Chapter 11
Natural Resources Plan

Introduction

The Pennsylvania Municipalities Planning Code (MPC) requires that municipal Comprehensive Plans address resource preservation, specifically identifying natural, cultural, and historic resources. The natural resources noted by the MPC are wetlands and other aquifer recharge zones, woodlands, steep slope areas, prime agricultural land, floodplains, and "unique natural areas." The MPC adds that municipalities are not limited by this list, but may provide for the protection of other resources of local importance. In addition to these resources, this chapter will identify energy conservation objectives for the planning Region. Prime agricultural land has been previously discussed in Chapter 7, the Future Land Use Plan. Historic Resources are addressed in Chapter 12, the Historic and Cultural Resources Plan.

The results of the citizen survey indicated that the Region's residents are concerned about natural resource preservation. Respondents also indicated a high level of interest in farmland and open space preservation.

NATURAL RESOURCES PLAN

Natural resources contribute to the economic activity, environmental health, and quality of life of a community. Parks, open space, woodlands, steep slopes, streams, wetlands, and farmlands are all resources that are aesthetically pleasing, and provide economic as well as environmental benefits. One example of this is the way that floodplains and wetlands act as natural storage basins in periods of high water and help to improve water quality by filtering out sediment and pollutants.

Natural and Scenic Resources

Goal: Protect and preserve the natural and scenic resources and beauty of the region.

Natural and Scenic Resources

Objectives:

- Encourage new planting of trees within developments.
- Encourage the preservation of scenic road corridors and viewsheds along them through retention of the character of rural-agricultural areas.

- Establish standards and processes for developers to respect and develop in accordance with land suitability and carrying capacity, preserve and protect environmental resources and quality, preserve unique natural features, and analyze and mitigate impacts of development.

- Encourage improvement of degraded views along road corridors in the Region.

- Require development to be sensitive to natural drainage ways.

- Protect groundwater aquifers and recharge areas from pollution through standards in municipal ordinances.

- Protect watersheds and wellhead areas for municipal water supplies.

- Protect steep slopes within stream corridors.

- Monitor the protection of "protected" lands to encourage their continued protection.

- Protect stream corridors and their watersheds in the Region.

- Protect the night sky from excessive light pollution through lighting standards in ordinances.

- Protect wildlife habitats within stream corridors and woodlands.

- Maintain and initiate partnerships with conservancies to protect the Region's natural resources such as wooded areas and stream corridors.

- Implement the recommendations and best management practices of the Tulpehocken Creek Watershed and Schuylkill River Watershed Stormwater Management Plans.

GEOLOGY

Penn Township, Jefferson Township, and Bernville Borough are located in northwestern Berks County within the physiographic region known as the Appalachian Highlands Region, Great Valley Section of the Ridge and Valley Province. The Appalachian Highlands Region is one of eight physiographic regions found in the United States. The U.S. Physiographic regions are: Canadian Shield, Atlantic Plain, Appalachian Highlands,

Interior Plans, Interior Highlands, Rocky Mountain System, Intermontaine Plateaus, and Pacific Mountain System. These geomorphic or physiographic regions are broad-scale subdivisions based on features such as terrain, rock type, and geologic structure and history. These Regions are further broken down into provinces and then into sections based on their geologic formations. This three-tiered system of classification (division, province, and section) was introduced by Nevin Fenneman in 1946.

The Region is part of the Appalachian Highlands Region, Great Valley Section of the Ridge and Valley Province. The Great Valley Section consists of a very broad lowland that lies south of Blue Mountain in Southeastern Pennsylvania. This area has rolling hills, shallow valleys, and isolated hills. The underlying rock structure is shale, sandstone, slate, limestone, and dolomite. The area was formed from fluvial erosion and has the distinct characteristic of having red soils. Different geologic formations, also known as bedrock, contain various chemical and physical characteristics and levels including mineral content, water bearing capacities and suitability, hardness, and strength.

Berks County is in the Appalachian Highlands Region, with portions in the Great Valley and Blue Mountain region of the Ridge and Valley Province, the Reading Prong region of the New England Province, and the Triassic Lowland of the Piedmont Province. The Blue Mountain is the northern border of the county. The Appalachian Highlands Region is characterized by rounded, forested landscape with an elevation of 6,000 feet or less on average. Three of its seven provinces are located in Berks County: Blue Ridge Province, Ridge and Valley Province, and Piedmont Province.

- *Blue Ridge Province* – Characterized by linear ridges, deep valleys, and flat uplands. Relief in this area is between 301 and 1,000 feet with elevation ranges between 450 and 2,080 feet. The area was formed by fluvial erosion of variable rocks with some peri-glacial mass wasting. A dentritic drainage pattern exists in this section.

- *Ridge and Valley Province* – Consists of broad lowland karst terrain with a relief between 101 to 600 feet with elevation ranges between 140 and 1,100 feet. The area was formed by fluvial erosion of variable rocks with some peri-glacial mass wasting. A dentritic drainage pattern exists in this section.

- *Piedmont Province* - Consists of three sections: the Gettysburg Newark Lowland, the Piedmont Lowland, and the Piedmont Upland.

    - *Gettysburg-Newark Lowland* – consists of rolling lowlands, shallow valleys, and isolated hills. The elevation ranges from 20 to 1,355 feet with relief ranging from 101 to 600 feet. It has dendritic and trellis drainage patterns, was formed from fluvial erosion and has distinctive red soils.

- *Piedmont Lowland* – Has elevations from 60-700 feet and relief from 101-300 feet. It was formed from fluvial erosion and some peri-glacial wasting and has dentritic and karst drainage patterns. This section consists of broad, moderately dissected karsts valleys separated by broad low hills.

- *Piedmont Upland* – Characterized by broad, rounded to flat-topped hills and shallow valleys. It was formed by fluvial erosion and some peri-glacial wasting. The relief for this area is 101 to 600 feet with altitudes between 100 to 1,220 feet.

WATER RESOURCES

Streams, creeks, and lakes provide scenic resources, aquatic habitat, and recreational opportunities. Water is used daily for residential, agricultural, industrial and commercial use. Streams and creeks provide potential recreational areas, water sources, and valuable aquatic habitats, while knowledge of drainage basins is necessary in designing sanitary sewers and storm sewers. It is of critical importance to protect our water resources and our watershed areas from pollution. Rivers, creeks, and streams flow through several townships, counties, and states so protection of these areas has been divided into watershed areas.

The Region is in the Tulpehocken Creek Watershed and the Schuylkill River Watershed. The Penn/Jefferson/Bernville planning region is located within the Delaware River Basin, Subbasin Number 3 (The Lower Delaware), Watershed C (Tulpehocken Creek) and the Schuylkill River watershed. These watersheds have been designated by the DEP under Act 167 of 1978, the Stormwater Management Act, and are required to have a stormwater management plan in place.

The Tulpehocken Creek and the Northkill Creek are the two largest streams that flow through the Bernville-Jefferson area. The Northkill Creek forms the eastern boundary of the Township and the western border of the Borough. The Tulpehocken Creek forms the southern boundary of Jefferson Township and joins the Northkill Creek near the southwest corner of the Borough and turns southeast eventually flowing into the Schuylkill River at Reading.

Seven miles south of Bernville, the Tulpehocken Creek was dammed by the U.S. Army Corps of Engineers forming Blue Marsh Lake. Blue Marsh Lake extends northward to the Bernville area along the Penn Township border.

Several small creeks and streams flow through the area. These include the Little Northkill Creek (which flows south along PA Route 183 to the Northkill Creek), the Mill

Creek (which flows along the southern side of Host Church Road to the Tulpehocken Creek) and other unnamed tributaries.

The Tulpehocken Creek is designated a scenic river by the Pennsylvania Department of Environmental Protection (PADEP) and is also a historic district. The historic district contains and protects the scenic river corridor, remnants of the old Union Canal which lies on the north bank and historic buildings, bridges and other structures along the creek. Currently no scenic or historic designations exist for the Northkill Creek or other streams in the area.

PADEP considers this section of the Tulpehocken Creek and its unnamed tributaries to be trout stocking fisheries (TSF). These areas contain warmer water and contain flora and fauna conducive to trout stocking, maintenance and propagation. The Northkill Creek is designated a cold water fishery (CWF) by PADEP. PADEP defines cold water fisheries as streams which are necessary for the maintenance and propagation of cold water fish and other flora and fauna indigenous to cold water habitats.

The Army Corps of Engineers owns and maintains several acres of flood prone land within the western edge of the Borough and southeast corner of Penn Township. In addition, 100-year floodplains parallel each of the area's creeks. The most significant floodplain areas occur along the Tulpehocken Creek, Northkill Creek, Little Northkill Creek and Mill Creek. Numerous pockets of wetlands are found along the stream corridors. Smaller pockets of wetlands are found in other hydric soil and high water table soil areas.

FLOODPLAINS

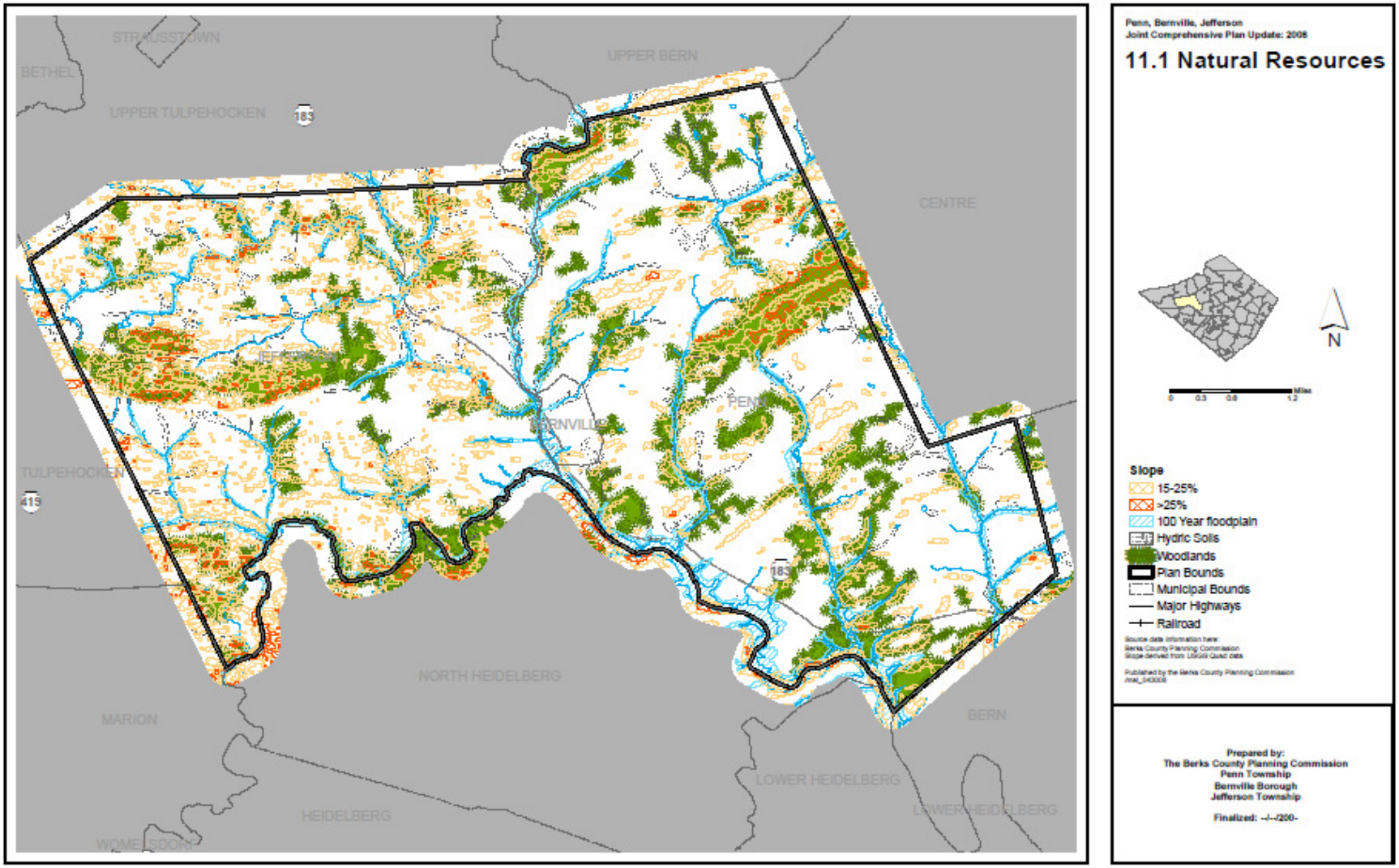
Floodplains are areas adjacent to rivers and streams which are subject to flooding during periods of excessive precipitation. The floodplain holds the excess water allowing it to seep into the groundwater and slowly drain back into the waterway. A 100-year floodplain is the area adjacent to a river or stream which has a one percent chance of being flooded during any one year, and is typically used for regulatory purposes. Floodplains should not be developed, due to the potential for damage to persons and property. If development occurs within the floodplain, it may limit the floodway, resulting in increased damage downstream because of resulting increased velocities of the floodwater downstream. Outdoor storage of materials within floodplains is not desirable because of the possibility of the materials being swept into the stream when flooding of the banks occurs. One hundred-year floodplains are shown from Federal Emergency Management Agency (FEMA) Maps. Detailed studies and calculations have not been performed to establish the extent of the 100-year floodplains for all watercourses. Any development proposed in the vicinity of watercourses would require the developer to obtain a calculated study of the 100-year floodplain if such studies have not been

performed by FEMA. The 100-Year Floodplain for the Region is depicted on Figure 11-1 and 11-2, The Natural Resources Maps.

Care must be taken in disturbing areas along watercourses because increased sedimentation within the stream (increased depositing of soil within the stream) can occur. Increased impervious cover along watercourses typically increases the volume of storm water runoff into the streams. This additional runoff can erode stream banks and channels. If sedimentation increases, streambeds may fill, causing floodwaters to affect a larger area.

Flood areas for Blue Marsh Lake extend up the Northkill Creek to the PA Route 183 crossing to form a physical barrier between the Borough and Jefferson Township. Blue Marsh flood areas also extend up the Tulpehocken Creek to an area just south of the Heidelberg Country Club and into the Borough along a small unnamed tributary of the Northkill as depicted on Figure 11-1 and 11-2 The Natural Resources Maps.

Wet (or "hydric") soils and floodplains along watercourses should be preserved from development in the interest of environmental preservation. These hydric soils areas act like a sponge when floodwaters rise and when coupled with established wetlands, they filter out nutrients and other pollutants. Hydric soils protect the quality of the groundwater and slow the storm runoff into local surface waters, all of which ultimately flow into the Susquehanna River. Impervious surfaces should be restricted from stream bank areas in order to facilitate absorption of storm runoff into the ground. Such increased absorption can help to replenish groundwater and to decrease flood peaks, as less runoff will flow directly into the stream. Inadequate supply of groundwater may result in reduced flows of water in a stream during dry months, and the inability to sustain stream flow can mean a greater concentration of pollutants at periods of low flow.


Penn, Bernville, Jefferson
Joint Comprehensive Plan Update: 2008
11.1 Natural Resources
N
Slope
15-25%
>25%
100 Year floodplain
Hydric Soils
Woodlands
Plan Bounds
Municipal Bounds
Major Highways
Railroad
Prepared by:
The Berks County Planning Commission
Penn Township
Bernville Borough
Jefferson Township
Finalized: --/--/200-
STRAUSSTOWN
BETHEL
UPPER BERN
UPPER TULPEHOCKEN
183
CENTRE
TULPEHOCKEN
419
NORTH HEIDELBERG
MARION
BERN
LOWER HEIDELBERG
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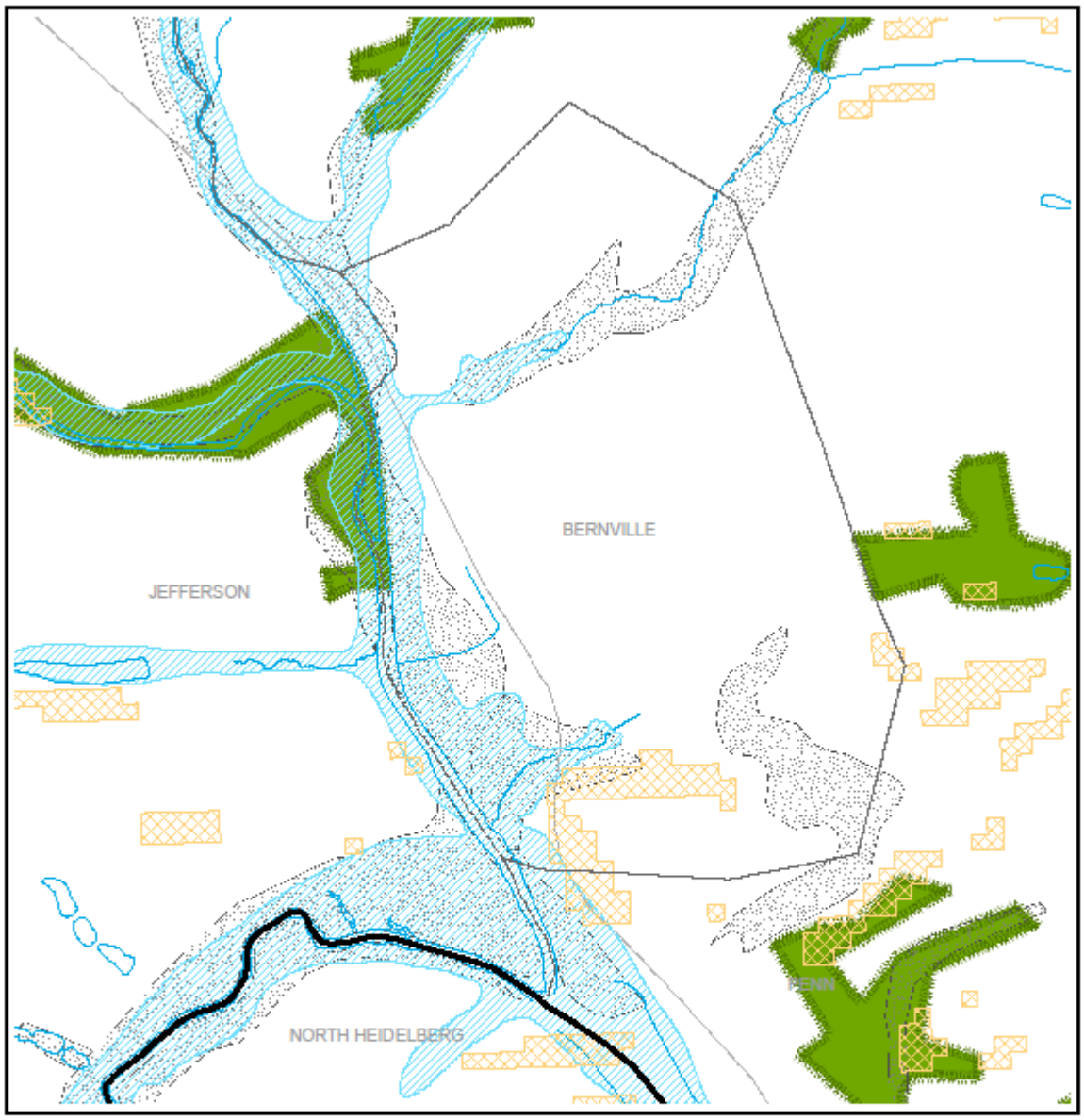

Penn, Bernville, Jefferson
Joint Comprehensive Plan Update: 2008

11.2 Natural Resources
Bernville Inset

0.2 0.1 0 0.2 Miles

Source data information here:
Berks County Planning Commission
Slope derived from USGS Quad data
Published by the Berks County Planning Commission
/mxl_042908

N

Slope
15-25%
>25%
Streams
100 Year floodplain
Hydric Soils
Woodlands
Municipal Bounds
Limited Access Highway
Major Highways
Railroad

Prepared by:
The Berks County Planning Commission
Penn Township
Bernville Borough
Jefferson Township

WETLANDS

Wetlands are generally found along rivers and streams and in areas subject to frequent flooding, and are characterized by soil type and the presence of hydrophytic ("water-loving") vegetation. Wetlands are typically rich in plant growth and provide habitat for a variety of animals. Wetlands can protect water sources by acting as a natural filter, removing pollutants such as bacteria and sediment from surface water before it enters the ground. Development activity, including the placement of fill material, is regulated by the Pennsylvania Department of Environmental Protection and the U.S. Army Corps of Engineers.

The wetlands depicted on the Natural Resources Maps (Figures 11.1 and 11.2), are from the National Wetlands Inventory, prepared by the Office of Biological Services, U.S. Fish and Wildlife Service. The wetlands inventory was prepared by stereoscopic analysis of high altitude aerial photographs, with the wetlands identified based on vegetation, visible hydrology, and geography. A detailed ground level analysis of any site may result in a revision of the wetland boundaries, and it is possible that small wetlands and those obscured by dense forest cover may not be identified. The wetlands in the Region are dispersed throughout the Region.

HYDRIC SOILS

Hydric soils are soils that are flooded, ponded or saturated long enough during the growing season to develop anaerobic (without oxygen) conditions. They are typically poorly drained and have a shallow water table. Lack of oxygen in the soil leads to certain characteristics of wetlands soil such as: non-decomposed plant material, oxidized root channels, and concentrations and depletions of iron and other elements. These soils, if undrained, may exhibit wetland vegetation and be an indicator of wetlands. Hydric Soils are noted on the Natural Resources Maps.

FORESTED AREAS

Forested areas provide shade, reduce pollution, act as noise barriers, prevent erosion, provide recreational and scenic enjoyment, produce oxygen and provide a habitat for birds and animals. Vegetation cover and root systems of the forest ecosystem protects against erosion and stabilizes the soil. Woodlands are areas which contain primarily second and third generation forests. Knowledge of woodland areas is important for the following reasons:

The Region has a significant amount of forested areas overall. Bernville has an insignificant amount of woodland but both Jefferson and Penn Townships have several stands of woodlands. Many of these woodlands are found in areas which were unsuitable

for farming such as areas with rocky soil, steep slopes, and floodplains and along stream banks and drainageways.

Forested areas include deciduous, evergreen, and mixed forest. Deciduous forests are characterized by shedding of leaves in the fall, 30-60 inches of annual rainfall, and the presence of seasons. Examples of Deciduous trees are: Maple, Oak, Elm, and Birch. Evergreen forests consist primarily or entirely of evergreens, or trees that retain their foliage all year long. Pine and fir trees are examples of evergreen trees. Mixed forests have both deciduous and evergreen trees. Forested areas are mapped on Figure 11-1 and 11-2, the Natural Resources Maps.

STEEP SLOPES

The topographic features of the landscape derive 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, tends to erode to form low-lying valleys.

Slope is measured by the change in vertical elevation (the "rise") over some horizontal distance (the "run"). This measurement is then expressed as a percentage. For example, if the ground rises two feet over a distance of twenty feet, then the slope is 2/20, or 10 percent. Areas that have slopes greater than 15 percent are deemed to have severe limitations to development. In general, development of such land can result in hazardous winter road conditions, costly excavation, erosion and sedimentation issues (a particular concern where the land may be cultivated), and accelerated velocity of stormwater runoff. Furthermore, conventional on-lot sewage disposal systems will not function properly where slope exceeds 15 percent. While specially designed systems will work in such areas, even custom installations will not function when the slope exceeds 25 percent. In steep areas, development should be controlled such that natural vegetative cover is maintained to the greatest extent possible, and erosion controls instituted. Without such cover, stormwater runoff can rapidly erode the slopes. The steep slopes for the Region, including the 15 to 25 percent, and the greater than 25 percent slopes, are shown on Figure 11-1 and 11-2, The Natural Resources Maps. The steep slopes are predominately in the Townships, with Penn Township having a significant area of steep slopes in the central and eastern portion of the Township with a few additional areas scattered across the rest of the Township. The majority of steep slopes in Jefferson Township are located in the western half of the Township both in the southwestern corner and a large area in the center of the Township. Bernville was founded on fairly level land near the coming together of the Northkill and Tulpehocken Creeks and has very few areas of steep slopes.

GROUND WATER SUPPLIES

Groundwater exists below the surface in moisture contained within the soils and the water table. This is the source of water for public and private wells and replenishes rivers and streams. Precipitation recharges groundwater as it infiltrates downward through soil and rock openings to the water table.

Groundwater that exists below the land in the water table is located within an aquifer. An aquifer is a geologic formation within the saturated zone which contains enough permeability to store and transmit usable amounts of water.

Penn Township, Jefferson Township and Bernville Borough are located within the Valley and Ridge Aquifer. The geology of this region was formed during the Ordovician Age and consists primarily of Martinsburg Shale with only a very small area of Leesport Cement Rock. Ordovician Age formations are considered to yield small to moderate amounts of groundwater.

Martinsburg Shale is a dark-gray shale, which is sandy toward the top. Martinsburg Shale is the parent material and forms the base of the Berks-Weikert-Bedington soil association. The Berks-Weikert-Bedington soil association contains shallow to deep well-drained, rolling soils formed in material weathered mainly from shale and siltstone. Leesport Cement Rock is a dark argillaceous to shaley limestone and the parent material and base of the Ryder-Fogelsville soil. The Ryder-Fogelsville association contains moderately deep and deep, well-drained, silty soils that are undulating and formed in material weathered from cement rock.

SOILS

Several soil types exist within the Region. Analyzing soil type is important to evaluate how well the soil can support septic systems or agriculture. Soils and their characteristics are the result of the geology of an area.

Soils are classified into eight classes, beginning with I and ending with VIII. Class I soils are the highest rated and have few restrictions on uses. Class VIII soils are limited in use based on severe slope and their propensity towards erosion.

Agriculturally productive soils are Class I through IV. Class I and Class II agricultural soils are considered prime agricultural soils and indicate where the best farmland is located. Class III soils have limitations in their ability to support certain crops and require additional conservation practices. Classes IV-VII are considered the least favorable for agricultural use because of their severe limitations to farming.

The definition of "prime farmland" has been established nationwide by the U.S. Department of Agriculture to include Class I and Class II soils. These are the classifications used by the Agricultural Preservation Board to determine eligibility in the Berks County Agricultural Easement Program. Prime farmland has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is managed according to acceptable farming methods. In general, prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, an acceptable level of acidity or alkalinity, an acceptable content of salt or sodium, and few or no rocks. Its soils are permeable to water and air. Prime farmland is not excessively eroded or saturated with water for long periods of time, and it either does not flood frequently during the growing season or is protected from flooding. Figure 7.2 identifies prime farmland as well as soils defined by the Commonwealth of Pennsylvania as "farmland of statewide importance" based upon conditions specific to Pennsylvania.

Stewards of prime farmland soils should recognize that soil properties are only one of several criteria that make for "prime" soil. Other factors include land use, frequency of flooding, irrigation, water table, and susceptibility to wind erosion.

- **Land use -** Prime farmland is designated independently of current land use, but it cannot be areas of water or urban or built-up land.
- **Frequency of flooding -** Some soil types include both prime farmland and land not prime farmland because of variations in flooding frequency.
- **Irrigation -** Some soil types include areas that have a developed irrigation water supply that is dependable and of adequate quality along with areas lacking such a supply. For these soil types, only the irrigated areas meet the prime farmland criteria.
- **Water table -** Some soil types include both drained and undrained areas; only the drained areas meet the prime farmland criteria.
- **Wind erodibility –** Susceptibility to erosion by wind is determined by a combination of soil characteristics and the climate. Due to varying climatic conditions, it is possible for a single soil type to be prime farmland in one part of a survey area but not in another.

Bernville has few remaining farmed parcels. A small area in the south of the Borough which is farmable contains Class II and Class III soils. The remaining farmable area at the Borough's northern boundary contains Class II, Class III and Class VI agricultural soils.

Jefferson and Penn Townships contain significant areas of farmland. Much of the existing farmed land contains either Class II or Class III agricultural soils. There are

significant quantities of Class IV through VIII in Penn Township. These areas contain mostly woodlands and steep slopes. The Region has no Class I soils.

On-site sewage disposal systems should not be located within areas containing hydric soils that are subject to flooding because of the danger of contamination of the stream and the groundwater due to the proximity of the stream and the presence of the high water table. There may not be an adequate distance between the on-site facility and surface water to permit renovation of sewage effluent prior to its reaching the stream. In some instances, soils found in the floodplains are very porous and the movement of sewage effluent is too rapid to allow for the renovation of the effluent prior to reaching the groundwater table or the stream. In other situations, the soil near the surface may be saturated with water or become readily saturated with sewage effluent, resulting in effluent remaining near or rising to the surface of the land. When flooding occurs, sewage effluent could then contaminate the surface water. The efficiency of filter fields of septic tanks can be impaired or destroyed as a result of flooding.

The hydric soils and floodplains found along the tributaries and watercourses within watersheds should be preserved. Serious consideration should be taken to limit development on hydric soils. These floodplains and hydric soils act like a sponge when floodwaters rise and, when coupled with established wetlands, can filter nutrients and pollutants to protect the surface and ground water that feed the various streams and lakes within the Region.

In general, soils which are steeply sloped, shallow, stony or poorly drained are considered unsuitable for on-lot systems. Soil suitability for on-site septic systems is not an important issue in areas served by public or private community sewage systems, such as in Bernville and the Heidelberg Country Club area of Jefferson Township. Soil suitability for on-site septic systems is a critical issue for existing and future development within the Region.

Few areas within the Region contain soils suitable for on-lot septic systems. Smaller lots within the Region such as those in New Schaefferstown, Jefferson Township, may encounter problems as existing systems begin to fail. Existing soil characteristics will also hinder new development from occurring in specific areas without the extension of public or private community sewage systems. Existing community sewage systems may need to be extended to accommodate existing and new development in the future.

SIGNIFICANCE OF NATURAL AREAS

The importance of natural resource protection is summarized below:

Floodplains	**Floodplains Importance**
Areas adjacent to rivers and streams which are covered by flood water during excessive precipitation.	• Can constrict floodwater flow, increasing the potential for flood damage • Wildlife habitats can be harmed or destroyed • Development poses a risk to people and property • Outdoor storage can be washed downstream during flooding. This can have a multitude of problems ranging from polluting the water and surrounding areas with either chemical pollutants or debris • Development can detract from the esthetic and recreational value • On-site sewage disposal can contaminate ground and surface water • Preservation of wet or "hydric" soils
Water Courses	**Water Courses Importance**
Watersheds of streams are important for planning and management of stream conservation and protection, water supply budgeting planning, watershed based zoning, stormwater management, and integrated resource planning.	• Scenic resources • Aquatic habitats • Recreational resources • Protected status limits the effluent from a point source discharge
Wetlands	**Wetlands Importance**
Areas that are subject to frequent flooding or saturated by surface or groundwater at a frequency and duration sufficient to support vegetation typically adapted for life in saturated soil conditions.	• Plant and animal habitats • Plants act as natural filters of pollutants from waters • Unsuitable for development and on-site sewage disposal • Reduce flooding by detaining stormwater • Replenishes groundwater and surface water through stored water
Steep Slopes	**Steep Slopes Importance**
Steep Slopes are measured by the change in vertical distance over the change in horizontal distance. This number is then shown as a percentage. A steep slope of 15% will have 15 feet of vertical change in elevation over 100 feet of horizontal distance.	• Stormwater runoff can rapidly erode the slopes • Can result in hazardous driving conditions in the winter from development of roads and driveways • Difficulty in road maintenance • Increased building costs due to excavating, and consideration of erosion controls • Stormwater runoff problems and erosion issues, especially in the absence of vegetative cover • Conventional on-site sewage disposal systems will not work properly with slopes greater than 15%

Forested Areas	Forested Areas Importance
Woodlands are areas that are covered by woods or trees.	• Stabilize soil against erosion • Scenic Resources • Wildlife habitats • Provide visual relief • Birding and hunting areas • Buffer development • Air purification • Absorb stormwater runoff
Hydric Soils	**Hydric Soils Importance**
Soils that have shallow depth to seasonally high water table. Potential wetlands, with need for further analysis.	• Unsuitable for development and on-lot sewage disposal • Flooded basements and poor foundation stability (if built upon) • Natural recharge areas which can reduce flooding and manage stormwater runoff • Filter surface water
Groundwater Supplies	**Groundwater Supplies Importance**
Groundwater enters through soil and creeks.	• Public water systems and private wells are usually dependent upon groundwater supplies • Groundwater supplies are affected by development which reduces recharge and pollutes groundwater • High water withdrawals can affect other water supplies

UNIQUE NATURAL AREAS

Berks County Natural Areas Inventory

The Berks County Natural Areas Inventory (NAI) is a document compiled and written by the Pennsylvania Science Office (PSO) of the Nature Conservancy, and updated by the Berks County Planning Commission. It contains information on the locations of rare, threatened, and endangered species and of the highest quality natural areas in the County. Each site description contained in the Inventory is accompanied by general management recommendations that would help to ensure the protection and continued existence of these rare plants, animals, and natural communities.

There are no recognized sites in the Region.

Riparian Buffers

Riparian buffers are particularly important to protect water resources because of the number of resources along watercourses, including floodplains, wetlands, hydric soils,

woodlands, and steep slopes. A riparian buffer is an area of vegetation that is maintained along the shore of a water body to protect stream water quality and stabilize stream channels and banks. Riparian buffers should be maintained along the Tulpehocken Creek and Northkill Creeks and their tributaries. Requirements for such buffers should be incorporated into zoning and subdivision and land development ordinances.

Buffers provide the following benefits:

- Filter runoff – Rain that runs off the land can be slowed and infiltrated in the buffer, settling out sediment, nutrients and pesticides (nonpoint source pollution) before they reach streams.

- Take up nutrients – Fertilizers and other pollutants that originate on the upslope land are taken up by tree roots. Nutrients are stored in leaves, limbs and roots instead of reaching the stream. Through a process called "denitrification," bacteria in the forest floor convert nitrate to nitrogen gas, which is released into the air.

- Provide shade – The leaf canopy's shade keeps the water cool, allowing it to retain more dissolved oxygen, and encouraging growth of plants and aquatic insects that provide food for fish.

- Contribute leaf food – Leaves that fall into the stream are trapped on fallen trees and rocks where they provide food and habitat for organisms critical to the aquatic food chain.

- Provide habitat – Streams that travel through woodlands provide more habitat for fish and wildlife. Woody debris provides cover for fish while stabilizing stream bottoms.

    - Provide migration corridors for wildlife.

    - Safeguard water supplies by protecting groundwater recharge areas.

    - Provide flood control.

    - Provide stormwater management potential – natural vegetation provides a basis for innovative stormwater management systems. Stormwater flows from retention basins can be directed to, and allowed to flow through, buffers to reduce nutrient and sediment loads.

    - Improve water and air quality.

- Stimulate economic opportunities such as by providing valuable open space which may increase land values and, therefore, the tax base.

- Provide some federal tax incentives to landowners (depending on a landowner's financial situation) willing and able to place some of their lands under conservation easement.

- Reduce grounds maintenance.

- Provide recreational opportunities, and associated economic benefits for recreation-related businesses.

- Provide educational and research opportunities for local schools and colleges.

- Provide windbreak, shade and visual buffer.

Natural Resources Actions:

A. Update zoning ordinances as necessary, and consider adopting official maps to reflect the resource protection Goal and Objectives of this Plan and to be consistent with the Future Land Use Map (Figure 7.1). The resource protection provisions of municipal zoning ordinances vary, and the approach taken by each Township will vary. Options include:

1. Adopt Natural Resource Protection Standards and/or Net-Out Provisions for the following resources:

    a. Floodplains
    b. Wetlands
    c. Wetland Margins (buffers)
    d. Watercourses
    e. Water bodies
    f. Greater than 25% slope
    g. 15-25% slope

2. Adopt Steep Slope Protection Provisions:

    a. Control and limit development on steep slopes

- Require larger lot sizes and impose stricter impervious restrictions for steep slopes of 15 to 25%

- Prohibit or severely restrict development on slopes greater than 25%

3. Adopt Groundwater Protection Provisions:

   a. Protect aquifers through design standards, construction guidelines, use restrictions, impervious limits, and permit submission requirements.

4. Adopt Tree and Woodland Protection, Management and Planting Provisions:

   a. Limit clearance for development in both subdivisions and land developments.

   b. Require tree protection and replacement during development.

   c. Encourage the use of native species in landscaping. Discourage invasive species.

   d. Establish limited clearance buffer zones around the perimeter of new developments

5. Adopt provisions for Wetland, Wetland Buffer, and Hydric Soil Protection:

   a. Restrict development in wetlands.

   b. Establish consistent wetland, wet area, and water body buffer (margin) requirements, such as 50 feet or 100 feet.

   c. Require wetland delineation in hydric soil areas.

6. Adopt Floodplain Protection Provisions:

   a. Severely restrict development in floodplains to compatible open space uses.

7. Establish Stream Corridor Overlay Zoning and require Riparian Buffers:

a. Restrict development and impervious surfaces.

b. Require riparian (vegetative) buffers to moderate water temperatures, protect wildlife habitats, control sedimentation, and reduce pollution.

c. Require greenways.

d. Utilize the Best Management Practices where practical, and implement the Tulpehocken Creek and Schuylkill River Watersheds Act 167 Stormwater Management Plans.

e. Protect the Region's streams.

8. Adopt Outdoor Lighting Standards to control light pollution and protect the night sky:

a. Establish illumination levels that are adequate but not excessive.

b. Require impacts on surrounding streets and properties to be mitigated by directing light down, not up or out to sides of fixtures.

c. Control glare.

9. Adopt Forestry Regulations:

a. Require accepted silvicultural (forestry) practices.

b. Require a forestry management plan.

c. Require stormwater and erosion and sedimentation control.

d. Require properly constructed internal logging roads and protection of public roads.

e. Require soil erosion protection during steep slope forestry.

B. Update subdivision and land development ordinances as necessary. Options include the following:

1. Expand plan data requirements to include a specific listing of environmental, scenic, historic, and cultural resources.

2. Require developers to identify the resources within their tracts, analyze the impacts of the development, and mitigate those impacts.

3. Require environmental assessment studies; hydrogeologic studies; scenic, historic and cultural resources impact studies; plans for preservation of environmental, historic, and cultural resources; and analysis of the site's ability to support the proposed use and intensity.

4. Require developers to identify natural, historic, scenic, architectural and cultural resources in their tracts and incorporate them into the open space system. Require management plans for open space as well as mechanisms to ensure the continuation as open space.

   In review of Subdivision and Land Development Plans, requirements for setting aside open space can be used to preserve conservation corridors and provide for greenways.

   Requirements for setting aside open space can also be used to protect targeted undeveloped areas and identified natural areas pursuant to municipal plans.

5. Establish development guidelines for development in groundwater recharge areas, including limits on impervious cover and limits on on-site sewage disposal.

6. Require protection of vegetation during site work.

7. Limit clearance on approved, but not developed, lots. Potential techniques include tree clearance ordinances, deed restrictions, net-out provisions, and identification of permissible clearance areas during the development process.

C. Create municipal Environmental Advisory Councils to work with municipal officials to preserve key tracts of open space, protect environmental resources in the Region, and implement open space and recreation plans.

   Act 148 of 1973 authorizes any municipality or group of municipalities to establish, by ordinance, an Environmental Advisory Council to advise the local planning commissions, park and recreation boards, and elected officials on matters dealing with the protection, conservation, management, promotion, and use of natural resources located in the municipality's territorial limits.

Act 148 empowers Environmental Advisory Councils to:

- Identify environmental problems and recommend plans and programs to the appropriate municipal agencies for the promotion and conservation of natural resources and for the protection and improvement of the quality of the environment within its municipal boundaries;

- Keep an index of all open space, publicly and privately owned, including flood-prone areas, and other unique natural areas, for the purpose of obtaining information on the proper use of such areas;

- Advise the appropriate local government agencies, including, but not limited to, the planning commission and park and recreation board or, if none, the elected governing body, on the acquisition of property, both real and personal.

D. Encourage formation of groups within the community to adopt a stream and provide monitoring and oversight along the stream corridor.

E. Pursue joint watershed planning opportunities under the Growing Greener initiative and other programs in order to protect community water resources.

Energy Conservation

The Penn, Jefferson, Bernville Region is growing, and with this growth comes the increased reliance on energy sources. Energy conservation is becoming a high priority because the way we use our resources today will have a profound effect on future generations. Land use plans, land development regulations, building codes, and transportation policies should be implemented to support the policy of energy conservation.

As the environmental impact of buildings becomes more apparent, a new field called *green building* is arising to reduce that impact at the source. *Green* or *sustainable building* is the practice of creating healthier and more resource-efficient models of construction, renovation, operation, maintenance, and demolition.

Goal: Conserve energy through appropriate land use and transportation planning techniques and public education efforts.

Objectives:

- Promote alternatives to motor vehicle use to improve air quality and conserve fossil fuels.

- Maximize recycling as the markets become available.

- Promote mixed-use development patterns and densities that result in more compact communities, encourage fewer and shorter vehicle trips, and limit the need to extend infrastructure.

Actions:

1. Educate residents and businesses regarding the benefits of energy conservation.

2. Review and update ordinances to include regulations for energy efficient building and design techniques. Encourage the use of renewable sources of energy, including solar, wind, and biomass (energy from organic matter).