site on Lewis Run (LW1), one site on Lick Run (LR1), and one site on Piney Fork (PF1). Sample data sets were collected in 2007 and 2008. All sample points are shown on the maps included in Attachment A as well as on the loading schematic presented on the following page.

Peters Creek is listed on the 1996 PA Section 303(d) list for metals from AMD as being the cause of the degradation to this stream. Although this TMDL will focus primarily on metal loading to the Peters Creek Watershed, acid loading analysis will be performed. The objective is to reduce acid loading to the stream, which will in turn raise the pH to the desired range (between 6 & 9) 99% of the time. The result of this analysis is an acid loading reduction that equates to meeting standards for pH (see TMDL Endpoint section in the report, Table 2). The method and rationale for addressing pH is contained in Attachment B.

An allowable long-term average in-stream concentration was determined at each sample point for metals and acidity. The analysis is designed to produce an average value that, when met, will be protective of the water-quality criterion for that parameter 99% of the time. An analysis was performed using Monte Carlo simulation to determine the necessary long-term average concentration needed to attain water-quality criteria 99% of the time. The simulation was run assuming the data set was log normally distributed. Using the mean and standard deviation of the data set, 5000 iterations of sampling were completed, and compared against the water-quality criterion for that parameter. For each sampling event a percent reduction was calculated, if necessary, to meet water-quality criteria. A second simulation that multiplied the percent reduction times the sampled value was run to insure that criteria were met 99% of the time. The mean value from this data set represents the long-term average concentration that needs to be met to achieve water-quality standards. Following is an explanation of the TMDL for each allocation point.

**Peters Creek Sampling Station Diagram**
Arrows represent direction of flow
Diagram not to scale



A waste load allocation for future mining was included at PC5 allowing for two operations with two active pits (1500’ x 300’) to be permitted in the future on this segment.

| Table D1. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.090 | 0.56 |
| Fe | 3.0 | 0.090 | 2.25 |
| Mn | 2.0 | 0.090 | 1.50 |

*TMDL calculations – PC5 – Peters Creek upstream of bridge in Finleyville*

The TMDL for sampling point PC5 consists of a load allocation to all of the area upstream of this point shown in Attachment A. The load allocation for this segment of Peters Creek was computed using water-quality sample data collected at point PC5. The average flow, measured at the sampling point PC5 (3.096 MGD), is used for these computations.

Sample data at point PC5 shows pH ranging between 7.25 and 8.17; pH not will be addressed because water quality standards are being met. Table D2 shows the measured and allowable concentrations and loads at PC5. Table D3 shows the load reductions necessary to meet water quality standards at PC5.

| Table D2 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 1.21 | 31.13 | 0.43 | 11.21 |
| | Iron | 0.78 | 20.12 | 0.78 | 20.12 |
| | Manganese | 0.52 | 13.52 | 0.52 | 13.52 |
| | Acidity | -97.50 | -2517.51 | -97.50 | -2517.51 |
| | Alkalinity | 135.43 | 3496.76 | | |

| Table D3. Allocations PC5 | |
|---|---|
| PC5 | Al (Lbs/day) |
| Existing Load @ PC5 | 31.13 |
| Allowable Load @ PC5 | 11.21 |
| Load Reduction @ PC5 | 19.92 |
| % Reduction required @ PC5 | 64% |

*<u>TMDL calculations- PCTR1 - Unnamed tributary to Peters Creek at Stonebridge Drive near Giant Eagle in Finleyville</u>*

The TMDL for sampling point PCTR1 consists of a load allocation to all of the area upstream of this point shown in Attachment A. The load allocation for the unnamed tributary to Peters Creek was computed using water-quality sample data collected at point PCTR1. The average flow, measured at the sampling point PCTR1 (0.0504 MGD), is used for these computations.

Sample data at point PCTR1 shows pH ranging between 7.84 and 9.13; pH will not be addressed. Table D4 shows the measured and allowable concentrations and loads at PCTR1. Table D5 shows the load reductions necessary to meet water quality standards at PCTR1.

| Table D4 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.61 | 0.26 | 0.17 | 0.07 |
| | Iron | 0.49 | 0.21 | 0.36 | 0.15 |
| | Manganese | 0.06 | 0.02 | 0.06 | 0.02 |
| | Acidity | -244.25 | -94.26 | -244.25 | -94.26 |
| | Alkalinity | 273.55 | 114.98 | | |

| Table D5. Allocations PCTR1 | | |
|---|---|---|
| PCTR1 | Al (Lbs/day) | Iron (Lbs/day) |
| Existing Load @ PCTR1 | 0.26 | 0.21 |
| Allowable Load @ PCTR1 | 0.07 | 0.15 |
| Load Reduction @ PCTR1 | 0.19 | 0.06 |
| % Reduction required @ PCTR1 | 73% | 29% |

*<u>TMDL calculations- PCTR2 – Unnamed tributary to Peters Creek at Norfolk Southern Railroad crossing in Gastonville</u>*

The TMDL for sample point PCTR2 consists of a load allocation to all of the area upstream of this point shown in Attachment A. The load allocation for this segment of the unnamed tributary to Peters Creek was computed using water-quality sample data collected at point PCTR2. The average flow, measured at the sampling point PCTR2 (0.604 MGD), is used for these computations.

Sample data at point PCTR2 shows that this segment has a pH ranging between 7.64 and 8.39; pH will not be addressed because water quality standards are being met. A TMDL for aluminum and manganese has been calculated at this site

Table D6 shows the measured and allowable concentrations and loads at PCTR2. Table D7 shows the percent reductions for aluminum and manganese.

| Table D6 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.77 | 3.87 | 0.15 | 0.77 |
| | Iron | 0.39 | 1.98 | 0.39 | 1.98 |
| | Manganese | 0.19 | 0.95 | 0.71 | 0.84 |
| | Acidity | -70.38 | -354.75 | -70.38 | -354.75 |
| | Alkalinity | 98.35 | 495.77 | | |

| Table D7. Allocations PCTR2 | | |
|---|---|---|
| PCTR2 | Al (Lbs/day) | Mn (Lbs/day) |
| Existing Load @ PCTR2 | 3.87 | 0.95 |
| Allowable Load @ PCTR2 | 0.77 | 0.84 |
| Load Reduction @ PCTR2 | 3.10 | 0.11 |
| % Reduction required @ PCTR2 | 80% | 12% |

*Waste Load Allocation –USA South Hills Landfill, Inc.*

The USA South Hills Landfill (SMP0200102; NPDES PA0591980) has two mine drainage treatment facilities requiring treatment. Outfalls 003A and 004B are discharges from treatment facilities. One discharge can be operational receiving water from one standard size pit (1500'X300'); in addition, iron must be discharged at a concentration of equal to or less than 1.5 mg/L. These discharges do not have effluent limits for aluminum currently; a concentration of 0.75 mg/L was assigned to the discharge for aluminum in the effluent. The following table shows the waste load allocation for this discharge.

| Table D8. Waste load allocations at USA South Hills Landfill | | | |
|---|---|---|---|
| Parameter | Monthly Avg. Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| 003A or 004B | | | |
| Al | 0.75 | 0.045 | 0.28 |
| Fe | 1.5 | 0.045 | 0.56 |
| Mn | 2.0 | 0.045 | 0.75 |

*TMDL calculations- PCTR3 – Unnamed tributary to Peters Creek draining mined area upstream of PC4*

The TMDL for sampling point PCTR3 consists of a load allocation to all of the area upstream of the point shown in Attachment A. The load allocation for this segment of Peters Creek was computed using water-quality sample data collected at point PCTR3. The average flow, measured at the sampling point PCTR3 (0.207 MGD), is used for these computations.

Sample data at point PCTR3 shows pH ranging between 4.12 and 4.95; pH will be addressed. A TMDL for aluminum, iron, and manganese at PCTR3 has been calculated.

Table D9 shows the measured and allowable concentrations and loads at PCTR3. Table D10 shows the percent reduction for aluminum, iron, manganese, and acidity needed at PCTR3.

| Table D9 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 11.31 | 19.56 | 0.23 | 0.39 |
| | Iron | 1.83 | 3.17 | 0.27 | 0.48 |
| | Manganese | 2.62 | 4.53 | 0.68 | 1.18 |
| | Acidity | 158.10 | 273.46 | 1.58 | 2.73 |
| | Alkalinity | 7.45 | 12.89 | | |

| Table D10. Allocations PCTR3 | | | | |
|---|---|---|---|---|
| PCTR3 | Al (Lbs/day) | Fe (Lbs/day) | Mn (Lbs/day) | Acidity (Lbs/day) |
| Existing Load @ PCTR3 | 19.56 | 3.17 | 4.53 | 158.10 |
| Allowable Load @ PCTR3 | 0.39 | 0.48 | 1.18 | 1.58 |
| Load Reduction @ PCTR3 | 19.17 | 2.69 | 3.35 | 156.52 |
| % Reduction required @ PCTR3 | 98% | 85% | 74% | 99% |

A waste load allocation for future mining was included at PC4 allowing for two operations with two active pits (1500’ x 300’) to be permitted in the future on this segment.

| Table D11. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.090 | 0.56 |
| Fe | 3.0 | 0.090 | 2.25 |
| Mn | 2.0 | 0.090 | 1.50 |

*TMDL calculations- PC4 – Peters Creek downstream of TR844 bridge*

The TMDL for sampling point PC4 consists of a load allocation to all of the area between PC5 and PC4 shown in Attachment A. The load allocation for this segment of Peters Creek was computed using water-quality sample data collected at point PC4. The average flow, measured at the sampling point PC4 (4.897 MGD), is used for these computations.

Sample data at point PC4 shows pH ranging between 7.30 and 8.04; pH will not be addressed as water quality standards are being met. A TMDL for aluminum, iron, and manganese at PC4 has been calculated.

Table D12 shows the measured and allowable concentrations and loads at PC4. Table D13 shows the percent reduction for aluminum, iron, manganese, and acidity needed at PC4.

| Table D12 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 1.48 | 60.29 | 0.18 | 7.23 |
| | Iron | 0.44 | 17.91 | 0.39 | 15.76 |
| | Manganese | 0.33 | 13.43 | 0.30 | 12.08 |
| | Acidity | -87.18 | -3560.59 | -87.18 | -3560.59 |
| | Alkalinity | 112.80 | 4607.22 | | |

The measured and allowable loading for point PC4 for aluminum, iron and manganese was computed using water-quality sample data collected at the point. This was based on the sample data for the point and did not account for any loads already specified from upstream sources. The additional load from points PCTR1/PCTR2/PCTR3/PC5 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points PCTR1/PCTR2/PCTR3/PC5 and PC4 to determine a total load tracked for the segment of stream between PCTR1/PCTR2/PCTR3/PC5 and PC4. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at PC4.

| Table D13. Allocations PC4 | | | |
|---|---|---|---|
| PC4 | Al (lbs/day) | Fe (lbs/day) | Mn (lbs/day) |
| Existing Load @ PC4 | 60.29 | 17.91 | 13.43 |
| Difference in measured loads between the loads that enter and existing PC4 | 5.47 | 14.53 | 0.99 |
| Additional load tracked from above samples | 12.44 | 0.63 | 2.02 |
| Total load tracked between PCTR1/PCTR2/PCTR3/PC5 and PC4 | 17.91 | 15.16 | 3.01 |
| Allowable Load @ PC4 | 7.23 | 15.76 | 12.08 |
| Load Reduction @ PC4 | 10.68 | 0 | 0 |
| % Reduction required at PC4 | 60% | 0% | 0% |

A waste load allocation for future mining was included at PF1 allowing for two operations with two active pits (1500’ x 300’) to be permitted in the future on this segment.

| Table D14. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.090 | 0.56 |
| Fe | 3.0 | 0.090 | 2.25 |
| Mn | 2.0 | 0.090 | 1.50 |

*<u>TMDL calculations- PF1- Piney Fork upstream of railroad underpass on Piney Fork Road</u>*

The TMDL for sampling point PF1 consists of a load allocation to all of the area upstream of this point shown in Attachment A. The load allocation for Piney Fork was computed using water-quality sample data collected at point PF1. The average flow, measured at the sampling point PF1 (10.820 MGD), is used for these computations.

Sample data at point PF1 shows pH ranging between 7.23 and 8.69; pH will not be addressed because water quality standards are being met.

Table D15 shows the measured and allowable concentrations and loads at PF1. Table D16 shows the load reductions necessary to meet water quality standards at PF1.

| Table D15 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.41 | 36.82 | 0.30 | 26.88 |
| | Iron | 0.23 | 21.03 | 0.23 | 21.03 |
| | Manganese | 0.28 | 24.93 | 0.28 | 24.93 |
| | Acidity | -101.60 | -9168.30 | -101.60 | -9168.30 |
| | Alkalinity | 131.05 | 11825.84 | | |

| Table D16. Allocations PF1 | |
|---|---|
| PF1 | Al (Lbs/day) |
| Existing Load @ PF1 | 36.82 |
| Allowable Load @ PF1 | 26.88 |
| Load Reduction @ PF1 | 9.94 |
| % Reduction required @ PF1 | 27% |

A waste load allocation for future mining was included at PC3 allowing for two operations with two active pits (1500’ x 300’) to be permitted in the future on this segment.

| Table D17. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.090 | 0.56 |
| Fe | 3.0 | 0.090 | 2.25 |
| Mn | 2.0 | 0.090 | 1.50 |

*TMDL calculations- PC3- Peters Creek downstream of abandoned bridge on Old Snowden Road*

The TMDL for sample point PC3 consists of a load allocation to all of the area between PC4 and PC3 shown in Attachment A. The load allocation for this segment of Peters Creek was computed using water-quality sample data collected at point PC3. The average flow, measured at the sampling point PC3 (11.739 MGD), is used for these computations.

Sample data at point PC3 shows that this segment has a pH ranging between 7.35 and 8.70; pH will not be addressed because water quality standards are being met.

Table D18 shows the measured and allowable concentrations and loads at PC3. Table D19 shows the percent reductions for aluminum, iron and manganese.

| Table D18 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.71 | 69.39 | 0.12 | 11.80 |
| | Iron | 0.42 | 40.87 | 0.31 | 30.25 |
| | Manganese | 0.19 | 18.18 | 0.19 | 18.18 |
| | Acidity | -136.80 | -13392.63 | -136.80 | -13392.63 |
| | Alkalinity | 161.70 | 15830.33 | | |

The measured and allowable loading for point PC3 for aluminum, iron and manganese was computed using water-quality sample data collected at the point. This was based on the sample data for the point and did not account for any loads already specified from upstream sources. The additional load from points PC3 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points PC4/PF1 and PC3 to determine a total load tracked for the segment of stream between PC3 and PC4/PF1. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at PC3.

| Table D19. Allocations PC3 | | |
|---|---|---|
| PC3 | Al (lbs/day) | Fe (lbs/day) |
| Existing Load @ PC3 | 69.39 | 40.87 |
| Difference in measured loads between the loads that enter and existing PC3 | -27.72 | 22.96 |
| Additional load tracked from above samples | 34.11 | 15.76 |
| Total load tracked between PC4/PF1 and PC3 | 24.56 | 38.72 |
| Allowable Load @ PC3 | 11.80 | 30.25 |
| Load Reduction @ PC3 | 12.76 | 8.47 |
| % Reduction required at PC3 | 52% | 22% |

*TMDL calculations- PCTR4- Unnamed tributary to Peters Creek at Old Snowden Road*

The TMDL for sampling point PCTR4 consists of a load allocation to all of the area upstream of this point shown in Attachment A. The load allocation for the unnamed tributary to Peters Creek was computed using water-quality sample data collected at point PCTR4. The average flow, measured at the sampling point PCTR4 (0.136 MGD), is used for these computations.

Sample data at point PCTR4 shows pH ranging between 7.89 and 8.89; pH will not be addressed because water quality standards are being met.

Table D20 shows the measured and allowable concentrations and loads at PCTR4. Table D21 shows the load reductions necessary to meet water quality standards at PCTR4.

| Table D20 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.38 | 0.43 | 0.21 | 0.24 |
| | Iron | 0.27 | 0.31 | 0.27 | 0.31 |
| | Manganese | 0.08 | 0.09 | 0.08 | 0.09 |
| | Acidity | -97.60 | -111.01 | -97.60 | -111.01 |
| | Alkalinity | 115.45 | 131.31 | | |

| Table D21. Allocations PCTR4 | |
|---|---|
| PCTR4 | Al (Lbs/day) |
| Existing Load @ PCTR4 | 0.43 |
| Allowable Load @ PCTR4 | 0.24 |
| Load Reduction @ PCTR4 | 0.19 |
| % Reduction required @ PCTR4 | 44% |

A waste load allocation for future mining was included at LR1 allowing for two operations with two active pits (1500’ x 300’) to be permitted in the future on this segment.

| Table D22. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.090 | 0.56 |
| Fe | 3.0 | 0.090 | 2.25 |
| Mn | 2.0 | 0.090 | 1.50 |

*TMDL calculations- LR1- Lick Run upstream of Piney Fork Road crossing*

The TMDL for sampling point LR1 consists of a load allocation to all of the area upstream of this point shown in Attachment A. The load allocation for Lick Run was computed using water-quality sample data collected at point LR1. The average flow, measured at the sampling point LR1 (5.258 MGD), is used for these computations.

Sample data at point LR1 shows pH ranging between 7.75 and 8.70; pH will not be addressed because water quality standards are being met.

Table D23 shows the measured and allowable concentrations and loads at LR1. Table D24 shows the load reductions necessary to meet water quality standards at LR1.

| Table D23 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.58 | 25.21 | 0.13 | 5.80 |
| | Iron | 0.19 | 8.30 | 0.19 | 8.30 |
| | Manganese | 0.13 | 5.60 | 0.13 | 5.60 |
| | Acidity | -82.90 | -3635.09 | -82.90 | -3635.09 |
| | Alkalinity | 116.60 | 5112.81 | | |

| Table D24. Allocations LR1 | |
|---|---|
| LR1 | Al (Lbs/day) |
| Existing Load @ LR1 | 25.21 |
| Allowable Load @ LR1 | 5.80 |
| Load Reduction @ LR1 | 19.41 |
| % Reduction required @ LR1 | 77% |

A waste load allocation for future mining was included at PC2 allowing for two operations with two active pits (1500’ x 300’) to be permitted in the future on this segment.

| Table D25. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.090 | 0.56 |
| Fe | 3.0 | 0.090 | 2.25 |
| Mn | 2.0 | 0.090 | 1.50 |

*TMDL calculations- PC2- Peters Creek at open metal grate bridge downstream of Beam Run*

The TMDL for sample point PC2 consists of a load allocation to all of the area between PC3 and PC2 shown in Attachment A. The load allocation for this segment of Peters Creek was computed using water-quality sample data collected at point PC2. The average flow, measured at the sampling point PC2 (17.511 MGD), is used for these computations.

Sample data at point PC2 shows that this segment has a pH ranging between 7.66 and 8.71; pH will not be addressed as water quality standards are being met.

Table D26 shows the measured and allowable concentrations and loads at PC2. Table D27 shows the percent reductions for aluminum, iron, manganese and acidity.

| Table D26 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.93 | 135.92 | 0.10 | 14.95 |
| | Iron | 0.49 | 72.14 | 0.23 | 33.19 |
| | Manganese | 0.13 | 18.95 | 0.13 | 18.95 |
| | Acidity | -92.15 | -13457.29 | -92.15 | -13457.29 |
| | Alkalinity | 116.45 | 17005.98 | | |

The measured and allowable loading for point PC2 for aluminum, iron and manganese was computed using water-quality sample data collected at the point. This was based on the sample data for the point and did not account for any loads already specified from upstream sources. The additional load from points PC2 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points PCTR4/LR1/PC3 and PC2 to determine a total load tracked for the segment of stream between PC2 and PCTR4/LR1/PC3. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at PC2.

| Table D27. Allocations PC2 | | |
|---|---|---|
| PC2 | Al (lbs/day) | Fe (lbs/day) |
| Existing Load @ PC2 | 135.92 | 72.14 |
| Difference in measured loads between the loads that enter and existing PC2 | 40.89 | 54.30 |
| Additional load tracked from above samples | 17.84 | 30.25 |
| Total load tracked between PC3/LR1/PCTR4 and PC2 | 58.73 | 84.55 |
| Allowable Load @ PC2 | 14.95 | 33.19 |
| Load Reduction @ PC2 | 43.78 | 51.36 |
| % Reduction required at PC2 | 75% | 61% |

A waste load allocation for future mining was included at LW1 allowing for two operations with two active pits (1500' x 300') to be permitted in the future on this segment.

| Table D28. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.090 | 0.56 |
| Fe | 3.0 | 0.090 | 2.25 |
| Mn | 2.0 | 0.090 | 1.50 |

*TMDL calculations- LW1- Lewis Run downstream of Bridge on Old Clairton Road near intersection with Route 51*

The TMDL for sample point LW1 consists of a load allocation to all of the area upstream of LW1 shown in Attachment A. The load allocation for this segment of Lewis Run was computed using water-quality sample data collected at point LW1. The average flow, measured at the sampling point LW1 (3.608 MGD), is used for these computations.

Sample data at point LW1 shows that this segment has a pH ranging between 7.85 and 8.64; pH will not be addressed because water quality standards are being met.

Table D29 shows the measured and allowable concentrations and loads at LW1. Table D30 shows the percent reductions for aluminum, iron, manganese and acidity.

| Table D29 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.45 | 13.63 | 0.17 | 5.04 |
| | Iron | 0.25 | 7.61 | 0.25 | 7.61 |
| | Manganese | 0.17 | 5.17 | 0.17 | 5.17 |
| | Acidity | -41.40 | -1245.71 | -41.40 | -1245.71 |
| | Alkalinity | 61.05 | 1836.97 | | |

| Table D30. Allocations LW1 | |
|---|---|
| LW1 | Al (Lbs/day) |
| Existing Load @ LW1 | 13.63 |
| Allowable Load @ LW1 | 5.04 |
| Load Reduction @ LW1 | 8.59 |
| % Reduction required @ LW1 | 63% |

*TMDL calculations- PCTR5 – Unnamed tributary to Peters Creek at bridge on Peters Creek Road off of Route 51*

The TMDL for sample point PCTR5 consists of a load allocation to all of the area upstream of PCTR5 shown in Attachment A. The load allocation for this segment of the unnamed tributary to Peters Creek was computed using water-quality sample data collected at point PCTR5. The average flow, measured at the sampling point PCTR5 (0.226 MGD), is used for these computations.

Sample data at point PCTR5 shows that this segment has a pH ranging between 8.01 and 8.75; pH will not be addressed because water quality standards are being met.

Table D31 shows the measured and allowable concentrations and loads at PCTR5. Table D32 shows the percent reductions for aluminum, iron, manganese and acidity.

| Table D31 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.35 | 0.67 | 0.24 | 0.46 |
| | Iron | 0.38 | 0.72 | 0.38 | 0.72 |
| | Manganese | 0.07 | 0.14 | 0.07 | 0.14 |
| | Acidity | -203.60 | -384.44 | -203.60 | -384.44 |
| | Alkalinity | 234.30 | 442.41 | | |

| Table D32. Allocations PCTR5 | |
|---|---|
| PCTR5 | Al (Lbs/day) |
| Existing Load @ PCTR5 | 0.67 |
| Allowable Load @ PCTR5 | 0.46 |
| Load Reduction @ PCTR5 | 0.21 |
| % Reduction required @ PCTR5 | 31% |

***Margin of Safety***

For this study the margin of safety is applied implicitly. A MOS is implicit because the allowable concentrations and loadings were simulated using Monte Carlo techniques and employing the @Risk software. Other margins of safety used for this TMDL analysis include the following:

- An additional MOS is provided because that the calculations were done with a daily Fe average instead of the 30-day average.

***Seasonal Variation***

Seasonal variation is implicitly accounted for in these TMDLs because the data used represents all seasons.

***Critical Conditions***

The reductions specified in this TMDL apply at all flow conditions. A critical flow condition could not be identified from the data used for this analysis.

# Attachment E

## Excerpts Justifying Changes Between the 1996, 1998, and 2002 Section 303(d) Lists and Integrated Report/List (2004, 2006)

*The following are excerpts from the Pennsylvania DEP Section 303(d) narratives that justify changes in listings between the 1996, 1998, 2002, 2004 and 2006 303(d) Lists and Integrated Report/List (2006). The Section 303(d) listing process has undergone an evolution in Pennsylvania since the development of the 1996 list.*

In the 1996 Section 303(d) narrative, strategies were outlined for changes to the listing process. Suggestions included, but were not limited to, a migration to a Global Information System (GIS), improved monitoring and assessment, and greater public input.

The migration to a GIS was implemented prior to the development of the 1998 Section 303(d) list. As a result of additional sampling and the migration to the GIS some of the information appearing on the 1996 list differed from the 1998 list. Most common changes included:

1. mileage differences due to recalculation of segment length by the GIS;
2. slight changes in source(s)/cause(s) due to new EPA codes;
3. changes to source(s)/cause(s), and/or miles due to revised assessments;
4. corrections of misnamed streams or streams placed in inappropriate SWP subbasins; and
5. unnamed tributaries no longer identified as such and placed under the named watershed listing.

Prior to 1998, segment lengths were computed using a map wheel and calculator. The segment lengths listed on the 1998 Section 303(d) list were calculated automatically by the GIS (ArcInfo) using a constant projection and map units (meters) for each watershed. Segment lengths originally calculated by using a map wheel and those calculated by the GIS did not always match closely. This was the case even when physical identifiers (e.g., tributary confluence and road crossings) matching the original segment descriptions were used to define segments on digital quad maps. This occurred to some extent with all segments, but was most noticeable in segments with the greatest potential for human errors using a map wheel for calculating the original segment lengths (e.g., long stream segments or entire basins).

## Migration to National Hydrography Data (NHD)

New to the 2006 report is use of the 1/24,000 National Hydrography Data (NHD) streams GIS layer. Up until 2006 the Department relied upon its own internally developed stream layer. Subsequently, the United States Geologic Survey (USGS) developed 1/24,000 NHD streams layer for the Commonwealth based upon national geodatabase standards. In 2005, DEP contracted with USGS to add missing streams and correct any errors in the NHD. A GIS contractor transferred the old DEP stream assessment information to the improved NHD and the old DEP streams layer was archived. Overall, this marked an improvement in the quality of the streams layer and made the stream assessment data compatible with national standards but it necessitated a change in the Integrated Listing format. The NHD is not attributed with the old DEP five digit stream codes so segments can no longer be listed by stream code but rather only by stream name or a fixed combination of NHD fields known as reachcode and ComID. The NHD is aggregated by Hydrologic Unit Code (HUC) watersheds so HUCs rather than the old State Water Plan (SWP) watersheds are now used to group streams together. The map in

Appendix E illustrates the relationship between the old SWP and new HUC watershed delineations. A more basic change was the shift in data management philosophy from one of “dynamic segmentation” to “fixed segments”. The dynamic segmentation records were proving too difficult to mange from an historical tracking perspective. The fixed segment methods will remedy that problem. The stream assessment data management has gone through many changes over the years as system requirements and software changed. It is hoped that with the shift to the NHD and OIT’s (Office of Information Technology) fulltime staff to manage and maintain SLIMS the systems and formats will now remain stable over many Integrated Listing cycles.

# Attachment F

***Water Quality Data Used In TMDL Calculations***

| Site Name | Date | Flow (MGD) | pH (Lab) | pH (Field) | Acidity (mg/L) | Alkalinity (mg/L) | Conductivity (uS) | TDS (mg/L) | TSS (mg/L) | Al (mg/L) | Fe (mg/L) | Mn (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PCTR1 | 8/8/2007 | 0.0144 | 8.2 | 7.84 | -196 | 258 | 1033 | 513 | 20 | 1.38 | 0.707 | 0.079 |
| PCTR1 | 10/4/2007 | 0.0072 | 8.2 | 8.05 | -267.4 | 297.2 | 998 | 504 | 1.5 | 0.25 | 0.15 | 0.054 |
| PCTR1 | 3/27/2008 | 0.1441 | 8.3 | 9.13 | -203.6 | 266.4 | 589 | 293 | 18 | 0.576 | 0.962 | 0.065 |
| PCTR1 | 6/26/2008 | 0.03603 | 8.3 | 8.58 | -230 | 272.6 | 920 | 460 | 6 | 0.25 | 0.15 | 0.025 |
| | Average | 0.05 | 8.25 | 8.40 | -224.25 | 273.55 | 885.00 | 442.50 | 11.38 | 0.61 | 0.49 | 0.06 |
| StDev | | 0.06 | 0.06 | 0.58 | 32.25 | 16.86 | 202.91 | 102.32 | 9.03 | 0.53 | 0.41 | 0.02 |

| Site Name | Date | Flow (MGD) | pH (Lab) | pH (Field) | Acidity (mg/L) | Alkalinity (mg/L) | Conductivity (uS) | TDS (mg/L) | TSS (mg/L) | Al (mg/L) | Fe (mg/L) | Mn (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PC5 | 8/8/2007 | 0.87 | 7.9 | 7.62 | -77.6 | 141.2 | 1082 | 541 | 18 | 0.928 | 0.906 | 0.436 |
| PC5 | 10/4/2007 | 0.6 | 7.6 | 7.25 | -76 | 122.1 | 1149 | 574 | 12 | 0.998 | 0.694 | 0.677 |
| PC5 | 3/27/2007 | 8.09 | 7.7 | 8.17 | -125.4 | 145.8 | 664 | 332 | 1.5 | 1.534 | 0.506 | 0.539 |
| PC5 | 6/26/2008 | 2.82 | 7.8 | 8 | -111 | 132.6 | 798 | 398 | 16 | 1.363 | 1.011 | 0.442 |
| | Average | 3.10 | 7.75 | 7.76 | -97.50 | 135.43 | 923.25 | 461.25 | 11.88 | 1.21 | 0.78 | 0.52 |
| StDev | | 3.47 | 0.13 | 0.41 | 24.62 | 10.43 | 230.26 | 115.15 | 7.35 | 0.29 | 0.22 | 0.11 |

| Site Name | Date | Flow (MGD) | pH (Lab) | pH (Field) | Acidity (mg/L) | Alkalinity (mg/L) | Conductivity (uS) | TDS (mg/L) | TSS (mg/L) | Al (mg/L) | Fe (mg/L) | Mn (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PCTR2 | 8/8/2007 | 0.32 | 8.05 | 7.87 | -50.9 | 102.4 | 1123 | 556 | 1.5 | 0.25 | 0.302 | 0.063 |
| PCTR2 | 10/4/2007 | 0.17 | 7.9 | 7.64 | -64.8 | 84.4 | 1105 | 548 | 1.5 | 0.25 | 0.15 | 0.025 |
| PCTR2 | 3/28/2008 | 1.28 | 7.8 | 8.39 | -91.2 | 112 | 684 | 339 | 4 | 1.833 | 0.678 | 0.54 |
| PCTR2 | 6/26/2008 | 0.65 | 7.9 | 8.16 | -74.6 | 94.6 | 845 | 422 | 8 | 0.739 | 0.442 | 0.125 |
| | Average | 0.61 | 7.91 | 8.02 | -70.38 | 98.35 | 939.25 | 466.25 | 3.75 | 0.77 | 0.39 | 0.19 |
| StDev | | 0.49 | 0.10 | 0.33 | 16.95 | 11.71 | 212.35 | 104.70 | 3.07 | 0.75 | 0.22 | 0.24 |

| Site Name | Date | Flow (MGD) | pH (Lab) | pH (Field) | Acidity (mg/L) | Alkalinity (mg/L) | Conductivity (uS) | TDS (mg/L) | TSS (mg/L) | Al (mg/L) | Fe (mg/L) | Mn (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PCTR3 | 8/8/2007 | 0.04 | 5 | 4.7 | 50 | 9 | 1213 | 605 | 1.5 | 1.79 | 1.32 | 2.05 |
| PCTR3 | 10/4/2007 | 0.0288 | 4.4 | 4.12 | 127 | 7.8 | 1265 | 628 | 1.5 | 12.3 | 0.15 | 3.02 |
| PCTR3 | 3/27/2008 | 0.63 | 4.5 | 4.95 | 349.8 | 9.8 | 945 | 473 | 10 | 15.74 | 4.805 | 2.462 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PCTR3 | 6/26/2008 | 0.14 | 4 | 4.3 | 105.6 | 3.2 | 1157 | 575 | 8 | 15.401 | 1.05 | 2.939 |
| | Average | 0.21 | 4.48 | 4.52 | 158.10 | 7.45 | 1145.00 | 570.25 | 5.25 | 11.31 | 1.83 | 2.62 |
| StDev | | 0.28 | 0.41 | 0.38 | 131.86 | 2.95 | 140.44 | 68.37 | 4.41 | 6.53 | 2.04 | 0.45 |

| Site Name | Date | Flow (MGD) | pH (Lab) | pH (Field) | Acidity (mg/L) | Alkalinity (mg/L) | Conductivity (uS) | TDS (mg/L) | TSS (mg/L) | Al (mg/L) | Fe (mg/L) | Mn (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PC4 | 8/8/2007 | 1.74 | 8.2 | 7.97 | -71.6 | 115.4 | 1097 | 547 | 1.5 | 0.584 | 0.319 | 0.141 |
| PC4 | 10/4/2007 | 0.84 | 7.7 | 7.3 | -67.6 | 93.8 | 1133 | 565 | 1.5 | 0.752 | 0.15 | 0.261 |
| PC4 | 3/27/2008 | 12.35 | 7.65 | 8.01 | -106.5 | 124.2 | 701 | 351 | 26 | 3.25 | 0.922 | 0.639 |
| PC4 | 6/26/2008 | 4.66 | 7.9 | 8.04 | -103 | 117.8 | 823 | 409 | 10 | 1.318 | 0.363 | 0.274 |
| | Average | 4.90 | 7.86 | 7.83 | -87.18 | 112.80 | 938.50 | 468.00 | 9.75 | 1.48 | 0.44 | 0.33 |
| StDev | | 5.23 | 0.25 | 0.35 | 20.41 | 13.20 | 210.32 | 104.59 | 11.55 | 1.22 | 0.34 | 0.22 |

| Site Name | Date | Flow (MGD) | pH (Lab) | pH (Field) | Acidity (mg/L) | Alkalinity (mg/L) | Conductivity (uS) | TDS (mg/L) | TSS (mg/L) | Al (mg/L) | Fe (mg/L) | Mn (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PF1 | 8/15/2007 | 5.99 | 7.6 | 7.55 | -98 | 139.8 | 1242 | 623 | 1.5 | 0.25 | 0.15 | 0.366 |
| PF1 | 10/4/2007 | 3.84 | 7.6 | 7.23 | -95 | 125.6 | 1236 | 618 | 1.5 | 0.25 | 0.15 | 0.273 |
| PF1 | 3/27/2008 | 18 | 8 | 8.69 | -134.4 | 162.2 | 988 | 496 | 1.5 | 0.51 | 0.15 | 0.319 |
| PF1 | 6/26/2008 | 15.45 | 7.5 | 7.98 | -79 | 96.6 | 835 | 418 | 9 | 0.622 | 0.482 | 0.147 |
| | Average | 10.82 | 7.68 | 7.86 | -101.60 | 131.05 | 1075.25 | 538.75 | 3.38 | 0.41 | 0.23 | 0.28 |
| StDev | | 6.95 | 0.22 | 0.63 | 23.40 | 27.47 | 199.15 | 99.64 | 3.75 | 0.19 | 0.17 | 0.09 |

| Site Name | Date | Flow (MGD) | pH (Lab) | pH (Field) | Acidity (mg/L) | Alkalinity (mg/L) | Conductivity (uS) | TDS (mg/L) | TSS (mg/L) | Al (mg/L) | Fe (mg/L) | Mn (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LR1 | 8/15/2007 | 4.38 | 8.2 | 8.03 | -79.8 | 121.6 | 1176 | 585 | 1.5 | 0.25 | 0.15 | 0.025 |
| LR1 | 10/4/2007 | 2.06 | 8 | 7.75 | -58.2 | 100.4 | 1140 | 571 | 1.5 | 0.25 | 0.15 | 0.025 |
| LR1 | 3/27/2008 | 11.77 | 8 | 8.7 | -106.4 | 136.8 | 1075 | 541 | 16 | 1.55 | 0.15 | 0.39 |
| LR1 | 6/27/2008 | *2.369* | 8.1 | 8.44 | -87.2 | 107.6 | 1016 | 506 | 2.5 | 0.25 | 0.307 | 0.071 |
| | Average | 5.14 | 8.08 | 8.23 | -82.90 | 116.60 | 1101.75 | 550.75 | 5.38 | 0.58 | 0.19 | 0.13 |
| StDev | | 4.54 | 0.10 | 0.42 | 19.92 | 16.09 | 70.82 | 35.03 | 7.10 | 0.65 | 0.08 | 0.18 |

| Site Name | Date | Flow (MGD) | pH (Lab) | pH (Field) | Acidity (mg/L) | Alkalinity (mg/L) | Conductivity (uS) | TDS (mg/L) | TSS (mg/L) | Al (mg/L) | Fe (mg/L) | Mn (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LW1 | 8/15/2007 | 1.97 | 8 | 7.96 | -42 | 64.2 | 1952 | 972 | 1.5 | 0.25 | 0.15 | 0.149 |
| LW1 | 10/4/2007 | 1.24 | 8 | 7.85 | -37.6 | 58.8 | 1916 | 953 | 4 | 0.25 | 0.15 | 0.156 |
| LW1 | 3/28/2008 | *5.033* | 7.9 | 8.64 | -42.4 | 61.4 | 846 | 422 | 8 | 1.062 | 0.562 | 0.304 |
| LW1 | 6/26/2008 | 6.18 | 7.9 | 8.35 | -43.6 | 59.8 | 823 | 413 | 6 | 0.25 | 0.15 | 0.078 |
| | Average | 3.61 | 7.95 | 8.20 | -41.40 | 61.05 | 1384.25 | 690.00 | 4.88 | 0.45 | 0.25 | 0.17 |
| | StDev | 2.38 | 0.06 | 0.36 | 2.62 | 2.36 | 635.04 | 314.77 | 2.78 | 0.41 | 0.21 | 0.09 |

| Site Name | Date | Flow (MGD) | pH (Lab) | pH (Field) | Acidity (mg/L) | Alkalinity (mg/L) | Conductivity (uS) | TDS (mg/L) | TSS (mg/L) | Al (mg/L) | Fe (mg/L) | Mn (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PCTR4 | 8/15/2007 | 0.04323 | 8.2 | 8.03 | -108.8 | 127.2 | 1775 | 892 | 1.5 | 0.25 | 0.326 | 0.064 |
| PCTR4 | 10/4/2007 | 0.036 | 8.2 | 8.01 | -108.6 | 130.8 | 1839 | 924 | 1.5 | 0.25 | 0.15 | 0.025 |
| PCTR4 | 3/28/2008 | *0.322* | 8 | 8.75 | -80 | 98.6 | 1097 | 547 | 12 | 0.775 | 0.472 | 0.151 |
| PCTR4 | 6/26/2008 | 0.1441 | 8 | 8.43 | -93 | 105.2 | 1429 | 714 | 12 | 0.25 | 0.15 | 0.073 |
| | Average | 0.14 | 8.10 | 8.31 | -97.60 | 115.45 | 1535.00 | 769.25 | 6.75 | 0.38 | 0.27 | 0.08 |
| | StDev | 0.13 | 0.12 | 0.35 | 13.87 | 15.94 | 343.07 | 174.61 | 6.06 | 0.26 | 0.16 | 0.05 |

| Site Name | Date | Flow (MGD) | pH (Lab) | pH (Field) | Acidity (mg/L) | Alkalinity (mg/L) | Conductivity (uS) | TDS (mg/L) | TSS (mg/L) | Al (mg/L) | Fe (mg/L) | Mn (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PC2 | 8/15/2007 | 13.94 | 8 | 7.91 | -97 | 123.6 | 1166 | 584 | 1.5 | 0.25 | 0.15 | 0.081 |
| PC2 | 10/4/2007 | 8.53 | 7.9 | 7.66 | -72.8 | 103.8 | 1194 | 597 | 1.5 | 0.25 | 0.15 | 0.025 |
| PC2 | 3/28/2008 | *12.302* | 8 | 8.71 | -109 | 126.6 | 879 | 440 | 40 | 2.973 | 1.526 | 0.322 |
| PC2 | 6/27/2008 | *35.301* | 8 | 8.33 | -89.8 | 111.8 | 1004 | 500 | 2.5 | 0.25 | 0.15 | 0.091 |
| | Average | 17.52 | 7.98 | 8.15 | -92.15 | 116.45 | 1060.75 | 530.25 | 11.38 | 0.93 | 0.49 | 0.13 |
| | StDev | 12.07 | 0.05 | 0.46 | 15.14 | 10.58 | 147.29 | 73.95 | 19.09 | 1.36 | 0.69 | 0.13 |

| Site Name | Date | Flow (MGD) | pH (Lab) | pH (Field) | Acidity (mg/L) | Alkalinity (mg/L) | Conductivity (uS) | TDS (mg/L) | TSS (mg/L) | Al (mg/L) | Fe (mg/L) | Mn (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PC3 | 8/15/2007 | 8.22 | 7.8 | 7.65 | -99 | 129.6 | 1136 | 569 | 1.5 | 0.25 | 0.15 | 0.23 |
| PC3 | 10/4/2007 | 5.31 | 8 | 7.35 | -252 | 273.8 | 1225 | 612 | 14 | 0.25 | 0.35 | 0.025 |
| PC3 | 3/28/2008 | *24.802* | 8 | 8.7 | -102 | 128.4 | 785 | 386 | 24 | 2.085 | 1.02 | 0.326 |
| PC3 | 6/27/2008 | *8.643* | 7.9 | 8.19 | -94.2 | 115 | 1011 | 506 | 2.5 | 0.25 | 0.15 | 0.162 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average | 11.74 | 7.93 | 7.97 | -136.80 | 161.70 | 1039.25 | 518.25 | 10.50 | 0.71 | 0.42 | 0.19 |
| | StDev | 8.83 | 0.10 | 0.60 | 76.87 | 75.03 | 190.88 | 98.33 | 10.64 | 0.92 | 0.41 | 0.13 |

| Site Name | Date | Flow (MGD) | pH (Lab) | pH (Field) | Acidity (mg/L) | Alkalinity (mg/L) | Conductivity (uS) | TDS (mg/L) | TSS (mg/L) | Al (mg/L) | Fe (mg/L) | Mn (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PCTR5 | 8/15/2007 | 0.036 | 8 | 7.9 | -249 | 280.6 | 2526 | 1255 | 4 | 0.25 | 0.58 | 0.025 |
| PCTR5 | 10/4/2007 | 0.0216 | 7.7 | 7.89 | -94.6 | 118.6 | 2573 | 1289 | 1.5 | 0.25 | 0.15 | 0.212 |
| PCTR5 | 3/28/2008 | *0.705* | 8.2 | 8.89 | -211.2 | 257.6 | 859 | 433 | 1.5 | 0.25 | 0.15 | 0.025 |
| PCTR5 | 6/27/2008 | 0.1441 | 8.1 | 8.41 | -259.6 | 280.4 | 1793 | 898 | 20 | 0.665 | 0.645 | 0.025 |
| | Average | 0.23 | 8.00 | 8.27 | -203.60 | 234.30 | 1937.75 | 968.75 | 6.75 | 0.35 | 0.38 | 0.07 |
| | StDev | 0.32 | 0.22 | 0.48 | 75.58 | 77.89 | 802.96 | 398.55 | 8.91 | 0.21 | 0.27 | 0.09 |

| Site Name | Date | Flow (MGD) | pH (Lab) | pH (Field) | Acidity (mg/L) | Alkalinity (mg/L) | Conductivity (uS) | TDS (mg/L) | TSS (mg/L) | Al (mg/L) | Fe (mg/L) | Mn (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BR1 | 3/28/2008 | *1.647* | 7.5 | 8.19 | -24.6 | 42 | 734 | 369 | 16 | 2.606 | 0.594 | 0.622 |
| BR1 | 6/26/2008 | 0.85 | 7.5 | 7.75 | -34.2 | 49.6 | 903 | 452 | 2.5 | 0.709 | 0.15 | 0.474 |
| | Average | 1.25 | 7.50 | 7.97 | -29.40 | 45.80 | 818.50 | 410.50 | 9.25 | 1.66 | 0.37 | 0.55 |
| | StDev | 0.56 | 0.00 | 0.31 | 6.79 | 5.37 | 119.50 | 58.69 | 9.55 | 1.34 | 0.31 | 0.10 |

Underlined values are included in the data set at half the detection limit.

# Attachment G

***TMDLs and NPDES Permitting Coordination***

NPDES permitting is unavoidably linked to TMDLs through waste load allocations and their translation, through the permitting program, to effluent limits. Primary responsibility for NPDES permitting rests with the District Mining Offices (for mining NPDES permits) and the Regional Offices (for industrial NPDES permits). Therefore, the DMOs and Regions will maintain tracking mechanisms of available waste load allocations, etc. in their respective offices. The TMDL program will assist in this effort. However, the primary role of the TMDL program is TMDL development and revision/amendment (the necessity for which is as defined in the Future Modifications section) at the request of the respective office. All efforts will be made to coordinate public notice periods for TMDL revisions and permit renewals/reissuances.

**Load Tracking Mechanisms**

The Department has developed tracking mechanisms that will allow for accounting of pollution loads in TMDL watersheds. This will allow permit writers to have information on how allocations have been distributed throughout the watershed in the watershed of interest while making permitting decisions. These tracking mechanisms will allow the Department to make minor changes in WLAs without the need for EPA to review and approve a revised TMDL. Tracking will also allow for the evaluation of loads at downstream points throughout a watershed to ensure no downstream impairments will result from the addition, modification or movement of a permit.

**Options for Permittees in TMDL Watersheds**

The Department is working to develop options for mining permits in watersheds with approved TMDLs.

**Options identified**

- Build excess WLA into the TMDL for anticipated future mining. This could then be used for a new permit. Permittee must show that there has been actual load reduction in the amount of the proposed permit or must include a schedule to guarantee the reductions using current data referenced to the TMDL prior to permit issuance.
- Use WLA that is freed up from another permit in the watershed when that site is reclaimed. If no permits have been recently reclaimed, it may be necessary to delay permit issuance until additional WLA becomes available.
- Re-allocate the WLA(s) of existing permits. WLAs could be reallocated based on actual flows (as opposed to design flows) or smaller than approved pit/spoil areas (as opposed to default areas). The "freed-up" WLA could be applied to the new permit. This option would require the simultaneous amendment of the permits involved in the reallocation.
- Non-discharge alternative.

**Other possible options**

The following two options have also been identified for use in TMDL watersheds. However, before recommendation for use as viable implementation options, a thorough regulatory (both state and federal) review must be completed. These options should not be implemented until the completion of the regulatory review and development of any applicable administrative mechanisms.

- Issue the permit with in-stream water quality criteria values as the effluent limits. The in-stream criteria value would represent the monthly average, with the other limits adjusted accordingly (e.g., for Fe, the limits would be 1.5 mg/L monthly average, 3.0 mg/L daily average and 4.0 instantaneous max mg/L).

- The applicant would agree to treat an existing source (point or non-point) where there is no responsible party and receive a WLA based on a portion of the load reduction to be achieved. The result of using these types of offsets in permitting is a net improvement in long-term water quality through the reclamation or treatment of an abandoned source.

# Attachment H
## Comment and Response

No public comments were received on the Peters Creek Watershed TMDL.

# Appendix C

## Peters Creek Watershed Water Quality Sampling

| Month | Date | Year | Time | pH | Temp | Conductivity | Tracer Cond | pH(Buf strip) | Location | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| February | 17 | 2011 | 15:09 | 8.30 | 43.2 | 1180 | | | 100 Acres Branch catfish Run above 1st downstream parking area | |
| March | 29 | 2011 | 14:37 | 3.85 | 52.7 | 1470 | | | AMD Discharge into Peters Creek at Lawsons Plaza w edge of Finleyville | |
| October | 26 | 2009 | 16:01 | 6.58 | 53.8 | 1086 | | | Beam Run above AMD Trib | |
| July | 14 | 2011 | 10:08 | 4.36 | 58.0 | 1407 | | | Beam Run at Chamberlain Rd Bridge | |
| July | 19 | 2011 | 10:21 | 5.34 | 63.6 | 1105 | | | Beam Run at Chamberlain Rd Bridge | Bacterial Site/High Flow |
| July | 28 | 2011 | 9:42 | 8.51 | 59.1 | 1374 | | | Beam Run at Chamberlain Rd Bridge | Bacterial Site/Normal Flow |
| August | 11 | 2011 | 10:22 | 4.84 | 58.5 | 1343 | | | Beam Run at Chamberlain Rd Bridge | Bacterial Site/Normal Flow |
| August | 18 | 2011 | 9:58 | 4.84 | 58.1 | 1318 | | | Beam Run at Chamberlain Rd Bridge | Bacterial Site/Normal Flow |
| September | 1 | 2011 | 11:17 | 7.69 | 66.2 | 499 | | | Beam Run at Chamberlain Rd Bridge | Bacterial Site/Flow Very High |
| February | 2 | 2012 | 10:53 | 5.34 | 45.4 | 1264 | | | Beam Run at trail crossing near reclamation mine site. | |
| July | 7 | 2011 | 10:05 | 4.09 | 59.1 | 1432 | | | Beam Run Bacterial Sampling Site WP153 Normal Flow | |
| June | 30 | 2011 | 11:49 | 4.04 | 60.3 | 1414 | | | Beam Run Bacterial Sampling WP150 | |
| March | 9 | 2013 | 14:22 | 3.98 | 51.0 | 1365 | | | Beam Run AMD discharge downstream(southern) branch | |
| March | 9 | 2013 | 14:16 | 3.67 | 53.2 | 1265 | | | Beam Run AMD discharge upstream(northern) branch | |
| October | 26 | 2009 | 15:44 | 3.35 | 53.9 | 1458 | | | Beam Run AMD tributary | |
| June | 4 | 2013 | 15:03 | 3.87 | 54.8 | 1290 | 1198 | 4.00 | Beam Run AMD tributary | |
| June | 17 | 2013 | 14:30 | 3.83 | 56.6 | 1274 | 1221 | | Beam Run AMD tributary | |
| July | 2 | 2013 | 14:27 | 3.87 | 56.6 | 1369 | 1237 | 4.00 | Beam Run AMD tributary | Flow above normal; Flow clear |
| July | 18 | 2013 | 12:27 | 3.7 | 56.4 | 1403 | 1261 | | Beam Run AMD tributary | |
| July | 30 | 2013 | 14:53 | 3.94 | 55.2 | 1414 | 1316 | 4.00 | Beam Run AMD tributary | |
| August | 13 | 2013 | 13:46 | 4 | 56.1 | 1390 | 1272 | | Beam Run AMD tributary | Air Temp 75 deg F; Sunny; No precip; Flow normal; Flow clear |
| August | 29 | 2013 | 13:59 | 4.05 | 56.5 | 1376 | 1282 | 4.00 | Beam Run AMD tributary | Air Temp 75 deg F; Flow normal; Flow clear; Sunny; Partly Cloudy; No precip |
| September | 15 | 2013 | 13:44 | 3.86 | 55.0 | 1378 | 1300 | | Beam Run AMD tributary | Air Temp 64 deg F; Sunny; Partly Cloudy; Flow normal; Flow clear; No precip |
| October | 2 | 2013 | 12:56 | 3.89 | 55.9 | 1363 | 1292 | 4.25 | Beam Run AMD tributary | Air Temp 71 deg F; Partly Cloudy; Sunny; Flow normal; Flow clear; No precip |
| October | 17 | 2013 | 12:54 | 4.1 | 54.7 | 1328 | 1284 | 4.00 | Beam Run AMD tributary | Air Temp 58 deg F; Overcast; Drizzling; Flow normal; Flow clear |
| November | 4 | 2013 | 12:27 | 4.14 | 51.7 | 1302 | 1321 | | Beam Run AMD tributary | Air Temp 48 deg F; Overcast; Mostly Cloudy; Flow normal; Flow clear; No precip |
| December | 3 | 2013 | 13:56 | 4.17 | 51.9 | 1378 | 1326 | 5.00 | Beam Run AMD tributary | Air Temp deg 60 deg F;Flow normal; Flow clear; Sunny; Partly cloudy; No precip |
| October | 26 | 2009 | 16:08 | 4.51 | 53.6 | 1316 | | | Beam Run downstream of AMD Trib | |
| July | 27 | 2009 | 15:45 | 7.73 | 68.0 | 1240 | | | Beam Run mouth | |
| August | 4 | 2009 | 12:21 | 7.83 | 64.6 | 1181 | | | Beam Run mouth | |
| July | 28 | 2011 | 12:50 | 7.44 | 69.2 | 1373 | | | Beam Run mouth | |
| March | 30 | 2011 | 12:16 | 7.00 | 41.9 | 1390 | | | Beam Run near mouth | Metals precipitate present on substrate |
| July | 9 | 2012 | 10:59 | 7.81 | 69.6 | 1240 | | | Beam Run near mouth above Peters Creek Rd bridge | Flow normal to below normal; Flow clear; Bromide sample |
| July | 23 | 2012 | 10:10 | 7.80 | 66.5 | 1196 | 1156 | 7.25 | Beam Run near mouth above Peters Creek Rd bridge | Green Frog calling;Tracer Temp 67.1 deg F |
| August | 7 | 2012 | 10:46 | 7.87 | 65.9 | 1224 | 1219 | | Beam Run near mouth above Peters Creek Rd bridge | Flow normal; Flow slightly cloudy |
| August | 21 | 2012 | 11:12 | 7.87 | 61.9 | 1325 | 1279 | 7.50 | Beam Run near mouth above Peters Creek Rd bridge | |
| September | 6 | 2012 | 11:13 | 7.85 | 70.0 | 1325 | 1291 | 7.50 | Beam Run near mouth above Peters Creek Rd bridge | |
| September | 24 | 2012 | 12:08 | 8.05 | 53.0 | 1274 | 1269 | | Beam Run near mouth above Peters Creek Rd bridge | Flow normal; Flow clear; Overcast |
| October | 8 | 2012 | 11:40 | 8.12 | 48.7 | 1202 | 1194 | | Beam Run near mouth above Peters Creek Rd bridge | Flow normal; flow clear |
| November | 8 | 2012 | 14:31 | 8.19 | 42.5 | 1151 | 1117 | | Beam Run near mouth above Peters Creek Rd bridge | Flow normal; Flow clear |
| December | 16 | 2012 | 14:23 | 8.25 | 47.3 | 1131 | 1032 | | Beam Run near mouth above Peters Creek Rd bridge | |
| March | 29 | 2013 | 12:12 | 7.92 | 48.7 | 1133 | 1075 | 7.00 | Beam Run near mouth above Peters Creek Rd bridge | |
| April | 18 | 2013 | 10:52 | 8.06 | 58.2 | 1089 | 1013 | | Beam Run near mouth above Peters Creek Rd bridge | Flow is somewhat high; flow is clear |
| June | 4 | 2013 | 11:20 | 8.17 | 56.4 | 1196 | 1152 | 7.00 | Beam Run near mouth above Peters Creek Rd bridge | Green Frogs calling |
| June | 17 | 2013 | 11:07 | 7.99 | 62.2 | 1075 | 1046 | | Beam Run near mouth above Peters Creek Rd bridge | |
| July | 2 | 2013 | 11:17 | 7.88 | 64.5 | 967 | 900 | 7.00 | Beam Run near mouth above Peters Creek Rd bridge | Flow normal; Flow slightly silted |
| July | 16 | 2013 | 9:59 | 7.9 | 63.3 | 1088 | 1028 | | Beam Run near mouth above Peters Creek Rd bridge | Flow normal; flow clear; changes in stream channel structure due to flooding; little aluminum precipitate on substrate as in past after heavy flooding |
| July | 30 | 2013 | 11:13 | 7.89 | 59.9 | 1193 | 1134 | | Beam Run near mouth above Peters Creek Rd bridge | Flow normal; Flow clear; Sunny |
| August | 14 | 2013 | 12:42 | 7.94 | 60.4 | 1277 | 1220 | | Beam Run near mouth above Peters Creek Rd bridge | Overcast; No precip; Flow normal; Flow clear; Air Temp 61 deg F |
| August | 29 | 2013 | 10:32 | 7.77 | 66.3 | 1002 | 944 | 6.50 | Beam Run near mouth above Peters Creek Rd bridge | Air Temp 72 deg F; Sunny but mostly cloudy; Flow normal; Flow clear |
| September | 13 | 2013 | 12:02 | 7.76 | 62.7 | 1301 | 1267 | 6.50 | Beam Run near mouth above Peters Creek Rd bridge | Flow normal; Flow clear; Overcast; Recent Downburst; Partly Cloudy; Air Temp 60 deg F |
| October | 1 | 2013 | 12:54 | 7.87 | 59.7 | 1313 | 1272 | 7.00 | Beam Run near mouth above Peters Creek Rd bridge | Air Temp 74 deg F; Partly cloudy; Overcast; Flow low; Flow clear |
| October | 17 | 2013 | 10:59 | 7.91 | 58.0 | 1138 | 1113 | 6.75 | Beam Run near mouth above Peters Creek Rd bridge | Air Temp 57 deg F; Flow normal; Overcast; Flow clear; Trace Precip |
| October | 30 | 2013 | 11:56 | 8.03 | 48.1 | 1267 | 1278 | 6.75 | Beam Run near mouth above Peters Creek Rd bridge | Air Temp 64 deg F; Overcast; Partly Cloudy; Flow low; Flow clear; No precip |
| November | 21 | 2013 | 14:35 | 8.22 | 42.8 | 1205 | 1195 | 7.50 | Beam Run near mouth above Peters Creek Rd bridge | Air Temp 62 deg F; Flow normal; Flow clear; Overcast; No precip |
| December | 3 | 2013 | 11:34 | 8.05 | 42.1 | 1263 | 1207 | 7.50 | Beam Run near mouth above Peters Creek Rd bridge | Air Temp 54 deg F; Flow normal; Flow clear; No precip; Partly cloudy; Overcast; Culvert under Peters Creek Rd is too small; Not sized correctly |
| October | 26 | 2009 | 16:44 | 3.79 | 54.3 | 1999 | | | Beam Run Waterman Estates Trib | |
| February | 2 | 2012 | 10:42 | 4.29 | 51.5 | 1204 | | | Beam Run Waterman Estates Tributary | Flow ~ 10-20 GPM |
| October | 24 | 2013 | 13:38 | 7.14 | 50.8 | 658 | 658 | 6.00 | Bebout Rd Trib near mouth | Flow normal to below normal; Sunny; Partly Cloudy; Major trib to Peters Creek in headwaters |
| October | 31 | 2013 | 14:43 | | 57.5 | | 636 | 7.50 | Bebout Rd Trib near mouth | Air temp 71 deg F; Flow low; Flow clear; Cloudy; No precip |
| November | 15 | 2013 | 13:20 | | 44.0 | | 682 | 7.25 | Bebout Rd Trib near mouth | Air temp 55 deg F; Flow low; Flow clear; Sunny; No precip |
| December | 6 | 2013 | 11:00 | | 43.8 | | 692 | | Bebout Rd Trib near mouth | Air temp 38 deg F; Flow high; Flow cloudy; Cloudy; No precip |
| October | 31 | 2013 | 15:15 | | 56.8 | | 720 | 7.75 | Bower Hill Rd near mouth | Air temp 71 deg F; Flow low; Flow clear; Cloudy; No precip |
| November | 15 | 2013 | 13:45 | | 41.9 | | 932 | 7.25 | Bower Hill Rd near mouth | Air temp 55 deg F; Flow low; Flow clear; Sunny; No precip |
| December | 6 | 2013 | 11:25 | | 46.0 | | 479 | | Bower Hill Rd near mouth | Air temp 38 deg F; Flow high; Flow muddy; Cloudy; Precip none |
| February | 17 | 2011 | 15:27 | 8.60 | 47.1 | 879 | | | Catfish Run 100 Acre Branch immediately above confluence with Main Branch | |
| May | 6 | 2011 | 15:40 | 8.56 | 58.2 | 1463 | | | Catfish Run across from Game Preserve in South Park County Park | |
| July | 6 | 2011 | 13:00 | | 76.3 | | 2380 | | Catfish Run across from Game Preserve in South Park County Park | Flow low; Partly cloudy; Trace rain past 48 hrs |
| August | 14 | 2011 | 10:15 | | | | 1157 | | Catfish Run across from Game Preserve in South Park County Park | Flow low; Cloudy; Light rain past 48 hrs |
| August | 29 | 2011 | 15:30 | | | | 1590 | | Catfish Run across from Game Preserve in South Park County Park | Flow low; Cloudy; No precip past 48 hrs |
| September | 10 | 2011 | 16:45 | | 72.1 | | 1880 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Cloudy; Intermittant rain past 48 hrs |
| September | 17 | 2011 | 19:36 | | 60.8 | | 1810 | | Catfish Run across from Game Preserve in South Park County Park | Flow low; Partly cloudy; No precip past 48 hrs |
| September | 24 | 2011 | 17:49 | | 70.5 | | 1809 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Sunny; Light rain past 48 hrs |
| September | 29 | 2011 | 17:52 | | 64.2 | | 1822 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Sunny; No precip past 48 hrs |
| October | 2 | 2011 | 14:08 | | 51.4 | | 654 | | Catfish Run across from Game Preserve in South Park County Park | Flow high; Cloudy; Heavy precip past 48 hrs |
| October | 15 | 2011 | 12:36 | | 57.7 | | 1534 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Partly cloudy; Light rain past 48 hrs |
| October | 18 | 2011 | 16:49 | | 55.0 | | 1620 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Sunny; No precip past 48 hrs |
| October | 28 | 2011 | 18:23 | | 49.6 | | 1354 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Overcast; Intermittent rain past 48 hrs |
| November | 5 | 2011 | 17:02 | | 49.6 | | 1707 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Sunny; No precip past 48 hrs |
| November | 12 | 2011 | 16:17 | | 50.4 | | 1675 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Partly cloudy; No precip past 48 hrs |
| November | 19 | 2011 | 12:34 | | 55.2 | | 1480 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Partly cloudy; No precip past 48 hrs |
| November | 23 | 2011 | 14:59 | | 51.1 | | 839 | | Catfish Run across from Game Preserve in South Park County Park | Flow high; Partly cloudy; Steady rain past 48 hrs |
| December | 3 | 2011 | 17:45 | | 57.6 | | 1391 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Partly cloudy; Light rain past 48 hrs |
| December | 7 | 2011 | 14:24 | | 45.7 | | 860 | | Catfish Run across from Game Preserve in South Park County Park | Flow high; Cloudy; Light mix past 48 hrs |
| December | 12 | 2011 | 10:22 | | 50.4 | | 1690 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Partly cloudy; No precip past 48 hrs |
| December | 24 | 2011 | 10:58 | | 42.3 | | 1233 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Cloudy; Light snow past 48 hours |
| December | 31 | 2011 | 15:48 | | 48.6 | | 1050 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Intermittent rain past 48 hrs |
| January | 16 | 2012 | 12:58 | 9.09 | 38.3 | 1644 | | | Catfish Run across from Game Preserve in South Park County Park | |
| January | 28 | 2012 | | | | | 1472 | | Catfish Run across from Game Preserve in South Park County Park | Flow high; Partly cloudy; Mixed precip past 48 hrs |
| February | 4 | 2012 | | | | | 1421 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Cloudy; Snow past 48 hrs |
| February | 13 | 2012 | | | | | 1046 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Sunny; Snow past 48 hrs |
| February | 25 | 2012 | | | | | 839 | | Catfish Run across from Game Preserve in South Park County Park | Flow high; Overcast; Mixed precip past 48 hrs |
| March | 2 | 2012 | | | | | 1550 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Overcast; Light rain past 48 hrs |
| March | 17 | 2012 | | | | | 1434 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Sunny; Heavy rain past 48 hrs |
| March | 24 | 2012 | | | | | 870 | | Catfish Run across from Game Preserve in South Park County Park | Flow very high; Overcast; Heavy rain past 48 hrs |
| March | 31 | 2012 | | | | | 924 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Sunny; Steady rain past 48 hrs |

| Month | Date | Year | Time | pH | Temp | Conductivity | Tracer Cond | pH(Buf strip) | Location | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| April | 18 | 2012 | | | | | 1586 | | Catfish Run across from Game Preserve in South Park County Park | Flow low; Partly cloudy; No precip past 48 hrs |
| April | 30 | 2012 | | | | | 1715 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Partly cloudy; No precip past 48 hrs |
| May | 12 | 2012 | | | | | 1316 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Sunny; No precip past 48 hrs |
| May | 19 | 2012 | | | | | 1630 | | Catfish Run across from Game Preserve in South Park County Park | Flow low; Sunny; No precip past 48 hrs |
| June | 9 | 2012 | | | | | 1762 | | Catfish Run across from Game Preserve in South Park County Park | Flow low; Sunny; No precip past 48 hrs |
| June | 17 | 2012 | | | | | 1479 | | Catfish Run across from Game Preserve in South Park County Park | Flow low; Partly cloudy; No precip past 48 hrs |
| June | 30 | 2012 | | | | | 1136 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Partly cloudy; Steady rain past 48 hrs |
| July | 11 | 2012 | | | | | 1901 | | Catfish Run across from Game Preserve in South Park County Park | Flow low; Sunny; No precip past 48 hrs |
| July | 19 | 2012 | | | | | 873 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Overcast; Heavy rain past 48 hrs |
| August | 4 | 2012 | | | | | 913 | | Catfish Run across from Game Preserve in South Park County Park | Flow high; Overcast; Heavy rain past 48 hrs |
| August | 13 | 2012 | | | | | 1872 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Partly cloudy; No precip past 48 hrs |
| August | 25 | 2012 | | | | | 1871 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Partly cloudy; No precip past 48 hrs |
| August | 31 | 2012 | | | | | 1185 | | Catfish Run across from Game Preserve in South Park County Park | Flow low; Sunny; No precip past 48 hrs |
| September | 9 | 2012 | | | | | 1251 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Partly cloudy; Steady rain past 48 hrs |
| September | 25 | 2012 | | | | | 1982 | | Catfish Run across from Game Preserve in South Park County Park | Flow low; Overcast; No precip past 48 hrs |
| October | 21 | 2012 | | | | | 1668 | | Catfish Run across from Game Preserve in South Park County Park | Flow low; Partly cloudy; Intermittent rain past 48 hrs |
| November | 4 | 2012 | | | | | 1028 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Overcast; No precip past 48 hrs |
| November | 11 | 2012 | | | | | 1444 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Sunny; Intermittent rain past 48 hrs |
| December | 27 | 2012 | | | | | 1573 | | Catfish Run across from Game Preserve in South Park County Park | Flow normal; Overcast; Snow past 48 hrs |
| April | 3 | 2011 | 16:19 | 3.43 | 53.1 | 2840 | | | Catfish Run AMD discharge downstream of South Park | |
| February | 20 | 2011 | 14:55 | 8.20 | 44.1 | 5130 | | | Catfish Run at Rt88 & Corrigan just out of Culvert | |
| February | 26 | 2011 | 14:13 | 7.90 | 43.2 | 4380 | | | Catfish Run at Rt88 & Corrigan just out of Culvert | |
| March | 20 | 2011 | 13:40 | 8.11 | 48.6 | 3850 | | | Catfish Run at Rt88 & Corrigan just out of Culvert | |
| April | 3 | 2011 | 15:06 | 8.30 | 47.4 | 4260 | | | Catfish Run at Rt88 & Corrigan just out of Culvert | |
| May | 6 | 2011 | 14:41 | 8.27 | 53.3 | 3170 | | | Catfish Run at Rt88 & Corrigan just out of Culvert | |
| January | 8 | 2012 | 13:32 | 8.50 | 47.6 | 3610 | | | Catfish Run at Rt88 & Corrigan just out of Culvert | |
| January | 16 | 2012 | 12:39 | 9.15 | 44.9 | 3840 | | | Catfish Run at Rt88 & Corrigan just out of Culvert | |
| January | 25 | 2012 | 13:13 | 9.24 | 45.3 | 4110 | | | Catfish Run at Rt88 & Corrigan just out of Culvert | Flow above normal |
| February | 7 | 2012 | 14:57 | 7.62 | 46.6 | 3490 | | | Catfish Run at Rt88 & Corrigan just out of Culvert | |
| February | 19 | 2012 | 15:31 | 8.57 | 45.0 | 4580 | | | Catfish Run at Rt88 & Corrigan just out of Culvert | Normal flow |
| February | 28 | 2012 | 15:16 | 8.23 | 46.0 | 4420 | | | Catfish Run at Rt88 & Corrigan just out of Culvert | |
| May | 21 | 2012 | 11:09 | 8.12 | 59.8 | 3280 | | | Catfish Run at Rt88 & Corrigan just out of Culvert | |
| July | 9 | 2012 | 12:33 | 8.13 | 68.5 | 3500 | | | Catfish Run at Rt88 & Corrigan just out of Culvert | Flow somewhat cloudy; Large school of fish in pool below culvert |
| July | 23 | 2012 | 13:35 | 8.15 | 67.7 | 2850 | 3080 | 8.00 | Catfish Run at Rt88 & Corrigan just out of Culvert | Flow normal; experienced heavy flooding; Tracer temp 68.3 deg F |
| August | 21 | 2012 | 14:14 | 8.27 | 67.6 | 3560 | 3940 | 8.00 | Catfish Run at Rt88 & Corrigan just out of Culvert | |
| September | 6 | 2012 | 14:19 | 7.37 | 70.3 | 2540 | 2660 | | Catfish Run at Rt88 & Corrigan just out of Culvert | Probable spill into Catfish Run; water has oily sheen |
| September | 24 | 2012 | 15:08 | 8.19 | 62.6 | 3360 | 3900 | | Catfish Run at Rt88 & Corrigan just out of Culvert | Flow normal; Flow clear; Sunny |
| October | 8 | 2012 | 14:36 | 8.06 | 58.7 | 2960 | 3460 | | Catfish Run at Rt88 & Corrigan just out of Culvert | Flow normal; flow clear |
| November | 9 | 2012 | 11:49 | 8.4 | 52.9 | 3060 | 3500 | | Catfish Run at Rt88 & Corrigan just out of Culvert | |
| December | 19 | 2012 | 14:02 | 8.21 | 51.2 | 2160 | 2240 | | Catfish Run at Rt88 & Corrigan just out of Culvert | Flow above normal |
| March | 29 | 2013 | 14:15 | 7.56 | 45.3 | 2470 | 2470 | 7.50 | Catfish Run at Rt88 & Corrigan just out of Culvert | |
| June | 4 | 2013 | 13:13 | 7.45 | 59.7 | 4200 | 3980 | 8.00 | Catfish Run at Rt88 & Corrigan just out of Culvert | |
| June | 17 | 2013 | 13:06 | 7.41 | 62.9 | 3680 | 3270 | 8.00 | Catfish Run at Rt88 & Corrigan just out of Culvert | |
| July | 2 | 2013 | 12:57 | 8.07 | 66.0 | 2200 | 2180 | 8.00 | Catfish Run at Rt88 & Corrigan just out of Culvert | Flow above normal; somewhat silted |
| July | 16 | 2013 | 11:56 | 7.38 | 65.5 | 3680 | 3410 | | Catfish Run at Rt88 & Corrigan just out of Culvert | Flow above normal; Flow clear; flooding but riparian buffer helped to mitigate damage to stream channel |
| July | 30 | 2013 | 13:09 | 7.56 | 66.0 | 3980 | 3670 | | Catfish Run at Rt88 & Corrigan just out of Culvert | Flow normal; Flow clear; Partly Sunny |
| August | 13 | 2013 | 12:10 | 7.78 | 68.1 | 3560 | 3330 | | Catfish Run at Rt88 & Corrigan just out of Culvert | Flow normal; Flow clear; Sunny |
| August | 29 | 2013 | 12:19 | 7.05 | 68.9 | 2110 | 2160 | 8.00 | Catfish Run at Rt88 & Corrigan just out of Culvert | Air Temp 75 deg F; Flow normal; Flow clear; Overcast but partly cloudy; No precip |
| September | 15 | 2013 | 13:02 | 7.41 | 65.4 | 3080 | 2890 | 7.50 | Catfish Run at Rt88 & Corrigan just out of Culvert | Air Temp 64 deg F; Overcast; Mstly Cloudy; No preci; Flow normal; Flow clear |
| September | 30 | 2013 | 11:20 | | 64.9 | | 3330 | 7.50 | Catfish Run at Rt88 & Corrigan just out of Culvert | Flow low; Flow clear; Overcast; No precip; Air Temp 69 deg F |
| October | 15 | 2013 | 17:17 | | 66.5 | | 2990 | 7.50 | Catfish Run at Rt88 & Corrigan just out of Culvert | Air Temp 73 deg F; Flow low; Flow clear; Cloudy; No precip |
| October | 30 | 2013 | 13:53 | | 61.6 | | 2030 | 7.00 | Catfish Run at Rt88 & Corrigan just out of Culvert | Air temp 58 deg F; Flow low; Flow cloudy; Cloudy; No precip |
| November | 10 | 2013 | 14:35 | | 54.6 | | 2040 | 6.50 | Catfish Run at Rt88 & Corrigan just out of Culvert | Air temp 46 deg F; Flow low; Flow cloudy; Cloudy; No precip |
| November | 27 | 2013 | 13:43 | | 44.7 | | 4730 | 6.25 | Catfish Run at Rt88 & Corrigan just out of Culvert | Air temp 30 deg F; Flow normal; Flow clear; Snowy; Precip light |
| December | 11 | 2013 | 16:08 | | 47.4 | | 4010 | 6.50 | Catfish Run at Rt88 & Corrigan just out of Culvert | Air Temp 32 deg F; Flow normal; Flow clear; Cludy; No precip |
| May | 21 | 2012 | 11:25 | 8.14 | 62.1 | 1928 | | | Catfish Run below Corrigan Rd circle | |
| June | 4 | 2013 | 13:36 | 3.65 | 51.9 | 2160 | 2170 | | Catfish Run Brownsville Rd AMD tributary | |
| June | 17 | 2013 | 13:38 | 3.68 | 62.1 | 2100 | 2040 | | Catfish Run Brownsville Rd AMD tributary | |
| July | 2 | 2013 | 13:17 | 3.89 | 62.6 | 2180 | 2070 | 4.00 | Catfish Run Brownsville Rd AMD tributary | Flow normal; flow clear |
| July | 16 | 2013 | 12:21 | 3.77 | 61.8 | 1978 | 1945 | | Catfish Run Brownsville Rd AMD tributary | Flow somewhat above normal; flow clear; 2 frogs |
| July | 30 | 2013 | 13:36 | 3.71 | 58.6 | 2220 | 2200 | | Catfish Run Brownsville Rd AMD tributary | Flow normal |
| August | 13 | 2013 | 12:43 | 3.74 | 60.6 | 2250 | 2220 | | Catfish Run Brownsville Rd AMD tributary | Sunny; Air Temp 76 deg F; No precip; Flow normal; Flow clear |
| August | 29 | 2013 | 12:39 | 3.77 | 61.1 | 2270 | 2230 | 4.00 | Catfish Run Brownsville Rd AMD tributary | Flow normal; Flow clear; Sunny; No precip |
| September | 15 | 2013 | 12:38 | 3.7 | 57.5 | 2300 | 2300 | 3.75 | Catfish Run Brownsville Rd AMD tributary | Air Temp 63 deg F; Sunny; Partly Cloudy; No precip; Flow normal; Algal bloom; Flow clear |
| September | 30 | 2013 | 9:20 | | 56.6 | | 2210 | 4.25 | Catfish Run Brownsville Rd AMD tributary | Flow low; Flow clear; Overcast; Precip none; Air temp 58 deg F |
| October | 15 | 2013 | 16:12 | | 62.6 | | 2280 | 4.25 | Catfish Run Brownsville Rd AMD tributary | Air temp 72 deg F; Flow low; Flow milky; Cloudy; No precip |
| October | 30 | 2013 | 13:39 | | 55.0 | | 2180 | 4.50 | Catfish Run Brownsville Rd AMD tributary | Air temp 59 deg F; Flow low; Flow milky; Cloudy; Precip none |
| November | 10 | 2013 | 14:14 | | 56.6 | | 2520 | 4.50 | Catfish Run Brownsville Rd AMD tributary | Air temp 46 deg F; Flow low; Flow milky; Cloudy; Precip none |
| November | 27 | 2013 | 13:15 | | 48.0 | | 2240 | 5.00 | Catfish Run Brownsville Rd AMD tributary | Air temp 32 deg F; Flow normal; Flow milky; Snowy; Precip light |
| December | 11 | 2013 | 16:25 | | 39.0 | | 2150 | 4.50 | Catfish Run Brownsville Rd AMD tributary | Air temp 32 deg F; Flow normal; Flow milky; Cloudy; No precip |
| February | 20 | 2011 | 15:30 | 8.45 | 43.0 | 3620 | | | Catfish Run down from Parking Lot Bridge exiting lot | |
| December | 24 | 2011 | 10:50 | | 43.2 | | 1245 | | Catfish Run downstream of Corrigan Circle | Flow normal; Cloudy; Light snow past 48 hrs |
| December | 31 | 2011 | 15:40 | | 47.3 | | 1615 | | Catfish Run downstream of Corrigan Circle | Flow normal; Cloudy; Intermittent rain past 48 hrs |
| January | 21 | 2012 | | | | | 4130 | | Catfish Run downstream of Corrigan Circle | Flow normal; Overcast; Mixed precip past 48 hrs |
| January | 28 | 2012 | | | | | 1601 | | Catfish Run downstream of Corrigan Circle | Flow high; Partly cloudy; Mixed precip past 24 hrs |
| February | 4 | 2012 | | | | | 1598 | | Catfish Run downstream of Corrigan Circle | Flow normal; Cloudy; Snow past 48 hrs |
| February | 13 | 2012 | | | | | 1268 | | Catfish Run downstream of Corrigan Circle | Flow normal; Sunny; Snow past 48 hrs |
| February | 25 | 2012 | | | | | 982 | | Catfish Run downstream of Corrigan Circle | Flow high; Overcast; Mixed precip past 48 hrs |
| March | 2 | 2012 | | | | | 1611 | | Catfish Run downstream of Corrigan Circle | Flow normal; Overcast; Light rain past 24 hrs |
| March | 17 | 2012 | | | | | 1529 | | Catfish Run downstream of Corrigan Circle | Flow normal; Sunny; Heavy rain past 48 hrs |
| March | 24 | 2012 | | | | | 994 | | Catfish Run downstream of Corrigan Circle | Flow high; Overcast; Heavy rain past 48 hrs |
| March | 31 | 2012 | | | | | 1067 | | Catfish Run downstream of Corrigan Circle | Flow normal; Sunny; Steady rain past 48 hrs |
| April | 18 | 2012 | | | | | 1471 | | Catfish Run downstream of Corrigan Circle | Flow low; Partly cloudy; No precip past 48 hrs |
| April | 30 | 2012 | | | | | 1728 | | Catfish Run downstream of Corrigan Circle | Flow low; Partly cloudy; No precip past 48 hrs |
| May | 12 | 2012 | | | | | 1569 | | Catfish Run downstream of Corrigan Circle | Flow normal; Sunny; No precip past 48 hrs |
| May | 19 | 2012 | | | | | 1583 | | Catfish Run downstream of Corrigan Circle | Flow low; Sunny; No precip past 48 hrs |
| June | 9 | 2012 | | | | | 1756 | | Catfish Run downstream of Corrigan Circle | Flow low; Sunny; No precip past 48 hrs |
| June | 17 | 2012 | | | | | 1556 | | Catfish Run downstream of Corrigan Circle | Flow low; Partly cloudy; No precip past 48 hrs |
| June | 30 | 2012 | | | | | 1159 | | Catfish Run downstream of Corrigan Circle | Flow normal; Partly cloudy; Steady rain past 48 hrs |
| July | 11 | 2012 | | | | | 1700 | | Catfish Run downstream of Corrigan Circle | Flow low; Sunny; No precip past 48 hrs |
| July | 19 | 2012 | | | | | 1003 | | Catfish Run downstream of Corrigan Circle | Flow normal; Overcast; Heavy rain past 48 hrs |
| August | 4 | 2012 | | | | | 1011 | | Catfish Run downstream of Corrigan Circle | Flow high; Overcast; Heavy rain past 48 hrs |
| August | 13 | 2012 | | | | | 1775 | | Catfish Run downstream of Corrigan Circle | Flow normal; Partly cloudy; No precip past 48 hrs |
| August | 25 | 2012 | | | | | 1792 | | Catfish Run downstream of Corrigan Circle | Flow normal; Partly cloudy; No precip past 48 hrs |
| August | 31 | 2012 | | | | | 1133 | | Catfish Run downstream of Corrigan Circle | Flow normal; Sunny; No precip past 48 hrs |
| September | 9 | 2012 | | | | | 1226 | | Catfish Run downstream of Corrigan Circle | Flow normal; Partly cloudy; Steady rain past 48 hrs |

| Month | Date | Year | Time | pH | Temp | Conductivity | Tracer Cond | pH(Buf strip) | Location | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| September | 25 | 2012 | | | | | 2080 | | Catfish Run downstream of Corrigan Circle | Flow low; Overcast; No precip past 48 hrs |
| October | 21 | 2012 | | | | | 1508 | | Catfish Run downstream of Corrigan Circle | Flow normal; Partly cloudy; Intermittent rain past 48 hrs |
| November | 4 | 2012 | | | | | 1033 | | Catfish Run downstream of Corrigan Circle | Flow normal; Overcast; No precip past 48 hrs |
| November | 11 | 2012 | | | | | 1480 | | Catfish Run downstream of Corrigan Circle | Flow normal; Sunny; Intermittent rain past 48 hrs |
| December | 27 | 2012 | | | | | 1587 | | Catfish Run downstream of Corrigan Circle | Flow normal; Overcast; Snow past 48 hrs |
| February | 20 | 2011 | 15:49 | 8.80 | 37.6 | 2090 | | | Catfish Run immediately before exiting park | |
| February | 26 | 2011 | 14:26 | 8.40 | 43.8 | 2040 | | | Catfish Run immediately before exiting park | |
| March | 20 | 2011 | 14:10 | 8.71 | 50.7 | 1466 | | | Catfish Run immediately before exiting park | |
| April | 3 | 2011 | 16:06 | 8.83 | 47.9 | 1837 | | | Catfish Run immediately before exiting park | |
| May | 6 | 2011 | 16:00 | 8.80 | 58.0 | 1398 | | | Catfish Run immediately before exiting park | |
| January | 8 | 2012 | 13:18 | 8.82 | 41.3 | 1835 | | | Catfish Run immediately before exiting park | |
| January | 16 | 2012 | 13:26 | 9.24 | 37.3 | 1632 | | | Catfish Run immediately before exiting park | Fairground bridge renovation in progress/water being diverted around work site. |
| January | 25 | 2012 | 15:02 | 9.25 | 42.5 | 1866 | | | Catfish Run immediately before exiting park | Fairground bridge renovation in progress/water being diverted around work site. |
| February | 7 | 2012 | 15:22 | 8.96 | 43.1 | 1500 | | | Catfish Run immediately before exiting park | |
| February | 19 | 2012 | 15:06 | 8.96 | 42.0 | 1886 | | | Catfish Run immediately before exiting park | Bridge Construction /No water diversion/Eroding stream bank |
| February | 28 | 2012 | 15:53 | 8.93 | 44.1 | 2040 | | | Catfish Run immediately before exiting park | |
| February | 17 | 2011 | 15:42 | 8.13 | 46.5 | 4060 | | | Catfish Run Main Branch above Skating Rink | |
| February | 17 | 2011 | 15:52 | 8.50 | 46.8 | 3860 | | | Catfish Run Main Branch at Maits House | |
| March | 20 | 2011 | 13:53 | 8.52 | 53.3 | 2720 | | | Catfish Run Main Branch at Maits House | |
| April | 3 | 2011 | 15:42 | 8.45 | 48.1 | 3240 | | | Catfish Run Main Branch at Maits House | |
| February | 17 | 2011 | 15:21 | 8.50 | 47.2 | 2980 | | | Catfish Run Main Branch just upstream of confluence with 100Acre Branch | |
| July | 27 | 2009 | 13:55 | 8.15 | 71.5 | 1203 | | | Catfish Run near mouth | |
| August | 3 | 2009 | 12:40 | 8.16 | 68.0 | 1332 | | | Catfish Run near mouth | |
| November | 5 | 2011 | 17:38 | | 46.4 | | 1622 | | Catfish Run near mouth | Flow normal; Sunny; No precip past 48 hrs |
| November | 12 | 2011 | 16:45 | | 48.9 | | 1488 | | Catfish Run near mouth | Flow low; Partly cloudy; No precip past 48 hrs |
| November | 19 | 2011 | 9:57 | | 45.7 | | 1397 | | Catfish Run near mouth | Flow low; Partly cloudy; No precip past 48 hrs |
| November | 23 | 2011 | 15:25 | | 49.3 | | 757 | | Catfish Run near mouth | Flow high; Partly cloudy; Steady rain past 48 hrs |
| December | 3 | 2011 | 17:36 | | 55.2 | | 1395 | | Catfish Run near mouth | Flow normal; Partly cloudy; Light rain past 48 hrs |
| December | 7 | 2011 | 14:38 | | 46.0 | | 923 | | Catfish Run near mouth | Flow high; Cloudy; Light mix past 48 hrs |
| December | 12 | 2011 | 17:53 | | 48.9 | | 1497 | | Catfish Run near mouth | Flow low; Partly cloudy; No precip past 48 hrs |
| December | 24 | 2011 | 11:11 | | 41.5 | | 1186 | | Catfish Run near mouth | Flow normal; Cloudy; Light snow past 48 hrs |
| December | 31 | 2011 | 15:57 | | 47.3 | | 1391 | | Catfish Run near mouth | Flow normal; Cloudy; Intermittent rain past 48 hrs |
| January | 21 | 2012 | | | | | 8540 | | Catfish Run near mouth | Flow normal; Overcast; Mixed precip past 48 hrs |
| January | 28 | 2012 | | | | | 1432 | | Catfish Run near mouth | Flow high; Partly cloudy; Mixed precip past 24 hrs |
| February | 4 | 2012 | | | | | 1407 | | Catfish Run near mouth | Flow normal; Cloudy; Snow past 48 hrs |
| February | 13 | 2012 | | | | | 1196 | | Catfish Run near mouth | Flow normal; Sunny; Snow past 48 hrs |
| February | 25 | 2012 | | | | | 702 | | Catfish Run near mouth | Flow high; Overcast; Mixed precip past 48 hrs |
| March | 2 | 2012 | | | | | 1508 | | Catfish Run near mouth | Flow normal; Overcast; Light rain past 24 hrs |
| March | 17 | 2012 | | | | | 1342 | | Catfish Run near mouth | Flow normal; Sunny; Heavy rain past 48 hrs |
| March | 24 | 2012 | | | | | 935 | | Catfish Run near mouth | Flow high; Overcast; Heavy rain past 48 hrs |
| March | 31 | 2012 | | | | | 1121 | | Catfish Run near mouth | Flow normal; Sunny; Steady rain past 48 hrs |
| April | 18 | 2012 | | | | | 1473 | | Catfish Run near mouth | Flow low; Partly cloudy; No precip past 48 hrs |
| April | 30 | 2012 | | | | | 1536 | | Catfish Run near mouth | Flow low; Partly cloudy; No precip past 48 hrs |
| May | 12 | 2012 | | | | | 1482 | | Catfish Run near mouth | Flow normal; Sunny; No precip past 48 hrs |
| May | 19 | 2012 | | | | | 1446 | | Catfish Run near mouth | Flow normal; Sunny; No precip past 48 hrs |
| June | 9 | 2012 | | | | | 1549 | | Catfish Run near mouth | Flow low; Sunny; No precip past 48 hrs |
| June | 17 | 2012 | | | | | 1423 | | Catfish Run near mouth | Flow normal; Partly cloudy; No precip past 48 hrs |
| June | 30 | 2012 | | | | | 1181 | | Catfish Run near mouth | Flow normal; Partly cloudy; Steady rain past 48 hrs |
| July | 11 | 2012 | | | | | 1596 | | Catfish Run near mouth | Flow normal; Sunny; No precip past 48 hrs |
| July | 19 | 2012 | | | | | 985 | | Catfish Run near mouth | Flow normal; Overcast; Heavy rain past 48 hrs |
| August | 4 | 2012 | | | | | 918 | | Catfish Run near mouth | Flow high; Overcast; Heavy rain past 48 hrs |
| August | 13 | 2012 | | | | | 1622 | | Catfish Run near mouth | Flow normal; Partly cloudy; No precip past 48 hrs |
| August | 25 | 2012 | | | | | 1656 | | Catfish Run near mouth | Flow low; Partly cloudy; No precip past 48 hrs |
| August | 31 | 2012 | | | | | 1139 | | Catfish Run near mouth | Flow normal; Sunny; No precip past 48 hrs |
| September | 9 | 2012 | | | | | 1071 | | Catfish Run near mouth | Flow normal; Partly cloudy; Steady rain past 48 hrs |
| September | 25 | 2012 | | | | | 1735 | | Catfish Run near mouth | Flow normal; Overcast; No precip past 48 hrs |
| October | 21 | 2012 | | | | | 1517 | | Catfish Run near mouth | Flow normal; Partly cloudy; Intermittent rain past 48 hrs |
| November | 4 | 2012 | | | | | 967 | | Catfish Run near mouth | Flow high; Overcast; No precip past 48 hrs |
| November | 11 | 2012 | | | | | 1456 | | Catfish Run near mouth | Flow normal; Sunny; Intermittent rain past 48 hrs |
| December | 27 | 2012 | | | | | 1685 | | Catfish Run near mouth | Flow normal; Overcast; Snow past 48 hrs |
| October | 19 | 2013 | 12:30 | 6.78 | 52.4 | 1242 | 1280 | 7.50 | Church Hill Rd Trib near mouth | Flow normal; Overcast; Flow slightly cloudy; No precip; Air Temp 49 deg F |
| October | 31 | 2013 | 14:15 | | 56.1 | | 1328 | 7.75 | Church Hill Rd Trib near mouth | Air temp 71 deg F; Flow low; Flow clear; Cloudy; No precip |
| November | 15 | 2013 | 12:53 | | 46.7 | | 1346 | 7.25 | Church Hill Rd Trib near mouth | Air temp 55 deg F; Flow low; Flow clear; Sunny; No precip |
| December | 6 | 2013 | 10:40 | | 46.4 | | 770 | | Church Hill Rd Trib near mouth | Air temp 38 deg F; Flow high; Flow muddy; Cloudy; Precip none |
| July | 28 | 2010 | 11:31 | 7.82 | 65.2 | 1177 | | | Coal Bluff above discharge | |
| July | 28 | 2010 | 11:40 | 6.14 | 57.9 | | | | Coal Bluff at discharge site | |
| March | 29 | 2011 | 14:27 | 3.15 | 55.7 | 2470 | | | Finleyville AMD Trib to Peters Creek | Flow ~100-150 GPM |
| June | 7 | 2011 | 9:53 | 3.21 | 56.1 | 1883 | | | Finleyville AMD Trib to Peters Creek | Flow ~100-150 GPM |
| June | 5 | 2013 | 10:11 | 3.44 | 56.7 | 1796 | 1703 | 3.50 | Finleyville AMD Trib to Peters Creek | |
| June | 18 | 2013 | 10:44 | 3.57 | 56.9 | 1753 | 1706 | 3.50 | Finleyville AMD Trib to Peters Creek | Flow above normal |
| July | 3 | 2013 | 10:32 | 3.57 | 57.0 | 1787 | 1663 | 4.00 | Finleyville AMD Trib to Peters Creek | Flow above normal; ~100-120 GPM |
| July | 18 | 2013 | 9:04 | 3.58 | 56.9 | 1774 | 1665 | | Finleyville AMD Trib to Peters Creek | |
| July | 31 | 2013 | 10:26 | 3.63 | 59.0 | 1801 | 1708 | | Finleyville AMD Trib to Peters Creek | Flow normal; Sunny |
| August | 14 | 2013 | 10:59 | 3.57 | 57.9 | 1844 | 1754 | | Finleyville AMD Trib to Peters Creek | Sunny; Partly Cloudy; Flow normal; Flow clear; Air Temp 64 deg F; No precip |
| August | 30 | 2013 | 10:53 | 3.57 | 58.5 | 1865 | 1815 | 3.50 | Finleyville AMD Trib to Peters Creek | Air Temp 80 deg F; Flow normal; Sunny; No precip |
| September | 13 | 2013 | 14:24 | 3.56 | 57.7 | 1861 | 1797 | 3.50 | Finleyville AMD Trib to Peters Creek | Air Temp 61 deg F; Overcast; Trace precip; Flow normal; Flow clear |
| October | 2 | 2013 | 10:01 | 3.55 | 57.8 | 1865 | 1796 | 3.50 | Finleyville AMD Trib to Peters Creek | Air Temp 68 deg F; Sunny; Flow below normal; Flow clear; No precip |
| October | 19 | 2013 | 12:10 | 3.65 | 56.7 | 1810 | 1809 | 3.75 | Finleyville AMD Trib to Peters Creek | Air Temp 55 deg F;Overcast; No precip; Flow normal; Flow clear |
| October | 30 | 2013 | 13:15 | 3.64 | 56.7 | 1816 | 1806 | 3.75 | Finleyville AMD Trib to Peters Creek | Air Temp 66 deg F; Flow normal; Flow clear; Overcast; No precip |
| December | 1 | 2013 | 13:19 | 3.87 | 52.8 | 1837 | 1805 | 6.00 | Finleyville AMD Trib to Peters Creek | Flow normal; Railroad reculverted discharge under tracks and cleared hillside; Overcast; No precip; Air Temp 48 deg F |
| July | 27 | 2009 | 16:02 | 8.14 | 86.7 | 2050 | | | Iron Bridge Ponds | |
| August | 1 | 2013 | 12:17 | 8.07 | 74.6 | 406 | 353 | | Landfill impoundment at old mining highwall at Finleyville Dumps ATV area | |
| March | 22 | 2011 | 16:18 | 7.40 | 53.3 | 1368 | | | Landfill Trib Branch from pond(east) | |
| June | 23 | 2011 | 11:35 | 6.51 | 75.1 | 1187 | | | Landfill Trib Branch from pond(east) | Flow ~ 15 GPM |
| April | 4 | 2013 | 14:47 | 6.71 | 47.3 | 1316 | | | Landfill Trib Branch from pond(east) | |
| July | 4 | 2013 | 10:09 | 7.85 | 76.5 | 876 | 815 | 7.50 | Landfill Trib Branch from pond(east) | |
| August | 31 | 2013 | 11:15 | 6.77 | 66.3 | 1288 | 1242 | 7.50 | Landfill Trib Branch from pond(east) | Air Temp 72 deg F; Overcast; No precip; Very little flow from pond branch; Less than 5 GPM. |
| June | 23 | 2011 | 11:30 | 3.69 | 65.0 | 1267 | | | Landfill Trib to Peters Creek just below confluence of east and west branch | Flow ~70 GPM |
| March | 22 | 2011 | 15:24 | 4.10 | 54.2 | 1538 | | | Landfill Trib to Peters Creek near Mouth | |
| June | 23 | 2011 | 11:59 | 4.58 | 65.8 | 1201 | | | Landfill Trib to Peters Creek near Mouth | |
| April | 4 | 2013 | 13:51 | 5.61 | 51.2 | 1124 | 1084 | | Landfill Trib to Peters Creek near Mouth | Flow cloudy; aluminum precipitate |
| June | 5 | 2013 | 12:18 | 4.65 | 58.7 | 1165 | 1106 | 4.50 | Landfill Trib to Peters Creek near Mouth | Flow ~40-50 GPM |
| June | 18 | 2013 | 12:04 | 7.77 | 65.8 | 955 | 931 | 6.00 | Landfill Trib to Peters Creek near Mouth | Flow above normal; Flow cloudy |
| July | 4 | 2013 | 10:49 | 6.38 | 69.1 | 975 | 925 | 6.00 | Landfill Trib to Peters Creek near Mouth | Flow somewhat above normal; flow slightly silted |
| July | 18 | 2013 | 11:25 | 7.77 | 69.8 | 955 | 885 | | Landfill Trib to Peters Creek near Mouth | Flow above normal; flow somewhat silted |
| August | 1 | 2013 | 12:56 | 5.17 | 65.3 | 1085 | 1032 | | Landfill Trib to Peters Creek near Mouth | |

| Month | Date | Year | Time | pH | Temp | Conductivity | Tracer Cond | pH(Buf strip) | Location | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| August | 15 | 2013 | 14:06 | 4.72 | 60.2 | 1232 | 1182 | 4.50 | Landfill Trib to Peters Creek near Mouth | Flow normal; Flow clear; Substrate silted; AMD precipitate; Air Temp 71 deg F |
| August | 31 | 2013 | 11:42 | 4.75 | 65.3 | 1239 | 1181 | 4.50 | Landfill Trib to Peters Creek near Mouth | Air Temp 76 deg F; Mostly cloudy; Sunny currently; Flow Normal; Flow Clear; Substrate silted |
| September | 15 | 2013 | 11:32 | 4.65 | 54.1 | 1212 | 1219 | 4.00 | Landfill Trib to Peters Creek near Mouth | Air Temp 62 deg F; Sunny; Partly Cloudy; Flow normal; Flow clear; Bottom silty with metals precipitate; No precip |
| October | 2 | 2013 | 11:03 | 4.8 | 58.9 | 1220 | 1188 | 4.25 | Landfill Trib to Peters Creek near Mouth | Air Temp 69 deg F; Overcast; Flow low; Flow clear; No precip |
| October | 19 | 2013 | 10:48 | 7.84 | 49.2 | 1120 | 1124 | 5.75 | Landfill Trib to Peters Creek near Mouth | Overcast; Flow normal; Flow cloudy; No precip |
| November | 4 | 2013 | 13:57 | 5.47 | 42.6 | 1236 | 1248 | | Landfill Trib to Peters Creek near Mouth | Air Temp 51 deg F; Flow low; Flow clear; Overcast; No precip |
| December | 1 | 2013 | 11:37 | 7.57 | 38.9 | 1224 | 1160 | 7.50 | Landfill Trib to Peters Creek near Mouth | Air Temp 47 deg F; Flow normal; Flow slightly cloudy; Sunny; Mostly cloudy |
| March | 22 | 2011 | 16:10 | 2.90 | 53.9 | 2090 | | | Landfill Trib Untreated AMD discharge branch(west) | Flow ~ 60-100 GPM |
| June | 23 | 2011 | 11:40 | 3.25 | 61.9 | 1511 | | | Landfill Trib Untreated AMD discharge branch(west) | |
| April | 4 | 2013 | 14:42 | 3.66 | 54.0 | 1343 | 1281 | | Landfill Trib Untreated AMD discharge branch(west) | Flow ~50-75 GPM |
| July | 4 | 2013 | 10:19 | 4.85 | 62.5 | 1143 | 1075 | 4.00 | Landfill Trib Untreated AMD discharge branch(west) | Flow above normal; contribution more from west branch; precipitation of metals |
| August | 31 | 2013 | 11:08 | 3.69 | 60.7 | 1458 | 1355 | 3.50 | Landfill Trib Untreated AMD discharge branch(west) | Air Temp 72 deg F; Overcast; No precip |
| July | 27 | 2009 | 16:21 | 8.10 | 72.9 | 1796 | | | Lewis Run at Old Clairton Bridge | |
| August | 4 | 2009 | 12:10 | 8.14 | 68.4 | 1870 | | | Lewis Run at Old Clairton Bridge | |
| June | 30 | 2011 | 10:53 | 8.10 | 65.0 | 2010 | | | Lewis Run at Old Clairton Bridge | Bacterial Sampling |
| July | 14 | 2011 | 9:43 | 8.19 | 63.4 | 2080 | | | Lewis Run at Old Clairton Bridge | |
| July | 19 | 2011 | 9:49 | 7.76 | 70.9 | 818 | | | Lewis Run at Old Clairton Bridge | Heavy precipitation previous night |
| July | 28 | 2011 | 9:15 | 8.12 | 68.1 | 2030 | | | Lewis Run at Old Clairton Bridge | Bacterial Site |
| August | 11 | 2011 | 9:45 | 7.21 | 64.5 | 1820 | | | Lewis Run at Old Clairton Bridge | Bacterial Site/Normal Flow |
| August | 18 | 2011 | 9:28 | 7.56 | 65.1 | 1932 | | | Lewis Run at Old Clairton Bridge | Bacterial Site/Normal Flow |
| July | 9 | 2012 | 10:38 | 7.98 | 71.3 | 1790 | | | Lewis Run at Old Clairton Bridge | Flow normal to below normal; Flow clear; Bromide sample |
| July | 23 | 2012 | 9:45 | 8.02 | 68.3 | 2110 | 2130 | 7.50 | Lewis Run at Old Clairton Bridge | Flow normal; Flow clear; Debis buildup upstream of bridge;Tracer temp 69.0 deg F |
| August | 7 | 2012 | 10:26 | 7.91 | 68.1 | 1874 | 1856 | | Lewis Run at Old Clairton Bridge | |
| August | 21 | 2012 | 10:54 | 7.98 | 64.6 | 2030 | 2040 | 7.50 | Lewis Run at Old Clairton Bridge | Flow below normal; Flow clear |
| September | 6 | 2012 | 10:50 | 8.01 | 71.4 | 1798 | 1828 | 7.50 | Lewis Run at Old Clairton Bridge | |
| September | 24 | 2012 | 11:50 | 8.01 | 56.1 | 1985 | 2070 | | Lewis Run at Old Clairton Bridge | Flow normal; Flow clear;Overcast; No precip |
| October | 8 | 2012 | 11:20 | 8.06 | 51.0 | 1863 | 1921 | | Lewis Run at Old Clairton Bridge | Flow normal; flow clear; large debris jam at bridge |
| November | 8 | 2012 | 14:08 | 8.14 | 45.7 | 2020 | 2070 | | Lewis Run at Old Clairton Bridge | Flow normal; Flow clear; Debris jam removed from bridge culvert entrance |
| December | 16 | 2012 | 14:06 | 8.36 | 49.0 | 1862 | 1777 | | Lewis Run at Old Clairton Bridge | |
| March | 29 | 2013 | 11:51 | 7.98 | 48.0 | 2210 | 2160 | | Lewis Run at Old Clairton Bridge | |
| April | 18 | 2013 | 10:35 | 8.11 | 58.1 | 1847 | 1808 | 7.00 | Lewis Run at Old Clairton Bridge | |
| June | 4 | 2013 | 10:57 | 8.16 | 59.8 | 1776 | 1844 | 7.00 | Lewis Run at Old Clairton Bridge | Flow normal; Sunny; Flow clear |
| June | 17 | 2013 | 10:48 | 7.98 | 65.7 | 1583 | 1595 | 7.50 | Lewis Run at Old Clairton Bridge | |
| July | 2 | 2013 | 11:01 | 7.92 | 69.0 | 1207 | 1154 | 7.50 | Lewis Run at Old Clairton Bridge | Flow normal; flow clear |
| July | 16 | 2013 | 9:37 | 7.93 | 66.6 | 1863 | 1888 | | Lewis Run at Old Clairton Bridge | Flow normal; Flow clear |
| July | 30 | 2013 | 10:54 | 7.97 | 63.1 | 1828 | 1855 | | Lewis Run at Old Clairton Bridge | Flow normal; Flow clear; debris jam upstream of bridge culvert |
| August | 13 | 2013 | 10:42 | 8.07 | 67.1 | 1865 | 1885 | | Lewis Run at Old Clairton Bridge | Flow normal; Flow clear; Overcast; No precip |
| August | 29 | 2013 | 10:13 | 7.8 | 68.1 | 1257 | 1209 | 7.00 | Lewis Run at Old Clairton Bridge | Air Temp 79 deg F; Sunny; Flow normal; Flow clear |
| September | 13 | 2013 | 11:40 | 7.9 | 65.3 | 1634 | 1628 | 7.00 | Lewis Run at Old Clairton Bridge | Flow normal; Flow clear; Sunny; Partly Cloudy; Air Temp 66 deg F; Substrate not silted; Debris jam at bridge culvert |
| October | 1 | 2013 | 12:37 | 7.95 | 62.2 | 1892 | 1886 | 7.50 | Lewis Run at Old Clairton Bridge | Air Temp 76 deg F; dlow low; Flow clear; No precip; Overcast; Partly Cloudy |
| October | 17 | 2013 | 10:37 | 7.98 | 59.4 | 1395 | 1390 | 7.00 | Lewis Run at Old Clairton Bridge | Flow normal; Flow clear; Overcast; No precip; Air Temp 58 deg F |
| October | 30 | 2013 | 11:38 | 7.97 | 50.2 | 1887 | 1996 | 7.00 | Lewis Run at Old Clairton Bridge | Flow low; Flow clear; No precip; Sunny; Air Temp 64 deg F |
| November | 21 | 2013 | 14:19 | 8.26 | 46.4 | 1540 | 1589 | 7.75 | Lewis Run at Old Clairton Bridge | Air Temp 60 deg F; Flow normal; Flow clear; Overcast; Partly cloudy; No precip |
| December | 3 | 2013 | 11:16 | 7.98 | 45.0 | 1997 | 2020 | 7.50 | Lewis Run at Old Clairton Bridge | Flow normal; Flow clear; No precip; Sunny; Air Temp 53 deg F |
| July | 7 | 2011 | 9:42 | 7.88 | 66.6 | 2080 | | | Lewis Run Bacterial Sampling Site | Flow normal |
| July | 31 | 2010 | 11:29 | 7.95 | 69.7 | 1952 | | | Lewis Run downstream of Dick Corp bridge near mouth | |
| March | 30 | 2011 | 13:19 | 5.96 | 50.0 | 2020 | | | Lick Run AMD discharge behind Patriot Point along Railroad tracks | |
| July | 27 | 2009 | 15:15 | 8.20 | 72.6 | 1181 | | | Lick Run near mouth | |
| August | 4 | 2009 | 12:48 | 8.32 | 68.8 | 1336 | | | Lick Run near mouth | |
| March | 30 | 2011 | 13:26 | 7.56 | 44.2 | 1758 | | | Lick Run near mouth | |
| July | 9 | 2012 | 11:20 | 8.11 | 73.2 | 1167 | | | Lick Run near mouth | Flow normal; flow clear |
| July | 23 | 2012 | 10:37 | 7.97 | 70.4 | 1382 | 1345 | 7.50 | Lick Run near mouth | Sewage smell; Flow high; Flow slightly cloudy; Tracer temp 71.5 deg F |
| August | 7 | 2012 | 11:08 | 7.94 | 69.7 | 1146 | 1128 | | Lick Run near mouth | |
| August | 21 | 2012 | 11:39 | 7.80 | 65.6 | 1232 | 1186 | 7.50 | Lick Run near mouth | Major sewage related problem evident at site; substrate covered in sewage |
| September | 6 | 2012 | 11:38 | 8.06 | 72.5 | 1171 | 1139 | | Lick Run near mouth | |
| September | 24 | 2012 | 12:30 | 8.23 | 58.0 | 1271 | 1268 | | Lick Run near mouth | Sewage problem cleared up |
| October | 8 | 2012 | 12:01 | 8.28 | 53.5 | 1318 | 1325 | | Lick Run near mouth | Flow normal; flow clear |
| November | 8 | 2012 | 14:54 | 8.27 | 48.6 | 1375 | 1378 | | Lick Run near mouth | |
| December | 16 | 2012 | 14:44 | 8.36 | 51.1 | 1342 | 1249 | | Lick Run near mouth | |
| March | 29 | 2013 | 12:35 | 8.88 | 48.7 | 1997 | 1952 | 7.50 | Lick Run near mouth | |
| April | 18 | 2013 | 11:10 | 8.41 | 58.3 | 1483 | 1404 | | Lick Run near mouth | |
| June | 2 | 2013 | 16:26 | 8.07 | 72.9 | 1265 | 1234 | 7.50 | Lick Run near mouth | |
| June | 17 | 2013 | 11:27 | 8.21 | 66.7 | 1294 | 1286 | | Lick Run near mouth | |
| July | 2 | 2013 | 11:38 | 8.11 | 69.0 | 1118 | 1062 | 8.00 | Lick Run near mouth | Flow above normal;Flow somewhat silted |
| July | 16 | 2013 | 10:25 | 8.2 | 69.2 | 1528 | 1503 | | Lick Run near mouth | Flow normal; Flow clear; flooding |
| July | 30 | 2013 | 11:36 | 8.28 | 64.2 | 1422 | 1377 | | Lick Run near mouth | |
| August | 13 | 2013 | 10:59 | 8.22 | 70.0 | 1387 | 1358 | | Lick Run near mouth | Flow normal; Flow clear; Overcast; Trace precip |
| August | 29 | 2013 | 10:56 | 8.02 | 70.8 | 959 | 897 | 7.50 | Lick Run near mouth | Air Temp 74 deg F; Flow normal; Flow somewhat silted; Sunny; No precip |
| September | 13 | 2013 | 12:25 | 8.2 | 66.5 | 1297 | 1265 | 7.50 | Lick Run near mouth | Air temp 62 deg F; Flow normal; Flow clear; Overcast; Partly Cloudy; Trace precip |
| October | 1 | 2013 | 13:12 | 8.25 | 64.5 | 1338 | 1291 | 7.50 | Lick Run near mouth | Air Temp 71 deg F; Sunny; Partly Cloudy; Flow low; Flow clear; No precip |
| October | 17 | 2013 | 11:20 | 8.23 | 61.2 | 1124 | 1087 | 6.75 | Lick Run near mouth | Air temp 57 deg F; flow normal; Flow clear; Overcast; Trace precip |
| October | 30 | 2013 | 12:16 | 8.47 | 52.6 | 1355 | 1361 | 7.50 | Lick Run near mouth | Flow low; Flow clear; Partly Cloudy; Overcast; Air Temp 63 deg F; No precip |
| November | 21 | 2013 | 14:51 | 8.62 | 48.7 | 1330 | 1340 | 8.00 | Lick Run near mouth | Air Temp 60 deg F; Flow normal; Flow clear; Partly Cloudy; Sunny; No precip |
| December | 3 | 2013 | 11:49 | 8.44 | 46.8 | 1662 | 1638 | 8.00 | Lick Run near mouth | Flow normal; Flow clear; Overcast; Mostly cloudy; Air Temp 54 deg F; No precip |
| October | 31 | 2009 | 11:48 | 5.53 | 55.0 | 2060 | | | Lick Run Riggs Rd Trib | Flow ~100-200 GPM |
| March | 30 | 2011 | 14:26 | 4.54 | 48.1 | 2610 | | | Lick Run Riggs Rd Trib | |
| March | 17 | 2013 | 8:40 | 6.16 | 43.4 | 1181 | | | Lobbs Run above Scheinbach Rd | |
| June | 5 | 2013 | 13:00 | 6.91 | 63.6 | 1102 | 1055 | 7.50 | Lobbs Run at Lobbs Cemetery | |
| June | 18 | 2013 | 12:33 | 8.17 | 61.7 | 904 | 861 | 7.50 | Lobbs Run at Lobbs Cemetery | |
| July | 2 | 2013 | 15:10 | 7.3 | 65.8 | 887 | 815 | 7.50 | Lobbs Run at Lobbs Cemetery | |
| July | 16 | 2013 | 13:29 | 6.94 | 67.4 | 947 | 871 | | Lobbs Run at Lobbs Cemetery | Flow above normal; Flow silty |
| July | 31 | 2013 | 13:46 | 8.2 | 64.9 | 1145 | 1077 | | Lobbs Run at Lobbs Cemetery | Flow slightly above normal; Flow slightly silty; Substate silted; smell of VOCs |
| August | 13 | 2013 | 14:19 | 6.56 | 70.1 | 1143 | 1089 | | Lobbs Run at Lobbs Cemetery | Flow normal; Flow cloudy; Silted bottom; Sunny; No precip; EQT pipeline work in vicinity |
| August | 29 | 2013 | 14:30 | 7.04 | 71.9 | 1058 | 1006 | 7.50 | Lobbs Run at Lobbs Cemetery | Air Temp 78 deg F; Flow normal; Flow clear; Overcast; No precip |
| October | 2 | 2013 | 13:33 | 6.85 | 65.3 | 1278 | 1241 | 8.00 | Lobbs Run at Lobbs Cemetery | Flow low; Flow clear; Sunny; No preci |
| November | 4 | 2013 | 15:25 | 6.96 | 46.5 | 1214 | 1224 | | Lobbs Run at Lobbs Cemetery | Sunny; Partly Cloudy; No precip; Flow low; Flow Clear; Air Temp 53 deg F |
| November | 21 | 2013 | 15:27 | 8.55 | 45.1 | 1127 | 1105 | 7.75 | Lobbs Run at Lobbs Cemetery | Flow normal; Flow clear; Sunny; Partly cloudy; No precip; Air Temp 62 deg F |
| December | 3 | 2013 | 14:27 | 7.23 | 44.9 | 1163 | 1086 | 7.50 | Lobbs Run at Lobbs Cemetery | Air Temp 59 deg F; Sunny; partly cloudy; Flow normal to above normal; Flow clear; No precip |
| March | 23 | 2011 | 12:28 | 3.40 | 55.3 | 1985 | | | McChain Rd Trib to Peters Creek | Flow ~150 GPM; AMD discharge at culvert exit |
| June | 17 | 2011 | 11:24 | 3.60 | 55.4 | 1400 | | | McChain Rd Trib to Peters Creek | Flow ~100 GPM; AMD discharge at culvert exit; Culverted under McChain Rd |
| October | 24 | 2013 | 13:00 | 5.49 | 50.5 | 1256 | 1344 | 4.50 | McChain Rd Trib to Peters Creek at mouth | Unsized concrete rubble on RAB for stabilization; Aluminum precipitate in substrate in Peters Creek at and downstream of confluence |
| March | 23 | 2011 | 12:18 | 3.57 | 53.9 | 1757 | | | McChain Rd Trib to Peters Creek downstream of discharge | Flow ~400-500 GPM |
| March | 29 | 2011 | 14:14 | 8.22 | 45.8 | 1022 | | | McClelland Rd Trib | Flow ~ 100-150 GPM |
| October | 31 | 2013 | 15:00 | | 56.3 | | 963 | 8.00 | McComb Rd Trib near mouth | Air temp 71 deg F; Flow low; Flow clear; Cloudy; No precip |
| November | 15 | 2013 | 13:30 | | 43.4 | | 1257 | 7.50 | McComb Rd Trib near mouth | Air temp 55 deg F; Flow low; Flow clear; Sunny; No precip |
| December | 6 | 2013 | 11:15 | | 46.2 | | 662 | | McComb Rd Trib near mouth | Air temp 38 deg F; Flow high; Flow cloudy; Cloudy; No precip |

| Month | Date | Year | Time | pH | Temp | Conductivity | Tracer Cond | pH(Buf strip) | Location | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| February | 2 | 2012 | 9:37 | 6.84 | 44.6 | 2150 | | | Mineral Run above discharge | Aluminum precipitate/Normal flow |
| February | 2 | 2012 | 10:01 | 3.59 | 51.1 | 2050 | | | Mineral Run Far Tributary | Flow ~50 GPM |
| June | 18 | 2013 | 9:42 | 3.53 | 58.7 | 1753 | 1756 | 3.50 | Mineral Run Far Tributary | |
| July | 2 | 2013 | 13:54 | 3.55 | 63.1 | 1808 | 1737 | 3.50 | Mineral Run Far Tributary | Flow above normal |
| July | 16 | 2013 | 13:04 | 3.61 | 61.2 | 1815 | 1791 | | Mineral Run Far Tributary | |
| July | 30 | 2013 | 14:27 | 3.66 | 60.8 | 1836 | 1781 | | Mineral Run Far Tributary | |
| August | 13 | 2013 | 13:19 | 3.62 | 61.8 | 1819 | 1755 | | Mineral Run Far Tributary | Sunny; Flow normal; Flow Clear; No precip; Air Temp 78 deg F |
| August | 29 | 2013 | 13:34 | 3.62 | 61.9 | 1786 | 1697 | 3.50 | Mineral Run Far Tributary | Air Temp 78 deg F; Flow above normal; Flow clear; No precip; Partly cloudy; no sunshine currently |
| September | 17 | 2013 | 13:39 | 3.68 | 58.4 | 1762 | 1712 | 4.00 | Mineral Run Far Tributary | Air Temp 64 deg F; Sunny; Flow normal; Flow clear; No precip; Middle branch not flowing |
| October | 2 | 2013 | 12:33 | 3.65 | 60.7 | 1770 | 1698 | 3.75 | Mineral Run Far Tributary | Air Temp 72 deg F; Partly Cloudy; Sunny; Flow normal; Flow clear; No precip |
| October | 17 | 2013 | 12:33 | 3.66 | 57.1 | 1702 | 1662 | 3.75 | Mineral Run Far Tributary | Air temp 57 deg F; Overcast; Flow normal; Flow clear; No precip |
| November | 4 | 2013 | 13:03 | 4.06 | 47.3 | 1709 | 1742 | | Mineral Run Far Tributary | Flow normal to below normal; Sunny; Partly cloudy; No precip; Flow clear; Debris jam cleaned out of culvert entrance |
| December | 3 | 2013 | 13:31 | 3.95 | 49.8 | 1716 | 1677 | 4.00 | Mineral Run Far Tributary | Flow normal; Flow clear; No precip; Sunny |
| February | 2 | 2012 | 9:57 | | | 1864 | | | Mineral Run Middle Tributary | |
| June | 18 | 2013 | 9:49 | 3.61 | 59.0 | 1752 | 1745 | 3.50 | Mineral Run Middle Tributary | |
| July | 2 | 2013 | 13:47 | 3.56 | 63.5 | 1772 | 1683 | 3.50 | Mineral Run Middle Tributary | Flow above normal |
| July | 16 | 2013 | 12:56 | 3.53 | 63.0 | 1792 | 1763 | | Mineral Run Middle Tributary | |
| July | 30 | 2013 | 14:20 | 3.56 | 64.4 | 1809 | 1756 | | Mineral Run Middle Tributary | |
| December | 3 | 2013 | 13:22 | 3.83 | 50.3 | 1688 | 1647 | 6.00 | Mineral Run Middle Tributary | |
| February | 2 | 2012 | 9:51 | 7.21 | 45.2 | 1630 | | | Mineral Run Pond tributary | |
| June | 18 | 2013 | 9:35 | 6.29 | 67.7 | 946 | 969 | 6.00 | Mineral Run Pond tributary | |
| July | 2 | 2013 | 13:41 | 6.4 | 73.8 | 1002 | 955 | 7.00 | Mineral Run Pond tributary | |
| July | 16 | 2013 | 12:46 | 6.68 | 76.0 | 1455 | 1454 | | Mineral Run Pond tributary | |
| July | 30 | 2013 | 14:12 | 6.36 | 69.8 | 1224 | 1260 | | Mineral Run Pond tributary | |
| August | 13 | 2013 | 13:08 | 6.28 | 73.0 | 1417 | 1425 | | Mineral Run Pond tributary | Sunny; Air Temp 74 deg F; Flow normal; Flow clear |
| August | 29 | 2013 | 13:25 | 6.29 | 73.4 | 870 | 829 | 6.00 | Mineral Run Pond tributary | Sunny; Partly Cloudy; No precip; Flow above normal; Flow silty; Air Temp 76 deg F |
| September | 17 | 2013 | 13:30 | 6.17 | 62.3 | 1289 | 1301 | 5.50 | Mineral Run Pond tributary | Air Temp 62 deg F; Sunny; Flow normal; Flow clear; No precip |
| October | 2 | 2013 | 12:22 | 6.73 | 63.6 | 1478 | 1476 | 5.00 | Mineral Run Pond tributary | Air Temp 72 deg F; Partly Cloudy; Somewhat sunny; Flow sokewhat below normal; Flow slightly cloudy; No precip |
| October | 17 | 2013 | 12:18 | 7.97 | 59.8 | 1110 | 1081 | 6.00 | Mineral Run Pond tributary | Overcast; Trace precip; Flow normal; Flow somewhat cloudy; Air Temp 57 deg F |
| November | 4 | 2013 | 12:54 | 6.6 | 46.6 | 1289 | 1315 | | Mineral Run Pond Tributary | Air Temp 47 deg F; Overcast; Flow normal; Flow clear; No precip |
| December | 3 | 2013 | 13:14 | 8.19 | 43.6 | 1574 | 1532 | 7.00 | Mineral Run Pond Tributary | Air Temp 56 deg F; Flow normal; Flow clear; Sunny; No precip |
| February | 2 | 2012 | 9:43 | 7.40 | 44.0 | 2100 | | | Mineral Run right below discharge | Flow ~30-60 GPM |
| June | 4 | 2013 | 14:27 | 3.53 | 60.4 | 1818 | 1791 | | Mineral Run tributary Far branch | |
| June | 4 | 2013 | 14:20 | 6.01 | 68.5 | 1351 | 1339 | 5.50 | Mineral Run tributary Pond branch | |
| August | 2 | 2013 | 9:40 | 5.42 | 55.5 | 1768 | 1711 | | Oakwood Rd AMD tributary to Lewis Run | |
| July | 27 | 2009 | 15:49 | 8.20 | 73.9 | 1156 | | | Peters Creek above Beam Run Confluence | ATV crossed 15 yards upstream approx 5 minutes to sampling |
| August | 4 | 2009 | 12:25 | 8.28 | 68.8 | 1271 | | | Peters Creek above Beam Run Confluence | |
| April | 4 | 2013 | 14:02 | 7.02 | 45.4 | 1013 | | | Peters Creek above Landfill Trib confluence | Flow somewhat cloudy |
| October | 31 | 2013 | 14:00 | | 55.4 | | 1019 | 7.50 | Peters Creek above one lane Rankintown bridge | Air temp 71 deg F; Flow low; Flow clear; Cloudy; No precip |
| November | 15 | 2013 | 12:47 | | 43.5 | | 1083 | 7.75 | Peters Creek above one lane Rankintown bridge | Air temp 55 deg F; Flow low; Flow clear; Sunny; No precip |
| December | 6 | 2013 | 10:30 | | 45.3 | | 588 | | Peters Creek above one lane Rankintown bridge | Air temp 38 deg F; Flow high; Flow muddy; Cloudy; Precip none |
| July | 7 | 2011 | 12:32 | 7.77 | 70.6 | 1246 | | | Peters Creek above Piney Fork confluence | Above section of Peters Creek effected by 48 inch water main break and salt spill on day of incident |
| July | 24 | 2010 | 10:31 | 7.95 | 75.9 | | | | Peters Creek across from Greenawalt Driveway | |
| December | 1 | 2013 | 12:06 | 8.12 | 36.9 | 1196 | 1109 | 8.00 | Peters Creek at bend above James bridge crossing Wypt | Air Temp 44 deg F; Flow normal; Flow clear to slightly cloudy; Overcast; No precip; No debris jams from Gas Line to James Bridge downstream |
| July | 8 | 2011 | 16:11 | 7.98 | 70.2 | 1611 | | | Peters Creek at Big Bend | Fish kill due to water main break and salt spill previous day |
| September | 15 | 2013 | 11:49 | 6.79 | 56.8 | 1065 | 1034 | 7.00 | Peters Creek at Gasline below TR844 Bridge | Air Temp 62 deg F; Sunny; Partly Cloudy; Flow normal; Flow clear |
| October | 2 | 2013 | 11:17 | 6.75 | 60.6 | 1188 | 1149 | 7.50 | Peters Creek at Gasline below TR844 Bridge | Air Temp 69 deg F; Flow low; Flow clear; No precip; Partly Cloudy; Overcast |
| February | 26 | 2011 | 15:11 | 8.20 | 43.3 | 1662 | | | Peters Creek at Iron Bridge | |
| July | 8 | 2011 | 15:45 | 7.96 | 69.9 | 1626 | | | Peters Creek at Knotweed Project | Heavy rain event previous evening; day following water main break and salt spill; fish kill extensive |
| July | 27 | 2009 | 10:15 | 7.80 | 67.4 | 1275 | | | Peters Creek at Large Park & Ride Lot | Bacterial Sampling Replicate |
| August | 3 | 2009 | 9:47 | 7.91 | 65.8 | 1161 | | | Peters Creek at Large Park & Ride Lot | Bacterial Sampling |
| May | 21 | 2012 | 12:40 | 8.64 | 66.3 | 1334 | | | Peters Creek at Large Park & Ride Lot | Fish fry evident present. |
| July | 9 | 2012 | 10:14 | 7.80 | 72.9 | 1350 | | | Peters Creek at Large Park & Ride Lot | Flow normal |
| July | 23 | 2012 | 9:23 | 7.75 | 69.8 | 1491 | 1474 | 7.50 | Peters Creek at Large Park & Ride Lot | Flow normal |
| August | 7 | 2012 | 10:10 | 7.77 | 68.6 | 1286 | 1274 | | Peters Creek at Large Park & Ride Lot | Flow normal; Flow clear |
| August | 21 | 2012 | 10:37 | 7.88 | 64.1 | 1421 | 1383 | 7.50 | Peters Creek at Large Park & Ride Lot | Flow slightly silted; Flow normal |
| September | 6 | 2012 | 10:30 | 7.67 | 71.5 | 1328 | 1314 | | Peters Creek at Large Park & Ride Lot | Flow normal; Slightly silted |
| September | 24 | 2012 | 11:26 | 7.7 | 56.2 | 1381 | 1394 | 7.25 | Peters Creek at Large Park & Ride Lot | |
| October | 8 | 2012 | 11:03 | 7.89 | 51.1 | 1371 | 1392 | | Peters Creek at Large Park & Ride Lot | Flow normal; flow clear |
| November | 8 | 2012 | 13:17 | 7.72 | 43.4 | 1380 | 1360 | | Peters Creek at Large Park & Ride Lot | Flow normal; Flow clear; Sunny |
| December | 16 | 2012 | 13:26 | 8.39 | 47.2 | 1265 | 1184 | 8.00 | Peters Creek at Large Park & Ride Lot | Datalogger in place |
| January | 6 | 2013 | 14:13 | 9.14 | 39.8 | 1554 | 1583 | 7.50 | Peters Creek at Large Park & Ride Lot | Algal bloom starting to be evident |
| January | 10 | 2013 | 12:56 | | 38.3 | 1763 | 1689 | | Peters Creek at Large Park & Ride Lot | Flow above normal |
| January | 11 | 2013 | 10:40 | | 41.1 | 1681 | 1621 | | Peters Creek at Large Park & Ride Lot | Tracer temp 41.7 deg F; raining; flow cloudy |
| January | 20 | 2013 | 14:44 | | 42.5 | 1374 | 1338 | | Peters Creek at Large Park & Ride Lot | Flow clear; No snow melt |
| March | 29 | 2013 | 11:03 | 7.86 | 43.5 | 1656 | 1578 | 8.00 | Peters Creek at Large Park & Ride Lot | Sunny; Flow normal; Flow clear |
| April | 18 | 2013 | 10:18 | 7.83 | 55.8 | 1350 | 1298 | 8.00 | Peters Creek at Large Park & Ride Lot | Datalogger download |
| June | 2 | 2013 | 15:20 | 7.36 | 74.2 | 1256 | 1245 | 7.50 | Peters Creek at Large Park & Ride Lot | |
| June | 17 | 2013 | 8:47 | 7.81 | 63.6 | 1184 | 1169 | | Peters Creek at Large Park & Ride Lot | Flow normal to above normal; Flow cloudy; sewage from culvert on RAB just downstream |
| July | 2 | 2013 | 10:38 | 7.44 | 67.7 | 969 | 905 | 7.50 | Peters Creek at Large Park & Ride Lot | Sunny; Flow above normal; flow very silted; Photo |
| July | 16 | 2013 | 9:13 | 7.71 | 68.5 | 1307 | 1281 | | Peters Creek at Large Park & Ride Lot | Flow normal; Flow slightly silted; Recent flooding changed stream channel; Sunny; Humid |
| July | 30 | 2013 | 10:18 | 7.72 | 62.6 | 1360 | 1322 | | Peters Creek at Large Park & Ride Lot | Flow normal; sunny |
| August | 1 | 2013 | 10:48 | 8.2 | 65.7 | 1442 | 1381 | | Peters Creek at Large Park & Ride Lot | Flow normal; Datalogger data retrieval |
| August | 13 | 2013 | 10:20 | 7.61 | 69.4 | 1354 | 1337 | | Peters Creek at Large Park & Ride Lot | Flow normal; Flow clear;Overcast |
| August | 29 | 2013 | 9:53 | 7.52 | 69.8 | 951 | 896 | 7.50 | Peters Creek at Large Park & Ride Lot | Flow above normal; Flow cloudy; Overcast; No precip |
| September | 13 | 2013 | 11:12 | 7.46 | 66.6 | 1344 | 1328 | 7.25 | Peters Creek at Large Park & Ride Lot | Flow normal; Flow clear; Sunny; Partly Cloudy; |
| October | 1 | 2013 | 12:18 | 7.41 | 62.3 | 1380 | 1352 | 7.50 | Peters Creek at Large Park & Ride Lot | Air Temp 73 deg F; Overcast; Partly Cloudy; Flow low; Flow clear; No precip |
| October | 17 | 2013 | 10:19 | 7.71 | 60.2 | 1140 | 1121 | 7.50 | Peters Creek at Large Park & Ride Lot | Flow normal; Overcast; Flow clear; No precip; Air Temp 58 deg F |
| October | 22 | 2013 | 12:15 | 7.64 | 53.0 | 1256 | 1308 | 6.75 | Peters Creek at Large Park & Ride Lot | Sunny; Flow normal; Flow clear; Sunny; Rain yesterday evening; Air Temp 46 deg F; Reading Datalogger |
| October | 30 | 2013 | 11:19 | 7.82 | 48.3 | 1460 | 1491 | 7.00 | Peters Creek at Large Park & Ride Lot | Air Temp 58 deg F; Flow low; Flow clear; Partly Cloudy; Sunny; No precip |
| November | 21 | 2013 | 13:57 | 7.66 | 43.3 | 1338 | 1384 | 7.75 | Peters Creek at Large Park & Ride Lot | Air Temp 60 deg F; Flow low; flow clear; Partly Cloudy; Sunny |
| December | 3 | 2013 | 10:55 | 7.27 | 43.5 | 1578 | 1576 | 8.00 | Peters Creek at Large Park & Ride Lot | Air Temp 51; Partly Cloudy; Sunny; Flow normal; Flow clear; No precip |
| July | 9 | 2012 | 14:02 | 8.21 | 78.3 | 956 | | | Peters Creek at Louise Vos in Gastonville | Flow normal; flow clear; Datalogger upright. |
| August | 10 | 2012 | 11:18 | 7.11 | 70.4 | 897 | 868 | | Peters Creek at Louise Vos in Gastonville | |
| September | 24 | 2012 | 14:10 | 8.07 | 56.6 | 1056 | 1092 | | Peters Creek at Louise Vos in Gastonville | |
| October | 8 | 2012 | 13:11 | 6.76 | 48.8 | 1039 | 1053 | | Peters Creek at Louise Vos in Gastonville | Flow normal; flow clear |
| November | 9 | 2012 | 13:33 | 7.96 | 42.9 | 938 | 905 | | Peters Creek at Louise Vos in Gastonville | |
| December | 19 | 2012 | 13:34 | 8.25 | 45.6 | 708 | 673 | | Peters Creek at Louise Vos in Gastonville | Flow above normal |
| June | 5 | 2013 | 11:11 | 7.76 | 60.5 | 1088 | 1010 | 7.50 | Peters Creek at Louise Vos in Gastonville | |
| June | 18 | 2013 | 11:40 | 8.08 | 63.7 | 950 | 918 | 7.50 | Peters Creek at Louise Vos in Gastonville | Flow above normal; Flow clear; Datalogger down; debris jam building up |
| July | 18 | 2013 | 9:56 | 8.02 | 67.2 | 901 | 827 | | Peters Creek at Louise Vos in Gastonville | Flow above normal; flow very silted; cloudy |
| July | 31 | 2013 | 11:34 | 8.17 | 63.6 | 1020 | 950 | | Peters Creek at Louise Vos in Gastonville | Flow normal; no debris jam; channel substrate is sandy; datalogger buried by recent flooding |
| August | 14 | 2013 | 12:11 | 8.17 | 62.0 | 1036 | 972 | | Peters Creek at Louise Vos in Gastonville | Flow normal; Flow clear; Overcast; No precip; Air Temp 59 deg F |
| August | 30 | 2013 | 11:55 | 8.03 | 70.2 | 1002 | 923 | 7.50 | Peters Creek at Louise Vos in Gastonville | Air Temp 78 deg F; Flow normal; Flow clear; Sunny; No precip |
| September | 30 | 2013 | 11:00 | | 60.0 | | 1105 | 7.00 | Peters Creek at Louise Vos in Gastonville | Flow low; Flow clear; Overcast; No precip; Air temp 65 deg F |
| October | 15 | 2013 | 17:02 | | 64.7 | | 1054 | 7.25 | Peters Creek at Louise Vos in Gastonville | Air Temp 74 deg F; Flow low; Flow clear; Cloudy; No precip |

| Month | Date | Year | Time | pH | Temp | Conductivity | Tracer Cond | pH(Buf strip) | Location | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| October | 24 | 2013 | 12:27 | 8.17 | 46.0 | 968 | 991 | 7.00 | Peters Creek at Louise Vos in Gastonville | Flow normal; Flow clear; Substrate very sandy; Partly cloudy; Sunny |
| October | 30 | 2013 | 13:16 | | 50.1 | | 1088 | 7.25 | Peters Creek at Louise Vos in Gastonville | Air temp 59 deg F; Flow low; Flow clear; Overcast; No precip |
| November | 10 | 2013 | 15:01 | | 45.6 | | 981 | 6.00 | Peters Creek at Louise Vos in Gastonville | Air temp 46 deg F; Flow low; Flow clear; Cloudy; No precip |
| November | 27 | 2013 | 12:55 | | 39.5 | | 1136 | 6.75 | Peters Creek at Louise Vos in Gastonville | Air temp 32 deg F; Flow normal to high; Flow murky; Snowy; Precip light |
| December | 11 | 2013 | 16:45 | | 37.7 | | 1159 | 6.50 | Peters Creek at Louise Vos in Gastonville | Air temp 32 deg F; Flow normal; Flow clear; Cloudy; No precip |
| January | 31 | 2012 | 13:58 | 9.42 | 44.9 | 870 | | | Peters Creek at Louise Vos in Gastonville | Cloudy/High Flow |
| May | 15 | 2012 | 11:32 | 8.38 | 59.9 | 888 | | | Peters Creek at Louise Vos in Gastonville | |
| May | 21 | 2012 | 10:31 | 7.42 | 62.2 | 1002 | | | Peters Creek at Louise Vos in Gastonville | Wypt 240 |
| July | 23 | 2012 | 12:47 | 8.10 | 71.5 | 1050 | 1023 | 7.50 | Peters Creek at Louise Vos in Gastonville | Tracer temp 72.3 deg F |
| September | 6 | 2012 | 12:32 | 8.04 | 74.6 | 1195 | 1174 | | Peters Creek at Louise Vos in Gastonville | Flow normal; flow clear; Datalogger upright. |
| July | 3 | 2013 | 11:32 | 8.13 | 67.5 | 847 | 771 | 7.50 | Peters Creek at Louise Vos in Gastonville | Flow above normal; very silted; almost bankfull; dead animal in debris jam just upstream of site |
| June | 6 | 2011 | 11:10 | 8.68 | 64.1 | 1050 | | | Peters Creek at Louise Vos in Gastonville description | |
| July | 7 | 2011 | 16:51 | 7.93 | 70.4 | 1567 | | | Peters Creek at Natural Stream Channel Design Project at US Steel coal waste pile | |
| July | 7 | 2011 | 14:04 | 7.97 | 79.6 | 4600 | | | Peters Creek at Natural Stream Channel Design Project Phase 1 in Jefferson Hills | Day of water main break and salt spill; Fish kill along this section |
| July | 12 | 2011 | 14:42 | 8.41 | 75.8 | 1140 | | | Peters Creek at Natural Stream Channel Design Project Phase 1 in Jefferson Hills | |
| July | 7 | 2011 | 13:50 | 7.87 | 78.4 | 4130 | | | Peters Creek at Peters Creek Wetland Biodiversity Area | Silted flow along right ascending bank |
| May | 25 | 2012 | 8:47 | 7.74 | 63.9 | 1208 | | | Peters Creek at Snowden Wetland | |
| November | 9 | 2012 | 14:50 | 8.22 | 44.9 | 1214 | 1209 | | Peters Creek at Thompson Mine site | |
| December | 16 | 2012 | 14:55 | 8.51 | 48.2 | 1159 | 1072 | | Peters Creek at Thompson Mine site | Flow cloudy |
| January | 6 | 2013 | 14:56 | 8.84 | 40.0 | 1468 | 1466 | | Peters Creek at Thompson Mine site | |
| January | 8 | 2013 | 15:43 | | 38.2 | 1428 | | | Peters Creek at Thompson Mine site | |
| October | 24 | 2013 | 14:19 | | 47.7 | 758 | 717 | 7.00 | Peters Creek at Valleyview Rd | Overcast; Partly Cloudy; Windy; No precip |
| October | 31 | 2013 | 15:30 | | 56.6 | | 776 | 7.75 | Peters Creek at Valleyview Rd | Air temp 71 deg F; Flow low; Flow clear; Cloudy; No precip |
| November | 15 | 2013 | 13:55 | | 43.5 | | 809 | 7.25 | Peters Creek at Valleyview Rd | Air temp 55 deg F; Flow low; Flow clear; Sunny; No precip |
| December | 6 | 2013 | 11:40 | | 46.5 | | 505 | | Peters Creek at Valleyview Rd | Air temp 38 deg F; Flow high; Flow muddy; Cloudy; Precip none |
| July | 7 | 2011 | 13:15 | 7.66 | 74.8 | 4660 | | | Peters Creek at Wheeling&Lake Erie Trestle | |
| July | 27 | 2009 | 12:27 | 8.05 | 68.8 | 774 | | | Peters Creek at Wrights Chapel | Above Debris Jam at end of Riffle |
| August | 3 | 2009 | 11:23 | 7.97 | 66.2 | 688 | | | Peters Creek at Wrights Chapel | |
| July | 9 | 2012 | 13:21 | 8.04 | 75.4 | 623 | | | Peters Creek at Wrights Chapel | Flow below normal; flow clear;Bromide sample |
| July | 23 | 2012 | 12:06 | 8.03 | 70.7 | 736 | 705 | 7.75 | Peters Creek at Wrights Chapel | Tracer temp 71.6 deg F |
| August | 7 | 2012 | 12:39 | 7.99 | 70.3 | 687 | 659 | | Peters Creek at Wrights Chapel | |
| August | 21 | 2012 | 13:12 | 7.94 | 64.7 | 808 | 769 | 7.50 | Peters Creek at Wrights Chapel | Flow normal; Flow clear |
| September | 6 | 2012 | 13:09 | 8.14 | 73.1 | 750 | 715 | | Peters Creek at Wrights Chapel | |
| September | 24 | 2012 | 14:28 | 8.18 | 53.2 | 749 | 727 | | Peters Creek at Wrights Chapel | Flow normal; Flow clear; Sunny |
| October | 8 | 2012 | 13:49 | 7.76 | 47.7 | 740 | 722 | | Peters Creek at Wrights Chapel | Flow normal; flow clear;overcast; cool |
| November | 9 | 2012 | 13:12 | 7.68 | 41.8 | 712 | 668 | | Peters Creek at Wrights Chapel | |
| December | 19 | 2012 | 12:59 | 7.91 | 45.1 | 573 | 543 | | Peters Creek at Wrights Chapel | Flow above normal |
| April | 3 | 2013 | 13:44 | 8.24 | 46.3 | 872 | 816 | 7.50 | Peters Creek at Wrights Chapel | |
| April | 18 | 2013 | 14:00 | 7.65 | 65.7 | 805 | 748 | | Peters Creek at Wrights Chapel | |
| June | 5 | 2013 | 10:31 | 6.68 | 58.9 | 854 | 779 | 7.50 | Peters Creek at Wrights Chapel | |
| June | 18 | 2013 | 11:06 | 7.31 | 64.1 | 754 | 726 | 8.00 | Peters Creek at Wrights Chapel | Flow above normal; Flow clear |
| July | 3 | 2013 | 10:52 | 6.99 | 68.3 | 674 | 606 | 7.50 | Peters Creek at Wrights Chapel | Flow above normal;close to bankfull; slightly silted |
| July | 18 | 2013 | 9:23 | 6.95 | 69.4 | 693 | 631 | | Peters Creek at Wrights Chapel | |
| July | 31 | 2013 | 10:52 | 6.92 | 64.1 | 779 | 708 | | Peters Creek at Wrights Chapel | Flow normal; Sunny |
| August | 14 | 2013 | 11:19 | 6.96 | 61.6 | 784 | 727 | | Peters Creek at Wrights Chapel | Air Temp 58 deg F; Flow normal; Flow clear; Overcast; No precip |
| August | 30 | 2013 | 11:14 | 6.85 | 68.9 | 741 | 675 | 7.50 | Peters Creek at Wrights Chapel | Air Temp 76 deg F; Sunny; Flow normal; Flow Clear; No precip |
| September | 13 | 2013 | 13:59 | 7.87 | 64.6 | 797 | 738 | 7.50 | Peters Creek at Wrights Chapel | Air Temp 59 deg F; Sunny; Partly Cloudy; No precip; Flow normal; Flow clear |
| September | 30 | 2013 | 10:25 | | 59.3 | | 785 | 7.50 | Peters Creek at Wrights Chapel | Flow low; Flow clear; Overcast; No precip; Air Temp 66 deg F |
| October | 15 | 2013 | 16:49 | | 64.7 | | 698 | 7.00 | Peters Creek at Wrights Chapel | Air temp 73 deg F; Flow low; Flow clear; Cloudy No precip |
| October | 30 | 2013 | 14:52 | | 52.1 | | 733 | 7.25 | Peters Creek at Wrights Chapel | Air temp 61 deg F; Flow low; Flow clear; Cloudy; Precip none |
| November | 10 | 2013 | 13:45 | | 46.2 | | 703 | 6.50 | Peters Creek at Wrights Chapel | Air temp 46 deg F; Flow low; Flow clear; Cloudy; Precip none |
| November | 27 | 2013 | 14:15 | | 39.7 | | 912 | 6.25 | Peters Creek at Wrights Chapel | Air temp 33 deg F; Flow normal; Flow clear; Snowy; Precip light |
| December | 11 | 2013 | 15:23 | | 37.4 | | 959 | 7.50 | Peters Creek at Wrights Chapel | Air temp 34 deg F; Flow normal; Flow clear; Cloudy; Precip none |
| July | 7 | 2011 | 14:26 | 7.86 | 79.5 | 6010 | | | Peters Creek behind Knotweed Project | |
| July | 13 | 2011 | 13:20 | 8.46 | 72.0 | 1469 | | | Peters Creek behind Knotweed Project | |
| July | 27 | 2009 | 14:56 | 7.93 | 72.3 | 1179 | | | Peters Creek behind Snowden wetland | |
| August | 4 | 2009 | 13:04 | 8.02 | 68.5 | 1261 | | | Peters Creek behind Snowden wetland | |
| July | 7 | 2011 | 12:38 | 7.79 | 72.3 | 3350 | | | Peters Creek below confluence Piney Fork | Sample taken along right descending bank |
| January | 8 | 2013 | 15:10 | | 38.6 | 1618 | | | Peters Creek below Large Park & Ride Lot | |
| October | 30 | 2013 | 13:31 | 6.91 | 50.6 | 1068 | 1083 | 7.50 | Peters Creek below McClelland Rd Trib confluence | Overcast; Flow low; Flow clear; No precip;Air Temp 64 deg F |
| July | 7 | 2011 | 12:49 | 7.70 | 73.2 | 4190 | | | Peters Creek below Snowden Bridge right descending bank | Sample taken along right descending bank |
| October | 19 | 2013 | 10:33 | 7.89 | 49.8 | 928 | 921 | 7.00 | Peters Creek below TR844 bridge at Gas Line | Flow normal; Flow clear; Mostly cloudy; No precip; Overcast; Air Temp 48 deg F |
| November | 1 | 2013 | 11:30 | 7.65 | | 948 | 950 | | Peters Creek below TR844 bridge at Gas Line | Air Temp 63 deg F; Flow high; Flow clear; partly cloudy; Sunny |
| June | 6 | 2011 | 12:02 | 8.16 | 64.9 | 1072 | | | Peters Creek downstream of Gastonville at Gas Line Crossing small fry present AMD evident | |
| July | 7 | 2011 | 13:35 | 7.89 | 75.5 | 3550 | | | Peters Creek downstream of Lick Run Confluence near Clairton Branch Trestle left descending bank | |
| March | 29 | 2011 | 14:04 | 7.89 | 44.2 | 948 | | | Peters Creek downstream of single lane bridge connection Union and Peters Twp | |
| April | 3 | 2011 | 13:57 | 8.17 | 47.7 | 1040 | | | Peters Creek downstream of Trax Farm Trib confluence Bacterial Sampling site AMD cloudy | |
| June | 23 | 2011 | 12:05 | 7.19 | 68.8 | 1101 | | | Peters Creek just above Landfill Trib confluence | |
| March | 29 | 2011 | 14:55 | 6.63 | 46.1 | 1046 | | | Peters Creek mainstem upstream of Bridge at Lawson Plaza w edge of Finleyville | |
| July | 7 | 2011 | 13:02 | 7.75 | 73.8 | 4290 | | | Peters Creek middle of Snowden Wetland left descending bank | |
| July | 27 | 2009 | 11:53 | 8.19 | 69.0 | 1077 | | | Peters Creek SR1006 Gastonville | Downstream of Bridge |
| July | 27 | 2009 | 12:00 | 8.21 | 68.9 | 1078 | | | Peters Creek SR1006 Gastonville | Upstream of Bridge Trib Silty |
| August | 4 | 2009 | 13:49 | 8.34 | 69.5 | 1057 | | | Peters Creek SR1006 Gastonville | |
| March | 30 | 2011 | 13:45 | 8.12 | 44.0 | 1454 | | | Peters Creek Trib below Snowden Parking Lot Bridge | |
| October | 24 | 2013 | 13:51 | | 47.9 | 672 | 717 | 7.25 | Peters Creek upstream of Bebout Rd Tributary confluence | Overcast; Partly cloudy; Stream culverted under private lane; Culvert not sized correctly |
| July | 31 | 2010 | 11:38 | 8.30 | 69.7 | 1388 | | | Peters Creek upstream of Lewis Run Confluence | |
| July | 27 | 2009 | 14:01 | 8.09 | 72.1 | 1416 | | | Piney Fork above Catfish Run confluence | |
| August | 3 | 2009 | 12:50 | 8.08 | 68.3 | 1048 | | | Piney Fork above Catfish Run confluence | |
| October | 30 | 2013 | 12:31 | 8.44 | 52.3 | 1387 | 1398 | 7.25 | Piney Fork above Corvette Tunnel | Air Temp 63 deg F; Flow low; Flow clear; Partly cloudy; Sunny |
| July | 27 | 2009 | 14:44 | 7.76 | 71.6 | 1209 | | | Piney Fork above Corvette Tunnel | |
| August | 4 | 2009 | 13:17 | 7.85 | 68.8 | 1331 | | | Piney Fork above Corvette Tunnel | |
| February | 26 | 2011 | 13:28 | 7.78 | 43.7 | 1912 | | | Piney Fork above Corvette Tunnel | |
| March | 20 | 2011 | 13:00 | 8.40 | 48.4 | 1522 | | | Piney Fork above Corvette Tunnel | |
| April | 3 | 2011 | 13:31 | 8.84 | 48.4 | 1634 | | | Piney Fork above Corvette Tunnel | |
| September | 17 | 2011 | 18:26 | | 63.3 | | 1249 | | Piney Fork above Corvette Tunnel | Flow low; Partly cloudy; No precip past 48 hrs |
| September | 29 | 2011 | 18:30 | | 63.1 | | 1360 | | Piney Fork above Corvette Tunnel | Flow normal; Sunny; No precip past 48 hrs |
| October | 2 | 2011 | 13:10 | | 52.3 | | 1014 | | Piney Fork above Corvette Tunnel | Flow high; Cloudy; Heavy rain past 48 hrs |
| October | 15 | 2011 | 13:18 | | 59.2 | | 1265 | | Piney Fork above Corvette Tunnel | Flow normal; Partly cloudy; Light rain past 48 hrs |
| October | 22 | 2011 | 18:04 | | 57.2 | | 1277 | | Piney Fork above Corvette Tunnel | Flow low; Partly cloudy; Intermittent rain past 48 hrs |
| October | 28 | 2011 | 18:04 | | 49.5 | | 1129 | | Piney Fork above Corvette Tunnel | Flow normal; Overcast; Intermittent rain past 48 hrs |
| November | 5 | 2011 | 18:02 | | 47.1 | | 1362 | | Piney Fork above Corvette Tunnel | Flow normal; Sunny; No precip past 48 hrs |
| November | 12 | 2011 | 17:13 | | 48.2 | | 1318 | | Piney Fork above Corvette Tunnel | Flow normal; Partly cloudy; No precip past 48 hrs |
| November | 19 | 2011 | 9:24 | | 43.9 | | 1255 | | Piney Fork above Corvette Tunnel | Flow normal; Partly cloudy; No precip past 48 hrs |
| November | 23 | 2011 | 16:02 | | 51.4 | | 807 | | Piney Fork above Corvette Tunnel | Flow high; Partly cloudy; Steady rain past 48 hrs |
| December | 3 | 2011 | 18:22 | | 56.7 | | 1351 | | Piney Fork above Corvette Tunnel | Flow normal; Partly Cloudy; Light rain past 48 hors |
| December | 7 | 2011 | 15:11 | | 45.7 | | 923 | | Piney Fork above Corvette Tunnel | Flow high; Cloudy; Light mix past 48 hr |

| Month | Date | Year | Time | pH | Temp | Conductivity | Tracer Cond | pH(Buf strip) | Location | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| December | 12 | 2011 | 11:09 | | 50.7 | | 1286 | | Piney Fork above Corvette Tunnel | Flow normal; Partly cloudy; No precip past 48 hrs |
| December | 24 | 2011 | 11:41 | | 42.3 | | 1141 | | Piney Fork above Corvette Tunnel | Flow normal; Cloudy; Light snow past 48 hrs |
| December | 31 | 2011 | 16:22 | | 47.7 | | 1303 | | Piney Fork above Corvette Tunnel | Flow normal; Cloudy; Intermittent rain past 48 hrs |
| January | 21 | 2012 | | | | | 4440 | | Piney Fork above Corvette Tunnel | Flow normal; Overcast; Mixed precip past 48 hrs |
| January | 28 | 2012 | | | | | 1369 | | Piney Fork above Corvette Tunnel | Flow high; Partly cloudy; Mixed precip past 24 hrs |
| February | 4 | 2012 | | | | | 1350 | | Piney Fork above Corvette Tunnel | Flow normal; Cloudy; Snow past 48 hrs |
| February | 13 | 2012 | | | | | 1216 | | Piney Fork above Corvette Tunnel | Flow high; Sunny; Snow past 48 hrs |
| February | 25 | 2012 | | | | | 1301 | | Piney Fork above Corvette Tunnel | Flow normal; Overcast; Mixed precip past 48 hrs |
| March | 2 | 2012 | | | | | 1382 | | Piney Fork above Corvette Tunnel | Flow low; Overcast; Light rain past 24 hrs |
| March | 17 | 2012 | | | | | 1120 | | Piney Fork above Corvette Tunnel | Flow high; Sunny; Heavy rain past 48 hrs |
| March | 24 | 2012 | | | | | 1178 | | Piney Fork above Corvette Tunnel | Flow high; Overcast; Heavy rain past 48 hrs |
| March | 31 | 2012 | | | | | 885 | | Piney Fork above Corvette Tunnel | Flow high; Sunny; Steady rain past 48 hrs |
| April | 18 | 2012 | | | | | 1251 | | Piney Fork above Corvette Tunnel | Flow normal; Partly cloudy; No precip past 48 hrs |
| April | 30 | 2012 | | | | | 1289 | | Piney Fork above Corvette Tunnel | Flow normal; Partly cloudy; No precip past 48 hrs |
| May | 12 | 2012 | | | | | 1292 | | Piney Fork above Corvette Tunnel | Flow normal; Sunny; No precip past 48 hrs |
| May | 19 | 2012 | | | | | 1306 | | Piney Fork above Corvette Tunnel | Flow normal; Sunny; No precip past 48 hrs |
| June | 9 | 2012 | | | | | 1310 | | Piney Fork above Corvette Tunnel | Flow normal; Sunny; No precip past 48 hrs |
| June | 17 | 2012 | | | | | 1190 | | Piney Fork above Corvette Tunnel | Flow low; Partly cloudy; No precip past 48 hrs |
| June | 30 | 2012 | | | | | 1096 | | Piney Fork above Corvette Tunnel | Flow high; Partly cloudy; Steady rain past 48 hrs |
| July | 9 | 2012 | 11:41 | 7.74 | 73.1 | 1264 | | | Piney Fork above Corvette Tunnel | Flow normal to below normal; Flow clear |
| July | 11 | 2012 | | | | | 1421 | | Piney Fork above Corvette Tunnel | Flow low; Sunny; No precip past 48 hrs |
| July | 19 | 2012 | | | | | 876 | | Piney Fork above Corvette Tunnel | Flow high; Overcast; Heavy rain past 48 hrs |
| July | 23 | 2012 | 10:56 | 7.90 | 70.5 | 1336 | 1300 | 7.50 | Piney Fork above Corvette Tunnel | Tracer temp 71.0 deg F |
| August | 4 | 2012 | | | | | 821 | | Piney Fork above Corvette Tunnel | Flow high; Overcast; Heavy rain past 48 hrs |
| August | 7 | 2012 | 11:27 | 7.97 | 69.7 | 1224 | 1216 | | Piney Fork above Corvette Tunnel | |
| August | 13 | 2012 | | | | | 1252 | | Piney Fork above Corvette Tunnel | Flow normal; Partly cloudy; No precip past 48 hrs |
| August | 21 | 2012 | 12:02 | 7.87 | 65.4 | 1247 | 1203 | 7.50 | Piney Fork above Corvette Tunnel | |
| August | 25 | 2012 | | | | | 1270 | | Piney Fork above Corvette Tunnel | Flow normal; Partly cloudy; No precip past 48 hrs |
| August | 31 | 2012 | | | | | 1266 | | Piney Fork above Corvette Tunnel | Flow normal; Sunny; No precip past 48 hrs |
| September | 6 | 2012 | 12:07 | 7.86 | 73.0 | 1194 | 1155 | | Piney Fork above Corvette Tunnel | |
| September | 9 | 2012 | | | | | 943 | | Piney Fork above Corvette Tunnel | Flow low; Partly cloudy; Steady rain past 48 hrs |
| September | 24 | 2012 | 12:48 | 8.05 | 58.1 | 1184 | 1174 | | Piney Fork above Corvette Tunnel | Flow normal; |
| September | 25 | 2012 | | | | | 1367 | | Piney Fork above Corvette Tunnel | Flow normal; Overcast; No precip past 48 hrs |
| October | 8 | 2012 | 12:17 | 8.3 | 52.3 | 1233 | 1236 | | Piney Fork above Corvette Tunnel | Flow normal; flow clear |
| October | 21 | 2012 | | | | | 1324 | | Piney Fork above Corvette Tunnel | Flow normal; Partly cloudy; Intermittent rain past 48 hrs |
| November | 4 | 2012 | | | | | 760 | | Piney Fork above Corvette Tunnel | Flow high; Overcast; No precip past 48 hrs |
| November | 8 | 2012 | 15:15 | 8.43 | 45.4 | 1363 | 1353 | | Piney Fork above Corvette Tunnel | |
| November | 11 | 2012 | | | | | 1430 | | Piney Fork above Corvette Tunnel | Flow normal; Sunny; Intermittent rain past 48 hrs |
| December | 16 | 2012 | 15:45 | 8.39 | 50.5 | 1352 | 1263 | | Piney Fork above Corvette Tunnel | |
| December | 27 | 2012 | | | | | 1482 | | Piney Fork above Corvette Tunnel | Flow low; Overcast; Snow past 48 hrs |
| March | 29 | 2013 | 13:08 | 9.05 | 47.3 | 1776 | 1720 | | Piney Fork above Corvette Tunnel | Algal bloom; treated sewage smell |
| April | 18 | 2013 | 11:27 | 8.74 | 58.4 | 1436 | 1364 | | Piney Fork above Corvette Tunnel | |
| June | 4 | 2013 | 11:48 | 8.05 | 60.2 | 1346 | 1304 | | Piney Fork above Corvette Tunnel | Flow normal to below normal; Algal bloom still present; Sunny |
| June | 17 | 2013 | 11:45 | 8.16 | 66.4 | 1249 | 1236 | | Piney Fork above Corvette Tunnel | Flow normal; Flow clear |
| July | 2 | 2013 | 11:57 | 8.21 | 67.5 | 1105 | 1034 | 8.00 | Piney Fork above Corvette Tunnel | |
| July | 16 | 2013 | 10:43 | 8.1 | 69.4 | 1347 | 1303 | | Piney Fork above Corvette Tunnel | Great deal of change in substrate and channel; Large sycamore fallen into channel;Flow normal; Flow clear |
| July | 30 | 2013 | 11:50 | 8.11 | 64.1 | 1364 | 1318 | | Piney Fork above Corvette Tunnel | Flow normal; flow clear; overcast |
| August | 15 | 2013 | 12:31 | 7.96 | 63.4 | 1393 | 1331 | | Piney Fork above Corvette Tunnel | Flow normal; Flow clear; Sunny; No precip |
| August | 29 | 2013 | 11:15 | 7.98 | 70.5 | 1038 | 974 | 7.50 | Piney Fork above Corvette Tunnel | Air Temp 75 deg F; Flow normal; Flow clear; Sunny but partly Cloudy; No precip |
| September | 13 | 2013 | 12:41 | 8.01 | 66.6 | 1314 | 1278 | 7.50 | Piney Fork above Corvette Tunnel | Air Temp 62 deg F; Flow normal; Flow clear; Overcast; Mostly cloudy; No precip |
| October | 1 | 2013 | 13:30 | 7.99 | 64.9 | 1276 | 1225 | 7.25 | Piney Fork above Corvette Tunnel | Air Temp 70 deg F; Flow low; Flow clear; Sunny; Partly Cloudy; No precip |
| October | 17 | 2013 | 11:40 | 8.17 | 60.8 | 1030 | 988 | 7.25 | Piney Fork above Corvette Tunnel | Air Temp 58 deg F; Flow normal; flow a bit cloudy; Trace precip; partly cloudy |
| November | 21 | 2013 | 15:05 | 8.8 | 45.9 | 1430 | 1437 | 8.00 | Piney Fork above Corvette Tunnel | Air Temp 59 deg F;Flow normal; Flow clear; Partly cloudy; Overcast; No precip |
| December | 3 | 2013 | 12:04 | 8.48 | 46.2 | 1638 | 1607 | 7.50 | Piney Fork above Corvette Tunnel | Air Temp 54 deg F; Flow normal; Flow clear;Overcast; No precip |
| July | 13 | 2012 | 12:47 | 7.16 | 70.3 | 1252 | | | Piney Fork above Sebolt Rd discharge but below low dam | School of fish; discharge above dam flow ~ 10 GPM; Aluminum precipitate from discharge |
| June | 17 | 2011 | 11:40 | 5.16 | 62.6 | 1387 | | | Piney Fork AMD discharge just upstream of CoGos along Montour Trail | |
| November | 4 | 2013 | 14:42 | 4.69 | 55.3 | 1579 | 1573 | | Piney Fork AMD Spring above old Montour RR ROW | Flow normal; Flow clear; Partly Cloudy; Sunny; No precip |
| July | 27 | 2009 | 12:50 | 8.51 | 73.5 | 1380 | | | Piney Fork at Simmons Park | |
| August | 3 | 2009 | 11:45 | 8.51 | 68.4 | 1238 | | | Piney Fork at Simmons Park | |
| February | 17 | 2011 | 16:11 | 8.63 | 47.9 | 1985 | | | Piney Fork at Simmons Park | |
| August | 14 | 2011 | 11:20 | | | | 705 | | Piney Fork at Simmons Park | Flow low; Cloudy; Light rain past 48 hrs |
| August | 29 | 2011 | 15:56 | | | | 1410 | | Piney Fork at Simmons Park | Flow low; Cloudy; No precip past 48 hrs |
| September | 10 | 2011 | 16:15 | | 76.6 | | 1390 | | Piney Fork at Simmons Park | Flow normal; Partly cloudy; Intermittent rain past 48 hrs |
| September | 17 | 2011 | 19:52 | | 62.4 | | 1442 | | Piney Fork at Simmons Park | Flow normal; Partly cloudy; No precip past 48 hrs |
| September | 24 | 2011 | 17:17 | | 71.8 | | 1406 | | Piney Fork at Simmons Park | Flow normal; Sunny; Light rain past 48 hrs |
| September | 29 | 2011 | 18:21 | | 67.5 | | 1410 | | Piney Fork at Simmons Park | Flow normal; Sunny; No precip past 48 hrs |
| October | 2 | 2011 | 14:25 | | 52.7 | | 629 | | Piney Fork at Simmons Park | Flow high; Cloudy; Heavy rain past 48 hrs |
| October | 14 | 2011 | 16:26 | | 63.3 | | 920 | | Piney Fork at Simmons Park | Flow high; Partly cloudy; Steady rain past 48 hrs |
| October | 18 | 2011 | 17:19 | | 59.2 | | 1390 | | Piney Fork at Simmons Park | Flow normal; Sunny; No precip past 48 hrs |
| October | 25 | 2011 | 17:26 | | 56.7 | | 1385 | | Piney Fork at Simmons Park | Flow normal; Sunny; No precip past 48 hrs |
| November | 5 | 2011 | 18:22 | | 46.2 | | 1403 | | Piney Fork at Simmons Park | Flow normal; Sunny; No precip past 48 hrs |
| November | 12 | 2011 | 15:53 | | 52.5 | | 1291 | | Piney Fork at Simmons Park | Flow normal; Partly cloudy; No precip past 48 hrs |
| November | 19 | 2011 | 12:11 | | 55.6 | | 1330 | | Piney Fork at Simmons Park | Flow normal; Partly cloudy; No precip past 48 hrs |
| November | 23 | 2011 | 14:25 | | 49.5 | | 814 | | Piney Fork at Simmons Park | Flow high; Partly cloudy; Steady rain past 48 hrs |
| December | 3 | 2011 | 18:15 | | 54.5 | | 1290 | | Piney Fork at Simmons Park | Flow normal; Partly cloudy; Light rain past 48 hrs |
| December | 7 | 2011 | 15:38 | | 45.0 | | 702 | | Piney Fork at Simmons Park | Flow high; Cloudy; Light mix past 48 hr |
| December | 12 | 2011 | 11:33 | | 49.5 | | 1301 | | Piney Fork at Simmons Park | Flow normal; Partly cloudy; No precip past 48 hrs |
| December | 24 | 2011 | 12:08 | | 43.7 | | 1160 | | Piney Fork at Simmons Park | Flow normal; Cloudy; Light snow past 48 hrs |
| December | 31 | 2011 | 16:46 | | 46.4 | | 1365 | | Piney Fork at Simmons Park | Flow normal; Cloudy; Intermittent rain past 48 hrs |
| January | 21 | 2012 | | | | | 13600 | | Piney Fork at Simmons Park | Flow normal; Overcast; Mixed precip past 48 hrs |
| January | 28 | 2012 | | | | | 1396 | | Piney Fork at Simmons Park | Flow high; Partly cloudy; Mixed precip past 24 hrs |
| February | 4 | 2012 | | | | | 1340 | | Piney Fork at Simmons Park | Flow normal; Cloudy; Snow past 48 hrs |
| February | 13 | 2012 | | | | | 1308 | | Piney Fork at Simmons Park | Flow high; Sunny; Snow past 48 hrs |
| February | 25 | 2012 | | | | | 1290 | | Piney Fork at Simmons Park | Flow normal; Overcast; Mixed precip past 48 hrs |
| March | 2 | 2012 | | | | | 1458 | | Piney Fork at Simmons Park | Flow normal; Overcast; Light rain past 24 hrs |
| March | 17 | 2012 | | | | | 1027 | | Piney Fork at Simmons Park | Flow high; Sunny; Heavy rain past 48 hrs |
| March | 24 | 2012 | | | | | 845 | | Piney Fork at Simmons Park | Flow high; Overcast; Heavy rain past 48 hrs |
| March | 31 | 2012 | | | | | 910 | | Piney Fork at Simmons Park | Flow normal; Sunny; Steady rain past 48 hrs |
| April | 18 | 2012 | | | | | 1316 | | Piney Fork at Simmons Park | Flow normal; Partly cloudy; No precip past 48 hrs |
| April | 30 | 2012 | | | | | 1389 | | Piney Fork at Simmons Park | Flow low; Partly cloudy; No precip past 48 hrs |
| May | 12 | 2012 | | | | | 1326 | | Piney Fork at Simmons Park | Flow low; Sunny; No precip past 48 hrs |
| May | 19 | 2012 | | | | | 1377 | | Piney Fork at Simmons Park | Flow low; Sunny; No precip past 48 hrs |
| June | 9 | 2012 | | | | | 1351 | | Piney Fork at Simmons Park | Flow low; Sunny; No precip past 48 hrs |
| June | 17 | 2012 | | | | | 1317 | | Piney Fork at Simmons Park | Flow low; Partly cloudy; No precip past 48 hrs |
| June | 30 | 2012 | | | | | 922 | | Piney Fork at Simmons Park | Flow normal; Partly cloudy; Steady rain past 48 hrs |
| July | 11 | 2012 | | | | | 1324 | | Piney Fork at Simmons Park | Flow low; Sunny; No precip past 48 hrs |

| Month | Date | Year | Time | pH | Temp | Conductivity | Tracer Cond | pH(Buf strip) | Location | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| July | 19 | 2012 | | | | | 736 | | Piney Fork at Simmons Park | Flow high; Overcast; Heavy rain past 48 hrs |
| August | 4 | 2012 | | | | | 705 | | Piney Fork at Simmons Park | Flow high; Overcast; Heavy rain past 48 hrs |
| August | 13 | 2012 | | | | | 1274 | | Piney Fork at Simmons Park | Flow normal; Partly cloudy; No precip past 48 hrs |
| August | 25 | 2012 | | | | | 1288 | | Piney Fork at Simmons Park | Flow normal; Partly cloudy; No precip past 48 hrs |
| August | 31 | 2012 | | | | | 956 | | Piney Fork at Simmons Park | Flow normal; Overcast; No precip past 48 hrs |
| September | 9 | 2012 | | | | | 1130 | | Piney Fork at Simmons Park | Flow normal; Partly cloudy; Steady rain past 48 hrs |
| September | 25 | 2012 | | | | | 694 | | Piney Fork at Simmons Park | Flow normal; Overcast; No precip past 48 hrs |
| October | 21 | 2012 | | | | | 1344 | | Piney Fork at Simmons Park | Flow normal; Partly cloudy; Intermittent rain past 48 hrs |
| November | 4 | 2012 | | | | | 908 | | Piney Fork at Simmons Park | Flow normal; Overcast; No precip past 48 hrs |
| November | 11 | 2012 | | | | | 1497 | | Piney Fork at Simmons Park | Flow low; Sunny; Intermittent rain past 48 hrs |
| December | 27 | 2012 | | | | | 1484 | | Piney Fork at Simmons Park | Flow normal; Overcast; Snow past 48 hrs |
| July | 13 | 2012 | 13:21 | 5.82 | 69.7 | 1676 | | | Piney Fork below bridge at Stewart Rd | Heavy aluminum precipitate on substrate; flow cloudy |
| August | 29 | 2011 | 16:30 | | | | 1345 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Cloudy; No precip past 48 hrs |
| September | 10 | 2011 | 17:20 | | 72.1 | | 1350 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Cloudy; Intermittent rain past 48 hrs |
| September | 17 | 2011 | 18:42 | | 63.7 | | 1278 | | Piney Fork below Piney Fork Rd sewage plant | Flow low; Partly cloudy; No precip past 48 hrs |
| September | 24 | 2011 | 18:26 | | 71.4 | | 1237 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Sunny; Light rain past 48 hrs |
| September | 29 | 2011 | 18:08 | | 64.9 | | 1353 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Sunny; No precip past 48 hrs |
| October | 2 | 2011 | 13:30 | | 53.1 | | 921 | | Piney Fork below Piney Fork Rd sewage plant | Flow high; Cloudy; Heavy rain past 48 hrs |
| October | 15 | 2011 | 13:07 | | 60.1 | | 1337 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Partly Cloudy; Light rain past 48 hors |
| October | 22 | 2011 | 17:53 | | 57.6 | | 1281 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Partly cloudy; Intermittent rain past 48 hrs |
| October | 28 | 2011 | 17:45 | | 50.9 | | 1152 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Overcast; Intermittent rain past 48 hrs |
| November | 5 | 2011 | 17:48 | | 47.1 | | 1316 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Sunny; No precip past 48 hrs |
| November | 12 | 2011 | 17:00 | | 50.4 | | 1344 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Partly cloudy; No precip past 48 hrs |
| November | 19 | 2011 | 9:41 | | 45.3 | | 1269 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Partly cloudy; No precip past 48 hrs |
| November | 23 | 2011 | 15:39 | | 50.7 | | 820 | | Piney Fork below Piney Fork Rd sewage plant | Flow high; Partly cloudy; Steady rain past 48 hrs |
| December | 3 | 2011 | 18:01 | | 56.8 | | 1218 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Partly cloudy; Light rain past 48 hrs |
| December | 7 | 2011 | 2:53 | | 45.7 | | 826 | | Piney Fork below Piney Fork Rd sewage plant | Flow high; Cloudy; Light mix past 48 hrs |
| December | 12 | 2011 | 10:48 | | 49.5 | | 1326 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Partly cloudy; No precip past 48 hrs |
| December | 24 | 2011 | 11:26 | | 44.6 | | 1169 | | Piney Fork below Piney Fork Rd sewage plant | Flow high; Cloudy; Light snow past 48 hrs |
| December | 31 | 2011 | 16:11 | | 48.6 | | 1298 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Cloudy; Intermittent rain past 48 hrs |
| January | 21 | 2012 | | | | | 6400 | | Piney Fork below Piney Fork Rd sewage plant | Flow high; Overcast; Mixed precip past 48 hrs |
| January | 28 | 2012 | | | | | 1410 | | Piney Fork below Piney Fork Rd sewage plant | Flow high; Partly cloudy; Mixed precip past 24 hrs |
| February | 4 | 2012 | | | | | 1342 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Cloudy; Snow past 48 hrs |
| February | 13 | 2012 | | | | | 1208 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Sunny; Snow past 48 hrs |
| February | 25 | 2012 | | | | | 1226 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Overcast; Mixed precip past 48 hrs |
| March | 2 | 2012 | | | | | 1369 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Overcast; Light rain past 24 hrs |
| March | 17 | 2012 | | | | | 900 | | Piney Fork below Piney Fork Rd sewage plant | Flow high; Sunny; Heavy rain past 48 hrs |
| March | 24 | 2012 | | | | | 926 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Overcast; Heavy rain past 48 hrs |
| March | 31 | 2012 | | | | | 817 | | Piney Fork below Piney Fork Rd sewage plant | Flow high; Sunny; Steady rain past 48 hrs |
| April | 18 | 2012 | | | | | 1179 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Partly cloudy; No precip past 48 hrs |
| April | 30 | 2012 | | | | | 1236 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Partly cloudy; No precip past 48 hrs |
| May | 12 | 2012 | | | | | 1200 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Sunny; No precip past 48 hrs |
| May | 19 | 2012 | | | | | 1271 | | Piney Fork below Piney Fork Rd sewage plant | Flow low; Sunny; No precip past 48 hrs |
| June | 9 | 2012 | | | | | 1210 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Sunny; No precip past 48 hrs |
| June | 17 | 2012 | | | | | 1179 | | Piney Fork below Piney Fork Rd sewage plant | Flow low; Partly cloudy; No precip past 48 hrs |
| June | 30 | 2012 | | | | | 1063 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Partly cloudy; Steady rain past 48 hrs |
| July | 11 | 2012 | | | | | 1500 | | Piney Fork below Piney Fork Rd sewage plant | Flow low; Sunny; No precip past 48 hrs |
| July | 19 | 2012 | | | | | 881 | | Piney Fork below Piney Fork Rd sewage plant | Flow high; Overcast; Heavy rain past 48 hrs |
| August | 4 | 2012 | | | | | 841 | | Piney Fork below Piney Fork Rd sewage plant | Flow high; Overcast; Heavy rain past 48 hrs |
| August | 13 | 2012 | | | | | 1265 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Partly cloudy; No precip past 48 hrs |
| August | 25 | 2012 | | | | | 1233 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Partly cloudy; No precip past 48 hrs |
| August | 31 | 2012 | | | | | 1176 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Sunny; No precip past 48 hrs |
| September | 9 | 2012 | | | | | 1021 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Partly cloudy; Steady rain past 48 hrs |
| September | 25 | 2012 | | | | | 1363 | | Piney Fork below Piney Fork Rd sewage plant | Flow low; Overcast; No precip past 48 hrs |
| October | 21 | 2012 | | | | | 1415 | | Piney Fork below Piney Fork Rd sewage plant | Flow low; Partly cloudy; Intermittent rain past 48 hrs |
| November | 4 | 2012 | | | | | 954 | | Piney Fork below Piney Fork Rd sewage plant | Flow high; Overcast; No precip past 48 hrs |
| November | 11 | 2012 | | | | | 1462 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Sunny; Intermittent rain past 48 hrs |
| December | 27 | 2012 | | | | | 1685 | | Piney Fork below Piney Fork Rd sewage plant | Flow normal; Overcast; Snow past 48 hrs |
| July | 27 | 2009 | 13:01 | 8.35 | 72.3 | 1258 | | | Piney Fork below South Park Rd Confluence | |
| August | 3 | 2009 | 12:00 | 8.27 | 68.5 | 1199 | | | Piney Fork below South Park Rd Confluence | |
| October | 30 | 2009 | 11:23 | 3.60 | 53.0 | 3690 | | | Piney Fork just downstream of Sebolt Rd AMD discharge confluence | |
| July | 13 | 2012 | 13:50 | 7.43 | 70.4 | 1626 | | | Piney Fork just upstream of CoGos along Brownsville Rd Ext | Upstream of AMD discharge on left ascending bank. |
| March | 15 | 2011 | 11:52 | 8.25 | 47.7 | 2090 | | | Piney Fork trib downstream of Triphammer Rd behind Duncans AMD discharge | |
| July | 27 | 2009 | 10:47 | 7.36 | 67.8 | 1230 | | | Piney Fork Triphammer | Bacterial Sampling |
| August | 3 | 2009 | 10:18 | 7.52 | 66.1 | 1287 | | | Piney Fork Triphammer | Bacterial Sampling water cloudy flow above normal |
| August | 4 | 2010 | 10:06 | 7.60 | 76.3 | 1542 | | | Pond along Elliot Road Lewis Run Trib | |
| July | 13 | 2012 | 13:01 | 4.24 | 63.4 | 2460 | | | Sebolt Rd AMD discharge at source along Selbolt Rd. | Flow ~60-100 GPM |
| April | 4 | 2011 | 13:28 | 4.93 | 49.3 | 1350 | | | Sebolt Rd AMD discharge near mouth | Flow ~50-100 GPM; Aluminum precipitat |
| July | 23 | 2012 | 11:19 | 4.82 | 65.6 | 1808 | 1810 | 4.25 | Sebolt Rd AMD discharge near mouth | Tracer Temp 68.5 deg F(possibly not correct) |
| August | 7 | 2012 | 12:02 | 4.67 | 66.2 | 2030 | 2090 | | Sebolt Rd AMD discharge near mouth | |
| August | 21 | 2012 | 12:35 | 4.69 | 65.7 | 1986 | 2000 | 4.00 | Sebolt Rd AMD discharge near mouth | Heavy VOC odor comng from culvert |
| September | 6 | 2012 | 13:48 | 4.44 | 65.0 | 2340 | 2380 | | Sebolt Rd AMD discharge near mouth | Flow ~ 100-150 GPM |
| October | 8 | 2012 | 12:51 | 4.89 | 60.4 | 1988 | 2130 | | Sebolt Rd AMD discharge near mouth | Aluminum precipitate less than usual; discharge smells of detergent |
| November | 9 | 2012 | 12:33 | 4.96 | 57.4 | 1863 | 1990 | | Sebolt Rd AMD discharge near mouth | |
| December | 19 | 2012 | 12:23 | 6.32 | 51.9 | 1300 | 1308 | | Sebolt Rd AMD discharge near mouth | Flow ~60-100 GPM |
| March | 29 | 2013 | 13:46 | 7.29 | 47.8 | 1237 | 1193 | | Sebolt Rd AMD discharge near mouth | Flow ~100 GPM |
| April | 18 | 2013 | 12:06 | 6.67 | 51.8 | 1194 | 1108 | | Sebolt Rd AMD discharge near mouth | |
| June | 4 | 2013 | 12:43 | 5.11 | 55.6 | 1333 | 1294 | 4.50 | Sebolt Rd AMD discharge near mouth | Flow ~50-100 GPM; Heavy aluminum precipitate |
| June | 17 | 2013 | 12:36 | 5.23 | 57.2 | 1413 | 1399 | 4.50 | Sebolt Rd AMD discharge near mouth | Flow above normal |
| July | 2 | 2013 | 12:31 | 7.93 | 60.4 | 1333 | 1261 | 5.50 | Sebolt Rd AMD discharge near mouth | Flow above normal |
| July | 16 | 2013 | 11:27 | 4.96 | 59.0 | 1512 | 1479 | | Sebolt Rd AMD discharge near mouth | Flow above normal; more aluminum than usual |
| July | 30 | 2013 | 12:36 | 5.04 | 58.6 | 1556 | 1539 | | Sebolt Rd AMD discharge near mouth | Flow normal; Flow ~50-60 GPM; more aluminum than in past; |
| August | 13 | 2013 | 11:42 | 5.75 | 67.2 | 770 | 768 | | Sebolt Rd AMD discharge near mouth | Flow above normal; Foaming profusely; Overcast |
| August | 29 | 2013 | 11:52 | 4.85 | 59.9 | 1959 | 1961 | 4.00 | Sebolt Rd AMD discharge near mouth | Air Temp 73 deg F; Flow normal; Overcast but sunny; No precip; Flow somewhat cloudy; Heavy load of Aluminum |
| September | 13 | 2013 | 13:17 | 4.7 | 59.2 | 2240 | 2360 | 4.00 | Sebolt Rd AMD discharge near mouth | Air Temp 64 deg F; Flow normal; Flow clear; Overcast; No precip; Threatening rain |
| September | 30 | 2013 | 9:55 | | 60.2 | | 2460 | 4.00 | Sebolt Rd AMD discharge near mouth | Flow low; Flow clear; Overcast; Precip none; Air Temp 64 deg F |
| October | 15 | 2013 | 15:44 | | 62.7 | | 2190 | 4.00 | Sebolt Rd AMD discharge near mouth | Air temp 73 deg F; Flow low; Flow clear; Cloudy; No precip |
| October | 30 | 2013 | 14:25 | | 61.8 | | 1346 | 4.25 | Sebolt Rd AMD discharge near mouth | Air temp 59 deg F; Flow low; Flow clear; Cloudy; Precip none |
| November | 10 | 2013 | 14:48 | | 48.2 | | 2140 | 4.25 | Sebolt Rd AMD discharge near mouth | Air temp 46 deg F; Flow low; Flow clear; Cloudy; No precip |

| Month | Date | Year | Time | pH | Temp | Conductivity | Tracer Cond | pH(Buf strip) | Location | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| November | 27 | 2013 | 13:32 | | 40.2 | | 2060 | 5.00 | Sebolt Rd AMD discharge near mouth | Air temp 29 deg F; Flow normal; Flow clear; Snowy; Precip light |
| December | 11 | 2013 | 15:49 | | 46.7 | | 2390 | 5.50 | Sebolt Rd AMD discharge near mouth | Air temp 34 deg F; Flow normal; Flow clear; Cloudy; No precip |
| July | 27 | 2009 | 14:18 | 8.21 | 69.4 | 1228 | | | Sleepy Hollow Run above Brownsville Rd Bridge | |
| August | 3 | 2009 | 13:03 | 8.21 | 67.2 | 1033 | | | Sleepy Hollow Run above Brownsville Rd Bridge | |
| September | 17 | 2011 | 19:00 | | 59.9 | | 1277 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Partly cloudy; No precip past 48 hrs |
| September | 24 | 2011 | 18:05 | | 70.0 | | 1143 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Sunny; Light rain past 48 hrs |
| September | 29 | 2011 | 18:45 | | 61.5 | | 1177 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Sunny; No precip past 48 hrs |
| October | 2 | 2011 | 13:45 | | 50.7 | | 576 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow high; Cloudy; Heavy rain past 48 hrs |
| October | 15 | 2011 | 12:51 | | 57.7 | | 1126 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Partly cloudy; Light rain past 48 hrs |
| October | 22 | 2011 | 17:37 | | 54.1 | | 1220 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow low; Partly cloudy; Intermittent rain past 48 hrs |
| October | 28 | 2011 | 17:30 | | 48.4 | | 1013 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Overcast; Intermittent rain past 48 hrs |
| November | 5 | 2011 | 17:28 | | 45.7 | | 1262 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow low; Sunny; No precip past 48 hrs |
| November | 12 | 2011 | 16:28 | | 48.7 | | 1262 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow low; Partly cloudy; No precip past 48 hrs |
| November | 19 | 2011 | 11:20 | | 53.4 | | 1138 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow low; Partly cloudy; No precip past 48 hrs |
| November | 23 | 2011 | 15:16 | | 49.5 | | 627 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow high; Partly cloudy; Steady rain past 48 hrs |
| December | 3 | 2011 | 17:17 | | 54.0 | | 1080 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow low; Partly cloudy; Light rain past 48 hrs |
| December | 7 | 2011 | 15:26 | | 43.3 | | 585 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow high; Cloudy; Light mix past 48 hrs |
| December | 12 | 2011 | 18:31 | | 49.3 | | 1071 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Partly cloudy; No precip past 48 hrs |
| December | 24 | 2011 | 11:56 | | 41.2 | | 883 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Cloudy; Light snow past 48 hrs |
| December | 31 | 2011 | 16:35 | | 45.5 | | 1040 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Cloudy; Intermittent rain past 48 hrs |
| January | 28 | 2012 | | | | | 1031 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Partly cloudy; Mixed precip past 24 hrs |
| February | 4 | 2012 | | | | | 1000 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow high; Cloudy; Snow past 48 hrs |
| February | 13 | 2012 | | | | | 896 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Sunny; Snow past 48 hrs |
| February | 25 | 2012 | | | | | 571 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow high; Overcast; Mixed precip past 48 hrs |
| March | 2 | 2012 | | | | | 1028 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Overcast; Light rain past 24 hrs |
| March | 17 | 2012 | | | | | 921 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Sunny; Heavy rain past 48 hrs |
| March | 24 | 2012 | | | | | 890 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Overcast; Heavy rain past 48 hrs |
| March | 31 | 2012 | | | | | 982 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Sunny; Steady rain past 48 hrs |
| April | 18 | 2012 | | | | | 1033 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Partly cloudy; No precip past 48 hrs |
| April | 30 | 2012 | | | | | 1078 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Partly cloudy; No precip past 48 hrs |
| May | 12 | 2012 | | | | | 1010 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Sunny; No precip past 48 hrs |
| May | 19 | 2012 | | | | | 1101 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Sunny; No precip past 48 hrs |
| June | 9 | 2012 | | | | | 1134 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow low; Sunny; No precip past 48 hrs |
| June | 17 | 2012 | | | | | 1065 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Partly cloudy; No precip past 48 hrs |
| June | 30 | 2012 | | | | | 1217 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow low; Partly cloudy; Steady rain past 48 hrs |
| July | 9 | 2012 | 12:06 | 8.13 | 72.8 | 1200 | | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow below normal; Flow clear; Bromide sample |
| July | 11 | 2012 | | | | | 1280 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow low; Sunny; No precip past 48 hrs |
| July | 19 | 2012 | | | | | 926 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Overcast; Heavy rain past 48 hrs |
| July | 23 | 2012 | 13:07 | 8.20 | 70.3 | 1157 | 1130 | 7.50 | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Flow clear; Tracer temp 70.8 defg F |
| August | 4 | 2012 | | | | | 891 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Overcast; Heavy rain past 48 hrs |
| August | 7 | 2012 | 11:44 | 8.21 | 68.9 | 1104 | 1089 | | Sleepy Hollow Run above Brownsville Rd Bridge | Slightly silty |
| August | 13 | 2012 | | | | | 1120 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Partly cloudy; No precip past 48 hrs |
| August | 21 | 2012 | 12:21 | 8.31 | 65.5 | 1169 | 1125 | 8.00 | Sleepy Hollow Run above Brownsville Rd Bridge | |
| August | 25 | 2012 | | | | | 1139 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Partly cloudy; No precip past 48 hrs |
| August | 31 | 2012 | | | | | 997 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Sunny; No precip past 48 hrs |
| September | 6 | 2012 | 14:54 | 7.85 | 74.8 | 1393 | 1375 | | Sleepy Hollow Run above Brownsville Rd Bridge | |
| September | 9 | 2012 | | | | | 939 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow low; Partly cloudy; Steady rain past 48 hrs |
| September | 24 | 2012 | 13:11 | 8.3 | 55.2 | 1302 | 1308 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; flow clear; Recent flooding caused bank erosion in area due to fallen treein channel |
| September | 25 | 2012 | | | | | 1257 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow low; Overcast; No precip past 48 hrs |
| October | 8 | 2012 | 12:36 | 8.44 | 48.4 | 1190 | 1184 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Flow clear |
| October | 21 | 2012 | | | | | 1186 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow low; Partly cloudy; Intermittent rain past 48 hrs |
| November | 4 | 2012 | | | | | 759 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow very high; Overcast; No precip past 48 hrs |
| November | 9 | 2012 | 12:13 | 8.81 | 42.5 | 1214 | 1177 | | Sleepy Hollow Run above Brownsville Rd Bridge | |
| November | 11 | 2012 | | | | | 1265 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Sunny; Intermittent rain past 48 hrs |
| December | 19 | 2012 | 12:02 | 7.85 | 45.2 | 845 | 797 | | Sleepy Hollow Run above Brownsville Rd Bridge | Construction on Montour Connector; site downstream of regular site by ~300 ft |
| December | 27 | 2012 | | | | | 1493 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Overcast; Snow past 48 hrs |
| March | 29 | 2013 | 13:29 | 8.65 | 48.2 | 1185 | 1116 | 8.00 | Sleepy Hollow Run above Brownsville Rd Bridge | |
| April | 18 | 2013 | 11:51 | 8.47 | 61.1 | 1020 | 1046 | | Sleepy Hollow Run above Brownsville Rd Bridge | |
| June | 4 | 2013 | 12:25 | 8.35 | 60.9 | 1222 | 1179 | 8.00 | Sleepy Hollow Run above Brownsville Rd Bridge | Montour Trail Connector complete |
| June | 17 | 2013 | 12:16 | 8.32 | 68.1 | 1104 | 1089 | 8.00 | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Flow clear |
| July | 2 | 2013 | 12:16 | 8.3 | 67.8 | 968 | 904 | 8.00 | Sleepy Hollow Run above Brownsville Rd Bridge | Flow above normal; sloght siltation |
| July | 16 | 2013 | 11:06 | 8.25 | 68.3 | 1171 | 1113 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Flow clear; structural damage due to flooding |
| July | 30 | 2013 | 12:15 | 8.3 | 62.1 | 1206 | 1147 | | Sleepy Hollow Run above Brownsville Rd Bridge | |
| August | 13 | 2013 | 11:23 | 8.22 | 68.8 | 1225 | 1190 | | Sleepy Hollow Run above Brownsville Rd Bridge | Flow normal; Flow clear; Sunny; Recent downpour; Trace precip |
| August | 29 | 2013 | 11:36 | 8.09 | 69.6 | 973 | 909 | 8.00 | Sleepy Hollow Run above Brownsville Rd Bridge | Air Temp 73 deg F; Sunny; No precip; Flow normal; Flow clear |
| September | 13 | 2013 | 13:01 | 8.17 | 64.7 | 1319 | 1278 | 8.00 | Sleepy Hollow Run above Brownsville Rd Bridge | Air Temp 64 deg F; Sunny; Flow normal; Flow Clear; No precip |
| September | 30 | 2013 | 9:35 | | 59.0 | | 1315 | 7.50 | Sleepy Hollow Run above Brownsville Rd Bridge | Flow low; Flow clear;Overcast; No precip; Air Temp 59 deg F |
| October | 15 | 2013 | 16:01 | | 62.6 | | 1185 | 7.50 | Sleepy Hollow Run above Brownsville Rd Bridge | Air temp 71 deg F; Flow low; Flow clear; Cloudy; No precip |
| October | 30 | 2013 | 14:16 | | 48.7 | | 1265 | 7.50 | Sleepy Hollow Run above Brownsville Rd Bridge | Air temp 60 deg F; Flow low; Flow clear; Cloudy; Precip none |
| November | 10 | 2013 | 14:25 | | 45.1 | | 1162 | 6.50 | Sleepy Hollow Run above Brownsville Rd Bridge | Air temp 46 deg F; Flow low; Flow clear; Cloudy; No precip |
| November | 27 | 2013 | 13:22 | | 39.5 | | 2080 | 6.50 | Sleepy Hollow Run above Brownsville Rd Bridge | Air temp 32 deg F; Flow normal; Flow clear; Snowy; Precip light |
| December | 11 | 2013 | 15:58 | | 35.0 | | 2190 | 6.50 | Sleepy Hollow Run above Brownsville Rd Bridge | Air temp 32 deg F; Flow normal; Flow clear; Cloudy; No precip |
| October | 31 | 2013 | 11:13 | | | | 1244 | 8.00 | Sleepy Hollow Run above King School Rd | Macros: Cranefly, Amphipods, snails, lots of leeches |
| August | 29 | 2011 | 15:36 | | | | 1066 | | Sleepy Hollow Run below Academy bridge | Flow high; Cloudy; No precip in past 48 hrs |
| September | 10 | 2011 | 16:30 | | 71.6 | | 2110 | | Sleepy Hollow Run below Academy bridge | Flow normal; Cloudy; Intermittent rain in past 48 hrs |
| September | 17 | 2011 | 19:14 | | 61.7 | | 1185 | | Sleepy Hollow Run below Academy bridge | Flow normal; Partly cloudy; No precip in past 48 hrs |
| September | 24 | 2011 | 17:32 | | 71.1 | | 1076 | | Sleepy Hollow Run below Academy bridge | Flow normal; Sunny; Light rain in past 48 hours |
| September | 29 | 2011 | 18:55 | | 61.5 | | 1188 | | Sleepy Hollow Run below Academy bridge | Flow normal; Sunny; No precip in past 48 hrs |
| October | 2 | 2011 | 14:00 | | 52.9 | | 595 | | Sleepy Hollow Run below Academy bridge | Flow high; Cloudy; Heavy precip in past 48 hrs |
| October | 14 | 2011 | 16:38 | | 57.4 | | 814 | | Sleepy Hollow Run below Academy bridge | Flow normal; Cloudy; Steady precip in past 48 hrs |
| October | 18 | 2011 | 17:02 | | 56.7 | | 1210 | | Sleepy Hollow Run below Academy bridge | Flow normal; Sunny; No precip in past 48 hrs |
| October | 25 | 2011 | 17:40 | | 56.8 | | 1164 | | Sleepy Hollow Run below Academy bridge | Flow normal; Sunny; No precip in past 48 hrs |
| November | 5 | 2011 | 17:17 | | 47.7 | | 1254 | | Sleepy Hollow Run below Academy bridge | Flow normal; Sunny; No precip in past 48 hrs |
| November | 12 | 2011 | 16:05 | | 49.6 | | 1220 | | Sleepy Hollow Run below Academy bridge | Flow low; Partly cloudy; No precip in past 48 hrs |
| November | 19 | 2011 | 12:22 | | 54.7 | | 1157 | | Sleepy Hollow Run below Academy bridge | Flow normal; Partly cloudy; No precip in past 48 hrs |
| November | 23 | 2011 | 14:46 | | 49.6 | | 758 | | Sleepy Hollow Run below Academy bridge | Flow high; Partly cloudy; Steady precip in past 48 hrs |
| December | 3 | 2011 | 18:47 | | 56.8 | | 1208 | | Sleepy Hollow Run below Academy bridge | Flow low; Partly cloudy; Light rain in past 48 hrs |
| December | 7 | 2011 | 15:51 | | 46.6 | | 612 | | Sleepy Hollow Run below Academy bridge | Flow high; Cloudy; Light mix in past 48 hrs |
| December | 12 | 2011 | 11:43 | | 49.3 | | 1194 | | Sleepy Hollow Run below Academy bridge | Flow low; Partly cloudy; No precip in past 48 hrs |

| Month | Date | Year | Time | pH | Temp | Conductivity | Tracer Cond | pH(Buf strip) | Location | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| December | 24 | 2011 | 12:18 | | 43.2 | | 1057 | | Sleepy Hollow Run below Academy bridge | Flow normal;Cloudy; Light snow in past 48 hrs |
| December | 31 | 2011 | 16:57 | | 46.4 | | 1148 | | Sleepy Hollow Run below Academy bridge | Flow normal; Cloudy; Intermittent rain in past 48 hrs |
| January | 21 | 2012 | | | | | 5150 | | Sleepy Hollow Run below Academy bridge | Flow normal; Overcast; Mixed precip past 48 hrs |
| January | 28 | 2012 | | | | | 1186 | | Sleepy Hollow Run below Academy bridge | Flow high; Partly cloudy; Mixed precip past 24 hrs |
| February | 4 | 2012 | | | | | 1140 | | Sleepy Hollow Run below Academy bridge | Flow high; Cloudy; Snow past 48 hrs |
| February | 13 | 2012 | | | | | 1072 | | Sleepy Hollow Run below Academy bridge | Flow normal; Sunny; Snow past 48 hrs |
| February | 25 | 2012 | | | | | 612 | | Sleepy Hollow Run below Academy bridge | Flow high; Overcast; Mixed precip past 48 hrs |
| March | 2 | 2012 | | | | | 1224 | | Sleepy Hollow Run below Academy bridge | Flow normal; Overcast; Light rain past 24 hrs |
| March | 17 | 2012 | | | | | 1136 | | Sleepy Hollow Run below Academy bridge | Flow normal; Sunny; Heavy rain past 48 hrs |
| March | 24 | 2012 | | | | | 800 | | Sleepy Hollow Run below Academy bridge | Flow normal; Overcast; Heavy rain past 48 hrs |
| March | 31 | 2012 | | | | | 1053 | | Sleepy Hollow Run below Academy bridge | Flow normal; Sunny; Steady rain past 48 hrs |
| April | 18 | 2012 | | | | | 1192 | | Sleepy Hollow Run below Academy bridge | Flow normal; Partly cloudy; No precip past 48 hrs |
| April | 30 | 2012 | | | | | 1221 | | Sleepy Hollow Run below Academy bridge | Flow normal; Partly cloudy; No precip past 48 hrs |
| May | 12 | 2012 | | | | | 1150 | | Sleepy Hollow Run below Academy bridge | Flow normal; Sunny; No precip past 48 hrs |
| May | 19 | 2012 | | | | | 1196 | | Sleepy Hollow Run below Academy bridge | Flow normal; Sunny; No precip past 48 hrs |
| June | 9 | 2012 | | | | | 1172 | | Sleepy Hollow Run below Academy bridge | Flow low; Sunny; No precip past 48 hrs |
| June | 17 | 2012 | | | | | 1130 | | Sleepy Hollow Run below Academy bridge | Flow low; Partly cloudy; No precip past 48 hrs |
| June | 30 | 2012 | | | | | 1234 | | Sleepy Hollow Run below Academy bridge | Flow low; Partly cloudy; Steady rain past 48 hrs |
| July | 11 | 2012 | | | | | 1198 | | Sleepy Hollow Run below Academy bridge | Flow normal; Sunny; No precip past 48 hrs |
| July | 19 | 2012 | | | | | 937 | | Sleepy Hollow Run below Academy bridge | Flow normal; Overcast; Heavy rain past 48 hrs |
| August | 4 | 2012 | | | | | 929 | | Sleepy Hollow Run below Academy bridge | Flow normal; Overcast; Heavy rain past 48 hrs |
| August | 13 | 2012 | | | | | 1179 | | Sleepy Hollow Run below Academy bridge | Flow low; Partly cloudy; No precip past 48 hrs |
| August | 25 | 2012 | | | | | 1206 | | Sleepy Hollow Run below Academy bridge | Flow low; Partly cloudy; No precip past 48 hrs |
| August | 31 | 2012 | | | | | 1062 | | Sleepy Hollow Run below Academy bridge | Flow normal; Sunny; No precip past 48 hrs |
| September | 9 | 2012 | | | | | 1060 | | Sleepy Hollow Run below Academy bridge | Flow low; Partly cloudy; Steady rain past 48 hrs |
| September | 25 | 2012 | | | | | 1248 | | Sleepy Hollow Run below Academy bridge | Flow low; Overcast; No precip past 48 hrs |
| October | 21 | 2012 | | | | | 1540 | | Sleepy Hollow Run below Academy bridge | Flow low; Partly cloudy; Intermittent rain past 48 hrs |
| November | 4 | 2012 | | | | | 803 | | Sleepy Hollow Run below Academy bridge | Flow high; Overcast; No precip past 48 hrs |
| November | 11 | 2012 | | | | | 1500 | | Sleepy Hollow Run below Academy bridge | Flow high; Sunny; Intermittent rain past 48 hrs |
| December | 27 | 2012 | | | | | 1753 | | Sleepy Hollow Run below Academy bridge | Flow high; Overcast; Snow past 48 hrs |
| May | 7 | 2013 | 11:17 | | 58.7 | 1120 | | 8.50 | Sleepy Hollow Run downstream of Academy | |
| October | 31 | 2013 | 11:43 | | | | 1225 | 7.50 | Sleepy Hollow Run in South Park County Park above Academy bridge | |
| February | 25 | 2013 | 14:50 | 8.73 | 45.5 | 1347 | | | Sleepy Hollow Run just downstream of Tennis Club property culvert; | Impacted severely by algae at this point; Stormwater discharge on LAB |
| May | 7 | 2013 | | | 58.6 | 1200 | | | Sleepy Hollow Run upstream of Academy | |
| July | 31 | 2010 | 12:04 | 7.15 | | 3060 | | | Small Discharge description of PC at Dick Corp building encroachment | |
| July | 27 | 2009 | 15:33 | 8.12 | 68.8 | 1424 | | | Snee Run above wetland | |
| August | 4 | 2009 | 12:37 | 8.19 | 64.6 | 1367 | | | Snee Run above wetland | |
| October | 31 | 2009 | 12:28 | 7.44 | 54.0 | 1455 | | | Snee Run above wetland | |
| July | 7 | 2011 | 10:50 | 7.17 | 68.4 | 1142 | | | Trax Farm Bacterial Site flow Normal | |
| June | 30 | 2011 | 12:49 | 7.10 | 66.5 | 1134 | | | Trax Farm near mouth | Bacterial Sampling; Wypt 151 |
| April | 3 | 2011 | 14:41 | 8.85 | 50.7 | 733 | | | Trax Farm Trib at Mineral Beach | |
| April | 16 | 2011 | 11:12 | 7.40 | 52.5 | 638 | | | Trax Farm Trib at Mineral Beach | |
| May | 10 | 2011 | 12:54 | 8.84 | 65.1 | 685 | | | Trax Farm Trib at Mineral Beach | |
| May | 17 | 2011 | 10:51 | 8.65 | 57.5 | 685 | | | Trax Farm Trib at Mineral Beach | |
| July | 9 | 2012 | 13:00 | 8.66 | 84.6 | 765 | | | Trax Farm Trib at Mineral Beach | |
| July | 23 | 2012 | 11:35 | 7.55 | 74.5 | 845 | | 8.00 | Trax Farm Trib at Mineral Beach | |
| August | 7 | 2012 | 12:20 | 7.64 | 76.0 | 740 | 716 | | Trax Farm Trib at Mineral Beach | |
| August | 21 | 2012 | 12:53 | 7.48 | 78.1 | 990 | 956 | 8.00 | Trax Farm Trib at Mineral Beach | |
| September | 6 | 2012 | 13:31 | 8.65 | 85.0 | 801 | | | Trax Farm Trib at Mineral Beach | Flow above normal; Draining Mineral Beach pool into trib? |
| September | 24 | 2012 | 13:40 | 7.03 | 66.9 | 813 | 815 | | Trax Farm Trib at Mineral Beach | pH on buffer strip is probably moe reliable reading |
| October | 8 | 2012 | 14:09 | 7.97 | 54.0 | 657 | 634 | | Trax Farm Trib at Mineral Beach | Encountered rat in culvert |
| November | 9 | 2012 | 12:48 | 6.92 | 51.2 | 675 | 655 | | Trax Farm Trib at Mineral Beach | |
| December | 19 | 2012 | 12:39 | 7.2 | 46.7 | 575 | 550 | | Trax Farm Trib at Mineral Beach | Flow above normal |
| April | 3 | 2013 | 14:14 | 8.79 | 51.0 | 839 | 790 | 7.50 | Trax Farm Trib at Mineral Beach | |
| June | 5 | 2013 | 9:47 | 7.05 | 61.6 | 849 | 800 | 8.00 | Trax Farm Trib at Mineral Beach | |
| June | 18 | 2013 | 10:26 | 7.09 | 65.2 | 750 | 740 | 8.00 | Trax Farm Trib at Mineral Beach | Flow above normal; Flow silted |
| July | 3 | 2013 | 10:11 | 7.85 | 70.6 | 719 | 655 | 7.50 | Trax Farm Trib at Mineral Beach | |
| July | 18 | 2013 | 8:41 | 8.25 | 68.1 | 746 | 690 | | Trax Farm Trib at Mineral Beach | Flow above normal; flow somewhat silted |
| July | 31 | 2013 | 9:47 | 7.44 | 65.4 | 860 | 800 | | Trax Farm Trib at Mineral Beach | |
| August | 14 | 2013 | 10:36 | 7.99 | 64.7 | 889 | 827 | | Trax Farm Trib at Mineral Beach | Partly cloudy; Flow normal to slightly high; Flow cloudy; no precip |
| August | 30 | 2013 | 10:33 | 7.92 | 72.5 | 949 | 883 | 8.00 | Trax Farm Trib at Mineral Beach | Air Temp 79 deg F; Flow normal; Flow clear; Sunny; No precip |
| September | 13 | 2013 | 13:37 | 7.28 | 68.8 | 751 | 706 | | Trax Farm Trib at Mineral Beach | Air Temp 58 deg F; Overcast; Raining; Flow normal; Flow somewhat silty |
| September | 30 | 2013 | 10:05 | | 61.3 | | 790 | 7.50 | Trax Farm Trib at Mineral Beach | Flow low; Flow clear; Overcast; Precip none; Air Temp 64 deg F |
| October | 15 | 2013 | 16:27 | | 66.7 | | 790 | 7.75 | Trax Farm Trib at Mineral Beach | Air Temp 76 deg F;Flow low; Flow clear; Cloudy; No precip |
| October | 30 | 2013 | 14:37 | | 55.9 | | 840 | 7.50 | Trax Farm Trib at Mineral Beach | Air temp 60 deg F; Flow low; Flow clear; Cloudy; No precip |
| November | 10 | 2013 | 14:05 | | 48.2 | | 805 | 7.00 | Trax Farm Trib at Mineral Beach | Air temp 46 deg F; Flow low; Flow clear; Cloudy; No precip |
| November | 27 | 2013 | 14:00 | | 41.7 | | 1160 | 6.50 | Trax Farm Trib at Mineral Beach | Air temp 31 deg F;Flow normal; Flow clear; Snowy; Precip light |
| December | 11 | 2013 | 15:39 | | 42.6 | | 948 | 7.50 | Trax Farm Trib at Mineral Beach | Air temp 35; Flow normal; Flow Clear; Cloudy; Precip none |
| July | 12 | 2011 | 13:02 | 8.01 | 73.0 | 1005 | | | Trax Farm Trib at Pleasant Stream Park Union Twp | |
| August | 4 | 2009 | 13:35 | 8.14 | 68.3 | 1086 | | | Trax Farm Trib near mouth | |
| April | 3 | 2011 | 14:05 | 8.05 | 50.1 | 1079 | | | Trax Farm Trib near mouth | |
| July | 14 | 2011 | 10:41 | 7.10 | 64.6 | 1149 | | | Trax Farm Trib near mouth | Bacterial sampling |
| July | 19 | 2011 | 10:54 | 7.61 | 70.3 | 870 | | | Trax Farm Trib near mouth | Bacterial Site |
| July | 28 | 2011 | 10:24 | 6.92 | 68.4 | 1116 | | | Trax Farm Trib near mouth | Bacterial Site |
| August | 11 | 2011 | 10:53 | 6.84 | 65.4 | 1100 | | | Trax Farm Trib near mouth | Bacterial Site/Normal Flow |
| August | 18 | 2011 | 10:41 | 7.26 | 66.0 | 1192 | | | Trax Farm Trib near mouth | Bacterial Site/Normal Flow |
| September | 1 | 2011 | 11:41 | 7.71 | 65.3 | 1041 | | | Trax Farm Trib near mouth | Bacterial Site/Slightly High Flow |
| May | 21 | 2012 | 10:42 | 7.84 | 61.2 | 994 | | | Trax Farm Trib near mouth | |
| July | 9 | 2012 | 13:46 | 8.31 | 76.9 | 1076 | | | Trax Farm Trib near mouth | Flow normal; Flow clear; Nutrient enrichment problem |
| July | 23 | 2012 | 12:29 | 8.08 | 70.1 | 1099 | 1070 | 7.50 | Trax Farm Trib near mouth | Tracer temp 70.8 deg F |
| August | 7 | 2012 | 12:56 | 8.07 | 71.7 | 1062 | 1082 | | Trax Farm Trib near mouth | |
| August | 21 | 2012 | 13:34 | 8.07 | 66.3 | 1168 | 1139 | 7.50 | Trax Farm Trib near mouth | |
| September | 6 | 2012 | 12:46 | 8.17 | 74.6 | 1171 | 1139 | | Trax Farm Trib near mouth | |
| September | 24 | 2012 | 13:56 | 7.78 | 58.2 | 1086 | 1079 | | Trax Farm Trib near mouth | flow normal; flow clear; Sunny |
| October | 8 | 2012 | 13:30 | 7.55 | 49.9 | 1063 | 1068 | | Trax Farm Trib near mouth | Flow normal; flow clear |
| November | 9 | 2012 | 13:49 | 8.13 | 48.1 | 916 | 888 | | Trax Farm Trib near mouth | |
| December | 19 | 2012 | 13:21 | 8.06 | 47.2 | 730 | 703 | | Trax Farm Trib near mouth | Flow above normal |
| April | 3 | 2013 | 13:21 | 8.11 | 49.0 | 1033 | 987 | 7.00 | Trax Farm Trib near mouth | |
| June | 5 | 2013 | 10:52 | 7.47 | 58.8 | 1036 | 966 | 7.50 | Trax Farm Trib near mouth | |

| Month | Date | Year | Time | pH | Temp | Conductivity | Tracer Cond | pH(Buf strip) | Location | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| June | 18 | 2013 | 11:27 | 7.74 | 63.0 | 970 | 934 | 7.50 | Trax Farm Trib near mouth | Flow above normal; flow clear |
| July | 3 | 2013 | 11:15 | 7.79 | 67.4 | 887 | 811 | 7.50 | Trax Farm Trib near mouth | Flow above normal; Flow slightly silted |
| July | 18 | 2013 | 9:41 | 7.58 | 65.2 | 1001 | 916 | | Trax Farm Trib near mouth | Flow above normal; flow slightly silted; substrate covered with silt |
| July | 31 | 2013 | 11:16 | 7.57 | 62.6 | 1057 | 982 | | Trax Farm Trib near mouth | Flow normal; flow clear; substrate very silty |
| August | 14 | 2013 | 11:47 | 7.65 | 60.9 | 1072 | 1004 | | Trax Farm Trib near mouth | Air Temp 66 deg F; Sunny but mostly cloudy; Flow Normal; Flow clear; Substrate silted; No precip; something dead nearby |
| August | 30 | 2013 | 11:39 | 7.61 | 69.2 | 1072 | 1009 | 7.50 | Trax Farm Trib near mouth | Air Temp 81 deg F; Flow normal; Flow clear; Sunny; No precip; Substrate silted |
| September | 13 | 2013 | 15:20 | 6.64 | 64.0 | 1000 | 955 | 7.00 | Trax Farm Trib near mouth | Air Temp 61 deg F; Overcast; Slight Precip; Flow normal; Flow clear; Subtrate very silted |
| September | 30 | 2013 | 10:45 | | 60.0 | | 1069 | 7.00 | Trax Farm Trib near mouth | Flow low; Flow clear; Overcast; No precip; Air Temp 67 deg F |
| October | 15 | 2013 | 17:09 | | 64.7 | | 1072 | 7.00 | Trax Farm Trib near mouth | Air temp 72 deg F; Flow low; Flow clear; Cloudy; No precip |
| October | 30 | 2013 | 13:26 | | 51.9 | | 1126 | 7.00 | Trax Farm Trib near mouth | Air Temp 59 deg F; Flow low; Flow clear; Cloudy; Precip none |
| November | 10 | 2013 | 15:09 | | 46.7 | | 1067 | 6.50 | Trax Farm Trib near mouth | Air temp 45 deg F; Flow low; Flow clear; Cloudy; No precip |
| November | 27 | 2013 | 13:01 | | 41.1 | | 1248 | 6.00 | Trax Farm Trib near mouth | Air temp 30 deg F; Flow normal to high; Flow clear; Snowy; Precip light |
| December | 11 | 2013 | 17:00 | | 39.7 | | 1150 | 6.50 | Trax Farm Trib near mouth | Air temp 32 deg F; Flow normal; Flow clear; Cloudy; No precip |
| July | 27 | 2009 | 12:12 | 8.10 | 68.5 | 1107 | | | Trax Farm Trib near mouth | |
| July | 31 | 2010 | 12:50 | 7.69 | 68.7 | 1787 | | | Tributary culverted under Dick Corp backlot | |
| February | 17 | 2012 | 13:32 | 7.53 | 51.8 | 860 | | | Wetland at Community College of Allegheny County South Campus in West Mifflin | Ice clearing out |
| October | 25 | 2013 | 15:26 | 8.23 | 47.0 | 1157 | 1169 | 6.75 | Wright's House Tributary below Venetia Rd | |
| October | 31 | 2013 | 14:37 | | 57.0 | | 1141 | 7.25 | Wright's House Tributary below Venetia Rd | Air temp 71 deg F; Flow low; Flow clear; Cloudy; No precip |
| November | 15 | 2013 | 13:05 | | 51.6 | | 1005 | 7.50 | Wright's House Tributary below Venetia Rd | Air temp 55 deg F; Flow very low; Flow clear; Sunny; No precip |
| December | 6 | 2013 | 10:45 | | 44.7 | | 480 | | Wright's House Tributary below Venetia Rd | Air temp 38 deg F; Flow low; Flow clear; Cloudy; No precip |
| February | 25 | 2013 | 13:47 | 8.92 | 45.9 | 1304 | | | Wypt353 Sleepy Hollow Run in South Park County Park upstream of Academy | Sunny; air temps upper 30's; wide floodplain; stream sinuous; lots of invasives; not good canopy along this section |
| July | 13 | 2012 | 12:36 | 4.51 | 64.1 | 2200 | | | | Flow ~50-100 GPM; Higher aluminum in discharge than prior |

# Appendix D

**Peters Creek Greenprint**
**A Land Conservation Plan for the Peters Creek Watershed**

# A LAND CONSERVATION PLAN FOR PETERS CREEK WATERSHED

UTILIZING ALLEGHENY LAND TRUST GREENPRINT METHODOLOGY TO IDENTIFY THE HIGH QUALITY UNIQUE NATURAL INFRASTRUCTURE (HQ-UNI) OF PETERS CREEK WATERSHED

BY:

MICHAEL J. KOTYK

A THESIS SUBMITTED
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
MASTER OF LANDSCAPE ARCHITECTURE (MLA)
AT CHATHAM UNIVERSITY

OCTOBER 2008

COMMITTEE:

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COMMITTEE MEMEBER - TIM SCHUMANN (PETERS CREEK WATERSHED ASSOCIATION)

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The Chatham University Office of Graduate Studies has verified and approved the above named committee members.

ACKNOWLEDGEMENTS

The clients for this study were the Allegheny Land Trust (ALT) and Peters Creek Watershed Association (PCWA). ALT is an independent non-profit incorporated in 1993 to conserve green space in Allegheny County. ALT's mission is "to serve as the lead land trust conserving and stewarding lands that support the scenic, recreational and environmental well being of communities in Allegheny County and its environs." To date, ALT has conserved over 1,300 acres in Allegheny County and Washington County. The PCWA is a 501(c)3 non-profit corporation dedicated to the protection, restoration and long-term stewardship of the natural resources within and adjacent to the Peters Creek Watershed.

The author acknowledges the following individuals for their generous input into this work, without whom a Land Conservation Plan for Peters Creek Watershed could not have been developed:

Roy Kraynyk, executive director, ALT; Tim Schumann, Peters Creek Watershed Association; Lisa Kunst Vavro, director, Chatham University Landscape Architecture Program; John Buerkle, vice president, Pashek Associates.

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Degree of Master of Landscape Architecture

# A Land Conservation Model for Peters Creek Watershed

*Utilizing Greenprint Techniques to Preserve the High Quality Unique Natural Infrastructure (HQUNI) of Peters Creek Watershed*

By:

Michael J. Kotyk
August 14, 2008

Chair: Lisa A. Kunst Vavro

This project consists of developing a Land Conservation Model for the Peters Creek Watershed in Allegheny and Washington Counties, Pennsylvania. The Peters Creek Watershed Association (PCWA) seeks to preserve lands within the watershed that are serving important stormwater control functions; protect areas that contribute to the scenic character of the watershed; preserve the biodiversity of the watershed; give municipal officials a tool to help them better understand what lands are important to the natural infrastructure of the watershed; and encourage municipalities to work together for the benefit of everyone in the watershed.

While working on this plan all existing planning efforts for each of the municipalities within the watershed were reviewed including documents such as Comprehensive Plans; Zoning, Subdivision and Land Development, and Floodplain ordinances; Greenway Plans; and County Natural Heritage Inventories. In addition, existing land use, existing natural infrastructure, and areas of special concern were inventoried throughout the watershed.

The analysis portion of this study utilizes Allegheny Land Trust's (ALT) ALT GREENPRINT techniques to preserve what is termed the High Quality Unique Natural Infrastructure (HQ-UNI) of the watershed. This is done by assigning values based on specific criteria to the elements of unique natural infrastructure based on their ability to serve stormwater control and water quality functions, enhance scenic character, and preserve biodiversity. These areas of HQ-UNI create the PCW GREENPRINT for the watershed. The PCW GREENPRINT is then used to prioritize planning regions of the watershed based on the value of the HQ-UNI within each subwatershed. This gives the PCWA and/or municipal officials the ability to seek out properties which serve the greatest public benefit for conservation efforts. Additionally, the PCW GREENPRINT gives municipal officials a tool to determine where the lands which are important to the natural infrastructure of the watershed are located, which will help guide future development.

Finally, this report documents recommendations for the watershed. Included in the recommendations is a methodology for how the PCWA or local municipal officials can utilize this Land Conservation Model to ensure development does not impact the areas determined to be HQ-UNI. In addition, strategies for implementation, including suggestions on applicable land use and regulatory controls, as well as funding sources for furthering conservation efforts within the watershed are discussed and suggested.

CHAPTER 1

INTRODUCTION

The Peters Creek Watershed consists of fifty diverse square miles in southeastern Allegheny and northeastern Washington Counties. Peters Creek covers a sixteen-mile stretch with its headwaters in Thomas, Washington County and drains all or parts of thirteen municipalities as it winds its way to the Monongahela River in Clairton, Allegheny County. The municipalities are listed in table 1-1.

The corridor surrounding the creek, as well as its tributaries, provides many recreation and conservation opportunities. Hunting, fishing, nature study and biking are popular in the valley and along the creeks many wooded slopes. The Peters Creek Watershed encompasses a two thousand acre multi-functional County Park, South Park, approximately twelve miles of the forty-six mile Montour Trail, and harbors several areas of special biological significance.

| Municipality | Sq Miles | Percent |
|---|---|---|
| Allegheny County | | |
| Baldwin Borough | 1.4 | 2.5% |
| Bethel Park Borough | 7.6 | 13.8% |
| Clairton City | 1.23 | 2.2% |
| Jefferson Hills Borough | 11.8 | 21.4% |
| Pleasant Hills Borough | 6.2 | 11.3% |
| South Park Township | 9.2 | 16.7% |
| West Mifflin Borough | 1.5 | 2.7% |
| Whitehall Borough | 0.23 | 0.4% |
| Washington County | | |
| Finleyville Borough | 0.14 | 0.3% |
| North Strabane Township | 0.04 | 0.1% |
| Nottingham Township | 2.8 | 5.1% |
| Peters Township | 6.2 | 11.3% |
| Union Township | 6.7 | 12.2% |

**Table 1.1 Municipalities**

From the heavy industry in the east, where Peters Creek flows into the Monongahela River, to the large commercial district along State Route 51 in the northeast, through the densely populated north suburban communities, and the southern agricultural areas under residential development pressure, this watershed is a veritable patchwork of land use types. All of these land use types can be seen as potential threats that can negatively impact the watershed if proper management and planning does not occur at the municipal level.

## Why Develop a Land Conservation Model?

Identifying the vital natural infrastructure within Peters Creek Watershed that is critical for; flood control, maintaining scenic character, preserving biodiversity, and affording recreational opportunities, is an essential first step toward developing an effective watershed-wide Land Conservation Model.

Managing a highly functional natural infrastructure network requires cooperation, as well as a consistent legislative agenda, between the watershed's thirteen municipal governments. Understanding the current land use status and policies within the watershed will provide the necessary information to develop plan recommendations.

The purposes of this study are to: identify those lands within the watershed that are serving important stormwater control functions, contribute to the scenic character of the watershed, and provide habitat for plants and animals within the watershed which impacts the quality of life; give municipal officials a tool that will help them better understand what lands are important to the natural infrastructure of the watershed; and encourage municipalities to work together for the benefit of everyone in the watershed.

## Project Area Characteristics

### Land Resources

Peters Creek Watershed is within the Pittsburgh Low Plateau Section physiographic province. Physiographic provinces are regions that are united by similar geography. The physiography of a region influences its topography and climate, which along with bedrock type affects soil development and hydrology, which ultimately affects land use patterns.

The Pittsburgh Low Plateau is underlain by siltstone, shale, sandstone, conglomerates, and coal. This section consists of a smooth undulating upland surface cut by numerous, narrow, relatively shallow valleys. The uplands are developed on rocks containing the bulk of the significant bituminous coal in

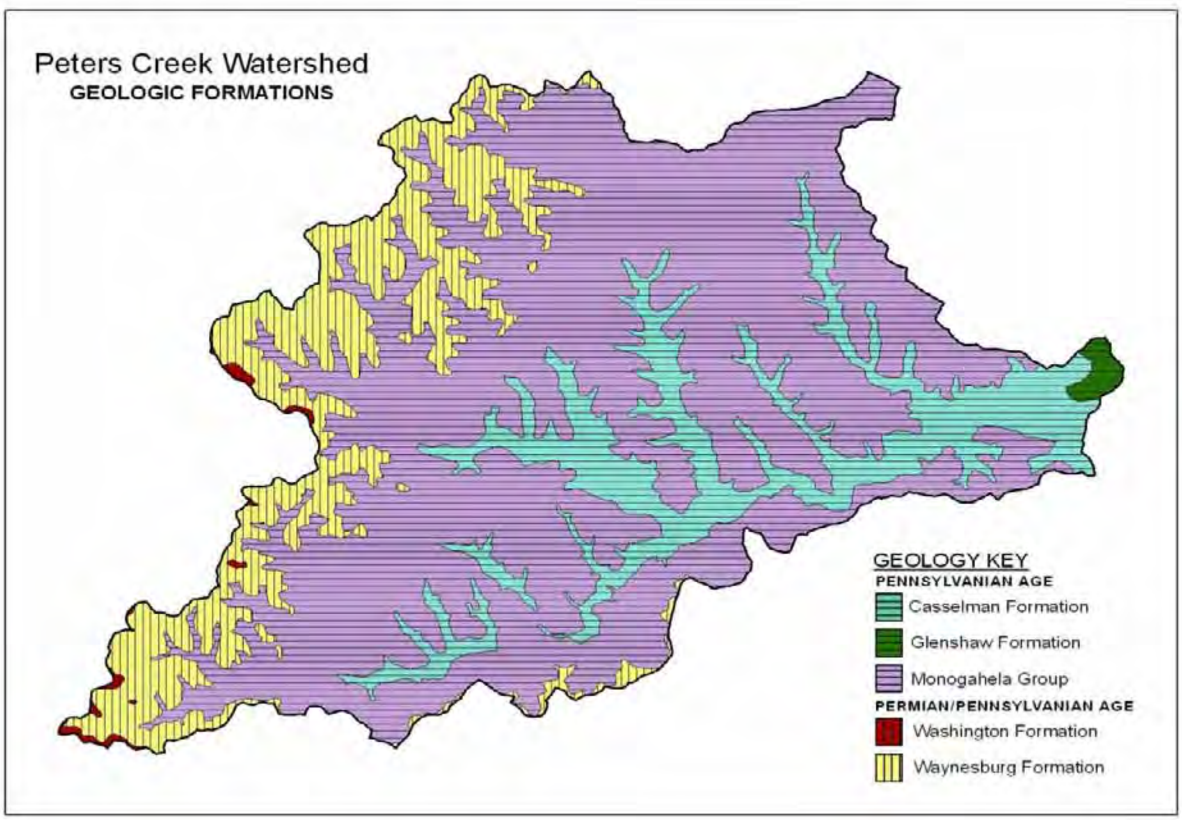



**Figure 1.1 Geologic Formations**

Pennsylvania and this can be seen in the landscape through the presence of old mining areas, and reclaimed mining areas. “The local relief on the uplands is generally less than 200 feet. Local relief between valley bottoms and upland surfaces may be as much as 600 feet. Valley sides are usually moderately steep except in the upper reaches of streams where the side slopes are fairly gentle. Elevations range from 660 to 1,700 feet” (DCNR, 2008).

In addition to the watershed’s physiography, the area can also be categorized by geologic formations. The geologic formations are areas of contiguous rock units with distinctive characteristics. There are five geologic formations in the Peters Creek Watershed. These formations are shown in Map 1.1. The most widespread formation is the Monongahela Group, which contains thick mineable coals. The other prevalent formaton is the Casselman Formation, which contains red beds, sandstones, and coal beds. This formation is found along many of the stream valleys in the watershed. The red beds are made up of clay and are an indicator of the presence of landslide prone soils.

There are also five soil associations found throughout the watershed, as shown on Map 1.2. Soil associations are made up of two or three major soils and some minor soils. The descriptions of the soil associations of Peters Creek Watershed as defined by the Natural Resource Conservation Service (NRCS) are:

- <u>Culleoka-Weikert-Newark</u> soil association shallow, moderately deep, well drained soils underlain by red and gray shale on uplands and deep, poorly drained soils within floodplains.

- <u>Strip Mines-Guernsey-Dormont</u> soil association contains deep, moderately well drained soils and strip mines underlain by shale and limestone on uplands.
- <u>Urban Land-Philo-Rainsboro</u> soil association contains deep, moderately well drained soils and urban land on floodplains and terraces.

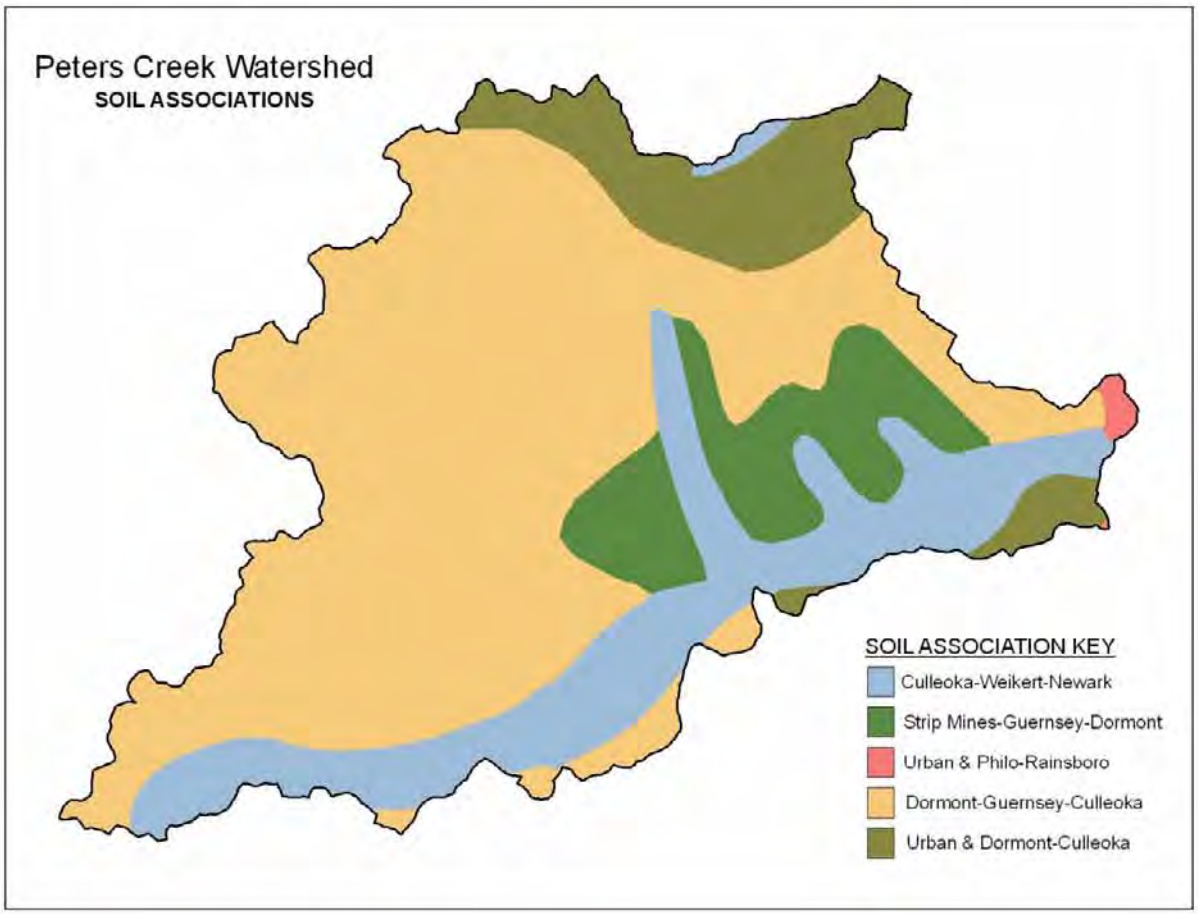



**Figure 1.2 Soil Associations**

- <u>Dormont-Guernsey-Culleoka</u> soil association contains moderately deep and deep, well drained and moderately well drained soils underlain by shale and limestone on uplands.

- Urban Land-Dormont-Culleoka soils association contains moderately deep and deep, well drained and moderately well drained soils underlain by shale and limestone on uplands.

**Water Resources**

The headwaters of Peters Creek are found in Nottingham Township, Washington County, near Thomas, and flows north east through Peters Township (creating the border between Peters and Nottingham Townships), Union Township, and Finleyville Borough before entering Allegheny County. In Allegheny County, Peters Creek continues to flow north east through South Park Township, Jefferson Hills Borough, and into City of Clairton.

Peters Creek travels approximately 16.2 miles before it outlets into the Monongahela River at the City of Clairton. Its elevation is approximately 1200 feet above sea level at its headwaters and 719 feet where it meets the Monongahela River.

For the purposes of this study, the Peters Creek subwatershed is broken into 3 regions: upper, middle and lower sections. Upper Peters Creek subwatershed accounts for 15.9 square miles, or 31.1 percent, of the project area. Middle Peters Creek subwatershed accounts for 2.5 square miles, or 4.8 percent, of the project area. Lower Peters Creek subwatershed accounts for 2.9 square miles, or 5.7 percent, of the project area.

Peters Creek has a designated protected use as stated in the Pennsylvania Code Chapter 93 on Water Quality Standards as a Trout Stocked Fishery (TSF). The TSF rating is issued to protect the aquatic life of the creek. Trout stocking includes maintenance of stocked trout from the middle of February to the end of July, as well as the maintenance and propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat.

There are six named tributaries in the Peters Creek Watershed, four of which drain directly into Peters Creek. The named tributaries to Peters Creek are:

Lewis Run begins in West Mifflin Borough, Allegheny County, just south of Century III Mall, and flows south through Pleasant Hills Borough to Jefferson Hills Borough. It travels approximately 3.6 miles until it meets Peters Creek near the intersection of PA Route 51 and PA Route 43. Lewis Run subwatershed accounts for 5.9 square miles, or 11.4 percent of the project area.

Beam Run originates in Jefferson Hills Borough, Allegheny County, near the intersection of Beam Run Road and Gill Hall Road, and flows approximately 2.6 miles in a southeasterly direction to where it enters Peters Creek east of Waterman Road along Peters Creek Road. The Beam Run subwatershed accounts for 1.9 square miles, or 3.9 percent, of the project area.

Lick Run begins in Bethel Park Borough, Allegheny County, near Millennium Park along Baptist Road, and flows south through Baldwin Borough and then creates the border between South Park Township and Jefferson Hills Borough. The length of Lick Run is approximately 6.7 miles from its headwaters to where it enters Peters Creek just east of Snowden. The Lick Run subwatershed accounts for 8.6 square miles, or 16.7 percent, of the project area.

Piney Fork originates in Bethel Park Borough, Allegheny County, near Jewel, and travels approximately 7.2 miles in a southeasterly direction through South Park

Township until it meets Peters Creek near Snowden. The Piney Fork subwatershed accounts for 8.4 square miles, or 16.4 percent, of the project area. Piney Fork also has two named tributaries Catfish Run and Sleepy Hollow Run.

Catfish Run is first seen where it comes out of a culvert in Bethel Park Borough, Allegheny County, within South Park, County Park near the five point's intersection of Library Road (State Route 88), Corrigan Drive, South Park Road, and Baptist Road. The stream actually begins under the large commercial district along Route 88. The stream flows in a southeasterly direction approximately 3.5 miles into South Park Township until it meets Piney Fork, just east of the area known as Piney Fork. The Catfish Run subwatershed accounts for 4 square miles, or 7.8 percent, of the project area.

Sleepy Hollow Run originates in Bethel Park Borough, Allegheny County, east of Boyer along Stoltz Road, and flows in a southeasterly direction. The run passes through South Park, County Park into South Park Township flowing approximately 2.3 miles before entering Piney Fork west of the area known as Piney Fork. The Sleepy Hollow Run subwatershed accounts for 1.1 square miles, or 2.2 percent, of the project area.

In addition to the named tributaries described above, there are also a number of unnamed tributaries draining into them. The total stream length within Peters Creek Watershed is estimated to be approximately 50 miles.

**Stream conditions**

In the 2008 Pennsylvania Integrated Water Quality Monitoring and Assessment Report, impaired streams, or streams that are not supporting their designated uses, are listed as required in Section 303(d) of the Clean Water Act. The designated use of all streams in the watershed for 2008 Chapter 93, PA Code is Trout Stocked Fishing (TSF).

The following information was found as to the ability of these streams to attain their designated use.

**Peters Creek.** The lower section of Peters Creek from Finleyville Borough to the mouth of the Monongahela River is listed as Non-Attaining, while the section of the creek from Finleyville to the headwaters is listed as Attaining.

The reasons for the creeks inability to attain its use are: metals from abandoned mine drainage; urban runoff resulting from storm sewers; organic enrichment/ low levels of dissolved oxygen; and urban runoff from storm sewers increasing siltation.

**Lewis Run.** The entire length of Lewis Run is listed as Non-Attaining for its designated use. The reasons for the inability of the run to attain its designated use are: removal of vegetation increasing siltation; removal of vegetation causing other habitat alterations; removal of vegetation resulting in suspended solids; bank modifications increasing siltation; bank modifications causing other habitat alterations; and bank modifications resulting in suspended solids.

**Lick Run.** The entire length of this stream is listed as non-attaining its designated use. The reasons that Lick Runs is not able to attain its designated use are: urban runoff from storm sewers; organic enrichment/low dissolved oxygen levels; metals from abandoned mine drainage.

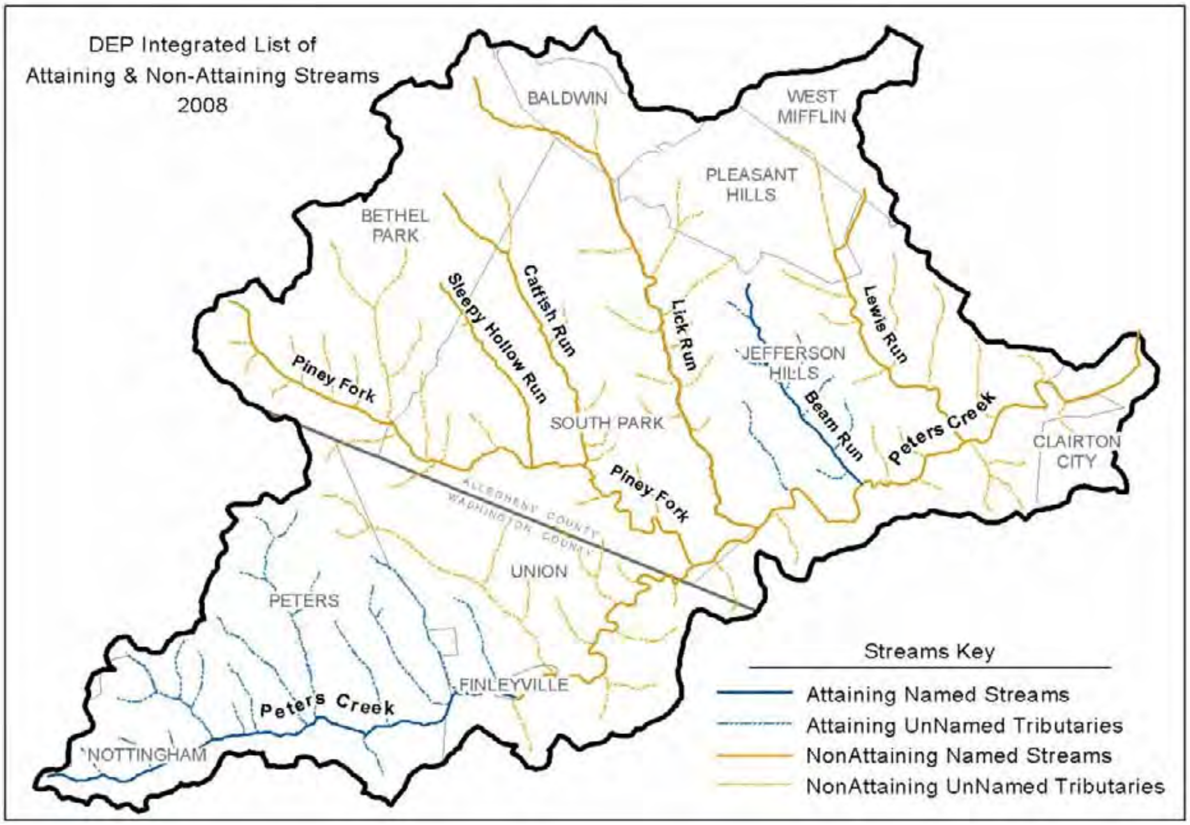



**Figure 1.3 Attaining & Non-Attaining Streams**

**Beam Run.** The entire length of Beam Run is listed as attaining its use. While the DEP designated this stream as attaining in its most recent 303(d) stream assessment report the stream actually is not. A visual assessment of Beam Run was recently completed by the Environmental Consultant for PCWA's Growing Greener Assessment Grant. Beam Run was divided into two sections for this assessment. Lower Beam Run received a score of 6.45 (FAIR) and upper Beam Run received a score of 5.8 (POOR). AMD discharges were found with pH of 2.67 and 3.00.

Abandoned mine pools containing large amounts of Al empty into Beam Run during large rain events. It is important that the DEP recognize that Beam Run is not in attainment so that future funding for AMD projects along the stream is obtainable.

**Piney Fork.** The entire length of Piney Fork is listed as non-attaining its designated use. The reasons Piney Fork is not attaining its designated use include: construction causing siltation; urban runoff from storm sewers; organic enrichment/low dissolved oxygen levels; metals from abandoned mine drainage; road runoff increasing siltation.

**Catfish Run.** The entire length of Catfish Run is listed as non-attaining for its designated use. The reasons this stream is not attaining its designated use are: urban runoff from storm sewers causing siltation; urban runoff from storm sewers causing organic enrichment/low dissolved oxygen levels; metals from abandoned mine drainage.

**Sleepy Hollow Run.** The entire length of Sleepy Hollow Run is listed as non-attaining for its designated use. The reasons this streams does not attain its designated use include: urban runoff from storm sewers causing siltation; urban runoff from storm sewers resulting in organic enrichment/low dissolved oxygen levels.

**Generalized Land Use**

Peters Creek Watershed is characterized by several different land use types and features spread throughout the watershed. Dense commercial development found along the Route 51 and Route 88 corridors, especially on Route 51 near the

Century III Mall in West Mifflin Borough, have a significant impact on the scenic character and greatly increase stormwater runoff.

**Figure 1.4 Century III Mall along Route 51**

Another defining characteristic of the watershed are the existing recreation opportunities. A more than 2,000 acre county park, South Park, is situated in Bethel Park and South Park Township in the Allegheny County section of the watershed. This park features ball fields, playgrounds, walking trails, fair grounds, an action park, and a golf course among other recreation assets. In addition to South Park, the Montour Trail is also found within the watershed. This approximately 51 mile multi-use trail follows Peters Creek from Clairton to Snowden and then parallels Piney Fork from Snowden to Library. This trail will eventually connect the area to the Great Allegheny Passage, part of the Pittsburgh to Washington D.C. trail system.

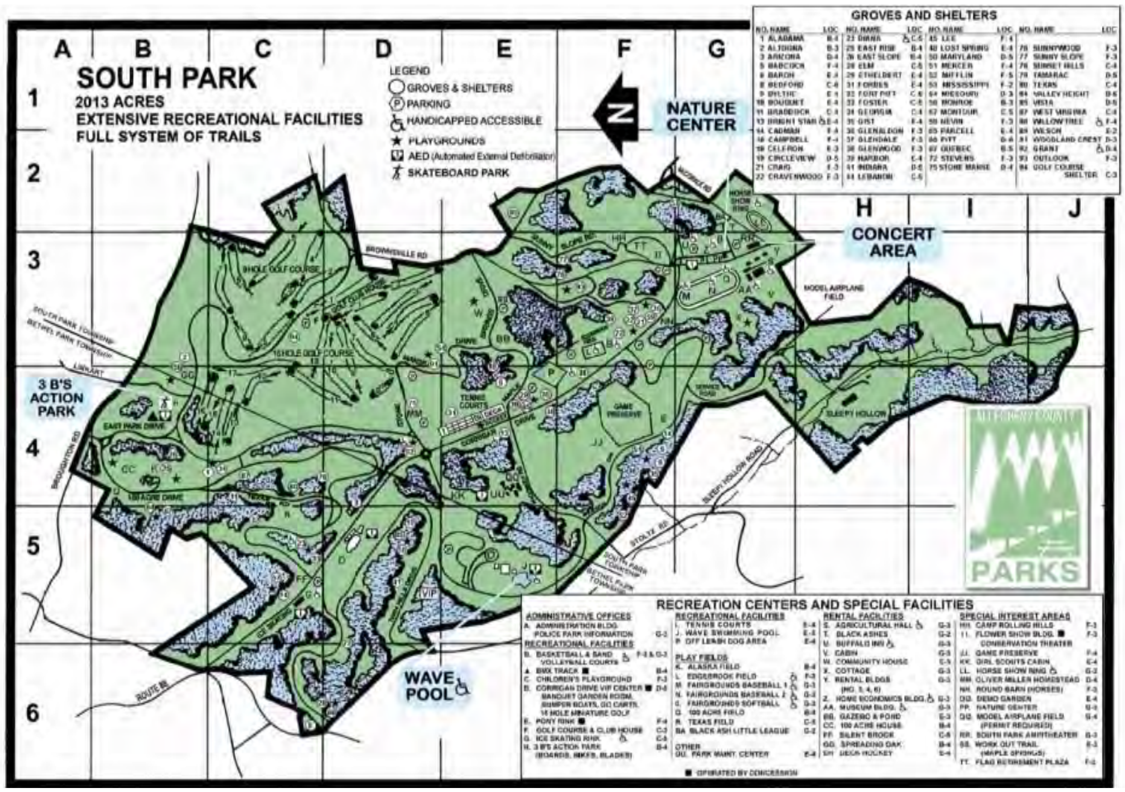



**Figure 1.5 South Park Map**

At the mouth of Peters Creek along the Monongahela River, the dominant land use is industry. This site is home to the U.S. Steel's Clairton Works mill. This industrial plant has adverse affects throughout the watershed, even though it is only located at the mouth of the creek. Overburden and strip mine areas found throughout the watershed are a byproduct of this industrial site. The Clairton Works is also responsible for the 1 million ton, 120 foot high coal waste pile along Peters Creek near the Jefferson Hills/Clairton border. Nobody knows exactly what the composition of this pile is, but it known that it is a result of a coal cleaning operation.

**Figure 1.6 Clairton Industry**

Transportation also has had a major impact on the watershed. The Mon-Fayette Expressway was recently constructed within the watershed parallel to Peters Creek. At present, this highway is incomplete ending in Jefferson Hills Borough shortly after crossing Route 51 on its way north to the City of Pittsburgh. This highway has degraded the water quality of Peters Creek through increased stormwater runoff, as well as affected the scenic character.

**Figure 1.7 Mon-Fayette Expressway**

Within Washington County, the watershed is characterized by large tracts of farmland, such as Trax Farm and Simmons Farm, two major commercial farms in the region. In addition, another dominant characteristic of this portion of the watershed is new residential development. The trend toward moving out of urban areas to more suburban or rural areas is drawing people out of the City and into Washington County. It is important to protect large tracts of farmland in order to ensure these lands are not development into new housing plans.

**Figure 1.8 Trax Farm**

## CHAPTER 2

## THE INVENTORY

The background information collected for this study was gathered through project-specific independent research. With the help of the Peters Creek Watershed Association, several studies, reports, planning documents, and ordinances were obtained and reviewed. Some of the documents included Comprehensive Plans, Zoning Ordinances, Greenways Plans, and other natural resources related materials. In this section the study will describe the watershed's resources and the sources of information consulted, referring to relevant sections of various existing planning documents, when appropriate.

### Existing Planning Efforts

The Pennsylvania Municipalities Code grants municipalities the authority to use land regulation powers such as comprehensive planning, subdivision regulations, and zoning. While the majority of the municipalities with the Peters Creek Watershed have land-use regulations, they are not utilizing the granted land-use control powers granted to the fullest extent when it comes to protecting their unique natural infrastructure.

#### Comprehensive Plans

Comprehensive plans are created to serve as guides for decision makers to ensure land use supports the greater good of the community. Without comprehensive plans, counties and municipalities may be vulnerable to undesirable land uses resulting from ill-advised residential, commercial, and industrial development. While the comprehensive plan does not regulate land use, it does establish a vision for future land use within the area it covers.

Allegheny and Washington County both have comprehensive plans. Allegheny County will complete their first comprehensive plan in 2008, which is not yet adopted, and Washington County's plan was adopted in 2005. It is generally recommended that comprehensive plans be updated every ten years.

Within Allegheny County, Bethel Park, Clairton City, Jefferson Hills, Pleasant Hills, South Park and West Mifflin all have comprehensive plans. Although Baldwin has a comprehensive plan, it is so outdated that it was not reviewed as a part of this study.

Within Washington County, only Peters Township has an adopted comprehensive plan. Union Township has completed a multi-municipal comprehensive plan, but it has not yet been adopted. Both Finleyville and Nottingham have yet to complete a comprehensive plan.

**Greenways Plans**

The Commonwealth of Pennsylvania's Greenways Plan: ***Pennsylvania's Greenways – An Action Plan for Creating Connections, 2001*** defines greenways as:

> *"A greenway corridor is a corridor of open space, varying greatly in scale, and incorporating or linking diverse natural, cultural, and scenic resources. Some greenways are recreational corridors or scenic byways accommodating pedestrian and non-motorized vehicle traffic on both land and water; while others function almost exclusively for environmental protection and are not designated for human passage."*

The Pennsylvania Greenways Plan established a strategy for creating a comprehensive, statewide greenway network by the year 2020. The Governor appointed the DCNR to oversee the Commonwealth's greenway program. The DCNR partners with county and municipal officials in support of greenway planning and implementation through education, technical assistance, and grant programs.

Development of a greenway plan allows a county or municipality to protect their exiting natural infrastructure and scenic character and to promote sustainable development and sound land use planning.

Allegheny and Washington County both have completed greenways plans. Additionally, Jefferson Hills Borough has a municipal level greenways plan.

**Zoning**

Zoning is a regulatory tool that allows governmental bodies to protect the public health, safety, and welfare by determining how a landowner can use privately owned land. Zoning ordinances divide the land within a municipality into districts and create regulations that apply to the municipality as a whole as well as to the specific individual districts. Zoning can also be used as a permitting system to prevent new development from harming existing residents or businesses.

Zoning includes regulations on the type of acceptable uses permitted on a particular lot, such as open space, residential, agricultural, commercial or industrial uses. In addition, zoning regulations can control the densities at which those uses can be developed. For example, a low-density housing district would typically allow single family homes and a high-density district would permit apartment buildings.

Other controls through zoning include: the amount of space structures may occupy; the location of a building on the lot (setbacks); the proportions of the types of space on a lot, such as how much landscaped space and how much paved space is permitted or required; and how much parking must be provided.

Neither Allegheny nor Washington County has adopted a zoning ordinance. Within the Peters Creek Watershed, all but two of the municipalities have zoning ordinances. The two municipalities that do not are Finleyville Borough and Nottingham Township, both of which are in Washington County. Since Washington County does not have a zoning ordinance, these municipalities are not regulated by zoning.

**Subdivision and Land Development Ordinances**

Subdivision and Land Development Ordinances (SALDO) are important tools for controlling growth, preserving unique natural infrastructure, and maintaining scenic character. Subdivision regulations give the governing body the right to approve development with advice from the planning commission or planning agency. Based upon standards and criteria set for the municipality within the SALDO, a decision is made as to whether the proposed subdivision meets the requirements of the codes of the community, including zoning.

SALDO's establish regulations and standards in certain areas such as stormwater management, roadway widths, sewage systems, and steep slopes. They can also require that additional studies be done, such as traffic studies, to evaluate potential impacts on the environment.

Allegheny County has a SALDO, but Washington County does not. Generally, when a county has a SALDO, the municipalities within that county follow the guidelines of the county ordinance if they do not have one.

While Washington County does not have an ordinance, they do have a SALDO Policy which states that "the County Planning Commission is required by Act 247 as amended, the Pennsylvania Municipalities Planning Code to review and report on subdivision and land development applications before the applications can be approved by the municipal governing body."

Within Allegheny County Baldwin, Bethel Park, Clairton City, Jefferson Hills, and Pleasant Hills all have SALDO's, while South Park and West Mifflin do not. In Washington County, Peters and Union both have SALDO's and Finleyville and Nottingham do not.

**Floodplain Ordinance**

A floodplain ordinance establishes land use regulations for properties within the delineated FEMA floodplain. The general purpose of these regulations is to minimize property damage from flooding and safeguard public health, safety, and welfare.

A floodplain ordinance can also be very beneficial in protecting the quality of a community's waterways and in providing for the appropriate development of sites in and adjacent to floodplains, wetlands, and riparian buffer areas by limiting the type and breadth of development in these areas.

Within Peters Creek watershed Baldwin, Jefferson Hills, Pleasant Hills, West Mifflin, Peters, and Union all have floodplain ordinances. Bethel Park, Clairton City, South Park, Finleyville, and Nottingham do not.

**Grading Ordinance**

A grading ordinance establishes standards for all grading, including fill and excavation, as well as guidelines for erosion and sedimentation control methods. The purpose of this type of ordinance is to protect against soil erosion that causes the degradation of waterways from nutrients, sediments or other earth materials being washed into streams.

Additional benefits a grading ordinance can provide by protecting waterways from sedimentation include, protecting drainage courses and watercourses from obstruction; protecting life and property from the destructive effects of flooding; and protecting fish, wildlife and their habitats by promoting the retention and restoration of riparian vegetation.

Within Peters Creek Watershed Baldwin, Jefferson Hills, Pleasant Hills, Peters, and Union all have grading ordinances. The majority of these ordinances do not allow for any grading to take place on slopes greater than twenty-five percent unless certain guidelines are followed or criteria met.

**Environmental Advisory Council**

Municipalities in Pennsylvania have the option of creating an Environmental Advisory Council (EAC). EAC's are formed to advise municipal officials on important environmental issues within the community as well as ways to protect, preserve, and enhance the natural environment. A council could be formed for a single municipality, or for multiple municipalities. Peters Creek Watershed should consider creation of an EAC for the municipalities within the watershed. None of the municipalities within the watershed currently have an EAC; however, Jefferson Hills Borough and Peters Township both have an Environmental Quality Board, whose purpose is similar to that of an EAC.

Generally, an EAC's activities include such issues as subdivision and land development plan reviews, management and expansion of recycling efforts, reviews and development of ordinances with environmental implications, surface and groundwater contamination investigations, and educational outreach.

Further information on forming an EAC can be obtained through the Pennsylvania Environmental Council, Environmental Advisory Network www.pecpa.org/node/86 or from the EAC Network at www.eacnetwork.org.

## Natural Infrastructure Inventory

A complete understanding of the natural infrastructure of Peters Creek Watershed is essential to developing a land conservation plan. The following natural infrastructure resources were inventoried and analyzed as part of the Natural Infrastructure Inventory section of this plan and can be found on Map 2.2:

### Wetlands

The National Wetland Inventory (NWI) is a program implemented by the U.S. Fish & Wildlife Service that produces information on the nation's wetlands. Wetlands serve many purposes to an ecosystem. They are home to thousands of wetland plants and animals as well as source of food and nesting to an estimated

50% of North America's bird population. More than 46% of U.S. endangered and threatened species need wetlands to survive.

In addition to sustaining habitat, wetlands are a necessary resource for the environment. Wetland soils absorb water from precipitation and their plants slow the water's flow. These benefits enable wetland areas to hold and release the water slowly into streams. Natural wetlands also filter out chemicals and fertilizer that people have put on their farms, lawns or discharged from their businesses.

Peters Creek Watershed contains approximately 150 acres of wetlands designated by the National Wetland Inventory. These wetlands are divided among two classifications: Marsh Edge 83.9 acres and River Edge 66.6 acres. Notable wetland areas can be found in numerous locations throughout the watershed including near Finleyville and along an Unnamed Tributaries to Peters Creek in Washington County, especially adjacent to Bebout Road in Peters Township.

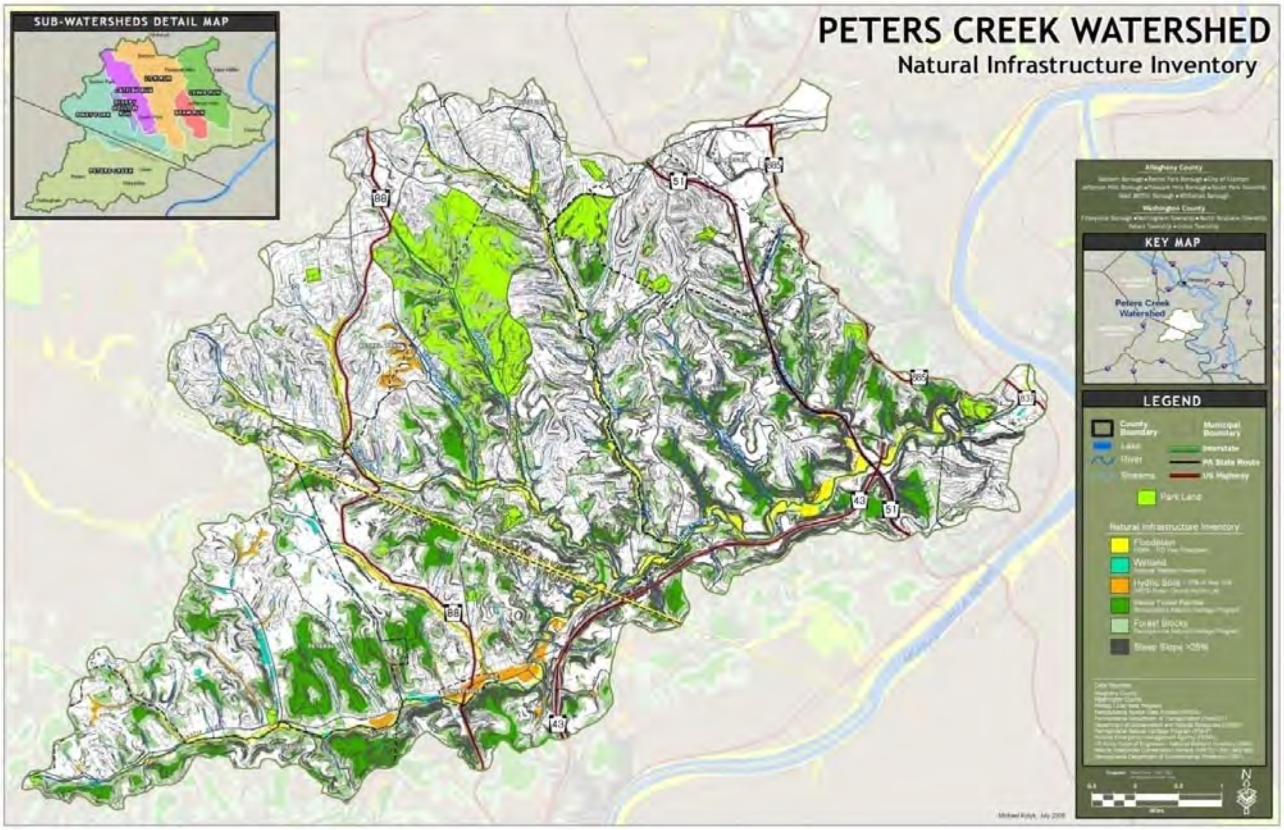



**Figure 2.1 Natural Infrastructure Inventory**

### 100 year Floodplain

Many of the streams in Peters Creek Watershed are bordered by floodplains. The Federal Emergency Management Agency (FEMA) delineates floodplains for the nation through its floodplain management program. In Pennsylvania, the PA Code has regulations designed to encourage any planning and development which occurs in a floodplain is to be consistent with sound land use practices. Additionally, most of the municipalities in the watershed have adopted their own Floodplain Ordinances which were reviewed as a part of this project.

Protecting the people and properties within floodplains from floodwaters is essential. In addition, preserving and restoring the efficiency and carrying capacity of streams in Peters Creek Watershed is vital to maintaining a sound ecological system.

Major floodplain areas in the PCW exist in the following locations:

- Peters Creek, most notably between Beam Run and Lick Run
- Lick Run
- Piney Fork
- Along the unnamed tributary of Peters Creek adjacent to Route 88
- Lower Catfish Run
- Lower Lewis Run

This study utilizes FEMA floodplain mapping to locate unique natural infrastructure areas within Peters Creek Watershed. This information can be used to further promote the preservation and restoration of these streams.

**Steep Slopes Greater than 25%**

The Pennsylvania Map (PAMap) Light Detection and Ranging (LiDAR) Beta Program funded in part by the Department of Conservation and Natural Resources (DCNR) recently created a Digital Elevation Model (DEM), which was utilized to run a surface analysis of the Peters Creek Watershed. Utilizing this analysis, areas with slopes greater than twenty-five percent have been delineated as steep slopes. These areas are typically considered environmentally important and in need of protection.

Soils in areas with steep slopes are generally unstable which can result in landslides, causing safety concerns for communities. When disturbed, these unstable soils also create erosion and sedimentation problems, which can lead to the increased degradation of water quality downstream.

Steep slopes are features that are essential to the natural system because they contribute to open space networks, they typically connect forested areas to water resources (which helps protect the quality of the water), they provide habitat for wildlife and support vegetation, and provide travel corridors for animal and avian species.

Notable steep slope areas in Peters Creek Watershed can be found adjacent to Peters Creek especially: near Finleyville; along PA Route 43; at the intersection of PA Route 43 and PA Route 51; and along the lower section of the creek where it bends before out letting into the Monongahela River. Other notable steep slope areas exist along Lewis Run, Beam Run, Lick Run, and an Unnamed Tributary to Peters Creek between Lick Run and Beam Run.

**Hydric Soils**

The Natural Resource Conservation Service (NRCS) has a hydric soil section which presents information on hydric soils. Hydric soils are those soils that are sufficiently wet enough during the growing season to support the growth of wetland vegetation. Hydric soils are designated by individual county soils surveys. The Allegheny and Washington County Conservation Districts were contacted to obtain a list of hydric soils for the watershed. Once this list was obtained, these soils were mapped and analyzed as part of the Natural Infrastructure Inventory. It is generally recommended that development in or around hydric soils be avoided to preserve the public benefits that these soils provide.

Hydric Soils of Allegheny County are:

- Atkins silt loam is a nearly level soil found on narrow floodplains adjacent to intermittent and perennial streams. This soil receives runoff from adjacent sloped soils and is subject to flooding during periods of intense rainfall (NRCS, 2008).
- Brinkerton silt loam is a nearly level and gently sloping soil typically found in long, narrow areas adjacent to and parallel to floodplains. This soil receives runoff from adjacent sloping soils (NRCS, 2008).

Hydric Soils of Washington County are:

- Purdy silt loam is a nearly level, deep, and poorly drained to very poorly drained soil. It is typically found on terraces and slopes are 110 to 500 feet long ranging from 2 to 100 acres (NRCS, 2008).

**Forests and Woodland Areas**

According to the National Land Cover Data Set for Pennsylvania (USGS 1999), approximately thirty-three percent (33 %), or seventeen (17) square miles, of Peters Creek Watershed is covered by forested land. While large areas of forest are thought to be protected in places like Allegheny County's South Park, much of the woodlands of the watershed remain in danger of being developed. The recent strip mining proposal for Sleepy Hollow, while defeated, did make it clear that forest in South Park is not completely protected.

The Pennsylvania Natural Heritage Program has provided mapping of large tracts of contiguous forest blocks throughout the state of Pennsylvania. Contiguous forest blocks offer enhanced habitat value over forested areas that may be fragmented by roads or other land uses. These forest blocks should be maintained as best possible to preserve habitat, protect water quality, intercept rainfall, and maintain wildlife corridors. For this study, forest blocks were also delineated to display Interior Forest Areas. This was done by creating an interior buffer measuring three hundred feet from the forest edge and removing it from each forest block.

Interior Forest is important because it provides a home for plant and animal species that require large contiguous forest blocks for reproduction. Interior Forest is defined as forested land cover that is at least three-hundred (300) feet from non-forested land cover or primary, secondary, and local roads.

Presently, more than half the state of Pennsylvania (12 million acres) is covered in forest. These forests help to clean our air and water, while providing habitat for wildlife. They also provide areas for recreation and enhance the beauty of the state. Economically, Pennsylvania's hardwood forests are some of the most valuable and productive in North America. "Each year, the timber industry processes 1.2 billion board feet of lumber, employs nearly 100,000 people, and produces annual shipments valued at more than $5 billion. The state's forests also support a vast repository of biodiversity, including more than 3,500 species of plants and animals". (*Penn State College of Agricultural Sciences, 2007)*

**Areas of Special Interest**

Areas of special interest were defined by the Peters Creek Watershed Association as being areas of concern within the watershed. These areas include: overburden piles; landslide prone slopes and soils; strip mined land; significant wetlands; natural heritage inventory sites; riparian wooded steep slopes; and wooded steep slopes. Not all of these areas were used in the analysis portion of this study, only the ones that feature unique natural infrastructure. Many of these areas were sited field identified by the PCWA and then mapped using aerial photography. These areas are important to protecting the quality of the water within the watershed and should be studied further in the future.

**Overburden areas**

Overburden Areas were mapped utilizing 2006 Aerial Photography and field observation methods. The overburden is the rock and soil that lies above the economically viable material to be extracted during mining. For this study, the over burden areas include the lands covered by piles of this material that was removed and disposed of when mining occurred. The Peters Creeks Watershed Association was able to pinpoint and map the location of known Overburden Areas throughout the watershed for use in this study.

**Landslide prone areas**

The data used for mapping Landslide Prone Areas was obtained from the Allegheny County Planning Department. This data was created to portray the landside-prone areas in the County in support of the County Comprehensive Plan. No data was found to exist for Washington County landslide prone areas.

Southwestern Pennsylvania is the most susceptible region for landslides in the state. The Peters Creek Watershed is situated in the Highest and High to Moderate susceptibility zone. Landslides occur most often in areas with loose soils or where old landslide debris is found on steep slopes. Urban and rural development is increasing the number of landslides. Development in areas that are prone to landslides also increase the economic impact due to the damage caused to new homes or business built in these areas. Greater economic impact is caused by more structures being constructed within landslide prone areas, thus increasing costs of damage from slides. Development should be avoided within landslide prone areas to minimize the risk of landslides (DCNR, 2008).

**Strip mined areas**

Strip Mined Areas were mapped utilizing 2006 Aerial Photography and field observation methods. The PCW watershed coordinator was able to pinpoint the location of known Strip Mined Areas throughout the watershed. The areas mapped were then cross referenced with abandoned mine land data from the DEP to determine accuracy and check for errors.

**Significant wetland areas**

Significant Wetland Areas are those areas not designated as part of the national Wetlands Inventory. These areas were mapped utilizing 2006 Aerial Photography and field observation methods. Peters Creeks Watershed Coordinator was able to pinpoint the location of known Significant Wetland Areas throughout the watershed that have not been designated or located by the Army Corps of Engineers National Wetland Inventory.

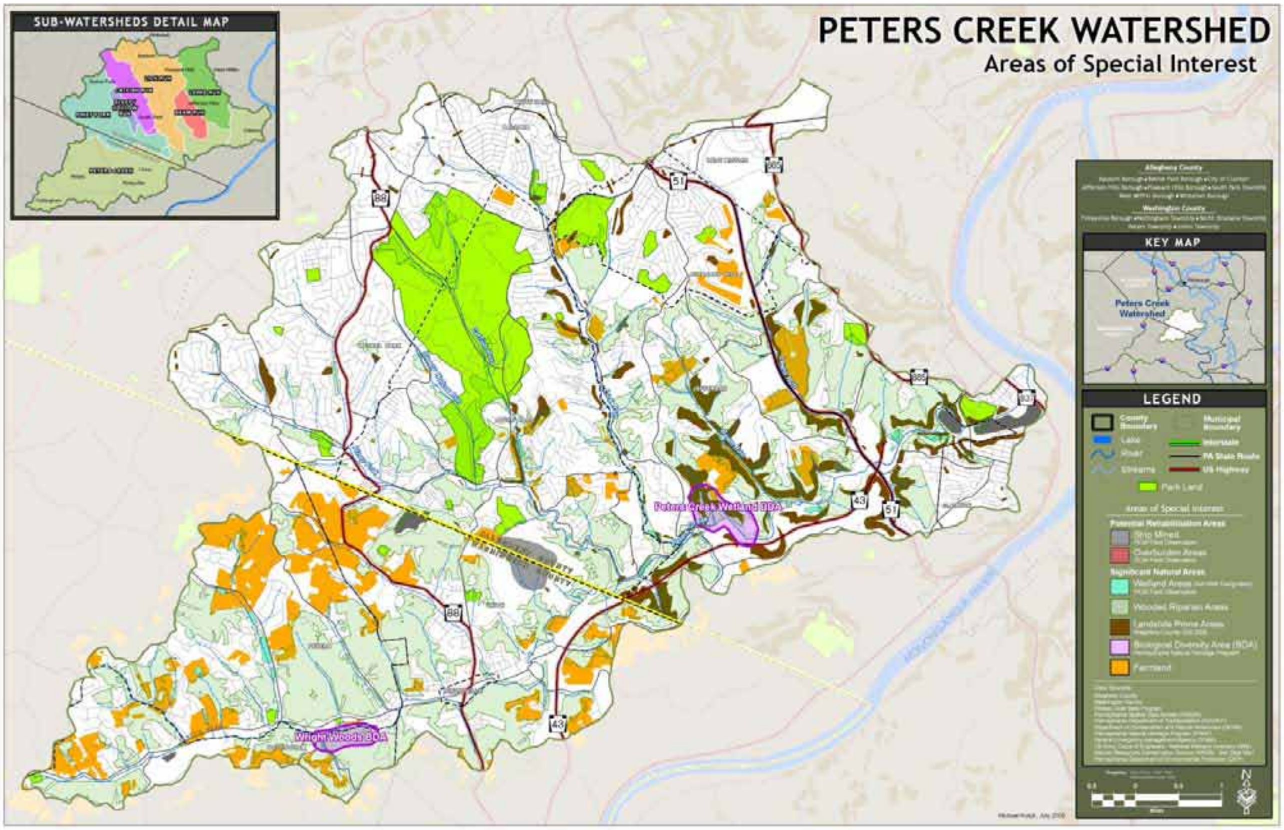



**Figure 2.2 Areas of Special Interest**

### Natural areas: the natural heritage program

Another essential source of information about important habitat areas is the Allegheny and Washington County Natural Heritage Inventory (NHI). These documents provide mapping and background information on the known outstanding flora and fauna within these counties.

The NHI classifies natural areas within the county as either Biodiversity Areas Core Habitat (BDAs), Supporting Natural Landscapes of the BDA (SNL), or Landscape Conservation Area (LCA). Within Peters Creek Watershed there are two BDA's. One of these BDA's is found in Washington County and one in Allegheny County. The one thing lacking in the NHI report is the inclusion of individual sites containing instances of populations of Pennsylvania rare and endangered species throughout the watershed. These are the areas throughout the watershed that are contributing most to the unique biodiversity of the area.

A BDA is an area containing: 1) one or more locations of plants, animals, or natural communities recognized as a state or federal species (or natural community) of concern; or 2) high quality examples of natural communities or areas supporting exceptional native diversity.

Natural areas or "areas of significance" as they are deemed by the NHI, are ranked according to their significance to the protection of biodiversity and ecological integrity of the region. These significance rankings were given a rating of 0 to 3 with 0 being of the highest significance and designated for no use, 1 being acceptable for nature observation without trails, 2 being acceptable for passive recreation/pedestrian trail development, and 3 being acceptable for active recreation.

The two Areas of Significance that were identified in the Allegheny and Washington County NHI reports are described briefly here:

- <u>Peters Creek Wetland BDA</u> is situated in Jefferson Hills Borough, Allegheny County. This BDA received a rating of exceptional value due to the emergent marsh community that is noted in the NHI as one of the few examples of wetland communities in the county. It also serves as habitat for a state listed plant species.

  The county NHI recommends the maintenance and improvement of the natural qualities of this wetland, which is dependent on the forested slopes that surround it to the north. The maintenance of the quality and quantity of the hydrology of this wetland is critical to its survival. Development of the uplands around it, alterations to the stormwater management, and any alteration to the stream including road construction and maintenance could impact negatively impact the hydrology here.

- Wrights Woods BDA is situated in Peters and Nottingham Townships, Washington County received a rating of High. This BDA was created to promote protection of a section of old-growth oak forest, which the county NHI lists as one of the best and last remaining examples in Washington County.

  The county NHI recommends limiting disturbance to this BDA and expanding the buffer areas surrounding the forest wherever possible. Additional recommendations include restricting motorized vehicle use within the BDA.

**Riparian wooded steep slopes**

Riparian areas, or riparian buffers, are vegetated areas along streams; rivers and lakes that help filter runoff and provide a transition between the land and water. Riparian buffers can effectively reduce flooding by retaining water in its vegetation and preventing erosion by the plants roots stabilizing soils. Riparian buffers also provide important corridors for wildlife and enhance habitat for fish by keeping streams cool with shade.

Forested riparian areas contribute greatly to the quality of water resources regardless of whether adjoining land uses are urban, agricultural or forestry.

Forested riparian areas can sequester excess nutrients, buffer pH, trap sediments, stabilize water temperature, and improve in-stream aquatic habitat structure through the contributions of large woody debris in addition to providing a myriad of wildlife, timber and other benefits to mankind. (NCASI 2008)

Logically, riparian forests should be managed to protect and enhance these contributions to the quality of the watershed's vital water resources. Thus, where water qualities are high, surrounding forests should be carefully managed to maintain the water quality. Where the water qualities are not as high, surrounding forests should be maintained to enhance the water quality.

In short, riparian areas have great value. They provide such essential functions as protection of water quality and groundwater recharge. The benefits provided by riparian areas affect not only humans but aquatic organisms and wildlife in general.

For this plan, an analysis was done on existing riparian wooded slopes. Wooded slopes greater than 25 percent have a greater impact on flooding and erosion than those with slopes less than 25 percent because they slow down rainfall that would entire back into the streams much faster than flat lands. While all riparian areas are important, wooded riparian areas are more important and wooded riparian areas on steep slopes are most important when prioritizing areas to target for protection.

**Wooded steep slopes**

In addition to riparian wooded steep slopes, other wooded steep slope areas within the watershed that are not necessarily adjacent to streams are of importance.

These areas stabilize slopes protecting them from erosion and landslides, and also add value to the scenic character of the region. Wooded slopes lining western Pennsylvania's roadways are an important contributor to this regions scenic character.

**Farmland**

Farmland is of great importance in the watershed because it provides a unique open field habitat that is not especially common in southwestern Pennsylvania. Additionally, farmland adds scenic character to the region; especially in the Washington County portion of the watershed, where these lands are being reduced by development.

## Existing Land Use Inventory

The existing land uses within Peters Creek Watershed includes a variety of residential, commercial, public facilities, industrial land, and park land. Existing land uses were mapped using data compiled as part of the Allegheny County Comprehensive Plan, Allegheny Places, from Allegheny County Department of Economic Development and the Southwest Pennsylvania Commission. The generalized land use categories used for this project were taken from the classification system used in the Allegheny Places Plan.

- Residential (11,346 Acres)
- Commercial (2,447 Acres)
- Industrial (726 Acres)
- Transportation (418 Acres)
- Recreation/Conservation(2,289 Acres)
- Community Facilities (1,244 Acres)
- Cemeteries (371 Acres)
- Golf Courses (131 Acres)

- Agriculture (2,522 Acres)
- Vacant Land (912 Acres)
- Undeveloped Land (8,728 Acres)

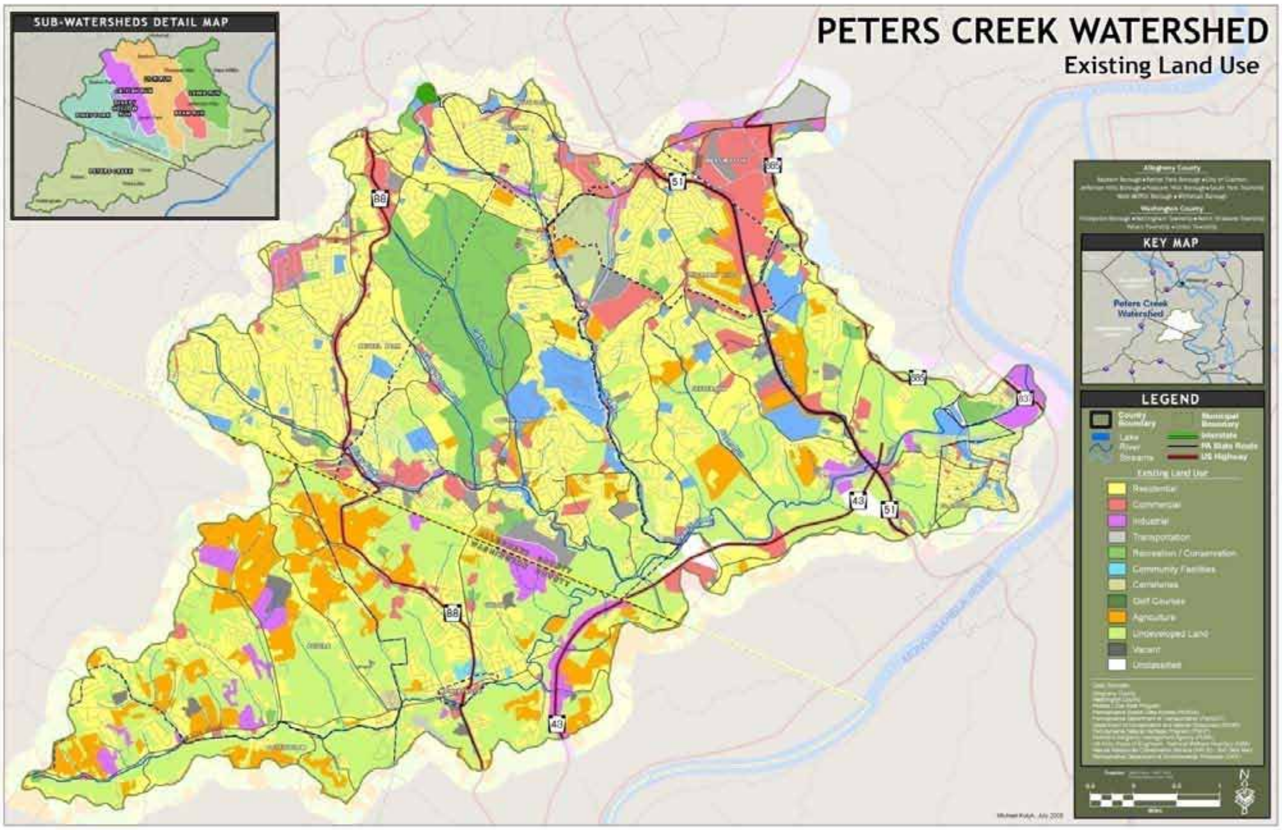



**Figure 2.3 Existing Land Use**

In addition to the undeveloped areas as designated in the existing land use data for Allegheny Places, for the purposes of this study the following classes were designated as undeveloped lands:

- Farmland
- Undeveloped Land
- Vacant Land
- Recreation / Conservation
- Golf Courses

These land use classes represent all the land within the watershed that is available for new construction, making them the most vulnerable to development.

Of the fifty-one (51) square miles in the watershed, nearly twenty-five (25) square miles is available for new development. The majority of this land is found in Washington County, while within Allegheny County Jefferson Hills does have a great deal of undeveloped land. The major undeveloped land in Allegheny County is found in South Park, County Park and technically should be protected from new development.

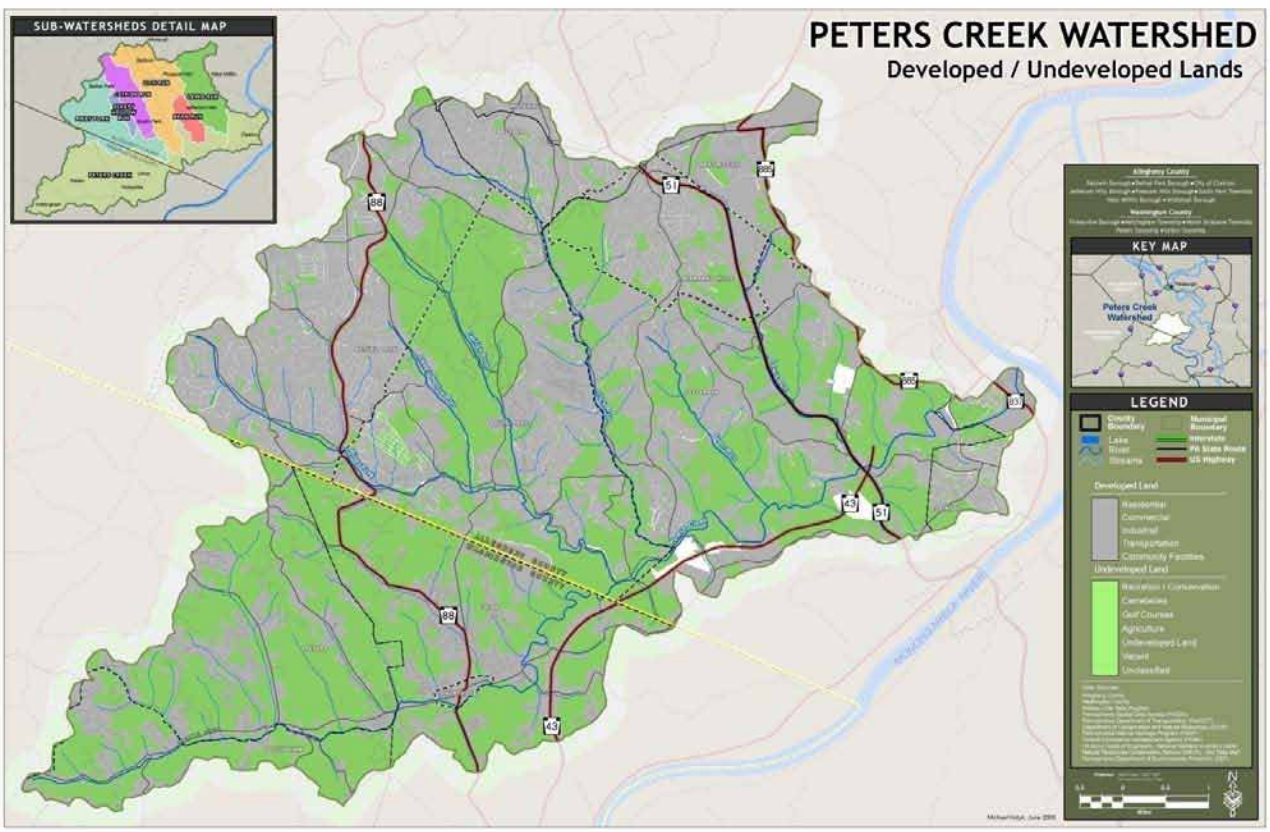



**Figure 2.4 Developed / Undeveloped Lands**

CHAPTER 3

THE ANALYSIS

This section will review the methodology and process for building the land conservation plan, including how Allegheny Land Trust's (ALT) Greenprint methodology were utilized as a part of the analysis. Also within this section will be a detailed review of how criteria were established for determining the High Quality Unique Natural Infrastructure (HQ-UNI) within the watershed.

At the end of this section, a few parcels will be selected based on the presence of the highest amount of HQ-UNI for potential pilot projects. These parcels will be recommended as important preservation targets within the watershed.

**Allegheny Land Trust - ALT GREENPRINT**

ALT was formed in 1993 with the goal of protecting land of natural value in and adjacent to Allegheny County. This non-profit organization protects natural lands by accepting donations of property and conservation easements, as well as through purchasing lands of particular natural significance.

In 2007-2008, ALT developed a conservation plan called ALT GREENPRINT – *"A regional conservation agenda prioritizing land conservation for public good"*. The Greenprint was developed to help ALT focus its resources on acquiring land that provides the greatest public benefit. Three criteria were utilized to develop this Greenprint; the presence of biodiversity, unique scenic character, and water management functions. The outcome of the Greenprint project was a map of regional conservation priorities. The map shows the result of compiling and processing data gathered over the past fifteen years to identify lands containing all three primary criteria. The diagram in figure 3.1 illustrates the methodology used.

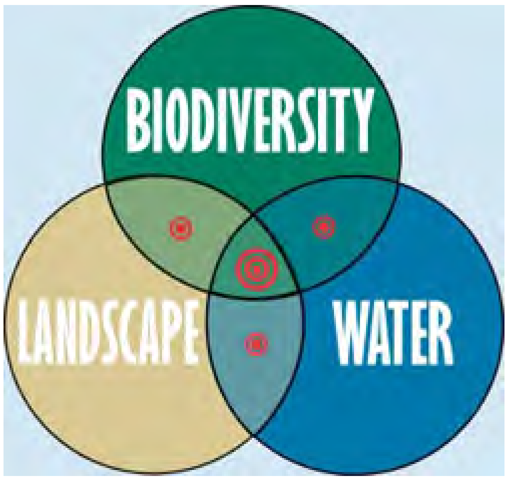



**Figure 3.1 ALT GREENPRINT Ven**

## Finding the HQ-UNI

As a part of the Peters Creek Watershed (PCW) GREENPRINT plan, areas with HQ-UNI are the lands which have been determined to have the greatest ability to serve the function of protecting habitat, maintaining or enhancing water quality, and adding to the scenic character of the watershed. These areas were located using the elements of unique natural infrastructure, as well as some of the areas of special concern, inventoried earlier in as a part of this plan. Only the areas of special concern that provide significant value to the natural environment were incorporated as a part of the analysis.

There are ten elements used to calculate the HQ-UNI for this study. These elements are the building blocks for the PCW GREENPRINT. The PCW GREENPRINT is the map locating the HQ-UNI (see Map 3.6). The building blocks for this study include: Wetlands (NWI); Wetlands (PCW); Floodplains; Hydric Soils; Wooded Riparian Areas; Wooded Riparian Steep Slopes; Wooded Steep Slopes; Woodlands; Interior Forest; and Farmland.

The first step in the analysis was to assign values to all the building blocks based on their contribution to the natural infrastructure, health and performance of the watershed. The building blocks received one point for each of the three criteria based on their ability to positively impact the criteria (see Table 3.1). Each building block was then mapped individually and then they were all overlaid onto each other and depicted on the HQ-UNI Location Map (see Figure 3.2). When more than one building block overlapped, their respective values were added together creating a cumulative value. The areas with a cumulative value greater than four were included in the Greenprint. The areas with a cumulative value of less than four were excluded so as to eliminate the possibility that only one building block was present in the area.

Geographic Information System (GIS) software was used to perform the analysis to determine the location of the HQ-UNI within the watershed. The building blocks for this study were in GIS data layers which came from multiple sources, and were created at varying scales. Data for the Land Conservation Model is interchangeable, so if a municipality or other local agency creates or obtains more accurate data it can be substituted in future calculations. The building block layers were converted to grid cells, or raster data, so that values could be assigned and then they could be calculated using the raster calculator tool.

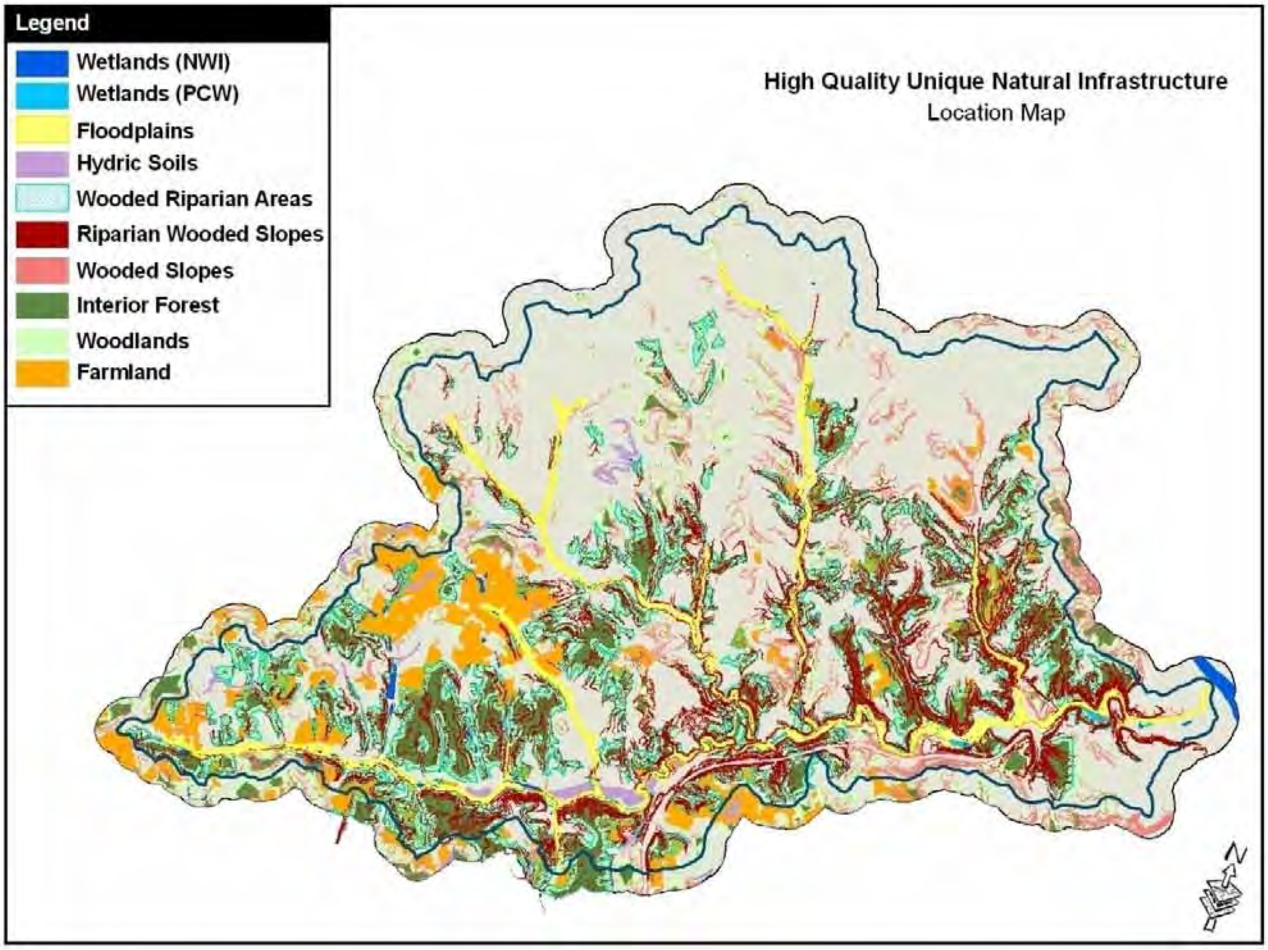



**Figure 3.2 HQ-UNI Location Map**

## The Criteria

Although similar methodology as the ALT GREENPRINT are utilized, this plan takes a slightly different approach by assigning values to what are termed building blocks, based on their role in enhancing water quality, preserving land for habitat, and their ability to contribute to the scenic character of the watershed. Instead of seeking out the location of lands with the presence of all three of these criteria, this study looks for the highest cumulative value of any of the three criteria.

**Water Quality**

A building block received one point if its presence has the ability to enhance water quality within the watershed. Water quality can be enhanced by the presence of trees and wetlands, which help detain and filter stormwater before it runs back into the streams. Additionally, hydric soils and floodplains also serve functions of detaining and filtering the water, although to a lesser scale than woodlands and wetlands.

Forested lands have a great deal of impact on water quality. Trees catch water before it hits the ground and their roots take up water from the soil allowing more water to permeate the soil preventing runoff. Increased runoff negatively impacts the hydrologic system of the watershed by stressing the system with more water than it can hold. Runoff can also negatively impact water quality by increasing sediment in streams which can choke out plant and animal life.

**Scenic Character**

The elements of unique natural infrastructure received one point in this category if they add to the scenic character of the watershed. Scenic resources can include, but are not limited to, hills, valleys, and ridgelines. These natural landforms serve as the backdrop or foreground for some other resources such as neighborhoods, commercial districts or farmlands, therefore add scenic character and quality to the watershed. Scenic character in southwestern Pennsylvania, especially within Peters Creek Watershed, is defined by the presence of wooded hillsides, ridgelines, and rolling farmland.

Additional criteria for warranting a point in this category is the visibility of the element. A highly visible element has more potential to add to the scenic character of the watershed based on its likelihood to be seen by a large number of people. While some less visible elements, such as wetlands or a waterfall found off the beaten path may have scenic qualities, they do not greatly enhance the scenery in the watershed for everyday visitors and residents.

While high visibility is an important part of the criteria for the scenic category, one building block that is very important to the scenic character of the watershed, yet not highly visible, is the interior forest. The PCWA designated this as an important, unique natural feature within the watershed. Although not everyone sees these areas on a regular basis, the ability to visit an area of such unique character within the watershed is invaluable.

**Habitat**

Nearly ninety-five percent of the species listed in the federal Endangered Species Act are endangered due to habitat loss or other alteration to the landscape. Biodiversity, the variability among living organisms on earth, sustains human life. This includes the variation within and between species as well as within and between ecosystems. The greatest threat to biodiversity is habitat loss, which is strongly linked to development. (Green Infrastructure, 2006) Directing development away from the identified HQ-UNI areas within the watershed can help to protect biodiversity regionally.

A building block received one point in this category if it has the ability to provide, maintain, or protect habitat for plants and animals within the watershed.

One example of the ability of a building block to provide habitat is the interior forest. Interior forest provides habitat for many species, such as the Pileated Woodpeckers, that cannot exist without it.

## The Building Blocks

The following building blocks were located, mapped and analyzed within the watershed. As mentioned above, the areas with more than one of these building blocks established the presence of HQ-UNI for this study. Figure 3.3 shows the building blocks with their assigned values ranging from one to three.

| Unique Natural Infrastructure | Water | Scenic | Habitat | Total |
|---|---|---|---|---|
| Wetlands (NWI delineated) | 1 | | 1 | **2** |
| Wetlands (PCW delineated) | 1 | | 1 | **2** |
| Floodplains | 1 | | 1 | **2** |
| Hydric Soils | 1 | | | **1** |
| Wooded Riparian Areas | 1 | 1 | 1 | **3** |
| Wooded Riparian Steep Slopes | 1 | 1 | 1 | **3** |
| Wooded Steep Slopes | 1 | 1 | 1 | **3** |
| Woodlands | 1 | 1 | 1 | **3** |
| Interior Forest | 1 | 1 | 1 | **3** |
| Farmland | 1 | 1 | | **2** |

**Table 3.1 HQ-UNI Criteria**

### Wetlands (NWI)

Wetlands provide habitat for wildlife, serve as natural basins for holding storm water, and help to purify groundwater. Due to these abilities and other values described in the natural infrastructure inventory section of this document, this element received a cumulative value of two. One point for water and one point for habitat.

While many would consider wetlands to have scenic character, wetlands within the watershed are not highly visible and thus did not meet all the criteria for the scenic category.

**Wetlands (PCW)**

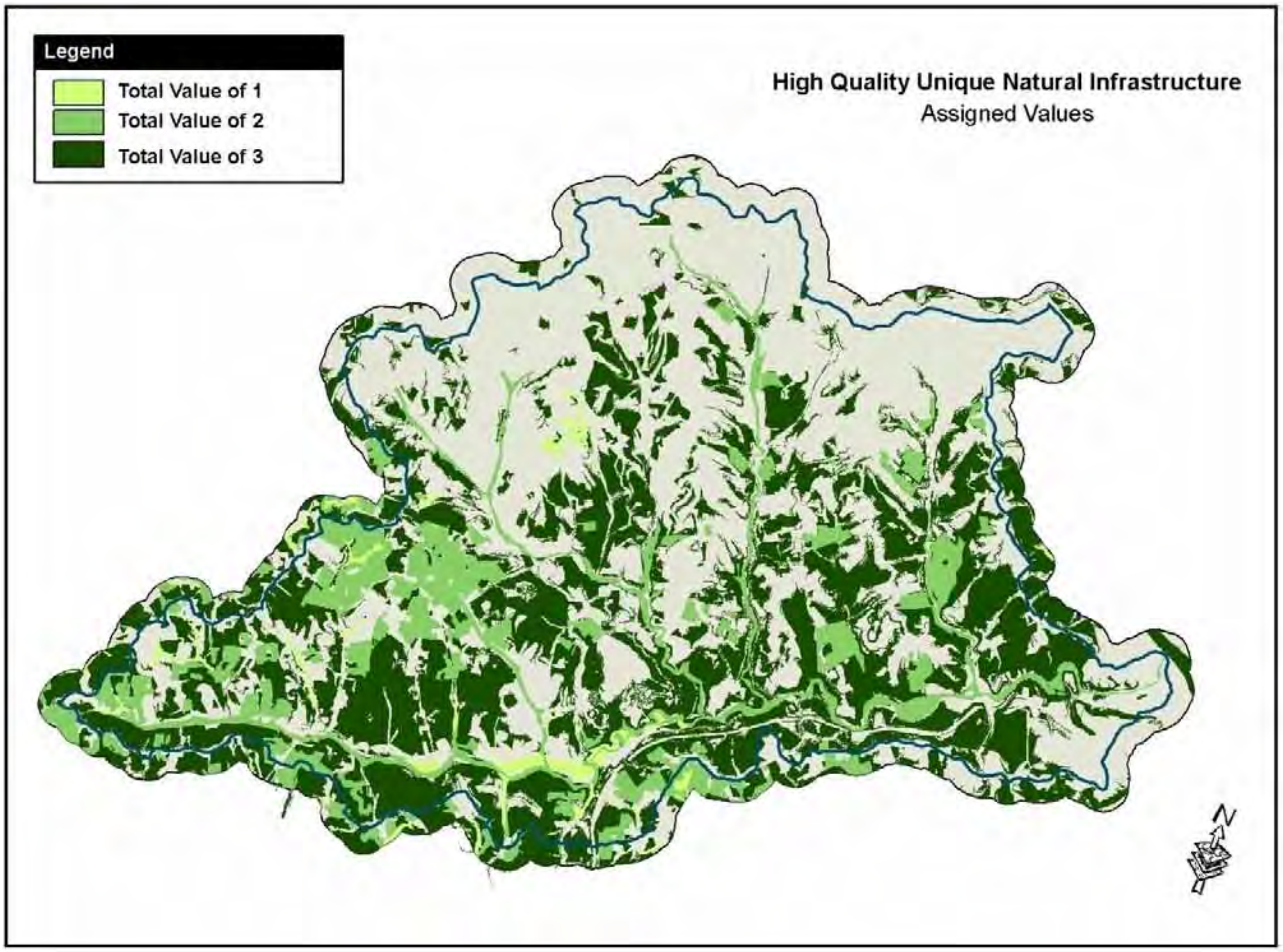
Even though these wetlands were not designated by the National Wetland Inventory, they still hold the same value to the water quality and habitat as wetlands that are. All wetlands provide habitat for wildlife, serve as natural basins for holding stormwater, and help to purify groundwater. Due to these abilities and other values described in the natural infrastructure inventory section of this document, this element received a cumulative value of two.

As with the NWI wetlands, the PCW wetlands within the watershed are also not highly visible and thus did not meet the criteria for the scenic category.

**Floodplains**

Floodplains received one point for water quality and one in the habitat category for a total of two points. If floodplains remain undeveloped they provide storage for water in storm events and can provide habitat for plants and animals in stream and river corridors. Among other things, development within the floodplain can increase the magnitude and frequency of flooding, increase the volume of surface runoff, and increase erosion of stream banks.

While in some cases floodplains can be scenic areas this is not always the case, especially in Peters Creek Watershed due to development along the streams. Additionally, the majority of floodplains that possess scenic qualities are not highly visible due to their isolation from development. Due to this, floodplains received no point in the scenic category.




**Map 3.3 HQ-UNI Assigned Values**

### Hydric soils

These soils are wet enough during the growing season to support the growth of wetland plants. While all areas of hydric soils are not wetlands, they have the potential to be. Therefore hydric soils provide benefits to the hydrologic system of the watershed, thus received one point in the water quality category.

**Wooded riparian areas**

Riparian areas are transition zones between land and water environments. Wooded riparian areas contribute to protecting stream banks from erosion; promoting the absorption and storage of water; regulating the flow of streams; and trapping nutrients and sediments.

In addition to influencing water quality, wooded riparian areas also provide and protect habitat within streams and along their banks. For example, trees adjacent to streams can help keep the water temperature cool allowing plant and fish species to thrive. Wooded riparian areas also provide scenic character to the watershed. These areas are highly visible in such locations as South Park, along the Montour Trail, and even along some of the roads such as Route 88 and Route 51, which parallels Lewis Run through the majority of the watershed. Wooded riparian areas received one point for each of the criteria categories giving them a total value of three.

**Wooded riparian slopes**

This building block encompasses wooded riparian areas with slopes greater than twenty-five percent. Wooded riparian slopes serve the same functions as wooded riparian areas, while providing even greater protection against erosion due to their ability to provide bank stabilization. As a result, wooded riparian slopes receive one point for each of the three criteria giving them a total value of three.

**Wooded slopes**

Wooded steep slopes provide similar functions as wood riparian slopes and wooded riparian areas. Wooded slopes are those found throughout the watershed, where wooded riparian areas and wooded riparian slopes are only found in or adjacent to riparian streams. These slopes are typically highly visible and help define the scenic character of the watershed. This building block received one point for each of the criteria for a total of three points.

**Interior forest**

Interior forest areas provide abundant benefits to the watershed. In order for interior forest to exist there has to be a large contiguous wooded area. This means a large number of trees are present; in turn more stormwater is intercepted before it runs off into the streams. These areas also provide habitat for a variety of plant and animals species that cannot be found in other places throughout the watershed. Also, as mentioned in the criteria section of this chapter, interior forests offer a unique scenic character value that cannot be duplicated. Due to the many functions this building block serves, it received one point for each of the criteria categories giving it a total value of three.

**Woodlands**

Woodlands are all remaining wooded areas within the watershed in addition to the wooded riparian areas. The many functions of woodlands are mentioned above, as well as in the inventory section of this plan. Woodlands received one point for each of the three criteria categories giving it a total value of three.

**Farmland**

This building block provides a great deal of scenic character to the watershed. Rural farmland is vanishing quickly in southwestern Pennsylvania under new development. These lands are some of the most vulnerable to development due to the ease of subdividing gently sloping fields into housing plans or commercial developments. Although farmland does not provide the same amount of stormwater intercepting capabilities as woodlands, the lack of impervious surface and the amount of vegetation on farmlands do offer benefits to water quality that would be diminished if the land were developed. This vegetation also provides habitat to many different species. It should also be noted that nutrient management is very important so that the practice of farming does not impact water quality. Farms with improper nutrient management can easily pollute as much as commercial or industrial development. Farmlands were given one point for water, one point for scenic, and one point for habitat resulting in a total value of three.

## The Results

After the HQ-UNI was mapped, the criteria established and the values assigned to the building blocks the analysis was ready to begin.

### Ranking the PCW GREENPRINT Values

Using GIS to calculate areas where building blocks overlaid one another resulted in cumulative values ranging from one to nineteen, with nineteen representing the areas with the most unique natural infrastructure within the watershed. Figure 3.4 displays the range of values for the building blocks.

The next step in the analysis after calculating the cumulative values entailed grouping the results of the calculation into three categories. The Natural Breaks (Jenks) classification system was utilized to group the identified HQ-UNI areas into three categories according to their cumulative building block values. When using this classification the GIS found clusters or concentrations of data then places class breaks between those clusters.

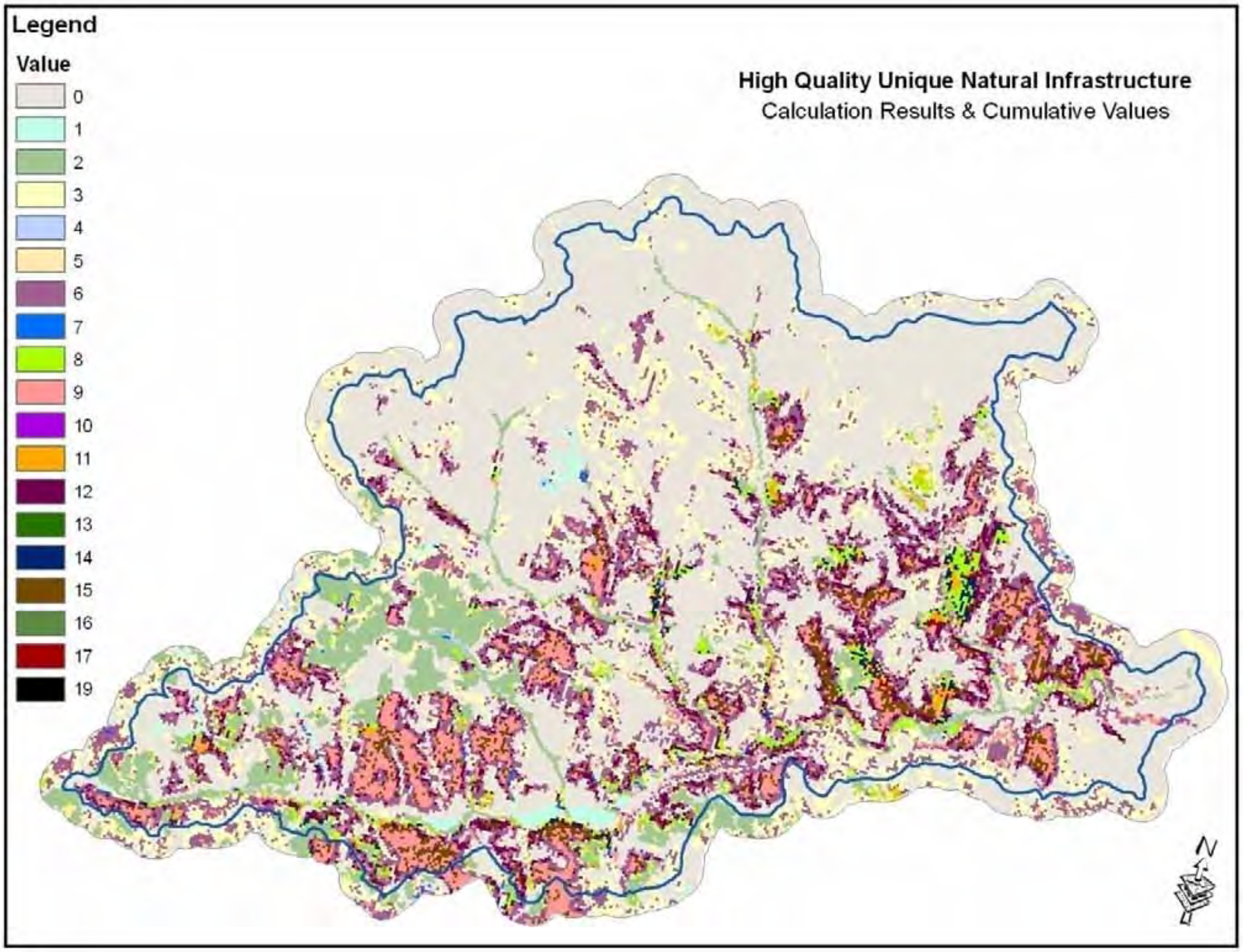



**Figure 3.4 HQ-UNI Calculation Results & Cumulative Values**

The dispersion of values for the HQ-UNI was based on more than nineteen thousand grid cells that made up the draft PCW GREENPRINT map. The majority of these cells had a cumulative value of six, while only one cell had a value of nineteen. Any cell with a value less than four was removed to ensure that only areas with more than one of the building blocks were included in the PCW GREENPRINT. The groups broke down as follows: Group #1 includes values four through seven; Group

#2 includes values eight through ten; and Group #3 includes values eleven through nineteen.

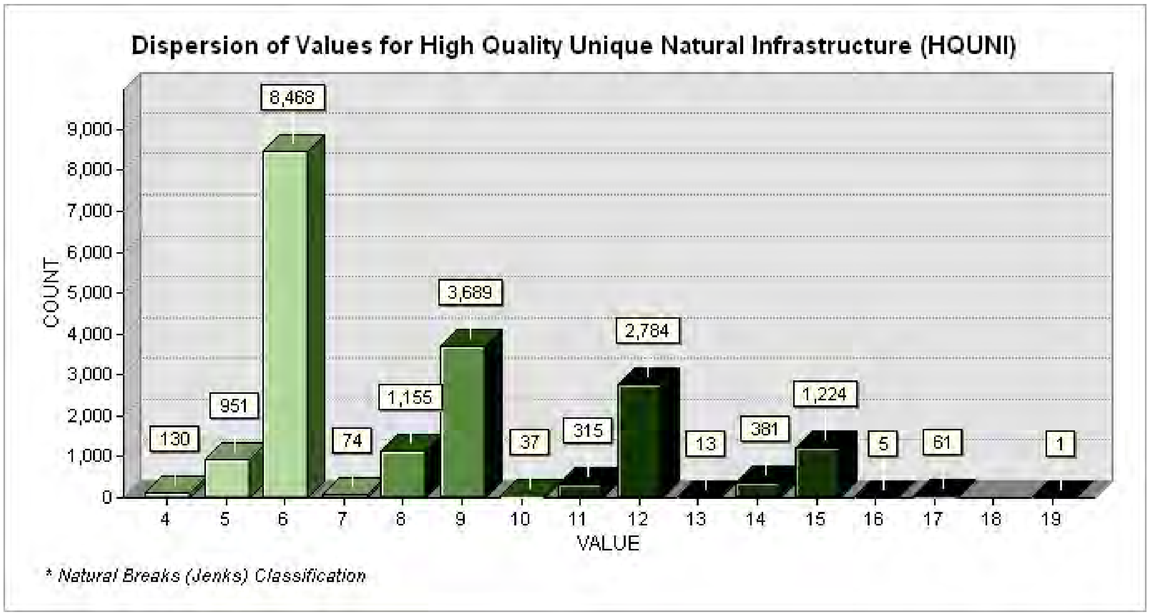



**Figure 3.5 HQ-UNI Natural Breaks Classification Graph**

Group #1 are areas of moderately valued HQ-UNI, Group #2 are areas of high value HQ-UNI, and Group #3 are areas of exceptional value HQ-UNI. This classification system enables municipalities, land trusts, or the PCWA to prioritize areas within the PCW GREENPRINT to target for the pursuit of conservation efforts.

Areas of exceptional value were found along lower Lewis Run and some its tributaries, adjacent to Beam Run and the unnamed tributary to Peters Creek just west of Beam Run, and along the south bank of Peters Creek south of Finleyville. While there are other areas with exceptional value rating, the areas mentioned above have the highest concentration of exceptional value grid cells.

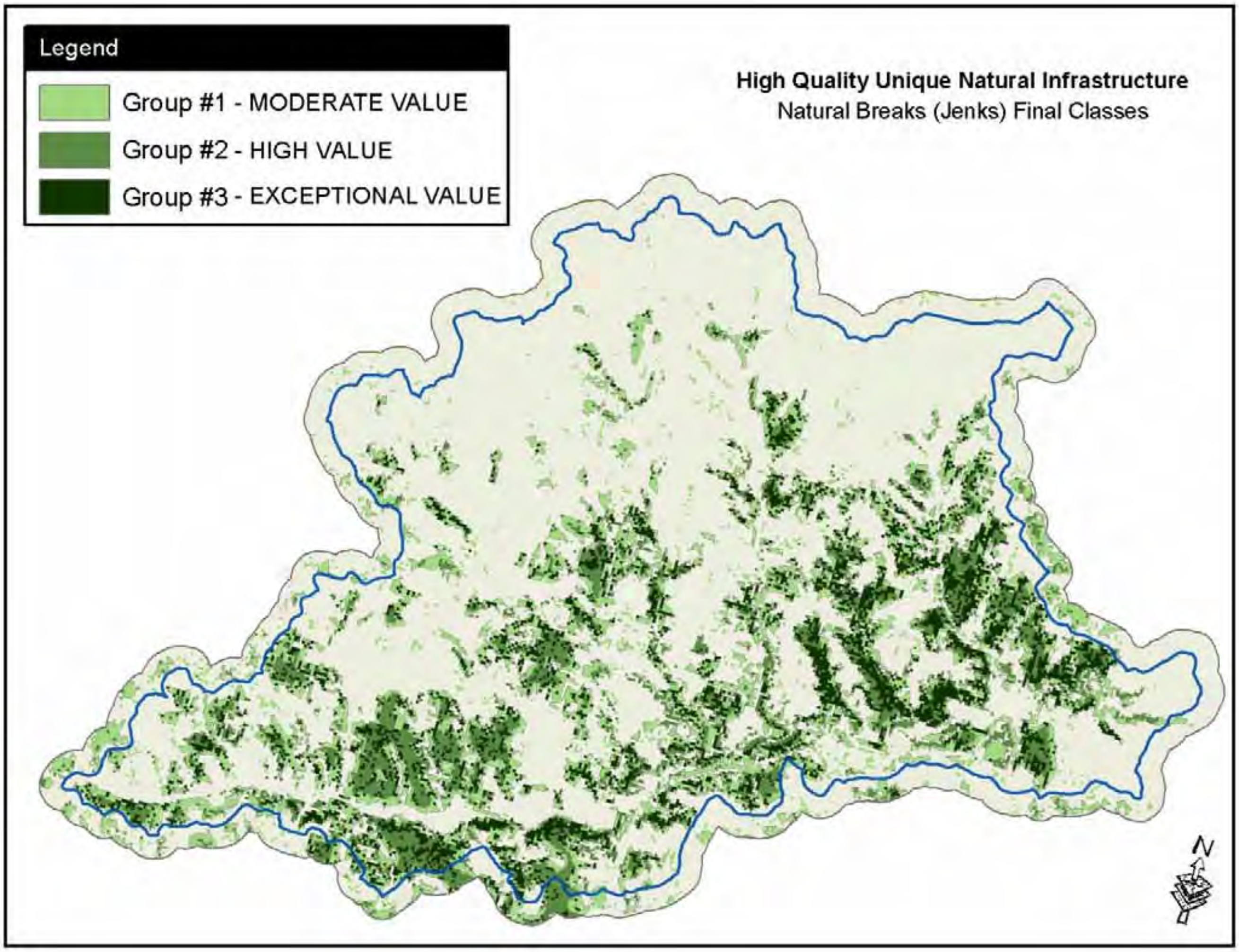



**Figure 3.6 PCW GREENPRINT Final Classes**

The next step was to utilize the values to prioritize target areas within the watershed. This was done by first using the subwatersheds to break the study area into planning regions (Figure 3.7). The values of the grid cells in each subwatershed were totaled to prioritize the planning regions. The total of all values was then divided by the total number of grid cells within each subwatershed to come up with the mean for each planning region.

This method of weighting enabled the priority ranking to be evenly distributed across the watershed, so that the size of the planning region did not have an effect on the ranking system.

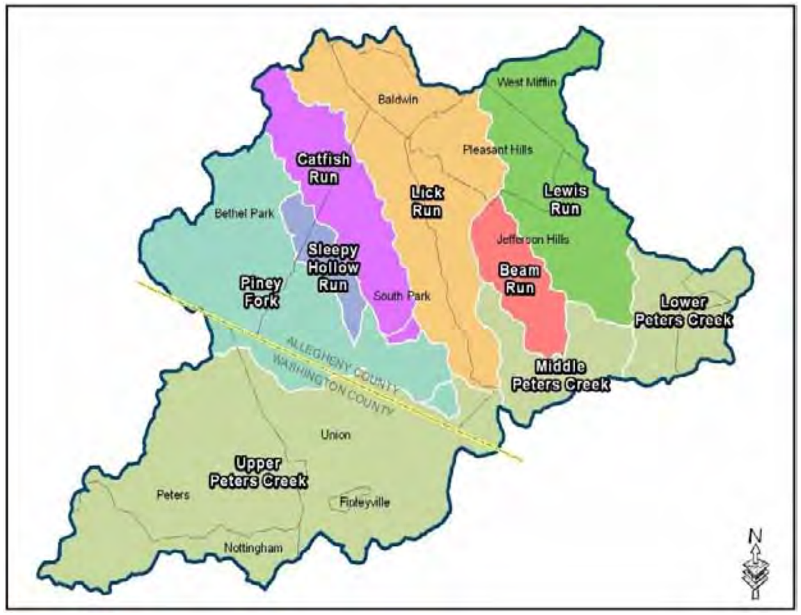



**Figure 3.7 PCW Subwatersheds**

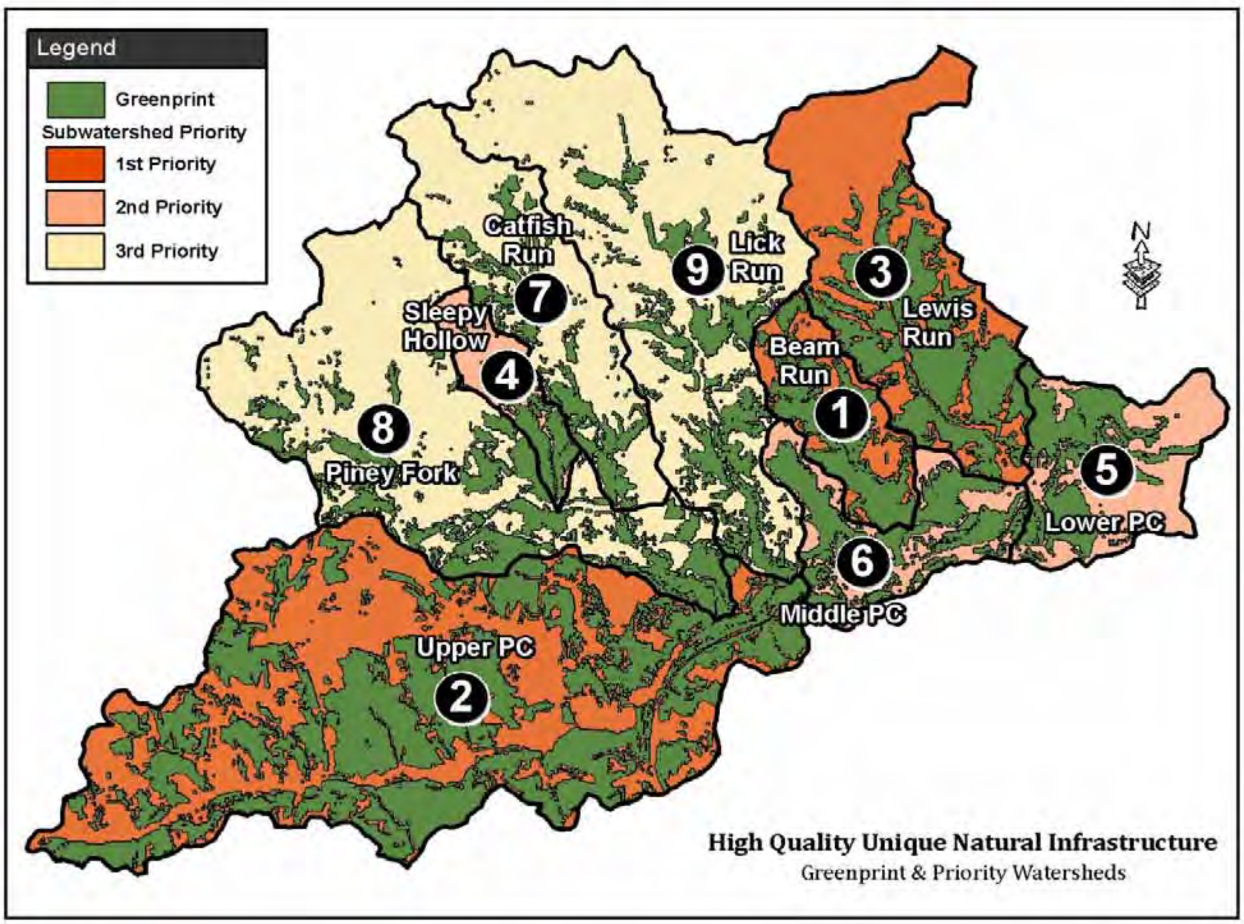



**Figure 3.8 PCW GREENPRINT & Priority Watersheds**

After ranking the planning regions one through nine, they were broken down into three priority groups using an equal interval classification system. The results found Sleepy Hollow Run, Beam Run, and Lewis Run to be First Priority Areas, Upper Peters Creek, Lower Peters Creek, and Lick Run to be Secondary in Priority, and Middle Peters Creek, Piney Fork, and Catfish Run to be Tertiary in Priority.

| | Subwatershed | Priority Ranking | Sensitivity Rating | Count | Min Value | Max Value | Sum of Values |
|---|---|---|---|---|---|---|---|
| 1st Priority | Beam Run | 1 | 9.35 | 1128 | 5 | 18 | 10546 |
| | Upper Peters Creek | 2 | 9.2 | 7022 | 3 | 18 | 64608 |
| | Lewis Run | 3 | 9.17 | 1963 | 5 | 18 | 18015 |
| 2nd Priority | Sleepy Hollow Run | 4 | 8.97 | 324 | 4 | 15 | 2906 |
| | Lower Peters Creek | 5 | 8.61 | 718 | 4 | 15 | 6183 |
| | Middle Peters Creek | 6 | 8.56 | 1099 | 4 | 18 | 9411 |
| 3rd Priority | Catfish Run | 7 | 8.4 | 849 | 5 | 20 | 7196 |
| | Piney Fork | 8 | 8.39 | 2066 | 4 | 18 | 17348 |
| | Lick Run | 9 | 8.35 | 1715 | 5 | 18 | 14326 |

**Table 3.2 Priority Subwatershed/Planning Regions**

This ranking system enables the PCWA or local municipality to focus on priority areas when seeking properties to target for land conservation, with the opportunity for protecting the most unique natural infrastructure within the watershed. While the priority areas defined by this study are recommend as the first target areas, any opportunity within the PCW GREENPRINT should be pursued if it becomes available, regardless of its priority ranking.

CHAPTER 4

STRATEGIES FOR IMPLEMENTATION

This chapter presents the recommendations and defines implementation strategies that must be completed in order to work towards establishing the PCW GREENPRINT as a Land Conservation Model and planning tool within the Peters Creek watershed and the municipalities within it.

**Next Steps**

The following steps should be promoted by the Peters Creek Watershed Association (PCWA) to all municipalities within the watershed. The PCWA should follow these steps in order to work with local municipal officials assisting them to protect parcels of land that have been identified as having High Quality Unique Natural Infrastructure (HQUNI) within this plan. The following steps are recommended to begin this process:

- Pursue creation of a PCW Environmental Advisory Council (EAC) to help municipal officials within the watershed guide development and make educated and informed decisions making sure HQ-UNI is not disturbed.
- Approach municipalities to educate them on the benefits of preserving HQ-UNI through utilization of the PCW GREENPRINT.
- Work with municipal officials to identify a demonstration parcel that will result in a success story project for the watershed.

- Aid officials in attaining support for advancing the project;
- Meet with officials and any local supporters to discuss this project and plan a strategy for approaching associated land owner/owners;
- Identify land trusts or other organizations as possible partners in land or easement acquisition;
- Determine who will hold property or the easement, if the acquisition or an easement is successful;
- Approach land owner with municipal officials and any selected partners to discuss the property acquisition;
- Review methods of acquisition and preservation and help negotiate with landowners to acquire property or establish easements;
- Help with preparation of grant applications to secure funding for acquisition of property;
- Where conflicts exist between permitted land uses and HQ-UNI, modify zoning to reduce or eliminate the impact that a particular land use could have on HQ-UNI.

**How to use the PCW GREENPRINT as a Planning Tool**

Protection of any open space is primarily achieved through one of two ways: 1) through acquisition of property or its underlying rights; or 2) through regulatory requirements. Land conservation tools for each of these categories are described in detail below. Many of these tools are discussed in the book "Land Use In Pennsylvania: Practices and Tools" released in 2000 by the Pennsylvania Department of Community and Economic Development (PA-DCED), Governor's

Center for Local Government Services, which can be found in the online at www.newpa.com.

The PCW GREENPRINT is a Land Conservation Model which the PCWA or local municipalities can utilize as a tool to determine what parcels of land are most valuable to the natural infrastructure of the watershed.

**Regulatory Tools**

Some of the PCW GREENPRINT lands are publicly owned; such as county parks, municipal parks, and other public lands. In these areas, the PCW GREENPRINT in theory shall generally be conserved for the intended use. However, many PCW GREENPRINT land is privately owned. The majority of the municipalities in the watershed have very basic provisions to promote the conservation of the natural infrastructure. These provisions typically address those features, such as floodplains and wetlands, which are currently protected by a higher authority.

| *Pocopson Township* | |
|---|---|
| **Resource Element** | **Pocopson Township** *Maximum Disturbance* |
| Floodplain Conservation District | 0% |
| Very Steep Slopes | 10% |
| Steep Slopes | 25% |
| Steep Slope Margins | 25% |
| Wetlands | 0% |
| Inner Riparian Buffer | 0% |
| Outer Riparian Buffer | 15% |
| Seasonal High Water Table Soils | 20% |
| Heritage Trees | 0% |
| Rare Species Sites | 0% |
| Exceptional Natural Areas | 10% |
| Forest Interior Habitat | 10% |
| Woodlands | 5-25%, depending on classification |

**Table 4.1 Pocopson Township Disturbance Table**

It is recommended that the PCW EAC work with local municipalities and their elected officials to educate them on the value of strengthening their ordinances, to be proactive in conserving PCW GREENPRINT lands, by encouraging the conservation of riparian buffers (streamside setbacks); steep slope margins; interior forest habitat; woodlands; seasonal high water table soils; heritage trees; and habitat of rare, threatened, or endangered species.

The strengthening of these ordinances is highly recommended to protect the health, safety, and welfare of PCW residents; to reduce flooding and other stormwater management problems currently being experienced by the municipalities within the watershed; and to reduce the costs of providing public services to maintain and operate the municipalities' built infrastructure.

Pocopson Township, in Chester County, has adopted a Natural Resource Protection Ordinance that was developed to conserve natural system greenway corridors, within their Township, in the context of addressing the goals noted above. Table 4.1 provides a summary of their conservation requirements.

Additionally, these models should be consulted as land use tools are being modified:

| Title | Source | For Additional Information |
|---|---|---|
| Pennsylvania Standards for Residential Site Development | Penn State University, Pennsylvania Housing Research / Resource Center | www.engr.psu.edu/phrc/Land%20Development%20Standards.htm |
| Better Development Models for Pennsylvania | The Conservation Fund and Pennsylvania Department of Conservation and Natural Resources | www.pagreenways.org/brc/grants/2005/BetterModels.pdf |
| Resource Protection Ordinance | Resource Protection Ordinance | Pocopson Township<br>PO Box 1<br>Pocopson, PA 19366 |
| Model Conservation Ordinance | Pennsylvania Land Trust Association | http://conserveland.org |
| Model Riparian Forest Buffer Protection Ordinance | Pennsylvania Land Trust Association | http://conserveland.org |
| Model Stream Corridor Buffer Easement | Pennsylvania Land Trust Association | http://conserveland.org |
| Model Trail Easement Agreement | Pennsylvania Land Trust Association | http://conserveland.org |
| Model Fishing Access Agreement | Pennsylvania Land Trust Association | http://conserveland.org |
| Water Quality Improvement Easement | Pennsylvania Land Trust Association | http://conserveland.org |
| Stream Corridor Protection Ordinance - Upper Salford Township | Delaware Valley Regional Planning Commission | www.dvrpc.org/planning/community/protectiontools/ordinances.htm |
| Forestry Management Model Regulations | Penn State University School of Forestry | pus.cas.psu.edu/freepubs/pdfs/uh171.pdf |

**Table 4.2 Development Models**

Furthermore, it's recommended that the PCW EAC complete audits of existing municipal zoning and subdivision and land development ordinances of PCW municipalities. Additionally, the PCW EAS should make recommendations to each municipality on how their ordinances can be strengthened or modified, to accomplish the recommendations contained herein, for the conservation of PCW GREENPRINT lands.

For example, steep slope conservation requirements should not only include provisions for those slopes over 25%, but also for slopes which are between 15% and 25%. Also, streamside buffer requirements should be consistent with the

Pennsylvania Department of Environmental Protection's NPDES process. This process recommends that three zones be considered:

- Zone A: 0 - 25' of center
- Zone B: 25' - 100' of center
- Zone C: 100' - 125' of center

It is recommended that no disturbance be permitted in Zone A, disturbance is limited to 15% in Zone B, and disturbance is limited to 30% in Zone C. Conservation of other natural system elements should be followed as included in the Pocopson Ordinance cited earlier in this chapter.

It is recommended that these audits be done based on the subwatershed priority rankings. Therefore, those municipalities within priority subwatershed number one should be audited first, and so on.

Utilizing the recommendations presented herein, the municipalities within Peters Creek Watershed give themselves the opportunity to guide growth and development in a sustainable manner and conserve natural resources, which provide life sustaining functions and create the character of place, for current and future generations.

**Open space zoning**

Utilizing open space zoning or conservation-by-design enables municipalities to protect large tracts of land while still allowing development to occur. This type of zoning protects farmlands, forests, or scenic views by regulating subdivision through requiring a landowner to dedicate a significant portion of land to permanent open space uses. The open space is typically owned and managed by a homeowners association, land trust, or municipality.

**Overlay zoning districts**

An overlay district applies additional protection or regulations to an underlying zoning district or districts. The additional restrictions of the overlay district supersede any provisions of the underlying district. Overlay districts have been used to preserve floodplains, woodlands, slopes, and other sensitive natural features. Within Peters Creek Watershed, Peters Township in Washington County has a Woodland Protection Overlay District which is intended to minimize impacts on environmental resources including sensitive lands such as wetlands, steep slopes, and floodplains. In addition, this district limits disturbance of natural features such as mature woodlands, hedgerows, and critical wildlife habitats.

An overlay zoning district allows regulations to be tailored to a specific area with specific conditions. The PA Municipal Planning Code, Section 605 (2), authorizes the creation of additional zoning classification through overlay zoning for "regulating, restricting, or prohibiting uses and structures at, along, or near…

(ii) Natural and artificial bodies of water

(iii) Places of relatively steep slope or grade, or areas of hazardous geological or topographic features

(iv) Places having unique historical, architectural, or patriotic interest or value

(v) Floodplain areas, sanitary landfills, and other places having a special character or us affecting and affected by their surroundings"

**Buffer zones**

Municipalities can enact regulations requiring buffers of a prescribed width between incompatible uses, such as residential and commercial areas or adjacent to sensitive resources such as, streams or drinking water supplies. This tool allows the municipality to limit or prohibit development within the buffer area.

The benefits of this tool are that these buffers can be used to protect large, linear corridors of valuable resources like stream and river banks, similar to those included in the PCW GREENPRINT. They allow municipalities to protect areas of sensitive land without having to shoulder the expense of acquisition.

The requirements for buffers are enacted as part of a zoning ordinance or subdivision and land development ordinance. Buffer restrictions should be wide enough to protect the resource or shelter the less intensive use. However, care must be taken not to create buffers that are so wide that they will disproportionately reduce the value of land in the municipality.

**Agricultural protection zoning**

This type of zoning designates areas where farming is the primary land use and discourages other land uses in those areas, keeping large tracts of land relatively free of non-farm development. Maintaining unbroken masses of farmland ensures continued support for local agricultural service businesses and maintains the value of farmland to the natural infrastructure and scenic character of the watershed. This option is of special importance in the Washington County section of PCW, where several municipalities throughout the county contain large swaths of agricultural land.

**Agricultural security areas**

A landowner or group of landowners, whose parcels together comprise at least 250 acres, may apply to their local government for designation as an Agricultural Security Area (ASA). Although ASAs do not offer conservation-based protection, they help ensure continuation of agricultural practices, which are a large part of the quality of life in the watershed, especially Washington County. This plan recommends that the counties continue to accept applications for agricultural security areas, and couple that effort with a strong conservation-based education program showing farmers in ASAs the benefits of best agricultural best management practices and natural resource conservation.

Once in an ASA, the land owner can apply to the county Farmland Preservation Board to sell the development rights. Contact Allegheny County Conservation District for more info at (412) 241-7645.

**Agricultural tax incentives**

This program allows farmers to continue operating an agricultural operation in the face of development, thus helping ensure the economic viability of agriculture. These tax laws align agricultural property taxes with what it actually costs local governments to provide services to the land.

**Clean and green program**

Pennsylvania ACT 319 (also known as Clean and Green) provides real estate tax benefit to owners of agricultural or forest land by taxing that land on the basis of its "use value" rather than its true market value.  This act provides preferential assessment to any individuals who agree to maintain their land solely devoted to one of the three following uses:

- Agricultural Use: Land used for producing an agricultural commodity or devoted to (and qualifying for) payments or other compensation under a soil conservation program under an agreement with a Federal government agency.
- Agricultural Reserve: A non-commercial open space used for outdoor recreation or enjoyment of scenic or natural beauty, offering public use without fee or charge. Agricultural reserve land is the only use under the Clean and Green program that requires landowners to permit nondiscriminatory public access. This use is generally requested by landowners that wish to maintain their land in a natural state; free of farming, timbering, or any other activities.
- Forest Reserve: A 10+ acre parcel of land stocked by forest trees that are capable of producing timber or other wood products. Forest reserve lands include any farmstead land on the same property parcel as the timber.

Clean and Green reduces property taxes for owners of farm, timber, or conservation land. Landowners applying for the Clean and Green Program must have 10 or more acres of active agricultural or forest land unless they gross at least $2,000 annual income from the land.

**Growing greener: conservation by design**

This program is a collaborative program between the Natural Lands Trust, a non-profit conservancy located in Media, PA; the DCNR, the Governor's Center for Local Government Services, Department of Community and Economic Development; and an advisory committee comprised of officials from state, local, and non-profit agencies and the private sector.

There is also a program from the Governor's office which provides state-wide funding initiative that shares the same "Growing Greener" name, but this is a separate program which funds natural resource protection and land preservation efforts across the Commonwealth.

In order to implement conservation subdivision design municipal zoning and subdivision ordinances are revised to focus not only on the development related issues (such as stormwater management) but also to place equal emphasis on conserving a variety of environmental, cultural, historic, and scenic features. These scenic features are what typically give a community its scenic character and often times are destroyed by development.

When local land use regulations require developers to design around special natural and cultural features, developers can become the municipality's greatest conservationists, at no cost to the community. To achieve this, several revisions must usually be made to the subdivision and zoning ordinances.

Subdivision ordinances must contain, at a minimum:

- Procedures that strongly encourage dialogue between the applicant and the municipality before detailed plans are engineered.

- Standards for configuration and location of conservation lands.
- A requirement for a context sensitive map, showing all natural and man-made features surrounding the site.
- A requirement that a detailed site inventory for existing features upon which to base decisions regarding whether they are to be protected.
- Required site visit by planning commission or EAC members accompanied by the developer, with the site inventory in hand.
- A four step design process in which conservation areas are determined first, before houses, streets, and lot lines are established.

Revisions to the zoning ordinance to create options for developers to chose from, relating to density to the provision of open space. These options offer density increases when greater open space is proposed and reduced density when less open space is proposed. In addition, the zoning ordinance needs to be made flexible to accommodate development in patterns that preserve natural resources.

Zoning ordinances must contain, at a minimum:

- The ability for the applicant to obtain full density, through a "by-right" (versus conditional use) approval process, but only when the conservation option is selected.
- A requirement that protected lands in conservation subdivisions are comprised of at least 50% of the buildable ground, whenever the underlying density is one unit per acre or lower.
- Strong disincentives to discourage "conventional" development, usually reducing the density by half.

- Restrictive covenants that ensure the conservation lands are perpetually restricted from further development.
- Open space location, design, and performance standards.

Additional informational material describing *Growing Greener: Conservation by Design* concepts is available from the Natural Lands Turst, Hildacy Farm, 1031 Palmers Mill Road, Media, PA 19063, 610-353-5587, www.natlands.org.

## How to Protect the Lands within the PCW GREENPRINT

This section describes Land Acquisition Tools which can provide permanent protection of lands within the PCW GREENPRINT.

### Fee simple purchase

This mechanism entails a direct purchase of land at a price agreeable to the land owner, typically by a governmental organization, public agency, or non-profit land trust organization. Land acquisitions can be made by any level of government.

The benefit of a Fee Simple Purchase is that it provides a more permanent level of protection than other methods such as zoning or subdivision requirements. Additionally, acquisition of a parcel by a non-profit group in partnership with a community places no financial or administrative burden on local government.

The Growing Greener Program established by the DEP and DCNR has sources of funding to help communities and non-profits with acquisition of lands for protection.

**Option or first right of refusal**

This tool allows a municipality to enter into an agreement with a landowner that gives the municipality the right to bid on the land before anyone else, if the owner decides to sell.

One of the benefits of this type of mechanism is that it gives the municipality time to line up funding needed to purchase a property or to reach an agreement with the landowner through other means.

**Conservation easement**

With a conservation easement, the landowner voluntarily agrees to sell the right to develop his or her land in certain ways by granting an easement to another entity such as a land trust. The landowner still retains the title to the land and must continue to pay taxes on it, however at perhaps a lower rate. The easement may or may not allow the grantee access to the land for certain purposes. Typically the easement buyer pays the land owner the difference between the value of the property if it were to be developed and the value of the land without the ability to be developed. The easement is then recorded on the deed and remains even if the land is sold.

The establishment of a conservation easement provides long-term protection, but is less costly than fee simple acquisition because the buyer receives less than full title to the land. If the easement is held by a non-profit group such as a land trust, the cost and burden on local government are minimal. Additionally, the land owner can benefit by paying reduced real estate taxes, subject to terms of the conservation easement and decision of the taxing bodies.

**Agricultural conservation easement**

This tool is a subset of the conservation easement described above, but these easements protect farms from being developed. A farm owner voluntarily sells any rights to develop his or her farm to a government entity or land trust. The agency or organization which purchases the agreement pays the difference between the value of the land for agriculture and the value of the land for its "highest and best" use, which is typically residential or commercial development. The benefit of an agricultural conservation easement is they provide financial benefits to farm owners while conserving farmland that also provides wildlife habitat. The owners of land with an agricultural conservation easement may also pay reduced taxes.

Much of the land in Peters Creek watershed is currently used for farming, especially within Washington County. Agriculture is a large part of the character and economy of the watershed and its protection may help prevent growth in areas where it is not wanted.

The county Agricultural Land Preservation boards have the primary responsibility for developing application procedures. They also establish the priority for easement purchases based on a numerical ranking system. The ranking system is modeled after the Pennsylvania Department of Agriculture regulations and requires consideration of soil quality, conservation practices, development pressures and proximity to other preserved farmland and open space.

Allegheny and Washington Counties should be contacted to urge them to strive to conserve open space by enhancing their agricultural preservation program.

At the time of this study it appeared that no farms within the Peters Creek Watershed have been placed under an Agricultural Conservation Easement.

**Forest land conservation easement**

This type of easement preserves working forests in the same way an agricultural conservation easement protects working farmland. A forest land conservation easement can be used to protect forests for present and future economic benefit, while simultaneously preserving wildlife habitat and protecting water quality in watersheds. Additionally, land owners can benefit from reduced property taxes. These easements are of great importance especially in Pennsylvania where timber is one of the top sectors in the states economy.

The United States Forest Service Legacy Plan (FLP) assists in identifying and protecting environmentally important forest lands under threat of conversion to non-forest use. The FLP provides funding to states to help purchase easements on private forestland. Eligible forestland must be in a Forest Legacy Area and meet specific eligibility requirements. While Peters Creek Watershed is not currently in a Forest Legacy Area, just across the Monongahela River all of Westmoreland County is. The DCNR Bureau of Forestry, in cooperation with the State Forest Stewardship Committee is responsible for implementation of this program throughout the Commonwealth of Pennsylvania. For more information about this program visit the website at: www.dcnr.state.pa.us/forestry.

**Transfer or purchase of development rights**

A Transfer of Development Rights (TDR) program would permit landowners in areas designated as having High Quality Unique Natural Infrastructure to transfer all or some of the development rights to their land (areas termed sending areas) to areas where growth is desired at higher densities than existing zoning requirements allow (the receiving areas). The landowner would still keep the title to the land, but gives up the right to develop it for any other purposes. The person who purchases the development rights from a sending area can use those rights to develop another parcel with a greater density than would otherwise be permitted. With a TDR, the transfer of rights would occur at the time of development.

A Purchase of Development Rights (PDR) works in a similar manner to a TDR. With a PDR, an entity such as a municipality or land trust buys the rights to develop land from a landowner. The landowner still retains the title and use of the land, and also receives tax benefits. The municipality or land trust would then hold those rights (or "bank" them) until the time that a developer purchases them.

In the State of Pennsylvania, TDR can only be used to transfer development rights within the same municipality or with two municipalities with shared zoning ordinances.

**Partnership with a land trust organization**

The regular acquisition of property rights (using several of the conservation tools mentioned previously in this section) for conservation defines an organization as a land trust.  Land trusts are non-profit organizations focused on working cooperatively with landowners and organizing land acquisition projects that benefit both landowner and community. Nearly 100 land trusts operate in Pennsylvania.

Land trusts can be private charitable organizations, or in some cases governmental agencies, that vary greatly in size and conservation priorities. They may be staffed entirely by volunteers concentrating efforts in a small area or municipality, or may be large regional entities staffed by many professionals (i.e. the Western Pennsylvania Conservancy).

Among the various possible focuses of land trusts are:

- Operating public recreation areas or nature preserves;
- Owning no property ,but holding conservation easements for the protection of natural resources;
- Acquiring land that is to be turned over to governments for public parks or other recreation, such as State Game Lands;
- Focusing on protection of water resources such as lakes, rivers, and streams;
- Preserving scenic views, wildlife habitat, or open space for public recreation;
- Promoting the preservation of productive farmland, forested areas, or hunting grounds; or
- Promoting smart land-use planning, environmental education, or trail development for transportation.

The conservation of open space in Pennsylvania is essential not only to the environment, but to the State's economy. Agriculture, timber production, eco-tourism, hunting, fishing, wildlife observation, and other outdoor recreation are all dependent on preservation and management of Pennsylvania's natural resources, upon which the State's economic success depends.

Since they are devoted to working directly with landowners, land trusts can dispel any fears about government "taking" of land. Their efforts can comply with community conservation interests while spelling out benefits to the landowner, thus creating a "win-win" situation.

In addition, land trusts may have considerably more success than municipalities in attracting funding for acquisition projects. They sometimes qualify for Federal, State, and local government funds available for conservation projects. Pennsylvania DCNR supports land trust acquisitions with Keystone Fund and Environmental Stewardship Fund (Growing Greener) grants, which support 50% of the costs of priority acquisitions. Land acquisition projects were a main focus of the Growing Greener grant funding in 2006. Of further interest, the Pennsylvania Land Trust Association (PALTA) also offers a similar program with a newly-increased maximum $6,000 reimbursement grant for conservation easements on natural areas and also for trail easements. (www.conserveland.org/ceap).

To meet PCW's conservation needs, municipal officials should consider expanding the mission or interests of an existing land trust, such as the Allegheny Land Trust.

APPENDIX A

VERIFYING ACCURACY OF THE PCW GREENPRINT

Once the PCW GREENPRINT calculation was complete, it was necessary to check the outcome of the process. This was done through two steps. First, the 303(d) Attaining and Non-Attaining streams data was overlaid on top of the PCW GREENPRINT (See Figure A-1).

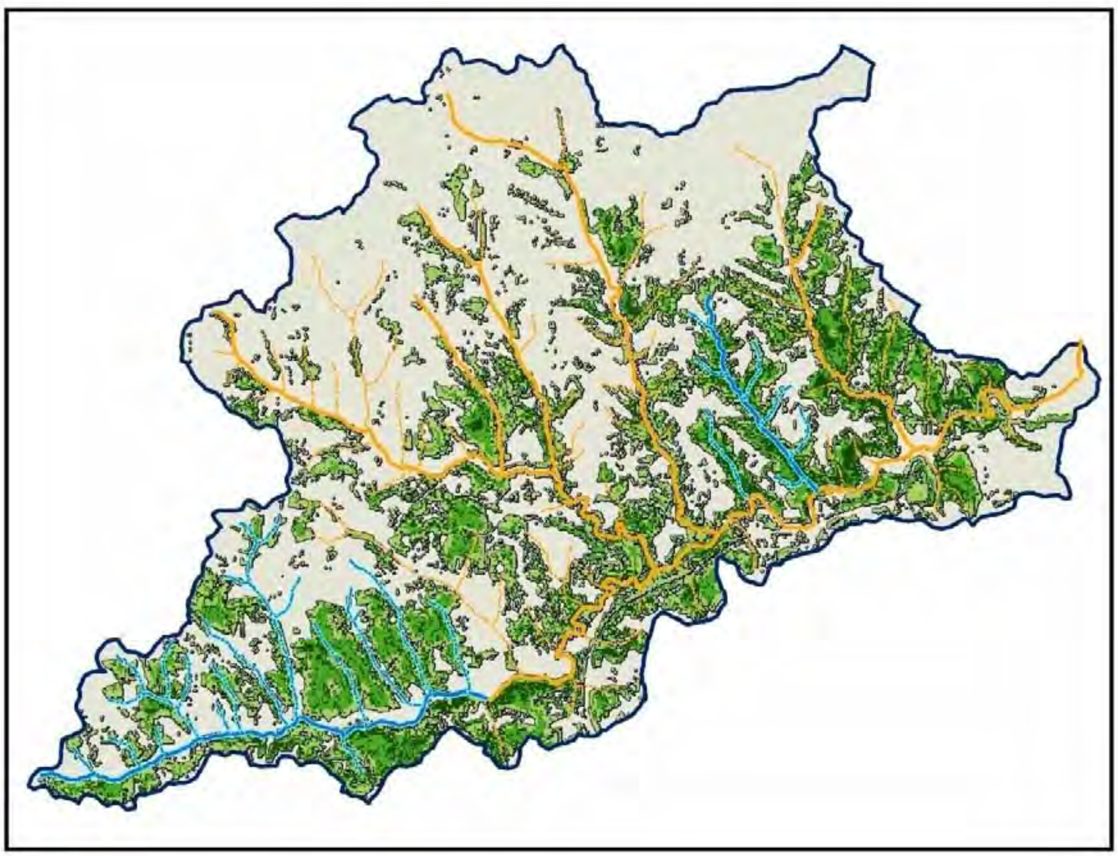


**Figure A-1 PCW GREENPRINT with 303(d) Streams**

In looking at Figure A-1, it is easy to see that the majority of the dense and dark green areas of the PCW GREENPRINT are found within areas that have attaining streams (shown in blue). One area in question is the green area along Lewis Run in the eastern section of the watershed highlight in Figure A-2 below.

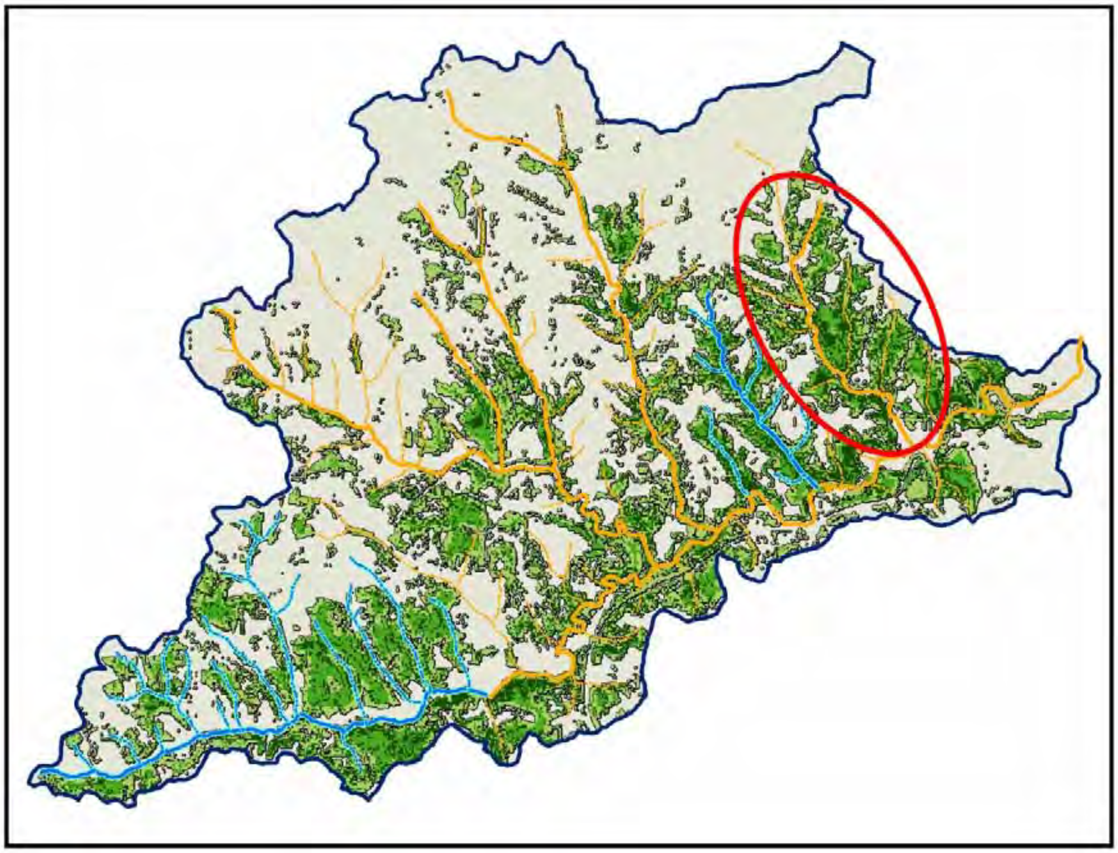


**Figure A-2 PCW GREENPRINT with 303(d) Streams Lick Run Highlight**

To get a better understanding of this area the existing land use data was brought back into the PCW GREENPRINT map, Figure A-3. In analyzing the existing land use data it can be seen that the headwaters of Lick Run are surrounded by the densest commercial development within the watershed, which is found on Route 51 around the area of Century III mall. In looking at the other non-attaining streams in the central portion of the watershed, it can be seen that even though South Park, county park is situated in this area, the dense residential development as well as additional commercial development along Route 88 have greatly impacted the streams. It's also evident that these areas have less of the PCW GREENPRINT within them. This analysis enabled verification that the PCW GREENPRINT process in fact was accurate to the scale of the data utilized for this study.

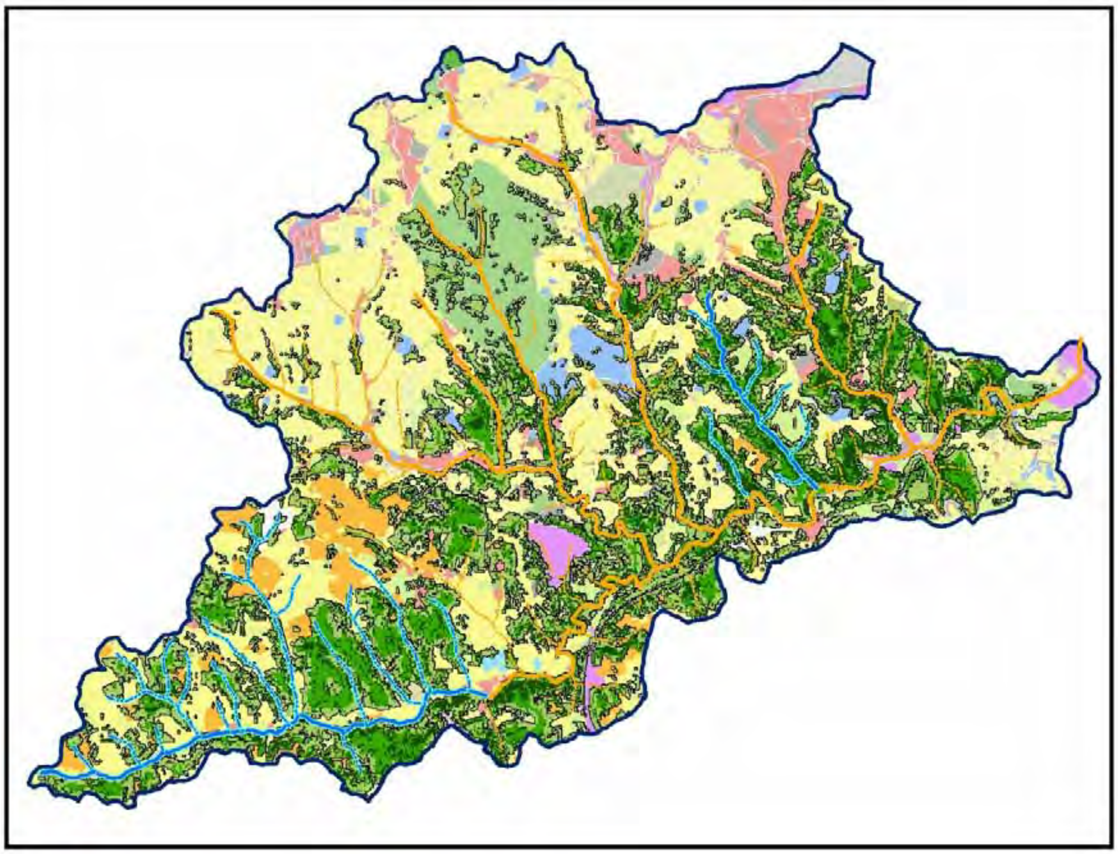


**Figure A-3 PCW GREENPRINT with 303(d) Streams & Existing Land Use**

In the final step of prioritizing subwatersheds, the DEP 303(d) data was once again examined to verify accuracy and quality of the outcome of the analysis. In looking at Figure A-4, it can be seen that the two highest priority subwatersheds are in fact the two areas with DEP designated attaining streams, Beam Run and Upper Peters Creek. It should be noted here that the case was made previously that Beam Run should not be designated as Attaining; especially the headwaters section of stream which was rated as Poor by a 2008 visual assessment by an environmental consultant. It should also be noted, however, that non-attainment due to Metals alone should not be considered as non-attainment for this Greenprint. The other subwatershed rated as an exceptional priority as a part of this study is Lewis Run. Even though the dense commercial development at the headwaters of this stream have obviously degraded the water quality, the amount of HQ-UNI found along the rest of the stream is greatly important to focus conservation effort on. Further development along Route 51 south of Century II Mall would severely damage the water quality, scenic character, and habitat of this area. It is critical that this area become a focus of the PCWA and its municipalities.

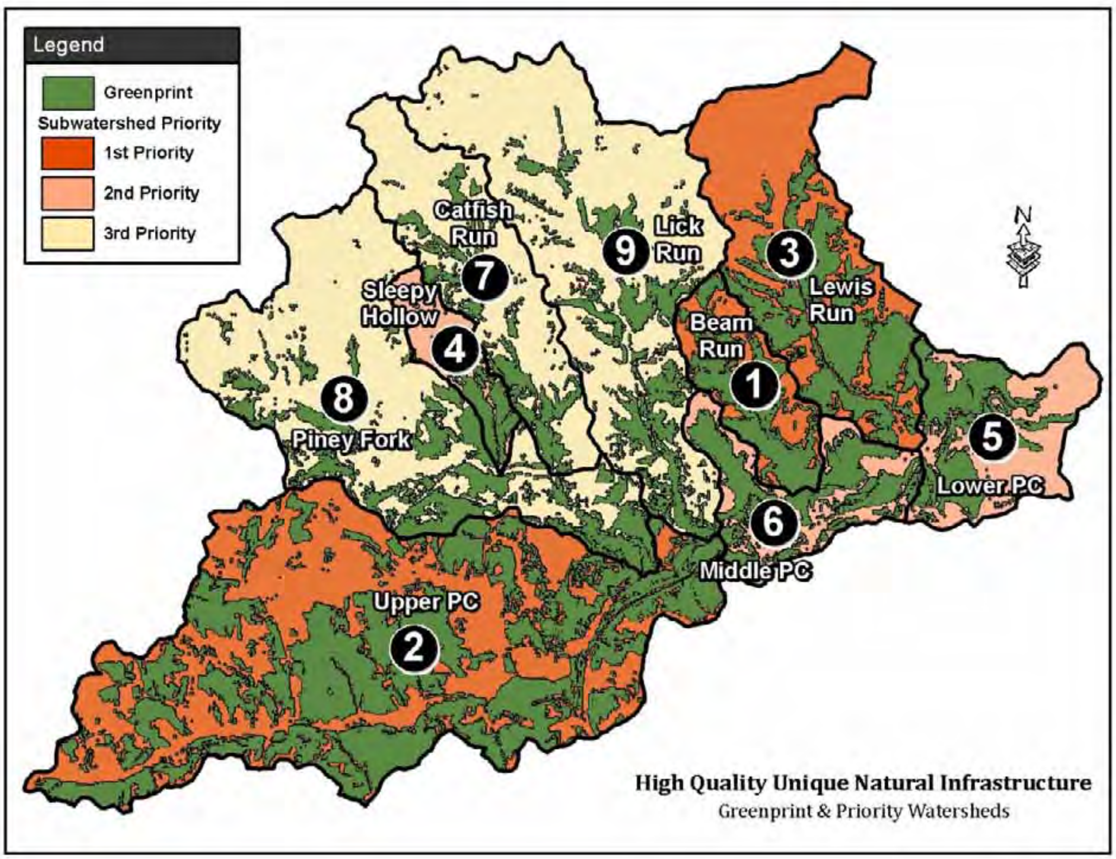



**Figure A-4 PCW GREENPRINT with Priority Subwatersheds**

APPENDIX B

SELECTING PILOT PARCELS

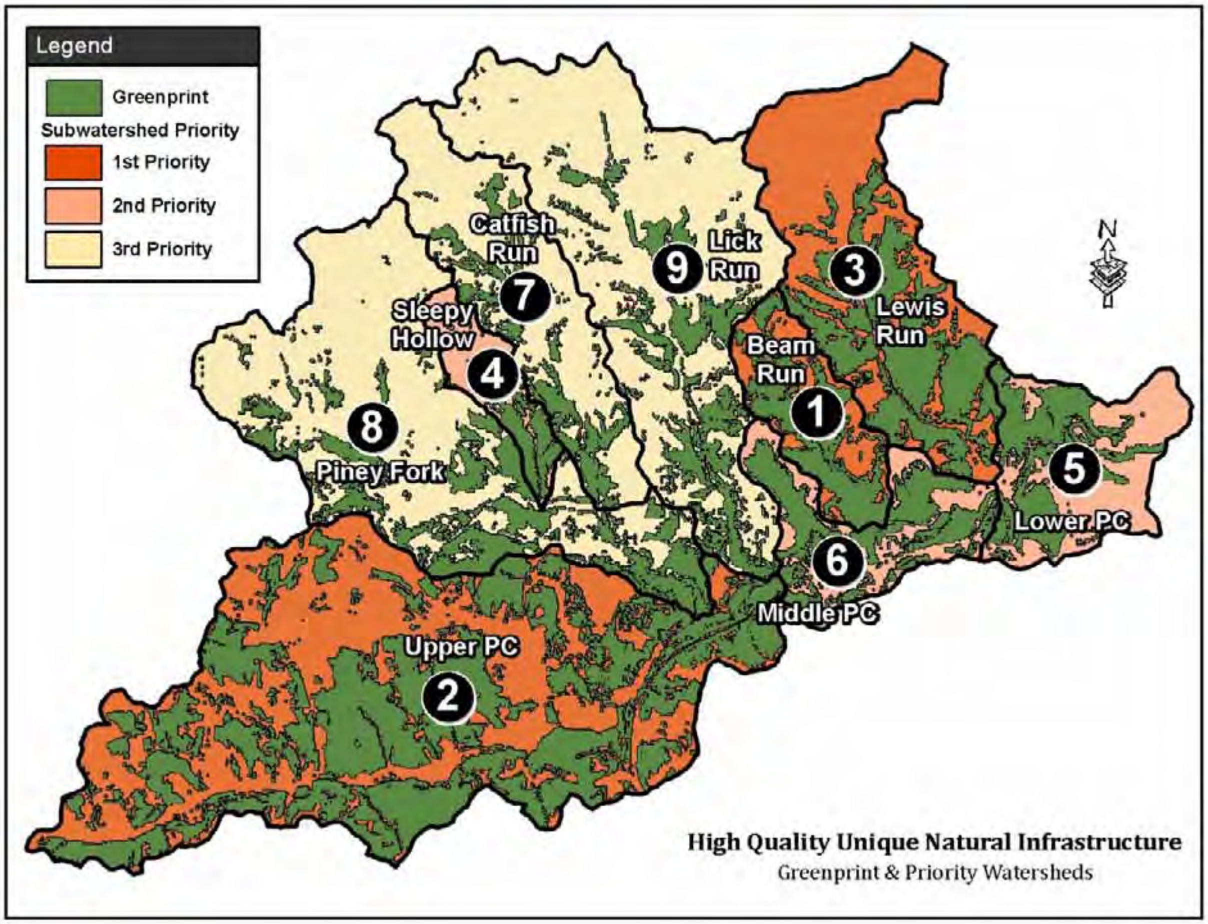



**Figure B-1 PCW GREENPRINT with Priority Subwatersheds**

The first step in selecting a pilot parcel for this study is to select a parcel in the 1st priority subwatershed, Beam Run (See Figure B-1). By enlarging the Beam Run subwatershed it becomes apparent where the exceptional HQ-UNI is located. These areas can be found by examine the contiguous PCW GREENPRINT areas, as well as the areas colored in the darkest green (see Figure B-2).

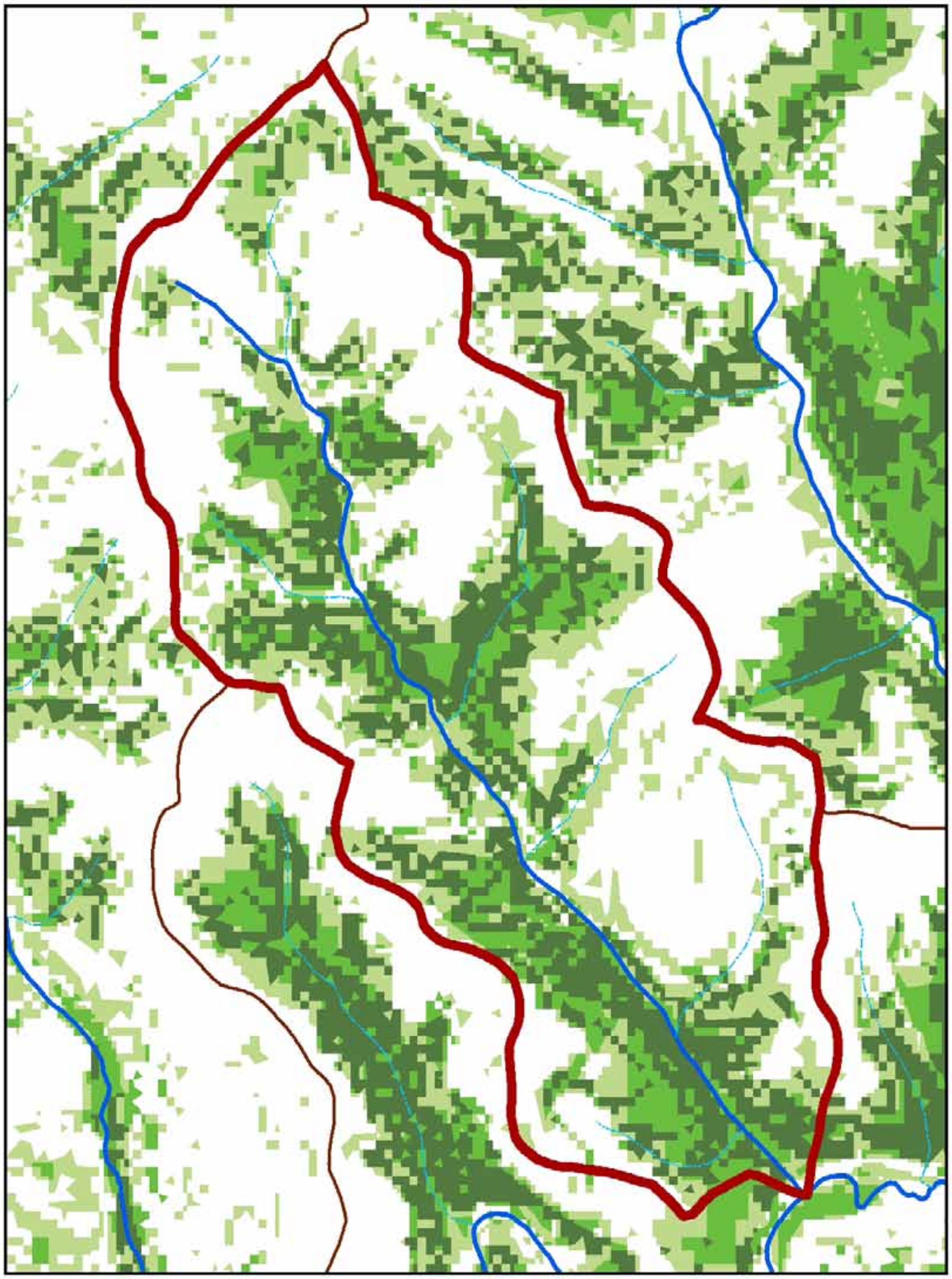


**Figure B-2 PCW GREENPRINT – Beam Run Enlargement**

After enlarging this area, the next step is to bring in the parcel data (see Figure B-3).

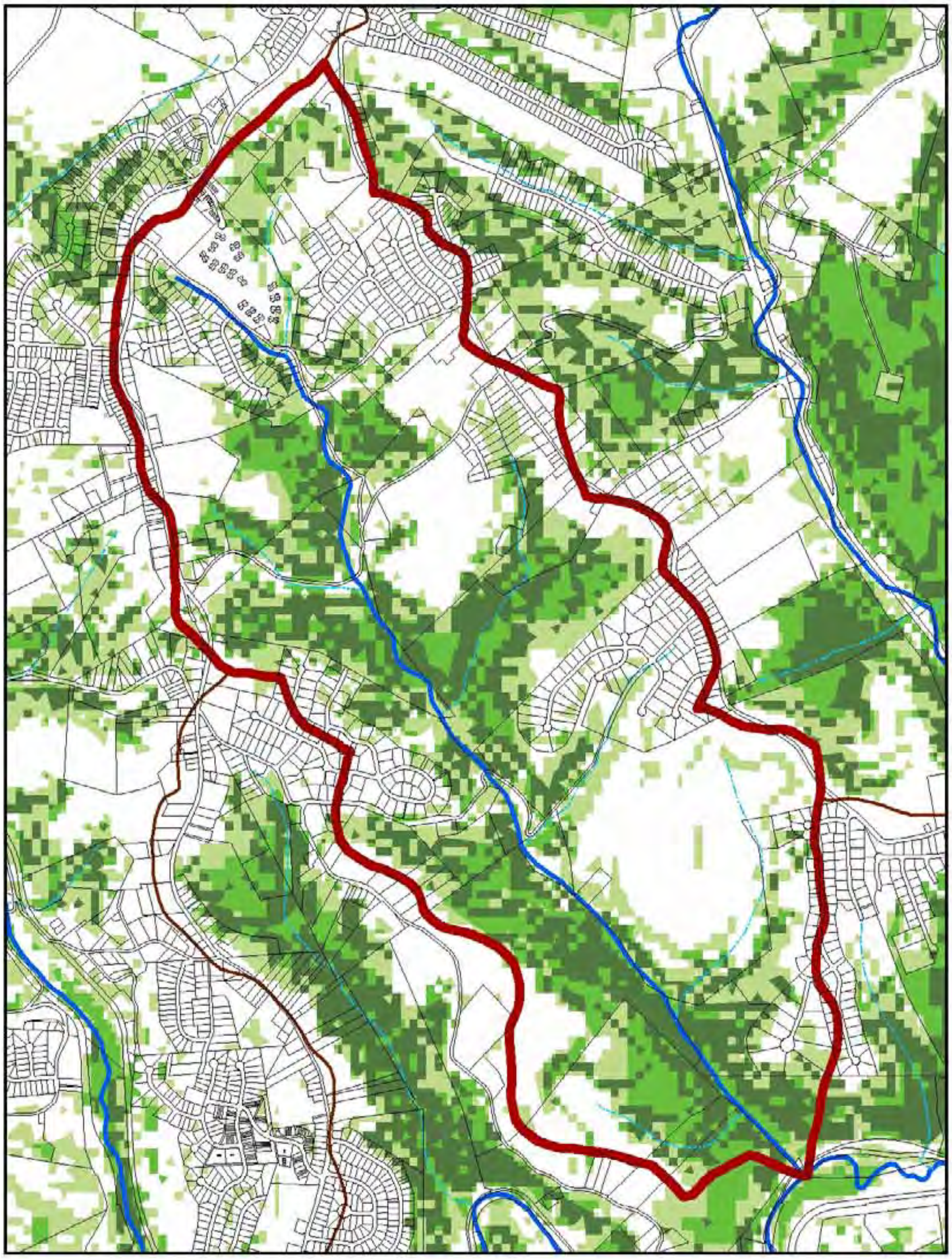


**Figure B-3 PCW GREENPRINT – Beam Run Enlargement with Parcels**

When examining the parcels within the Beam Run subwatershed, two parcels in the center of the subwatershed appear to be almost entirely cover in green (see Figure B-4).

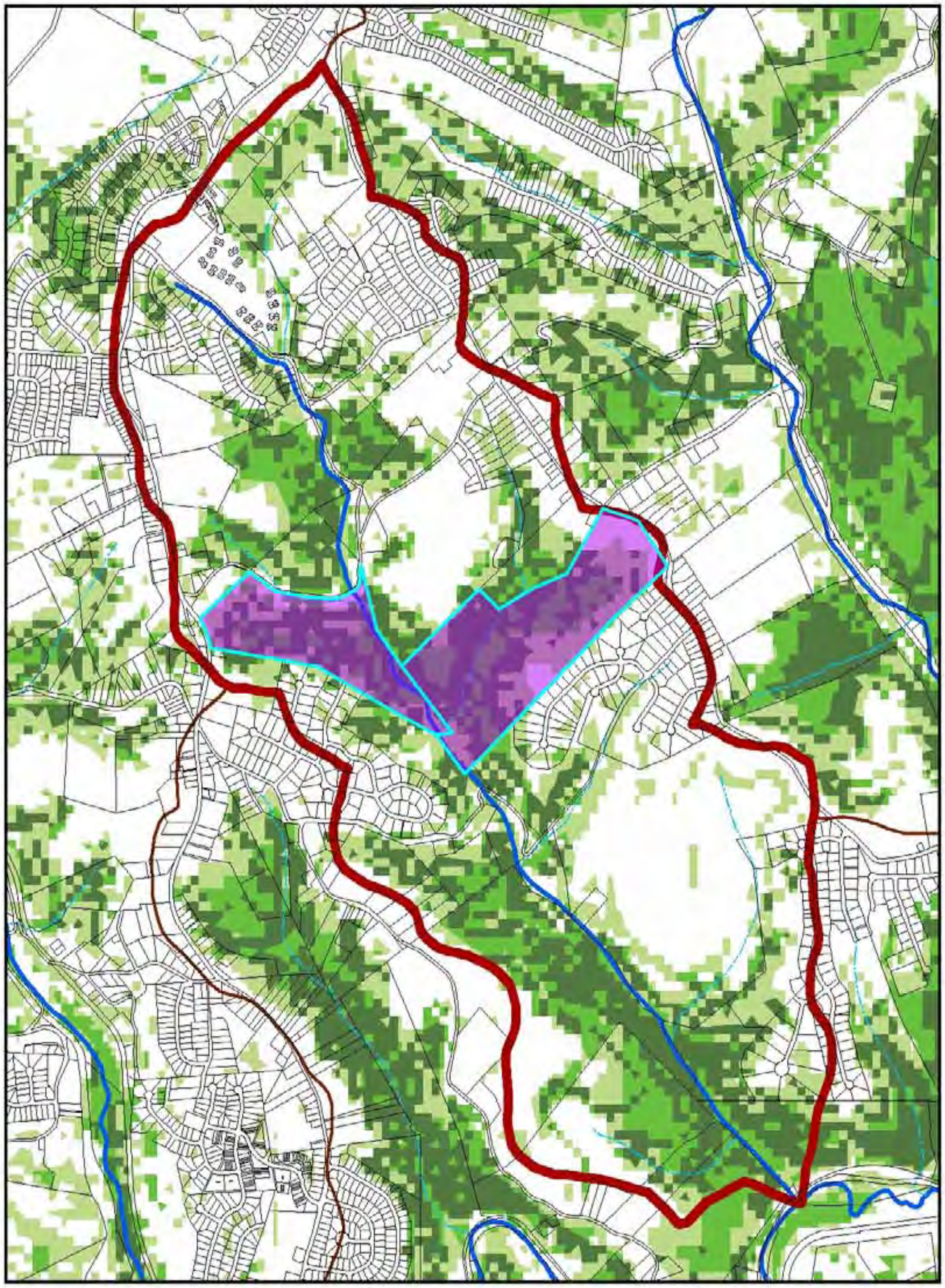


**Figure B-3 PCW GREENPRINT – Beam Run Enlargement with Parcel Selection**

To examine these parcels more closely it is necessary to enlarge them and bring in the aerial photography from 2006 provided by the PaMAP Program (see Figure B-4).

**Figure B-4 PCW GREENPRINT –Parcel Selection Enlargement with Aerial**

While this provides a good picture of what is going on with these two parcels, one more step will allow the ability to take an even closer look at the ground conditions. To do this the PCW GREENPRINT is turned off so that the aerial become clear to examine (see figure B-5).

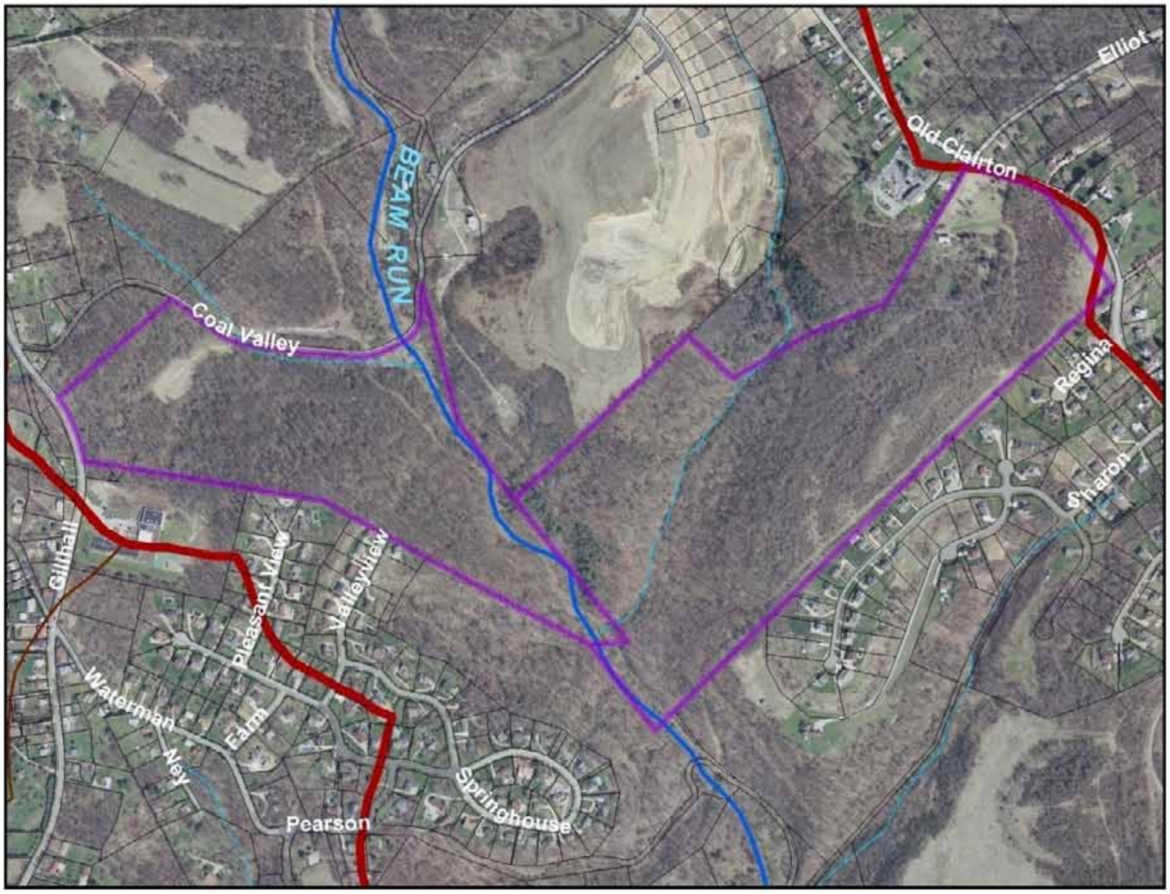



**Figure B-5 Parcel Selection Enlargement with Aerial**

Without the PCW GREENPRINT it can clearly be seen that the two parcels selected are almost completely wooded. Beam Run flows between these parcels and in addition there are two tributaries that also flow almost directly through them. It appears that to the north of the parcel to the east there is some new residential development that is was being constructed at the time of the aerial photography. One can speculate that the parcel being developed at one time looked similar to the two parcels selected as having high value as PCW GREENPRINT. These two parcels area recommended as Pilot Projects for the PCWA to work toward obtaining and protecting through any of the methods discussed in the recommendations section of this document.

APPENDIX C

A RESOURCE GUIDE FOR LAND TRUSTS IN ALLEGHENY & WASHINGTON COUNTY'S

Allegheny Land Trust
Sewickley Car Barn Shops, Suite 206A
409 Broad St.
Sewickley, PA 15143

Audubon Society of Western Pennsylvania
614 Dorseyville Rd.
Pittsburgh, PA 15238
*Mission:* The mission of ASWP is to inspire and educate the people of southwestern Pennsylvania to be respectful and responsible stewards of the natural world.

Chartiers Nature Conservancy
PO Box 44221
Pittsburgh, PA 15205

Fox Chapel Area Land Trust
401 Jamesborough Dr
Pittsburgh, PA 15238

Hollow Oak Land Trust
PO Box 741
Coraopolis, PA 15108-0741

Independence Conservancy
1869-F Barclay Hill Road
Beaver, PA 15009-9040
*Mission:* The Independence Marsh Foundation, Inc. is a wholly independent 501(c)3 nonprofit organization dedicated to:
- Educating the public about the functions and values of wetlands.
- Providing site-specific teacher training and curriculum development assistance.
- Providing stewardship of lands in the Raccoon Creek and nearby watersheds.
- Promoting the use of natural areas as outdoor classrooms.

Montour Trail Council
304 Hickman Street
Suite 3
Bridgeville, PA 15017
*Mission:* To build and maintain a hiking and biking trail on the right-of-way of the former Montour Railroad

Pine Creek Land Conservation Trust
PO Box 259

Ingomar, PA 15127

Rachel Carson Trails Conservancy
P.O. Box 35
Warrendale, PA 15086-0035
*Mission:* The Rachel Carson Trails Conservancy, Inc. is a nonprofit, volunteer-based organization dedicated to the development, protection, and promotion of hiking, biking, and walking trails throughout western Pennsylvania.

Regional Trail Corporation
PO Box 95
West Newton, PA 15089
*Mission:* The Regional Trail Corporation is a non-profit partnership whose mission is to acquire, develop and manage appropriate trail corridors in southwestern Pennsylvania and to create and promote opportunities for recreation, tourism, economic development and historic and environmental conservation.

Western Pennsylvania Conservancy
800 Waterfront Drive
Pittsburgh, PA 15222
*Mission:* Western Pennsylvania Conservancy protects, conserves and restores land and water for the diversity of the region's plants, animals and their ecosystems. Through science-based strategies, collaboration, leadership and recognition of the relationship between humankind and nature, WPC achieves tangible conservation outcomes for present and future generations.

APPENDIX D

POCOPSON TOWNSHIP SAMPLE ORDINANCE

***Final Draft – Resource Protection Amendments***
January 11, 2006

**Zoning Ordinance**

***Amend §250-6 to delete the following existing definitions***:
"DBH," "Net Tract Area," "Seasonal High Water Table Soils," "Wetland," and "Woodland."
***Amend §250-6 to add the following new definitions***:
CLEARCUTTING – The removal of all trees greater than twelve (12) inches dbh on a site, or any portion thereof greater than one-half (0.5) acre in contiguous area, during a single timber harvesting operation or within a three (3) year period.
DIAMETER AT BREAST HEIGHT (DBH) – The diameter of a tree trunk, measured at four and one-half (4.5) feet from the ground surface at the point of the highest elevation in contact with the trunk of such tree.
EXCEPTIONAL NATURAL AREA – Any area identified as Exceptional Natural Area on the Pocopson Township Exceptional Natural Areas Inventory.

EXCEPTIONAL NATURAL AREAS INVENTORY – The Exceptional Natural Areas Inventory indicates the locations and extent of all areas deemed by the Township to comprise Exceptional Natural Areas and shall be considered an addendum to the Zoning Map of Pocopson Township. The Exceptional Natural Areas Inventory is incorporated by reference into this Chapter and made a part hereof.

FOREST CANOPY – The aerial cover formed by the crowns of trees greater than fifty (50) feet in height.
FOREST CANOPY TREES – The individual trees which collectively form the forest canopy.
FOREST INTERIOR HABITAT (FIH) – Forest Interior Habitat is that portion of a forest or woodland which lies beyond most of the influences which degrade a forest from the outside - influences such as light, wind, noise, and non-native species. Forest Interior Habitat provides the best habitat for certain rare and sensitive species and can be referred to as the 'deep' woods or the 'heart of the forest.' Forest Interior Habitat is defined as any area meeting the definition of Woodland which is located more than 300 feet from the outermost drip line of all trees along the edge of the subject woodland area. Generalized mapping of Forest Interior Habitat is indicated on the Pocopson Township "Woodland Classification Map," adopted by the Board of Supervisors as an addendum to the Zoning Map of Pocopson Township.


GREENWAY CORRIDORS MAP – The Greenway Corridors Map is a map indicating the locations of all Greenway Corridors and shall be considered an addendum to the Zoning Map of Pocopson Township. The Greenway Corridors Map is incorporated by reference into this Chapter and made a part hereof.

HEDGEROW. – A hedgerow is a linear plant community dominated by trees and/or shrubs. Hedgerows often occur along roads, fence lines, property lines, or between fields, and may occur naturally or be specially planted (e.g. as a windbreak). Hedgerows are considered woodlands and regulated as such.

HERITAGE TREE – Any tree greater than 30 inches dbh shall be considered a Heritage Tree regardless of species, except that any tree of the species specified below shall be considered a Heritage Tree where greater than 24 inches dbh.

Tree, Botanical Name Common Name
Aesculus hippocastanum Common Horsechestnut
Betula pendula White Birch
Carya cordiformis Bitternut Hickory
Carya glabra Pignut Hickory
Carya ovata Shagbark Hickory
Carya tomentosa Mockernut Hickory
Juglans cinerea Butternut Walnut
Liquidambar styraciflua Sweetgum
Quercus montana Chestnut Oak
Quercus prinoides Chinquapin Oak

In the context of a subdivision or land development review or in consideration of any application for approval of special exception variance, or conditional use, and upon the recommendation of a qualified forester or equivalent professional, the Township may designate as additional Heritage Trees any tree or other plant selected as uniquely representative of a class or group in terms of size, shape, form, age, historical importance, scenic qualities, visual prominence or other characteristics. Trees or other plants determined to be dead or diseased or in any manner constituting a safety hazard shall not be considered Heritage Trees.

HIGHER VALUE SPECIES – Any tree(s) of the following species where greater than or equal to twelve inches (12”) diameter at breast height (dbh):

Tree, Botanical Name Common Name
Acer saccharium Sugar Maple
Carya cordiformis Bitternut Hickory
Carya glabra Pignut Hickory
Carya ovata Shagbark Hickory
Carya tomentosa Mockernut Hickory
Fraxinus americana White Ash
Juglans nigra Eastern Black Walnut
Quercus alba White Oak



Quercus bicolor Swamp White Oak
Quercus coccinea Scarlet Oak
Quercus montana Chestnut Oak
Quercus palustris Pin Oak
Quercus rubra Northern Red Oak
Quercus velutina Black Oak

LAND DISTURBANCE – Any activity which exposes soils, alters topography, and/or alters vegetation, except for the removal of hazardous or alien vegetation. Customary agricultural practices such as tilling, plowing, mowing, and harvesting are excluded from the definition of land disturbance.
NET TRACT AREA – The net area of any lot or tract for purposes of density calculation and determination of compliance with certain area and bulk criteria, measured in acres. The Net Tract Area shall be determined by subtracting the following from the surveyed gross area of the tract:

A. All lands within existing rights-of-way or easements for public or private streets or other access ways;

B. All lands within existing or proposed rights-of-way or easements for pipelines, or electrical transmission lines for 125 KVA or greater;

C. Any lands within any other easements to the extent that such easements clearly limit development of the tract or restrict the use of land for density calculation purposes.

D. Ninety percent (90%) of any acreage comprising one or more of the following:
1. Flood plain or alluvial soils as established by the provisions of the Flood Plain Conservation District (Article VI of this Chapter);
2. Very Steep Slopes as defined herein except that for any tract of fifteen (15) acres or less and involving three or fewer dwellings, USGS topography may be used where the Township Engineer agrees that, based on USGS topography, no slopes exceed twenty (20) percent;
3. Wetlands as defined herein.

E. Fifty percent (50%) of the any acreage comprising Seasonal High Water Table Soils as defined herein.

F. For purposes of density calculation only, an additional five percent (5%) of the gross tract acreage shall be excluded in order to provide for future infrastructure needs;

OLDFIELD – An area undergoing natural succession characterized by the presence of herbs, shrubs, and small trees (seedlings) whose branches do not form a complete or nearly complete aerial canopy.

PNDI – Pennsylvania Natural Diversity Inventory.

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POCOPSON TOWNSHIP BOTANICAL SURVEY – A selective survey or inventory of vegetation and/or wildlife habitat conducted on behalf of Pocopson Township. Where adopted by the Board of Supervisors, such survey shall be considered an addendum incorporated by reference into this Chapter and made a part hereof.

RARE SPECIES SITES – Sites which have been identified on the Pennsylvania Natural Diversity Inventory (PNDI), the Chester County Natural Areas Inventory, or any Pocopson

Township Botanical Survey, as possessing floral or faunal species of concern or sites in which federally and or state recognized rare, threatened or endangered species of flora and/or fauna are present. The land area regulated as a Rare Species Site shall be as mapped in the pertinent inventory or survey. Mapping as indicated in any Pocopson Township Botanical Survey or Exceptional Natural Areas Inventory shall take precedence where differing from any other map source.

RIPARIAN BUFFER – A riparian buffer is an area of trees and other vegetation adjacent to a watercourse that forms a transition area between the aquatic and terrestrial environment. The riparian buffer is designed to intercept runoff from upland sources for the purpose of mitigating the effects of nutrients, sediment, organic matter, pesticides or other pollutants prior to entry into surface waters. The riparian buffer shall be divided into two Zones:

A. Zone One: Inner Riparian Buffer - This zone shall begin at each edge of any identified wetland or watercourse and shall occupy a margin of land on each side, each with a minimum width of fifteen (15) feet from any wetland or twenty-five (25) feet from any watercourse, whichever is greater. The width of such margin shall be measured horizontally on a line perpendicular to the applicable edge of the wetland or, in the case of a watercourse, to the nearest edge of the water at bankful flow. Where very steep slopes (+20%) are located within and extend beyond such margin, Zone One shall extend to include the entirety of the very steep slopes up to a maximum dimension of one hundred (100) feet from the subject watercourse or seventy five (75) feet from the subject wetland, whichever is greater.

B. Zone Two: Outer Riparian Buffer - Zone Two begins at the outer edge and on each side of any area delineated within Zone One and occupies any additional area, if any, within one hundred (100) feet of the nearest edge of any watercourse or seventy five (75) feet from the nearest edge of any wetland, whichever is greater and measured as for Zone One.

SEASONAL HIGH WATER TABLE SOILS – Any soil inventoried or described as hydric, as a soil with hydric inclusions, or as a soil with a seasonally high water table in the Soil Survey of Chester and Delaware Counties, Pennsylvania, or other information provided by the U.S. Natural Resources Conservation Service (NRCS). Where such soils are regulated as wetland(s), the more restrictive regulation shall apply. In Pocopson Township, Seasonal High Water Table Soils shall include, but are not limited to:

Calvert Silt Loam (CaB2)
Chester Very Stony Silt Loam (CgC)



Chewacla Silt Loam (Ch)
Glenville Silt Loam (GnA, GnB, GnB2, GnC2
Wehadkee Silt Loam (We)
Worsham Silt Loam (WoA, WoB, WoB2)

Where site conditions indicate that the location of Seasonal High Water Table Soils differ from locations indicated by the NRCS, the burden shall be upon the Applicant to verify such location(s) to the satisfaction of the Board of Supervisors, otherwise the NRCS information shall be presumed to be accurate. Where the Applicant requests reclassification of Seasonal High Water Table Soils or adjustment of their location, such request shall be supported by documentation submitted by a Certified Soil Scientist or other similarly qualified professional.

SELECTIVE CUTTING – The felling of certain, but not all trees, in an area for the purpose of removing dead, diseased, damaged, mature, or marketable timber or for improving the quality of a tree stand.

STEEP SLOPE – Those areas of land where the grade is ten (10) percent or greater. Steep slopes are divided into two categories:

A. <u>Moderately Steep Slopes</u> are those areas of land where the grade is ten (10) percent to twenty (20) percent.

B. <u>Very Steep Slopes</u> are those areas of land where the grade is greater than twenty (20) percent.

Slopes shall be measured as the change in elevation over the horizontal distance between consecutive contour lines and expressed as a percent. For the purpose of application of these regulations, slope shall be measured over three (3) or more two (2) foot contour intervals (six [6] cumulative vertical feet of slope). All slope measurements shall be based on contour intervals determined by detailed topographical survey using aerial photogrammetry or actual field survey and shall be signed and sealed by a registered surveyor or engineer licensed to practice in the Commonwealth of Pennsylvania.

STEEP SLOPE MARGIN – Any area not otherwise regulated as steep slope and located within twenty-five (25) feet upslope of any area regulated as steep slope, measured perpendicularly to the contour of the land. Areas measured laterally or downslope of steep slope areas shall not be regulated as steep slope margin.

TIMBER HARVESTING OPERATION – The uprooting or removal for any purpose of more than four (4) trees of Higher Value Species or six trees total of six (6) inches or greater dbh, per acre, from any area identified as woodland on the Woodland Classification Map, whether accomplished in a single operation or in more than one operation over three or fewer years. The removal of any Heritage Tree, regardless of number or location, shall be considered a Timber Harvesting Operation. The removal of trees pursuant to an approved subdivision or land development plan, landscape plan or open space management plan, the removal of dead or diseased trees, or non-native invasive species, and the cutting of trees as part of a Christmas tree



farming operation shall not be considered Timber Harvesting Operations. Forestry, as defined by the Pennsylvania Municipalities Planning Code, as amended, shall be considered a Timber Harvesting Operation. All Timber Harvesting Operations shall comply with the provisions set forth in § 250-87.

TIMBER HARVESTING PLAN – A plan submitted in conformance with the provisions set forth in Subsection 250-87. which describes, by means of text and maps, proposed actions involving the removal of trees from a tract of land. Such plan shall have been prepared by a professional with demonstrable expertise in forest management, and shall document measures to be taken to: protect water quality; minimize impacts from skid trails and logging roads, land areas, and the tree removal process; and ensure site restoration.

WATERCOURSE – A watercourse is a channel or conveyance of surface water having defined bed and banks, with perennial or intermittent flow. The definition of watercourse shall exclude facilities constructed solely for stormwater management.
WETLAND OR WETLANDS – Wetlands are those areas inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances, do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, ponds, lakes, and similar areas. Wetlands shall include any area so delineated by the National Wetlands Inventory of the U.S. Fish and Wildlife Service and all lands regulated as wetlands by the Pennsylvania Department of Environmental Protection or the U.S. Army Corps of Engineers. In the event there is a conflict between the definitions of these agencies, the more restrictive definition shall apply.
WOODLAND – A tree mass or plant community covering an area of one-quarter acre or more, in which tree species are dominant or co-dominant and the branches of the trees form a complete, or nearly complete aerial canopy. The extent of any woodland plant community or any part thereof shall be measured from the outermost drip line of all the trees in such plant community. Woodland shall include any area where timber has been harvested within the previous three years and/or woodland disturbance has occurred within the previous three years which would have met the definition of woodland prior to timbering or disturbance. Woodlands do not include orchards or old fields.
WOODLAND CLASSIFICATION MAP – The Woodland Classification Map is a map indicating the locations of all woodlands classified as Class I, Class II or Class III Woodlands, and also indicating the locations of areas identified as Forest Interior Habitat. Where specific application of the definition of Forest Interior Habitat results in variation from mapping as indicated on the Woodland Classification Map, application of said definition shall supercede. The Woodland Classification Map shall be considered an addendum to the Zoning Map of Pocopson Township and is incorporated by reference into this Chapter and made a part hereof.

WOODLAND DISTURBANCE.

A. Any activity which alters the existing structure of a woodland or hedgerow. Alterations include the cutting or removal of canopy trees, subcanopy trees, understory shrubs and

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vines, woody and herbaceous woodland floor species as well as the removal of humus or duff from the ground;

B. Any activity which constitutes a land disturbance (exposes soils, alters topography) within a woodland or hedgerow;

C. Woodland disturbance does not include the following:

1. Removal of vegetation which constitutes hazardous condition(s); nor

2. Selective cutting or removal of invasive alien trees, shrubs, vines or herbaceous species including; Rosa multiflora (Multiflora Rose), Eleagnus umbellata (Autumn Olive), Lonicera japonica (Japanese Honeysuckle), Celastrus

orbiculatus (Oriental Bittersweet), Acer platanoides (Norway Maple), Pueriria lobata (Kudzu) and Polygonum perfoliatum (Mile-a-Minute Weed).

D. Where woodland disturbance is regulated as a Timber Harvesting Operation, such operation shall not be separately regulated as woodland disturbance.

Amend §250-87 to replace the existing text in its entirety with the following:

§250-87. Conservation of Natural Resources

A. Purpose

The following natural resource conservation standards are established to protect the public health, safety, and welfare by minimizing adverse environmental impacts. These standards are intended to meet the following purposes.

1. Define and delineate selected natural resources within the Township and establish resource conservation standards to assist the Township in reducing the impact proposed uses will have on the environment.
2. Conserve valuable natural resources within the Township in accordance with the Pocopson Township Comprehensive Plan (2001) and the Pocopson Township Parks, Recreation, and Open Space Plan (1993).
4. Conserve and protect natural resources within the Township and the Kennett Area Region in accordance with the following policies of the Kennett Area Region Comprehensive Plan (2000), as amended.
   a. Preserve and protect areas which are naturally unsuitable for development or which provide valuable wildlife habitat including stream valleys, riparian zones, steep slopes, floodplains, woodlands, wetlands, and seasonal high water table soils.

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   b. Continue to preserve sensitive natural areas and wildlife habitats from development by strengthening natural resource conservation standards contained in each municipality's zoning and subdivision and land development ordinance.
   c. Protect regional watersheds and the quality of groundwater and streams within the Region and pursue measures to maintain and, where possible, improve water quality.

B. General Applicability of Conservation Standards

1. In the event that the provisions of this Section and any other provisions of the Township Code are in conflict, the more restrictive provisions shall apply.
2. In the event that two or more natural resource areas identified in this Section occur on the same lot or tract, disturbance limitations shall be measured separately. Where such resource areas overlap, the most restrictive standard (the least amount of permitted alteration, regrading, clearing, or building) shall apply to the area of overlap.
3. It shall be a violation of this Chapter to regrade, fill, pipe, divert, channel, build upon, or otherwise alter or disturb a natural resource protected by this Section prior to the submission, review, and approval of any applicable

application for zoning or building permit(s), conditional use or special exception approval, zoning variance, or subdivision or land development plan(s).

4. Limitations to the disturbance of resources shall apply before, during, and after construction on a site.
5. Disturbance limitations, established as a maximum percentage of permitted disturbance, shall be applied concurrently as a percentage of each applicable resource area to the extent that it is present on the entirety of any tract or any lot AND as a percentage of the area within each discrete resource area measuring one acre or more. A discrete resource area is the entirety of any single contiguous area comprising any one resource regulated by the provisions of this Section. Any area of resource overlap shall be measured as part of the contiguous resource area with the most restrictive disturbance limitation.
6. Disturbance limitations shall be applied based on the occurrence of identified resource areas at the time of adoption of this Section. Disturbance permitted over time in multiple applications on the same lot or tract shall be measured against the same overall limitations established at the time of the first application.
7. Information submitted to demonstrate compliance with this Section shall be verified as correct by the Township Engineer or other qualified professional as determined by the Township.

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8. Regulations and disturbance limits for each specific resource area set forth below shall be complied with as applicable. The following summary table is provided as an overview of disturbance limitations. In certain cases as provided herein, exceptions or modifications may apply.

| Resource Area | Maximum Disturbance |
|---|---|
| Floodplain Conservation District | 0 % |
| Very Steep Slopes | 10 % |
| Moderately Steep Slopes | 25 % |
| Steep Slope Margins | 25 % |
| Wetlands | 0 % |
| Zone One – Inner Riparian Buffer | 0 % |
| Zone Two – Outer Riparian Buffer | 15 % |
| Seasonal High Water Table Soils | 20 % |
| Heritage Trees | 0 % |
| Rare Species Sites | 0 % |
| Exceptional Natural Areas | 10 % |
| Forest Interior Habitat | 10 % |

| | |
|---|---|
| Class I Woodlands located on Very Steep Slopes | 5% |
| Class I Woodlands outside Very Steep Slopes | 15 % |
| Class II Woodlands | 15 % |
| Class III Woodlands in Greenway Corridors | 15 % |
| Class III Woodlands outside Greenway Corridors | 25 % |

C. Floodplain Conservation

Areas identified as being within the boundaries of the Floodplain Conservation District shall not be regraded, filled, built upon, channeled, or otherwise altered or disturbed except in conformance with Article VI of this Chapter.

D. Steep Slope Conservation

1. Steep slope areas shall be preserved in their natural state whenever possible. Where construction of roads, buildings, driveways, or infrastructure cannot be avoided, disturbance shall be kept to the minimum necessary and, in no case, shall it exceed the following permitted disturbance limits:
   a. Moderately Steep Slopes - No more than twenty-five (25) percent of moderately steep slopes shall be regraded, cleared, built upon, or otherwise altered or disturbed.

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   b. Steep Slope Margins - No more than twenty-five (25) percent of steep slope margins shall be regraded, cleared, built upon, or otherwise altered or disturbed.
   c. Very Steep Slopes - No more than ten (10) percent of very steep slopes shall be regraded, cleared, built upon, or otherwise altered or disturbed. In addition, disturbance permitted on very steep slopes shall be limited to the following activities:
      1) Timber harvesting, when conducted in compliance with the required timber harvesting plan. Clearcutting or grubbing of trees is prohibited on very steep slopes.
      2) Grading for the minimum portion of a driveway necessary for access to the principal use and sewer, water, and other utility lines when it can be demonstrated to the satisfaction of the Township that no other routing is practicable, but excluding sewage disposal systems.
      3) Hiking and riding trail(s) of minimum adequate width(s), where developed so as to minimize potential erosion, follow existing topographic contours to the greatest degree practicable, and where using unpaved surfaces to the maximum practicable extent.
2. All permitted buildings or structures shall be constructed in such a manner as to provide for the least alteration necessary of the existing grade, vegetation, and natural soils condition.

3. A grading plan shall be provided identifying the existing contours of the site, proposed finished grades, and the proposed location of all buildings and structures. Locations for all stockpiled earth, stone, and other materials shall be shown on the plan and shall not be located within the drip line of any trees intended to remain post permitted disturbance.
4. Excessive cut and fill shall be avoided. New roads and improvements to existing roads should be designed within the existing contours of the land to the extent possible and strive for compatibility with the character of rural roads.
5. Finished slopes of permitted cut and fill shall not exceed thirty-three (33) percent slope unless the applicant can demonstrate the method by which steeper slopes will be stabilized and maintained adequately.
6. Any stockpile(s) of earth intended to be stored for more than twenty-one (21) days shall be seeded or otherwise stabilized to the satisfaction of the Township Engineer . Any disturbed areas of Very Steep Slope and any cut and fill resulting

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in slopes of greater than twenty (20) percent shall be protected with an erosion control blanket.
7. Any disturbance of land shall be in compliance with the erosion and sedimentation control standards of Chapter 190, Subdivision and Land Development, and PA DEP Title 25, Chapter 102.
    a. An erosion and sedimentation control plan and soil stabilization plan shall be submitted consistent with the requirements of Chapter 190, Subdivision and Land Development.
    b. The plan shall demonstrate how soil will be protected from erosion during construction and how soil will be stabilized upon the completion of construction.
8. Where the following information has not been previously submitted as part of a subdivision or land development plan application, such information shall be submitted to the Township with building permit, conditional use, special exception, or zoning applications, when applicable:
    a. The adequacy of access to the site for emergency vehicles shall be subject to review by the fire marshal or his designee. The necessary information shall be submitted by the applicant to the fire marshal or his designee for his review.
    b. Grading plan and Erosion and Sedimentation Control Plans.

E. <u>Wetlands Conservation</u>

1. Wetlands shall not be regraded, filled, piped, diverted, channeled, built upon, or otherwise altered or disturbed, including for purposes of access or utility crossings, except where all applicable permits have been obtained and copy thereof submitted to the Township.

2. Any applicant proposing a use, activity, or improvement which would entail the regrading or placement of fill in wetlands shall provide the Township with proof that the Pennsylvania Department of Environmental Protection

(Bureau of Dams and Waterway Safety and Bureau of Water Quality Management) and the U.S. Army Corps of Engineers have been contacted to determine the applicability of state and federal wetland regulations. Any applicant contacted by the Pennsylvania Department of Environmental Protection or the U.S. Army Corps of Engineers in regard to wetlands also shall concurrently provide to the Township a copy of such correspondence.

3. Where permitted subject to applicable regulation and as otherwise provided herein, sewers or other liquid transport pipelines shall only be permitted to cross



wetlands on the minimum traversal distance and where every precaution shall be taken to prevent leaks (including x-ray of steel welds) and to prevent any possible draining of the wetland (e.g., water flowing through or along any pipe or trench).

4. Where wetland disturbance is permitted subject to applicable regulation on any lot or tract, no more than ten (10) percent nor more than one (1) acre of any wetland area, whichever is less, shall be disturbed for any purpose. To the maximum extent feasible, any disturbance to or loss of natural wetlands shall be compensated with created wetland areas at the rate of three times the lost or disturbed wetland area. Created wetlands shall be hydrologically fed with stormwater discharged from an approved stormwater management facility and may be located at a site approved by the Township for remediation, whether on or off the property that contains the subject wetland. Where and to the extent applicable, in lieu of wetland creation, loss of natural wetlands may be compensated by permanent conservation of other existing wetlands or by restoration of former wetlands (e.g., through removal of tilefields or other drainage facilities) by means satisfactory to the Township.

5. Where required to comply with state or federal regulation, any applicant also shall provide the Township with a full wetland delineation report conducted by a qualified wetland biologist, soil scientist, or environmental professional of demonstrated qualifications, subject to the following:

    b. Where there is any question as to the accuracy of the wetland delineation report, the Township may hire a qualified consultant to review the delineation and recommend revisions at the applicant's expense.

    c. Such a professional shall certify that the methods used correctly reflect the currently accepted technical concepts, including identification and analysis of wetland vegetation, hydric soils, and hydrologic indicators. Methods used in the delineation report shall be acceptable to the Township Engineer or other qualified consultant hired by the Township.

    d. The wetland report submitted to the Township shall include a determination of whether wetlands are present on the site and a full delineation, area measurement (in square feet), and description of any wetlands determined to be present.

F. Watercourse & Riparian Buffer Protection Standards

1. Zone One – Inner Riparian Buffer – With the exception of those uses or activities listed below, no land disturbance shall be permitted within the Zone One Riparian Buffer:
    - a. Regulated activities permitted by the Commonwealth (i.e. permitted stream or wetland crossing).



    - b. Provision for trail and trail access where approved by the Township with minimum disturbance to existing woodland vegetation;
    - c. Selective removal of hazardous or invasive alien vegetative species; or
    - d. Vegetation management in accordance with an approved landscape plan or open space management plan.

2. Zone Two – Outer Riparian Buffer - Except for the following activities, no more than fifteen (15) percent of a Zone Two Riparian Buffer shall be regraded, filled, built upon, or otherwise altered or disturbed:
    - a. Activities permitted in the Zone One Riparian Buffer.
    - b. Timber harvesting, when conducted in compliance with a timber harvesting plan approved by the Township. Clear-cutting of timber shall not be permitted within the riparian buffer.

G. Conservation of Seasonal High Water Table Soils

1. With the exception of those uses or activities listed below, and where not otherwise regulated more restrictively under the provisions of this Chapter, no more than twenty (20) percent of any Seasonal High Water Table Soil shall be regraded, filled, built upon, or otherwise altered or disturbed:
    - a. Regulated activities permitted by the Commonwealth (i.e. permitted stream or wetland crossing);
    - b. Provision for trails;
    - c. Selective removal of hazardous or invasive alien vegetative species; or
    - d. Vegetation management in accordance with an approved landscape plan or open space management plan.
2. Notwithstanding the twenty (20) percent disturbance limitation set forth above, the following regulations shall apply to Seasonal High Water Table Soils:
    - a. No structures for human use or habitation or for regular animal occupancy shall be constructed in any area of soil where the seasonal high water table is within one (1) foot of the surface;
    - b. No subsurface sewage system shall be constructed within any area of Seasonal High Water Table Soil.



    - c. No roadway shall cross any area of Seasonal High Water Table Soil except where providing necessary access which clearly is otherwise impracticable and only where drainage, adequate base preparation, and special paving approved by the Township Engineer shall be provided.

H. Heritage Trees

1. No Heritage Trees, shall be removed from any lot or tract except where Applicant demonstrates to the satisfaction of the Township that such removal is essential to eliminate hazardous condition(s). In consideration of any need for tree removal, the Township may engage the services of an arborist, reasonable costs therefore to be borne by the Applicant.
2. To the minimum extent necessary to permit retention of Heritage Trees while providing for lawful use, modification to otherwise applicable area and bulk requirements may be approved in the following situations:
   a. Where approved by the Board of Supervisors as part of any applicable subdivision or land development application, or
   b. Where approved by the Zoning Officer upon approval of any applicable building permit, and
   c. Provided that no applicable yard area setback shall be reduced more than fifty (50) percent, except where approved as a variance by the Zoning Hearing Board.

3. Where any applicant for building, zoning, subdivision or land development approval establishes conservation restrictions acceptable to the Township which shall result in the conservation of Heritage Trees, all such Heritage Trees to be retained shall be credited toward any tree replacement required under § 250-87.H.8 below, at the ratio of four trees credited for each Heritage Tree retained.

I. Rare Species Sites

1. With the exception of selective removal of hazardous or invasive alien vegetative species, no Rare Species Site shall be regraded, filled, built upon, or otherwise altered or disturbed.
2. A buffer area with a minimum dimension of twenty-five (25) feet shall be provided around the entire perimeter of any Rare Species Site within which no land disturbance shall be permitted.
3. To the minimum extent necessary to avoid disturbance to Rare Species Site(s) or to provide for required buffer(s), while providing for lawful use, modification to



otherwise applicable area and bulk requirements may be approved in the following situations:
   a. Where approved by the Board of Supervisors as part of any applicable subdivision or land development application, or

b. Where approved by the Zoning Officer upon approval of any applicable building permit, and

c. Provided that no applicable yard area setback shall be reduced more than fifty (50) percent, except where approved as a variance by the Zoning Hearing Board.

J. Exceptional Natural Areas

1. With the exception of those uses or activities listed below, and where not otherwise regulated more restrictively under the provisions of this Chapter, no more than ten (10) percent of any Exceptional Natural Area, where not otherwise classified as woodland, shall be regraded, filled, built upon, or otherwise altered or disturbed:

   a. Regulated activities permitted by the Commonwealth (i.e. permitted stream or wetland crossing);

   b. Provision for trails;

   c. Selective removal of hazardous or invasive alien vegetative species; or

   d. Vegetation management in accordance with an approved landscape plan or open space management plan.

2. Exceptional Natural Areas which are classified as Woodland on the Woodland Classification Map, shall be regulated as provided in § 250-87.K, without further limitation under this subsection.

K. Woodlands and Hedgerows

1. Disturbance Limitations for Woodlands and Hedgerows

   Notwithstanding the provisions of this Section, selective harvesting of timber shall be permitted where undertaken in compliance with the provisions set forth in § 250-87.H.13 below. Clearcutting of any woodland area shall be prohibited except to the minimum extent necessary to permit the implementation of an approved land development or building permit in conformance with this section. Except for an approved timber harvesting operation, all woodland disturbance shall be subject to the following total disturbance limitations:



   a. Permitted woodland disturbance on any lot or tract shall not exceed five (5) percent of any area designated Class I Woodland on the Pocopson Township Woodland Classification Map, where such woodland is coextensive with any area of Very Steep Slope.

   b. Except where § 250-87.K.1.a applies, permitted woodland disturbance on any lot or tract shall not exceed fifteen (15) percent of any area designated Class I or Class II Woodland on the Pocopson Township Woodland Classification Map, nor any woodland within a designated Greenway Corridor.

   c. Outside of areas designated as Greenway Corridors, permitted woodland disturbance on any lot or tract shall not exceed twenty-five (25) percent of any Class III Woodland.

d. Permitted woodland disturbance on any lot or tract shall not exceed ten (10) percent of any area designated as Forest Interior Habitat on the Pocopson Township Woodland Classification Map.

e. Disturbance limitations shall be measured based on the extent of the subject woodland classification at the time of first submission of applicable application(s) after the adoption of this Section and shall be indicated on applicable plan(s). The extent of any area of woodland disturbance shall be measured to include the entire area within the drip line of any tree where any part of the area within the drip line of said tree is subject to woodland disturbance. Any disturbance limitation shall run with the land, once established. Subsequent applications shall be subject to the initial determination of disturbance limitations, regardless of intervening disturbance which may have occurred. If, at any time within three years prior to an applicable application, there had existed a greater extent of woodland, such greater area shall be utilized to calculate the extent of woodland disturbance and the limitations set forth herein.

2. Woodland Replacement.

a. Where permitted, any woodland disturbance exceeding any of the following standards shall require provision for vegetation replacement as set forth in § 250-87.H.8 below. Each of the following standards shall be applied independently and the corresponding replacement requirements shall be cumulative.

1) Any woodland disturbance in any of the following areas:

(a) Any area designated as Class I or Class II Woodland on the Pocopson Township Woodland Classification Map;



(b) Any area designated as a Greenway Corridor;

(c) Any area within the drip line of any Heritage Tree;

(d) Any area within any Riparian Buffer.

2) Woodland disturbance in excess of 10,000 square feet of existing area of Class III woodland or hedgerow(s) for each principal use permitted on any lot or tract. As an example, where two principal uses are permitted, woodland disturbance may involve up to 20,000 square feet (10,000 X 2) before replacement is required, except as otherwise provided herein.

3. In determining where necessary woodland disturbance shall occur in the context of any subdivision or land development, Applicant shall consider the following:

a. The location(s) and benefit of conservation of healthy mature woodland stands;

b. The impacts, in terms of functions and values to wildlife, of separating, dividing and/or encroaching on wildlife travel corridors and/or extensive habitat areas. Such impacts must be explicitly assessed in any area designated as one or more of the following:

1) Greenway Corridor;
2) Forest Interior Habitat;
3) Rare Species Site(s);
4) Exceptional Natural Areas;
5) Riparian Buffers;
6) Class I or Class II woodlands.

4. In areas of permitted woodland disturbance and areas adjacent to permitted woodland disturbance, remaining trees shall be protected from damage. The following procedures shall be utilized during construction in order to protect remaining trees:

a. Where existing trees are to remain, no change in existing grade shall be permitted within the drip line of the trees. Appropriate fencing 4 feet in height shall be placed at the drip line of trees to remain, wherever adjacent to proposed construction. Such fencing shall be maintained in place throughout the duration of construction activity. Roots shall not be cut within the drip line of any trees to remain.

b. Trees within 25 feet of a building, or bordering entrances or exits to building sites, shall be protected by a temporary barrier to be maintained in place throughout the duration of construction activity.



c. No boards or other material shall be nailed or otherwise attached to trees during construction.

d. Construction materials, equipment, soil and/or debris shall not be stored nor disposed of within the drip lines of trees to remain.

e. Tree trunks, limbs, and exposed roots damaged during construction shall be protected from further damage by being treated immediately in accordance with accepted professional landscape procedures.

5. Calculation of Required Vegetation Replacement.

Where woodland disturbance exceeds any of the standards set forth in § 250-87.H.3 above, applied independently and cumulatively, replacement plantings shall be installed in accordance with the standards set forth below. A sample list of acceptable replacement plantings is found in § 250-87.N.

a. Required Replacement Trees shall be determined using the calculation set forth below which results in the greatest number of replacement trees:

1) <u>Replacement Tree Calculation Based on Area of Woodland Disturbance</u>. At a minimum, for each five hundred (500) square feet of woodland disturbance area, or fraction thereof, in excess of the applicable standard set forth in § 250-87.H.3 and regardless of the character and sizes of the disturbed vegetation, one tree at least 2-2½” caliper shall be planted.

2) <u>Replacement Tree Calculation Based on Specific Tree Removal</u>. Regardless of any disturbance allowances, for each tree greater

than 12” dbh to be removed, required replacement trees also shall be calculated in accordance with the following schedule. For purposes of this section, it shall be assumed that any tree greater than 12” dbh shall be removed if located within twenty-five (25) feet of any proposed land disturbance:

For each tree to be removed, Minimum number & caliper at the following sizes, dbh: of replacement trees:

One, 12” to 18” dbh Two 2-2½” caliper
One, 18” to 24” dbh Three 2-2½” caliper
One, 24” to 36” dbh Four 2-2½” caliper
One, greater than 36” dbh Six 2-2½” caliper

b. <u>Required Replacement Shrubs</u>. At a minimum, for each one hundred (100) square feet of woodland disturbance area, or fraction thereof, in excess of the applicable standard set forth in § 250-87.H.3 and regardless



of the character and sizes of the disturbed vegetation, one shrub at least 24-30” in height shall be planted in addition to any required tree replacement. Shrubs planted in accordance with this requirement may be of restoration quality and not necessarily landscaping quality.

c. Required replacement plantings shall be in addition to any required street trees or any other landscape material required under applicable provisions of this Chapter or Chapter 250, Zoning.

d. Where approved by the Township as a condition of any building, zoning, subdivision or land development approval or as a condition of grant of modification under § 250-87.J.3, required replacement trees may be substituted for greater numbers of trees of smaller caliper than otherwise required or by vegetation other than trees (e.g., for purposes of reforestation).

e. Where approved by the Township as a condition of any building, zoning, subdivision or land development approval or as a condition of grant of modification under § 250-87.J.3, some or all of the required replacement plantings may be installed at a site other than that subject to required replacement planting.

f. In lieu of actual installation of replacement plantings, the Township may permit any applicant to place the equivalent cash value, as agreed upon by the Township and the applicant, for some or all of the required replacement plantings into a special fund established for that purpose. Such fund shall be utilized at the discretion of the Township for the purchase and installation of plantings elsewhere in the Township. Installation of such plantings on private lands shall be dependent upon the establishment of conservation easement(s) or other restriction(s) acceptable to the Township that will reasonably guarantee the permanent protection of such plantings. Where the provisions of this Section are otherwise applicable, any grant of approval of modifications requested pursuant to § 250-87.J.3 also may be conditioned upon the placement of equivalent cash value for otherwise required replacement plantings into such a fund.

g. The locations, selected species, and sizes of all replacement plantings, along with a planting schedule tied to the timing and/or phasing of the development, shall be indicated on the Final Subdivision/Land Development Plan(s) or building permit application, as applicable.

6. Required replacement vegetation and their measurement shall conform to the standards of the publications "American or U.S.A. Standard for Nursery Stock," ANSI or U.S.A.S. Z60.1 of the American Association of Nurserymen, as amended. All plant material used on the site shall have been grown so as to have

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a high likelihood of survival on the site (e.g., grown specifically for planting in the applicable USDA hardiness zone) and shall be nursery grown, unless it is determined by the Township that the transplanting of trees partially fulfills the requirements of this section.

7. Species of replacement plantings selected and planting locations shall reflect careful site evaluation and in particular the following considerations:

a. Existing and proposed site conditions and their suitability for the plant materials, based upon the site's geology, hydrology, soils, and microclimate.

b. Specific functional and design objectives of the plantings, which may include but not necessarily be limited to: replacement of woodland area removed, enhancement of existing woodland or oldfield area(s), reforestation of riparian buffer areas, mitigation of new woodland edge conditions as a result of land disturbance, provision for landscape buffer, visual screening, noise abatement, energy conservation, wildlife habitats, and aesthetic values.

c. Maintenance considerations such as hardiness, resistance to insects and disease, longevity, and availability.

d. Because of the many benefits of native plants (ease of maintenance, longevity, wildlife habitat, etc.), the use of nursery-grown free-fruiting native trees and shrubs is strongly encouraged. Species selection should reflect species diversity characteristic of the native deciduous woodland.

8. All replacement plantings shall be guaranteed and maintained in a healthy and/or sound condition for at least twenty-four (24) months or shall be replaced. In addition, the Applicant may be required to escrow sufficient additional funds for the maintenance and/or replacement of the proposed vegetation during the 24 month replacement period and to provide for the removal and replacement of vegetation damaged during construction, based upon the recommendation of the Township Engineer.

9. All applicants shall include, as part of preliminary and final plan submission, where applicable, a plan for the long-term management of any woodland area not subject to woodland disturbance and any area selected for introduction of replacement plantings in accordance with this Section. Such plan shall include a statement of woodland management objectives and shall demonstrate to the satisfaction of the Board of Supervisors the feasibility of intended management practices, aiming to ensure the success of stated objectives, including the viability of introduced plantings, deterrence of invasive species, and means to minimize any future woodland disturbance. Applicants are strongly encouraged to seek woodland management assistance from a qualified professional.

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10. Timber Harvesting Operations

a. Any timber harvesting operation shall be undertaken in accordance with a Timber Harvesting Plan approved by the Township. All Timber Harvesting Plans shall be submitted to the Township for review for compliance with the standards for timber harvesting operations set forth herein not less than forty-five (45) days prior to commencement of the timber harvesting operation. Within thirty (30) days of submission to the Township, a Timber Harvesting Plan shall be approved, denied, or approved subject to reasonable conditions and the Applicant so notified in writing.

b. Any Timber Harvesting Plan submitted to the Township for review and approval shall be consistent with the Timber Harvesting Guidelines of the Pennsylvania Forestry Association, as applicable, and shall include a plan or plans indicating the following information:

1) Site location and boundaries of both the entirety of the property upon which the timber harvesting operation shall occur and the specific area proposed for timber harvesting;

2) Significant natural features on the property including steep slopes, wetlands, Riparian Buffer zones, Heritage Trees, Rare Species Sites, and Exceptional Natural Areas.

3) Identification of the classification of the woodland or woodland(s) where the timber harvesting operation is proposed to occur, as indicated on the Pocopson Township Woodland Classification Map;

4) Identification of areas of forest interior habitat where timber harvesting is proposed to occur;

5) Identification of Greenway Corridors where timber harvesting is proposed to occur, as indicated on the Pocopson Township Greenway Corridors Plan.

6) The general location of the proposed operation in relation to municipal and state highways and any proposed accesses to those highways;

7) Design, construction, maintenance, and retirement of the access system, including haul roads, skid roads, skid trails, and landings;



8) Design, construction, and maintenance of water control measures and structures such as culverts, broad-based dips, filter strips, and water bars; and,

9) Design, construction, and maintenance of proposed stream and wetland crossings.

c. Any permits required by any other agency under any applicable regulation shall be the responsibility of the landowner or timber harvesting operator as applicable. Copy of all required permits shall be submitted to Pocopson Township at least twenty (20) days prior to commencement of the timber harvesting operation.

d. The following management practices shall apply to all timber harvesting operations:

1) Felling and skidding of trees shall be undertaken in a manner which minimizes damage to trees or other vegetation not intended to be harvested (e.g., successive limbing up the tree rather than felling in its entirety).

2) Felling or skidding across any public thoroughfare is prohibited without the express written consent of the Township or Penn DOT, whichever is responsible for the maintenance of said thoroughfare.

3) No timber loads weighing more than 60,000 pounds shall be permitted on Township roads. The applicant shall review with the Township Roadmaster the condition of any Township road that will be used to transport log loads or that may otherwise be impacted by the timbering operation. The Township shall require the posting of a bond or other approved security of no less than $50,000 to cover any damage to Township roads.

4) No tops or slash shall be left within twenty-five (25) feet of any public thoroughfare or private roadway.

5) Litter resulting from a timber harvesting operation shall be removed from the site or otherwise dealt with as approved by the Township (e.g., chipped and recycled on-site).

6) The operation shall not cause harm to the environment or any other property.

e. No timber harvesting operation shall be permitted within any Zone One Riparian Buffer or any Rare Species Site, nor within twenty-five (25) feet of any Rare Species Site. No clear-cutting of timber shall be



permitted within any Zone Two Riparian Buffer or any Exceptional Natural Area.

f. In all woodlands, a minimum percentage of the forest canopy trees shall remain in good condition after the completion of any timber harvesting operation, as set forth in the table below. Remaining forest canopy trees shall be well distributed throughout the area subject to the timber harvesting operation.

| Percentage Forest Canopy Trees to Remain by location | | | |
|---|---|---|---|
| Woodland Class | Zone One Riparian Buffer | Zone Two Riparian Buffer | All Other |
| Class III | 100 | 60 | 30 |
| Class II | 100 | 70 | 40 |
| Class I | 100 | 80 | 50 |
| Forest Interior Habitat | 100 | 90 | 60 |

g. At least fifty (50) percent of the required remaining forest canopy trees, as provided above, shall be comprised of Higher Value Species. Where the number of trees comprising Higher Value Species that exist prior to the approval of any timber harvesting operation, is less than the number which would be required to comply with this provision, no Higher Value Species may be harvested.

h. Township representative(s) shall be permitted access to the site of any timber harvesting operation before, during, or after active timber harvesting to review, inspect and ascertain compliance with the provisions set forth herein.

i. Upon determination that a timber harvesting operation is in violation of these regulations, each day where any violation occurs shall constitute a separate violation subject to the provisions of this Chapter.

L. Greenway Corridor Conservation

1. Use Regulations. Within any designated greenway corridor a building may be erected, altered, or used, and a lot may be used as provided in the underlying base zoning district, except that all uses within a greenway corridor shall be subject to conditional use approval.



2. Area and Bulk Regulations. Within any designated greenway corridor, and subject to conditional use approval, the area and bulk regulations of the underlying base zoning district shall apply.

3. Special Criteria for Development within Greenway Corridors. Except as otherwise noted herein, the following special criteria are applicable within any designated greenway corridor to any new principal use and to the expansion, alteration, modification, or reconstruction of any existing use or structure for which a building permit is required:

a. Under any development option, on properties subject to subdivision or land development, building locations shall be selected outside of designated Greenway Corridors where feasible and, where not feasible, shall be located as near to the edge of the designated corridor as practicable, in order to conserve the largest possible breadth and extent of the greenway corridor.

b. The conventional development option shall not be utilized except where approved as a conditional use upon determination by the Board of Supervisors that no other development option is practicable.

c. Open space resulting from subdivision shall be located so as to maximize the degree to which lands within designated greenway corridors shall be so preserved.

d. Where applicable under any development option, the Board of Supervisors may grant conditional use approval subject to modification of any otherwise applicable area, bulk or design standard, where such modification is deemed as promoting the conservation of any designated greenway corridor.

e. Where applicable and where not undertaken voluntarily by the affected landowner(s), as condition(s) of conditional use approval, the Board of Supervisors may require establishment of formal conservation easements and/or public trail easements, in order to permanently secure the benefits of the greenway corridor subject to application.

4. Woodlands, riparian buffers and identified natural areas or Exceptional Natural Area within designated Greenway Corridors shall be preserved to the greatest extent feasible. Where feasible, more than one type of habitat area on a single tract shall be preserved in order to promote maintenance of habitat diversity.
5. In the context of an application for approval of a conditional use, subdivision or land development plan, special exception, variance, or building permit, the Township may require reforestation within designated Greenway Corridors. A



landscape plan shall accompany the application and adequately illustrate proposed reforestation plans, including a list of native trees and shrubs to be provided, and defining the long-term management provisions. All plantings shall be established prior to final occupancy permit approval.
6. Alteration of natural ridgelines within any designated greenway corridor through grading or earthmoving shall be avoided or, if not feasible, shall be minimized to the greatest extent feasible.

M. Application of Natural Resource Conservation Standards

1. Plan Information and Delineation of Protected Resources

To ensure compliance with the natural resource conservation standards of this Section, the following information shall be submitted by the Applicant when applying for a zoning or building permit, conditional use or special exception approval, zoning variance, or subdivision and land development approval where land disturbance is contemplated. In those cases where only a limited amount of the site will be subject to disturbance, the Zoning Officer may determine the area of land required to be shown on the plan such that information submitted will adequately demonstrate compliance with the natural resource conservation standards of this Section. Where less than the entire site is to be shown on the plan, the application shall be accompanied by a written explanation from the applicant as to why it is not necessary to include the entire site with the plan information.

a. A site plan which identifies the limits of all natural resources on the site, including areas of woodlands or other vegetation to be preserved, and the proposed use of the site including any existing or proposed structures.
b. The limits of all encroachments and disturbances necessary to establish the proposed use on the site, including a grading plan showing existing and proposed contours.
c. Calculations indicating the area of the site comprising each of any regulated natural resources and the area of each of such natural resources that would be disturbed or encroached upon. The calculations shall be shown on submitted plan sheet(s).

2. Continued Protection of Identified Natural Resources

To ensure the continued protection of identified natural resources, the following requirements shall apply:

a. Protected Resource Areas On Individual Lots

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1) For resource areas protected under the terms of this section located on individual lots, restrictions meeting Township specifications shall be placed in deeds for each site or lot that has resource protection areas within its boundaries.

2) Deeds shall clearly state that the maintenance responsibility lies with the individual property owner. The restrictions shall provide for the continuance of the resource protection areas in accordance with the provisions of this Chapter.

3) Other mechanisms for ensuring the continued protection of identified resources, such as conservation easements, may also be considered and used if approved by the Township.

b. Protected Resource Areas Held In Common

1) For resource protected areas held in common, the provisions of § 250-98 (Open Space Standards) and § 250-99 (Homeowners Associations) shall apply.

2) Conservation restrictions acceptable to the Township shall be placed on any natural area to be held in common.

3) The party or organization responsible for the maintenance of any natural area(s) shall be clearly identified in applicable deed(s). The restrictions shall provide for the continuance of the resource protected areas in accordance with the provisions of this Chapter.

c. Changes to Approved Plans

All applicable plans and deeds shall include the following wording: "Any structures, infrastructure, utilities, sewage disposal systems, or other proposed land disturbance indicated on the approved final plan shall only occur at the locations shown on the plan. Changes to such locations shall be subject to additional review and re-approval in accordance with the provisions of § 250-87 Chapter 250, Zoning, of the Pocopson Township Code."

3. Modifications to Natural Resource Conservation Standards

a. For any use or activity subject to Subdivision or Land Development review, as part of applicable Plan Submission, modification(s) may be requested to the provisions of this § 250-87. Requested modification(s) may be granted at the discretion of the Board of Supervisors pursuant to the provisions of Chapter 190, Subdivision and Land Development.

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b. For any use or activity not subject to Subdivision or Land Development review, but where the use or activity is subject to application for approval of a Conditional Use, Special Exception, or Zoning Variance, modification(s) to the provisions of this § 250-87 may be requested as part of such application.

c. For any use or activity not otherwise subject to permit or approval as provided in subsections a or b above, modification(s) to the provisions of this § 250-87 may be requested in the form of an application for grant of a Special Exception by the Zoning Hearing Board. Such applications shall be submitted to the Township Planning Commission for review and comment prior to formal Special Exception application to the Zoning Hearing Board.

d. In consideration of approval of any request for modification(s) under this § 250-87, it shall be determined that the specific nature of the lawful use or activity, existing site conditions, and/or safety considerations warrant such modification(s), and that the resource protection purposes of this §250-87 shall be adhered to, to the maximum extent practicable.

N. Suggested Plant List

The following list includes species acceptable for woodland replacement plantings. Examples of species appropriate for use where screening or buffering is desirable or required are indicated with an asterisk (*). Appropriate species for street tree plantings are indicated by the notation "ST." Specific species selection and planting locations shall reflect careful site evaluation as further set forth herein.

Tree, Botanical Name Common Name
Evergreen Trees
Eastern redcedar* Juniperus virginiana
Canadian Hemlock Tsuga canadensis
Red (Eastern or Yellow) spruce* Picea rubens
Norway spruce* Picea abies
Eastern White Pine* Pinus strobes
Shade Trees
Red maple, ST Acer rubrum
Sugar maple, ST Acer saccharum
White ash, ST Fraxinus americana
Green ash, ST Fraxinus pennsylvanica
Sycamore Platanus occidentalis
White oak, ST Quercus alba
Northern red oak, ST Quercus rubra
Tulip poplar Liriodendron tulipifera
Scarlet oak, ST Quercus coccinea
Pin oak, ST Quercus palustris
Shagbark hickory Carya ovata



American basswood Tilia americana
American beech Fagus grandifolia

Black cherry Prunus serotina
London plane tree Platanus acerifolia
Small Trees and Shrubs
Rhododendron Rhododendron sp.
Black chokecherry Aronia melanocarpa,
Shadbush/Serviceberry* Amelanchier canadensis
Redbud Cercis canadensis
Flowering dogwood* Cornus florida white
Winterberry Ilex verticulata
Washington hawthorn* Crataegus phaemopyrum
New Jersey tea Ceonothus americanus
Sourwood Oxydendrum arboreum
Ironwood Ostrya virginiana
Arrowwood Viburnum dentatum
Black Haw Viburnum prunifolium
Maple Leaf viburnum Viburnum acerifolium
Mountain laurel Kalmia latifolia
Highbush blueberry Vaccinium corybosum
Lowbush blueberry Vaccinium vacillans
Common juniper Juniperus communis

Subdivision/Land Development Ordinance
Amend § 190-23 and § 190-24 to read as follows:

§ 190-23. Existing Resources and Site Analysis Plan

A. An Existing Resources and Site Analysis Plan consisting of one or more maps shall be prepared for all subdivisions or land developments to provide the developer or landowner and the Township with a comprehensive analysis of existing conditions, both on the subject property and within 250-500 feet of the property boundaries, as specifically provided below. Minor Subdivisions, Conservation Subdivisions meeting the requirements of Article III of the Chapter 250, Zoning, or subdivisions for the purposes of establishing transferable development rights only, may be exempted from providing some information as provided below.

B. Submission requirements hereunder shall be reduced for Conservation Subdivisions with an average lot size of 20 acres or restricted to no more than two residential dwellings, and subdivisions required to establish transferable development rights where no more than two residential dwellings or development rights shall be retained on the subject property. In such instances, Applicants shall be required to submit paper copies of required plans only, and at a scale of 1 inch equals 100 feet. The only information required shall be as follows, and shall only be required for the subject property:

(1) The accurate depiction of all Class I and II agricultural soils and any Seasonal High Water Table Soils;

(2) Any information required to determine the net tract area, as provided in Chapter 250, Zoning;

(3) The information set forth in Subsection E(3) (Map 3);

(4) The most accurate topographic information electronically available at a reasonable cost;

(5) The depiction of the location of any Exceptional Natural Area as identified in the Exceptional Natural Areas Inventory;

(6) The indication of location, type and size of any Heritage Tree(s),

(7) The depiction of any Rare Species Site(s);

(8) The indication of any area(s) located within Greenway Corridors as identified on the Greenway Corridors Map; and

(9) The extent and differentiation of woodland classifications, including forest interior habitat, as indicated on the Woodland Classification Map.

C. All other Conservation Subdivisions and subdivisions required for transfers of development rights shall be required to submit all of the data layers required for Maps 1 and 3 in paper form at a scale of 1 inch equals 50 feet. Indication of conditions beyond the boundaries or the subject property, as otherwise required herein, may be described on the basis of published reports or data, aerial photographs or computer accessible data. The landowner or equitable owner should consult with the Planning Commission and Township Engineer before preparing such maps or a subdivision plan to determine what level of assistance may be provided by the Township and what the critical mapping and subdivision issues will be. The most accurate topography electronically available may be used to prepare Map 1 and used in Map 3. However, where public improvements such as streets or road improvements are required or where significant cuts and fill may be involved to implement a Conservation Subdivision, the Planning Commission or Township Engineer may require the developer or landowner to comply with standard provisions for mapping topography for Map 1, as set forth below.

D. Minor subdivisions involving two acres or less shall only be required to provide the information set forth in Subsection E(1)(c) and (f) (Map 1) and the information set forth in Subsection E(3) (Map 3) and, where information otherwise is required beyond the boundaries of the subject property, only for the first 250 feet. Where field surveys or orthographically corrected aerial photography are not reasonably available, USGS topography may be used for minor subdivisions.

E. Except as provided above for Minor Subdivisions, Conservation Subdivisions and subdivisions for transfer of development rights, as noted above, the Existing Resources and Site Analysis Plan shall consist of all of the Maps as set forth below. Required



information shall be submitted to the Township on paper and Mylar copies at a scale of one inch equals 50 feet and on computer disks in an AutoCAD or ArcInfo GIS format or other format compatible with the systems used by the Township and its Engineer. Electronic submissions shall separate data layers for each of the site features required. To the extent reasonably feasible, required information shall be submitted at the time of Sketch Plan submission and shall, in all cases, be required for Preliminary and Final Plan submission. The Township shall review the Existing Resources and Site Analysis Plan to assess its accuracy and thoroughness.

(1) Map 1 shall consist of:

(a) Topography, the contour lines of which shall be at two-foot intervals, determined by photogrammetry with clear differentiation of all Very Steep Slopes (>20%), Moderately Steep Slopes (10-20%) and Steep Slope Margins, as defined in Chapter 250, Zoning. Topography for major subdivisions shall be prepared by a professional land surveyor or professional engineer from an actual field survey of the site or from orthographically corrected aerial photography and shall be coordinated with official U.S.G.S. benchmarks. Datum to which contour elevations refer shall be noted.

(b) The location and extent of ponds, watercourses, natural drainage swales, one-hundred-year floodplains and wetlands as defined in Chapter 250, Zoning, shall be clearly delineated for the subject property and within 250 feet of the property boundaries. Wetlands identified in the field by soil testing, the presence of hydrophytic plants, or observation of standing water or other indicators shall be included for major subdivisions and land developments. Copy of any required Wetland Delineation Report shall be submitted to the Township to accompany submission of Map 1.

(c) The location, delineation, and classification of all woodlands, including forest interior habitat, as indicated on the Woodland Classification Map.

(d) The location and delineation of any areas located within greenway corridors, as indicated on the Greenway Corridors Map.

(e) The location, delineation, and identification of any Exceptional Natural Area as identified in the Exceptional Natural Areas Inventory, any Rare Species Site(s) as defined in Chapter 250, Zoning, where found on the subject property or within 250 feet of the property boundaries.

(f) Ridge lines and watershed boundaries shall be identified.

(g) All visually significant landscapes as identified on the Scenic Resources map of the Pocopson Township Open Space, Recreation, and Environmental Resources Plan or delineated for the state designated Lower Brandywine Scenic River Corridors (including along Pocopson Creek). This information shall be supplemented with a viewshed analysis showing the location and extent of views into the property from public roads and from adjoining public or private non–profit owned recreational or open space properties.

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(h) Locations of all historic districts and historic and archaeological resources on the tract or the abutting tracts as identified in the Pocopson Township open space study referenced above, the National Register of Historic Places, or any published study available at the Township.

(i) Geologic formations and large rock outcrops on the subject property, based on available published information or data obtained by the applicant in field surveys.

(2) Map 2 shall consist of:

(a) Topography at two-foot intervals determined by photogrammetry and prepared in the manner noted above, but without slope differentiation.

(b) Vegetative cover conditions on the property according to general cover type including any cultivated land, permanent grassland/meadow, old field, hedgerow, wetland, free-standing trees greater than twelve inches diameter at breast height, woodland areas delineated on the Woodland Classification Map, and Heritage Trees, as defined in Chapter 250, Zoning, whether free-standing or within a woodland, hedgerow or other tree mass. Each area identified shall be described regarding plant community composition, and general conditions, including delineation of any area where a timber harvesting operation has occurred within three years prior to the subject subdivision or land development application. For each stand of woodland and hedgerow, average tree size (dbh) shall also be noted along with actual canopy extent and any other pertinent information. Actual canopy extent also shall be indicated for each Heritage Tree.

(c) Soil series, types and phase, as mapped by the U.S. Department of Agriculture, Natural Resources Conservation Service in the Soil Survey for Chester and Delaware Counties, Pennsylvania - 1963, and accompanying data tabulated for each soil. With the exceptions of properties proposed for transfer of development rights or for Conservation Subdivision, a soils map shall be overlain with geological delineations and the results of a fracture trace analysis of all fractures on the property (prepared by a registered geologist or hydrogeologist). The following soil types shall be specifically identified:

[1] Alluvial and colluvial (e.g. Worsham) soils.

[2] Seasonal High Water Table Soils including specific delineation of hydric soils and soils with hydric inclusions.

[3] Soils with percolation rates within four feet of the surface of 1.2 to 2 inches per hour and those with rates in excess of 2 inches per hour.

[4] All Class I and II agricultural soils.

(3) Map 3 shall include the following:

(a) Topography as provided with Map 2.



(b) Calculations of area and delineation of all features subject to reduction of Net Tract Area as defined in § 250-16 of Chapter 250, Zoning.

(c) The location and dimensions of all existing streets, roads, buildings, stormwater management facilities, utilities and other man-made improvements on the subject property or within 500 feet of the property boundaries, and sewage systems, wells, and spring houses providing drinking water on the property or within 150 feet of the property.

(d) The locations and extent of any wetland mitigation facilities, created wetlands including source of hydrology, and tilefields or other facilities used to drain former wetlands.

(e) The locations of trails and bikeways on the property and on abutting properties that have been in public use (pedestrian, equestrian, bicycle, etc.) or have been approved or dedicated and those proposed trails and bikeways shown on the Pocopson Township Trail and Bikeway System map, including those corridors within which the exact location of the trail or bikeway has not yet been determined.

(f) All easements and other encumbrances of property which are or have been filed of record with the Recorder of Deeds of Chester County shall be shown on the plan.

§ 190-24. Conservation Plan.

A. A Conservation Plan is required to accompany the preliminary and final subdivision or development plans and shall be clearly and legibly drawn to the same scale as that of the preliminary and final plans.

B. The Conservation Plan shall show, within the total tract boundaries of the property being subdivided or developed, the information required below:

(1) Contour lines at vertical intervals of not more than two feet.

(2) Location and elevation to which contour elevations refer; where reasonably practicable, datum used shall be a known, established bench mark.

(3) All existing watercourses, flood hazard areas as identified by alluvial soils and the Federal Flood Insurance Map.

(4) Locations of all soil classifications.

(5) Location and results of soil percolation tests for all areas to be used for on-site percolation of sewage (e.g. septic drain fields or spray irrigation areas) or recharge facilities and detention basins.

(6) Location and type of all temporary and permanent storm water runoff and erosion and sedimentation control measures, including all stormwater storage and reuse and recharge facilities, temporary and, when necessary, permanent detention and

retention facilities, grassed drainage swales, diversion terraces, check dams or other velocity controls, and storm drains and inlets. Proposed timing for construction of these facilities and making them operational (recharge and storage and reuse facilities should generally not be used until soil is fully stabilized), details of all facilities, together with summaries of their temporary and permanent capacities and calculations of volumes and flows and other information to support the adequacy of the facilities and such other information as may be required by the Stormwater Management Ordinance and this Chapter.

(7) Notations indicating all trees or portions of tree masses proposed to be cleared as part of the proposed subdivision or development plan, together with reasons for such clearing; all proposed alterations of the natural grade, whether by cut or by fill, exceeding two feet, together with reasons for such alteration; compliance with all applicable erosion and sedimentation control and stormwater management standards.

(8) Locations of all areas exceeding 20% slope, based on the contour plans prepared pursuant to § 190-23.E(1), above, with information sufficient to establish that the plan complies with §§ 250-86 and 250-87 of Chapter 250, Zoning.

(9) Location of all existing trails on the property especially those linking to trails on neighboring properties or to the Township's Trail and Bikeway System and trails and bikeways shown on the Township's Trail and Bikeway System Map that exist or are proposed in the area of the property.

(10) Written instructions to all contractors and diagrams indicating how existing trees will be protected during the period of construction of roads or houses, along with a notation that damage, destruction, or felling of a tree slated for protection shall require replacement with a tree of similar size or such number of trees as are required to equal the circumference of the affected tree.

(11) In the case of a major subdivision or a land development of two acres or more or where the Township Engineer determines that the potential for wastewater, wells, and stormwater conflicts is great, the results of a fracture trace analysis of the subject property and adjoining properties within 100 feet of the property prepared by a registered geohydrologist or comparable expert in surface-groundwater interactions shall be presented and related to the location of

stormwater management facilities and drainageways, wetlands and percolation test pits. Fracture trace analysis shall be used in the design of stormwater management facilities in order to prevent the pollution of groundwater and to facilitate the recharge of clean stormwater to the groundwater, and to indicate that sufficient groundwater will be available to supply the development. The applicant's methodology of analysis, and the findings, shall be subject to the review and approval of the Township Engineer.

(12) Historic buildings or sites, natural areas, woodlands, or features of importance identified in the Pocopson Township Open Space, Recreation and Environmental Resources Plan, the Chester County Historic Sites Survey, the National Register



of Historic Places, or such plans as the Township may adopt to identify and prioritize such resources and areas.

(13) A sequence of construction shall be provided on all plans that describes the timing and relationship between the implementation and maintenance of sediment controls, including permanent and temporary stabilization measures and the various stages or phases of earth disturbance and construction. The sequence of construction shall, at a minimum, include the following activities:

(a) Clearing and grubbing of all those areas where erosion and sedimentation controls are to be installed;

(b) Construction of erosion and sedimentation controls, including diversion terraces, check dams, stormwater management basin(s);

(c) Remaining clearing and grubbing for streets and other improvements;

(d) Construction of trails;

(e) Rough and fine grading for the road(s) and commercial driveway(s);

(f) Construction of dwellings and other buildings;

(g) Installation of stormwater storage and reuse facilities, recharge tanks and recharge beds and reuse and recharge distribution systems;

(h) Rough and fine grading for the remainder of the site;

(i) Utility installation and whether storm drains will be used or blocked until after completion of construction and methods to prevent discharges to recharge facilities or any sediment contamination of recharge facilities until the site is stabilized;

(j) Construction of road and commercial driveway base and wearing courses;

(k) Final grading or stabilization;

(l) Removal of any temporary detention facilities and removal of sediment from all permanent stormwater management facilities; and

(m) Street tree planting.

(n) Replacement tree and shrub planting as required pursuant to § 250-87 of Chapter 250, Zoning.

(o) Any required wetland mitigation.

APPENDIX E

SAMPLE STEEP SLOPE ORDINANCE

**Upper Salford Township, Montgomery County**
**ARTICLE XVII SS STEEP SLOPE CONSERVATION OVERLAY DISTRICT**
**SECTION 1700.PURPOSES**

In expansion of the Declaration of Legislative Intent found in Article 1, Section 101 of this
Ordinance, and the Statement of Community Development Objectives found in Article I, Section
102 of this Ordinance, the purpose of this Article, among others, is as follows:

A. Preserve the natural character and aesthetic value of mountains and hillsides.
B. Guard against property damage and personal injury, and minimize the potential for erosion,
soil failure, stream siltation, and contamination of surface waters caused by the misuse of
steep slope areas.
C. Encourage innovative residential development by allowing the flexibility necessary to
maximize conservation of steep slopes and produce unique, environmentally sensitive
projects.
D. Conserve existing woodlands for air and water quality benefits, to provide habitat for
wildlife, and to maintain the ecological balance among the natural systems on steep slope
areas.

**SECTION 1701.DEFINITION AND ESTABLISHMENT OF STEEP SLOPE CONSERVATION OVERLAY DISTRICT**

The Steep Slope Conservation Overlay District is established as all those areas of the township
with a slope of 15 percent or more, referred to as "steep slopes" or "steep slope areas." This
district may be referred to as the "Steep Slope District."

A. Applicants shall show the boundaries of Steep Slope Areas on all subdivision and land
development plans, based on an on-site survey prepared by a Registered Professional
Engineer or Surveyor.
B. The Steep Slope Areas to be shown on all subdivision and land development plans shall be
further divided into the following 4 categories when measured over 3 or more contour lines
at 2 foot intervals:
1. Slopes of at least 15 percent but less than 20 percent.

2. Slopes of at least 20 percent but less than 25 percent.
3. Slopes of at least 25 percent but less than 30 percent.
4. Slopes of 30 percent or more.
C. The Township shall exempt manmade slopes from the provisions of this Article if it is
determined that alteration, regrading, clearing, or construction upon such slopes will not be
injurious to the health, safety, and welfare of township residents. It shall be the burden of the
applicant to demonstrate that the slopes were manmade.

**SECTION 1702.OVERLAY CONCEPT**

The Steep Slope Conservation District shall be an overlay on all zoning districts and shall
function in accordance with the following:
A. For any lot or portion thereof lying within the Steep Slope Conservation District, the
regulations of the overlay district shall take precedence over the regulations of the underlying district.
B. Should the underlying zoning of any lot or any part thereof which is located in the Steep
Slope Conservation District be changed through any legislative or judicial action, such
change shall have no effect on the overlying Steep Slope Conservation District unless such
change was included as part of the original application.
C. All uses, activities and development occurring within the Steep Slope Conservation District
shall be undertaken only in strict compliance with the provisions of this Article, with all
federal and state laws, and with all other applicable Township codes and ordinances.

**SECTION 1703.GENERAL REGULATIONS**

In all zoning districts, for those portions of a lot having steep slope areas, as defined in Section
1701, herein, the following standards shall apply for all proposed uses:
A. Disturbance Limits. Based upon steep slope category, the following disturbance limits shall
be the maximum area of such slopes that may be regraded and/or stripped of vegetation:

**Steep Slope Category Disturbance Limit**

Slopes at least 15% but less than 20% 30%
Slopes at least 20% but less than 25% 20%
Slopes at least 25% but less than 30% 10%
Slopes 30% or greater 5%

1. Non-residential lots within the REC Recreational District shall be permitted to disturb a

maximum of 30 percent of steep slope areas within each steep slope category, provided
it is the minimum disturbance necessary to allow a permitted use.
B. Grading or earthmoving on all steep slope areas shall not result in earth cuts or fills whose
highest vertical dimensions exceed 10 feet, except where no reasonable alternatives exist for
construction of public roads, drainage structures, and other public improvements, in which
case such vertical dimensions shall not exceed 20 feet. Finished slopes of all cuts and fills
shall not exceed three to one (3: 1), unless the applicant can demonstrate that steeper slopes
can be stabilized and maintained adequately. The landscape shall be preserved in its natural
state insofar as practicable.

**SECTION 1704.DEVELOPMENT REGULATIONS**

The requirements of the following zoning districts shall be modified on all land containing steep
slopes, as defined in Section 1701, herein, as designated below:
A. Each parcel of land located in the R-2, R-1.5, R-1, R-30, IN, REC, or CB zoning district,
having a steep slope ratio of 15 percent or more and proposed for residential use shall be
subdivided consistent with one of the following requirements (Option 1, Option 2, or Option
3):
1. Option 1 - Conservation Subdivision. In order to encourage preservation of the steep
slopes, and other significant natural features, the applicant's proposed design shall be
consistent with the standards for conservation subdivision within the underlying zoning
district and shall locate the steep slopes within the required greenway land, considering
the greenway delineation standards within the Upper Salford Township Subdivision and
Land Development Ordinance.
2. Option 2 - Density Transfer for Creation of Conservation Area (CA). A density credit
may be provided for all steep slopes areas, as defined in Section 1 70 1, designated as
permanently protected conservation areas. The density credit may be transferred only to
the remaining tract area by providing a reduction in the required minimum lot size of the

underlying district, consistent with the following requirements:
a. Establishment of Conservation Area. Land designated for a conservation area shall be deed restricted from development and the removal of vegetation and preserved via an ownership option listed in Section 2208 or located on individual lots provided the conservation area does not count toward meeting the minimum lot size
requirement and an easement is dedicated to the township, subject to the approval of the Township Solicitor.
b. Minimum Conservation Area. Designated conservation area land shall preserve steep slopes, based upon steep slope category, consistent with the following standards:

| Steep Slope Category | Minimum Area Preserved within Designated Conservation Area |
|---|---|
| Slopes at least 15% but less than 20% | 50% |
| Slopes at least 20% but less than 25% | 75% |
| Slopes at least 25% but less than 30% | 100% |
| Slopes 30% or greater | 100% |

c. Additional Conservation Area Lands. Additional portions of the site may be included within the designated conservation area, including but not limited to wetlands, floodplains, alluvial soils, woodlands or portions of the parcel made inaccessible due to the creation of a conservation area. All additional lands designated as part of the conservation area shall be made contiguous to a steep slope area.
d. Conservation Area Acreage. When the total acreage of conservation area exceeds 50 percent of the gross tract acreage, the underlying district's dimensional standards
for conservation subdivision shall be utilized. In addition, the development shall meet the conservation subdivision design standards of Section 2207.
e. Reduction of Minimum Lot Area. The creation of conservation area permits a reduction in the minimum lot area, allowing the tract's base density to be achieved. The maximum number of permitted dwelling units on the tract, designation of eligible receiving areas, and the new dimensional requirements shall be determined in accordance with the following:
i. Yield Plan. The maximum number of dwelling units to be permitted on the tract shall be based upon the standards for rural subdivision within the underlying zoning district, as demonstrated by an actual yield plan. The yield plan must be prepared as a layout plan in accordance with the standards of the township's subdivision and land development ordinance, containing proposed lots, streets, rights-of-way, and other pertinent features. The yield plan must identify the site's primary and secondary resources, as identified as part of the natural features plan, and demonstrate that the primary resources could be successfully absorbed in the development without disturbance, by allocating this area to proposed single-family dwelling lots which conform to the standards for rural subdivisions. The number of units shown on the yield plan will be the maximum number of units that may be permitted in the eligible

receiving areas.

ii. Eligible Receiving Areas. Eligible receiving areas shall not include those portions of the tract within the ultimate right-of- way, or are limited from development by some other provision of this Ordinance.

iii. The minimum lot size, dimensional and impervious standards for the eligible receiving area shall be consistent with the following standards based on the underlying zoning district, except as permitted by Section 1704.A.2.d:

Dimensional and Impervious Standards

| **Zoning District** | **R-2 and REC** | **R-1.5** | **R-1** | **R-30** |
|---|---|---|---|---|
| **Minimum Lot Size** | 40,000 square feet | 30,000 square feet | 20,000 square feet | 15,000 square feet |
| **Minimum Lot Width** | 175 feet | 135 feet | 135 feet | 100 feet |
| **Front Yard Setback** | 60 feet | 50 feet | 50 feet | 50 feet |
| **Rear Yard Setback** | 60 feet | 50 feet | 50 feet | 50 feet |
| **Side Yard Setback** | 30 feet (75 foot aggregate) | 25 feet (60 foot aggregate) | 25 feet (60 foot aggregate) | 15 feet (50 foot aggregate) |
| **Maximum Impervious** | 15 percent | 25 percent | 25 percent | 25 percent |

3. Option 3 - As a conditional use, each lot hereinafter created by subdivision having a steep slope ratio of 15 percent or greater shall increase the required minimum lot size and adjust the maximum impervious surface limit consistent with the following requirements:

Minimum Lot Size (square feet)

| | **Steep Slope Ratio** | |
|---|---|---|
| **District** | **15% to 50%** | **51% or more** |

**R-2 and REC** 120,000 160,000
**R-1.5** 90,000 120,000
**R-1** 60,000 80,000
**R-30** 45,000 60,000
Maximum Impervious Ground Cover (per lot)
**Steep Slope Ratio**
**District 15% to 50% 51% or more**
**R-2, R-1.5, R-1, and**
**REC**
10% 8%
**R-30** 15% 12%

B. Tracts hereinafter subdivided for residential use in the NMR zoning district or nonresidential
use in the R-30, IN, REC, CB, LLI, or LI zoning district, having a steep slope
ratio of 15 percent or more shall locate the steep slopes within the required greenway land or
green area for the underlying district, considering, where applicable, the greenway
delineation standards within the Upper Salford Township Subdivision and Land
Development Ordinance.

**SECTION 1705.CONDITIONAL USE APPLICATION**

Applications for conditional uses shall comply with the procedures in Article XXII of this
ordinance and provide the following information and documentation.

A. A plan by a Registered Professional Engineer or Surveyor which accurately locates the
proposed use with respect to the Steep Slope District boundaries and existing development
within 200 feet of the proposed use, together with all pertinent information describing the
parcel, and a topographical survey with contour elevations at no greater than 5-foot intervals.

B. A plan of proposed development or use of the site, conforming to the preliminary plan
requirements of the subdivision and land development ordinance, with contours shown at 2-
foot intervals, where feasible, throughout the steep slope areas proposed for development or
use. Contours shall be accurately drawn from on-site survey or aerial photographic sources.

C. Proposed modifications to the existing topography and vegetative cover, as well as the
means of accommodating stormwater runoff.

D. Documentation of any additional engineering and/or conservation techniques designed to
alleviate environmental problems created by the proposed activities.

E. Specifications of building materials and construction including filling, grading, materials
storage, water supply, and sewage disposal facilities.
F. An erosion and sediment control plan in compliance with the erosion and sediment control
practices set forth in the Erosion and Sediment Pollution Control Program Manual of the
Department of Environmental Protection, 1990, and any subsequent amendments thereto.
G. The location of all trees having a diameter of 8 inches or more dbh.

**SECTION 1706.CONDITIONAL USE STANDARDS AND CRITERIA**

In considering a conditional use application, the Board of Supervisors shall consider the
following:
A. Relationship of the proposed use to the objectives set forth in Section 1700.
B. Adverse effects on abutting properties.
C. The need for a woodland management plan on wooded steep slope areas.
D. Evidence that:
1. Alternative placements on non-steep slope areas were carefully evaluated for structures,
including buildings, retaining walls, swimming pools, roads, access driveways, parking
facilities and other development, and can be shown to be inappropriate or infeasible to
the satisfaction of the Board of Supervisors.
2. Proposed buildings and structures are of sound engineering design and that footings are
designed to extend to stable soil and/or rock.
3. Proposed roads, drives and parking areas are designed so that land clearing and/or
grading will not cause accelerated erosion. Both vertical and horizontal alignment of
such facilities shall be so designed that hazardous conditions are not created.
4. Surface run-off of water will not create unstable conditions, including erosion, and that
appropriate stormwater management facilities will be constructed as necessary.
5. Proposed non-agricultural displacement of soil shall be for cause consistent with the
intent of this ordinance and shall be executed in the manner that will not cause erosion
or other unstable conditions. The applicant shall provide an erosion and sediment
control plan and supporting evidence.
6. Proposed on-lot sewage disposal facilities shall be properly designed and constructed in
conformity with applicable regulations.

**SECTION 1707.LIMIT OF MUNICIPAL LIABILITY**

The granting of a use and occupancy permit or the approval of a subdivision or land development
plan on or near the Steep Slope Conservation District shall not constitute a representation,
guarantee or warranty of any kind by the township or any official or employee thereof regarding
the practicability or safety of the proposed use and shall create no liability upon the Township, its
officials, or its employees.
Protections provided by this ordinance are for regulatory purposes and based on minimum
engineering studies. The ordinance does not imply that areas outside the District are free from
adverse effects of erosion and sedimentation.

APPENDIX F

SAMPLE RIPARIAN BUFFER PROTECTION

Revised through: 4/25/06 2:07 PM Last printed: 4/25/06 2:08 PM
- 1 -

**RIPARIAN FOREST BUFFER PROTECTION AGREEMENT**

THIS RIPARIAN FOREST BUFFER PROTECTION AGREEMENT (this “Protection Agreement”) dated
as of ____________ (the “Agreement Date”) is by and between ________________ (the “undersigned Owner
or Owners”) and ________________ (the “Holder”).

**Article I. Background**

**1.01 Property**

The undersigned Owner or Owners are the sole owners in fee simple of the Property described in Exhibit “A”
(the “Property”). The Property is also described as:
Street Address:
Municipality:
County:
Parcel Identifier:

**1.02 Purpose**

**(a) Conservation Objectives**

The undersigned Owner or Owners and Holder are entering into this Protection Agreement to establish a
riparian forest buffer (the “Riparian Buffer”) along ___________ Creek (the “Creek”) for the following
purposes (collectively, the “Conservation Objectives”): to maintain and improve the quality of water
resources associated with the Creek; to perpetuate and foster the growth of healthy forest; to preserve
habitat for Native Species dependent on water resources or forest; and to ensure that activities and uses in
the Riparian Buffer are sustainable, i.e., they neither diminish the biological integrity of the Riparian
Buffer nor deplete the soil, forest and other natural resources within the Riparian Buffer over time.

**(b) Riparian Buffer Area**

The Riparian Buffer consists of the strips of land stretching _______ (__) feet landward from the Top of
the Banks of the Creek, together with the banks and bed of the Creek, to the extent that the strips, banks
and bed are contained within the Property.

**(c) Baseline Documentation**

The report (the “Baseline Documentation”), to be kept on file at the principal office of Holder, describes

the conservation values of the Riparian Buffer identified in the Conservation Objectives, describes
existing conditions of the Riparian Buffer including Existing Improvements as of the Agreement Date,
and includes, among other information, photographs depicting the Riparian Buffer.

**1.03 Owners' Control**

Owners reserve all rights and responsibilities pertaining to their ownership of the Property but for the rights
*specifically* granted to Holder in this Protection Agreement. No public access is granted by virtue of this
Protection Agreement.

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**1.04 Defined Terms**

Initially capitalized terms used and not otherwise defined in this Article I are defined in the last Article of this
Protection Agreement (the "Glossary").

**Article II. Restrictive Covenants: Improvements**

No Improvements are permitted within the Riparian Buffer except as set forth in this Article II.

**2.01 Existing Improvements**

Any Existing Improvement may be maintained, repaired and replaced in its existing location. An Existing
Improvement may be expanded or relocated if the expanded or relocated Improvement complies with
requirements applicable to an Additional Improvement of the same type set forth in this Article.

**2.02 Additional Improvements**

Only the following Additional Improvements are permitted within the Riparian Buffer:

**(a) Existing Agreements**

Improvements that Owners are required to allow under Existing Agreements.

**(b) Other Additional Improvements**

(i) Fences, walls and gates along the perimeter of the Riparian Buffer; signs not exceeding one square
foot each; and habitat improvement devices such as birdhouses and bat houses.
(ii) Trails of highly porous surface and footbridges for non-motorized use.
(iii) Subject to Review, fish passage, fish habitat improvement and stream bank stabilization structures.
(iv) Subject to Review, irrigation facilities accessory to agricultural use of the Property.
(v) Subject to Review, stream crossing and access structures and associated access corridor for the
purpose of allowing passage across the Riparian Buffer by livestock, horses and agricultural

equipment to cross the Creek or access water in the Creek in a specified location. It is Owners'
responsibility to install fencing whenever necessary to prevent grazing within or other unrestricted
access to the Riparian Buffer by horses or livestock.
(vi) Subject to Review, access drives and utility lines but only if there is no other reasonably feasible
means to provide access and utility services to the Property except via the Riparian Buffer.

**Article III. Restrictive Covenants: Activities; Uses; Disturbance of Resources**

No activities, uses or disturbances of resources are permitted within the Riparian Buffer except as set forth in this
Article III.

**3.01 Existing Agreements**

Activities, uses and Construction that Owners are required to allow under Existing Agreements are permitted.

**3.02 Other Activities and Uses**

Except as provided in the preceding section, activities and uses within the Riparian Buffer are limited to those
permitted below and provided in any case that the intensity or frequency of the activity or use does not have
the potential to materially and adversely impair maintenance or attainment of Conservation Objectives.

**(a) Disturbance of Resources**

(i) Cutting trees, Construction or other disturbance of resources, including removal of Invasive Species,
to the extent reasonably prudent to remove, mitigate or warn against an unreasonable risk of harm to
Persons, property or health of Native Species on or about the Riparian Buffer. Owners must take
such steps as are reasonable under the circumstances to consult with Holder prior to taking actions
that, but for this provision, would not be permitted or would be permitted only after Review.
(ii) Planting Native Species but no monoculture.
(iii) Removal of Invasive Species to accommodate replanting with Native Species.
(iv) Sustainable forestry in accordance with a Resource Management Plan approved for that activity after
Review but not within fifty (50) feet of the top of the bank of the Creek.
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(v) Agricultural use is limited to passage of horses, livestock and equipment via a corridor (if any)
permitted under Article II to access water at a specified location or stream crossing structures (if
any) permitted under Article II.

(vi) Subject to Review, stream bank stabilization, dam removal and other habitat improvement activities.
(vii) Other resource management activities consistent with Conservation Objectives and conducted in
accordance with the Resource Management Plan approved for that activity after Review.
(viii) Subject to Review, removal and disturbance of soil, rock and vegetative resources to the extent
reasonably necessary to accommodate Construction of and maintain access to Improvements within
the Riparian Buffer with restoration as soon as reasonably feasible by replanting with Native
Species.
(ix) Vehicular use (including motorized vehicular use) in connection with an activity permitted within
the Riparian Buffer or otherwise in the case of emergency.

**(b) Recreational and Educational Uses**

Activities that do not require Improvements other than those permitted within the Riparian Buffer and do
not have the potential to materially and adversely affect Conservation Objectives such as (i) walking,
nature study, bird watching, fishing and hunting; and (ii) other educational or scientific activities
consistent with maintenance or attainment of the Conservation Objectives.

**Article IV. Rights and Duties of Holder and Beneficiaries**

**4.01 Grant to Holder**

By signing this Protection Agreement and unconditionally delivering it to Holder, the undersigned Owner or
Owners, intending to be legally bound, grant and convey to Holder a conservation servitude over the Riparian
Buffer in perpetuity for the purpose of administering and enforcing the restrictions and limitations set forth in
this Protection Agreement. The undersigned Owner or Owners warrant to Holder that the Riparian Buffer is,
as of the Agreement Date, free and clear of all Liens or, if it is not, that Owners have obtained and attached to
this Protection Agreement as an exhibit the legally binding subordination of any Liens affecting the Riparian
Buffer as of the Agreement Date.

**4.02 Rights and Duties of Holder**

The grant to Holder under the preceding section gives Holder the right and duty to perform the following
tasks:

**(a) Enforcement**

To enforce the terms of this Protection Agreement in accordance with applicable provisions of this

Protection Agreement including, in addition to other remedies, the right to enter the Property to
investigate a suspected, alleged or threatened violation.

**(b) Inspection**

To enter the Property and inspect the Riparian Buffer for compliance with the requirements of this
Protection Agreement upon reasonable notice, in a reasonable manner and at reasonable times.

**(c) Review**

To exercise rights of Review in accordance with the requirements of this Article as and when required
under applicable provisions of this Protection Agreement.

**(d) Interpretation**

To interpret the terms of this Protection Agreement, apply the terms of this Protection Agreement to
factual conditions on or about the Riparian Buffer, respond to requests for information from Persons
having an interest in this Protection Agreement or the Riparian Buffer (such as requests for a certification
of compliance), and apply the terms of this Protection Agreement to changes occurring or proposed
within the Riparian Buffer.

**4.03 Other Rights of Holder**

The grant to Holder under this Article also permits Holder, without any obligation to do so, to exercise the
following rights:

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**(a) Amendment**

To enter into an amendment of this Protection Agreement with Owners if Holder determines that the
amendment is consistent with and in furtherance of the Conservation Objectives; will not result in any
private benefit prohibited under the Internal Revenue Code; and otherwise conforms to Holder's policy
with respect to amendments of conservation servitudes.

**(b) Signs**

To install one or more signs identifying the protected status of the Riparian Buffer which may be located
(i) within the Riparian Buffer or (ii) in another location within the Property readable from the public right
of way and otherwise reasonably acceptable to Owners.

**4.04 Review**

The following provisions are incorporated into any provision of this Protection Agreement that is subject to
Review:

**(a) Notice to Holder**
At least thirty (30) days before Owners begin or allow any Construction, activity or use that is subject to
Review, Owners must notify Holder of the change including with the notice such information as is
reasonably sufficient to comply with Review Requirements and otherwise describe the change and its
potential impact on natural resources within the Riparian Buffer.
**(b) Notice to Owners**
Within thirty (30) days after receipt of Owners' notice, Holder must notify Owners of Holder's
determination to (i) accept Owners' proposal in whole or in part; (ii) reject Owners' proposal in whole or
in part; (iii) accept Owners' proposal conditioned upon compliance with conditions imposed by Holder;
or (iv) reject Owners' notice for insufficiency of information on which to base a determination. If Holder
gives conditional acceptance under clause (iii), commencement of the proposed Improvement, activity,
use or Construction constitutes acceptance by Owners of all conditions set forth in Holder's notice.
**(c) Failure to Notify**
If Holder fails to notify Owners as required in the preceding subsection, the proposal set forth in Owners'
notice is deemed approved.
**(d) Standard of Reasonableness**
Holder's approval will not be unreasonably withheld; however, it is not unreasonable for Holder to
disapprove a proposal that may adversely affect Conservation Objectives.
**4.05 Beneficiaries**
Owners and Holder grant and convey to any of the Persons identified below (collectively, the "Beneficiaries")
the right to exercise Holder's rights and duties under this Protection Agreement should Holder fail to uphold
and enforce in perpetuity the restrictions under this Protection Agreement.
• The conservation district of the county in which the Property is located.
• The Commonwealth of Pennsylvania acting through the Department of Environmental Protection.
**Article V. Violation; Remedies**
**5.01 Breach of Duty**
If Holder fails to enforce this Protection Agreement, or ceases to qualify as a Qualified Organization, then the
rights and duties of Holder under this Protection Agreement may be (i) exercised by a Beneficiary or a
Qualified Organization designated by a Beneficiary; and/or (ii) transferred to another Qualified Organization

by a court of competent jurisdiction.

**5.02 Violation of Protection Agreement**

If Holder determines that this Protection Agreement is being or has been violated or that a violation is
threatened or imminent then the provisions of this Section will apply:

**(a) Notice**

Holder must notify Owners of the violation. Holder's notice may include its recommendations of
measures to be taken by Owners to cure the violation and restore features of the Riparian Buffer damaged
or altered as a result of the violation.

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**(b) Opportunity to Cure**

Owners' cure period expires thirty (30) days after the date of Holder's notice to Owners subject to
extension for the time reasonably necessary to cure but only if all of the following conditions are
satisfied: (i) Owners cease the activity constituting the violation promptly upon receipt of Holder's
notice; (ii) Owners and Holder agree, within the initial thirty (30) day period, upon the measures Owners
will take to cure the violation; (iii) Owners commence to cure within the initial thirty (30) day period;
and (iv) Owners continue thereafter to use best efforts and due diligence to complete the agreed upon
cure.

**(c) Imminent Harm**

No notice or cure period is required if circumstances require prompt action to prevent or mitigate
irreparable harm to natural resource within the Riparian Buffer described in the Conservation Objectives
in clear violation of the terms of this Protection Agreement.

**5.03 Remedies**

Upon expiration of the cure period (if any) described in the preceding Section, Holder may do any one or
more of the following:

**(a) Coercive Relief**

Seek coercive relief to specifically enforce the terms of this Protection Agreement; to restrain present or
future violations of this Protection Agreement; and/or to compel restoration of natural resources
destroyed or altered as a result of the violation.

**(b) Civil Action**

Recover from Owners or other Persons responsible for the violation all sums owing to Holder under

applicable provisions of this Protection Agreement together with interest thereon from the date due at an
annual rate of interest equal at all times to two percent above the "prime rate" announced from time to
time in *The Wall Street Journal.* These monetary obligations include, among others, Losses and
Litigation Expenses.

**(c) Self-Help**

Enter the Property to prevent or mitigate irreparable harm to natural resources within the Riparian Buffer
identified in the Conservation Objectives in clear violation of the terms of this Protection Agreement.

**(d) Restitution**

Seek restitution of any amounts paid for this Protection Agreement if the Riparian Buffer is the subject of
a taking in eminent domain or other civil action seeking modification or termination of this Protection
Agreement or release of the Riparian Buffer from this Protection Agreement.

**5.04 Remedies Cumulative**

The description of Holder's remedies in this Article does not preclude Holder from exercising any other right
or remedy that may at any time be available to Holder under this Article or otherwise under Applicable Law.
If Holder chooses to exercise one remedy, Holder may nevertheless choose to exercise any one or more of the
other remedies available to Holder at the same time or at any other time.

**5.05 No Waiver**

If Holder does not exercise any right or remedy when it is available to Holder, that is not to be interpreted as a
waiver of any non-compliance with this Protection Agreement or a waiver of Holder's rights to exercise its
rights or remedies at another time.

**5.06 No Fault of Owners**

Holder will waive its right to reimbursement under this Article as to Owners (but not other Persons who may
be responsible for the violation) if Holder is reasonably satisfied that the violation was not the fault of
Owners and could not have been anticipated or prevented by Owners by reasonable means.

**5.07 Continuing Liability**

If the Riparian Buffer is transferred while a violation remains uncured, the transferor Owners remain liable
for the violation jointly and severally with the transferee Owners. This provision does not apply if Owners
(a) notify Holder of the names and address for notices of the transferees and, if less than the entirety of the

Property is transferred, furnish Holder with a survey and legal description of the portion of the Property
transferred; and (b) Holder has issued a certificate of compliance evidencing no violations within thirty (30)
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days prior to the transfer. It is the responsibility of the Owners to notify Holder of the transfer and request a
certificate of compliance to verify whether violations exist as of the date of transfer.

**Article VI. Miscellaneous**

**6.01 Notices**

**(a) Requirements**

Each Person giving any notice pursuant to this Protection Agreement must give the notice in writing and
must use one of the following methods of delivery: (i) personal delivery; (ii) certified mail, return receipt
requested and postage prepaid; or (iii) nationally recognized overnight courier, with all fees prepaid.

**(b) Address for Notices**

Each Person giving a notice must address the notice to the appropriate Person at the receiving party at the
address listed below or to another address designated by that Person by notice to the other Person:

If to Owners:

If to Holder:

**6.02 Governing Law**

The internal laws of the Commonwealth of Pennsylvania govern this Protection Agreement.

**6.03 Binding Agreement**

This Protection Agreement binds and benefits Owners and Holder and their respective personal
representatives, successors and assigns.

**6.04 Amendments, Waivers**

No amendment or waiver of any provision of this Protection Agreement or consent to any departure by
Owners from the terms of this Protection Agreement is effective unless the amendment, waiver or consent is
in writing and signed by an authorized signatory for Holder. A waiver or consent is effective only in the
specific instance and for the specific purpose given.

**6.05 Severability**

If any provision of this Protection Agreement is determined to be invalid, illegal or unenforceable, the
remaining provisions of this Protection Agreement remain valid, binding and enforceable. To the extent

permitted by Applicable Law, the parties waive any provision of Applicable Law that renders any provision
of this Protection Agreement invalid, illegal or unenforceable in any respect.

**6.06 Counterparts**

This Protection Agreement may be signed in multiple counterparts, each of which constitutes an original, and
all of which, collectively, constitute only one agreement.

**6.07 Indemnity**

Owners must indemnify and defend the Indemnified Parties against all Losses and Litigation Expenses
arising out of or relating to: (a) any breach or violation of this Protection Agreement or Applicable Law; (b)
damage to property or personal injury (including death) occurring on or about the Riparian Buffer if and to
the extent not caused by the negligent or wrongful acts or omissions of an Indemnified Party.

**6.08 Guides to Interpretation**

**(a) Captions**

Except for the identification of defined terms in the Glossary, the descriptive headings of the articles,
sections and subsections of this Protection Agreement are for convenience only and do not constitute a
part of this Protection Agreement.

**(b) Terms**

The word “including” means “including but not limited to”. The word “must” is obligatory; the word
“may” is permissive and does not imply any obligation.

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**(c) Conservation and Preservation Easements Act**

This Protection Agreement is intended to be interpreted so as to convey to Holder all of the rights and
privileges of a holder of a conservation easement under the Pennsylvania Conservation and Preservation
Easements Act, Act 29 of 2001, Pub. L. 390.

**(d) Restatement of Servitudes**

This Protection Agreement is intended to be interpreted so as to convey to Holder all of the rights and
privileges of a holder of a conservation servitude under the Restatement (Third) of Servitudes.

**6.09 Entire Agreement**

This is the entire agreement of Owners, Holder and Beneficiaries (if any) pertaining to the subject matter of
this Protection Agreement. The terms of this Protection Agreement supersede in full all statements and

writings between Owners, Holder and others pertaining to the transaction set forth in this Protection
Agreement.

**6.10 Incorporation by Reference**

The following items are incorporated into this Protection Agreement by means of this reference:

- The Baseline Documentation
- The legal description of the Property attached as Exhibit "A"

**6.11 Coal Rights Notice**

The following notice is given to Owners solely for the purpose of compliance with the requirements of the
Pennsylvania Conservation and Preservation Easements Act, Act 29 of 2001, Pub. L. 390:

NOTICE: This Protection Agreement may impair the development of coal interests including workable coal seams or coal interests which have been severed from the Riparian Buffer.

**Article VII. Glossary**

**7.01 Additional Improvements**

All buildings, structures, facilities and other improvements within the Riparian Buffer other than Existing
Improvements.

**7.02 Applicable Law**

Any federal, state or local laws, statutes, codes, ordinances, standards and regulations applicable to the
Riparian Buffer or this Protection Agreement as amended through the applicable date of reference.

**7.03 Beneficiary or Beneficiaries**

The Persons (if any) designated as a Beneficiary under Article IV.

**7.04 Construction**

Any demolition, construction, reconstruction, expansion, exterior alteration, installation or erection of
temporary or permanent Improvements; and, whether or not in connection with any of the foregoing, any
excavation, dredging, mining, filling or removal of gravel, soil, rock, sand, coal, petroleum or other minerals.

**7.05 Existing Agreements**

Easements and other servitudes affecting the Riparian Buffer prior to the Agreement Date and running to the
benefit of utility service providers and other Persons that constitute legally binding servitudes prior in right to
this Protection Agreement.

**7.06 Existing Improvements**

Improvements located on, above or under the Riparian Buffer as of the Agreement Date as identified in the
Baseline Documentation.

**7.07 Improvement**

Any Existing Improvement or Additional Improvement.
**7.08 Indemnified Parties**
Holder, each Beneficiary (if any) and their respective members, directors, officers, employees and agents and
the heirs, personal representatives, successors and assigns of each of them.
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**7.09 Invasive Species**
A plant species that is (a) non-native (or alien) to the ecosystem under consideration; and (b) whose
introduction causes or is likely to cause economic or environmental harm or harm to human health. In cases
of uncertainty, publications such as "Plant Invaders of the Mid-Atlantic Natural Areas", by the National Park
Service National Capital Region, Center for Urban Ecology and the U.S. Fish and Wildlife Service,
Chesapeake Bay Field Office are to be used to identify Invasive Species.
**7.10 Lien**
Any mortgage, lien or other encumbrance securing the payment of money.
**7.11 Litigation Expense**
Any court filing fee, court cost, arbitration fee or cost, witness fee and each other fee and cost of investigating
and defending or asserting any claim of violation or for indemnification under this Protection Agreement
including in each case, attorneys' fees, other professionals' fees and disbursements.
**7.12 Losses**
Any liability, loss, claim, settlement payment, cost and expense, interest, award, judgment, damages
(including punitive damages), diminution in value, fines, fees and penalties or other charge other than a
Litigation Expense.
**7.13 Native Species**
A plant indigenous to the locality under consideration. In cases of uncertainty, published atlases, particularly
*The Vascular Flora of Pennsylvania: Annotated Checklist and Atlas* by Rhoads and Klein and *Atlas of United
States Trees, vols. 1 & 4* by Little are to be used to establish whether or not a species is Native.
**7.14 Owners**
The undersigned Owner or Owners and all Persons after them who hold any interest in all or any part of the
Riparian Buffer.
**7.15 Person**
An individual, organization, trust or other entity.
**7.16 Resource Management Plan**

A record of the decisions and intentions of Owners prepared by a qualified resource management professional
for the purpose of protecting natural resources described in the Conservation Objectives during certain
operations potentially affecting natural resources protected under this Protection Agreement. The Resource
Management Plan includes a resource assessment, identifies appropriate performance standards and projects a
multi-year description of planned activities for identified operations to be conducted in accordance with the
plan.

**7.17 Review**

Review and approval of Holder under the procedure described in Article IV.

**7.18 Review Requirements**

Collectively, any plans, specifications or information required for approval of an activity, use or Construction
under Applicable Law (if any) plus (a) the information required under the Review Requirements incorporated
into this Protection Agreement either as an exhibit or as part of the Baseline Documentation or (b) if the
information described in clause (a) is inapplicable, unavailable or insufficient under the circumstances, the
guidelines for Review of submissions established by Holder as of the applicable date of reference.

**7.19 Top of the Bank**

The elevation at which rising waters begin to inundate the floodplain. In case of ambiguous, indefinite or
nonexistent floodplain or question regarding location, the Top of the Bank shall be the bankfull water
elevation as delineated by a person trained in fluvial geomorphology and utilizing the most recent edition of
*Applied River Morphology* by Dave Rosgen or reference book of greater stature.

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INTENDING TO BE LEGALLY BOUND, the undersigned Owner or Owners and Holder, by their
respective duly authorized representatives, have signed and delivered this Protection Agreement as of the Agreement
Date.

Witness/Attest:

________________________ ___________________________

Name:

________________________ By: _________________________

Name:

Title:

COMMONWEALTH OF PENNSYLVANIA:
COUNTY OF :
ON THIS DAY ____________, before me, the undersigned officer, personally appeared
_________________________, known to me (or satisfactorily proven) to be the person(s)
whose name(s) is/are
subscribed to the within instrument, and acknowledged that he/she/they executed the same for the purposes therein
contained.
IN WITNESS WHEREOF, I hereunto set my hand and official seal.
______________________, Notary Public
Print Name:
COMMONWEALTH OF PENNSYLVANIA :
SS
COUNTY OF :
ON THIS DAY ______________ before me, the undersigned officer, personally appeared
___________________________, who acknowledged him/herself to be the
____________________ of
______________________, a Pennsylvania non-profit corporation, and that he/she as such officer, being
authorized to do so, executed the foregoing instrument for the purposes therein contained by signing the name of the
corporation by her/himself as such officer.
IN WITNESS WHEREOF, I hereunto set my hand and official seal.
______________________, Notary Public
Print Name:

**Riparian Forest Buffer**
**Protection Agreement**
**& Commentary**

a model document and guidance

*Prepared by the*
Pennsylvania Land Trust Association
*with support from the*
William Penn Foundation
*and the*
Pennsylvania Department of Environmental Protection "Growing Greener" Program

*Project Team*
Patricia L. Pregmon, Esq., principal author
Andrew M. Loza, project manager

11/28/2005 edition



**COMMENTARY**
**to the Riparian Forest Buffer Protection Agreement**
**Introduction to the Tool**

The model Riparian Forest Buffer Protection Agreement (the "Protection Agreement") is a tool to help private landowners and conservation organizations work in partnership to establish permanent riparian buffers along Pennsylvania's waterways and lakes. The purpose of establishing these buffers is to:

- maintain and improve the quality of water resources associated with the waterway or lake
- perpetuate and foster the growth of healthy forest (or if natural conditions are not conducive to forest growth, then healthy marsh, shrub land, etc.)
- preserve habitat for native species dependent on water resources or forest; and
- ensure that activities and uses in the riparian buffer are sustainable, neither diminishing the biological integrity nor depleting the soil, forest and other natural resources within the riparian buffer over time.

The Protection Agreement achieves these conservation objectives while keeping the property in the landowner's ownership and control.

The Protection Agreement is an agreement between the landowner (the "Owner") and the conservation organization (the "Holder"). In the Protection Agreement, the Owner places permanent restrictions on activities that would harm the water, forest, or soil, and the Holder commits to watch over the land and enforce the restrictions.

The Holder of the Protection Agreement may be a charitable entity with a conservation purpose holding IRS 501(c)(3) tax status and registered with the Pennsylvania Bureau of Charitable Organizations (such as many "land trusts", "watershed associations" or "conservancies"). Or the Holder may be a governmental body such as a county conservation district.

**The Right Tool?**

The Protection Agreement, also known as a ***conservation easement*** or ***conservation servitude***, can be an appropriate tool to protect natural resources when it is necessary or desirable to keep the land in a private landowner's ownership and control. If a conservation organization wants to manage the land in a significant way or to have substantial access to and use of the property, then acquisition of the land itself should be considered.

**The Right Model?**

The Protection Agreement is tailored specifically for where:

• The goal is to protect a relatively narrow ribbon of land along a waterway or lake for the purposes
stated above; and
• The landowner is donating the conservation servitude, or the conservation organization is paying
no more than a nominal amount for the conservation servitude; and
• The landowner is not seeking a charitable tax deduction on his or her federal income taxes for
donation of the conservation servitude.
*Revised through: 4/25/06 2:07 PM Pennsylvania Land Trust Association*
*Riparian Forest Buffer Protection Agreement* - C3 - *Commentary*
Presumably, the riparian buffers will most often comprise lands of severely limited development potential
due to periodic flooding. The acreages to be restricted will most often be small due to the narrow width of
the buffers. Consequently, the potential tax deduction (which generally equals the value of the development
rights given up) may very well be less than the costs of securing the appraisal and other services needed for
substantiating a federal tax deduction.
If the conservation situation is not as described in the above three points, then users should consider as an
alternative base model the *Pennsylvania Conservation Easement & Commentary* available at
*conserveland.org*.1
**General Instructions**
• Users of the Protection Agreement are encouraged to read through the commentary at least once.
The commentary follows the same Article and Section structure as the easement to make crossreferencing
easy. To address different situations, the commentary often suggests alternative language to that found in the model. The commentary also explains the purposes behind many
provisions.
• The Protection Agreement and this commentary should not be construed or relied upon as legal
advice or legal opinion on any specific facts or circumstances. The Protection Agreement must be
revised to reflect the specific circumstances of the particular conservation project under the
guidance of legal counsel.
• Standard 9. Practice A. of the 2004 edition of *Land Trust Standards & Practices* published by the
Land Trust Alliance (hereafter referred to in this commentary as S&P) requires the land trust to

obtain legal review of every land and easement transaction, appropriate to its complexity, by an attorney experienced in real estate law.

• In the following commentary, titles in bold preceded by numbers refer to sections of the same title in the Protection Agreement. Bullets preceding text indicate a comment. Text without bullets varies with the context, covering alternative text to add to the Protection Agreement and extracts from other documents.

• Check *conserveland.org* periodically for updates to the Protection Agreement and commentary pertaining to the Protection Agreement.

**Preliminary Matters**

**Margins**

• Several counties (Montgomery and Chester, for example) require a minimum 3-inch margin at the top of the first page of any document presented for recording and 1-inch margins on the left, right and bottom margins. (However, page numbers may be less than an inch from page bottom.) Many counties require that documents presented for recording must be printed on 8.5 inch by 11 inch paper. Many counties require type size not less than 10-point. The model has been formatted to conform to these requirements.

1 If users seek to protect land beyond a relatively narrow riparian area or seek to establish multiple protection levels with substantially differing restrictions to address varying conservation objectives within a property, then the Pennsylvania Conservation Easement could be better suited to the task. If the economic value being given up is high, and the landowner wishes to pursue a federal tax deduction, then it is best if users either use the Pennsylvania Conservation Easement, which is specifically designed to meet IRS requirements, or very carefully incorporate the needed provisions into the riparian buffer model. If the conservation organization is paying the landowner a substantial sum for the conservation easement, then users should consider using the Pennsylvania Conservation Easement, which offers the landowner and purchaser more protections than are contained in the Riparian Buffer Conservation Easement.

**Header**

• In the final version of a document prepared using the model Protection Agreement as the base, it is good practice to remove the header “Revised through: [date].” In MS Word, click on *View*, then *Header and Footer*, delete the phrase and close.

**Title of Document**

• The document has been labeled a “Protection Agreement” because we believe that landowners will respond more favorably to it than the traditional alternative. It has been a common but not universal practice to use the term “conservation easement” to refer to the restrictive covenants and right to enforce the restrictive covenants contained in the Protection Agreement. However, there is growing momentum in the land trust community to use a more marketable term, such as Protection Agreement. To quote Public Opinion Strategies and Fairbank, Maslin, Maullin & Associates in a 6/1/04 memo to The Nature Conservancy and the Trust for Public Land:

Our research demonstrates clearly and unequivocally that the language the environmental community has been using on this issue has NOT been helpful in positioning the issue with the public. Instead, we recommend the following: DO NOT say “conservation easement.” DO say “land preservation agreements” or “land protection agreements.” … The focus groups demonstrate that “easements” itself is NOT a positive term. It tends to evoke being forced into doing (or not doing) something with part of your land. In focus groups, the word “easements” made them think of restrictions on their property when they purchased a home or land.

• The term “conservation easement” causes immediate confusion and misconception. People fear that if a conservation easement is granted, the Holder (and perhaps the public) will have a continuing right of way over the property to enter at will and/or actively use the property. Most people, *lawyers and non-lawyers alike*, are unfamiliar with the concept of a “negative” easement – the right to compel an owner *not* to do something on his property. The vast majority of easements

(other than conservation easements) grant affirmative rights of way to travel over or to maintain
improvements on the property of another.
• The Restatement of Servitudes (Third) (a recently published summary of legal principles
recommended by respected authorities) uses the term "conservation servitude" rather than
conservation easement. The term "servitude" is an umbrella term for all types of promises that are
binding on future landowners as well as the landowner making the promises. So both easements
and restrictive covenants are included within a single concept. However, while many legal
professionals may more quickly grasp the workings of the conservation tool if the term
"conservation servitude" is used, the term seems unlikely to resonate with landowners. Hence,
while "conservation servitude" is used in the commentary, it is generally avoided in the Protection
Agreement itself.

**Opening Recital**

• **Purpose.** The purpose of the opening recital is to identify the parties to the document and the
effective date of the document.

**Agreement Date**

• The date can be added in hand writing at the time of signing.
• The date should not be earlier than the date of the earliest acknowledgment (notary signature)
attached to document. In situations in which the document is being signed earlier than the desired
effective date (for example, because it is being delivered into escrow pre-closing), substitute for
"dated as of ___": "signed _______ but delivered _______". The date of delivery is the effective
"Agreement Date".

**Undersigned Owner or Owners**

• Insert names exactly as set forth in the deed by which the Owners acquired the Property. If there
has been a change (for example, by death) in the ownership from the names on the deed into the
Owners, it is good practice to recite the off-record facts to clear up the apparent gap in title. The

customary practice is to recite these facts either in the Background section or at the end of the

legal description attached as Exhibit “A”.
• The relationship of multiple Owners to each other may be added here but is not necessary for
recording or other purposes. Example: X and Y, husband and wife or X and Y, as joint tenants
with rights of survivorship.
• If a Person other than an individual is granting the conservation servitude, a phrase identifying the
type of entity and state in which the Person was created is desirable but not necessary for
recording or other purposes. Example: X, a Pennsylvania limited partnership.
• If a provision is intended to apply only to the Person signing the Protection Agreement, the phrase
“the undersigned Owner or Owners” is used. In all other cases, the term “Owners” (always plural)
is used. This arrangement of setting apart the undersigned Owner or Owners from all Owners
present and future also has the practical advantage of not requiring conversion of plural to singular
or vice versa throughout the document depending upon whether one or more than one persons
signed the document.

**Holder**

• The full legal name of the Holder (including Inc. or Incorporated if part of the legal name) should
be inserted here.
• A phrase identifying the type of entity and state in which the Holder was created is desirable but
not necessary for recording or other purposes. Example: X, a Pennsylvania non-profit
corporation.

**Article I. Background**

• **Purpose**. The purposes of Article I “Background” are to inform the reader of the factual
information necessary to understand the subject matter of the document and the intentions of the
parties in entering into a legally binding relationship. The material in the Background section
should never be used to set forth enforceable restrictions on the Property.
• **Articles and Sections**. The model has been structured in Articles and Sections rather than a list of
paragraphs. There are several practical reasons for this. One reason is to encourage additional
provisions to be clustered with similar provisions instead of adding them to the end where they

may be missed in a quick review. Another reason is to avoid wherever possible cross-references
to specific paragraphs. A common drafting error is to add or delete paragraphs and not check
whether cross-references are still correct. This structure seeks to minimize the opportunities for
that error to occur.

**1.01 Property**

• **Purpose.** The purpose of this Section is to identify the land affected by this Protection
Agreement.

Street Address: Insert a street address if available; otherwise, try to
identify by acreage and frontage along a certain
road or roads. Example: 100 acres more or less
north side of ___Road west of the intersection of
___ Road and __ Road.

Municipality: Insert the city, township or borough in which the
Property is located. This may or may not be the
name of the town used for mailing address
purposes.

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County: Identification of the county is required for
recording purposes. If the Property is located in
more than one county, it is important to have
multiple originals signed so as to permit recording
to occur simultaneously in both counties.

Parcel Identifier: The Tax Parcel Identification number for the
Property is required for recording in most if not all
counties. Some counties also require a Uniform
Parcel Identification number. *See* Uniform Parcel
Identifier Law (21 Pa. Stat. §§331-337). Some
counties charge additional recording fees to note
the tax parcel number and/or uniform parcel
identifier number on the document presented for
recording if not furnished in the document itself or
the legal description attached as Exhibit "A".

**1.02 Purpose**

• **Purpose.** This Section serves a number of important purposes. First and most obvious is that it
sets out the intentions of the parties with respect to the conservation of the Riparian Buffer.
Second it is intended as an educational tool for future Owners. Third, it will serve as a guide for
future amendment: there may be perfectly acceptable alternative means to achieve the same ends.

Fourth, if the Protection Agreement becomes the subject of litigation, it will help inform the court
of the rationale underpinning particular covenants.

**(a) Conservation Objectives**

• Substitute “Stream”, “River” or “Lake” as appropriate for “Creek” by universal change throughout
the document.

• If all or portions of the land to be protected are naturally incapable of supporting forest but can
support ecologically important habitat, then alter the Conservation Objectives as appropriate.
(Also, remove “Forest” from the title of the document if appropriate.) For example:
to maintain and improve the quality of water resources associated with the Creek; to
perpetuate and foster the growth of healthy forest, shrub land or other biological communities
as would be naturally found with the Riparian Buffer; to preserve habitat for Native Species
dependent on water resources, forest or other natural habitat; …

**(b) Riparian Buffer Area**

• The Protection Agreement defines the Riparian Buffer as: (i) the strips of land stretching ___ feet
landward from the Top of Banks of the Creek, (ii) the banks of the Creek, and (iii) the bed of the
Creek. The definition goes on to limit this area to that portion actually contained within the
Property.

• This approach enables users to use the same definition whether the Owner owns one side of the
stream or both sides.

• This description creates a Riparian Buffer that moves with the stream if the stream should
meander. This supports a key purpose of the Protection Agreement – to protect the stream’s water
resources – wherever the stream may be at any particular time.

• The alternative to a moveable Riparian Buffer is to describe the Riparian Buffer as a fixed location
permanently marked on the ground. The fixed location may be less desirable because (i) the water
resources would likely receive less effective protection if the stream meandered; and (ii) the fixed
location would have to be described in accordance with a metes and bounds survey to conform to

the requirements of the Pennsylvania Conservation Easements Act which would result in
additional expense.
• Another alternative is to establish the Riparian Buffer as a uniform width measured from the
centerline of the stream. This has the advantage of being simple to state in writing. However, with
this approach a wider section of stream would receive less protection than a narrower section since
a portion of the uniform buffer width includes the streambed, and less buffer is actually
established as compared to a buffer measured from the bank with the same nominal buffer width.
Also, measuring a buffer from a stream centerline can be more challenging in the field than from
the Top of the Bank.
• A stream may meander off the Owners' property. In that case, whether the Riparian Buffer was
fixed or moveable, measured from bank or centerline, the Holder would not be able to require
compliance with the Protection Agreement as applied to areas outside the Property.
• The description of the Riparian Buffer might also reference a boundary established by another
public document such as a 50-year or 100-year flood plain. A key challenge with this approach is
translating a boundary on a map into markings on the ground.
• The width of the strips of land stretching landward from the Top of Banks of the Creek (i.e., the
blank to be completed in §1.02(b)) may be any width but should be as wide as is acceptable to the
Owner who enters into the Protection Agreement and, in any event, not less than thirty-five (35)
feet. The 35-foot minimum is consistent with the minimum width for riparian forest buffer
required under the Conservation Reserve Program originally authorized under the Food Security
Act of 1985 and regulations promulgated under that act set forth in Title 7 of the Code of Federal
Regulations Part 1410 ("CRP") and the Conservation Resource Enhancement Program, 16
U.S.C.S. §3831 *et seq.* ("CREP"). See also the recommendations in *Riparian Forest Buffers*
(Welsch, 1991), Forest Resources Management, USDA Forest Service, Radnor, PA, NA-PR-07-
91, available on-line at
www.na.fs.fed.us/spfo/pubs/n_resource/riparianforests/Tab%20II.htm.

• A description of the Riparian Buffer by means of a setback from a stream bank conforms to the
requirements of §4(b) of the Pennsylvania Conservation and Preservation Easements Act, Act 29
of 2001, Pub. L. No. 330 set forth below. Otherwise, a metes and bounds description is required if
the Riparian Buffer is less than the entirety of the Property.
[A] conservation easement may encompass an entire fee simple interest in a parcel of real
property as described in the deed to the property, or any portion thereof or estate therein.
Except when referencing an easement's boundary using setback descriptions from existing
deed boundaries or natural or artificial features, such as streams, rivers or railroad rights-ofway,
a metes and bounds description of the portion of property subject to the easement shall
be provided in the easement document.
• In most cases, it is expected that parties should be able to reasonably agree to the location of the
Top of the Bank. However, in case of ambiguous, indefinite or nonexistent floodplain or question
regarding location, the model's approach provides science-based instructions for determining Top
of the Bank to be found in the definition of Top of the Bank in Article VII.

**(c) Baseline Documentation**

• The Baseline Documentation is intended to serve as an objective information baseline for
monitoring compliance with the terms of the Protection Agreement. Among other information
describing and depicting the Stream and the vegetative and other resources to be found within the
Riparian Buffer, the Baseline Documentation should include photographs identifying the location
of the Stream as of the Agreement Date. The Baseline Documentation is incorporated into the text
of the Protection Agreement under §6.10 even though it is not attached to the recorded
documentation. Because it is not attached to the recorded document, it is imperative that the
definitive baseline report be signed by the undersigned Owners and the Holder with a notation
identifying the report as the Baseline Documentation referred to in the Protection Agreement
between Owners and the Holder dated ____.

**1.03 Owners' Control**

Applicable rules of law provide that, except for rights specifically granted, all other rights pertaining to the ownership of land remain vested in the Owners. This provision is intended to provide comfort to Owners that they are not relinquishing any control over their Property except as specifically set forth in Articles II and III and they are not granting any rights of access except to the Holder for monitoring purposes as set forth in Article IV.

**1.04 Defined Terms**

The purpose of this Section is to direct the reader to Article VII for the definitions of other terms used in this Protection Agreement.

***Additional Provision, if applicable: The following section may be added to Article I if Owners receive payment for the grant of the Protection Agreement:***

**1.05 Purchase Price**

In consideration of the grant of this conservation servitude, Holder has paid to the undersigned Owner or Owners the sum of $__________ (the "Purchase Price"). The undersigned Owner or Owners acknowledge receipt of payment in full of the Purchase Price.

***Additional Provision, if applicable: The following section title could be added to Article I along with other text as indicated below if Owners intend to seek a federal tax deduction for the grant of the Protection Agreement:***

**1.06 Charitable Contribution**

- The model Protection Agreement must be adapted if the Owners intend to seek a charitable deduction on their federal income tax return for donating to Holder the rights to enforce the Protection Agreement. If Owners desire to claim a charitable contribution for the grant of the conservation servitude, consider using the Pennsylvania Conservation Easement (available at *conserveland.org*) as the base document. Alternatively, amend the Protection Agreement to include those provisions of the Pennsylvania Conservation Easement required to qualify the grant as a charitable contribution; for example, those set forth in Article I entitled "Charitable Contribution" of the Pennsylvania Conservation Easement. Owners and their counsel are also

advised to review the commentary accompanying the Pennsylvania Conservation Easement for the
requirements that apply to charitable deductions of Qualified Conservation Contributions under
§170(h) of the Internal Revenue Code.

**Article II. Restrictive Covenants: Improvements**

• **Purpose.** The purpose of this Article is to control the size and location of Improvements within
the Riparian Buffer consistent with Conservation Objectives.

• The Article begins with a broad prohibition on Improvements to assure that the list of permitted
items comprises the universe of Improvements permitted within the Riparian Buffer.

**2.01 Existing Improvements**

• Existing Improvements within the Riparian Buffer are always permitted to remain in their existing
locations as of the Agreement Date.



**2.02 Additional Improvements**

**(a) Existing Agreements**

• Existing Agreements are entitled to priority over the Protection Agreement under Applicable Law
so there is no point in trying to control the exercise of those rights by persons who are not a party
to the Protection Agreement.

• The model can be used in conjunction with existing CRP and CREP agreements.

**(b) Other Additional Improvements**

• The phrase "subject to Review" may be added to subsections (i) and/or (ii) if the undersigned
Owners and Holder desire Holder to exercise rights of Review prior to commencement of
Construction of the items permitted in those subsections.

• The list may be expanded; however, Additional Improvements within the Riparian Buffer should
be limited to those that the Holder has determined are consistent with Conservation Objectives for
conservation of this ecologically sensitive area.

• The model is constructed with a very limited list of Additional Improvements. Because the list of
items is so limited, additional limitations such as impervious coverage limitations were not
considered necessary. However, if the list in this section is expanded to include items with the
potential for significant Impervious Coverage, then a "Limitations on Additional Improvements"

section should be added. *See*, for example, limitations provided in the Pennsylvania Conservation
Easement applicable to Improvements within the Standard Protection Area.

• Additional limitations may be imposed on trails. Trails may be limited to a relatively narrow width (such as 4-6 feet). On the other hand, a wider path (particularly when used as a bridle path) may be less likely to become rutted.

• The reference to "highly porous" in §2.02(b)(ii) includes paths covered by gravel, stone or wood chips.

**Article III. Restrictive Covenants: Activities; Uses; Disturbance of Resources**

• **Purpose.** The purpose of this Section is to control intensity of use of land and disturbance of natural resources identified in the Conservation Objectives.

• The Protection Agreement does not create affirmative obligations on the Owners to perform any particular resource management activities. Accordingly, Holders are encouraged to educate Owners as to appropriate activities to enhance forest buffers.

**3.01 Existing Agreements**

• Activities, uses and disturbances of resources that a Person has a right to do under an Existing Agreement are permitted as a matter of right anywhere within the Property. Land trusts should obtain title information to determine what rights Persons have to disturb natural resources within the Property by exercise of rights under Existing Agreements.

**3.02 Other Activities and Uses**

• **Purpose.** The purpose of this section is to describe those activities that are consistent with protection of water resources and other Conservation Objectives for the Riparian Buffer.

**(a) Disturbance of Resources**

• **Hazardous Conditions.** The provision in subsection (i) is intended to shield the Holder from liability for personal injury or property damage occurring on or about the Property by trees limbs falling or similar hazards. Holders who are concerned that this provision creates a loophole for



unwarranted interference with trees and other resources should consult with their legal counsel and insurance representatives before changing the provision.

• **Review.** Except for the provision pertaining to hazardous conditions in subsection (i) (which should be permitted without Review to avoid liability), Holders may use their discretion whether or not they want to condition other activities on "subject to Review".

**(b) Nature Preserve and Trail Uses**

• Owners should be aware that permitting hunting, fishing and other uses listed in this paragraph does not mean that public access must be given for these purposes. If Owners and Holder desire to establish an easement or license vesting a public right of access for these activities, they must either do so by separate agreement or by adding a section to Article IV granting public access. *See* commentary to Article V of the Pennsylvania Conservation Easement re: "Grant of Public Access".

• The Holder may use its discretion to expand the list of permitted activities to include others – such as horseback riding and biking – that may or may not have the potential to materially and adversely affect Conservation Objectives applicable to the particular Riparian Buffer.

**Article IV. Rights and Duties of Holder and Beneficiaries**

**4.01 Grant to Holder**

• **Purpose.** This section describes the necessary conditions to create a legally binding conveyance of an interest in real property whether or not consideration is present.

• **Unconditional.** The grant to the Holder must be unconditional. Conditional delivery is not sufficient; for example, if a signed document is delivered in escrow to a third party (a title company, for example) the document is not effective until released from escrow.

• **Perpetual.** The model has been constructed to extend for a perpetual term the protection given to a Riparian Buffer for a term of years under CRP or CREP.

• **Recording.** Recording in the Public Records is necessary to make the covenants binding upon future owners who do not otherwise know about the terms of the Protection Agreement but the grant is complete once the document is signed and unconditionally delivered.

• **Consideration.** The phrase "intending to be legally bound" is a valid substitute for consideration (that means it makes a promise to make a gift as enforceable as other contracts) under the Uniform Written Obligations Act, 33 Pa. Stat. §6.

• **Grant and Convey.** The words "grant and convey" have a special meaning in real estate law.
When an Owner grants and conveys that automatically means that the Owner warrants that he or
she owns the property (or interest in the property) being conveyed in fee simple and has a right to
convey the property.
• **Conservation Servitude.** According to the Restatement (Third) of Servitudes, a "conservation
servitude" is a servitude for conservation purposes. A servitude is promise that is binding upon
future owners of the property. Conservation purposes include retaining or protecting the natural,
scenic or open-space value of land, assuring the availability of land for agricultural, forest,
recreational or open-space use, protecting natural resources, including plant and wildlife habitats
and ecosystems, and maintaining or enhancing air or water quality or supply.
• **Subordination of Liens.** Subordination of any Lien affecting the Property as of the Agreement
Date is important because Holder needs assurance that the Protection Agreement could not be
extinguished by foreclosure of a Lien prior in right to the Protection Agreement.
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**4.02 Rights and Duties of Holder**

• **Standard of Care.** Note that in this section the Holder not only has the right but also the
obligation to perform the tasks listed in §4.02. Whenever a Person owes a duty to another, the
Person has the obligation to perform the duty in good faith and with a standard of care that a
reasonably prudent person would use. The following section (§4.03) lists rights that the Holder
may but is not obligated to perform.

**4.03 Other Rights of Holder**

• **Purpose.** To give the Holder the right and power to perform at its election, the discretionary
powers identified in this section.

**(a) Amendment**

• **Policy for Amendment. The Pennsylvania Land Trust Association ("**PALTA") urges Holders
to formulate and adopt a policy on amendment. PALTA intends to publish at *conserveland.org*
examples of amendment policies adopted by land trusts in Pennsylvania. For an explanation of

private benefit rules, refer to §501(c)(3) of the Internal Revenue Code and associated regulations.

**(b) Signs**

• **Project Identification.** Installing signage may benefit the Holder in several ways. First, signs bring to the attention of the public the benefits of conservation of riparian buffer. Second, signs provide notice to a prospective purchaser, lessee or other user of the Property of the interest of the Holder. It then becomes their responsibility to inquire about the terms of the Protection Agreement.

• **Public Access.** Rights to install trail signage may need to be added if it is expected that Owners may someday grant a right of public access to the Riparian Buffer.

**4.04 Review**

• **Purpose.** The purpose of this section is to provide the procedure for Review as and when Review is required under Articles II and III.

**(a) Notice to the Holder**

• This provision contains the procedural requirements to initiate the Review process.

• If the Holder has adopted a specific set of minimum criteria for submission, then this provision should be modified to substitute following after "including with the notice": "the items required for such submission under the Review Requirements of the Holder". The definition of "Review Requirements" in Article VIII accommodates two approaches – the Review Requirements can be simply included in the Baseline Documentation or can also be attached as an Exhibit to the Protection Agreement. In either case, the definition incorporates changes to the Review Requirements over time.

**(b) Notice to Owners**

• Among the four possible responses to Owners' request for Review is rejection of Owners' proposal for insufficiency of information on which to base the Holder's decision. This alternative is included so as to avoid the need to incorporate detailed Review Requirements into the Protection Agreement and to give the Holder a reasonable opportunity to determine whether or not additional information is needed to give a definitive response to Owners' proposal.

**(c) Failure to Notify**

• This subsection sets forth the consequences of the Holder's failure to respond in a timely way. An
alternative to extending the time in subsection (b) above to 45, 60 or 90 days is to reverse the
"deemed approved" to "deemed disapproved." The rationale for this reversal is that it provides an
incentive to Owners to contact the Holder before the running of the 30-days to be sure the Holder
has received all of the information the Holder needs to make the decision. It is also more likely

that, if additional time is needed to make the decision, it is to the benefit of Owners to grant the
extension.

**(d) Standard of Reasonableness**

• The approach taken by the model is to require the Holder to act reasonably in discharging its duty
to Review. The rationale for this approach is that courts are unlikely to sustain a "sole and
arbitrary standard". However, to avoid the risk that a court might hold the Holder to a standard of
commercial reasonableness, the model provides a standard of "ecological reasonableness".

**4.05 Beneficiaries**

• **Purpose.** The purpose of this section is to describe one or more Beneficiaries who are intended to
have rights to exercise Holder's rights if the Holder should fail in its duties. Alternatively, one or
more Beneficiaries could be granted additional rights. For example:
The ____________ Conservation District has the following rights as Beneficiary of this
Protection Agreement: (i) the right to exercise Holder's rights and duties under this Protection
Agreement should Holder fail to uphold and enforce in perpetuity the restrictions under this
Protection Agreement; (ii) the right to approve any transfer of Holder's rights under this
Protection Agreement; and (iii) the right to approve any amendment of this Protection
Agreement.

***Additional Provision, if applicable: The following section may be added to Article IV to help the Holder
cover costs in discharging its duties with respect to the Protection Agreement. This provision is
particularly important if the Holder has not secured sufficient stewardship funding to cover all costs***

***likely to be incurred as a result of holding the Protection Agreement.***

**4.06 Reimbursement**

Owners must reimburse Holder for the costs and expenses of Holder reasonably incurred in the course of
performing its duties with respect to this Protection Agreement other than monitoring in the ordinary
course. These costs and expenses include the allocated costs of employees of Holder.

• This provision correlates the obligation of Owners to reimburse with the obligations of the Holder
to enforce, inspect, review and interpret under §4.02. Note that expenses under §4.03(a) entitled
"Amendment" are not automatically covered. These should be handled as part of the amendment
agreement.

**Article V. Violation; Remedies**

**5.01 Breach of Duty**

• **Purpose.** The purpose of this provision is to ensure that the Protection Agreement will be
enforceable in perpetuity.

**5.02 Violation of Protection Agreement**

• **Purpose.** This section sets forth the procedure for enforcement of the Protection Agreement.

• **Persons Responsible.** Do not alter this provision to create a connection between the violation and
some act or failure to act by Owners. A violation is a violation whether or not caused by Owners.
Tenants, invitees and trespassers can violate the restrictive covenants set forth in the Protection
Agreement. It is up to Owners to maintain control over the Property; however the section titled
"No Fault of Owners" under this Article should give Owners comfort that they will not be
unreasonably held responsible for the acts of others.

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**(a) Notice**

• **Purpose.** This provision is to give Owners some comfort that, before they are exposed to
monetary damages or other remedies, they will be given notice and opportunity to cure the
violation. See Article VI for requirements applicable to notices.

**(b) Opportunity to Cure**

• **Purpose.** The approach taken by the model is to provide a reasonable period to cure if, within the
initial 30-day period, there is a meeting of the minds between Owners and the Holder as to what

constitutes a reasonable cure and what constitutes a reasonable period of time to effectuate that cure.

**(c) Imminent Harm**

- **Purpose.** If the Holder becomes aware of a prohibited activity that will destroy protected resources, the Holder cannot delay obtaining a court order to cease the activity. For example, if the violation is tree cutting, the trees will be gone by the time the cure period expires.
- **Consultation.** On the other hand, Owners frequently want some kind of notice before they become responsible for Litigation Expenses incurred by the Holder based on an alleged violation. If that is an issue, the Holder can consider adding a statement to the effect that the Holder will endeavor to communicate or consult with Owners regarding the alleged violation prior to commencement of remedies. Do not use the words “notice” or “notify” because that will require written notice given in accordance with Article VI. Consulting or communicating with Owners can be accomplished via a telephone call.

**5.03 Remedies**

- **Purpose.** The purpose of this section is to describe the specific remedies that the undersigned Owners and the Holder agree are appropriate if a violation should occur in the future.
- **Enforceability of Waivers.** Drafters of conservation servitudes need to keep in mind that not all promises of the undersigned Owners are binding upon future Owners of the Property who did not, themselves, make the promise. The rule developed by case law over many centuries required that the promise had to be about something pertaining to the land itself. For example, the restrictive covenants in Articles II and III are unquestionably binding upon future Owners. On the other hand, it is highly questionable whether a court would enforce against future Owners waivers of procedural or constitutional rights just because the undersigned Owner was willing to do so.
- **Due Process of Law.** The approach taken by the model is to include only those remedial provisions that a court would be willing to enforce against all Owners and that do not purport to

waive the constitutional rights of Owners to notice, opportunity to be heard, to have the dispute
determined by a court before a jury and any other constitutionally protected right of due process of
law.

• **Arbitration; Mediation.** Provisions for arbitration and/or mediation are sometimes added to
conservation servitudes; however, it is doubtful that the undersigned Owner can waive the
constitutional right of future Owners to a trial by jury so requirements for mandatory arbitration or
mediation may be of limited usefulness in a conservation easement. Holders who want to insert
provisions for arbitration or mediation should consult with counsel and choose an effective and
enforceable provision. For information on arbitration and mediation, consult the website of the
American Arbitration Association (www.adr.org) which provides a "Practical Guide to Drafting
Dispute Resolution Clauses".

**(a) Coercive Relief**

• **Purpose.** Relief in the nature of a court order forcing a Person to do or refrain from doing certain
activity is a special remedy that under Applicable Law usually requires a showing that other relief
will not suffice to make the Person harmed by the activity whole.

• **Restatement.** The Restatement (Third) of Servitudes recommends special treatment for a
conservation servitude held by a governmental body or a conservation organization: it is

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enforceable by coercive remedies and other relief designed to give full effect to the purposes of the
servitude without the showing otherwise required under Applicable Law.

**(b) Civil Action**

• This remedy is intended to furnish the Holder with a judgment for a specific sum of money that
the Holder is entitled to collect from Owners. The judgment automatically creates a lien on the
real property of Owners in the county in which the judgment is entered and can be enforced
against any assets of Owners. The amount of the judgment will be set by the court in the
reasonable amount necessary to compensate the Holder for Losses, Litigation Expenses and other

sums owing by Owners under the Protection Agreement.
**(c) Self-Help**
• Many Holders will want the power to enter the Property so as to stop a violation while a court
order is being sought to restrain further activity. Holders are urged to consult with counsel and, if
circumstances suggest that the entry is unwelcome, consider requesting police escort. The power
of self-help should be used only if the entry can be made without violence and without harm to
persons or property.
**5.04 Remedies Cumulative**
• **Purpose.** The purpose of this provision is to negate the presumption under Applicable Law that
once a Person chooses a particular remedy, the Person has made his election and cannot choose
others or pursue more than one remedy at the same time.
**5.05 No Waiver**
• **Purpose.** If a violation of the Conservation Easement occurs and the Holder doesn't notice it or
for some reason ignores it, a court could refuse to use its power to require correction of the
violation if the court found that, under the circumstances, strict enforcement would be unfair or
unjust to Owners. The purpose of this provision is to avoid application of that rule.
**5.06 No Fault of Owners**
• **Purpose.** This provision is intended to give some comfort to Owners that they will not be held
responsible for the acts of others.
• **Burden of Proof.** The provision is specifically worded to avoid imposing on the Holder the
burden of proving that a particular violation was the fault of Owners and no one else.
**5.07 Continuing Liability**
• **Purpose.** Many forms have a requirement for prior notice of a transfer but there is really no
remedy if the transferring Owner fails to do so. This provision is intended to provide a compelling
incentive for the Owners to obtain a certificate of compliance prior to a transfer.
**Article VI. Miscellaneous**
• **Purpose.** The purpose of this Article is to group together a variety of provisions pertaining to
both Owners and the Holder or pertaining to the administration or interpretation of the Protection
Agreement.
**6.01 Notices**

• The purpose of this Section is to provide a procedure for the giving of formal notices under the
Protection Agreement.

**(a) Form of Notices**

• Electronic mail and telefax can be added as well if the Holder is confident these means of
communication will be duly noted. The customary practice is to require that notices by these
means be followed promptly by notice delivered by one of the methods listed above.

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*Riparian Forest Buffer Protection Agreement* - C15 - *Commentary*

**(b) Address for Notices**

• A street address should be furnished as commercial couriers (such as FedEx or UPS) cannot
deliver to P.O. Boxes.

**6.02 Governing Law**

• In case the undersigned Owner or a future Owner is an out-of-state resident, this provision makes
it clear that only the laws of the Commonwealth of Pennsylvania apply. This avoids a dispute
about whether the laws of another jurisdiction or the choice of law rules of the Commonwealth of
Pennsylvania apply.

**6.03 Binding Agreement**

• **Purpose.** To set forth the understanding of Owners and the Holder that the Protection Agreement
is not just the agreement of the undersigned Persons but binds and benefits all Persons who
succeed to their respective interests.

**6.04 Amendments, Waivers**

• **Purpose.** This provision has several purposes. First, it puts Owners on notice that they should
never rely on an oral statement of an employee or other representative of the Holder that is
contradictory to the terms of the Protection Agreement. Second, it puts Holders on notice of their
need to inform staff or other Persons performing monitoring or administrative duties of the limits
of their authority.

• **Authorization.** Holders need to establish what authorization is needed for amendments, waivers
or consents.

• **Amendment.** Ordinarily, an amendment needs to be approved by the Board or other governance
committee that approves acceptance of the Protection Agreement. An amendment is signed with

all of the formalities required of the original Protection Agreement and is intended to be recorded in the Public Records. An amendment permanently changes the terms of the Protection Agreement.

• **Consent or Waiver.** A discretionary consent or waiver (even if in writing) does not constitute an amendment. It is granted for a particular purpose and only for a limited time due to extraordinary circumstances not contemplated under the Protection Agreement. For example, a forest fire or extended drought may necessitate Owners taking extraordinary measures not specifically permitted under the terms of the Protection Agreement. The terms of the Protection Agreement remain unchanged but the Holder waives its right to invoke its remedies under Article V. A consent or waiver should always be memorialized in writing but it can simply be a letter from the Holder to Owners in response to a written request from Owners to the Holder requesting a waiver to permit specified activities for a specific period of time.

**6.05 Severability**

• **Purpose.** If the provisions of a document are dependent on each other, then if one fails they all fail. The provision set forth in this section is intended to avoid application of that rule – if one provision fails (for example, the Holder is not permitted a self-help remedy under Applicable Law) the others remain in full force.

**6.06 Counterparts**

• **Purpose.** There are several purposes for this provision. First, it makes clear that more than one counterpart of the Protection Agreement can be signed. Second, it allows the undersigned Owners and Holder to exchange signature pages signed separately rather than circulate original documents back and forth to collect necessary signatures.

**6.07 Indemnity**

• **Purpose.** The Riparian Buffer is not in the care, custody or control of the Holder. The Holder needs to be protected from claims that are the responsibility of the Owners in the first place so that Owners (or their insurer) will defend those claims without the need for the Holder to furnish its own defense and incur Litigation Expenses.

• Among other liabilities under Applicable Law, this provision is intended to avoid Litigation
Expenses in case the Holder is named as a potentially responsible party with respect to an alleged
violation of environmental laws on or about the Property.

• This provision is intended to place the burden for defense of claims ordinarily covered by
homeowners insurance on the Owners and their insurer.

**6.08 Guides to Interpretation**

• The provisions of this section are intended to assist future readers of the document to interpret it
correctly.

**(a) Captions**

• This provision is self-explanatory; however, drafters need to be aware of the consequences of
falling afoul of this provision. You cannot rely on a caption to convey meanings that are not in the
text itself.

**(b) Terms**

• These provisions avoid needless repetition of phrases.

**(c) Conservation and Preservation Easements Act**

• The purpose of this paragraph is to state the intention of the undersigned Owners to grant to the
Holder all rights, powers and privileges accorded to the holder of a conservation easement under
Applicable Law.

**(d) Restatement of Servitudes**

• The purpose of this paragraph is to increase the likelihood that a court interpreting this Protection
Agreement, should there be any doubt as to the correct interpretation of a provision, will look to
the Restatement of Servitudes as the better view of the law applicable to conservation servitudes.

*See* Pregmon, Patricia L. "How Changes in the Law of Servitudes Affect Conservation Easements", *Exchange: The National Journal of Land Conservation*, Vol. 24, No. 2, pp. 27-28.

**6.09 Entire Agreement**

• The written text of the Protection Agreement signed by Owners and the Holder is final and
definitive. Whatever was proposed in previous drafts and said in previous negotiations is of no
further consequence in interpreting the intentions of the parties.

**6.10 Incorporation by Reference**

• The provision serves several purposes (1) it avoids needless repetition of phrases; and (2) it serves
as a handy list to check which Exhibits need to be attached to the document.
• The Baseline Documentation is incorporated into the text of the Protection Agreement here even
though it is not attached to the recorded documentation. Because it is not attached to the recorded
document, it is imperative that the definitive baseline report be signed by the undersigned Owners
and the Holder with a notation identifying the report as the Baseline Documentation referred to in
the Protection Agreement between Owners and the Holder dated ___.

**6.11 Coal Rights Notice**

• This statement is required for compliance with §9(d) of the Conservation and Preservation
Easements Act. The notice has been formatted to comply with the requirements of that Act – at
least 12-point type and preceded by the word "Notice" in at least 24-point type.

**Article VII. Glossary**

• **Purpose.** The purpose of this Article is to keep all defined terms in one Article for convenience of
reference. All initially capitalized terms not defined in Article I should be defined in the Glossary
not in the body of the Protection Agreement. Occasionally, exceptions to this rule are appropriate
and, in that case, cross-reference the definition in the Glossary.



**7.01 Additional Improvements**

• *See* commentary to Article II.

**7.02 Applicable Law**

• This definition is intended to incorporate changes in law over time. For example, if the question
of compliance arises in 2020, the reference is to Applicable Law at that time (not the Agreement
Date).

**7.03 Beneficiary or Beneficiaries**

• *See* commentary to §4.06.

**7.04 Construction**

• Note that the definition of Construction encompasses a variety of activities that go beyond
construction of Improvements.

**7.05 Existing Agreements**

• *See* commentary §3.02(b). PALTA recommends obtaining appropriate title information to identify Existing Agreements as part of the Baseline Documentation. At a minimum, land trusts should request a copy of Owners' title policy and inquire whether Owners have granted any easements or other servitudes during their period of ownership.

**7.06 Existing Improvements**

• If there are no Existing Improvements within the Riparian Buffer, substitute the following for the text in the model: "There are no Existing Improvements within the Riparian Buffer as of the Agreement Date".

• If there are only a few Existing Improvements within the Riparian Buffer, substitute a list of them for the text in the model. Example:

Existing Improvements as of the Agreement Date consist of an earthen trail, approximately 4-feet wide, along the south side of the Stream and a wooden pedestrian bridge crossing the Stream.

**7.07 Improvement**

• The definition provides a collective term to refer to all buildings and structures on the Property whether existing as of the Agreement Date or later constructed.

**7.08 Indemnified Parties**

• The definition is intended to be sufficiently expansive to cover claims against Persons acting on behalf of the Holder. Nevertheless, PALTA recommends that Holders consult with their insurance carriers to evaluate their coverage under this indemnity.

**7.09 Invasive Species**

• The source of the definition is Executive Order 13112 authorizing formation of the National Invasive Species Council which coordinates federal responses to the problem of Invasive Species.

*See* www.invasivespecies.gov – the gateway to federal efforts concerning Invasive Species. On this site is information about the impacts of Invasive Species and the federal government's response, as well as profiles of select species and links to agencies and organizations dealing with Invasive Species issues.

• The definition provided in the model applies to plant species only and is, accordingly, more limited than the federal definition. The definition in the model can be expanded, if desired, to include all biota – not just plants.

**7.10 Lien**

• The definition is used in §5.01 pertaining to the obligation of Owners to obtain and deliver
subordinations of Liens existing as of the Agreement Date.



**7.11 Litigation Expense**

• The definition includes fees incurred in connection with investigation of a violation. Frequently
survey fees are required to establish whether or not a violation has occurred. These would be
included in Litigation Expenses whether or not litigation has commenced.

• The source of this definition is Stark, Tina, *Negotiating and Drafting Contract Boilerplate*, ALM
Publishing 2003. ISBN 1588521052, §10.08(l) (hereafter referred to in this commentary as
*Negotiating Boilerplate.*

**7.12 Losses**

• This definition is intended to encompass the items that may be included in a civil action under
§6.03.

• The source of this definition is *Negotiating Boilerplate*.

**7.13 Native Species**

• This definition may be refined to refer to a specific valley or region if desired by the Holder.

• The source of the definition is the Pennsylvania Department of Conservation and Natural
Resources, State Forest Resource Management Plan "*Management of Natural Genetic Diversity in
Pennsylvania State Forest Lands"* available online at
www.dcnr.state.pa.us/forestry/sfrmp/eco.htm#biodiversity.

• For a listing of plants identified as Native Species in Pennsylvania, *see* the listing provided by the
Pennsylvania Natural Heritage Program available online at
www.dcnr.state.pa.us/forestry/pndi.

**7.14 Owners**

• The defined term is always used in the plural because it refers to all Owners starting with the
undersigned Owners and encompassing all future Owners in perpetuity.

**7.15 Person**

• The definition avoids the need for repetitious phrases.

**7.16 Resource Management Plan**

• There are many ways to describe a Resource Management Plan. This definition emphasizes that
the plan is, in the first instance, prompted by what the Owners want to do on their Property. The

RMP is then developed so as to accommodate the Owners' desires to the extent consistent with
and in furtherance of the Conservation Objectives and the terms of the Protection Agreement.

**7.17 Review**

• *See* commentary to Article IV.

**7.18 Review Requirements**

• The definition is intended to incorporate future changes in Review Requirements and incorporate
Review Requirements set forth as an Exhibit or included in the Baseline Documentation.

**7.19 Top of the Bank**

• In most cases, it is expected that parties should be able to reasonably agree to the location of the
Top of the Bank. However, in case of ambiguous, indefinite or nonexistent floodplain or question
regarding location, the definition provides science-based instructions for determining the location
based on delineating the bankfull water elevation.

**Closing Matters**

• **Closing:** The phrase "INTENDING TO BE LEGALLY BOUND" is especially important in
Protection Agreements where there is no consideration being given for the donation of the
conservation servitude because the phrase is a valid substitute for consideration in the
Commonwealth of Pennsylvania. The term "consideration" means something of value given in
return for a promise.



• **Witness/Attest:** It is good practice but not necessary for validity or recording to have a document
witnessed or, if a corporation, attested by the secretary or assistant secretary.

• **Signature lines.** Add as many signature lines as are necessary to accommodate the number of
Owners and Beneficiaries who will be signing the Conservation Easement. It is good practice to
sign in black ink rather than blue ink so that signatures are legible on microfilm or microfiche.

**Acceptance.** The Conservation and Preservation Easements Act requires Beneficiaries to sign the
Protection Agreement (or record a separate document of acceptance) to evidence their acceptance
of the rights and duties. However, the acceptance does not have to be made a part of the initial

Protection Agreement but can be recorded later if and when the need arises for Beneficiary to
enforce its rights under the Protection Agreement independent of the Holder.

• **Acknowledgment.** The date of the acknowledgment should not be earlier than the Agreement
Date. *See* commentary to opening recitals of Protection Agreement.

• **Exhibits.** It is very important to check that all exhibits referenced in the Protection Agreement are
attached to the Protection Agreement before it is signed and recorded in the Public Records. *See*
commentary to §6.10.

APPENDIX G

SAMPLE STREAM CORRIDOR PROTECTION ORDINANCE

**Upper Salford Township, Montgomery County**
**ARTICLE XVIII RCC - RIPARIAN CORRIDOR CONSERVATION OVERLAY DISTRICT**
**SECTION 1800.PURPOSES**

In expansion of the Declaration of Legislative Intent found in Article 1, Section 101 of this
Ordinance, and the Statement of Community Development Objectives found in Article 1, Section
102 of this Ordinance, the purpose of this Article, among others, is as follows:

A. Reduce the amount of nutrients, sediment, organic matter, pesticides, and other harmful
substances that reach watercourses, wetlands, subsurface, and surface water bodies by
using scientifically- proven processes including filtration, deposition, absorption,
adsorption, plant uptake, and denitrification, and by improving infiltration, encouraging
sheet flow, and stabilizing concentrated flows.

B. Improve and maintain the safety, reliability, and adequacy of the water supply for
domestic, agricultural, commercial, industrial, and recreational uses along with sustaining
diverse populations of aquatic flora and fauna.

C. Regulate the land use, siting, and engineering of all development to be consistent with the
intent and objectives of this ordinance, accepted conservation practices, and to work
within the carrying capacity of existing natural resources.

D. Assist in the implementation of pertinent state laws concerning erosion and sediment
control practices, including the Pennsylvania Clean Streams Law, Act 394, P.L. 1987,
Chapter 102 of the Administrative Code (as amended October 10, 1980 Act 157 P.L.),
Title 25, and any subsequent amendments thereto, as administered by the Pennsylvania
Department of Environmental Protection and the Montgomery County Conservation
District.

E. Conserve the natural features important to land or water resources (e.g., headwater areas,
groundwater recharge zones, floodway, floodplain, springs, streams, wetlands,
woodlands, prime wildlife habitats) and other features constituting high recreational value
or containing amenities that exist on developed and undeveloped land.

F. Work with floodplain, steep slope, and other ordinances that regulate environmentally

sensitive areas to minimize hazards to life, property, and riparian features.
G. Recognize that natural features contribute to the welfare and quality of life of the township's residents.
H. Conserve natural, scenic, and recreation areas within and adjacent to riparian areas for the
community's benefit.

**SECTION 1801.DEFINITION, ESTABLISHMENT, AND WIDTH DETERMINATION OF THE DISTRICT**

A. Definition. The Riparian Corridor Conservation District is defined as an overlay district
consisting of :
1. Areas surrounding municipally designated surface water bodies, including creeks, lakes, intermittent watercourses, and wetlands that intercept surface water runoff, wastewater, subsurface flow, and/or deep groundwater flows from upland sources and function to remove or buffer the effects of associated nutrients, sediment, organic matter, pesticides, or other pollutants prior to entry into surface waters. This area may also provide wildlife habitat, control water temperature, attenuate flood flow, and provide opportunities for passive recreation. This corridor area may or may not contain trees and other native vegetation at the time of ordinance enactment.
B. Establishment
1. The Riparian Corridor Conservation District applies to the following watercourses and waterbodies and the land adjacent to them:
a. All naturally occurring watercourses that normally contain flowing water during all times of the year, including streams that may dry up during periods of extended drought. These shall include, but not be limited to:
i Perennial streams identified in the most recent Soil Survey of Montgomery County. (Note: Shown as solid lines on Soil Survey Maps)
ii Perennial streams identified on United States Geological Survey Maps (U.S.G.S.). (Note: Shown as solid blue lines on older USGS maps, and thick solid blue lines on newer maps)
b. All intermittent watercourses otherwise identified in the most recent Soil Survey of Montgomery County, or identified on plans submitted by applicants. (Note: Soil Survey shows intermittent streams as dots and dashes)
c. All watercourses bordered by the following alluvial soils, as mapped in the most recent Soil Survey of Montgomery County:
Bm - Bermudian silt loam
Bo - Bouldery alluvial soil
Bp - Bowmansville silt loam
Rt - Rowland silt loam
d. Streams which are bordered by the following local alluvium soils, as identified in the most recent Soil Survey of Montgomery County, provided the local alluvium soil is connected to an alluvial soil listed above in section 180 1.B. 1.c, above:

BrA - Bownmansville silt loam
BrB - Bowmansville silt loam
RwA - Rowland silt loam
RwB - Rowland silt loam
e. Lands at the margins of wetlands and ponds greater than 5,000 square feet in area.
2. The District will consist of two distinct zones designated as:
a. Zone One: This zone will occupy a margin of land with a minimum width of 25 feet measured horizontally on a line perpendicular to the edge or centerline of the watercourse, as appropriate, and/or the edge of the wetland or pond.
i Where slopes in excess of 25 percent are located within 25 feet of a municipally designated watercourse, Zone One shall extend the entire distance of this sloped area or 75 feet, whichever is less. Where the width of Zone One has been adjusted to a width of less than 75 feet, the width of Zone Two will be adjusted so that the total corridor width (Zone One and Zone Two) will be 75 feet maximum.
b. Zone Two: This zone will begin at the outer edge of Zone One and occupy a minimum width of 50 feet in addition to Zone One. Where Zone One has been adjusted to a width greater than 25 feet the width of Zone Two will be adjusted so that the total corridor width (Zone One and Zone Two) will be 75 feet maximum.
i Where the 100-year floodplain extends greater than 75 feet from the waterway, Zone One shall remain a minimum of 25 feet wide, and Zone Two shall extend from the outer edge of Zone One to the outer edge of the 100-year floodplain.
3. The width and applicable regulations of the Riparian Corridor Conservation District Overlay shall be as follows, consistent with the standards for Zone 1 and Zone 2 in 1801.B.2, above:
a. For watercourses identified in Section l8Ol.B.1.a, b, c and d, above, both Zone l and Zone 2 shall apply.
b. For wetlands and ponds identified in Section l8Ol.B.1.e, herein, only Zone l shall apply.
4. The measurement of the Riparian Corridor Conservation Overlay District shall be as follows:
a. For watercourses identified in Section 180 1.B. La: A minimum of 75 feet from each defined edge of the watercourse at bank full flow, or shall equal the extent of the 100year floodplain, whichever is greater.
b. For watercourses identified in Section 1801.B. Lb, c, and d: A minimum of 75 feet from the centerline of the watercourse, or shall equal the extent of the 100-year floodplain, whichever is greater.
c. For wetlands and ponds identified in Section l8Ol.B.1.e: A minimum of 25 feet from the edge of the wetland or pond. For wetlands at the edge of a pond, the measurement shall be made from the wetland edge.

**SECTION 1802.USES PERMITTED IN THE RIPARIAN CORRIDOR CONSERVATION**

**DISTRICT**
The following uses are permitted either by right or as a conditional use in the Riparian Corridor
Conservation District.
A. Zone One
1. Uses Permitted by Right. Open space uses that are primarily passive in character shall be permitted to extend into the area defined as Zone One, including:
a. Wildlife sanctuaries, nature preserves, forest preserves, fishing areas, passive areas of public and private parklands, and reforestation.
b. Streambank stabilization.
c. Driveways serving one single-family detached dwelling unit, provided the requirements of Section 1807, herein, are satisfied.
2. Uses Permitted by Conditional Use.
a. Corridor crossings by farm vehicles and livestock, recreational trails, roads, railroads, centralized sewer and/or water lines, and public utility transmission lines, provided that disturbance is offset by corridor improvements identified.
b. Sustained yield harvesting of trees when removal is consistent with a longterm forest management plan prepared by a professional forester.
B. Zone Two
1. Uses Permitted By Right. The following uses which are primarily passive in character, shall be permitted by right to extend into the area defined as Zone Two:
a. Open space uses including wildlife sanctuaries, nature preserves, forest preserves, passive areas of public and private parklands, and recreational trails conducted in compliance with methods prescribed in the Department of Environmental Protection's Erosion and Sediment Pollution Control Program Manual, 1990, as amended.
b. Reforestation when done in compliance with a forest management plan prepared by a professional forester.
c. No more than one half (½) the depth of any minimum required front, side, and/or rear yards on private lots. The result of this requirement is that one half of the minimum required yard depth shall act as a setback from the Zone 2 boundary, and the other half may extend into Zone 2 to complete the minimum required yard area. However, the portion of the setback within Zone 2 shall be subject to the regulations of Zone 2.
d. Agricultural uses existing at the time of adoption of this ordinance, so long as they are conducted in compliance with methods prescribed in the Department of Environmental Protection's Erosion and Sediment Pollution Control Program Manual, 1990, as amended.
e. Driveways serving one single-family detached dwelling unit, provided the requirements of Section 1807, herein, are satisfied.
2. Uses Permitted by Conditional Use.
a. New agricultural uses in compliance with methods prescribed in the Department of Environmental Protection's Erosion and Sediment Pollution Control Program Manual 1990, as amended.
b. Corridor crossings by farm vehicles and livestock, roads, railroads,

centralized sewer and/or water lines, and public utility transmission lines provided that disturbance is, at a minimum, offset by corridor improvements.
c. Centralized sewer and/or water lines and public utility transmission lines running along the corridor, provided that any disturbance is, at a minimum, offset by corridor improvements. These lines shall be located as far from Zone One as practical.
d. Sustained yield harvesting of trees when removal is consistent with a longterm forest management plan prepared by a professional forester.
e. Passive use areas such as camps, campgrounds, picnic areas, and golf courses. Active recreation areas such as ballfields, playgrounds, and courts provided these uses are designed in a manner that will not permit concentrated flow.
f. Naturalized stormwater basins, provided the basin is located a minimum of 50 feet from the defined edge of identified watercourses.

**SECTION 1803.USES SPECIFICALLY PROHIBITED IN THE RIPARIAN CORRIDOR DISTRICT**

Any use or activity not authorized within Section 1802, herein, shall be prohibited within the Riparian Corridor Conservation District and the following activities and facilities are specifically prohibited:
A. Storage of any hazardous or noxious materials, including conformance with Section 1606.G.
B. Use of fertilizers, pesticides, herbicides, and/or other chemicals in excess of prescribed industry standards or the recommendations of the Montgomery County Conservation District.
C. Roads, except where permitted as corridor crossings in compliance with Sections 1802.A.2.a, or 1802.B.2.b, herein.
D. Motor or wheeled vehicle traffic in any area not designed to accommodate adequately the type and volume.
E. Parking lots.
F. Any type of permanent structure, except structures needed for a use permitted in Section 1802, herein.
G. Subsurface sewage disposal areas.
H. Sod farming.

**SECTION 1804.NONCONFORMING STRUCTURES AND USES**

Nonconforming structures and uses of land within the Riparian Corridor Conservation Overlay District shall be regulated under the provisions of Article XXI, Nonconforming Status, herein.

The following additional regulations also shall apply:
A. Existing nonconforming structures or uses within Zones One or Two that are not permitted under Section 1802, herein, may be continued but shall not have the existing
building footprint or uses expanded or enlarged within or into Zones One or Two.
B. Discontinued nonconforming uses may be resumed any time within one year from such
discontinuance but not thereafter when showing clear indications of abandonment. No
change or resumption of use shall be permitted that is more detrimental to the Riparian
Corridor Conservation Overlay District, as measured against the intent and objectives
under Section 1800, herein, than the existing or former nonconforming use.
C. The one year time frame shall not apply to agricultural uses which are following prescribed Best Management Practices for crop rotation, as identified in an approved
Conservation Management Plan.

**SECTION 1805.BOUNDARY INTERPRETATION AND APPEALS PROCEDURE**

A. When an applicant disputes the Zone One and/or Two boundaries of the Riparian Corridor or the defined edge of a watercourse, surface water body, or wetland, the applicant shall submit evidence to the township that shows the applicant's proposed boundary, and provides justification for the proposed boundary change.
B. The Township Engineer, and/or other advisors selected by the Board of Supervisors shall
evaluate all material submitted and provide a written determination within 45 days to the
Board of Supervisors, Township Planning Commission, and landowner or applicant.
C. Any party aggrieved by any such determination or other decision or determination under
this section may appeal to the Zoning Hearing Board under the provisions of Article XXIV, Zoning Hearing Board, of this ordinance. The party contesting the location of the
district boundary shall have the burden of proof in case of any such appeal.

**SECTION 1806.INSPECTION OF RIPARIAN CORRIDOR CONSERVATION OVERLAY DISTRICT**

A. Lands within or adjacent to an identified Riparian Corridor Conservation Overlay District will be inspected by the township's Zoning Officer when:
1. A subdivision or land development plan is submitted.
2. A building permit is requested.
3. A change or resumption of nonconforming use is proposed.
B. The district may also be inspected periodically by the Zoning Officer and/or other representatives designated by the Board of Supervisors for compliance with an approved
restoration plan, excessive or potentially problematic erosion, hazardous trees, or at any

time when the presence of an unauthorized activity or structure is brought to the attention
of township officials.

**SECTION 1807. MANAGEMENT OF THE RIPARIAN CORRIDOR CONSERVATION OVERLAY DISTRICT**

A. Corridor Management Plan. A corridor management plan shall be developed when
required by the Upper Salford Township Subdivision and Land Development Ordinance,
consistent with the requirements therein.

B. Mitigation Measures. Uses permitted in Section 1802.A.2.a, and 1802.B.2.b and c that
involve disturbance of vegetation within the riparian corridor shall be mitigated by one of
the following measures:

1. Increasing the width of the corridor. The width of the riparian corridor, measured from the defined edge of the waterbody, is increased so that the average width of the corridor's full length is equal to that required by Section 1801.B.3.
2. Increasing the effectiveness of the corridor. In existing degraded wooded areas or proposed new wooded areas, an area equal to twice the area of disturbance shall be planted with three distinct layers of vegetation: (1) canopy trees, such as oak, hickory, maple, gum, beech, sycamore, spruce, hemlock, pine, and fir, (2) shrubs that provide an understory, such as elderberry, viburnum, azalea, rhododendron, holly, laurel, and alders, and (3) herbaceous plants that serve as ground cover, including ferns, sorrel, trillium, violet, Virginia creeper, nettle, phlox, aster, and worts. All three layers shall be planted at a density sufficient to create a fullyfunctioning,
naturalized riparian corridor.
3. Converting to a more effective landscape. An area equal to three times the area of disturbance is converted to a more effective landscape. The following landscapes are listed in order of effectiveness, from most effective to least effective:
Woodland, Meadow, Shrub, Old Field, Lawn, and Pasture.

C. Restoration and Conversion of Landscapes.

1. Landscapes shall be restored by removing invasive vines, removing invasive trees, cleaning out trash, correcting soil erosion problems, planting appropriate plants, and properly maintaining all new plantings.
2. Landscapes shall be converted to a more effective landscape by removing existing, incompatible vegetation, planting plants that are appropriate for the proposed landscape type and the site, and maintaining and protecting the plantings from invasive plants, deer, and other long-term problems.

D. Vegetation Selection. To function properly, dominant vegetation proposed as part of a
mitigation measure shall be selected from a list of plants most suited to the riparian corridor. Plants not included on the lists may be permitted by the Township Board of

Supervisors, in consultation with the township engineer, when evidence is provided from
qualified sources certifying their suitability. The township may require species suitability
to be verified by qualified experts in the Montgomery County Conservation District,
Natural Resources Conservation Service, Pennsylvania Fish and Boat Commission, the
U.S. Fish and Wildlife Service, or state and federal forest agencies.

1. In Zone One, dominant vegetation shall be composed of a variety of native riparian tree and shrub species and appropriate plantings necessary for streambank stabilization.
2. In Zone Two, dominant vegetation shall be composed of riparian trees and shrubs, with an emphasis on native species and appropriate plantings necessary to stabilize the soil.

REFERENCE LIST

National Wetland Inventory (NWI): http://www.fws.gov/nwi/

Federal Emergency Management Agency (FEMA): http://www.fema.gov/

United States Geological Survey (USGS): http://www.usgs.gov/

Natural Resources Conservation Service (NRCS): http://soils.usda.gov/

PA Department of Environmental Protection (DEP) – PA Code: Chapter 93: Water Quality http://www.pacode.com/secure/data/025/chapter93/chap93toc.html

The Effects of Special Protection Designation, produced by the Pennsylvania Campaign for Clean Water, 2007.http://www.coldwaterheritage.org/Effectsofspecialprotection.pdf

Western Pennsylvania Conservancy (WPC)

Pennsylvania Natural Heritage Program (PNHP)

Peters Creek Watershed Association (PCWA) - Field View/Key Person Interview

Allegheny County Economic Development

Allegheny County Geographic Information Systems Department

National Council for Air and Stream Improvement, Inc. (NCASI) www.ncasi.org

Department of Conservation and Natural Resources (DCNR)

# Appendix E

**Peters Creek Greenprint Brochure**

# Project Overview

The Peters Creek Watershed is comprised of all that land that drains into Peters Creek. The creek and its tributaries flow through thirteen municipalities from its origin in Nottingham Twp, Washington County to where it empties into the Monongahela River at Clairton, Allegheny County. Land use practices within the watershed have a profound effect on the health and water quality of our streams.

A steep wooded slope covered with Trillium along Peters Creek.

Woodlands, wetlands and all types of naturally vegetated greenspace within the watershed provide many services to our communities that often go unnoticed and unappreciated.

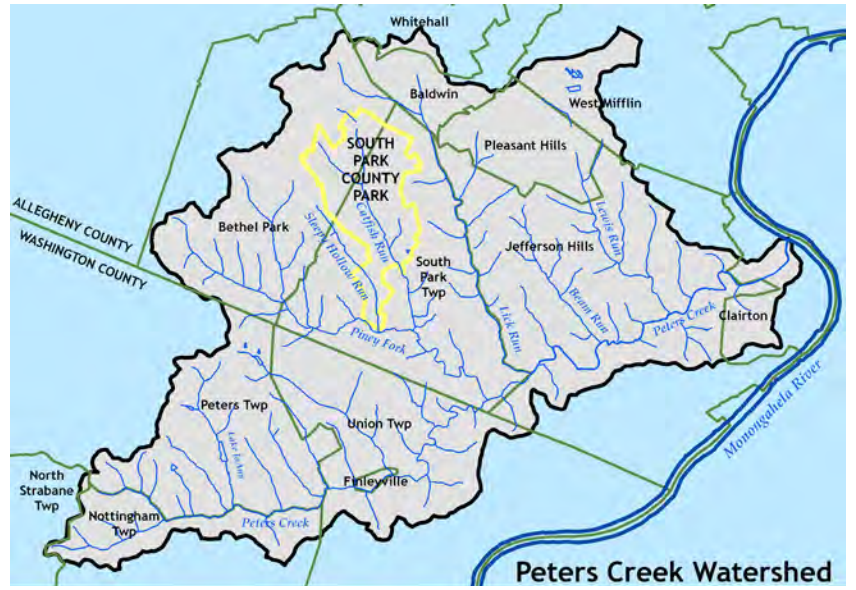
They help to decrease flooding and improve water quality within our streams by intercepting great quantities of rainwater before it becomes stormwater.

Steep wooded slopes provide the scenic character of our watershed as well as habitat for wildlife. They also harbor a number of rare plants.

Wooded stream banks provide shade and help to decrease water temperatures within streams; important if we are to maintain Peters Creek and Piney Fork as viable fisheries.

Conservation of highly functional greenspace within the watershed is essential if we are to create and maintain an ecologically sustainable watershed.

Wetlands, like the Peters Creek Biodiversity Area, help to decrease flooding and provide habitat for wildlife as well as a number of rare and endangered plant species in Pennsylvania.




Greenspace throughout the watershed is not created equally. Some has a greater capacity to control stormwater, provide scenic character and maintain biodiversity than others. Identifying, prioritizing and conserving those lands throughout our watershed contributing most effectively to these services is necessary in order to create a sustainable watershed.

Assuring adequate control of stormwater and maintenance of scenic character within a rapidly developing watershed is not a simple task. It requires a well thought out plan as well as cooperation between government, the business community and private landowners.

Stormwater detention ponds, like this one along Bebout Rd in Peters Twp, can be designed not only to decrease flooding but also to provide wildlife habitat and scenic character .

The Peters Creek Watershed Greenprint is a land conservation plan that identifies and prioritizes those lands throughout the Peters Creek watershed that most effectively harbor biodiversity, manage water resources and maintain the scenic character of our watershed. It is modelled after the methodology of Allegheny Land Trust's Greenprint and utilizes Geographic Information System(GIS) technology and numerous data sources to perform this task.

Implementing the recommendations of this Greenprint will help to build a sustainable watershed and guide our conservation efforts.

# Process

## Creating the Greenprint for the Peters Creek Watershed

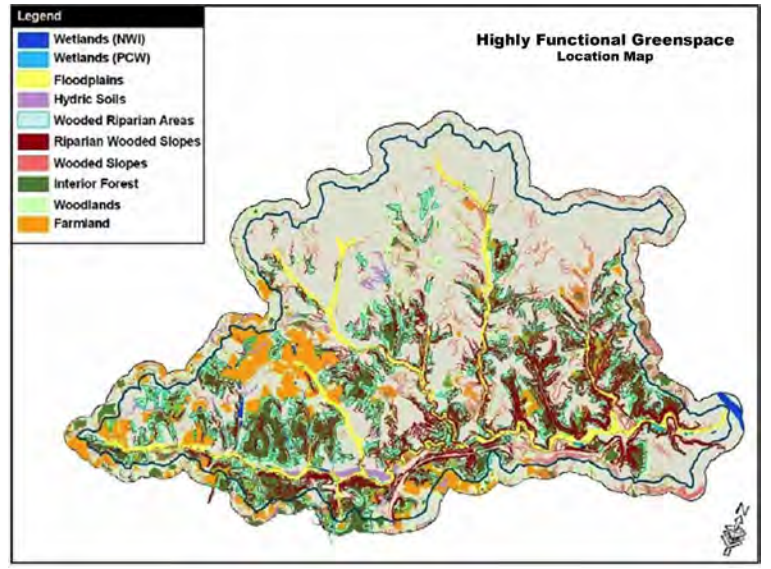
**Step 1** - Identify physical attributes within the watershed boundaries that contribute significantly to biodiversity, scenic character, and/or water management.

- **Wetlands**
- **Floodplains**
- **Hydric Soils**
- **Wooded Riparian Areas**
- **Wooded Riparian Steep Slopes**
- **Wooded Steep Slopes**
- **Woodlands**
- **Interior Forest**
- **Farmland**

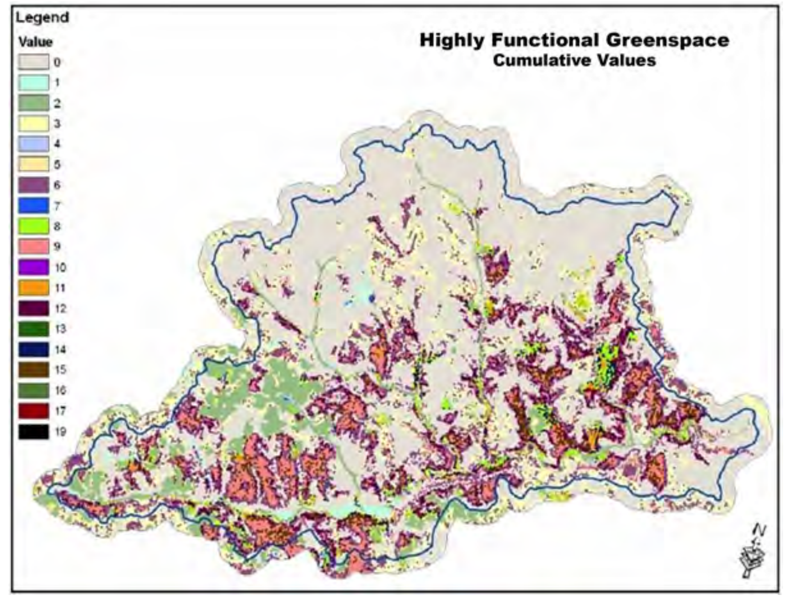
**Step 2** - Assign scores to each attribute indicating whether the attribute contributes to biodiversity, scenic character and/or water management.

| Unique Natural Infrastructure | Water | Scenic | Habitat | Total |
|---|---|---|---|---|
| Wetlands (NWI delineated) | 1 | | 1 | 2 |
| Wetlands (PCW delineated) | 1 | | 1 | 2 |
| Floodplains | 1 | | 1 | 2 |
| Hydric Soils | 1 | | | 1 |
| Wooded Riparian Areas | 1 | 1 | 1 | 3 |
| Wooded Riparian Steep Slopes | 1 | 1 | 1 | 3 |
| Wooded Steep Slopes | 1 | 1 | 1 | 3 |
| Woodlands | 1 | 1 | 1 | 3 |
| Interior Forest | 1 | 1 | 1 | 3 |
| Farmland | 1 | 1 | | 2 |

**Step 3** - Map each attribute on an equally spaced grid for the entire Peters Creek watershed. Each cell on this grid either exhibits the attribute or it does not. Verify by field observation that the mapping is accurate.




**Step 4** - For each grid cell sum the scores for each attribute exhibited by that grid cell.




**Example:** A grid cell (outlined in yellow) along Piney Fork Rd in South Park Twp is bisected by Peters Creek. North of the creek is a narrow forest margin and then Snowden Wetland which falls within the FEMA 100 yr floodplain. Adjacent to and south of the creek is a steeply sloped (> 25 deg) forest in the riparian zone. Attributes exhibited by this grid cell along with scoring:

- **Wetland** 2
- **Floodplain** 2
- **Hydric Soils** 1
- **Wooded Riparian Areas** 3
- **Wooded Riparian Steep Slopes** 3
- **Wooded Steep Slopes** 3
- **Woodlands** 3

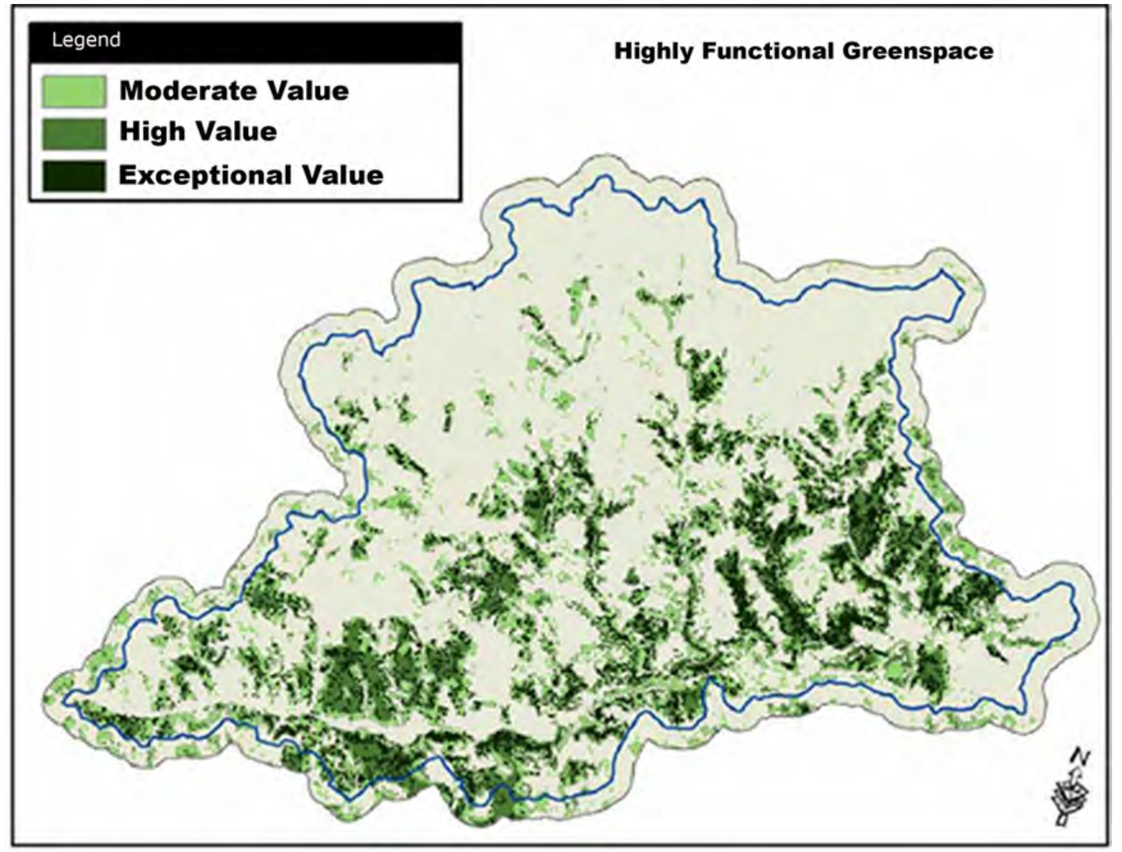
**Total score for this grid cell: 17**

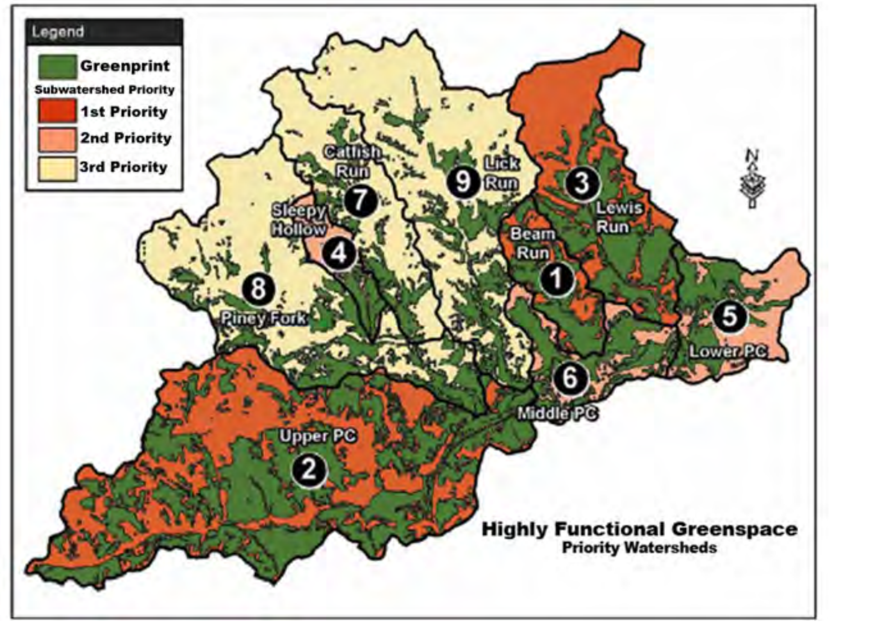

# Results

**Step 5** – Create three groups from the resultant grid cell summed values.

- **Moderate Value (4-7)**
- **High Value (8-10)**
- **Exceptional Value (11-19)**

## This is the Peters Creek Watershed Greenprint




The Peters Creek Watershed Greenprint can be utilized to guide conservation efforts and answer many questions.

We can use it to determine individual parcels containing highly functional greenspace.

Subwatersheds containing the greatest percentage of highly functional greenspace can also easily be identified; providing a means to most effectively concentrate conservation efforts where they will yield the greatest benefit.

*The analysis to the left reveals that the Beam Run, Upper Peters Creek and the Lewis Run subwatersheds contain the greatest percentage of highly functional greenspace and , therefore, provide the most important conservation opportunities within the Peters Creek Watershed.*

# Recommendations

Conserving highly functional greenspace within the Peters Creek watershed is an economic as well as a "quality of life" issue. Significant infrastructure (bridges, roads, etc.) repair and maintenance costs are associated with increased flooding due to inadequate stormwater controls and loss of greenspace. A watershed approach to controlling stormwater is essential if we are to build an ecologically sustainable watershed; one that effectively manages stormwater, retains its scenic character, conserves biodiversity and maintains Peters Creek and Piney Fork as viable fishing destinations.

**Recommendations for successful implementation of the**
**PETERS CREEK WATERSHED GREENPRINT**

**1) Create a multi-municipal Peters Creek Watershed Environmental Advisory Council to develop a plan to conserve highly functional greenspace throughout the Peters Creek watershed.**

**2) Educate municipal officials and residents on the benefits of preserving highly functional greenspace.**

**3) Develop an inventory of highly functional greenspace throughout the watershed at the parcel level.**

**4) Encourage watershed municipalities to strengthen their ordinances to proactively protect highly functional greenspace.**

**5) Encourage watershed municipalities and landowners to utilize all state programs and options provided by the PA Municipal Planning Code to conserve highly functional greenspace.**

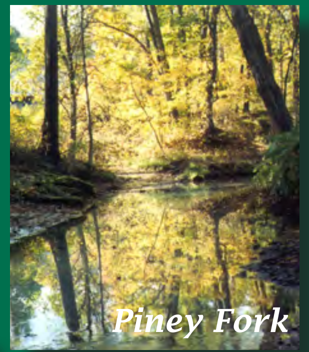
**6) Encourage Allegheny County and Washington County to implement a state-mandated Stormwater Management Plan for the Peters Creek watershed.**

**7) Partner with a land trust organization to maximize conservation of highly functional greenspace identified by the Peters Creek Watershed Greenprint.**

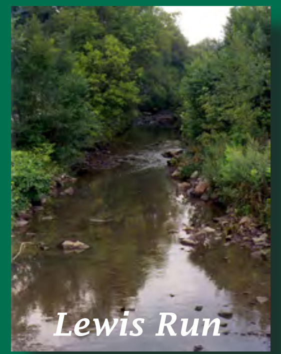
For more information visit: **greenprint.peterscreek.org**

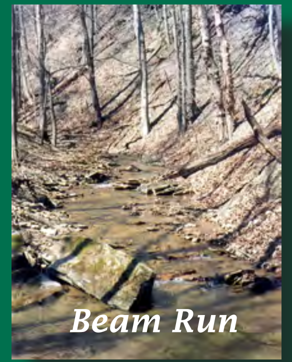
Questions and comments are welcome: **peterscreekwsa@verizon.net**

Peters Creek Watershed Association











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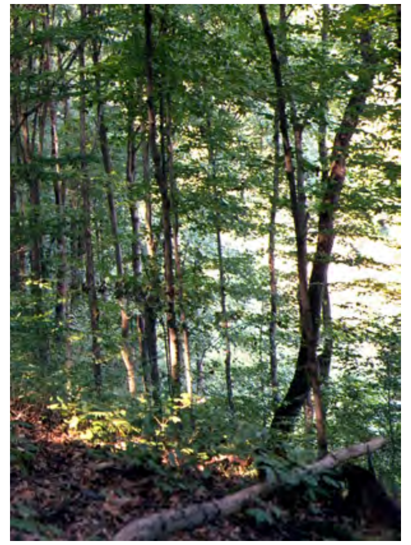
biodiversity

scenic character

water resources



# Peters Creek Watershed Greenprint

*A Land Conservation Plan to identify, prioritize and conserve lands that harbor biodiversity, manage water resources, and define our watershed's scenic character.*

Peters Creek Watershed Association