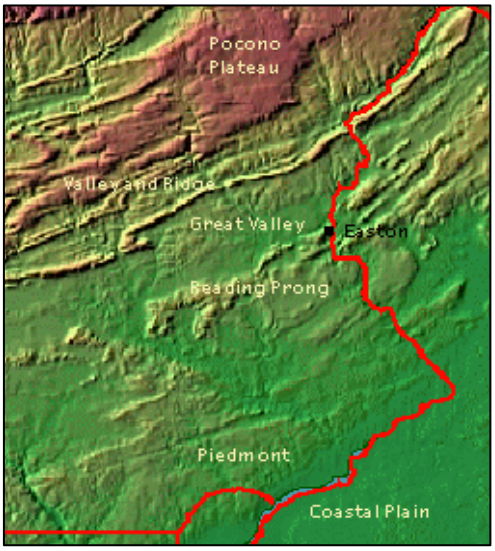
III. NATURAL & CULTURAL FEATURES

This chapter will describe and map the Eastern Berks County Region's natural and cultural resources. This information will be extremely useful in allocating future land uses within the Region, as well as in formulating policies and implementing measures that protect these natural and cultural resources.

A. Topography



The northern tip of the Eastern Berks County Region (EBCR) is situated within the Great Valley Section of the Valley and Ridge Province. The "Great Valley" section derives its name from the fact that it forms an almost continuous valley extending from New York to Georgia. Along the way this valley takes on local names like the Cumberland Valley, Lebanon Valley, Lehigh Valley and, in Virginia, the Shenandoah Valley. Within the EBCR, this valley is comprised of Cambrian and Ordovician limestones and dolomites that form low, flat and gently rolling terrain with a thick fertile soils cover and a karst drainage pattern.

The southern expanse of the EBCR is located along the northern edge of the Reading Prong of the New England Province. This area is formed by a deeply dissected mountain range that rises more than 800 feet above the adjoining Great Valley. Here ridges of 6 to 8 miles in width extend between the Delaware River to the Schuylkill River near the City of Reading. The rocks include the Cambrian Hardyston Formation and Precambrian Granitic Gneiss. These formations are characterized by large over-turned folds and thrust faults which occurred during two major mountain building geologic periods. This creates a rugged terrain with complex structure and sudden elevation changes.

B. Geology

The geology of an area plays an important role in determining the surface shape of the environment. Throughout the ages, underlying rock is subjected to natural weathering forces that chemically and physically erode its original shape. The physical properties of underlying rock determine its strength and suitability to support development, including the ease of excavation, and ability to support the foundations of various structural types.

Geologic Formations

The *Soils and Geology Maps* illustrates the geologic conditions within the Region. All of the geologic formations within the Region were formed during the Precambrian, Cambrian and Ordovician Eras, which occurred between 523 and over 600 million years ago years ago.

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The ECBR contains large deposits of the ***Felsic to Mafic Gneiss (formerly known as Granitic Gneiss)*** and the ***Hornblended Gneiss*** formation of the Reading Prong. These formations are very hard and resistant to erosion thus forming the hills and ridges so abundant in this area. These formations are composed of compact and dense rock that does not "hold" or "convey" water except through joints and widely-spaced fractures. This makes it difficult to obtain high yield wells although yields of 10 to 15 gpm (gallons per minute) are average. These formation's weathering has over the millennia produced the Region's Gladstone and Towhee soils.

Landscape of Gneiss formation

The ***Leithsville Formation*** is principally located along the northern edge of the Reading Prong and the southern edge of the Great Valley landforms, although two small areas of District Township also include this formation. This formation appears as a band that largely straddles State Street through Topton Borough and the northern tip of Rockland Township. This formation consists of crystalline dolomite and is a carbonate rock like limestone. Accordingly, this rock is comparatively soft and subject to erosion which over time creates their characteristic flat and fertile lowlands. These same properties make this formation susceptible to the creation of solution channels that can convey large quantities of groundwater; however, these same waters are also susceptible to contamination via the solution channels. This formation's weathering has produced the Region's Ladig and Murrill soils.

The Region is dominated by the ***Hardyston Formation*** that occurs throughout the Region's larger gneiss formations. It consists of metamorphisized quartz sandstone called quartzite. The upper horizons closest to the surface decomposes into a siliceous clay while deeper materials are composed of rounded pebbles of quartz and feldspar called conglomerate. This formation is very hard and resistant to erosion and produces the highest ridges in the area with steep side slopes. Over time, cementation and metamorphism have made this rock more dense and impermeable. Like the gneiss formations, the Hardyston Formation produce low well yields except where it adjoins another more permeable rock type. This formation's weathering has produced the Region's Edgement soils.

Along the northern tip of the Region are the two formations associated with the Great Valley landform. The ***Allentown Formation*** appears as a broad band sweeping in an east-to-west direction generally north of Pennsylvania Railroad line. This formation is characterized with carbonate rock that formed during the Ordovician period. The softer limestone has eroded over thousands of years to produce low-lying fertile flatlands with a karst topography. They yield abundant groundwaters through solution channels but are therefore susceptible to widespread contamination. This formation has produced the Duffield and Duffield-Ryder soils within the Region.

Several other minor occurrences of geology are also represented within the ECBR. These include the ***Beekmantown Group, Graphitic Felsic Gniess, and Metadiabase formation***.

The following table has been constructed to show the relationship between the geology of the Region and four important land use planning considerations. Porosity and permeability, ease of excavation, foundation stability, and groundwater availability are integral to the planning of land use activities. This table is intended for reference use only and can be utilized to determine general characteristics of formation types.

The ***porosity*** and ***permeability*** of a geologic formation refer to how quickly and easily water, air, and other substances pass through the rock. A classification of low means the rock is essentially impermeable. A classification of moderate refers to a permeability of less than 14 feet per day, while high permeability means that substances may pass through the rock at a rate between 14 and 847 feet per day. The ***ease of excavation*** refers to how pliable the rock is when moving or drilling it. The classifications range from easy to difficult. ***Foundation stability*** can be classified as either good, fair, or poor. Good foundation stability means that the bearing capacity of the rock is sufficient for the heaviest classes of construction, except where located on intensely fractured zones or solution openings. Fair foundation stability is determined by the location of the water table, type of rock composition, and weathering depth. Poor foundation stability means that foundations must be artificially stabilized to allow sufficient bearing capacity for construction.

GEOLOGIC FORMATION CHARACTERISTICS

Formation Name (Composition)	Symbol	Porosity & Permeability	Ease of Excavation	Foundation Stability	Groundwater
ALLENTOWN FORMATION (Medium-gray dolomite and impure limestone; dark-gray chert stringers and nodules; laminated; some oolite and sharpstone conglomerate; maximum thickness is about 2,000 feet; reference sections are along Lehigh River and Jordan Creek in vicinity of Allentown, Lehigh County.)	Ꞓal	Solution channels produce a secondary porosity of moderate to high magnitude; low permeability.	Difficult; bedrock pinnacles are a special problem; moderate to slow drilling rate; numerous sandstone beds containing chert lenses slow the drilling rate.	Good; a thorough sinkhole investigation should be undertaken.	Median yields from specific study areas range from 60 to 210 gal/min; many wells are capable of yielding 1,000 gal/min or more; aquifer can be easily contaminated; turbidity is a common water-quality problem.
BEEKMANTOWN GROUP (Where these rocks have not been subdivided into separate formations, they are interbedded, finely laminated, light-gray limestone containing dark-gray dolomite beds; dolomite is fractured, and the fractures are recemented by white calcite; limestone weathers to a pale-gray surface contrasting with the yellowish-gray-weathering dolomite; maximum thickness is about 2,300 feet; reference section is between Leesport and Reading [Berks County] along the Schuylkill River.)	Ob	Joint and solution-channel openings provide a secondary porosity of low to moderate magnitude; low permeability.	Difficult; bedrock pinnacles are a special problem; moderate drilling rate; chert beds, lenses, and quartz sand slow the drilling rate.	Good; should be investigated thoroughly for solution openings.	High yields from fractures and solution cavities; median yield is 50 gal/min in southeastern Pennsylvania; industrial and public supplies are available in most areas.
Felsic to Mafic Gneiss (Light buff to light pink; fine to medium grained; most mineral grains are about 1 mm in diameter; primary minerals are quartz, microcline, hornblende (5 to 10 percent), and occasional biotite.)	gn	Joints provide a very low secondary porosity; low permeability.	Difficult; slow drilling rate.	Good; should be excavated to sound rock.	Median yield is less than 20 gal/min; yields of 35 gal/min or more may be obtainable from wells properly sited and developed; wells should be at least 100 feet deep, but probably not over 200 feet for maximum yield
GRANODIORITE & GRANODIORITE GNEISS	ggd	Joints produce a secondary porosity of	Difficult; large surface and near-surface	Good; should be excavated to	Yield of 10 gal/min or less may be expected; yields of

GEOLOGIC FORMATION CHARACTERISTICS

Formation Name (Composition)	Symbol	Porosity & Permeability	Ease of Excavation	Foundation Stability	Groundwater
(Medium grained; light pink to green; largely quartz, feldspar, and mica; commonly gneissic.)		low magnitude; low permeability.	boulders hamper excavation; slow drilling rate.	sound material.	25 gal/min or more may be obtained from wells properly sited and developed.
HARDYSTON FORMATION (Light-gray quartzite; weathers yellow brown; porous and limonitic in many places; quart-pebble conglomerate occurs at base; maximum thickness is 800 feet; reference to section is at Mt. Penn, Reading, Berks County)	Cha	Joint- and cleavage-plane openings produce a secondary porosity of low magnitude; low permeability.	Difficult; slow drilling rate, in part due to many quartz veins that exceed 12 inches in width; boulders may be a special problem; locally highly fractured, highly weathered, and moderately easy to excavate.	Good; should be excavated to sound material.	Median yield of 20 water-yielding fractures seldom found below 200 feet; water is usually soft and of good quality; iron may be a problem.
HORNBLENDE GNEISS (Dark-gray to black; most grains are about 1 to 2 mm in diameter; hornblende makes up about 50 percent of the rock; the other 50 percent is labradorite [feldspar]; rock is extremely resistant to abrasion and very resistant to rupture, but may be susceptible to crumbling.	hg	Extremely low primary porosity; joint openings provide a low secondary porosity; highly weathered near- surface rock may have high porosity; low permeability.	Highly weathered portion of rock mass has moderately easy excavation; un-weathered rock is difficult; fast to moderate drilling rate.	Good; should be excavated to sound material.	Median yield of reported wells is 10 gal/min; yields of 35 gal/min or more may be obtained from wells properly sited and developed.
LEITHSVILLE FORMATION (Dark-gray to medium-gray dolomite; some calcareous shale and sandy dolomite; cherty; 1,500 feet thick; type section is at Leithsville, Northampton County.)	Clv	Joint openings and solution channels pro- vide a secondary porosity of high magnitude; moderate to high permeability.	Difficult; bedrock pinnacles may be a special problem; fast drilling rate.	Good; solution openings and bedrock pinnacles should be thoroughly investigated.	Median yield is 100 gal/min; large yields may be obtained from solution openings; aquifer can be easily contaminated; turbidity is a common water-quality problem; water is relatively hard.
MARTINSBURG FORMATION (Buff weathering, dark-gray shale, and thin interbeds of siltstone, metabentonite, and fine-grained sandstone; brown-weathering, medium-grained sandstone containing shale and siltstone interbeds occurs in the middle of the formation; basal part grades into limy shale and platy-weathering, silfy limestone; may be 12,800 feet thick; reference section is in a small quarry along Longs Gap Road, North Middleton Township, Cumberland County.)	Includes Om, Omgs, and Oml	Cleavage- and joint- plane openings provide a secondary porosity of generally low magnitude; low permeability.	Moderately easy in shale; moderately difficult in limestone; difficult in sandstone; fast drilling rate.	Good; should be excavated to sound rock; limestone should be investigated for solution openings.	A median sustained yield of 32 gal/min has been calculated and a maximum well yield of 200 gal/min is reported; yielding zones are commonly less than 150 feet in depth but occur as deep as 400 feet below land surface; the natural quality of the water is often poor due to hydrogen sulfide and high concentrations of iron.
METADIABASE (Dark-greenish-gray to almost black diabase; generally ½ to 1 mm in grain size; consists of augite, feldspar [andesine to labradorite], and magnetite; extensively altered—feldspar is altered to sericite and augite has been replaced by epidote and chlorite; occurs as mostly thin dikes, but a few may be greater than 100 feet thick; reference locality is a mile south of Ritten- house Gap, Berks County.)	md	Joint-plane openings provide a very shallow and low secondary porosity; low perme- ability; effective porosity and permeability probably exist to 150 feet in depth.	Moderately easy where highly fractured and weathered; difficult elsewhere and at depth.	Excellent; should be excavated to sound bedrock.	Yield of less than 5 gal/min are common.

Source: Alan R. Geyer and J. Peter Wilshusen, *Engineering Characteristics of the Rocks of Pennsylvania* (Harrisburg, PA: Pennsylvania Geologic Survey, 1982 and the United States Geologic Service (USGS)).

Groundwater & Wellhead Protection

Geology is also a primary determinant of ***groundwater quality and quantity***, as shown in the foregoing table. Groundwater is surface water that has seeped into and is contained by underground geological formations called aquifers. Water stored in aquifers is sometimes released to the surface through springs or can be pumped to the surface through wells. Groundwater aquifers are part of an interconnected network that includes surface waters, such as streams, ponds, wetlands, and lakes. Aquifers regulate the levels and flow rates of these surface waters by collecting and retaining water reaching the ground and gradually releasing it during dry periods.

Some of the primary geological determinants of groundwater quality and quantity are the type, structure, permeability, porosity, and chemical composition of the bedrock formations present in the area. An understanding of local groundwater conditions is necessary to (1) plan for future public sewer and water needs, (2) allocate future land uses so as to protect important groundwater recharge areas, and (3) protect existing and potential future groundwater sources from contamination.

A typical household with three family members requires an average flow of 0.2 to 0.4 gpm with a peak rate of use ranging between 3 and 5 gpm. ***The more rural southern areas of the Region are characterized by geologic formations that average between 10-20 gpm and can adequately accommodate a sparsely-developed rural land use pattern.*** The northern tip of the Region with its limestone and dolomite formations provide for more ample groundwater yields that range between 60 to 210 gpm with many wells capable of obtaining 1000 gpm in the larger Allentown Formation. ***Public water supplies and small-scale community systems within the ECBR that rely upon wells for source should be located in the vicinity of these carbonate formations to take advantage of the abundant groundwater supplies. However, such sources should be routinely monitored and treated as necessary due to the vulnerability of this groundwater from contamination via the widespread solution channels.***

Wellhead protection safeguarding public groundwater sources is also a particularly sound investment because wellhead protection is more effective and less expensive than cleaning a contaminated groundwater source, which may cost 30-40 times more than initial protection. The following presents a brief synopsis of the five initial steps of the planning process needed to undertake a wellhead protection program as presented in *the Wellhead Protection Workbook for Local Municipal Water Planning Teams* (Lancaster County Planning Commission & Lancaster County Water Resources Task Force):

(1) ***Form a Water Planning Team*** of local officials, citizens, and interested experts who are interested in a successful wellhead protection program and can commit the time to assist in the work involved. Then establish a regular meeting schedule to be followed;

(2) ***Define the land area to be protected*** - A wellhead is defined as an area above or below grade that contributes water to, and could potentially contaminate a water supply. Wellhead protection areas should be delineated by a professional geologist at the outset. A water supplier may use its own municipal engineer or retain a qualified consultant for this work. Not all public groundwater sources warrant a wellhead protection program. That is a decision that should be made based on several factors: feasibility of protecting the recharge area, influence of surface water on the water supply, existence of a filtration plant, possible interconnection to buy water from another system, or designation of the water source as a sole-source aquifer. Within Pennsylvania wellheads are generally divided among three different zones:

Zone I is a 100 to 400 foot radius immediately surrounding a well or spring in which no development should be permitted. Activities in this area generally pose the greatest risk to groundwater because of the short distance (and correspondingly short travel time) that contamination must travel to reach the well.

Zone II is a larger area from which the groundwater is pulled into a well by pumping. Generally, the harder a well is pumped, the further out the water is drawn from. Because springs are not pumped, a Zone II is not delineated for springs.

Zone III is the area from which any rain that fails to the surface and eventually flows into Zone II or a spring.

Not all wellhead protection programs utilize the three zone approach and local officials should tailor their program with appropriate levels of regulation and implementation that meets local protection goals and responds to local conditions.

(3) ***Identify potential contaminate sources*** - The water planning team should review the following list of potential sources of groundwater contamination then specifically inventory and map such sources within their respective wellhead zones.

Potential Source for Groundwater Contamination

AGRICULTURE Animal burial areas Irrigation Animal feedlots Manure storage areas Pesticide and herbicide storage areas	**RESIDENTIAL** Fuel storage systems Septic systems, cesspools, water softeners Furniture and wood strippers and refinishers Sewer lines Household hazardous products Chemical applications to lawns
COMMERCIAL Airport Boat Yards Medical Institutions Paint shops Photography business Printing business Carwashes Railroad tracks Railroad yards or maintenance facility Cemeteries Research laboratories Construction areas Road deicing operations (i.e. road salt storage or use) Dry cleaning establishment Scrap and junk yards Gas station Auto Repair Shops Storage tanks and piping (either above ground or underground) Golf courses (chemical applications) Jewelry and metal plating Laundromats	**INDUSTRIAL** Abandoned properties Asphalt plants Chemical manufacture, warehousing and distribution Electrical and electronic products and manufacturing Electroplaters and metal fabricators Foundries Fire Training Facilities Machine and metal working shops Manufacturing and distribution sites for cleaning supplies Quarries Petroleum products production, storage and distribution Pipelines (e.g. oil, gas) Septage lagoons and sludge Storage tanks (i.e. above ground, underground) Toxic and hazardous spills Wells- operational and abandoned (e.g. water supply, injection, monitoring) Wood Preserving facilities

OTHER	WASTE MANAGEMENT
Rifle and pistol ranges	Hazardous waste management units (e.g. landfills, land treatment areas, surface impoundments, waste piles, incinerators, treatment tanks) Municipal incinerators Municipal landfills Municipal wastewater and sewer lines Open burning sites Recycling and reduction facilities Stormwater drains, retention basins, transfer stations

(4) **Evaluate alternative tools and techniques** – Based upon results of previous task select from the many techniques that can be used to protect groundwater, including but not limited to:

ASSORTED STRATEGIES & TECHNIQUES FOR GROUNDWATER PROTECTION

Regulatory Techniques	Non-Regulatory Techniques
• Overlay Zones; • Prohibited Land Uses; • Special and temporary permitting; • Performance standards; • Amortization of land uses; • Restrictive agricultural or conservation zoning; • Lot coverage regulations; • Transfer of development rights; • Staging of development; • Setbacks; • Disturbance requirements; • Conservation plans; • Stormwater management regulations; • Materials & waste handing requirements; • Fuel storage tank regulations; • Well drilling regulations; • OLDs maintenance; • Sewage planning strategies; • Nutrient management plans; • Integrated pest management	• Emergency preparedness; • Contingency planning; • Signage; • Monitoring; • Remediation; • Land purchase; • Land donation; • Easements; • Land banking; • Comprehensive planning • Regional wellhead / watershed protection planning; • Public education; • Environmental watch groups; • Street sweeping; • Household & hazardous waste collection; • Storm drain labeling; • Sinkhole cleanup; • Streambank cleanup; • Streambank fencing & stabilization.

(5) **Develop and implement a plan of action –** Using any combination of the above, prepare a plan that assigns duties and schedules completion. Then, conduct public hearings with local officials for official adoption of plan, and ordinances or approval of resolutions needed to implement the Plan. Regularly review the status of the Plan's effectiveness and related developments within the field of wellhead protection. Conduct ongoing public education about the need for groundwater protection and possible consequences for violations. Whatever, the first step the municipality or water provider takes (either modest or comprehensive) it must have local official and community-based support to be effective.

Given this Plan's goals and the Region's sensitive environmental conditions, it is recommended that all known public wellhead protection areas be reserved for low intensity rural uses with limited permitted lot coverages and woodland preservation requirements that will reduce potential impact on groundwater volumes and quality. Furthermore, any home-based businesses or rural occupations should require the applicant for such uses to demonstrate the means by which he/she will properly handle materials, and dispose of any wastes, that could threaten groundwater contamination.

In addition it is recommended that the following "Best Management Practices" (BMPs) for the control of stormwater be applied to:

1. ***Minimize on-site impervious areas by preserving natural wooded cover and drainage- ways on-site.***
2. ***Utilize pervious surfaces, such as porous pavement and gravel as ways to minimize runoff.***
3. ***Minimize directly connected impervious area. Promote natural removal of pollutants using vegetation and soil. Direct impervious area runoff to pervious. For example:***
   - ***a. roof downspouts to lawns***
   - ***b. driveways to lawns***
   - ***c. parking areas to lawns or grassed swales***
4. ***Eliminate the opportunity for pollutants to mix with storm water runoff by:***
   - ***a. street sweeping***
   - ***b. cover chemical storage areas***
   - ***c. dike potential spill areas***
   - ***d. regular sediment removal from drainage system***
5. ***Minimize the potential for concentrating pollutants and concentrating storm water runoff by:***
   - ***a. utilizing grass swales and filter strips: and,***
   - ***b. utilizing infiltration trenches, where applicable.***

C. Soils

The constant weathering of geologic formations produces various soil types. The capabilities and constraints exhibited by these soils are related to the geologic characteristics of the underlying rock and the local climatic conditions. A soils analysis is essential to planning for future land uses, which are best located on soils that are suitable and have complementary characteristics for specific land uses. For example, agricultural land uses are usually found where soils are level, well-drained and fertile. Residential land uses are suitably located where soils are fairly level and sufficiently above bedrock and the water table. The appropriate siting of development significantly reduces the costs associated with excavating a foundation, as well as locating and designing an on-lot sewage disposal system. Finally, industrial uses favor soils that are relatively flat and sturdy so as to withstand the heavy weights associated with the operation of large plants.

The EBCR is dominated by the **Gladstone Gravelly Silt Loam** soil group. This soil is closely associated with the widespread Granitic and Hornblende Gneiss geologic formations. The areas of this soil that are less sloped tend to be fertile and have moderate development limitations while steeper slopes have thinner soils that are less fertile with severe development limitations, particularly for use of on-lot sewers. To a lesser extent the Region's gneiss geologic areas also have **Edgemont Channery Loam and Towhee Silt Loam** soils. The Edgemont soils are better suited for development than the severely constrained Towhee soils.

Just north of the above-described soils are a band of **Murrill Gravelly Loam and Ladig Gravelly Loam** soils in the geologic transition between the rugged gniess and the more level limestone formations. These soils tend to be best suited for development within the Region.

And finally along the northern edge of the Region are found the **Duffield Silt Loams** associated with the Allentown and Epler geologic formations. These soils provide the greatest concentration of prime farmlands but are generally severely constrained for development.

Prime Farmland

A major consideration of any soils analysis is the identification of ***prime farmland***. Prime farmland soils are those soils with an agricultural rating of Class I or II. In addition, the USDA considers

Class III soils to be of ***Statewide importance*** to agriculture. The United States Department of Agriculture (USDA) describes prime agricultural land as "the land that is best suited for producing food, feed, forage, fiber and oilseed crops." It possesses the soil quality, growing season and water supply needed to economically produce a sustained high yield of crops when it is treated and managed using acceptable farming methods. Prime farmlands are rich in chemical nutrients, have good permeability to air and water with few rocks, are well-drained but resistant to erosion, and have relatively flat topography. Prime farmlands produce the highest yields with minimal inputs of energy and economic resources, and farming them results in the least damage to the environment. The USDA encourages all levels of government and private individuals to effectively use these valuable resources to meet the nation's food and fiber needs.

Aside from the limestone areas, the Region only has scattered Class I & II prime farmlands that extend along the valleys between the rugged ridge tops. The side slopes of the hills transition with Class III soils of statewide importance. Unfortunately, the soils most suitable for agricultural purposes are also those most suitable for development, creating competition between these uses for these soils, and resulting in the loss and fragmentation of the most productive farmlands.

Prime farmlands of Duffield Soils

Prime farm soils and soils of Statewide importance should be protected from conversion to other uses through appropriate planning and zoning, including strengthening the Townships' agricultural zones and applying it to more of the Townships' farmlands. Development abutting working farmland can minimize disruption of farming activities by using conservation subdivision design, explained further in Chapter XII of this Plan.

Development Constraints

Another important soils consideration relates to those soils that produce constraints for building development and the operation of on-lot utilities. ***Building development constraints*** can include a wide range of soil characteristics, including steep slopes, wetness, depth to bedrock, frost action, shrink-swell, low strength and cemented pans, and flooding. Other soil-related constraints become important if ***on-site sewage disposal systems*** are contemplated. Constraints associated with the installation and operation of these systems include steep slopes, wetness, flooding, slow percolation rates, poor filtration characteristics, and high secondary porosity due to the presence of fractures and solution channels. It is important to identify and map those soils that possess building development and on-site sewage disposal constraints so that future land uses can be kept away from these environmentally sensitive areas. The soils of the EBCR are generally severely restricted for building development and/or on-lot sewers. Only a small band of Murrill Gravelly Loam generally straddling the Pennsylvania Lines Railroad and scattered pockets of low-lying Gladstone Gravelly Silt Loams are free of both these severe limitations. ***Future planning should avoid development in areas with severe soil constraints or be accompanied by strict siting standards in local zoning or SALDO ordinances.***

The following table lists the soil characteristics found within EBCR:

SOILS CHARACTERISTICS OF THE EASTERN BERKS COUNTY REGION

Soil Symbol	Soil Name and Slope	Agricultural Rating	Hydric	Drainage Classification
AoB	Andover-Buchanan gravelly loams, 0 to 8 percent slopes, extremely stony	7	Partially hydric	Poorly drained
BuB	Buchanan gravelly loam, 3 to 8 percent slopes	2	Partially hydric	Moderately well drained
BvB	Buchanan gravelly loam, 0 to 8 percent slopes, extremely stony	7	Partially hydric	Moderately well drained
CmA	Clarksburg silt loam, 0 to 3 percent slopes	2	Partially hydric	Moderately well drained
CmB	Clarksburg silt loam, 3 to 8 percent slopes	2	Partially hydric	Moderately well drained
DbA	Duffield silt loam, 0 to 3 percent slopes	1	Partially hydric	Well drained
DbB	Duffield silt loam, 3 to 8 percent slopes	2	Partially hydric	Well drained
DfC	Duffield-Ryder silt loams, 8 to 15 percent slopes	3	Partially hydric	Well drained
EdB	Edgemont channery sandy loam, 0 to 8 percent slopes, extremely stony	7	Partially hydric	Well drained
EdD	Edgemont channery sandy loam, 8 to 25 percent slopes, extremely stony	7	Partially hydric	Well drained
EdF	Edgemont channery sandy loam, 25 to 60 percent slopes, extremely stony	7	Partially hydric	Well drained
EhB	Edgemont channery loam, 3 to 8 percent slopes	2	Partially hydric	Well drained
EhC	Edgemont channery loam, 8 to 15 percent slopes	3	Partially hydric	Well drained
EhD	Edgemont channery loam, 15 to 25 percent slopes	4	Partially hydric	Well drained
GeB	Gladstone gravelly loam, 3 to 8 percent slopes	2	Partially hydric	Well drained
GeC	Gladstone gravelly loam, 8 to 15 percent slopes	3	Partially hydric	Well drained
GeD	Gladstone gravelly loam, 15 to 25 percent slopes	4	Partially hydric	Well drained
GfB	Gladstone gravelly loam, 0 to 8 percent slopes, very bouldery	6	Partially hydric	Well drained
GfD	Gladstone gravelly loam, 8 to 25 percent slopes, very bouldery	6	Partially hydric	Well drained
GfF	Gladstone gravelly loam, 25 to 55 percent slopes, very bouldery	7	Partially hydric	Well drained
GnA	Glenville silt loam, 0 to 3 percent slopes	2	Partially hydric	Moderately well drained

GnB	Glenville silt loam, 3 to 8 percent slopes	2	Partially hydric	Moderately well drained
HeD	Hazleton very channery loam, 8 to 25 percent slopes, extremely stony	7	Not hydric	Well drained
HeF	Hazleton very channery loam, 25 to 60 percent slopes, extremely stony	7	Not hydric	Well drained
Ho	Holly silt loam	3	All hydric	Poorly drained
LaB	Laidig gravelly loam, 3 to 8 percent slopes	2	Not hydric	Well drained
LaC	Laidig gravelly loam, 8 to 15 percent slopes	3	Not hydric	Well drained
LaD	Laidig gravelly loam, 15 to 25 percent slopes	4	Not hydric	Well drained
LbB	Laidig very gravelly loam, 0 to 8 percent slopes, extremely stony	7	Partially hydric	Well drained
LbD	Laidig very gravelly loam, 8 to 25 percent slopes, extremely stony	7	Partially hydric	Well drained
LdF	Laidig-Rubble land complex, 25 to 55 percent slopes	7	Partially hydric	Well drained
Me	Middlebury silt loam	2	Partially hydric	Moderately well drained
MuB	Murrill gravelly loam, 3 to 8 percent slopes	2	Partially hydric	Well drained
MuC	Murrill gravelly loam, 8 to 15 percent slopes	3	Partially hydric	Well drained
PaA	Penlaw silt loam, 0 to 3 percent slopes	3	Not hydric	Somewhat poorly drained
ThA	Thorndale-Penlaw silt loams, 0 to 3 percent slopes	4	Partially hydric	Poorly drained
ToA	Towhee silt loam, 0 to 3 percent slopes	4	All hydric	Poorly drained
ToB	Towhee silt loam, 3 to 8 percent slopes	4	All hydric	Poorly drained
TwB	Towhee silt loam, 0 to 8 percent slopes, very stony	7	All hydric	Poorly drained
Ua	Udorthents	7	Not hydric	Moderately well drained
UmB	Urban land-Duffield complex, 0 to 8 percent slopes	8	Partially hydric	NA
W	Water		Unknown	NA

D. Surface Waters

The way in which water moves through our environment has implications for land use planning. First, rivers, streams, creeks, runs, and their floodplains present hazards to development. Second, land areas adjacent to surface waters offer high quality habitat, conservation and recreational opportunities. Finally, the drainage basin within which surface waters flow is a basic geographic unit used to plan and design sanitary and storm sewers; systems that can make use of gravity-fed lines can reduce the costs of these types of utilities.

Drainage Basins

A drainage basin consists of the streams and associated floodplains which dispose of surface water from that area. Drainage basins are separated by ridge lines. All of the water draining from the Eastern Berks County Region eventually flows into the Delaware River. Because of the Region's topographic position, five of Berks County's most important watersheds converge here. The Region's major and minor drainage basins are identified on the *Natural Resources Map*.

The Toad Creek, which flows into the ***Little Lehigh Creek,*** is the largest drainage basin in Topton Borough. The Toad and Little Lehigh Creeks all originate within Longswamp Township and flow in a northeast direction into adjoining Lehigh County where they all feed into the Little Lehigh Creek. The eastern half of Topton Borough is within this drainage area and straddles the upper reaches of Toad Creek. ***This entire drainage area within the Region has been designated by the State as a High- Quality Cold Water Fishery. As such this area should be fitted with future land uses that comply with protective measures aimed at keeping these waters free from unnecessary degradation.***

The ***Perkiomen Creek*** watershed sits along the Region's southeastern border, principally within District Township. Here several tributaries to the West Branch of Perkiomen Creek originate and flow in an easterly direction where they meet just across the Hereford Township line. In addition Swamp Creek also originates here in the extreme southeastern tip of the Region; this too flows east into adjoining Washington Township and is a high quality cold water fishery. The West Branch of this Creek was nominated and approved for Exceptional Value status.

The ***Pine Creek*** watershed straddles both District and Rockland Townships along the southern border of the Region. Here several tributaries feed the Western Branch of Pine Creek and its main course. These waters flow in a southwestern direction where they converge in adjoining Pike Township to the south and eventually spill into the Manatawny Creek. ***All areas within this watershed within the EBCR are State-designated Exceptional Value Waters. This is the highest level of water quality recognized by the State and commands protection from uses and practices that would degrade its purity.***

The ***Saucony Creek*** watershed straddles the northern portion of Rockland Township, the eastern portion of Topton Borough and touches a small section of northeastern District Township. Here the Little Saucony and the main course of the Saucony Creek flow in a northwesterly direction before they merge near Smoketown Road. Above this convergence the watershed is also a ***State-designated Exceptional Value Waters. This is the highest level of water quality recognized by the State and commands protection from uses and practices that would degrade its purity.*** Downstream of this convergence the watershed is a cold water fishery.

The ***Bieber Creek*** watershed occupies the western half of Rockland Township along the Region's southwestern border. The headwaters for this creek initially flow in a northern direction but then shift to the south eventually leading into the Manatawny Creek. ***The central branch of Bieber Creek is also State-designated Exceptional Values Waters and worthy of special protection.*** Peripheral tributaries are cold water fisheries.

A small area of western Rockland Township is located within the ***Willow and Moselem Creeks,*** which are part of the Maiden Creek Watershed, are largely located to the west of the Region; however, no named tributaries are shown within the Region as water mostly "sheet-flows" until it collects further downstream in adjoining Richmond Township. ***This small area is a State-designated High-Quality Cold Water Fishery.***

Overall the Region's drainage pattern exhibits a course texture and generally dendritic shape. This is consistent with the resistant geologic materials that produce its rugged landform and high elevations.

High Quality & Exceptional Value Waters

The Federal Water Pollution Control Act of 1972 was passed to "restore and maintain the chemical, physical and biological integrity of the Nation's waters."[1] To implement this Federal mandate, the PA DEP passed the Pennsylvania Clean Streams Law and designated some 12,500 miles of rivers and streams as "special protection water," including ***Exceptional Value Waters*** and ***High Quality Waters***.

Water Quality
Protection Measures

1. Riparian buffers
2. Streambank stabilization
3. Streamside fencing
4. Filter strips
5. Conservation plans
6. Development setbacks
7. Limitations on land uses

Benefits of High Quality Waters

1. Recreational values
2. Fisheries protection
3. Aesthetic/visual
4. Health and welfare

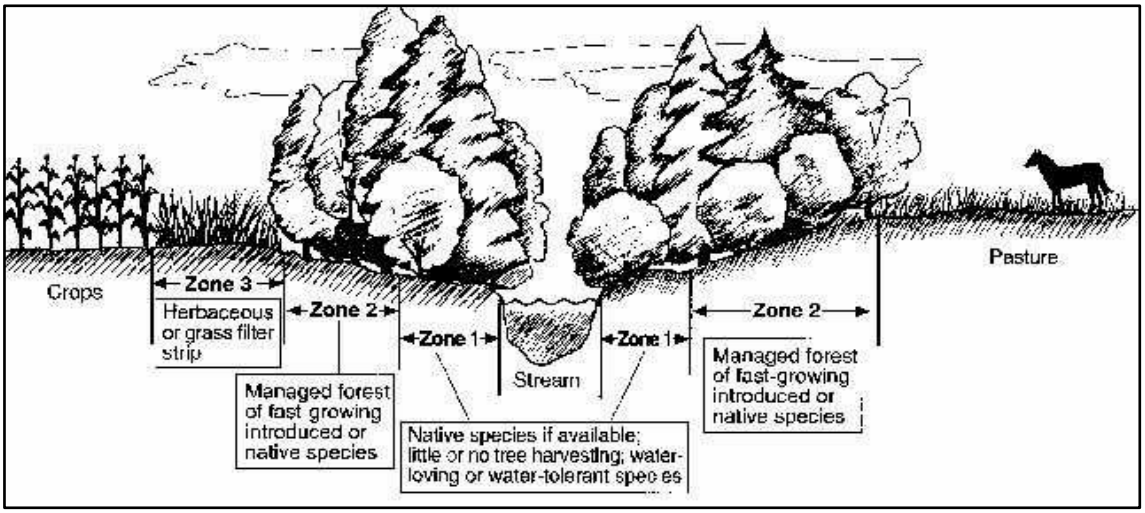
It is estimated that the majority of the Region consist of Exceptional Value waters, including portions of the Bieber, Pine, Oysterville, Saucony, West Branch of the Perkiomen Creeks watersheds and High-Quality waters including the Toad and Swamp Creek areas within the Little Lehigh and Swamp Creek watersheds. Clearly surface water quality is a feature that distinguishes the Region from many other areas within Berks County and across the State. Local officials should take active steps to preserve and protect these "sacred" resources from inappropriate land use and local activities that could threaten their integrity.

The PADEP also provides a measure of protection to High Quality and Exceptional Value Waters by regulating the discharge of wastewater, and other point sources of pollutions. However, nonpoint source pollution such as agricultural and other types of runoff is only partially regulated. Under Pennsylvania law, the regulation of land uses and activities that generate nonpoint source pollution is largely a municipal function. To avoid degradation of these waters, existing and potential future land uses and activities must be carefully scrutinized.

Local measures which could be adopted to provide water quality protection for the Region's streams include the adoption of a riparian protection partnership program involving the Region's municipalities, the Berks County Conservation District, Penn State Cooperative Extension, Trout Unlimited, private landowners, and others. This program might consist of a mix of educational, assistance and regulatory measures to promote surface water quality protection as identified in the adjacent inset. ***Local officials should develop a public/private partnership to protect stream water quality using a combination of educational, assistance and regulatory measures.***

[1]Pennsylvania Department of Environmental Protection, *Local Protection of High Quality Streams* (Harrisburg, PA: June, 198

While protection of floodplains and wetlands are widely accepted land use management techniques, recent awareness of diminishing surface water quality suggests the need for more protection. Studies conducted by the U.S. Forest Service demonstrate that riparian buffers offer real advantages in the removal of harmful nutrients and sediment from storm water before it enters the stream. These same riparian buffers can increase the food supply and create interconnected natural systems of movement for local wildlife. ***Riparian buffers are areas adjoining streams where naturally successive vegetation is provided and protected. Each of the Region's municipalities should apply riparian buffer standards to developments that seek to locate within these valuable watersheds.***



It is estimated that 85% of all surface water occurs in smaller streams and creeks. Therefore, the inclination of society to focus upon water quality of larger streams, creeks, rivers, and bays is defective. It is vital that surface water quality of small stream headwaters and low-order tributaries becomes our priority. Without such measures, our higher order creeks and rivers are threatened by poor surface water quality. Surface water quality is a direct function of the interaction between water and the land and vegetation through which it flows. The greatest interaction occurs within lower order streams. Within high order streams and rivers, water is principally contributed from tributaries rather than the adjoining streamside areas; therefore, the opportunity for water quality improvement is minimal. For example, no overhead tree canopy could possibly span the width of the Schuylkill River and reduce its summer water temperature. On the other hand, a well-designed riparian buffer along a low order stream can offer direct water quality benefit to the adjoining property owner and those located downstream. More information about this topic is contained with Chapter XII (Future Land Use) of this Plan.

Wetlands

Wetlands are areas that are regularly inundated or saturated long enough to produce the particular types of vegetation associated with ***swamps, bogs and marshes***. While there are several definitions of wetlands used by regulatory agencies, all definitions require the presence of hydrophytic plants (plants that grow in wet soils), hydric (wet and anaerobic) soils, and the presence of water at or near the surface at some part of the growing season.

Benefits of Wetlands

1. Provide food and habitats for an abundance of animal life.
2. Are breeding, spawning, feeding, cover, and nursery areas for fish.
3. Are important nesting, migrating and wintering areas for waterfowl.
4. Act as natural storage areas during floods and storms.
5. Act as groundwater recharge areas, particularly during droughts.
6. Purify ground and surface waters by filtering and assimilating pollutants.

Recently, much attention has been focused upon the importance of wetlands. All wetlands have value, although their value is highly variable. Wetlands support an abundance and diversity of life unrivaled by most types of environments. The many benefits wetlands provide are summarized in the adjacent inset.

Wetlands within the Region have been identified using the U.S. Department of the Interior's National Wetlands Inventory, derived from high altitude aerial photograph interpretation of surfacial features commonly associated with wetlands. This inventory tends to identify the larger wetland areas only. These include a combination of scattered palestrine and riverine wetlands. Palestrine wetlands are ponds and small lakes, while riverine wetlands are associated with rivers, streams, runs, creeks, and brooks. The Natural Features Map identifies these USDI wetland areas.

The latest Soil Survey completed for the County by the Natural Resources Conservation Service identifies hydric soils which can also indicate the presence of wetland areas. Holly Silt Loam (Ho), Thorndale-Pennlaw silt loam (ThA) and Towhee Silt Loams (ToA, ToB & TwB) are those hydric soils within the Region; these hydric soils have been depicted with severe building and sewer constraints on the Soils & Geology Map contained earlier in this Chapter.

Wetland Protection Measures

1. Modifications to road maintenance practices(e.g., salt and de-icing chemicals).
2. Homeowner education (e.g., application of yard chemicals).
3. Development setbacks.
4. Limitations on land uses.
5. Filter strips.
6. Environmental Impact Assessment.

A variety of laws have been passed to protect wetlands. Infill and development in larger wetlands are now regulated by the U.S. Environmental Protection Agency and subject to both State and Federal permitting processes. Careful local planning, education, and the incorporation of protective standards into local subdivision and land development ordinances could extend further protection to the Region's smaller wetlands as well as to land areas immediately surrounding wetlands. A requirement for an Environmental Impact Assessment (EIA) prior to any subdivision approval could identify potential adverse impacts as well as opportunities and mitigating measures intended to protect the resource. Such additional protection would further enhance the many benefits wetlands provide to the Region. Examples of such efforts could include any of those measures noted in the above inset.

Municipal officials should consider the adoption of various measures to protect the Region's wetlands, including modified road maintenance standards, an EIA requirement in their respective SALDO, land use and development limitations, and a homeowner educational program.

Floodplain Protection

A floodplain is an area of land adjoining a water source, such as a river or stream that is subject periodically to partial or complete inundation by the water source. The floodplain consists of the ***floodway*** and the ***floodway fringe***. The floodway is the stream channel plus an additional area that must be kept free of encroachments to avoid an increase in flood heights. The floodway fringe is the remaining portion of the floodplain within which encroachments must be limited.

Flooding can result in the loss of life and property, health and safety hazards and significant public expenditures for flood protection and relief. Floodplains also often contain valuable prime farmlands and wildlife habitats. Floodplain protection safeguards the public health, safety and welfare, while protecting natural resource values.

Benefits of Floodplain Protection

1. Protection of life, health and safety.
2. Protection of property.
3. Protection against surface water pollution.
4. Protection against soil, crop and wildlife habitat loss.
5. Reduces/eliminates need for public expenditures.

Flood hazard areas within the Region have been identified by the Federal Emergency Management Agency (FEMA). Local governments which regulate development and fill within flood hazard areas qualify to participate in the Federal Flood Insurance Program. Flood hazard areas have been identified for the Region's four municipalities, all of which participate in the Federal Program.

Federal floodplain mapping denotes estimated 100-year floodplain boundaries, areas within which there is the probability that flooding will occur once in 100 years. These areas are identified on the *Natural Features Map*. The presence of alluvial soils may also be used to identify additional areas subject to periodic inundation. The latest Soil Survey for the County identifies two alluvial soil types for the Region—Holly Silt Loam (Ho) and Middlebury Silt Loam (Me). The delineation of alluvial soils generally provides wider floodplains than those identified by FEMA; this is an option for increased protection against flooding for the Region's municipalities. The Region's alluvial soils have been depicted with severe building and sewer limitations on the Soils and Geology Map contained earlier in this Chapter. The following tabulates the regulatory floodplains protected in each of the Region's municipalities under current ordinances:

Municipality	100-Year Floodplain	Alluvial Soils
District Township	X	
Rockland Township	X	
Topton Borough	X	

District and Rockland Townships and Topton Boroughs should consider the use of alluvial soils to augment their flood hazard boundaries.

Stormwater Management

One of the most frequently described planning problems is the impact from storm water runoff. As an area develops, the patterns, volume and velocities of storm water runoff are likely to change. Individual developments produce marginal impacts; however, these impacts produce major cumulative problems unless measures are used to protect the capacity of watersheds to discharge surface water in a timely manner and at a safe rate. Storm water runoff can and should be managed. The benefits of storm water management are summarized in the adjacent inset.

Recognizing the need to resolve serious problems associated with flooding the Pennsylvania General Assembly enacted Act 167, the Pennsylvania Stormwater Management Act. This Act changed the way local stormwater management occurred by applying a watershed-based, comprehensive program of regional stormwater management. Act 167 requires all counties within Pennsylvania to prepare and adopt stormwater management plans for each of its watersheds, as designated by the Pennsylvania Department of Environmental Protection (DEP). These plans are to be prepared in consultation with municipalities within the watershed, working through a Watershed Plan Advisory Committee.

Benefits of Storm Water Management

1. Reduces off-site and downstream flooding.
2. Reduces soil erosion and habitat loss.
3. Protects surface water quality.
4. Improves groundwater recharge.

The plans are to contain stormwater controls to manage stormwater runoff from proposed subdivision and land development applications.

Given the Region's importance as the headwaters of many of the County's watersheds these plans have been prepared for all of the areas within the Region. Completed plans include the Pine Creek Watershed Protection Plan, the Upper Perkiomen Watershed Protection Plan, and the Little Lehigh, Saucony and Swamp Creek Act 167 Watershed Stormwater Management Plans. Within the Region, the Manatawny Creek watershed involves the Pine Creek and Bieber Creek sub-basins, which do not currently have an overall stormwater management plan. These plans recommend, among other things, that municipalities:

- employ a wide range of planning and design techniques to properly locate intensive land uses away from sensitive waters and their adjoining lands;
- protect important conservation and agricultural features through proper community planning and transferable development rights programs;
- apply a regional approach to growth allocation to focus development into established communities with needed infrastructure; and,
- adopt and enforce a full range of environmental protection ordinances for wetlands, floodplains, riparian buffers, steep slopes, and habitats.

Another important component of stormwater management relates to the use of Best Management Practices (BMPs). BMPs are techniques that manage stormwater from particular land uses in a manner that is more consistent with the natural characteristics of the resources of the watershed. BMPs are a broad series of land and water management strategies designed to minimize the adverse impacts from developments and other disruptive activities. BMPs provide varying levels of protection and are becoming more widely utilized within Pennsylvania.

BMPs can be "structural" or "non-structural". Structural BMPs are measures that require the design and physical constructions of a facility to assist with reducing or eliminating a non-point source of pollution and control stormwater. Structural BMPs are most often applied to agricultural operations and stormwater management. Non-structural BMPs are approaches to planning, site design or regulations that positively affect water quality and reduce stormwater runoff. Nonstructural BMPs are generally implemented through the enactment of municipal ordinances that specify site design and construction standards and operational procedures and activities.

Agricultural BMPs include requirements that adequately address soil erosion control measures, nutrient management and pest control. • Conservation management, tillage and contour farming techniques intended to limit disturbance and erosion. • Provisions for grass or filter strips intended to remove sediment or other non-point pollutants from runoff. • Providing stream fencing intended to keep livestock out of stream channels. • Establishing programs for pesticide management intended to reduce the off-site impacts or spraying or applying pesticides. • Developing a manure management program to reduce runoff of nutrients and pathogens to streams.	**Conservation BMPs** include requirements that adequately address soil erosion control measures and stabilization techniques. • Stabilize stream embankments by utilizing structural or natural techniques designed to minimize erosion. • Provisions for grass or filter strips intended to remove sediment from point or non-point pollutant sources. • Preserve natural resources and habitats. • Establish networks of forested riparian buffers. • Establish mandatory setback requirements from wetlands and floodplains. • Develop a public education program to provide information (seminars and literature) to the residents of the community on the importance of protecting our natural and hydrological resources.
Stormwater Management BMPs include requirements that adequately address surface drainage, groundwater recharge and soil erosion control measures. • Minimize the volume of stormwater runoff generated by minimizing impervious surfaces required to support development. • Promote effective groundwater recharge within all stormwater management facilities including detention ponds, swales and downspouts. • Protect receiving stream channels by routing outfall locations from detention basins through grass or filter strips intended to remove contaminants. • Protect adjacent land areas from direct stormwater discharge by establishing a minimum isolation distance to enhance stabilization and groundwater recharge. • Establish stormwater management and natural features easements. • Utilize pervious surfaces to promote groundwater recharge. • Establish networks of forested riparian buffers.	**Land Development BMPs** include requirements that adequately address design requirements and conservation management techniques. • Reduction of infrastructure required to adequately support subdivision and land development activity. • Develop effective requirements to minimize the environmental impacts resulting from the change in land use. • Promote groundwater recharge by establishing minimum standards to maintain a balanced water budget of what is required to support the needs of the development versus the amount if water that is lost as a result of the development. • Incorporate the use of non-structural stormwater management techniques into site landscaping to minimize stormwater runoff and maximize infiltration. • Establish networks of forested riparian buffers as part of the landscaping requirements. • Include incentives in municipal regulations to achieve site design that is sensitive to existing environmental, natural, scenic, historical and cultural resources.

E. Important Plant & Wildlife Habitats

As an area is converted from its natural to a man-made state, the delicate balance of the local ecosystem is often disrupted. This imbalance degrades or strains the environment's ability to support varied forms of plant and animal species. Consequently, species become ***threatened*** or ***endangered***.

State and Federal agencies have become increasingly concerned over the protection of local natural habitats as a means of protecting wildlife diversity. The protection of these habitats can also provide other benefits, as summarized in the adjacent inset. For these reasons, all levels of government and other conservation-oriented groups have become involved in the protection of these habitats.

Benefits of Habitat Protection

1. Protection of plant and wildlife diversity.
2. Protection of threatened and endangered species.
3. Protection of woodlands and linear corridors.
4. Provision of passive recreation opportunities.

Natural Areas

Information for this section was obtained from the *Berks County Natural Heritage Inventory*, a document recently updated by the Pennsylvania Science Office of the Nature Conservancy. In turn, this document draws heavily from the Pennsylvania Natural Heritage Program (PNHP) database and recent field inspections (these were previously called the Natural Areas Inventory and the Pennsylvania Natural Diversities Inventory). This agency conducts an ongoing process that cumulatively updates and refines data regarding rare, endangered, or otherwise significant natural features. This inventory uses some 800 sources of information to map, describe and disseminate facts about important natural features.

It is the policy of the PNHP not to release detailed site-specific information about significant natural features for general exposure to the public. This protects the feature from persons who become curious and attempt to locate and collect such features. Instead, PNHP provides generalized locations of known or historic natural features occurrences.

Using PNHP's criteria, it is unsurprising that the Region contains an abundance of important habitats. The following tabulates information about these sites which are keyed to their depiction on the Natural Features Map.

Important Natural Areas within the Region

NHA No.	Site Name	Municipality	Notes
1	Bieber Creek	Rockland	Regional – Wetlands and riparian forest along Bieber Creek support 4 plant species of concern, including globally vulnerable bog bluegrass, in addition to two sensitive species of concern.
2	Bittig Road Seeps	District	State - Wetland seeps in a powerline right-of-way supports a population of twisted yellow-eyed grass, a critically imperiled plant species in Pennsylvania.
3	Boyers Junction	Rockland	Regional – Forest that supports bog bluegrass, a state threatened plant species, and an additional sensitive species of concern.
4	Fredericksville	District	State - This forested site provides habitat for two sensitive species of concern.
5	Landis Well	District	State – Wetlands and riparian habitat support a sensitive species of concern.

Important Natural Areas within the Region			
Site No.	**Site Name**	**Municipality**	**Notes**
6	New Jerusalem Cemetery	Rockland	Regional - Wetlands at the edge of a cemetery support a population of possum-haw, an endangered plant species in Pennsylvania, and a population of a sensitive species of concern.
7	Pine Creek - Manatawny	District	State – Forested floodplain that supports a plant species of concern.
8	Sacony Creek	Rockland	State – This site provides habitat for a sensitive species of concern.
NA	West Branch of Pine Creek Seeps	Rockland	High-gradient clear water creek and exceptional value watershed
NA	Swamp Creek Seeps	District	Wooded wetland dominated by a young red maple canopy with spice bush shrubs and a variety of species on the ground.
NA	Weller Cemetery Seeps	District	Headwater feeder wetland for Swamp Creek dominated by older tulip poplar, yellow birch and red maple trees. Upland and wetland areas provide a fairly diverse habitat for plants and animals. Area should be buffered around the seeps.

Many of these important natural areas are contained within other inventoried natural features that have combined to produce the pristine areas of the Region. Techniques used to manage these other resources should assist in the protection of these areas.

Natural Areas Protection Measures

1. Development and vegetation removal setbacks.
2. Modifications to road maintenance (e.g., snow and ice removal; salt and de-icing chemicals).
3. Limitations on land use.
4. Homeowner education (e.g., application of yard chemicals/removing plants).
5. Environmental Impact Assessments.

However, rare and endangered plant and animal species must be preserved and protected from indiscriminate development by using development review procedures intended to conserve habitats in which these species occur. ***A requirement for an Environmental Impact Assessment prior to any subdivision approval should be applied to areas within these natural areas. These EIAs can be applied universally within rural areas or imposed as a special overlay zone within the designated areas. Required EIAs should require the identification of potential adverse impacts as well as opportunities and mitigating measures that could protect these areas amid development. Other development review procedures that protect these natural features include those promoted under Growing Greener: Conservation by Design (explained further in Chapter XII), which include a detailed Existing Resources/Site Analysis Plan for every development site, as well as a design process founded on designing around conserved open space.***

Pennsylvania State Gamelands

The Pennsylvania State Game Commission owns and administers State Gamelands No. 315 on the north side of Long Lane in northern District Township. This 117-acre property is principally used for public hunting of small game and deer.

Woodlands

Woodlands comprise approximately much of the land area within the Eastern Berks County Region. Most of the Region's woodlands are scattered atop the steep ridges that converge here. The side slopes tend to have more fragmentation amid pockets of farming and rural housing on large lots. It is no accident that the Region has high quality surface and groundwaters as forests play a major role in the protection of these waters. It is also no surprise that many of the Region's significant natural habitats also correspond to wooded areas as they offer wildlife cover and food supplies.

Recent amendments to the Pennsylvania Municipalities Planning Code (MPC) specifically enable local governments to protect significant woodland areas by preventing extensive development in those areas and/or engaging development review procedures that conserve these important natural features. However, the MPC also requires every municipality to permit forestry uses by right in every zone within the Commonwealth.

Benefits of Woodlands Protection

1. Slows erosion by stabilizing steep slopes and stream banks through extensive root systems.
2. Aids in storm water management and replenishment of aquifers by promoting groundwater recharge.
3. Aids in purifying groundwater by filtering runoff and reducing sediment wash caused by erosion.
4. Provides important wildlife habitat areas, particularly when large, unbroken areas of forest cover or linkages to other blocks of woodland can be maintained.
5. Offers excellent passive recreation opportunities, such as hiking, horseback riding, photography, hunting, and camping.
6. Helps reduce the level of air pollution by absorbing airborne pollutants and producing beneficial carbon dioxide.
7. Moderates climatic conditions by providing wind-breaks and shade from direct sunlight.

Therefore each municipality has made these required changes within their respective Zoning Ordinance, even Topton Borough as absurd as it may sound. Furthermore it is vital that each municipality develop and adopt sound forestry management regulations that can protect the sensitivity of wooded areas and adjoining neighbors from the deleterious impacts of uncontrolled logging uses and operations. More on this subject and a model forestry ordinance can be found within the Future Land Use Section XII of this Plan.

Next, the concentrations of woodland deserve protection particularly in light of the Region's desire to protect its ground and surface waters. Reforestation and tree preservation requirements can require that a majority of existing trees in proposed subdivisions or land developments be maintained or replaced, except those whose removal is necessary for the proposed structures and required improvements.

The Region's municipalities should consider the adoption of other protective measures for woodlands, such as limiting the removal of trees adjacent to streams, in steep sloped areas, and in or adjacent to identified Natural Areas. In addition, developers as well as woodlot managers should be encouraged to

Woodland Protection Measures

1. Tree removal setbacks adjacent to streams.
2. Tree removal limitations in steep-sloped areas and in and near Natural Areas.
3. Maintenance of wildlife corridors.

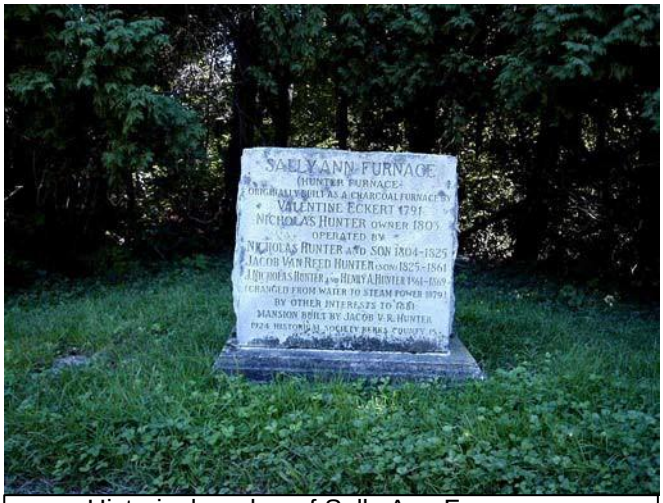
maintain established wildlife corridors in the form of linkages to other wooded areas. ***Municipal officials should consider the adoption of zoning and subdivision and land development standards limiting the removal of trees in sensitive areas, and encouraging the preservation of wildlife corridors.***

Caves

According to the publication entitled *Caves of Berks County* by the Mid-Appalachian Region of the National Speleological Society, the Sally Ann Furnace cave is located on the site of an old iron furnace several miles south of Bowers near the headwaters of the Saucony Creek. This cave supposedly has a moderately sized entrance with a passage beyond and a stream. It is located within Granitic Gneiss at an elevation of 730 feet and on private property. Since this description is vague it is difficult to verify this cave's location within the Region; however, it seems quite possible. Moreover, historical accounts describe the Sally Anne Furnace as being first built in 1811 within Rockland Township. The Pennsylvania Cave Protection Act was signed into law on November 21, 1990. It provides protection to caves, their mineral deposits and wildlife inhabitants from prescribed acts of destruction, defacing, unlawful entry, dumping, burning and disposal of wastes. ***Local officials within Rockland Township should protect the cave's integrity.***

F. HISTORICAL SKETCH

The Eastern Berks County Region possesses a rich historical heritage that like today is strongly influenced by its rugged terrain and remote location. The following excerpts from previous municipal comprehensive plans assemble a glimpse into the Region's past.



Historical marker of Sally Ann Furnace

The land area of the Region (and most of Berks County) was purchased in 1732 by the sons of William Penn from the Schuylkill tribe of the Delaware Indians.

Swedes made the first European Settlement in Berks County along the Maxatawny Creek in 1701. Extensive German settlement soon followed, beginning in 1712. Approximately 75% of Berks County's inhabitants reported German ancestry in the first federal census in 1790. Berks County was incorporated in 1752 from parts of Chester, Lancaster, Philadelphia and Montgomery Counties.

District Township originated in 1759. Rockland Township was created from a part of Oley in 1785. Topton was named in 1859 when it was identified as the highest point along the East Penn Railroad from Reading to Allentown but it wasn't formally created until 1876.

Berks County experienced early industrial development. The mining of ore became the Region's first principal industry by the mid-1800's. The most notable of these was the Sally Ann Charcoal Furnace which produced iron as early as 1791. This furnace required much power to provide air blast in the furnace which was provided by the swiftly-moving waters of the Saucony Creek. There were over 100 mines in the area during the peak of this activity which began its decline around 1900. The Region also supplied charcoal to the nearby iron industries in Pottstown and in the Schuylkill Valley. Ancient coal burning pits can still be found throughout the dense woodlands of the Region. Also a cave is supposedly intact at the original site of the Sally Ann Furnace. The Region's creeks powered many early mills that were an important part of industry and domestic life in the past.

A lack of prime agricultural soils and steep slopes at times has hindered growth and development within the Region. Today its rugged terrain still presents substantial impediment to widespread development. This Plan will acknowledge this longstanding relationship between the conservation values that have helped to form the Region in the past and the pressures of growth exerted from beyond its boundaries.

The historic settlement pattern that developed in the area over the last 300 years will remain a vital influence on the future growth and character of the Region. Its Pennsylvania-German heritage is still very much evident. Existing historic structures and traditional rural values will continue to influence the shape of future development in the area.

G. Historic Sites

The cultural heritage of the Eastern Berks County Region is evident in the many older individual buildings, structures, and sites throughout the Region. Local officials and residents recognize the value of conservation, rehabilitation, restoration, and adaptive reuse of these historic features as a means of providing a glimpse into the Region's important past. Additionally, historic preservation can provide educational opportunities regarding historic life and architectural styles. Well-maintained historic sites and areas can create a sense of unique identity and stimulate civic pride, economic vitality and tourism opportunities.

To identify the Region's specific historic sites, the Berks County Planning Commission Historic Resources Inventory was used. This inventory includes PHMC, Meiser, Berks County Conservancy, and other resource data. The inventory includes 73 different historic sites that have been identified as important from a local, State and National perspective. The Region's sole National Register site is the Sally Ann Furnace Complex located along Sally Ann Furnace Road in Rockland Township. This well-known site contains a furnace and a farm setting with a manager's house, charcoal house, mule barn, blacksmith shop and other related outbuildings.

The following identifies those sites listed in the Berks County Historic Resources database with their respective name, municipality, data source, and National Register status:

District

Resource ID	Historic Name	Source	National Register Status
1718	Bechtel-Benfield Farm	PHMC	Undetermined
1719	David L. Stokes Property	PHMC	Undetermined
1721	German Furnace	PHMC	Undetermined
1722	Fredericksville Hotel	PHMC	Undetermined
1723	Landis Farm	PHMC	Undetermined
1724	Landis Hotel	Meiser	Unknown
1725	Landis Store Hotel	PHMC	Undetermined
1726	Village of Landisville	PHMC	Undetermined
1727	Landisville School	Meiser	Unknown
1728	Lesher Cabin	PHMC	Undetermined
1729	Lesher Forge	PHMC	Undetermined
1730	Old Landis Farm	PHMC	Undetermined
1732	Spohn House	Conservancy	Unknown
1734	Treichler Orchard	PHMC	Undetermined
1735	Weidner Farm	PHMC	Undetermined
1736	Weller Farm	PHMC	Undetermined
5917	Marker Property	Conservancy	Unknown
6523	Schaefer Barn	PHMC	Unknown

Rockland

Resource ID	Historic Name	Source	National Register Status
5020	Alfred Huff Property	PHMC	Undetermined
5021	Angstadt Homestead	PHMC	Undetermined
5022	Anthony Mickey Deoliveira Property	PHMC	Undetermined
5023	Christ (Mertz) Evangelical Lutheran Church	PHMC	Undetermined
5024	Delong Bridge	PHMC	Undetermined
5025	Delong Farm	PHMC	Undetermined
5026	Dr. C.P. Dent Property	PHMC	Undetermined
5027	Dry Store	PHMC	Undetermined
5028	Farmers & Drovers Hotel	PHMC	Undetermined
5029	Forgedale Rd Property	PHMC	Undetermined
5030	Grim's Mill	PHMC	Undetermined
5031	Guinther's Head Rock	PHMC	Undetermined
5032	Hertzog School	PHMC	Undetermined
5033	Hoch Road Bridge	PHMC	Undetermined

5034	James Lengel Property	PHMC	Undetermined
5035	Jerome Lendacki Property	PHMC	Undetermined
5036	Original Hertzog Farm	PHMC	Undetermined
5037	Luke Snyder Property	PHMC	Undetermined
5038	Moyer Farm	PHMC	Undetermined
5039	Village of New Jerusalem	PHMC	Undetermined
5040	New Jerusalem Evangelical Lutheran Church	PHMC	Undetermined
5041	New Jerusalem Hotel	PHMC	Undetermined
5042	Nicholas Niess Property	PHMC	Undetermined
5043	Norman Burkholder Property	PHMC	Undetermined
5044	Oyster Forge	PHMC	Undetermined
5045	Paddock Property	PHMC	Undetermined
5046	Paul & Deborah Stolz Property	PHMC	Undetermined
5047	Reinert Equipment Shop	PHMC	Undetermined
5048	Richard & Eleanor Shaner Property	PHMC	Undetermined
5049	Robert & Sue Hollowbush Property	PHMC	Undetermined
5050	Rockland Forge Farm	PHMC	Undetermined
5051	Rockland Forges #1 And #2	PHMC	Undetermined
5052	Rupperts School	PHMC	Undetermined
5053	S.R. Burkholder Property	PHMC	Undetermined
5054	Sally Ann Furnace Complex	PHMC	Listed
5055	Stanley Nieznay Property	PHMC	Undetermined
5056	Stonehill	PHMC	Undetermined
5057	Village of Stony Point	PHMC	Undetermined
5058	Wayne Readinger Property	PHMC	Undetermined
5945		BCPC Survey	Unknown
6613	Bridge	PHMC	Ineligible
6614	Rockland Bridge	PHMC	Ineligible
6615	Bridge	PHMC	Ineligible

Topton

Resource ID	Historic Name	Source	National Register Status
5367	American House	Meiser	Unknown
5368	Callowhill & Weis Store / Hotel	Meiser	Unknown
5369	Charles & Myrtle Smith Property	PHMC	Undetermined
5370	Greg Brown Property	PHMC	Undetermined
5371	Ziegler Hotel	PHMC	Undetermined

5372	Railroad Station & Freight Station	PHMC	Undetermined
5374	St Peters Union Church	PHMC	Undetermined
5375	Village of Topton	Meiser	Unknown
5376	Topton Furnace	PHMC	Ineligible
5377	Topton House	PHMC	Undetermined
6305	Philadelphia and Reading Railroad	PHMC	Undetermined

Pennsylvania Act 167-1961 enables local governments to regulate the alteration, demolition or erection of structures within designated local historic districts. Such districts should consist of an area with a significant concentration of historic structures as identified by an inventory and might overlap or entirely include National Register Districts. Proposed local historic districts must be approved by the Pennsylvania Historical and Museum Commission (PHMC) and a Historic Architectural Review Board (HARB) established to provide guidance to governing body decisions on proposed actions within these areas.

Municipalities following this path should then adopt local historic preservation ordinances to be administered by the HARB which apply to local historical districts. These ordinances should contain suitable historical review standards addressing proposed demolitions, alterations and removal of structures, as well as assuring the architectural and historic compatibility of new development with the existing character of the District.

Today, local officials have many resources to engage a meaningful program of historic preservation. An effective historic preservation program does not necessarily require a strict program of architectural control like that described above. Some municipalities have adopted more voluntary approaches. First, they clearly designate historic sites and widely publicize their existence. Next, they adopt an "overlay zone" that requires a "waiting period", during which would-be developers and property owners are encouraged to meet with local or County historic preservation experts, before they substantially alter or demolish an historic site. This is also known as demolition by delay.

Oftentimes, this meeting will give the experts a chance to present other suitable building options that are more consistent with the site's character and will enhance the property's value. In other instances, the waiting period gives the community the opportunity to devise other adaptive reuse options for buildings that are proposed for demolition. For example, maybe an old historic house could be converted into a physician's office or a bed and breakfast. In either event, such worthwhile efforts require some commitment on the part of local municipalities to take the next step toward historic preservation.

Designating historic sites within the region can also allow for provisions to be included in the region's respective zoning ordinances to prevent demolition by neglect. In some instances, owners may allow their historic property to deteriorate when upkeep becomes too expensive or creates a hardship for them. Sometimes, historic property owners may try to circumvent the demolition permit process by allowing the structure to demolish or deteriorate 'naturally'. By including language in these ordinances regarding the historic preservation of the identified historic districts and properties, many municipalities can better maintain and preserve the historic characteristics that exist in their respective municipality.

Local officials are encouraged to consider the benefits of these voluntary approaches and gauge public reaction. Local historical societies, Berks County Historic Preservation Trust, and Berks County Planning Commission can assist in these efforts. If response is favorable, local interested citizens should be deputized to continue the process and work with these organizations. The following list some of the actions that can better incorporate historic preservation within the Region.

Successful historic preservation involves more than a mere compilation of data. Rather, it should recognize the importance of its historic defining features and indicate how those features relate to the future by:

1. ***Establishing realistic goals to implement suitable preservation guidelines and standards. Realistic goals should be established that are adopted with considerable public scrutiny and support (make sure that goals are achievable);***
2. ***Identifying individual resources and districts based on the survey that could be eligible for the National Register of Historic Places and apply for listing on the Register;***
3. ***Adding regulations into the zoning ordinance which will help achieve historic preservation goals, like the review of demolitions; design guidelines for infill construction; Historic Overlay Zones; incentives for adaptive reuse, demolition by delay, etc.;***
4. ***Updating existing zoning regulations to resolve conflicts with historic preservation goals, like incompatible uses, excessive setbacks, required off-street parking, reduced lot coverage, etc.; and,***
5. ***Developing partnerships with community groups and organizations to facilitate a public education initiative about local history and the historic resources in the municipality.***