

## CHAPTER 5: PHYSICAL ENVIRONMENT AND NATURAL RESOURCES

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### GENERAL DESCRIPTION

Clearfield County is located slightly west of the center of Pennsylvania. It is bounded on the north by Elk and Cameron Counties; east by Centre and Clinton Counties; south by Cambria County; and west by Jefferson and Indiana Counties. It is to the west of the main ridge of the Allegheny Mountains.

The Borough of Clearfield is the County Seat and is located in the center of the County along the West Branch of the Susquehanna River. There are 51 municipalities in Clearfield County; 30 townships, 20 boroughs, and one city. The County is mostly rural and covers approximately 1,147 square miles, making it the fourth largest county in Pennsylvania in terms of land area.

Clearfield County is approximately 85 miles, or a 2-hour drive from Pittsburgh, about 95 miles or 2.5 hours from Harrisburg and approximately 175 miles or a 4-hour drive from Philadelphia. Clearfield County is also within a day's drive of New York City, Washington D.C., and most other eastern U.S. population centers. Figure 1 shows the County's location relative to Pennsylvania and surrounding counties.



### TOPOGRAPHY

Clearfield County is just west of the center of the state on the western slope of the Allegheny Mountains. The topography of Clearfield County is steep rolling to hilly. The County has no distinct mountain ranges, but there are ridges and hills broken by valleys and streams. The elevation ranges from a low of 789 feet above sea level where the West Branch of the Susquehanna River leaves the County to a high of 2,405 feet on Chestnut Ridge, known as "Big Knob."



## PHYSICAL ENVIRONMENT and NATURAL RESOURCES

### Chapter 5 Soils

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Clearfield County falls entirely in the Pittsburgh Low Plateau whose dominant topographic form is described as smooth to irregular, undulating surface, narrow, relatively shallow valleys; strip mines and reclaimed land. The underlying rock is predominately shale, siltstone, sandstone, and coal.

The West Branch of the Susquehanna River and its tributaries form the principal drainage system for most of the County, except for a small area in the northwestern corner of the County which drains into the Allegheny River (Ohio River Basin).

Topography is an important tool in land use planning. Understanding our natural environment and its development limitations can assist us in avoiding development in high risk areas, such as those prone to landslides, flooding, and erosion.

**(Please see map section of the Appendices to view a map of the physiographic provinces of Clearfield County.)**

## NATURAL RESOURCES

### Soils

The soils of Clearfield County formed in materials derived from horizontal and gently folded sedimentary rocks of sandstone, shale, and siltstone.

There are five general soil classifications found in Clearfield County:

1. **Rayne-Gilpin-Ernest**, which are well drained soils found deep and moderately deep on gently sloping to very steep hilltops, ridges, hillsides, and foot slopes
2. **Cookport-Hazelton-Clymer**, which are moderately well drained and well drained soils found deep at nearly level to moderately steep uplands, ridges, and hillsides on the Allegheny Plateau
3. **Hazelton-Dekalb**, which are well drained soils found deep and moderately deep on moderately steep to very steep hillsides
4. **Udorthents-Gilpin-Rayne**, which are well drained to somewhat poorly drained soils found shallow to deep on nearly level to steep hilltops, ridges, benches, and foot slopes
5. **Atkins-Philo-Monongahela**, which are poorly drained to moderately well drained soils found shallow to deep on nearly level and gently sloping floodplains and terraces

**(Please see map section of the Appendices to view the general soils map of Clearfield County.)**

## PHYSICAL ENVIRONMENT and NATURAL RESOURCES

### Chapter 5 Agriculture

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Clearfield County soils are predominately those of the Rayne-Giplin-Ernest soil association followed by the Cookport-Hazelton-Clymer soil association, which make up 78% of the County.

Prime farmland soils in Clearfield County account for 17% of our soils or 127,000 acres.

**(Please see map section of the Appendices to view the prime farmland soil map of Clearfield County).**

Soils tell us a great deal about the types of development that would best suit a parcel of ground. Soil properties can assist in identifying yields per acre of crops and pastures, management of water resources, development of recreational facilities, wildlife habitat, building site development, development of on-lot sewage and landfill facilities, and the suitability for construction materials. One widely used characteristic of soils is slope. Slope percentages equal to or greater than 17 % are generally unsuitable for development.

For more soil information, please refer to the Clearfield County Soil Survey prepared by the US Department of Agriculture's Soil Conservation Service.

#### **Agriculture**

Agriculture plays only a minor role in Clearfield County's economy. There are 468 farms in the County covering a total of 60,961 acres. Approximately 61% of this land is used for crops, but the market value of agricultural products sold by Clearfield County farmers leans more toward livestock. \$11.1 million in agricultural products were sold in Clearfield County according to the USDA's 2002 Census of Agriculture with 54.5% of this amount attributable to sales of livestock, poultry, and their related products.

Most farming in Clearfield County is done on a relatively small scale. The United States Department of Agriculture and others have defined "small farms" to be those farms that are less than 180 acres in size or have a gross income of \$50,000 or less per year. By this definition, between 75% and 88% of all farms in Clearfield County are small farms. Many farms in Clearfield County can be considered "mini-farms" with 225 or approximately 48% of all farms in the County reporting less than \$2,500 in annual sales.

Many farmers in Clearfield County also have employment off the farm. 49.4% of Clearfield County farmers report some other occupation as their primary occupation with 65.0% of farmers reporting working in some capacity outside their farm.

## PHYSICAL ENVIRONMENT and NATURAL RESOURCES

### Chapter 5 Ag. Preservation

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#### **Agricultural Preservation**

Agriculture is the largest industry in Pennsylvania, producing over \$45 billion annually and providing approximately 1 in 6 jobs in agriculture and related businesses.

Farmers are facing a tough challenge when it comes to keeping their land profitable through agriculture. These financial issues have led to many farmers selling their properties to developers. Overall, Pennsylvania developed some 1.14 million acres or 1,800 square miles of fields, open space, and natural land between 1982 and 1997—the sixth largest in the nation.

On the upside, Pennsylvania ranks number one among the 50 United States in the production of export grade hardwood. Exports include significant quantities of high quality red maple, red oak, black cherry, sugar maple, and other hardwoods. Pennsylvania exports of lumber and wood products are nearly \$350 million annually. Exports of paper and allied products are over \$300 million annually, while exports of furniture and fixtures exceed \$50 million annually.

One tool available to assist farmers in retaining or growing their businesses is the First Industries Fund which is a grant and loan program aimed at strengthening Pennsylvania's agriculture and tourism industries. The First Industries Fund is part of PA Grows, the Pennsylvania Department of Agriculture's new initiative, designed to assist agricultural producers in gaining access to the capital they need to begin, continue, or expand their businesses.

The State also offers a number of farmland preservation programs as well.

#### **Agricultural Security Areas (ASAs)**

Agricultural Security Areas are a tool for strengthening and protecting our quality farmland from the urbanization of rural areas. Key features of the program are:

- Voluntary for farmers. Petitions are submitted to township supervisors by the farmers to create the ASA. They are reviewed every seven years; however, new parcels of farmland may be added to an established ASA at any time.
- A minimum of 250 acres from among all the participating farmers is required.

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- An ASA may include non-adjacent farmland parcels of at least 10 acres or be able to produce \$2,000 annually from the sale of agricultural products.

Participants receive special consideration regarding:

- Local ordinances affecting farming activities
- Nuisance complaints
- A review of farmland condemnation by State and local government agencies
- An ASA qualifies land for consideration under the Easement Purchase Program at the landowner's request if the ASA has at least 500 acres enrolled.

Currently, the following municipalities have **Agricultural Security Areas in Clearfield County:**

- **Brady Township**
- **Burnside Township**
- **Chest Township**
- **Union Township**

#### **Easement Purchase Program**

The Pennsylvania Agricultural Conservation Easement Purchase Program was developed in 1988 to help slow the loss of prime farmland to non-agricultural uses. The program enables state, county, and local governments to purchase conservation easements (sometimes called development rights) from owners of quality farmland. The first easements were purchased in 1989. Counties participating in the program have appointed agricultural land preservation boards with a state board created to oversee this program. The State board is responsible for distribution of State funds, approval and monitoring of county programs, and specific easement purchases.

#### **How Farms Are Chosen For Easement Purchase**

Aside from being part of an ASA, the farm is rated against other eligible parcels according to the following criteria:

- **Quality of the Farmland.** State regulations require that easements be purchased on farms with a minimum of 50 acres in size. Parcels as small as 10 acres may be preserved if adjacent to existing preserved farmland or used for the production of crops unique to the area. At least half the tract must either be harvested cropland, pasture, or grazing land, and it must contain 50 soil capability classes I-N.

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- Stewardship. Farms are rated on the use of conservation practices and best management practices of nutrient management and control of soil erosion and sedimentation.
- Likelihood of conversion. Easements offered for sale to counties will be scored and ranked for acquisition based on a variety of factors such as:
  - Proximity of farm to sewer and water lines
  - Extent and type of non-agricultural uses nearby
  - Amount and type of agricultural use in the vicinity
  - The amount of other preserved farmland in close proximity

#### **Proceeds From Easement Sale**

Farmers may choose to receive the proceeds from easement sales in a lump sum payment, installments up to five years, or on a long-term installment basis. Many farmers use the proceeds from easement sales to reduce debt loads, expand operations, and as a way to pass on farms to the next generation.

#### **The Clean and Green Program**

The Clean and Green Act of 1974 was established to preserve farmland, forest land, and open space by taxing land according to its use rather than the prevailing market value. The program is administered by county assessment offices. The program is voluntary and generally requires that a 10-acre minimum remain in designated use (agricultural use, agricultural reserve, and forest reserve). Parcels less than 10 acres and capable of producing \$2,000 annually from the sale of agricultural products are eligible for the agriculture use designation. Land taken out of the permitted use becomes subject to a rollback tax, imposed for up to seven years, and an interest penalty.

In drafting a specific agricultural preservation plan for Clearfield County, the above-mentioned tools should be utilized. The first item that needs to be addressed in this plan is to assure that land use regulations are compatible with existing agricultural operations. Since about 80% of our county is unzoned, agricultural operations are not unduly restricted. For those municipalities who do have zoning, the County will be encouraging them as, identified in the goals and objectives section, to review and update their regulations to assure that the vision statements developed for this comprehensive plan update are achievable. Fortunately, we have seen little conflicts with existing agricultural operations.

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### Chapter 5 Minerals

As for agricultural preservation easement purchases, we have seen little interest from the agriculture community in developing such a program. Also, when conferring with the County Conservation District, they expressed that area farmers want to retain the option to sell their farms and even look to it as their retirement fund. With little interest from the younger generation and the low profit margins, many are concerned whether or not their operations will be sustained.

Most municipal officials do not want to unduly restrict existing operations. However, they are very concerned about future impacts, if a large scale concentrated animal feed operation were to come to their municipality. They have expressed interest in addressing such impacts. We believe that the County's role in agricultural preservation can begin by hosting informational meetings to present the State programs that are available for preserving agricultural lands and operations. Based upon the interest of our agricultural sector, we would provide assistance with the development of a program designed to meet their needs. We would work with our conservation district, economic development agencies, and our municipal officials in developing the resultant preservation program.

#### **Minerals**

Coal and clay are the major minerals found in Clearfield County. In fact, at one time Clearfield County was ranked third in the State for bituminous coal production and first for clay production.

Clearfield County sits within the main bituminous coal fields of PA. Mostly medium volatile coals with some high volatile coals can be found in the County. It has been estimated that PA had around 107 billion tons of coals prior to any mining. Now there are approximately 76 billion tons that remain. Much of what remains, however, will be more difficult to access and more expensive to recover.

Clearfield County's bituminous or "soft" coal was deposited during the time geologists call the Pennsylvania period which occurred over 290-330 million years ago. Coal production was a major industry for Clearfield County for several decades until declining in the '80-'90s. Coal production still occurs today. In fact, coal production has been on the increase. In 2002, coal production records show that Clearfield County had the highest number of bituminous surface mine operators, employees, and active mine sites in the State. Over 2.7 million tons were extracted that year within the County.

The many clay zones that have been mined for years are underneath the different coal layers. The common mined clays are the lower mercer hard clay and the Clarion (Bigler) clay. Much of these clays are used for making decorative brick. Sandstones are also abundant and are currently being mined across the County mainly for construction materials. Shale too is a common mineral found exposed at the surface and usually found above the coal seams. This material is generally well suited for use as road fill or low use secondary roads.

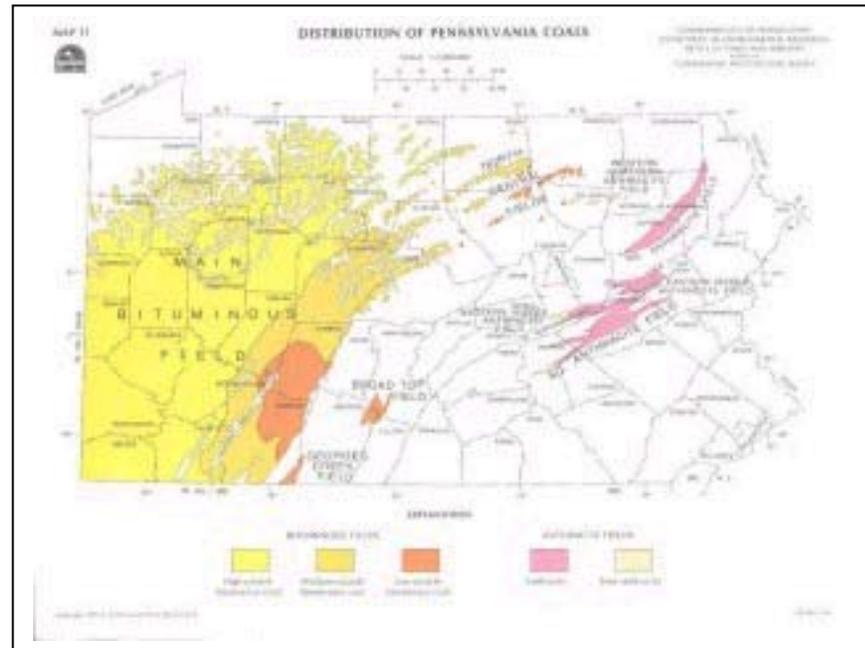
**PHYSICAL ENVIRONMENT and NATURAL RESOURCES**

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Minerals**

Coal Production <sup>1</sup>		Surface Mined Minerals <sup>2</sup>	
Year	Tons	Year	Tons
1981	10,460,138	1980	NA
1999	2,741,750	1999	473,535
2004	3,157,825	2004	126,329

1. Source- DEP Annual Mining Reports
2. Source - "The Mineral Industry of PA", William Kebblish & Robert J. Tuchman

Note: During 1980, Clearfield County was a top producer of clay. All state and federal mining reports during this time period did not contain production numbers to avoid disclosing company proprietary data.



Mineral extractions are making a comeback in Clearfield County. Coal extraction has seen a recent boom with the high cost of fuel. A large mining operation is currently underway in Huston Township which has presented some land use conflicts in the sense that the additional truck traffic has impacted the small town of Penfield which also happens to be the main gateway to the PA Wilds, a statewide tourism initiative. Truck traffic was already an issue before this operation due to the volume of tractor-trailers moving goods to and from the north through the town of Penfield to get to the Interstate. A large powdered metals industry north generates a strong percentage of this traffic as does the Greentree landfill located in Elk County. These additional traffic impacts from this new coal operation are of great concern to the local municipality. In fact, it was a factor in them deciding recently to prepare a multi-municipal plan with four of their neighboring municipalities. Specific funding to analyze traffic impacts is being proposed.

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Since mineral extraction is allowed in any zoning district, zoning is not a realistic tool to control any negative impacts from mineral extractions. The County will work with our local municipalities and resource extractors to address such impacts and make recommendations that could improve issues such as alternative traffic routes or modes. In the case of Huston Township, there are unfortunately no other alternative routes. Another mode of transportation that is quickly growing is the use of rail. Opportunities exist to move existing goods by rail rather than by truck. Rail could be used to free up our highway transportation network.

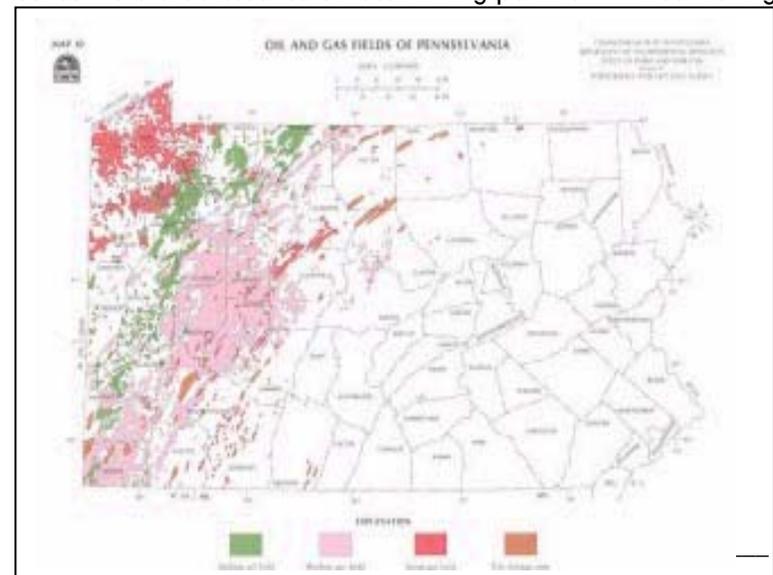
Some mineral extractions have been positive from an environmental stance since many old abandoned un-reclaimed lands have been re-mined and then reclaimed. Some others have garnered concern due to their close proximity to the headwaters of local streams. Two such mining permit applications were heavily opposed last year yet were ultimately issued permits by the State. One of those applications that was opposed was the operations mentioned earlier located in Huston Township.

Since resource extraction is regulated by the State, local municipalities have no jurisdiction or control to stop such operations. One county municipality, Graham Township, petitioned the State to declare Big Run and Willholm Run watersheds “unsuitable for mining”. If approved, it would provide some protection for those watersheds from surface mining. The County, as a means to protect such water sources, will utilize this approach to protecting pristine watersheds.

Another means that has been unsuccessful in addressing land use conflicts with mineral extraction is the State’s Act 67 and 68 review process which was instilled a few years ago which requires State agencies to consider local land use regulations before issuing certain permits. Conflicts with local comprehensive plans and the County’s natural areas inventory were not enough to influence the State’s issuance of local mining permits. Without zoning regulations, we have been told that conflicts with other land use documents are irrelevant. Mineral extraction is an important economy for the area. However, it has been identified as a major concern during our public participation process. The majority of our residents do not support mineral extraction if it degrades our area’s water quality, environment and/or natural beauty.

#### **Oil & Gas**

Gas production from the Upper Devonian or younger sandstones is classified as shallow and is not typically used for gas production, but does get used as gas storage reservoirs. Gas located within the Middle to Lower Devonian rocks. Onondaga and Oriskany Groups is classified as deep and these reserves are where most gas production occurs.



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Clearfield County contains both shallow and deep gas fields. The shallow gas fields can be found mostly in the southeastern portion of the County. Several deep gas fields can be found in the northwestern part of the County. One of the largest gas fields is the Rockton field with other main gas production areas located in the Penfield, DuBois, Sabula and Hollywood areas of the County.

#### **Forest**

Despite the extensive land disturbances that have occurred over the history of Clearfield County from timbering and mineral extractions, natural communities have redeveloped across the County. This is particularly true of the northern portion of the County north of interstate 80 which contains large areas of contiguous forest that provided abundant habitat for forest dwelling species. The forests of Clearfield County are almost all second or third growth stands.

The three ecoregions of the County provide for distinct forest communities. In the Central Appalachian Mountains portion of the County, you will find a mesophytic influenced forests made up of red maple, black birch, white oak, sassafras, and black gum. Mountain laurel and blueberry make up a majority of the understory of this forest. The High Allegheny plateau is characterized by northern hardwoods and hemlock/white pine. Today, these species are much less prevalent while red maple, black cherry, and sugar maple have greatly increased. The Western Allegheny Plateau previously was dominated by white oak with shagbark hickory, red maple, shingle oak, scarlet oak, chestnut oak, black oak, red oak, American chestnut, and black cherry.

Less disturbed forests tend to be characteristic of the eco-region they fall in. However, they also contain species of the adjacent eco-region especially following lines of topography.

On upper slopes, drier sites, and higher elevations, the forest communities are dominated by oaks - primarily chestnut oak, but also red oak and black oak. American chestnut was once an important component of this forest until the species was decimated by the chestnut blight of the early 20<sup>th</sup> century. Today, red maple and black birch are common. There is often a shrub layer of mountain laurel and blueberry found under the canopy as well.

Forest in the southern portion of the County, typically lands of lower elevations and valleys, contain more diverse mixture of canopy trees such as tulip poplar, green ash, swamp white oak, and cucumber magnolia.

**(Please see map section of the Appendices to view the contiguous forest blocks map of Clearfield County).**

## PHYSICAL ENVIRONMENT and NATURAL RESOURCES

### Chapter 5 Fish & Game

#### Fish

Most of Clearfield County falls within the Susquehanna River drainage Basin. Today's variety of species is limited due to extensive acid mine drainage, impaired streams, and obstructions such as the Curwensville Dam and the Shawville power plant. Such obstructions can impact water quality and quantity, temperature, and migration.

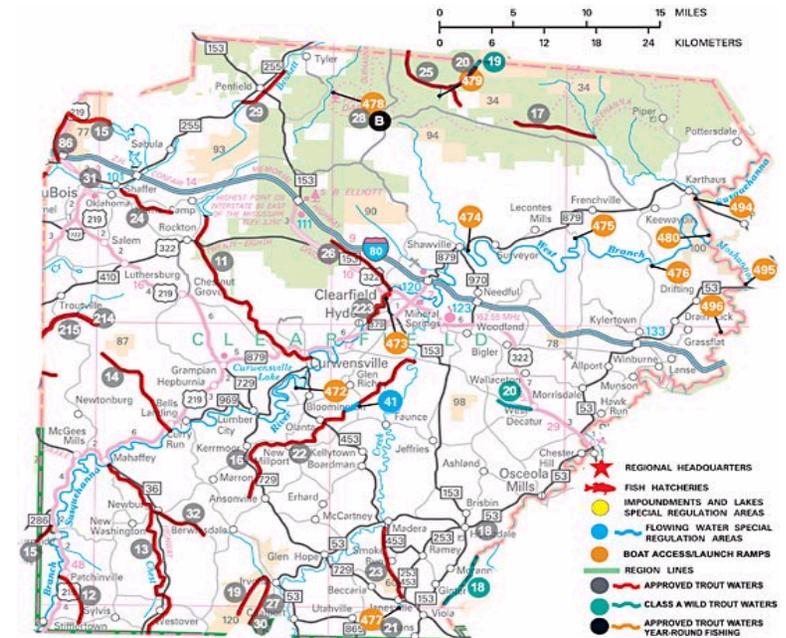
Clearfield County does contain three Class A wild trout streams: 1) Moshannon Creek from headwaters downstream to Roup Run 2) Jack Dent Branch from headwaters downstream to Jack Dent Road Bridge and 3) Simeling Run headwaters downstream to mouth.

In addition to the wild trout streams, there are several streams, lakes, ponds, and reservoirs which meet certain water quality standards to support stocked trout.

#### Game

Typical game found in Clearfield County includes, but is not limited to, ruffed grouse, white tailed deer, elk, groundhogs, bobcats, black bears, fishers, opossums, porcupines, red foxes, beavers, wild turkeys, pheasants, gray squirrels, raccoons, rabbits, chipmunks, skunks, owls, and red tail hawks.

Certain species such as the bobcat, fisher, and barred owl require large contiguous forested areas that support the habitat necessary to maintain viable populations. For example, the bobcat requires 125,000 - 319,244 acres of contiguous forested habitat. Species such as the barred owl depend on mature forest for nesting habitat and require a high degree of canopy cover. The northern portion of Clearfield County falls within a larger contiguous forested area that encompasses several counties and is one of the largest contiguous forested in the state of Pennsylvania. This important forest community is important not only to many area sensitive forest dwelling birds, but also has global significance since it supports a variety of migratory birds. When forests are fragmented or developed, these area sensitive species decline. A significant component of the State's forest management plan includes maintaining these contiguous forested areas.



Fish & Boat Commission's Fishable Waters Map

## PHYSICAL ENVIRONMENT and NATURAL RESOURCES

### Chapter 5 Water Supply

One such important location for migratory and forest dwelling birds in Clearfield County is the Quehanna Wild Area which encompasses portions of Girard, Covington, and Karthaus Townships. The Quehanna Wild Area has been identified as an important bird area (IBA) whose habitat supports many neotropical migratory birds. As an important birding area, it is part of a global network of places recognized for their outstanding value to bird conservation. Birds that have been identified in the Quehanna Wild Area include species such as bald & golden eagles, great blue herons, northern grosbeak, barred owls, whip-poor-wills, eastern wood-pewees, least flycatchers, eastern phoebes, eastern bluebirds, hermit thrushes, cedar waxwings, black & white warblers, ovenbirds, indigo buntings and rose breasted grosbeaks. A more comprehensive listing of sited birds can be found at the PA Audubon Society's web site.

**(Please see map sections of the Appendices to view the important birding areas map of Clearfield County).**

A complete natural heritage inventory for Clearfield County was completed in 2004 and contains significant plant and animal habitats by municipality including recommended management strategies. This inventory is available on -line at [www.paconserve.org](http://www.paconserve.org) or at the County Planning Office.

## WATER



### **General Water Description**

Most of the water supply for Clearfield County comes from the West Branch of the Susquehanna River watershed with the watershed's ground water serving as the main source for its drinking water. Wells are the most commonly used conduit for ground water. However, one of the largest sources of supply for the greater DuBois area, the DuBois Reservoir, located in Union Township, is surface water.

Approximately 72 % of the County relies on a community water distribution system for their water supply. Average rainfall is 42 inches per year. Only during severe drought conditions have suppliers experienced water quantity issues. Water losses from leaky aging distribution lines average about 31%.

Iron sulfite and iron pyrite are found throughout the County and are found in some domestic wells making them too acidic. Approximately 20% of the homes in the County rely on private wells

## PHYSICAL ENVIRONMENT and NATURAL RESOURCES

### Chapter 5 Water Supply

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#### **Water Supply**

In 2004, the County developed a countywide water supply plan to address both water supply quantity and quality issues. This detailed study, which entailed a water supplier survey, unveiled that water quantity was reported by suppliers as only being an issue during extreme periods of drought. Many of those suppliers also would realize additional water savings if they corrected existing water losses within their systems. The average water loss per system was reported at 31 %. The maximum water loss goal recommended is 20%. The highest loss reported for any one system was 61%.

As for future water quantity needs, suppliers indicated that they have adequate supplies for the foreseeable future. It should be noted, however, future large-scale projects might influence those predictions. Already in the works is a large waste coal burning power plant that is expected to utilize an average of 4.4 million gallons of water per day from the Susquehanna River Basin.

Another point brought out by the study was water withdraws from the Susquehanna River Basin for the DuBois area. The greater DuBois area solely relies upon the Anderson Creek Reservoir located in Union Township. This reservoir is supplied by Anderson Creek, a tributary of the Susquehanna River. A majority of the Clearfield County residents including some residents in Jefferson County rely on this drinking water supply. This supply which serves a large population base, is extremely susceptible to contamination due to having Interstate 80 crossing through its headwaters. This northwestern portion of the County is where the majority of our growth has occurred and it is expected that this growth will continue. A concern for development in this watershed is that certain restrictions of the Susquehanna River Basin Commission may restrict future withdrawals due to the fact that many water users are within the Ohio River Basin. At the time of the writing of this plan Sandy Township had begun exploration of alternate water supplies.

The water supplier survey also included a mapping component whereas the suppliers provided information for use in development of a county wide waste service area map. These suppliers were also asked for information as to where they plan to expand their services in the future.

**(Please see page section of the Appendices to view the water service areas map of Clearfield County).**

Another important component of the plan included educational information for both the supplier and homeowners on water conservation, water supply protection and infrastructure maintenance as well as a component on how to prepare an individualized water supply protection plan for their supply. Implementation of water supply protection plans on a county level is difficult when land use controls lie within the local municipal

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### Chapter 5 Wetlands & Floodplains

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government's jurisdiction. Therefore it is imperative that municipal governments become aware of the importance they play in the protection of such supplies. The County planning office can play a significant role by providing direction and guidance to the local municipal government, the water supplier and private property owners in addressing a plan to best protect such precious water supplies.

While the County's water supply plan provided some general guidance on protection of water supplies, it is imperative that we be proactive and identify specific source protection plans to assure that we can provide safe, adequate drinking water supplies to meet the future demands of our County's residents and businesses. Implementation of water supply protection plans can be difficult when land use controls are not widely used by our local municipalities. The County will focus on, working with our water suppliers, municipal officials, and private landowners to develop individual water supply protection plans for those sources most at risk. This initiative was listed as a top priority in this plan. Some of this work has been done through the DEP's water risk assessments, which were conducted a few years back. Some supplies are protected simply because the supplier owns the lands around the source. It should be noted that the County's water supply plan is consistent with state water planning initiatives and that lawful activities such as extraction of minerals may impact water supply sources. Statutes that regulate mineral extraction, which also provide for replacement of water supplies that are affected by such activities govern these activities. Another type of operation that may also impact water supplies is commercial agriculture production. Additional information on county water supplies can be found within the water supply plan itself, which is available at the County planning office as well as at office of the water suppliers themselves.

#### **Wetlands**

In the landscape of Clearfield County wetlands occur naturally at the headwaters of streams, in the floodplains of streams and rivers, in areas where groundwater intercepts the surface of the ground and in beaver impounded areas. Each of these settings provides different habitat values for native biodiversity.

Wetlands are important for their habitat value to many species and their role in ecological processes such as nutrient cycling, water filtration and flood mitigation. Most notable wetlands in Clearfield County are located in the northern portion of the County many of which is located on state owned lands.

**(Please see map section of the Appendices to view the important wetlands map of Clearfield County).**

#### **Floodplains**

Floodplains are the lands adjacent streams subject to periodic flooding. Understanding where floodplains are located is important tool for developers since the risks associated with flooding are so high. Loss of life and property can be significant if development occurs within a floodplain. Limited

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### Chapter 5 Watershed Inventory

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types of development are allowable in some floodplains if certain design specifications are adhered to. Floodplain habitats are also home to rare plant species, such as the Eastern Featherbell, which prefers moist woods and meadows.

**(Please see map section of the Appendices to view the floodplain map of Clearfield County.)**

In 2003, the County's Emergency Management Agency oversaw the drafting of a County Hazard Mitigation plan. The main purpose of this plan was to identify and assess the risk of life, injury and property damage due to natural and man-made hazards. One outcome of the plan was a flood vulnerability assessment map, which identifies facilities, and ranks them for their vulnerability to flooding.

**(Please see map section of the Appendices to view the flood risk map of Clearfield County.)**

#### WATERSHED INVENTORY

There are a total of fourteen watersheds located in Clearfield County. Only three of those watersheds, which include the Sandy Lick, the East Branch of the Mahoning and the Mahoning, all drain into the Ohio River Basin, whereas the other eleven all drain into the Susquehanna River Basin.

**(Please see map section of the Appendices to view the watersheds map of Clearfield County.)**

Over the last decade many multi-municipal efforts have been based on watershed delineation. Approximately 17 various watershed groups exist whose efforts are geared upon improving county watersheds. A majority of these groups are focused on restoration efforts partially in the treatment of acid mine drainage impaired streams.

**(Please see map section of the Appendices to view the impaired streams map of Clearfield County.)**

Although there are many impaired streams located in our county we do still have a few exceptional value and high quality streams left. A few of them have obtained official status from the Department of Environmental Protection as being unsuitable for mining. Those include Rogues Harbor, Upper Little Muddy Run, Moose & Montgomery Creeks, and Gose Run.

**(Please see map section of the Appendices to view the exceptional value streams map of Clearfield County.)**

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### **Chapter 5 Natural Diversity Inventory**

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Another multi-municipal activity that commonly occurs on a watershed basis is storm water management. Storm water management is necessary to compensate for the impacts of new development which can lead to flooding, erosion & sedimentation, causing property damage and can also contribute to non-point pollution contamination. So far only three of our County watersheds have storm water management plans in places. Those with such plans include Sandy Lick Creek, East Branch of the Mahoning and Chest Creek. Due to limited funding and the lack of local municipal desire to enact resultant storm water management ordinances, such plans have been limited.

The Department of Environmental Protection has a Storm Water Best Management Practices Manual available on-line ([www.dep.state.pa.us](http://www.dep.state.pa.us)) which provides guidance for storm water management utilizing best management practices (BMPs) in Pennsylvania. Due to the increased need to improve water quality and protect water resources through improved storm water runoff management, this manual provides the planning concepts and design standards to guide local and state governments, planners, land developers, contractors, and others involved with planning, designing, reviewing, approving, and constructing land development projects in meeting those needs.

#### **NATURAL DIVERSITY INVENTORY**

In 2004, Clearfield County, worked with the Western PA Conservancy in development of Clearfield County's first ever Natural Heritage Inventory. This inventory is a unique listing of the exceptional living resources in the County. High quality landscapes, exemplary natural communities, rare and unique species and general habitat diversity were all considered.

An inventory does not confer protection of those resources, however can be used as a tool for informed and responsible decision-making. Each municipality in Clearfield County received a copy in which to use in local planning and decision-making. Since land use controls are at the discretion of local governments it is their prerogative whether or not local regulations are needed to protect the local natural assets.

It is an important tool to planners, local government, and developers. The inventory can be used in reviewing various projects and for comprehensive planning purposes. It can prevent potential conflicts long before developers spend thousands of dollars on project design. It encourages development that incorporate green space, wetlands and forest buffers that ultimately increase the property value for the developer.

One common theme in the success of a community is the fact that have identified their natural resources such as riparian areas, special habitats, contiguous forested tracts and scenic views. Recognizing what is worth protecting is the first step followed by a plan of action of how those resources would be maximized for the benefit of the community.

**PHYSICAL ENVIRONMENT and NATURAL RESOURCES**

**Chapter 5  
Natural Diversity Inventory**

One of Clearfield County’s best assets is its natural resources. It’s these natural resources that sustained its residents over the past few decades and if managed properly can continue to do so. Open space promotes a healthy lifestyle by providing recreational opportunities, which in turn increases the quality of life of County residents. Another benefit of such assets, is the tourism & recreation economy it supports. With tourism being the 2<sup>nd</sup> leading industry in PA, combined with nature tourism, an opportunity exists for growing a new economic niche.

Many of the significant plants and species identified were found on our undisturbed contiguous forestlands, wetlands and floodplains.

Specific recommendations and management strategies, by municipality, can be found in the Clearfield County Natural Heritage Inventory. The inventory is available at either the County Planning office or online at [www.paconserve.org](http://www.paconserve.org).

The following is a table, which outlines the plant and animal species of special concern, which was found to exist in Clearfield County.

<b>Plants and Animals of Special Concern in Clearfield County</b>	
Documented in the PA Natural Diversity Inventory database since 1960	
<b>Animals</b>	
<i>Scientific Name</i>	Common Name
<i>Ardea herodias</i>	Great blue heron
<i>Crotalus horridus</i>	Timber Rattlesnake
<i>Myotis septentrionalis</i>	Northern long eared bat
<i>Pandion halieetus</i>	Osprey
<b>Plants</b>	
<i>Arabis hirsuta</i>	Hairy rock-cress
<i>Carex paupercula</i>	Bog sedge
<i>Platanthera ciliaris</i>	Yellow-fingered orchid
<i>Prunus allegheniensis</i>	Allegheny plum
<i>Sentanthium gramineum</i>	Eastern featherbell
<i>Viburnum trilobum</i>	Highbush cranberry
<i>Vittaria appalachiana</i>	Appalachian gametophyte

## PHYSICAL ENVIRONMENT and NATURAL RESOURCES

### Chapter 5 Green Infrastructure

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#### **GREEN INFRASTRUCTURE INVENTORY**

Green infrastructure can be thought of as both public and private lands such as parks, greenways, river and stream corridors, paths and trails valued for its natural beauty, recreational attributes and environmental significance.

This network of infrastructure is often referred to as greenways. A definition of a greenway as provided by the DCNR follows. A greenway is a corridor of open space. Greenways vary greatly in scale, from narrow ribbons of green that run through urban, suburban, and rural areas to wider corridors that incorporate diverse natural, cultural and scenic features. They can incorporate both public and private property, and can be land- or water-based. They may follow old railways, canals, or ridge tops, or they may follow stream corridors, shorelines, or wetlands, and include water trails for non-motorized craft. Some greenways are recreational corridors or scenic byways that may accommodate motorized and non-motorized vehicles. Others function almost exclusively for environmental protection and are not designed for human passage. Greenways differ in their location and function, but overall, a greenway will protect natural, cultural, and scenic resources, provide recreational benefits, enhance natural beauty and quality of life in neighborhoods and communities, and stimulate economic development opportunities.

**(Please see map section of the Appendices to view the green infrastructure map for Clearfield County.)**

#### **NATURAL / SPECIAL HAZARD AREAS**

Land-use planning based on environmental geology is extremely important not just from a safety standpoint but also from an economic one. Natural and man-made hazards such as landslides, rock falls, sinkholes, earthquakes, mine subsidence, waste disposal sites should be considered before and during construction. Engineers and developers should heed the conclusions and recommendations developed by a registered geologist particularly in areas where known hazards are known to exist.

##### **Landslides**

Landsliding is a natural geologic process involving the movement of earth materials down a slope. Landsliding is also a significant geologic hazard. Landslides cause damage to utilities, buildings, and transportation routes, which, in turn, creates travel delays and other side effects. The easiest way to avoid landslide hazards is to keep construction and development out of landslide-prone areas. This is not very realistic in the modern world, so the next best way is to be aware of the hazards and prepare for them. Safe construction in landslide areas is possible, but additional costs of detailed site investigation and design of specially engineered facilities can be high. Clearfield County has been identified as having a high to moderate landslide susceptibility.

## PHYSICAL ENVIRONMENT and NATURAL RESOURCES

### Chapter 5 Natural & Special Hazards

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#### **Earthquakes**

Compared to other states, Pennsylvania is relatively free of earthquake activity. Nevertheless, earthquakes do occur in our commonwealth, and Pennsylvania may be subject to the effects of earthquakes that have epicenters located outside our borders. Fortunately for Clearfield County there are no such epicenters located within our borders. The closest epicenter being located in the southeastern corner of Centre County.

#### **Sinkholes**

A sinkhole is a subsidence feature. Subsidence is the downward movement of surface material; it involves little or no horizontal movement. Subsidence occurs naturally due to the physical and chemical weathering of certain types of bedrock. Subsidence can also occur as a result of underground mining, excessive pumping of groundwater, or subsurface erosion due to the failure of existing utility lines.

Case histories of sinkhole occurrence reveal that sinkholes occur only in certain parts of Pennsylvania; areas underlain by carbonate bedrock. Clearfield County is fortunate that it is not underlined with carbonate bedrock therefore there is no need for concern when it comes to naturally occurring sinkholes.

#### **Mine Subsidence**

While we may not have to worry about naturally occurring sinkholes we do have an issue with mine subsidence. Therefore it is important that the locations and depth of subsurface coal mine workings be accurately known to insure that precautions are taken prior to building or site selection. Construction with proper modifications may then be made in these potentially hazardous subsidence areas. Developers should consult with the Department of Environmental Protection for location of underground mines prior to development.

**(Please see map section of the Appendices to view the landslide loss potential map for Clearfield County.)**