

The physical landscape and abundant natural resources have affected the growth and development of Greene County from its earliest settlement. The steep topography has limited settlement patterns and concentrated development in locations along river valleys and in the eastern section of the county. The Southern portion of the County exemplifies this situation as the physical landscape ranges from minimal slopes in the east to severe development limitations in the south-central portion of the County. The Natural Resources Section provides a cursory overview of these constraints, existing resources, environmentally important sites, existing and potential threats to natural resources, and offers recommendations for future development and preservation.



Wayne Township (Mackin 2007)

PHYSICAL CHARACTERISTICS

Climate

The mean temperature for Greene County is 50.2 degrees Fahrenheit (°F) with a maximum mean monthly temperature of 71.1°F in July and a mean monthly low of 28.0°F in January. Precipitation averages just under 40 inches per year and is fairly evenly distributed throughout the year. May is the wettest month with an average of 4.2 inches per year and February is the driest month with 2.5 inches per year. For the years between 1971 and 2000, the average annual snowfall is 29.9 inches, with almost all of it coming between December and March (USDA, 2002).

Physiography

Pennsylvania is divided into numerous physiographic provinces, which are defined as regions in which all parts are similar in geologic structure, climate, relief, and have a unified geomorphic history. The majority of Greene County is located in the Waynesburg Hills Section of the Appalachian Plateaus physiographic province; however, a small section in the southeastern quadrant of the county is located in the Pittsburgh Low Plateau Section. The dominant topography in the region is very hilly with narrow hilltops and steep-sloped, narrow valleys and is underlain with sandstone, shale, red beds, and limestone.

Slopes play a significant role when determining the extent and type of development that is being planned. Land with slopes in excess of 25 percent begins to cause serious problems for development.

Map 5-1: Land Resources illustrates the locations of slopes between 25 percent and 40 percent and areas with slopes over 40 percent within the Planning Area. This data was developed by the Southwestern Pennsylvania Commission (SPC) for the “Natural Infrastructure Project”. The slope data used 20-foot USGS topographic lines that were ‘reduced’ to 100-foot topographic lines using algorithms in the Geographic Information System (GIS) before being used to calculate slope. As the map shows, areas east of I-79 have the least amount of steep slopes, particularly those areas along the PA Route 88 corridor and the Monongahela River.

Table 5-1: Steep Slopes list the percent of steep slopes for each municipality within the Southeastern Greene Region. As shown, Wayne Township and Perry Township have the highest percent of land calculated as having slopes greater than 25 percent, where each municipality has over half of its land area classified as steep slopes. The Village of Mt. Morris and surrounding area comprises the largest area of flat land in Perry Township. With the exception of the two boroughs, Monongahela and Cumberland Townships have the least amount steep slopes, at 13 and 14 percent, respectively. Dunkard and Greene Townships each have roughly one quarter of their land area classified as steep slopes.

Table 5-1: Steep Slopes

	Total # of Acres	# Acres >25% Slope	% Acres > 25%
Carmichaels Boro.	109.4	1.3	1.2%
Cumberland Twp.	24,888.4	3,586.4	14.4%
Dunkard Twp.	20,383.6	5,502.5	27.0%
Greene Twp.	11,889.1	3,162.0	26.6%
Greensboro Boro.	91.7	0.7	0.8%
Monongahela Twp.	11,444.8	1,551.6	13.6%
Perry Twp.	19,348.6	10,863.8	56.1%
Wayne Twp.	25,088.2	14,728.1	58.7%

Soil Associations

Soil is produced through the interaction of five natural forces: climate, plant and animal life, parent material, topographic relief, and time. The degree and influence of each of these factors differ from place to place and influence individual characteristics of the soil. General knowledge of the soil associations within an area is useful for planning. These associations can provide background information for determining suitable land uses for land tracts. In addition, this information is useful for watershed management, forestland management, and community development.

A soil association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils, but is named for the major soils. The soils within an association can occur in other association but in a different pattern (NRCS, 2006). Three soil associations exist within Greene County (USDA, 1979) all of which can be found within the Southeastern Greene Planning Area. These soil associations and general locations are discussed below:

Dormont-Culleoka

This soil association is characteristically marked as those soils that are moderately well drained and well drained; deep and moderately deep; gently sloping to very steep soils; on hilltops, ridges, benches, and hillsides. Less sloping areas can be used for farming and most areas are suitable for trees. Slope, erosion and a seasonal high water table are the main limitations for use. This soil association is found throughout the Planning Area and is the main association in Perry Township.

Dormont-Culleoka-Newark

The Dormont-Colleoka-Newark soil association is characterized by drained to somewhat poorly drained; deep and moderately deep; nearly level to very steep soils; on hilltops, ridges, benches, hillsides, and floodplains. Less sloping soils are suited to farming. Major limitations associated with this association are the steep slopes, the tendency for erosion to occur, a seasonal high water table, and occasional flooding. This soil association is found along the Whiteley Creek east of PA Route 88 in Monongahela and Dunkard Townships, and in Wayne Township along Hooever's Run and Roberts Run.

Glenford-Dormont-Library

This soil association is characterized by moderately well drained and somewhat poorly drained; deep, nearly level to sloping soils; on terraces and surrounding uplands. Most areas are cultivated or used for hay and to a lesser extent community development. Less sloping soils are suited to farming and most acreage is suited to trees. The major limitations associated with this association include steep slopes, the tendency for erosion to occur, a seasonal high water table, and slow and moderately slow permeability. This soil association is found along Dunkard Creek in the eastern portion of Dunkard Township, throughout Cumberland Township along Muddy Creek, and in Monongahela Township west of PA Route 88 along Whiteley Creek to the Cumberland Township border.

Hydric Soil

As defined by the NRCS, a hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions (USDA, 2004). The identification of hydric soils is an important consideration when performing any type of physical analysis of the community. Hydric soils support the growth and regeneration of hydrophytic (water-loving) vegetation. These soils are important due to the fact that the location of hydric soils is one indication of the potential existence of a wetland area. Hydric soils are mapped on *Map 5-2: Hydrologic Resources*.

Hydric soil imposes restrictions for development of land. These soils have severe surface and subsurface drainage problems, resulting in significant development limitations, including restricting the placement of septic systems within a hydric soil area. There is one true hydric soil in the Planning Area – Purdy Silt Loam, which can be found in each municipality within the Southeastern Greene Region. However, the data indicates that the watersheds within Cumberland Township, Greene Township, Monongahela Township, and Dunkard Township have a preponderance of these soils. In addition, the hydric soils are found throughout the land area that has a slope less than 25 percent, which represents the most developable land in the Project Area.

Ecological Habitats

State Game Lands

The State Game Lands (SGL) system was established in 1920 by the Pennsylvania Game Commission (PGC) to ensure appropriate habitat and forage for wild animals. This system currently contains about 300 separate tracts comprising a total of about 1.4 million acres (PGC, 2003). Each SGL has an individual management plan designed to improve wildlife habitat and provide recreational opportunities. Greene County is located within State Game Lands District #2. Within District #2 are State Game Lands 232 and 232 A, which are located in Greene, Dunkard, and Cumberland Townships. These lands encompass 7,223 acres across the three townships. State Game Lands 232 and 232 (A) can be found on *Map 5-1: Land Resources*.

According to information released by District #2, the following wildlife can be found: Rabbits, Pheasants, Ruffed Grouse, Squirrels, Furbearers (beaver, mink, raccoon, and weasels), Wild Turkey, Black Bear, and Deer. The District noted that the area around the Kirby exit of I-79 is the main area for stocking in the county and SGL 232 has plentiful habitat, which results in excellent pheasant hunting. Across Greene County, deer numbers are high and the District indicates that the antler restrictions have been beneficial for hunters.

Natural Heritage Inventory Areas

The Greene County Natural Heritage Inventory (2005) is a record of the native biological diversity within the political boundaries of Greene County. The major purpose of this inventory is to provide county and local governments and community groups with a valuable tool to assist them in their planning efforts. Not only can this inventory guide local development, it can also give suggestions for protecting significant natural heritage resources in Greene County.

The Greene County's Natural Heritage Inventory lists seven general recommendations for protecting Natural Heritage Areas (NHAs) within Greene County:

1. Consider conservation initiatives for NHAs on private land;
2. Prepare management plans that address species of special concern and natural communities;
3. Protect bodies of water;
4. Provide for buffers around NHAs;
5. Reduce fragmentation of surrounding landscape;
6. Encourage the formation of grassroots organizations; and,
7. Manage for invasive species.

Map 5-1: Land Resources illustrates the locations of Biological Diversity Areas (BDA) and Landscape Conservation Areas (LCA) in the Southeastern Greene Region. The Natural Heritage Inventory ranks these locations as Exceptional, High, or Notable according to amount, degree, and rate of protection. *Table 5-2: BDA of Exceptional and High Significance* lists the BDAs and *Table 5-3: LCA of Exceptional and High Significance* lists the LCAs of exceptional and high significance that are found in the Project Area. Future land and development planning by officials and residents should include consideration to these areas, which may warrant special protection measures.

Biological Diversity Areas (BDA)

A Biological Diversity Area (BDA) is defined as “an area containing plants or animals of special concern at state or federal levels, exemplary natural communities, or exceptional native diversity. BDAs include both the immediate habitat and surrounding lands important in the support of these special elements” (Greene County NHI, 2005). The NHI recommends that disturbances, except for special cases, associated with all land uses be eliminated from the site and its buffer. If a disturbance is necessary, municipalities, developers, or residents are encouraged to contact the appropriate resource agency.

Landscape Conservation Areas (LCA)

An LCA is defined as “a large contiguous area that is important because of its size, open space, habitats, and/or inclusion of one or more BDAs” (Greene County NHI, 2005). LCAs can be either forest block LCAs or watershed LCAs. Within Greene County, there are no large blocks of contiguous natural landscape remaining, and no topographic features such as ridgelines, which strongly define the landscape. The exceptional and high LCAs in the Project Area are watershed LCAs, which are watersheds that support important aquatic resources. Conservation efforts should focus on improving water quality.

Table 5.2: BDA of Exceptional and High Significance

Municipality	Wayne Twp
Name	Brave BDA
Significance	Exceptional
Description	Aquatic habitat in the headwaters of Dunkard Creek that is the location for an animal and plant species of special concern.
Threats	<ul style="list-style-type: none"> ❖ Lack of complete riparian vegetative buffers makes these BDAs vulnerable to nonpoint source runoff from nearby developed areas, including the town of Brave. ❖ Active strip-mining can cause excessive sedimentation if runoff is not controlled at the mine. ❖ Direct disturbance and incursions by invasive species. ❖ Nutrients and agricultural runoff could threaten the water quality.
Recommendations	<ul style="list-style-type: none"> ❖ Establish adequate riparian buffers. ❖ Restore strip-mined areas to improve water quality. ❖ Landowners should be encouraged to adopt best management practices (BMPs) to reduce runoff. ❖ Maintain adequate riparian buffers to trap runoff that occurs. ❖ Mine officials should try to control sediment that may wash into the stream. ❖ Municipal crews / roadside maintenance should not apply herbicides in the vicinity of the plants.
Municipality	Dunkard Twp & Perry Twp
Name	Dunkard Creek BDA
Significance	Exceptional
Description	Aquatic habitat, rich slopes and roadsides that are habitat for four animals and five plant species of special concern.
Threats	<ul style="list-style-type: none"> ❖ Abandoned mine drainage (AMD). ❖ Aluminum discharge in high concentrations is toxic to the animal species of concern. ❖ De-icing salt runoff from a road bridge. ❖ Fertilizer runoff from agricultural fields can create algae blooms and anoxic conditions
Recommendations	<ul style="list-style-type: none"> ❖ Remediation of the AMD discharges in the lower part of the valley is priority – as is reduction of aluminum discharge. ❖ Landowners in upstream areas should be encouraged to use best management practices (BMPs) to reduce erosion and runoff.
Municipality	Perry Twp
Name	Mount Morris BDA
Significance	Exceptional
Description	Aquatic habitat of Dunkard Creek, floodplain and rich slopes that home to a plant species, natural community and three animal species of special concern.
Threats	<ul style="list-style-type: none"> ❖ Agricultural runoff, sewage treatment plants and urban runoff pose a negative threat to the animals living here. ❖ Nutrients, sediments and chemicals such as herbicides, petrochemical products (like tar and asphalt) and salt in the winter.
Recommendations	<ul style="list-style-type: none"> ❖ Establish adequate riparian buffers within the core landscape areas. ❖ Education of public and private landowners on the management of riparian areas. ❖ Municipalities can utilize BMPs and establish careful road maintenance procedures and establish adequate riparian zones and buffers adjacent to roads.

Table 5.2 continued: BDA of Exceptional and High Significance

Municipality	Monongahela Twp
Name	Sigsbee BDA
Significance	Exceptional
Description	Calcareous slope and wooded ravine of a tributary to Whiteley Creek that is the location of three plant species of special concern.
Threats	<ul style="list-style-type: none"> ❖ The core habitat is small and bisected by a road. ❖ Confined and impacted by intensive land uses including a filtration plant and strip mines. ❖ Limestone influence and adjacent disturbance makes this area vulnerable to invasive species.
Recommendations	<ul style="list-style-type: none"> ❖ Expand the forest and restores sections of the surrounding landscape that are no longer in active use to limit encroachment of invasive species.
Municipality	Monongahela Twp
Name	Mapletown BDA
Significance	High
Description	Slope and floodplain above Whiteley Creek that is home to three plant species of special concern.
Threats	<ul style="list-style-type: none"> ❖ Invasive species – garlic mustard (<i>Alliaria petiolata</i>), ground ivy and multiflora rose (<i>Rosa multiflora</i>) already established. ❖ Trash dump at the top of the slope is sending debris down the slope.
Recommendations	<ul style="list-style-type: none"> ❖ Control invasive species allow the woods to mature with a larger canopy. ❖ Remedy the trash problem and exercise care in the clean up.
Municipality	Greene Township
Name	Willow Tree BDA
Significance	High
Description	Features a roadside and moist slope on which two plant species of special concern are found.
Threats	<ul style="list-style-type: none"> ❖ Roadside maintenance, if done at the wrong time could eliminate the plants growing here. ❖ Due to the steepness of the slope, disturbances above the BDA could result in increased siltation and runoff.
Recommendations	<ul style="list-style-type: none"> ❖ Roadside maintenance activities should take place in the spring and fall to allow the plants to flower and fruit. ❖ Monitored for invasive species and control any infestations. ❖ Activities that cause increased siltation or runoff are not recommended here.

Table 5.3: LCA of Exceptional and High Significance

Municipality	Dunkard Twp & Perry Twp
Name	Lower Dunkard Creek LCA
Significance	Exceptional
Description	Watershed just upstream of the Dunkard Creek confluence to the Monongahela River that is critical to the water quality in an aquatic habitat.
Threats	<ul style="list-style-type: none"> ❖ Non-point source pollution: fertilizer and pesticide runoff from agricultural and residential areas and abandoned mine drainage (AMD) from old strip mines. ❖ Forested riparian buffers are narrow and/or nonexistent. ❖ Widespread fragmentation of the forested areas reduces ecological value.
Recommendations	<ul style="list-style-type: none"> ❖ Improve riparian buffers along Dunkard Creek ❖ Reduce fragmentation of the forested areas by using existing rights-of-way for new development ❖ Allow cleared areas to revert to forest wherever possible in order to create larger areas of contiguous forest.
Municipality	Freeport Twp, Gilmore Twp, Jackson Twp & Wayne Twp
Name	Upper Dunkard Creek LCA
Significance	Exceptional
Description	Watershed on Dunkard Creek that is critical to the water quality of an aquatic habitat.
Threats	<ul style="list-style-type: none"> ❖ Surface mining in West Virginia could cause increased sedimentation and negatively impact the aquatic organisms. ❖ Sedimentation from road maintenance, road salt and herbicides sprayed along the rights-of-way. ❖ Lack of wooded riparian buffers allows sediment and runoff pollution direct access to the streams.
Recommendations	<ul style="list-style-type: none"> ❖ Mining activities should minimize the amount of sediment washing into Dunkard Creek. ❖ Control runoff from road maintenance such as grading and herbicide spraying. ❖ Maintain significant riparian buffers, preferably forested, to provide more protection to aquatic habitats.
Municipality	Center Twp, Franklin Twp, Jackson Twp, & Wayne Twp
Name	Upper South Fork Ten Mile Creek LCA
Significance	High
Description	Watershed on South Fork Ten Mile Creek that is critical to the water quality of an aquatic habitat.
Threats	<ul style="list-style-type: none"> ❖ Non-point source pollution such as fertilizer, pesticide, or herbicide runoff from farms and residential lawns, petroleum product runoff from roads and parking lots, or sediment from open banks associated with cattle and equipment crossings of the creek. ❖ Lacks forested riparian buffers, reducing the amount of filtration before runoff water reaches the stream. ❖ Widespread fragmentation of the forested areas reduces ecological value.
Recommendations	<ul style="list-style-type: none"> ❖ Develop buffer vegetation. ❖ Work with landowners to develop buffer zones, build fences to keep cattle out of the creek, and implement other best management practices (BMPs). ❖ Public education about healthy watershed practices, such as reduced use of fertilizer and pesticide in residential gardens. ❖ Allow targeted cleared areas to regenerate to mature forest to improve the contiguity of existing forest blocks and improve ecological condition.

WATER RESOURCES

Watersheds

Every river, stream, and tributary has an individual watershed. The entire Project Area falls within the Ohio River watershed, which has a drainage area of 3,487 square miles in Pennsylvania (United States Department of the Interior, Geologic Survey). The Monongahela River watershed is a sub-watershed of the Ohio River watershed and, therefore, any watercourse that drains into the Monongahela River is not only part of the Monongahela River watershed, but it also part of the larger Ohio River watershed. Watersheds can encompass numerous sub-watersheds. *Table 5-4: Watersheds* lists the sub-watersheds along with its drainage area within the Project Area. The Dunkard Creek Watershed is the largest of the sub-watersheds within the Project Area, with a drainage area of 91.4 square miles. Whiteley Creek and Muddy Creek Watersheds are the second largest, with drainage areas at around 25 square miles each.

Table 5-4: Watersheds

Watershed Name	Municipality	Drainage Area (miles ²)
Dunkard Creek	Wayne Township Perry Township Dunkard Township	91.4
Whiteley Creek	Whiteley Township Greene Township Perry Township	25.1
Muddy Creek Watershed	Cumberland Township	24.4
Monongahela River	Cumberland Township Monongahela Township Greensboro Borough Dunkard Township	16.1
Little Whiteley Creek	Greene Township Monongahela Township Cumberland Township	8.9
Crooked Run Watershed	Dunkard Township	5.0
Southfork Ten Mile Creek	Cumberland Township	3.4
Pumpkin Run Watershed	Cumberland Township	2.6
Notes: HQWWF - high quality warm water fishery; TSF - trout stocked fishery (according to PADEP Chapter 93. Water Quality Standards		

Surface Waters

Surface waters are defined in The Commonwealth of Pennsylvania Code Title 25 Environmental Protection Chapter 93 Water Quality Standards as “Perennial and intermittent streams, rivers, lakes, reservoirs, ponds, wetlands, springs, natural seeps and estuaries, excluding water at facilities approved for wastewater treatment such as wastewater treatment impoundments, cooling water ponds, and constructed wetlands used as part of a wastewater treatment process” (Pennsylvania Code, 1971). There are numerous streams and tributaries and one river within the Southeastern Greene Region. *Table 5-5: Water Courses* lists the general characteristics of Rivers and Streams in the Project Area by classification. These watercourses are displayed on *Map 5.2: Hydrologic Resources*.

All Commonwealth waters are protected for a designated aquatic life use as well as a number of water supply and recreational uses. The use designation shown in the water quality standards is the aquatic life use. These uses are Warm Water Fishes (WWF), Trout Stocking (TSF), Cold Water Fishes (CWF), and Migratory Fishes (MF). In addition, streams with excellent water quality may be designated High Quality Waters (HQ) or Exceptional Value Waters (EV). *Table 5-5: Water Courses* lists the streams that are classified as a protected use in the Project Area. There are no streams of exceptional value or that support migratory fishes in the Project Area.

Table 5-5: Water Courses

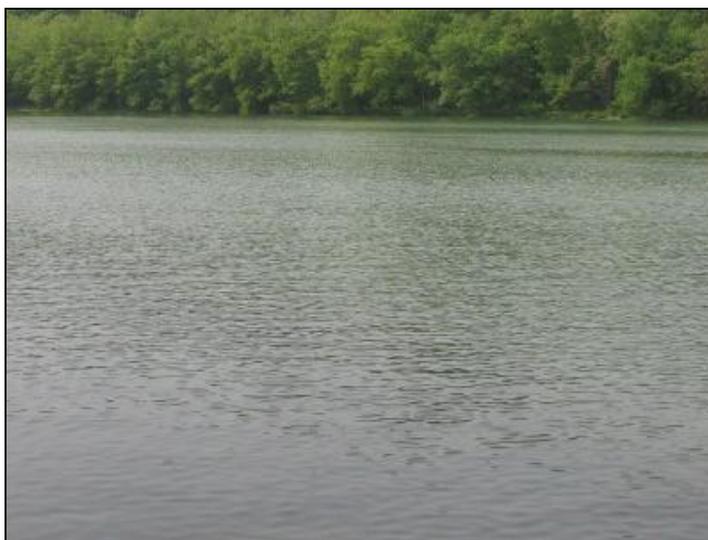
Stream Name	Affected SE Greene Municipality	Chapter 93 Protected Water Use
Pursely Creek	Wayne Township	HQWWF
Monongahela River	All municipalities along the eastern border of the county	WWF
Little Shannon Run	Perry Township	CWF
Whiteley Creek (and its tributaries)	Greene Township Perry Township	TSF
Dunkard Creek	Wayne Township Perry Township Dunkard Township	WWF
Notes: HQWWF - high quality warm water fishery; TSF - trout stocked fishery, CWF – cold water fishery Source: PADEP Chapter 93. Water Quality Standards		

High Quality Warm Water Fishery Streams

HQWWF streams must show a macro-invertebrate community score of 83 percent or better, or be a State Designated Class A trout stream. Pursely Creek, located in northern Wayne Township, is classified as a high quality warm water fishery, as it is a tributary to Southfork Ten Mile Creek.

Warm Water Fishery Streams

WWF streams maintain and propagate fish species and additional flora and fauna that are indigenous to warm water habitat (Pennsylvania Code, 1971). Other than Pursely Creek, the Monongahela River is the only waterway that is classified as a WWF.



Monongahela River (Mackin 2006)

Cold Water Fishery Streams

CWF streams maintain and propagate fish species and additional flora and fauna that are indigenous to a cold water habitat (Pennsylvania Code, 1971). There is one Cold Water Fishery in the Project Area, Little Shannon Run, which runs through the southern portion of Perry Township.

Trout Stocked Fishery Streams

TSF streams are those that provide for the maintenance of stocked trout from February 15 to July 31 and the maintenance and propagation of fish species and additional flora and fauna, which are indigenous to a warm water habitat. The only TSF in the Project Area is Whiteley Creek, which runs through Greene and Monongahela Townships.

Wetlands

A wetland is defined by the United States Fish and Wildlife Service (USFWS) as any land transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of the year (USFWS, 2004). The USFWS provides information on the characteristics, extent, and status of the Nation's wetlands and deepwater habitats and other wildlife habitats. The USFWS attributes causes of wetland losses to urban development, agriculture, silviculture and rural development.

The US Fish and Wildlife Service developed a National Wetland Inventory (NWI) as directed by the Emergency Wetland Resources Act of 1986. Mapping and additional information about Greene County's wetlands can be accessed on the US Fish and Wildlife Service's National Wetland Inventory (NWI) website: <http://wetlandsfws.er.usgs.gov/>. *Map 5.2: Hydrologic Resources* illustrates the known wetland locations within the Planning Area. However, it should be noted that this list is in no way the definitive listing of wetland sites. All future development should take into account that unknown locations may be in existence.

Floodplains / Floodways

According to 25 Pa. Code § 106, the definition of a floodplain is “the 100-year floodway and that maximum area of land that is likely to be flooded by a 100-year flood as shown on the floodplain maps approved or promulgated by Federal Emergency Management Agency (FEMA).” A floodway is defined as “the channel of the watercourse and those portions of the adjoining floodplains, which are reasonably required to carry and discharge the 100-year flood.” Floodplains are important to a community and its environment because they hold back storm flows and reduce destructive flooding downstream and provide an important linkage between aquatic and upland habitat. In addition, they are very fertile habitat, providing for good cropland for agriculture. The one hundred and five hundred-year floodplains are generally narrow and restricted by the steep slopes that border most of the corridor. *Map 5-2: Hydrologic Resources* illustrates the floodplain locations within the Southeastern Greene Project Region.

Floodplains can be found along Hoovers Run and Roberts Run in Wayne Township, Shannon Run in Perry Township, Dunkard Creek in Dunkard Township, Whiteley Creek in Monongahela and Greene Townships, and along Muddy Creek and its tributaries in Cumberland Township.

Groundwater

Water quality and quantity are life sustaining elements for human habitation, and plant and animal life. In very fundamental terms, groundwater is water that has traveled through the soil to locations within the ground where saturation occurs and creates the water table. This area within the ground has rock and / or soil layers that can store and transmit water—these rock and soil layers are called aquifers. There are generally two types of aquifers—consolidated and unconsolidated. Consolidated aquifers are locations of rock (limestone, granite, etc.) that hold water in the fractures of the rock. Unconsolidated aquifers include areas of rock debris or soil that hold the water between the particles.

Groundwater is defined as water under the surface of the earth in the saturated zone (PADEP, 2001). It is found underground in the cracks and pores in soil, sand, and rocks and makes up the base flow of rivers and streams. Groundwater is used everyday for household, agricultural, and industrial needs. Fifty-one percent of the total United States and 99 percent of the rural population of the US uses groundwater for their source of drinking water (The Groundwater Foundation, 2003).

Groundwater production areas are based on the production of known non-residential groundwater wells in the County as reported by private property owners to the PA DEP. The Monongahela River, particularly in the southeast portion of the County, has the highest groundwater production.

Both the quality and quantity of water resources are impacted by the natural occurrence of precipitation and the ability of surface waters to handle the additional flow as well as groundwater to recharge itself. Surface waters and groundwater can both be impacted negatively by human development and/or activities. For instance, development can reduce the effective infiltration of water through soil to provide the necessary recharging of aquifers. Certain development activities can reduce the effectiveness of natural systems to accommodate large water flows thereby causing flooding and erosion.

Surface water production areas represent watersheds that possess exceptional water quality and provide ideal water sources for public consumption. There are no areas within Southeastern Greene County that produce prime surface water protection areas. However, there are 5,240 acres of good surface water protection areas located near Dunkard Creek.

THREATS TO NATURAL RESOURCES

Air Quality

Air pollution is the nation's largest environmental health risk. Two hundred million tons of toxic emissions pollute the air in the United States each year. Much of this pollution is created by human influences, such as industry, power plants, cars, and trucks. Since air pollution is not confined to a specific area, it affects everyone.

Two of the largest sources of air pollution in the county are from Allegheny Energy's Hatfield's Ferry and Fort Martin power plants (NRDC, 2004). Hatfield's Ferry power station is located in Monongahela Township along the shore of the Monongahela River; Fort Martin power station is located in Madsville, West Virginia. Although Fort Martin is not within the political boundary of Greene County, the power station's emissions affect the human and animal population of the county.

Allegheny Energy is in the process of installing a \$750 million sulfur dioxide scrubber at the Hatfield's Ferry Power Station. The project should be completed next year and is designed to remove 95 percent of the sulfur dioxide pollution from the plant's power generators. The scrubber will also reduce mercury and particulates from the plant's air emissions. Once the scrubbers are activated in late 2009, the current discharge of 145,000 to 148,000 tons of sulfur dioxide a year will be reduced to about 131/2 tons.

Each year, the two power stations release nitrogen oxides, sulfur oxides, heavy metals, and particulate matter (NRDC, 2004). High emissions of these chemicals result in negative health effects on humans and animals. Lung damage, heart disease, asthma, respiratory illness, and cancer are documented effects from acute and chronic exposure to some or all of these toxins.

Water Quality

The quality of water in streams, rivers, lakes, ponds, and groundwater is important because it impacts the biological, physical, and chemical processes that take place in these waters directly. Because all water within a watershed and across watershed boundaries is directly or indirectly related, any impacts to one form bear an influence on all of the other forms.

While water can become unsafe for human consumption, without treatment, due to naturally occurring minerals or contaminants such as iron, radon, etc, more often, is the contamination of water supplies from waste disposal, resource extraction, agricultural practices, and human development. Under Section 303(d)

of the Clean Water Act, states, territories, and authorized tribes are required to develop lists of impaired waters (USEPA 2004). This section requires that these jurisdictions establish priority rankings for waters on the lists and develop Total Maximum Daily Loads (TMDLs) for these waters. A TMDL specifies the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and allocates pollutant loadings among point and non-point pollutant sources.

Solid waste, human waste, chemical treatment products, resource extraction, farming, and land use can all affect the quality of water and availability of water. The presence of any one of these things can degrade water quality or even change the level of water from which to draw. Human waste and animal manure are two common causes of water contamination in rural areas. Human development or activities can cause significant damage to the natural occurring recharge and filtration of groundwater thereby reducing the availability of drinking water. Human impacts are typically in one of two forms of pollution—point source and non-point source.

Point Source Pollution

Point source, or end of pipe, pollutants are easily identified and can be directly traced to their source (e.g., industrial discharges, municipal discharges, storm water discharges, combined sewer overflow discharges, and concentrated animal feeding operations (CAFO)).

All point source discharges require a National Pollutant Discharge Elimination System (NPDES) permit, established by Section 402 of the 1972 Clean Water Act. The NPDES permit limits what a facility can discharge, requires monitoring and reporting, and contains other provisions to ensure that the discharge does not negatively impact water quality or people's health. *Table 5-6: NPDES Permits in the Project Area* lists the NPDES permits that have been issued in the Project Area.

Table 5.6: NPDES Permits in the Project Area

Municipality	Facility	Discharge Type
Carmichaels Borough	Bernes Body Shop	hazardous waste
	Carmichaels Area School District	air emissions
	Carmichaels Municipal Water Authority	water discharger
	Daves Amoco Service	hazardous waste
Cumberland Township	Burrell Leder Beltech Inc	hazardous waste
	Carmichaels Cumberland Joint Sewer Authority Waste Water Treatment Plant	multi-activities
	Golden Eagle Construction Company-Carmichaels Plant	multi-activities
	Jefferson Aelmets Inc	hazardous waste
	Montec Hydraulics – Carmichaels Plant	multi-activities
	Nemacolin Mine Youngstown Sheet & Tube	hazardous waste
	Nemacolin Sewage Treatment Plant	water discharger
	Southwestern Pennsylvania Water System	water discharger
	Tetco-Monongahela	hazardous waste
	Yarish Garage	hazardous waste
	Dunkard Township	D&D Auto
Dana Mining Company of PA		water discharger
Dunkard Bobtown Sewage Treatment Plant		water discharger
Jordan Auto Parts		water discharger
Riviera MHP		water discharger
Shannopin Mining Company		multi-activities
Shuppe Rentals Trailer Park		water discharger
Warwick Mine No. 3, 3 North Sewage Treatment Plant		water discharger
Greene Township	Warwick Mine Treatment Plant	water discharger
Monongahela Township	Cumberland Coal Resources LP	water discharger
	Greensboro-Monongahela Sewage Treatment Plant	water discharger
	Hatfields Ferry Power Station	multi-activities
	Jacobs Petro Products Inc (Ganocys Exxon)	water discharger
	Southeastern Greene School District – sewerage systems	water discharger
Perry Township	Arrison HB WV	hazardous waste
	J Tennant Trucking	hazardous waste
	Morgantown Tech SVC	multi-activities
	Mt Morris Sewage Treatment Plant	water discharger
Wayne Township	Accurate Forging Corporation	multi-activities
	Chissy’s Truck Salvage	water discharger
	Consolidation Coal Company	water discharger
	Davis Company LLP	water discharger
	WSPA Inc – Walls Savage	water discharger
Source: EPA’s Envirofacts Warehouse Internet website (http://oaspub.epa.gov/enviro/ef_home2.water)		

Non-Point Source Pollution

Non-Point Sources (NPS) comes from many different sources and is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human made pollutants, depositing them into rivers, wetlands and underground sources of drinking water (EPA, 2007). PA DEP protects four stream water uses: aquatic life, fish consumption, potable water supply, and recreation. Streams are evaluated under the Clean Water Act for attainment of these uses and if a stream segment is found not attaining any one of its four uses, it is considered impaired.

- ❖ Aquatic Life – the integrity reflected in any component of the biological community
- ❖ Fish Consumption – the risk posed to people by the consumption of aquatic organisms
- ❖ Recreational – the risk associated with human recreation activities in or on a water body
- ❖ Potable Water Supply – the risk posed to people by the ingestion of drinking water

Table 5.7: Impaired Streams in the Planning Area lists impaired streams in the Planning Area, their location, principal use, and identifies both the source and primary pollutant for each.

Table 5.7: Impaired Streams in the Planning Area

Stream Name	Municipality	Source	Use
Crooked Run	Dunkard Township	AMD – metals	Aquatic Life
Dooley Run	Perry Township	AMD – metals	Aquatic Life
Dunkard Creek	Dunkard Township	Grazing related agriculture siltation	Aquatic Life
Dunkard Creek*	Dunkard Township	Source unknown – mercury	Fish Consumption
Dunkard Creek	Dunkard Township Monongahela Township	Source unknown – mercury	Fish Consumption
Dunkard Creek	Dunkard Township Monongahela Township	AMD – Metals AMD – Suspended Solids	Aquatic Life
Dunkard Creek*	Perry Township	Source unknown – mercury	Fish Consumption
Dunkard Creek*	Wayne Township	Source unknown – mercury	Fish Consumption
Monongahela River*	Dunkard Township Monongahela Township	Source Unknown – PCB Source Unknown - Chlordane	Fish Consumption
Rush Run	Wayne Township	AMD – metals	Aquatic Life
Unnamed Tributary to Pumpkin Run	Cumberland Township	Crop Related Agriculture – Nutrients ; Grazing Related Agric - Organic Enrichment/Low D.O.	Aquatic Life
Unnamed Tributary to Whiteley Creek	Monongahela Township	Small Residential Runoff - Organic Enrichment / Low D.O.	Aquatic Life
Whiteley Creek	Greene Township (west of Garards Fort) Monongahela Township (east of Sigsbee)	Agriculture – siltation; Subsurface mining – siltation	Aquatic Life
Source: PA DEP, 2007 (http://www.emappa.dep.state.pa.us/emappa/viewer.htm)			
* indicates that the stream listing is tentative and up for approval the following year			

By far, Dunkard Township and Monongahela Township have the most impaired streams and unnamed tributaries in the Project Area (not all unnamed tributaries are listed in *Table 5-7*). However, no impaired streams pose a threat to either recreational use or water drinking supply. Abandoned mine drainage (AMD) and agricultural activities are the two most common sources of impairment. Dunkard Creek was identified as a fishery impacted by AMD through the Natural Infrastructure Project, which was conducted for the ten-county region in southwestern Pennsylvania, as noted on *Map 5-3: Environmental Concerns*.

Abandoned Mine Drainage

Mine Drainage, Dunkard Township (Mackin 2007)

According to PA DEP, mining accounts for more than 70 percent of the degradation of the Monongahela River watershed. AMD is a source of non-point source pollution from a complex interaction involving sulfides and oxygen during the mining process. After mines are abandoned, drainage flowing from these sites often decreases the pH of streams and rivers affected by the drainage. Additionally, it can elevate concentrations of heavy metals and suspended solids within impacted waterways (Frey, 1996). Many serious problems arise from AMD, including contaminated drinking water, plant and animal growth and reproductive problems, and corrosion of infrastructure. AMD is both a severe ecological and economic problem.

As the fourth largest coal producing state in the United States, Pennsylvania has more than 250,000 acres of abandoned mine lands, refuse banks, old mine shafts and other relics, according to the PA DEP. As a result of these abandoned lands and subsequent mine drainage, more than 2,400 miles of stream are polluted and do not meet water quality standards. Thus, AMD remains as the single biggest source of surface water impairment in the state of Pennsylvania.

PA DEP maintains an inventory of the approximate location of Abandoned Mine Land Problem Areas containing public health, safety, and public welfare problems created by past coal mining. It is a subset of

data contained in the Office of Surface Mining (OSM) Abandoned Mine Land Inventory. Each abandoned mine land site consists of one or more of the following documented features:

- ❖ Abandoned strip mines (dry or flooded)
- ❖ Spoil piles
- ❖ Mine entries (drift, tunnel, or country bank)
- ❖ Mine shafts
- ❖ Crop falls
- ❖ Subsidence openings
- ❖ Abandoned refuse piles (burning and not burning)
- ❖ Underground mine fires
- ❖ Subsidence-prone areas
- ❖ Abandoned structures or equipment
- ❖ Abandoned coal processing settling basins
- ❖ Deep mine discharges and surface mine seeps or discharges

The purpose of this inventory is to provide the necessary data to implement Title IV Abandoned Mine Reclamation, of the Surface Mining Control and Reclamation Act (SMCRA) of 1977. SMCRA is a federal grants program provided to PA DEP to reclaim eligible high priority abandoned mines. A problem is eligible for funding if it resulted from pre-August 3, 1977 mining. Active coal operators pay a 35-cents-per-ton fee for each ton of surface-mined coal and 15-cents-per-ton of deep-mined coal to fund the program.

There are 26 abandoned mine land sites in the Planning Area, as listed in *Table 5-8: Abandoned Mine Land Inventory*. For more detailed information regarding the abandoned mine land features present, please visit PA DEP's website at <http://www.emappa.dep.state.pa.us/emappa/viewer.htm>.

Table 5-8: Abandoned Mine Land Inventory

Cumberland Township		
Crucible North	Rices Landing South	Stringtown South
Carmichaels North	Stringtown North	
Dunkard Township		
Bald Hill East	Glade Run	Taylorstown
Bobtown Northeast	Mt Pleasant	Taylorstown East
Crooked Run 1	Mundell Hollow	Walnut Hill
Crooked Run 2	Newtown	West Point Marion
Dunkard Creek	Poland Mines	
Durrs Knob	Roberts Run	
Greene Township		
Garards Fort Southeast		
Monongahela Township		
Ceylon	Mable Hill West	Mapletown Jr High
Perry Township		
Calvin Run		
Source: PA DEP, 2007 (http://www.emappa.dep.state.pa.us/emappa/viewer.htm)		

In 2003, Dunkard Township received a \$600,000 grant to use 10-Percent Mining Set-Aside funds to pump the Shannonpin Deep Mine pool and construct a treatment facility for 3,500 gallons per minute of mine water.

Urban Runoff

Increased urban development results in an increased pollution load that reaches area water bodies, and therefore, is considered another form of non-point source pollution. Natural landscapes, such as forests, fields, and wetlands, are porous and act as natural filtering systems that help to carry rainwater and snowmelt runoff gradually flow toward receiving waters. Urban areas, on the other hand, are nonporous and, as a result, storm drains are installed to quickly channel runoff from roads and other impervious surfaces into receiving streams and/or treatment areas. This runoff contains sediment from development and new construction; oil, grease and toxic chemicals from automobiles; nutrients and pesticides from turf management and gardening; viruses and bacteria from failing septic systems; road salts; and heavy metals and reaches receiving waters quickly, traveling at a high velocity. This large volume of quickly flowing runoff has the potential to erode stream banks, damage streamside vegetation, widen stream channels, and carry pollutants such as directly to the stream (USEPA, 2004).

Agriculture

Pollution from unmanaged agricultural practices contributes to the degradation of the waterways and groundwater. Fertilizers, manure, pesticides, and silt from agricultural lands can contribute to heavy siltation, nutrient accumulation, and suspended solids within stream and groundwater systems. In addition, unrestricted access of livestock into streams also creates harmful effects, such as, stream bank erosion, sedimentation and excessive nutrient enrichment. Approximately 41 percent of the Project Area is classified as agriculture (using land classification for parcel data from the Greene County Tax Assessment Office). The following shows the percent of agricultural lands per municipality:

- ❖ Carmichaels Borough – 0%
- ❖ Cumberland Township – 36%
- ❖ Dunkard Township – 47%
- ❖ Greene Township – 31%
- ❖ Greensboro Borough – 0.2%
- ❖ Monongahela Township – 36%
- ❖ Perry Township – 46%
- ❖ Wayne Township – 46%

In 2001, the Greene County Conservation District received a Growing Greener grant for the installation of agricultural best management practices (BMPs) in Dunkard Creek watershed. BMPs included streambank fencing, stabilized agricultural crossings, livestock watering facilities, pasture and hayland plantings, heavy use area protection, timber stand improvements and wildlife habitat management. The project was completed to implement the Dunkard Creek Rivers Conservation Plan (RCP).

Sewage Discharge

Sewage discharge is a form of non-point source pollution. Raw sewage discharge often results in elevated levels of fecal coliform bacteria, which can lead to potential health risks. In addition, untreated sewage discharge leads to an increase in nutrients in a stream system leading to an increase in Biological Oxygen Demand (BOD) making it more difficult for macroinvertebrates and fish to survive. According to a countywide sewerage study performed by Charterhouse Associates in 2006, the following percentage of each municipality is using decentralized sewerage systems (private septic systems, etc.):

- ❖ Carmichaels Borough: 0%
- ❖ Cumberland Township: 44%
- ❖ Dunkard Township: n/a
- ❖ Greene Township: 100%
- ❖ Greensboro Borough: 0%
- ❖ Monongahela Township: n/a
- ❖ Perry Township: 52%
- ❖ Wayne Township: 70%

Locations of suspected raw sewage discharge were identified by the Steering Committee. These locations were mapped and are displayed on *Map 5-3: Environmental Concerns*.

Monongahela Township

- ❖ Village of Alicia: Alicia Road near Monongahela River
- ❖ Village of Mapletown Crossroads: State Route 88 from Sugar Grove Road to Mapletown / Stone Hill Road
- ❖ Village of Poland Mines: Dunkard Road, Main Street, Maple Street

Issues surrounding sewage discharge and the treatment of wastewater are discussed in greater detail in *Section 6: Community Facilities*

Extraction

An additional non-point source of water pollution in the Planning Area may arise from oil and gas extraction. Because water is used as a primary lubricant or coolant during all phases of extraction—exploration, well development, production and site abandonment—the water has the opportunity to mix with a variety of chemicals and materials. Although all these processes create waste water, the majority is produced during production and site abandonment. In addition to improper disposal of waste water, this water pollution can also be in form of brine, waste pit sludge, and erosion and sedimentation.

Dirt & Gravel Roads

Dirt and gravel roads cause erosion, sediment, and dust pollution. Sedimentation is the most common source of pollution to streams. The Pennsylvania State Conservation Commission's Dirt & Gravel Road Program is a water quality improvement program that is designed to address sedimentation problems from dirt and gravel roads. The program funds environmentally sound maintenance of unpaved roadway sections that have been identified as sources of dust and sediment pollution. The program is locally administered by the Greene County Conservation District and projects are:

- ❖ Proposed by local road maintenance entities on one-page grant applications.
- ❖ Reviewed for appropriateness by a local 4-member Quality Assurance Board (QAB).
- ❖ Considered for approval by the county conservation district board of directors.

In addition, the road must be associated with a stream and directly affect water quality. There are no active projects in Greene County currently but the Conservation District is taking applications. Both Greene and Monongahela Townships have filed applications.

With their steep slopes, environmentally sensitive waterways and high percentage of unpaved roads, both Wayne Township and Perry Township could benefit from application to the Dirt & Gravel Road Program.

Hazardous or Nuisance Areas

Hazardous and Toxic Waste Sites

An inventory of hazardous and toxic waste sites was conducted for Greene County using the US Environmental Protection Agency's (USEPA) Right-to-Know Network database (USEPA, 2004). This query system identifies waste management facilities listed within the following regulatory databases:

- ❖ Resource Conservation and Recovery Information System (RCRIS)
- ❖ Comprehensive Environmental Response, Cleanup, and Liability Information System (CERCLIS)

RCRIS Sites

Resource Conservation and Recovery Act (RCRA) allows the federal government through the auspices of the USEPA to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous wastes (USEPA, 2006). The Right-to-Know Network database was used to identify any Large Quantity Generators (LQG) located within the county. LQGs are operations that produce >2,200 lbs. of hazardous waste in any given month of the year. Results of this search indicated that there are four LQGs in the Project Area; none of these LQGs were noted as having any current violations as of June 2004. The sites listed below are small quantity generators (SQG).

Carmichaels Borough

- ❖ Daves Amoco Service (SQG)

Cumberland Township

- ❖ Golden Eagle Construction Company: Carmichaels Plant (SQG)
- ❖ Montec Hydraulics: Carmichaels Plant (LQG)
- ❖ Nemaquin Mine Youngstown Sheet & Tube (LQG)
- ❖ Tetco-Monongahela (LQG)

Dunkard Township

- ❖ Shannopin Mining Company (SQG)

Monongahela Township

- ❖ Consolidation Coal Co., Robena Prep Plant (SQG)
- ❖ Hatfields Ferry Power Station (SQG)

Perry Township

- ❖ Arrison HB of WV, Inc (SQG)
- ❖ Mountaineer Honda / Mazda / Hyundai (SQG)

Wayne Township

- ❖ Accurate Forging Corporation (LQG)

CERCLIS Sites

Comprehensive Environmental Response, Cleanup, and Liability Act (CERCLA) provides a Federal “Superfund” to clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment. Through the Act, EPA was given power to seek out those parties responsible for any release and assure their cooperation in the cleanup (USEPA, 2006). The CERCLIS database provides listings of regulated hazardous waste sites along with the federal environmental legislation related to these sites. Using a CERCLIS query, no Pennsylvania Superfund Sites (NPL) or active CERCLIS sites were identified within Greene County.

Landfills

There are no municipal waste landfills located within Greene County. Allegheny County and Greene County are the only two counties in southwestern Pennsylvania that have no areas suitable for a landfill. Butler, Indiana and Armstrong Counties offer the most land suitable for a landfill (PEC et al, 2005).

Illegal Dumping / Littering

Littering has significant environmental, economical, and aesthetic impacts to an area. Both the aquatic and terrestrial environment are affected by both physical and chemical littering. Water pollution results from the improper or illegal disposal of chemicals. Littering impacts a community economically by increasing the cost to the taxpayer. Cleaning up litter is approximately nine times more expensive than collecting trash from trash receptacles (PA DEP, 2004). Trash could also potentially reduce property value in a community. The presence of litter has a negative impact on the aesthetic value of a community and can reduce the quality of life for some individuals.

Littering and illegal dumping is a problem in Greene County; abandoned tires, cans and bottles, scrap lumber, furniture, and even appliances are found at various locations around the County. The Greene County Conservation District is currently in the final spending stage of a \$70,000 Growing Greener 2003 grant for the removal of illegal dumps throughout the Dunkard Creek Watershed.

The Project Area steering committee has identified and mapped sites that are prone to illegal dumping / littering. These sites have been noted and are shown on *Map 5-3: Environmental Concerns*.

Cumberland Township

- ❖ Illegal dumping along Tin Can Hollow Road.

Dunkard Township

- ❖ Illegal dumping along Brick House Road.
- ❖ Illegal dumping along Creek Hill Road.

Greensboro Borough

- ❖ Illegal dumping along Front Street.

Monongahela Township

- ❖ Illegal dumping along Kiger Road.

Perry Township

- ❖ Littering along Locust Avenue/SR 2009 near Mt Morris.

Illegal dumps and/or littering should be reported to local officials first, as they are familiar with properties and residents and should be able to respond quickly. The following state agencies may also be contacted:

- ❖ PA State Police – will respond if there are no local police or the problem is on public land (such as a state road right-of-way).
- ❖ PA DEP – will respond if illegal dumping has occurred (will not respond to littering complaints).
- ❖ PA Game Commission – will respond if littering and/or dumping occurs on State Game Lands and on private property that is open to hunting.
- ❖ PA Fish and Boat Commission – will respond if the trash lies in or near surface waters, particularly trout streams.

ENVIRONMENTAL/CONSERVATION RESOURCES

Organizations

Greene County Conservation District

The Greene County Conservation District is governed by a Board of Directors comprised of at least four farm directors, no less than two public directors, and one county commissioner. It is these directors who plan and direct the District programs, coordinate the help of governmental agencies, assign priority to requests for assistance from private landowners for resource development efforts, and serve as a community through the District every year. The policy of the Greene County Conservation District is to provide for the conservation of the soil, water and related resources of Greene County, for the control and prevention of soil erosion, and to preserve natural resources; assist in the control of floods; prevent impairment of dams and reservoirs; assist in maintaining the navigability of rivers and harbors; preserve wildlife; preserve the tax base; protect public lands; and protect and promote the health, safety and general welfare of the people of Greene County (www.co.greene.pa.us).

The following programs are sponsored by the Conservation District:

- ❖ The Dirt and Gravel Roads Program
- ❖ Water Resources Symposium
- ❖ Ryerson Lake Watershed Assessment Project
- ❖ Watershed Specialist
- ❖ Nutrient Management
- ❖ Project Grass

The following Conservation District projects are located within the Southeastern Greene County Planning Area:

- ❖ Rudolph Run Assessment Project (*Perry Township*)
- ❖ Woodland Avenue Storm Water Assessment Project (*Wayne Township*)
- ❖ Dunkard Creek Non-Point Pollution Project (*Dunkard Township*)
- ❖ Muddy Creek, Little Whiteley Creek, Whiteley Creek, and Non-Point Pollution Project (*Carmichaels Borough, Cumberland Township, Greene Township, Monongahela Township*)
- ❖ Dunkard Deep Mine Assessment Project (*Dunkard Township*)
- ❖ Dunkard Dump Cleanup Project (*Dunkard Township*)
- ❖ Whiteley Creek Watershed Strip Mine Reclamation Site Project (*Greene Township & Monongahela Township*)

Greene County Watershed Alliance (GCWA)

The GCWA was formed in October of 2000, became incorporated in May of 2001, and as of June 2002 the GCWA is a 501(c)3 charitable organization. The goals of the GCWA are as follows:

- ❖ To educate the public about issues and concerns pertaining to the watersheds which originate or pass through Greene County.
- ❖ Promote the wise use of our natural resources, and encourage restoration and conservation practices that will promote sustainable land use and water quality.
- ❖ Serve as a central source for watershed information.
- ❖ Encourage the development of grassroots watershed organizations.

Tally Hollow

The 66-acre former family farm was longwall mined by Consol Energy before leasing the farm to Sustaining Greene County, a nonprofit environmental group that runs farming and forestry demonstration projects there aimed at lowering pollution levels in the watershed. As with many streams in Greene County, erosion and sedimentation dominate Rudolf Run. Tally Hollow will be the first demonstration site in Greene County that highlights forestry best management practices, and will include forest stand plantings, better timbering practices, stream management practices, and free-range poultry production by funding made available from the PA DEP Growing Greener grant program.

The GCWA is partnering in this effort with Sustaining Greene County by providing water quality stream monitoring for the purpose of education/outreach. With the assistance of Canaan Valley Institute and WV DEP, a water quality monitoring plan will be developed specific to the unnamed stream that flows through Tally Hollow.

Dunkard Creek Watershed Restoration

Through a partnership effort with Streams Restoration, Inc. and 76 other supporting partners in Pennsylvania and West Virginia, including local landowners, business owners, community members, local, state and federal government agencies and other nonprofit organizations, the Dunkard Creek Watershed Restoration proposal was developed to improve the Dunkard Creek watershed. The project will use funding from the EPA funding to construct a Passive System using the latest technology to remove metals and other pollutants from an abandoned mine discharge. Work will include a study for the removal of Manganese and a hands-on interactive environmental education program will showcase three acres of naturally-functioning wetlands with about 30 native species as well as explain wildlife habitat and stream water quality improvements (<http://www.greenwatersheds.org/index.html>).

The East Dunkard Watershed Association

The East Dunkard Watershed Association was organized in 2002 by the Greene County Watershed Alliance through a PA DEP Growing Greener grant. The purpose of this organization is to unify the eastern Dunkard Creek watershed and implement the Dunkard Creek Rivers Conservation Plan. Working in partnership with the Greene County Conservation District, an awareness campaign has been developed to gain interest in watershed issues throughout the community that include acid mine drainage, illegal dumping, historical components as it relates to past economic trends, recreation, and an evaluation of overall watershed sustainability. Several partnerships have been created with other local organizations, including the Bobtown Rod & Gun Club, Bobtown Reading Center, and the Dunkard Grange. Their efforts have enabled the community to participate in streamside clean-ups, public meetings, and has allowed for displays and informational material.

The goal of the East Dunkard Watershed Association is to develop a more unified organization by attaining nonprofit 501(c)3 status, which will enable the association to engage the local community on watershed issues through education/outreach, recreational activities, and provide to this organization the tools it needs to seek funding from public and private sources (<http://www.greenewatersheds.org/edunkard.html>).

A Rivers Conservation Plan was completed in 2000 for the Dunkard Creek Watershed. Biological, physical, and social/cultural characteristics of the watershed were discussed in the report and several major concerns were identified with AMD labeled as the number one problem and first priority in the watershed. Other issues listed in descending order of priority by the Plan include: solid waste/trash dumps, erosion/sedimentation, education, sewage, water quality, and recreation/heritage.

Greene County PA Cleanways Chapter

The Greene County PA Cleanways Chapter was organized in 2001 to combat illegal dumping and littering, and to educate the public of the detrimental effects these activities have on the environment.

The County's PA Cleanways Chapter has contributed a significant amount in the reduction of these dumps and littering havens. Reporting illegal dumps via the PA Cleanways website alerts the volunteer group to specific areas that need attention (PA Cleanways, http://www.pacleanways.org/enf_reportinglitterdumpingindex.html, 2006). The most recent event was held in April of 2007, a Special Collection/Recycling Event, at the Greene County Fairgrounds in Greene County. The event was a free one-day event where they collected goods and tires.

Western Pennsylvania Conservancy

The Western Pennsylvania Conservancy (WPC) is a non-profit organization that was formed in 1932 to conserve natural resources. WPC has acquired land for the creation of the following state parks; Ohiopyle State Park, Laurel Ridge State Park, Oil Creek State Park, McConnell's Mill State Park, Moraine State Park, and Erie Bluffs State Park. In 1980, the WPC acquired the 1,152-acre Lone Star Farm, which was sold to the PA Game Commission in 1993 to expand State Game Lands 223. There is no property owned by the WPC in Southeastern Greene County.

GOALS AND STRATEGIES**GOAL: Actively support the remediation of abandoned mine drainage from streams and tributaries in the Project Area.**

- ❖ Municipalities of the Dunkard Creek watershed should provide support to the Dunkard Creek Watershed Association. The Townships should begin to meet regularly with representatives of the Watershed Association and determine what services can be provided to aid their efforts.
- ❖ Focus remediation efforts to the impaired streams listed in *Table 5:7 Impaired Streams in the Project Area*.
- ❖ Pursue funds from the 10-Percent Mining Set-Aside program to restore water quality in the Project Area.

GOAL: Protect the significant natural resources within Southeastern Greene County

- ❖ Follow the suggestions given in the Greene County Natural Heritage Inventory by incorporating the seven recommendations for protecting Natural Heritage Areas (listed on page 5-5 of this plan) into any land use and development planning process.
- ❖ Development should be restricted in areas designated as flood prone areas, see *Map 5.2: Hydrologic Resources*.
- ❖ Protect environmentally sensitive areas within the municipalities by establishing Rural Resource Areas, as allowed under the Pennsylvania Municipalities Planning Code, Act of 1968, P.L. 805, No. 247 as reenacted and amended.

GOAL: Eliminate unsightly and hazardous illegal dump sites within Southeastern Greene County.

- ❖ Support the efforts of the Greene County PA Cleanways chapter to identify, prioritize and clean illegal dump sites. Townships can assist by identifying new sites and offering the use of municipal owned heavy equipment in the clean up process. *Map 5.3: Environmental Concerns* lists illegal dumping and littering sites.
- ❖ Identify areas in the communities to place trash receptacles. Specific locations should include areas with a more dense population, such as:

- Carmichaels
- Mt. Morris
- Greensboro
- Greene River Trail

- ❖ Organize an annual clean up day to clean creeks and other natural areas. Involve local community groups and schools.

- ❖ Enact or revise ordinances that enforce fines for illegal dumping and littering.

- ❖ Partner with PennDOT to remove litter from state roadways by developing a “Keep PA Beautiful” program for the project area.

GOAL: Reduce other sources of non-point stream pollution throughout Southeastern Green County.

- ❖ Wayne Township and Perry Township should both consider application to the Pennsylvania State Conservation Commissions Dirt and Gravel Road Program to reduce sedimentation from the numerous unpaved roads in both townships.

- ❖ Follow the recommendations given in Section 6 to reduce the problems associated with wastewater treatment and untreated sewage discharge.

- ❖ Focus treatment of raw sewage discharges of areas listed on page 5-25.

- ❖ Partner with the Greene County Conservation District to improve water quality, specifically through the installation of agricultural best management practices.

- ❖ Educate property owners along the creeks about the importance of riparian buffers. Riparian buffers are areas of vegetation that are maintained along the shore of a water body to protect stream water quality and stabilize stream channels and banks.

- ❖ Pursue additional 10-Percent Mining Set-Aside funds to pump and treat the numerous abandoned mines throughout the Planning Area.

- ❖ Partner with Greene County Conservation District to conduct a Watershed Evaluation of the Whiteley Creek Watershed.

- ❖ Partner with Greene County Conservation District to conduct an inventory assessment of acid mine drainage sites in Southeastern Greene County.

- ❖ Dunkard Township should partner with Greene County Conservation District to clean up the discharge from Dunkard Creek near Newtown.

GOAL: Protect groundwater and surface groundwater production areas

- ❖ Preserve 5,240 acres of good surface water protection areas located near Dunkard Creek.