

NATURAL RESOURCES**INTRODUCTION**

To assist in providing orderly, intelligent, and efficient growth for Perry County, it is essential that the appropriate features of the natural environment be delineated, and that this information be integrated with all the other planning tools and procedures. The purpose of this section is to provide a practical compilation of all the available environmental data as an aid to planning in the County. It is important that government decision makers and the residents of the County are aware of the constraints that the natural environment may impose upon the future development of the County.

CLIMATE (REGIONAL)

Perry County is dominated by atmospheric flow patterns common to Humid Continental type climate. The complex weather systems that influence the area originate in the Central Plains of the United States. As they travel eastward, they are gradually modified by the characteristics of the underlying topography. Moisture in the form of precipitation is lost due to topographic uplift, as the weather systems moving eastward are lifted over the Appalachian Mountain chain. A secondary flow pattern and primary source of heavy precipitation associated with cyclonic circulation forms from the Gulf of Mexico northward through the County. The moist airflow from the Atlantic Ocean, to the east, is a modifying rather than a controlling climatic factor. A considerable amount of moisture is periodically picked up by storms developing and moving up along the southeastern coastline of the United States. Disturbances of this type usually bring moderate to heavy precipitation to the Lower Susquehanna River area due to the general up slope motion of moist air over the area's rugged terrain. In the colder months when temperatures are near or below freezing, these storms often deposit heavy amounts of wet snow throughout the area. The Great Lakes, a source of moisture, have little or no influence on the climate of the study area since the weather systems formed over the Great Lakes typically migrate northward.

The normal succession of high and low pressure systems moving eastward across the United States produce weather changes in the area every few days in the winter and spring of the year. In the summer and fall, the weather changes are less frequent due to a slowing down of the general atmospheric circulation during the warmer months. Low-pressure cyclonic systems usually dominate the area with southerly winds, rising temperatures, and some form of precipitation. The high-pressure anticyclonic systems normally bring west to northwest winds, lowering temperatures, and clearing skies to the area.

Hurricanes or tropical disturbances as they move northward, follow a northeasterly path in the middle latitudes and produce heavy rainfalls and strong surface winds in the study area. Frequently affecting water supplies and causing floods, these tropical storms are observed during the hurricane season, June through November.

Weather elements or activities of the atmosphere, such as precipitation, temperature, wind direction and speed, relative humidity, and sunshine have measurable qualities; which affect the study area.

The study area normally receives about 46 inches of precipitation annually. Normal monthly precipitation totals average from a minimum of 2.6 inches in February to a maximum of 4.3 inches in August. Snowfall is light to moderate averaging about 30 inches annually, while the mean annual number of days with snow cover one inch or more is about 50 days.

Air temperatures are important to the management of water resources and water quality. The average annual temperature for the study area is about 50 degrees F. The mean freeze-free period is about 175 days. Because of the rugged terrain, the freeze-free season varies between 170 days in the mountains to 180 days in the lowlands. In the study area, the summer mean temperature is about 76 degrees F, and the winter mean is about 32 degrees F.

Winds are important hydrological factors because of their evaporate effects and their association with major storm systems. The prevailing wind directions in the area are from the northwest in winter and from the west in spring. The average wind speed is 10 mph, with an extreme wind speed of 68 mph from the west-northwest reported in the Lower Susquehanna area during severe storm activity in March of 1955.

Relative humidity also affects evaporation processes. The mean monthly relative humidity for the months of January, April, July, and October are about 68 percent, 62 percent, 70 percent and 75 percent, respectively.

Sunshine, which varies with latitude and time of the year, is a factor to be considered in the various aspects of water resources. The mean annual sunshine in hours per year for the study area is about 2,500 hours.

The evaporation process is controlled by temperature, wind, sunshine, and humidity. The rate of evaporation during the warmer months has an important impact on water storage in reservoirs and on irrigation. The mean May to October evaporation accounts for about 72 percent of the total annual evaporation.

Development in the County should take some of the climatic conditions into consideration. Tree lines and high ground should be on the northwest side of buildings to take advantage of microclimates of a tract of land. By breaking the velocity of the northwest winds, energy conservation can be realized by reducing the temperature slightly. To take advantage of the sun for passive or active solar systems, building should have south facing walls. Although the climate will not have a major effect on land uses, it should be considered in the layout of buildings.

CLIMATE (LOCAL)

Located at the Harrisburg International Airport, in Harrisburg/Middletown, at 40.2 ° north latitude by 76.7 ° west longitude at an elevation of 308’ is a U.S. Weather Service recognized weather station. The following weather statistics were recorded at the weather station.

**TABLE 3-1
PERRY COUNTY WEATHER STATISTICS
(Harrisburg/Middletown Station)**

Coldest Temperature	-9 ° Fahrenheit	Clear Days	85
Hottest Temperature	107 ° Fahrenheit	Partly Cloudy Days	111
Average Mean Temperature	52.9 ° Fahrenheit	Cloudy Days	169
Average Annual Rainfall	37 – 42.9 inches	% Chance of Sunshine	57%
Maximum Annual Rain	81.74 inches (1996)	Relative Humidity (Morning Average)	76
Average Annual Precipitation	40.50 inches		
Average Annual Snowfall	34.8 inches	Relative Humidity (Afternoon Average)	54
Maximum Annual Snowfall	92.2 inches (1996)		
Maximum Seasonal Snowfall	117.7 inches (1995-1996)		
Wind (Average Speed)	7.5 MPH	Wind (Maximum Speed)	7.7 MPH

SOURCE: *National Oceanic and Atmospheric Administration (NOAA)*

HYDROLOGY

In order to provide safe usable drinking water at continuous levels for the residents of the County, as well as guide future development in areas of potentially damaging high water levels in streams and rivers, decision makers must understand the importance of watershed management. Studies of water usage pertaining to water consumption and quality are generally concerned with low water flow conditions. Where floodplain management is concerned, high water levels and its flow patterns are of considerable importance. Only through understanding and awareness of watersheds by decision makers and residents in combination with responsible management can positive results be attained within Perry County’s watersheds.



The Juniata River from the PA Traffic Route 17 Bridge (looking southward)

A watershed is the entire land area drained by a particular watercourse. Land use activities and wastewater discharges within the watershed determine the quality of the water; which eventually flows out of the drainage area. The concept of watershed management has practical planning application, due to the fact that it is the primary geographic region in which to collect water resources.

Almost all of Perry County lies in the Susquehanna River watershed. The Juniata River is a major tributary that enters the Susquehanna River at the eastern county line. The Juniata River portion of the Susquehanna River watershed drains 37 percent of the County while nearly 63 percent drains into the Susquehanna River from sources other than the Juniata River. The largest drainage area into the Susquehanna River from those other sources is Sherman Creek; which drains 42 percent of Perry County. Only a very small area of 520 acres along the western boundary drains into the Conococheaque Creek, a contributing tributary to the Potomac River Basin.

The first factor affecting water flow conditions is runoff; which is primarily influenced by precipitation distribution. However, other factors such as land cover and land use, geology and physiography influence the variability of flows from individual watersheds.

Runoff has a distinct seasonal variation, with the period of highest runoff occurring in late winter or early spring, and the period of lowest runoff occurring in late summer and early fall. The seasonality of evapotranspiration accounts for most of this variation.

Low flow deficiencies develop after prolonged periods of little or no precipitation and persist until sufficient rainfall relieves the situation. Flow deficiencies of significant duration may cause new water supply problems and may magnify existing water quality problems.

Although floods occur in all seasons, studies of the relationships among storm intensity, duration, affected area, and seasonality suggest a tendency for flooding on principal streams to occur in winter and for floods on small streams to occur mostly in summer. Large flood areas are caused by storms of low rainfall intensity and long duration covering the entire area of principal watersheds. Small area floods, on the other hand, are caused by storms of high rainfall intensity and relatively short duration. An exception to this is tropical storms; which normally occur during the summer months and cause extensive flooding over large areas. The result of such flooding over long periods of time is the creation of flood plains.

Flood plains are defined as low lying, flat areas adjacent to streams, which are subject to frequent, periodic flooding. For the purpose of land use planning in Perry County, those areas delineated by the Federal Emergency Management Agency as within the 100-year flood boundary and those areas delineated as floodplain soils in Table 16 of the Soil Survey of Cumberland and Perry Counties, Pennsylvania, issued April 1986, should be considered flood plains.

Flood plains are intrinsic and beneficial aspects of the natural landscape. They allow for an increase in drainage during rainy periods and buffer the stream from any detrimental effects of surrounding land uses. **Map 3-1** shows the 100-year flood plains in Perry County.

GROUNDWATER

The Topography, or physical land features, of the study area determines the drainage patterns and surface flow characteristics. Steeper slopes cause increased runoff and erosion and discourage infiltration to the water table. Groundwater flow directions are controlled in part by the topography.

Bedrock geology has ultimate control on the storage, transmission, and utilization of groundwater. Geologic factors such as rock type, intergranular spacing, rock strata inclination, faults, joints, folds, bedding planes, and solution channels affect groundwater movement and availability. Natural groundwater quality is a result of interaction between the groundwater and the bedrock with which it is in contact. The more soluble bedrock types will allow more compounds to become dissolved in the groundwater. For example, groundwater in highly soluble limestone aquifers will commonly have high hardness values. Groundwater quality will eventually affect surface water quality as it percolates into surface streams as base flow.

The County is located within the physiographic province called the Ridge and Valley Province. The mountains running east and west through the County are the ridge portions of the province. Rock types in the ridge section are quartzite, sandstones, and conglomerates. Most of the sandstones, conglomerates, and quartzite are tightly cemented, and in general, their primary porosity is quite low. Although these rocks are tightly cemented and have a low primary porosity, they are hard and brittle so that numerous joints have developed. These joint openings produce a secondary porosity, which increases the permeability of the rock. In general, the number and size of joint openings decrease with depth. With quartzite, jointing is the most important factor in groundwater production.

A major portion of the Valley Province is composed of shales. The shale provides about half of the wells of the Valleys with an adequate amount of groundwater for domestic needs. The pore spaces in these shales are very small. Fortunately, however, joints break the shale and it is these joints, as well as spaces between bedding planes, that allow for some water movement. In hard, brittle shale, joints are more open and tend to have somewhat greater yields.

The remaining portion of the County is composed of limestone and dolomites. Almost anywhere in these areas where limestone or dolomite occur at the surface or in the subsurface, serious problems may be expected from solution opening cave-ins. Such depressions are known as sinkholes. Surface drainage passes directly into the groundwater system, which means a high potential for groundwater pollution.

SLOPES-TOPOGRAPHY

The topographic features of the landscape are derived from the structure and weathering characteristics of the underlying bedrock. The more weather-resistant rock is responsible

for areas of higher elevation, while less resistant rock, such as limestone has eroded to form low lying valleys of moderate relief.

The features of Perry County showing the most prominent relief are Blue Mountain, which forms the southern boundary of the County, Tuscarora Mountain, which forms the northern boundary, a series of mountains in the eastern half of the County including Cove Mountain, Mahoney Ridge and Buffalo Mountain, and several mountains in the western portion of the County including Sherman Mountain, Bowers Mountain, Amberson Ridge, Rising Mountain and Conococheague Mountain. These mountains along with numerous ridges with local names run in a general east-west direction divided by several valleys. The valleys are generally rolling and border the local streams, which created them. The major break in this pattern is the narrow valley carved by the Juniata River while the eastern boundary is also a valley created by the Susquehanna River.

Topography has been a determining factor in the distribution of population within Perry County. Because of the relative ease of development of the flatter areas, the more desirable lands are those occurring in the valleys located on these mostly level lands. The steeper the slopes of the mountain and hill areas of the County have presented physical barriers to the development of these lands, which are, therefore, the least populated areas of the County. The combination of the valleys meeting the rivers created an ideal area for development of such Boroughs as Marysville, Duncannon, Millerstown, Newport and Liverpool.

Agricultural uses also occur in the valleys, as these lands allow for efficient farming operations. In Perry County, this factor is enhanced by the occurrence of the best agricultural soils with the lower, flatter lands. Additional competition for the flatter lands is intensified because commerce and industry, along with residential and agricultural uses, seek flatter, more easily developed areas.

In the development and planning of any area, the slope of the land is a major factor. **Map 3-2** shows those areas of 15 percent and over. Development in these areas should be considered with caution.

When discussing the slope of the land, it is important to keep in mind that the natural gradients are created by erosion forces trying to establish a stable condition. Sometimes when altering these slopes in road building or other construction, it upsets the balance, which results in landslides, rock falls, mudslides, and soil creep as nature tries to restore the equilibrium.

Within Perry County, soil creep is prevalent and may at times be severe in areas where shale occurs. In locations where soil creep should be curtailed, adequate drainage leading water away from the face of a steep slope and keeping it from entering the top of the slope is advisable.

GEOLOGY

Geologists recount that at one time the eastern part of the United States sank below sea level and formed a great inland body of water known as the Appalachian Gulf. Sediments and dissolved material from surrounding areas settled or precipitated out in uniform layers resulting in the formation of stratified layers of shale, siltstone and sandstone. Continued deposition of sediments exerted extreme pressure on the deeper layers forming flat hard sheets referred to as sedimentary rocks. Then followed a period of upward movement caused by great horizontal compression, folding, and faulting the flat sheets of rock, forming a series of ridges and valleys which follow a parallel pattern northeast to southwest.

In a later period, molten material originating from within the earth heated these sedimentary rocks. The expansion of these heated rocks and gases forced this molten material into cracks and cavities in the surface. Upon solidification, this became igneous rock. Igneous rocks are formed from cooled magma. Metamorphic rocks are the result of intense heat and pressure, which has changed the texture and/or component minerals of sedimentary or igneous rocks.

The oldest rocks exposed in Perry County are the Ordovician limestone and shale. Progressively younger rocks were formed during the Silurian and Devonian Periods. Mississippian rocks are the youngest in the County. The following is a more detailed description of the significant rock formations found in the county beginning with the oldest and continuing through the youngest.

Ordovician Period

Name: *Martinsburg Formation*

Geologic Description: Dark-gray, slaty to phyllitic shale, calcareous at the base. Probably only lower part of Martinsburg Formation is present; overlain by Hamburg sequence rocks.

Name: *Juniata Formation*

Geologic Description: Grayish-red, very fine to medium-grained, cross-bedded sandstone, and grayish-red siltstone and shale; merges with underlying Bald Eagle Formation to the south; not present east of Susquehanna River, except Spitzenberg Hill area (Berks County).

Name: *Bald Eagle Formation*

Geologic Description: Gray to olive-gray and grayish-red, fine- to coarse-grained, crossbedded sandstone, siltstone, and shale; some conglomerate (Lost Run Member); not present east of Susquehanna River, except at Spitzenberg Hill area (Berks County).

Silurian Period

Name: *Bloomsburg Formation*

Geologic Formation: Grayish-red and greenish-gray shale, siltstone, and very fine to coarse-grained sandstone; some calcareous mudstone in central Pennsylvania; thins to west and is replaced by Mifflintown beds; thickens eastward, replacing overlying Wills Creek and Tonoloway Formations and underlying Mifflintown Formation.

Name: *Tuscarora Formation*

Geologic Formation: Light to medium gray quartzite and quartzitic sandstone and minor inter-bedded shale and siltstone, locally conglomeratic in lower part; includes (to the northwest) interbedded red and non-red sandstone (Castanea Member) at top; east of Harrisburg equivalent to Minsi and Weiders Members of Shawagunk Formation.

Name: *Clinton Group*

Geologic Formation: Predominantly Rose Hill Formation—light-olive-gray to brownish-gray, fossiliferous shale; locally, limestone occurs near top; includes dark-reddish-gray, very fine to coarse-grained, ferruginous sandstone; east of Harrisburg, equivalent to Lizard Creek Member of Shawagunk Formation. Above Rose Hill is Keefer Formation—light-to dark-gray, fossiliferous sandstone, hematitic, oolitic sandstone, and shale; not recognized east of Harrisburg.

Name: *Bloomsburg Formation: Bloomsburg and Mifflintown Formations, undivided*

Geologic Formation: Includes, in descending order, the Bloomsburg Formation which is described above, and the Mifflintown Formation—inter-bedded dark-gray shale and medium-gray fossiliferous limestone; equivalent to “McKenzie” and “Rochester” of earlier workers; not present east of Harrisburg.

Names: *Wills Creek Formation*

Geologic Formation: Variegated gray, grayish-red, yellowish-gray and greenish-gray, inter-bedded calcareous shale, siltstone, shaly limestone, and dolomite; passes into Bloomsburg Formation in the southeast; not present east of Harrisburg.

Devonian and Silurian Periods

Name: *Keyser and Tonoloway Formations*

Geologic Formation: In descending order: Keyser Formation—medium-gray, crystalline to nodular, fossiliferous limestone; upper part laminated and mud cracked; not present east of Harrisburg; passes into lower Coeymans, Rondout, and Decker Formations in the east. Tonoloway Formation—medium-gray, laminated, mud-cracked limestone containing some medium-dark or olive-gray shale interbeds; lower part passes into Wills Creek Formation east and south; passes into Bossardville and Poxono Island beds in the east.

Devonian Period

Name: Onondaga and Old Port Formations

Geologic Formation: Includes, in descending order, the Onondaga Formation, Ridgeley Member of Old Port Formation, and Shriver, Mandata, Corriganville, and New Creek Members of Old Port Formation, undivided.

Name: Trimmers Rock Formation

Geologic Formation: Olive-gray siltstone and shale, characterized by graded bedding; marine fossils; some very fine grained sandstone in northeast; black shale of Harrell Formation at base in Susquehanna Valley.

Name: Clarks Ferry Member of Catskill Formation

Geologic Formation: Gray to yellowish-gray sandstone, siltstone, and conglomerate.

Name: Duncannon Member of Catskill Formation

Geologic Formation: Grayish-red sandstone, siltstone, and mudstone in fining-upward cycles; conglomerate occurs at the base of some cycles.

Name: Irish Member of Catskill Formation

Geologic Formation: Averaging 350 feet in thickness and containing calcareous materials, the McKenzie formation is composed of thin greenish-gray shale inter-bedded with thin fossiliferous limestone.

Name: Sherman Creek Member of Catskill Formation

Geologic Formation: Also calcareous, the Bloomsburg formation rests above the McKenzie formation and is red thin and thick-bedded shale, siltstone, and sandstone with thin impure limestone.

Mississippian and Devonian Periods

Name: Spechty Kopf Formation

Geologic Formation: Light-to olive-gray, fine-to medium grained, crossbedded sandstone, siltstone, and local polymictic diamictite, pebbly mudstone, and laminite; arranged in crude fining-upward cycles in some places; locally has grayish-red shale near top conglomerate at base and in middle.

Mississippian Period

Name: Pocono Formation

Geologic Formation: Light-gray to buff or light-olive-gray, medium-grained, cross-bedded sandstone and minor siltstone; commonly conglomeratic at base and in middle; medial conglomerate, where present, is used to divide into Mount Carbon and Beckville Members; equivalent to Burgoon Sandstone of Allegheny Plateau.

Name: *Mauch Chunk Formation*

Geologic Formation: Grayish-red shale, siltstone, sandstone, and some conglomerate; some local non-red zones. Includes Loyalhanna Member (cross-bedded, sandy limestone) at base in south-central and southwestern Pennsylvania; also includes Greenbrier Limestone Member, and Wymps Gap and Deer Valley Limestones, which are tongues of the Greenbrier. Along Allegheny Front from Blair County to Sullivan County, Loyalhanna Member is greenish-gray, calcareous, cross-bedded sandstone.

The mineral resources of Perry County are not extensive. During the past century, iron was produced locally to supply several small furnaces. The ore was obtained from the Onondaga formation, which is a part of the Marcellus and Mahantango.

The limestone for the flux was obtained close by from the Keyser, upper part of the Tonoloway and to a limited extent, the Onondaga. Agriculture lime and later crushed stone for road construction have been obtained from the above three formations. Large developments in the limestone formations are not likely with the massive limestone in great quantities in the nearby Cumberland Valley.

The geology of an area is an ever-present factor in land use planning. The ultimate or best use of land has historically been determined by the characteristics and quality of an area's geologic composition. The resulting soil layer produced from the weathering of the geology. On-lot sewage disposal, drainage, well water and construction cost are some of the factors affected by bedrock geology. For the most part, the rock types found in Perry County generally do not present specific inherent limitations. However, there are a few notable formations with limestone which could contribute to the rapid spread of groundwater contaminants. In some cases, on-site evaluation of geologic factors may be necessary to determine the feasibility and impacts of a proposed project.

The engineering aspects of the bedrock geology are also important. These characteristics give an indication of such things as ease of excavation, cut-slope stability, and foundation stability. Generally, the rock formations in the County provide strength and support for heavy structures such as dams, highways, bridges, and large buildings. Those areas, which are underlain by limestone and dolomites, however, may pose some problems to foundation engineering. Cavernous areas and areas known to be susceptible to sinkholes should be investigated thoroughly before construction of heavy structures. It is important to recognize that most of these problems would be site specific and require an on-site evaluation to determine the appropriateness of a project. The geology of Perry County is shown on [Map 3-3](#).

SOILS

The soil is that mantle of the weathered material, which covers the surface of the earth. It is a product of the geology, topography, climate, and vegetation. Alterations in any of these variables cause major changes in soil type. Soil formation and soil erosion are

continuing actions, the latter of which has been greatly accelerated by the misuse of the land.

Soils have many properties by which they are identified. Knowledge of these properties is essential in determining land use policy. Some soils are deep and well drained making them suitable to most, if not all, types of urban or agricultural uses. However, shallow and poorly drained soils have definite use limitations. Although these soils may be altered by applying various engineering practices to the land, this is always a costly and frequently unwarranted expenditure. In an effort to avoid such expenditures, engineers, planners and developers are using soil maps more frequently as a basis for land use decisions and planning.

A detailed soil survey has been made of Perry County which classifies the soils according to depth, texture (coarseness or fineness), natural drainage, thickness, and arrangement of the various layers, kind of parent material, slope, erosion, flooding and other characteristics. Because each soil has its own characteristic place depending on the slope or its composition, and soils ordinarily occur together in the landscape, a small scale map can be produced to present this information. The Soil Associations Map of Perry County is shown on [Map 3-4](#).

The following list describes the various soil associations in the County. These principle soils are named in order of their importance in the association. After the soil name there is a brief description explaining the extent of the soil in the association. It is important to note that minor soils occurring within the association are estimated and that one solid series can occur in more than one association, depending on its relative extent, the slope, or stoniness phases which are typical within the areas of the different associations.

Name: *Berks-Weikert-Bedington Association*

Soil Description: Shallow to deep, gently sloping to very steep, well drained soils that formed in material weathered from gray and brown shale, siltstone, and sandstone; on uplands.

Name: *Hagerstown-Duffield Association*

Soil Description: Deep, nearly level to moderately steep, well drained soils that formed in material weathered from limestone; on uplands.

Name: *Hazleton-Laidig-Buchanan Association*

Soil Description: Deep, nearly level to very steep, well drained to somewhat poorly drained soils that formed in material weathered from gray and brown quartzite, sandstone, siltstone, and shale; on uplands.

Name: *Monongahela-Atkins-Middlebury Association*

Soil Description: Deep, nearly level and gently sloping, moderately well drained to poorly drained soils that formed in alluvium; on terraces and flood plains.

Name: *Murrill-Laidig-Buchanan Association*

Soil Description: Deep, nearly level to moderately steep, well drained to somewhat poorly drained soils that formed in colluviums from gray sandstone, conglomerate, quartzite, and limestone, on uplands.

Name: *Elliber-Freamer Association*

Soil Description: Deep, gently sloping to very steep, well drained and moderately well drained soils that formed in material weathered from cherty limestone; on uplands.

Name: *Weikert-Calvin-Berks Association*

Soil Description: Shallow and moderately deep, gently sloping to very steep, well drained soils that formed in material weathered from red, gray, and brown shale, siltstone and sandstone; on uplands.

The Soil Survey of Cumberland and Perry Counties, Pennsylvania, published in April 1986, is the primary source for information regarding soils in the County. The overall capabilities of soils are referred to by grouping the soils into classes; all soils in a single class have similar limitations and management problems. Approximately 42,000 acres, or 12 percent of the County is defined by the Soil Conservation Service as prime farmland. These include Soil Classes I, II, III, and IV and are the most productive soils for crop production because they are well drained, not highly erodible, and resist flooding during the growing season.

The Pennsylvania Municipalities Planning Code (Act 247, as reenacted and amended) defines "Prime Agricultural Land" as:

"land used for agricultural purposes that contains soils of the first, second or third class as defined by the United States Department of Agriculture natural resource and conservation services county soil survey."

There are seven capability classes of soils in Perry County. Classes I, II, and III have few limitations for crop production. Most of this land is currently in crop production. However, because these desirable agricultural soils coincide with flat, level topographic features, development pressure could affect these prime farmland areas. [Map 3-5](#)

Historically, agriculture has been very important to the culture and economy of Perry County. Agriculture is extremely dependent upon the quality of soils. It is important to realize, once these prime agricultural soils are taken out of production by development, they cannot be replaced.

Another concern that has vital links to soil conditions is the development of on-lot sewage systems. These systems often accompany the rural development of the county. A few of the soil types are known to pose severe limitations on development and major construction projects. These limitations result from such factors as slow percolation rates for on-lot sewage disposal, shallow depth to bedrock, and erodibility. Individual soil tests

are recommended prior to construction on sites where the soil type indicates that such limitations may exist.

A rather significant extent of the County can expect unsatisfactory performance of septic tank absorption fields including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage all of which can affect public health. In situations where (1) soils are composed of highly permeable sand and gravel, or (2) fractured bedrock is less than 4 feet below the absorption field, or (3) excessive slopes exist, or (4) the water table is near the surface, the potential for groundwater pollution is increased. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively to prevent the groundwater pollution.

WOODLANDS

Prior to clearing by European settlers, most of Perry County was covered by forests. Today, most of the forested areas are concentrated on the slopes and ridges of the County.

The main forest cover type is mixed oak-hickory stands consisting mainly of white oak, red oak, hickory, black oak, and chestnut oak. Other species to be found include yellow poplar, shagbark hickory, white ash, red maple, beech, elm, birch, sycamore, hemlock, white pine, and Virginia pine.



View of the Tuscarora State Forest from the Hickory Ridge Overlook (Hemlock Road/Toboyne Township)

Forests have a relationship with water resources in both protective and a depletive manner. They offer protection from floods and erosion, while at the same time gradually deplete the stream flows. The latter occurs primarily during the growing season. Covered with litter (leaves and twigs), the forest floor acts as a protective layer to the soil and reduces the possibility of sheet erosion caused by raindrop splash and impact on soil. In addition, litter decays and becomes humus, which helps to form a highly permeable layer of soil, in which infiltration rates usually exceed rainfall intensities. This retards runoff from heavy rainfall, thus reducing downstream flood peaks.

However, where the forest floor becomes disturbed, particularly through activities associated with constructing roads and buildings, the potential for erosion increases. Soil loss then becomes a function of soil erodibility, as well as, the length and steepness of slopes. The wooded areas on steep slopes and along streams should be preserved to prevent erosion and reduce flooding.

WILDLIFE

Perry County has an abundance of wildlife. There are a variety of non-game species of birds, amphibians, reptiles, and small mammals. Game species include white-tailed deer, gray squirrel, cottontail rabbit, turkey, grouse, ring-neck pheasant, woodcock, morning dove, and various waterfowl. There are also red and gray fox, mink, muskrat, raccoon, weasel, opossum, and beaver.

WETLANDS

Wetlands are low lying, swampy areas usually associated with larger bodies of water such as lakes and streams. Wetlands have unique environmental characteristics, which include various plants and animal species peculiar to these areas. Significant wetlands areas in Perry County are associated with the confluence of the Susquehanna and Juniata Rivers with their tributary streams.

The National Wetlands Inventory, the only official statewide mapping of wetlands, can be found in the offices of the Perry County Conservation District, Tri-County Regional Planning Commission and the Pennsylvania Department of Environmental Protection, Division of Rivers and Wetlands. These maps highlight documented wetlands throughout the County and region. Their publication date, however, inhibits documentation of recently proven wet areas. Therefore these maps should be used only as a guideline and initial reference when examining for wetland potential.

Though they are often overlooked and ignored, wetlands provide a wide variety of important functions in the environment for man and animals. Their existence helps to ensure food and natural habitat for an assortment of wildlife. They create safe areas for migrating and nesting birds, as well as wintering areas for waterfowl. Wetlands naturally form breeding, spawning and feeding areas, and provide natural cover for nursery areas for fish. During flooding and high water periods, wetlands form natural water storage areas by retaining the high waters and then releasing them gradually after subsidence. This action helps to cushion the effects of flooding and ultimately reduce flood damages. Wetlands also act as groundwater recharge areas, and through their filtering processes they assist in naturally purifying water by removing pollutants.

To preserve the advantages that healthy wetlands provide for the natural environment, the United States Army Corps of Engineers has the regulatory authority at the federal level (and the Department of Environmental Protection at the state level) over the discharge of dredged and or fill materials within these wetland areas (Section 404 of the Clean Water Act of 1977). [Map 3-6](#) graphically identifies the location of NWI Identified wetlands in Perry County.

NATURAL AREAS INVENTORY (NAI)

In October 1999, the Natural Areas Inventory for the Tri-County Region was completed after more than three years of field investigations and public involvement. The final

report was compiled and written by the Pennsylvania Science Office of the Nature Conservancy. Based on public input and field investigations, the final report and map products contain information on the locations of threatened and endangered species and the highest quality natural areas in the three counties. However, it is not an inventory of open space.

The same pieces of the landscape which provide scenic and recreational opportunities also function as habitat for a great diversity of plants and animals, including some which are rare, threatened, or endangered species. Perry County contains intact examples of natural communities and sites for species rare in the state or even globally rare. Protecting the integrity of these natural systems provides benefits to humans and provides for the survival of wildlife and habitat.

A balance between growth and the conservation of scenic and natural resources can be achieved by guiding development away from the most environmentally sensitive areas. In order to achieve such a balance and ensure protection of critical natural areas, County and municipal governments, the public and developers must know the location and importance of these sites. This knowledge can help prevent conflicts over land uses as well as help to direct protection efforts and limited conservation dollars to the most vulnerable areas.

The inventory describes locations of areas significant on a countywide scale but not deemed exemplary natural communities because past disturbances to the areas surrounding them have rendered them somewhat isolated. These “locally significant” sites represent good examples of habitats that are relatively rare in the County, support an uncommon diversity of plant species, and/or provide valuable wildlife habitat on a local level.



**North Entrance to the Hemlocks Natural Area
(Hemlock Road/Toboyne Township)**

The inventory is one tool which will aid the implementation of this plan and municipal comprehensive plans. The inventory can be used by a number of organizations to identify potential protection projects that may be eligible for funding through state or community grant programs. Landowners will also find this inventory useful in managing and planning for the use of their land. It gives them the opportunity to explore alternatives that will provide for their needs while protecting the species and habitat on their land. In addition, land managers may wish to consult this report in an effort to avoid potential conflicts in areas with species of special concern and/or identify ways of enhancing or protecting this resource.

Natural Areas in Perry County with State Significance for the Protection of Biological Diversity

Within the NAI sites received a rank where the highest priority ranking were listed as 1 while the least significant received a rank of 5. The initial reported sites are as follows:

1. **BOX HUCKLEBERRY STATE FOREST NATURAL AREA – CENTRE TOWNSHIP:** This site is an approximately 10-acre oak-heath forest occupying a dry, northwest facing slope. Box huckleberry is a dominant species in the groundcover on about eight acres of the site. This is the largest population of species in PA, and it is thought to have persisted at the site for over 1200 years. (Newport USGS quadrangle) (Rank = 1)
2. **LAMBS GAP/TROUT RUN HEADWATERS – RYE TOWNSHIP:** This site supports a fair quality example of a Circumneutral Broadleaf Swamp Natural Community. The site supports a good quality population of a globally rare plant species. Limiting disturbances in this watershed in the future will help to maintain the quality of this site and help the globally rare plant species to persist here. (Wertzville USGS quadrangle) (Rank = 1)
3. **SECOND NARROWS SLOPES – TOBOYNE TOWNSHIP:** This site contains a fair to good quality Ephemeral/Fluctuating Natural Pool Community in State Game Lands 76. The site contains two plant and one animal species of concern. (Doylesburg and Newburg USGS quadrangles) (Rank = 2)
4. **WATTS MOUNTAIN – WATTS TOWNSHIP:** This site is a series of parallel ridges on the eastern side of the Juniata River and U.S. Routes 22/322. Various portions of the wooded north facing upper slopes support a good ranked population of a PA-endangered plant species. (Duncannon USGS quadrangle) (Rank = 2)
5. **ADUEDUCT BLUFFS/JUNIATA RIVER SCOUR – WHEATFIELD TOWNSHIP:** This site along the Juniata River has four listed species occupying several distinct habitats. There are two additional plant species of concern occur along the riverbank. Finally, an aquatic animal species of concern was collected from the Juniata River at this site in 1994. (Duncannon USGS quadrangle) (Rank = 3)

Others initially included were:

6. **BOWERS MOUNTAIN SITE EAST – JACKSON TOWNSHIP:**
7. **BOWERS MOUNTAIN SITE WEST – JACKSON AND TOBOYNE TOWNSHIPS:**
8. **COVE MOUNTAIN SLOPES –PENN TOWNSHIP:**

9. FOWLER HOLLOW ROAD SITE –TOBOYNE TOWNSHIP:
10. MILLIGAN RIDGE PONDS –SPRING TOWNSHIP:
11. PEPPERBUSH HILL PONDS/LIBERTY VALLEY POOLS – NORTHEAST MADISON TOWNSHIP:
12. WHITE RUN VALLEY – MILLER TOWNSHIP:
13. JUNIATA RIVER AT HALF FALLS/HALF FALLS MOUNTAIN –BUFFALO, HOWE, MILLER, AND WATTS TOWNSHIP:
14. JUNIATA RIVER AT NEWPORT – HOWE AND OLIVER TOWNSHIPS AND NEWPORT BOROUGH:
15. JUNIATA RIVER SCOUR AT TRIMMERS ROCK –HOWE, MILLER, AND OLIVER TOWNSHIPS:
16. JUNIATA RIVER – MILLERSTOWN TO OLD FERRY STATION – GREENWOOD, OLIVER, AND TUSCARORA TOWNSHIPS AND MILLERSTOWN BOROUGH:
17. LIMESTONE RIDGE WOODS –CENTRE TOWNSHIP:
18. THREE SQUARE HOLLOW PONDS – TOBOYNE TOWNSHIP:

In 2005, the NAI was revisited at which time, twelve (12) sites were added to the overall list. These twelve sites were as follows:

1. Conococheaque Mountain Site – Toboyne Township
2. Susquehanna River at Fort Hunter-Rockville – Marysville Borough
3. Susquehanna River at Speeceville – Penn Township
4. Waggoners GAP – Spring and Tyrone Townships
5. Flat Rock Site – Tyrone Township
6. Gunter Valley and Ridges – Toboyne Township
7. Susquehanna River at Halifax – Buffalo Township, New Buffalo Borough and Watts Township
8. Susquehanna River at Millersberg - Liverpool Borough and Buffalo Township
9. Susquehanna River at State Game Lands #258 – Liverpool Borough and Township
10. Three Square Hollow East – Duncannon Borough, Penn Township, and Watts Township
11. Big Knob – Jackson Township
12. Tuscarora Trail Site – Tyrone Township

In an effort to conserve space in this Plan, the reader is referred directly to the NAI of Perry County for this additional information and descriptions offered.

Natural Areas in Perry County with Local Significance

Within the revised NAI three (3) additional sites were added which were considered natural areas in Perry County having local significance. The three sites were as follows:

1. **Bull Run School Cliffs – Jackson Township:** This site consists of approximately 150 meters of exposed geology along Shermans Creek. The outcrop of cliffs are a scenic feature to view.
2. **Pine Ridge Swamp – Penn and Rye Townships:** This is a forested swamp which contributes water to Trout Run. The swamp is located in a narrow valley between Cove Mountain and Pine Ridge. The swamp is fed by many springs and seeps in the area.
3. **Gibsons Rock Woods – Carroll Township:** This site includes 11 pools and wet depressions at the base of Sherman Mountain, near the headwaters of Laurel Run. Significant forestlands exist around the pools and depressions. The site is entirely within the Tuscarora State Forests. (Newburg USGS quadrangle)

Map 3-7 graphically depicts the location of these sites.

AGRICULTURAL SECURITY AREAS

The Agricultural Area Security Law (Act of June 30, 1981, P.L. 128, No. 43)(3 P.S. §§ 901-915), as amended allows any owner or owners of land used for agricultural production totaling at least 500 acres to submit a petition to their approving municipal authority for the creation of an Agricultural Security Area. If the petition is approved by the participating landowners agree to keep their lands for agricultural use in return for certain benefits that the municipality will give.

Benefits of an Agricultural Security Area are:

1. Local governments are not to pass ordinances that unreasonably restrict farm structures or properties.
2. Prevents local governments from defining or prohibiting as a “public nuisance” agricultural activities and operations within the security area.



Dairy farm located outside Blain Borough in Jackson Township

3. Protects farm operations by discouraging condemnation of agricultural land through eminent domain.
4. Acreage in the security area can participate in the Agricultural Easement Program.

Participation in the Agricultural Security area is purely voluntary. There are no penalty provisions for an individual who changes land use while in a security area. The term of an Agricultural Security Area is seven years followed by a re-certification process. As of March 2006, approximately 779 properties, with 80,398 acres of farmland, in eighteen municipalities, were recorded with the County as an Agricultural Security Area. **Map 3-8** graphically depicts the general location of Agricultural Security Areas in Perry County.

AGRICULTURAL PRESERVATION EASEMENTS

In 2006, Perry County had 28 farms utilizing 4,596 acres of land. This represents approximately 14 percent of the County's land area. Increasing development pressure has taken its toll on the viability of agriculture. The continuity of a viable agricultural community must be maintained and strengthened where possible to retain this County's principal industry.

Recognizing the need for local leadership to conserve and protect remaining viable agricultural land, the Perry County Board of Commissioners appointed a Perry County Agricultural Land Preservation Board in January of 1990. The purpose of the Preservation Board is to preserve farmland by developing a program to protect farmland and to provide leadership and support to County agricultural land preservation efforts.

In an effort to stem the need to sell off land for a profit, the Agricultural Easements are a reasonable option. The program is structured to place capital in the hands of the landowner in exchange for the signing over of the property's development rights.

Map 3-8 shows the location of the easements and Agricultural Security Areas as identified by the Perry County Agricultural Land Preservation Board.