

Appendix D

NATURAL RESOURCES INVENTORY

Introduction

Natural resources have played a critical role in how land use has evolved in East Goshen Township. This appendix provides an overview of the major natural resources, their importance to the community, and a summary of the municipal protection measures currently in place for their protection. This appendix analyzes these resources as well as protection measures to determine an appropriate course of action for their protection.

The East Goshen Township Open Space, Recreation, and Environmental Resources Plan was prepared and adopted in 1993 to address the management of natural resources. This plan was prepared under the County's Heritage Park and Open Space Municipal Grant Program and was required to include a relatively detailed inventory of municipal natural resources, organized under the broad categories of water, land, and biotic resources. This appendix provides analysis based on a sampling of natural resource information from the Township's Comprehensive Plan (1992) and Open Space, Recreation and Environmental Resources Plan.

This appendix analyzes the following information:

Water Resources:

- Watersheds
- Headwater Areas
- Stream Corridors
- Floodplains
- Riparian Forest Buffers
- Wetlands and Hydric Soils
- Groundwater
- Ponds

Land Resources:

- Steep Slopes
- Prime Agricultural Soils

Biotic Resources:

- Woodlands
- Locally Important Vegetation
- Pennsylvania Natural Diversity Sites (PNDI)
- Habitat Areas

Existing Protection Measures:

- Zoning Ordinances
- Subdivision and Land Development Ordinances

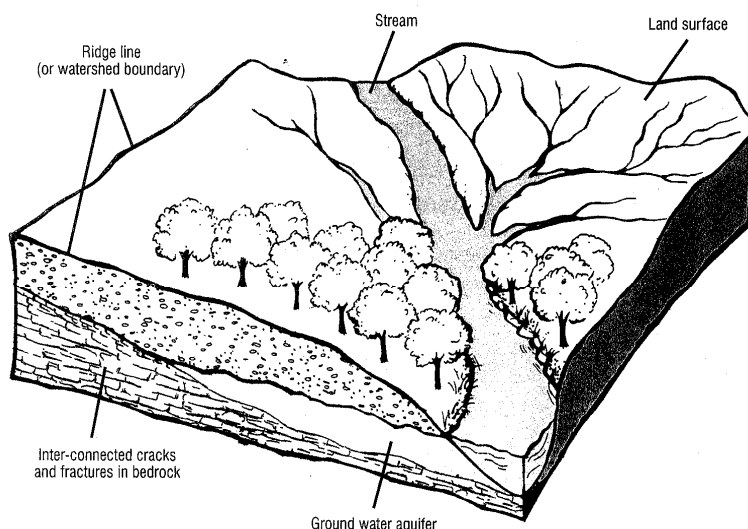
Water Resources

The creeks, streams, rivers, and ponds throughout Chester County and the surrounding region have influenced development patterns and quality of life since before the time of the first colonial settlers. Water is a critical resource in East Goshen Township as it is both essential for the processes of life and represents one of the primary forces that has shaped and will continue to shape the character of the landscape. Proper management of this resource is necessary to meet growing demands for its use, protect it from degradation, and improve its quality where possible. Individual water resources are integral parts of a larger hydrology system. Simply put, the way in which one resource is identified and protected will directly impact the stability of another resource. For example, if the vegetation in a riparian buffer is removed for the purposes of farming or development this will negatively impact the filtering capability of the soil, the stability of the stream banks, and the habitat areas within the stream.

Watersheds

A watershed is an area of land, bounded by a ridge that drains into a stream, river, or lake. Water flows from each ridgeline divide toward the stream within its basin. See Figure D-1. A good portion of the precipitation that falls into a watershed becomes part of the area's streams and groundwater, while a small percentage is transpired by plants or evaporated. A watershed represents the top level in a hierarchy of water resources. Associated water resources, such as floodplains and headwaters, impact the quality and quantity of water in this integrated system which, in turn, impacts the groundwater in the aquifer system. Therefore, the proper management of water resources should be developed on a watershed basis.

Figure D-1: Typical Watershed



East Goshen Township is located within two watersheds that flow into the Delaware River Basin, the Chester Creek and the Ridley Creek. The Chester Creek watershed is located in the southwestern portion of the Township adjacent to the boundaries of West Goshen and Westtown Townships (about 1/3 of the Township). The Ridley Creek watershed is located in the northeastern portion of the Township adjacent to boundaries with West and East Whiteland and Willistown Townships (about 2/3 of the Township). The dividing line of these two watersheds generally follows the alignment of Boot Road in the northern half of the Township, and Route 352 in the south. Please see Map D-1. The Ridley Creek is designated as a

“High Quality” watershed by the Pennsylvania Department of Environmental Protection (DEP) because of its exceptional water quality. This designation reinforces the need to manage water resources on a watershed basis by ensuring the protection of all associated resources. DEP has also designated Ridley and Chester Creeks as Trout Stocked Fisheries.

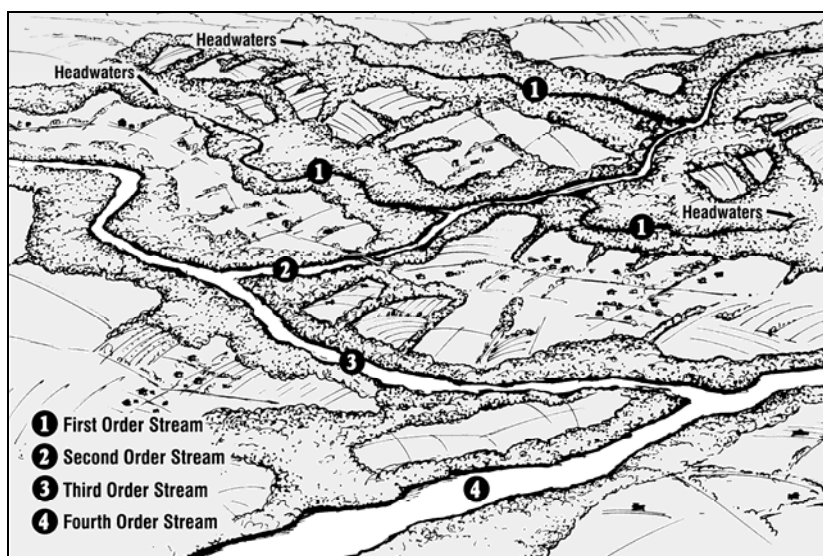
Watershed protection takes many forms, including:

- Providing and protecting stream corridors, headwater areas, floodplains and alluvial soils, riparian forest buffers, wetlands, and hydric soils;
- Encouraging groundwater recharge;
- Reducing impervious surfaces;
- Encouraging individuals to properly manage fertilizers, pesticides, household hazardous wastes, and on-lot septic systems; and,
- Establishing effective stormwater management programs for both agriculture and development.

Stream Corridors

Within the watershed, “stream ordering” is the method used to classify streams and their tributaries. The smallest streams in the network have no tributaries and are called first order streams. When two first order streams join, they form a second order stream. Order one and two streams are important from a long range planning perspective because their watersheds often contain the best recharge areas and ground water yields. Roughly, an average of 70 percent of a given watershed consists of first and second order streams. Third order streams occur when two second order streams are joined together. Fourth order streams form the major tributaries of larger river basins. See Figure D-2.

Figure D-2: Stream Ordering



First Order streams account for 53% of streams in the Chester Creek Watershed and 43% of streams in the Ridley Creek Watershed. In addition, portions of the Chester and Ridley Creek are considered third order streams. Please refer to the Township Open Space, Recreation, and Environmental Resources Plan for a complete listing and identification of stream designations.

Impact on watershed: Stream corridors represent the conduit or pipes that transport surface water through the watershed to the Delaware River Basin.

Headwater Areas

Headwater areas are land areas which both drain into first order streams and which contain springs, marshes, and intermittent streams at the uppermost terminus of a stream. See Figure D-2. Headwater areas provide stream recharge into first order streams during periods of low flow and are important for maintaining groundwater base flows. The headwater areas around first order streams often contain hydric or wet soils and provide important wildlife breeding areas. Water quality in these streams is usually clearer than larger order streams and are more likely to support trout and a variety of aquatic species and other wildlife.

In headwater areas, the exchange between ground and surface waters is the most rapid and direct. Streams in headwater areas, because of their modest flows and inability to flush themselves, are highly susceptible to degradation. Therefore, the ecological health of first order streams, and the watershed, is dependent on how land in headwater areas is used and maintained. Headwater areas maintained under a forest or dense meadow (riparian forest buffer) cover yield streams with higher water quality and greater natural or biodiversity than those that are not.

The location of headwaters is directly related to the location and area of first order streams. The preceding section discussed the location of first order streams in the upper portions of the Chester and Ridley Creek stream corridors, predominantly north of Paoli Pike. A significant percentage of these headwater areas are located near or have been encroached upon by residential development. Therefore, the protection of headwater areas should be considered a priority in areas of the Township where headwater areas have remained undisturbed.

Impact on Watershed: The stability of Headwater areas directly impacts the quality of water and quantity of water that will flow as first order streams within the watershed

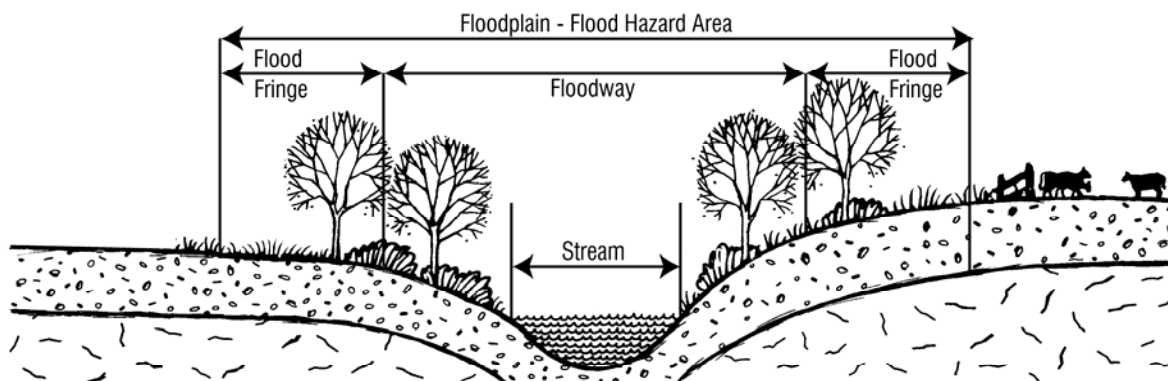
Floodplains and Alluvial Soils

Floodplains - The 100-year floodplain shown on Map D-1 is based on the Federal Emergency Management Agency (FEMA) maps. The 100-year floodplain represents the highest level of flooding that, on the average, is likely to occur every 100 years or, from another perspective, a flood level that has a one percent (1%) potential of occurring each year. The floodway is located within the 100-year floodplain. See Figure D-3. As defined by FEMA, this area must be reserved to carry the base floodwaters without increasing the base flood elevation more than one foot. This area is the most strictly regulated portion of the floodplain; any obstructions within the floodway that might raise the base flood elevation are prohibited. The remainder of the 100-year floodplain beyond the floodway, known as the flood fringe, may be developed if structures are elevated or floodproofed. See Figure D-3. However, many communities (including East Goshen) choose to prohibit all or most development within the entire 100-year floodplain.

There are several hundred acres of floodplain located within the boundaries of East Goshen Township along the Chester and Ridley Creeks and their tributaries. In the hierarchy of water resources, a floodplain is the most inclusive element other than the watershed itself. Stream corridors and associated riparian buffers are located within the area of the floodplain. The majority of wetlands and hydric soils

are, more often than not, located within the area of the floodplain as well. It is imperative, therefore, that the protection of designated floodplain areas be given the highest priority as they impact or are impacted by all other water resources.

Figure D-3: Floodplain



Impact on watershed: The protection of a floodplain directly impacts the health of the stream corridor and the stability of the associated watershed.

In addition to its important environmental functions, floodplain areas provide recreation, scenic, and open space opportunities. While floodplain land is generally narrow, it provides a valuable source of open space. Great potential exists to link existing parks and open space areas by using open space corridors along the many creeks and streams as promoted in the Chester County's Open Space Plan, *Linking Landscapes*. However, use for passive recreation, such as hiking trails, must be balanced with other preservation and resource protection goals. For example, there will be areas where the provision of undisturbed wildlife habitat and corridors for the movement of wildlife is likely to be a higher priority than recreational access.

Because disturbance and development of floodplains creates a high potential for erosion, downstream sedimentation, upstream or downstream flooding, and potential threats to life and property, wildlife habitat, and water quality, and floodplains, areas of alluvial soils, (and their value as greenways) and passive recreational areas should remain undeveloped and undisturbed to the greatest extent possible.

Alluvial Soils - Alluvial soils are those soils which have been eroded, transported and deposited by flooding water over time and thus generally indicate a strong potential for flooding (i.e. define floodplain boundaries). Most floodplains and areas of alluvial soils are narrow and found immediately adjacent to streams, largely due to the presence of very steep slopes along most of the subsequent floodways. Because few first order streams have FEMA-mapped floodplains, the presence of alluvial soils can be used to define the extent of the floodplain in these unmapped areas. Alluvial soils in Chester County include Chewacla silt loam (Ch), Congaree silt loam (Cr), Wehadkee silt loam (We), Bowmansville silt loam (Bo), and Rowland silt loam (Ro, Rp).

Impact on watershed: The protection of floodplains and alluvial soils directly impacts the health of the stream corridor and the stability of the associated watershed.

Riparian Forest Buffers

A riparian forest buffer is a vegetated area of land adjacent to a pond, lake, stream, creek, river, marsh, wetland, or shoreline. Technically, a riparian forest buffer is more appropriately included in the land resource category. However, the relationship of this resource to other water resources such as stream corridors and floodplains justifies its inclusion here. By protecting these buffers of trees, shrubs, and other vegetation, water can be protected from the impacts of human activities such as farming, grazing, lumbering, and development. The root systems of the vegetation intercept, reduce the velocity of, and filter polluted and sediment-laden stormwater before it reaches the water body. In addition, the soil holding capacity of the associated root systems reduce erosion and resulting sedimentation along the banks of water systems. Riparian forest buffers left in their natural state can provide valuable wildlife habitat and outdoor recreational activities.

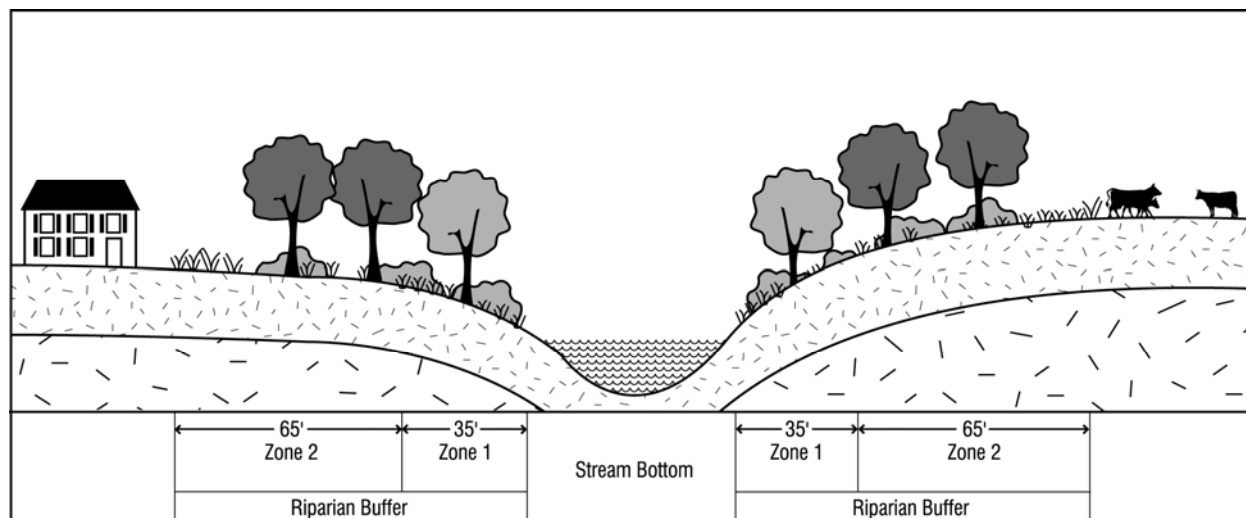
In the Chester County Water Resources Plan, *Watersheds*, the Chester County Water Resources Authority developed a hierarchy for the protection of riparian buffers based on associated plant communities and the stream bank system. The need for this hierarchy is twofold: 1) to establish a system to identify the areas to be protected and 2) to establish the degree of protection needed for these designated areas.

Two zones of protection were established:

Zone One: Inner Riparian Forest Buffer – This zone begins at the top of the streambank of a watercourse and occupies a margin of land with a minimum width of thirty-five (35) feet measured horizontally on a line perpendicular to the edge of the water at the top of the defined bank (at bankfull) as reviewed and approved by the Township Engineer. Where prohibitive slopes (25+%) are located within thirty-five (35) feet of a watercourse, Zone One shall extend the entire distance of the sloped area. See Figure D-4.

Zone Two: Outer Riparian Forest Buffer – This zone begins at the outer edge of Zone One and occupies a minimum width of sixty-five (65) feet in addition to Zone One. See Figure D-4.

Figure D-4: Riparian Buffer



Impact on Watershed: The condition of the Riparian Buffer directly impacts the quality of water that flows into and through the associated stream corridor and therefore the stability of the associated watershed.

Wetlands and Hydric Soils

Wetlands - Wetlands are recognized as being one of the world's most productive ecosystems. Often located in headwater areas, they offer key wildlife habitat and are important storage areas for surface and ground water. The Army Corps of Engineers and the Pennsylvania Department of Environmental Protection (DEP) protect wetlands under Section 404 of the Clean Water Act of 1977. From a regulatory standpoint, the presence of wetland areas is determined based on the site's soil, hydrology, and vegetation. Areas lacking any one of these three parameters are generally not considered wetlands. From a layman's perspective, any area with periodic standing water and hosting wetland-type vegetation (including cattails, skunk cabbage, red maple, and silver maple) is likely to fall within the official definition of a wetland.

Although there is no comprehensive inventory of wetlands, the National Wetlands Inventory (NWI) identifies certain wetland areas, based on aerial photography. Please see Map D-1. The NWI identified stream systems, certain marshy areas, stormwater detention areas, open excavations, and farm ponds as wetlands. While other wetlands certainly exist, they were not identified as a result of either their small size or specific characteristics that made them more difficult to identify from aerial photography. As a result, some communities have established a boundary or wetlands margin where protection measures can be established based on the proximity to the mapped wetland boundary.

For the most part, wetlands in East Goshen are located within the identified 100 year floodplains along Chester and Ridley Creeks and their tributaries. Site specific wetland studies are the only clear method to determine the entire extent of wetlands in the Township, as it appears as though a significant percentage of wetlands have been subject to at least some degree of encroachment by adjacent residential development. Therefore, regulations to protect undisturbed wetlands and their associated margins should be considered a priority.

Impact on Watershed: Wetlands impact the watershed from headwater areas to the quantity of water reaching stream corridors and the quality of groundwater that is run-off and filtered through the wetland.

Hydric Soils – Wet or hydric soils contain high amounts of moisture, are very poorly drained, and are typically found within floodplain and wetland areas. Hydric soils are typically associated with headwater areas and are found in low-lying areas, at the fringes of floodplains, and sometimes in upland depressions. These soils have occasional standing water and a generally shallow depth to the underground water table. Lacking detailed wetlands mapping, hydric soils are an indicator of where wetlands are likely to be located. The hydric soils shown on Map D-1, though generalized in nature, offer a mapped “pointer” for potential wetlands investigation sites. In East Goshen Township, hydric soils are located along the Chester and Ridley Creeks with a concentration on the Ridley Creek near the intersection of Boot Road and Paoli Pike and on the Chester Creek near West Chester Pike.

Hydric soils provide a rich habitat for a diversity of plants and animals. Naturally vegetated areas with wet soils provide a critical filter for sediments and pollutants. Hydric soils are a significant indicator of locations where chronic or occasional wetness may weaken foundations or otherwise inhibit construction. Potential development problems associated with hydric soils include on-lot septic system failures, flooded basements, poor foundation stability, disturbance of natural drainage and groundwater recharge areas, and the risk of surface and ground water contamination. With these problems in mind, development should be limited on hydric soils or precluded if a given location is determined to be a wetland. Where development is permitted, precautions should be taken to avoid negative impacts to drainage patterns on and off a development site. In addition, appropriate construction techniques should be employed that avoid damage to foundations and water seepage into dwellings.

Impact on Watershed: Hydric soils provide a filter for sediments and pollutants which helps to sustain water quality in a watershed.

Groundwater Aquifers and Geology

Aquifer - An aquifer is the underground area where fresh water is stored in voids within soil and rock and the cracks, fractures, and solution channels in bedrock. The water-producing capability of an aquifer is largely determined by the geology and precipitation of an area. Because many residents in East Goshen Township continue to be dependent on on-lot wells that draw from ground water, the protection of this resource is critical.

East Goshen Township is underlain with a geologic formation known as “Crystalline Rock.” Geologic units (sub-categories) found within the Crystalline Rock formation include Quartzites, Schist, and Gneiss. There are five sub-categories identified within the boundaries of East Goshen Township. They are Octoraro Phyllite, Wissahickon Schist, Ultramafite, Mafic Gneiss (granulite facies) and Felsic Gneiss (granulite facies). Technically, groundwater in crystalline rocks moves through intergranular openings in the weathered zone and through a network of interconnecting secondary openings (fractures and joints) in the unweathered rock. Permeability of the unweathered rock depends on the number and size of the fractures, as well as how well interconnected they are. The ground water table reflects the topography of the land, and the ground water flow is usually local, with streams acting as the discharge points. Usually the ground water and surface water divides coincide.

What does this mean to the Township? In general, well yields for Crystalline rocks are significantly lower than well yields in other geologic units. The formation can occasionally provide sufficient yields for public water supply wells; however, most areas must continue to rely on domestic wells. Geologic formations such as gneiss and schist are hard and dense and their value for groundwater availability and recharge is much less significant. Their more limited water yields present a limiting factor for development utilizing groundwater wells. This is discussed in further detail in Chapter Six - Community Facilities and Services Plan and Chapter Two - Land Use Plan. The specific formations found below the surface in East Goshen Township and their associated well yields are included in Table D-1.

Table D-1: Domestic Well Yields

Geologic Formation	Range (gallons per minute)	Median (gallons per minute)
Octoraro Phyllite	<1 to 300	10 gpm
Wissahickon Schist	<1 to 400 gpm	13 gpm
Ultramafite	N/A	N/A
Granulate facies mafic gneiss	1 to 40	15 gpm
Granulite facies felsic gneiss	1 to 134	25 gpm

Sources: Geology, Hydrology, and Groundwater Quality of Chester County, Chester County Water Resources Authority and USGS, 1994.

The geology in East Goshen Township helps to define the character of the community. Within the Ultramafite sub-category there are three types of stone or lithology: Pyroxenite, Steatite, and Serpentinite. Serpentinite or Serpentine is a unique stone which has been utilized, in a limited fashion, in architectural designs throughout the County of Chester. East Goshen Township is fortunate to have several outcroppings of Serpentine located within the northern half of the Township.

These outcroppings represent a unique community feature and are located in the following areas (from West to East):

- A group of small outcroppings is located adjacent to the cul-de-sac turnaround at the end of Amalfi Drive in Mill Creek Estates just to the west of the intersection of Jaclyn Road and Boot Road. This grouping appears to be contained within the limits of the parcel.
- A small outcropping is located adjacent to the intersection of Jaclyn and Boot Roads, about 100 feet northeast of Boot Road.
- A large outcropping is located about 500 feet south of the intersection of Jaclyn and Boot Roads about 150 feet from Boot Road within Hershey's Mill Village.
- A large group of small outcroppings is located on both sides of Route 352 just to the south of the intersection of Highland Avenue and Route 352.
- A large group of outcroppings is located in the upper portion of East Goshen Township Park (North of Paoli Pike) which is visible from the gazebo and walking trail.

The location of these outcroppings has been identified on Map D-2.

Impact on watershed: The goal of watershed protection is to protect the quality and quantity of the groundwater flowing into, through, and out of its area.

Ponds

The ponds of East Goshen Township consist man-made water holding basins located throughout the community. The largest of these is the former Milltown Reservoir, on Reservoir Road. A Township-owned pond at Hershey's Mill Village is used as a landscape pond. The remaining five significant ponds at Bowtree I, Bowtree II/III, Hershey's Mill Village, Marydell Farm, and Pin Oak are all utilized as stormwater management facilities and shall be addressed in the Community Facilities and Services Inventory.

As the condition, treatment, and future of the East Goshen ponds have become a matter of intense public interest a survey was distributed to Township residents to determine their concerns about this resource. The response focused on pollution caused by migrating Canada Geese and an overload of dissolved nutrients. In addition, a lack of shoreline vegetation (causing shoreline erosion) and aquatic vegetation was blamed for poor water quality. The survey further blurred the line between the need for protection of this resource and a potential impact on the health of nearby residents.

Options for the maintenance, rehabilitation, or access to these facilities will be discussed in detail in Chapter Seven – Community Service and Facilities Plan.

Regional Coordination - *Watersheds*

The Chester County Water Resources Authority (WRA) recently adopted *Watersheds: An Integrated Water Resources Plan for Chester County, Pennsylvania and its Watersheds*. *Watersheds* provides the County, its municipalities, utilities, and stakeholders with technically sound policies, strategies, approaches, and implementation techniques to achieve the goals of the Plan. These goals include:

- Protecting of the hydrogeologic systems of all Chester County watersheds
- Guiding the locations and expansion of water and wastewater infrastructure
- Managing stormwater from existing and future land uses
- Protecting of groundwater and stream quality, and
- Encouraging the implementation of integrated resources planning by municipalities.

Watersheds was adopted in September 2002 and serves as the water resource protection component of the County’s policy plan, *Landscapes*. In addition to extensive background information on water resources and the current state of water related issues in Chester County, the plan includes numerous municipal implementation strategies for the effective protection and management of water resources. Chapter 7 of *Watersheds*, entitled “Stakeholder Roles - Opportunities for Stewardship” outlines twelve categories of strategies for municipal implementation. See Table D-2. Section 13.3 of the *Chester County Water Resources Compendium* (the Technical Appendix of *Watersheds*) includes extensive and specific recommendations for municipalities to implement these twelve strategies.

Table D-2: Twelve Categories of *Watersheds* Strategies for Municipal Implementation

1.	Involving the Public in Watershed Stewardship
2.	Providing Water-Based Recreation and Cultural Resources
3.	Establishing Networks of Forested Riparian Buffers
4.	Using Conservation (Low Impact) Development Designs
5.	Protecting Natural Resources through Land Preservation
6.	Protecting Ground Water Quality
7.	Protecting Sources of Public Drinking Water Supplies
8.	Agricultural and Landscape Management
9.	Reducing Stormwater and Flooding Impacts
10.	Natural Stream Restoration and Stabilization
11.	Protecting Ground Water Balances and Stream Baseflow
12.	Integrated Water Resources Planning

Land Resources

Land is a finite, non-renewable resource that can never fully recover once degraded. Land and water are intertwined so that whatever happens to the land will also affect components of the watershed. Therefore, land resources should be protected not only for their production value (agriculture, forests, and meadows) but because inappropriate uses and poor maintenance practices can lead to the degradation of water, wildlife, and plant resources.

East Goshen Township falls entirely within the Piedmont Province, a band of gently undulating to steeply rolling countryside that stretches from the Hudson River to Georgia, between the Atlantic Coastal Plain and the Blue Ridge. This Province is further divided into three sections based on geologic history and landscape – the Piedmont Uplands, Triassic Lowlands, and the Conestoga Valley. More than 80 percent of the County is located in the Piedmont Uplands section, including East Goshen Township. The variable

resistance to weathering and erosion of the underlying geology has led to a hilly to gently rolling landscape of low ridges and narrow valleys. Most of the land in the Piedmont Uplands has been cleared for farmland or development, with only the steep hillsides and wet soils remaining forested with a mix of oak, tulip poplar, and beech.

Steep Slopes

For the purposes of this Plan, moderate steep slopes are considered to include any land with a slope of 15-25 percent. Very steep slopes are those of 25 percent or greater. Steep slopes in East Goshen Township are located near the banks of streams of the Chester and Ridley Creeks, with a concentration of very steep slopes around the upper reaches of the Ridley Creek near Hersheys Mill Road. Please see Map D-2.

Steep slopes are often covered by woodlands and have shallow soils that are easily eroded. Many stream valleys are bordered by moderately steep slopes. Steep slopes are very vulnerable to erosion, particularly when natural vegetation has been disturbed. Once erosion has begun, it is often difficult and expensive to control. Erosion of steep slopes tends to spread along the side slopes, eventually threatening larger areas and different properties. Maintaining vegetated steep slopes provides a natural system of erosion protection, as well as a location for valuable wildlife habitat.

Limiting development on steep slopes is important for preventing soil erosion, minimizing pollution of surface water resources, reducing the potential for flooding, preserving stream banks (riparian forest buffers), and maintaining water flow in headwaters. Improper development of steep slopes can also lead to higher construction costs (including significant engineering), increased rates of septic system failures (as cited in DEP regulations governing slope limitations for septic systems), and increased stormwater runoff. The ideal situation would be to maintain moderate steep slopes under a dense forest or meadow cover to prevent erosion, stream sedimentation, and other problems associated with their development. Very steep slopes should be left undisturbed to avoid the aforementioned problems associated with their disturbance.

Prime Agricultural Soils

For the purposes of this Plan, prime agricultural soils are soils designated as capability Class I, II, and III by the U.S.D.A. Soil Conservation Service. Class I and II soils are the more common prime agricultural soils as identified by the Soil Conservation Service, whereas Class III soils are identified by the State (or Commonwealth). Prime agricultural land produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment.

- Class I soils have few limitations that restrict their use for farming.
- Class II soils have some limitations that reduce the choice of plants or require moderate conservation practices.
- Class III soils have more severe limitations that reduce the choice of plants, require special conservation practices, or both, and are included as prime agricultural soils by Commonwealth (or State) designation as agricultural soils of statewide importance.

Prime agricultural soils occur mainly on hilltops and gentle slopes and, by definition, do not occur on steep slopes. Please see Map D-2. Class III soils are often found adjacent to stream valley areas and their accompanying alluvial or hydric soils. Soils not classified as Class I, II, or III are generally in areas of floodplains, wetlands, or steep slopes and are not considered suitable for agricultural use. Since Class I and II soils are also often the most suitable for building, many areas of prime agricultural soils in East Goshen Township and the County have already been developed.

Despite the significant amount of residential development that took place in East Goshen Township in the past few decades, there appear to be some acres of prime agricultural soils that have not been developed. Although these soils appear to be fairly evenly dispersed throughout the community, the most significant area of prime agricultural soils are located along the eastern boundary with Willistown Township. Table D-3 indicates the prime agricultural soils found in East Goshen Township, and the soil type classification provided by the U.S.D.A. Soil Conservation Service.

Table D-3: Prime Agricultural Soils in East Goshen Township

Soil Type Classification	Soil Name	Soil Designation*
Class I	Chester Silt Loam	CdA
Class II	Chester Silt Loam	CdA2, CdB, CdB2
	Chrome Gravelly Silty Clay Loam	CkB2
	Glenelg Channery Silt Loam	GeA2, GeB, GeB2
	Manor Loam	MgA2, MgB2
	Neshaminy Gravelly Silt Loam	NaB2
	Urban Land – Glenville Complex	UogB
	Glenville Silt Loam	GnA, GnB, GnB2
Class III	Chewacla Silt Loam	Ch
	Conowingo Silt Loam	CoA, CoB2
	Glenelg Channery Silt Loam	GeC
	Manor Loam	MgC, MgC2

Source: Chester County Soil Survey, USDA Soil Conservation Service, 1963.

* Soil Designations indicate the soil type, the topographic slope on which the soil is found (A = 0-3%, B = 3-8%, C = 8-15%), and the level of erodibility of the soil at the site (2 = moderate erosion, 3 = high erosion).

Biotic Resources

Biotic resources refers to the plant and animal life of East Goshen Township, and their habitats. This section discusses the importance of maintaining natural diversity and describes major habitat areas in East Goshen Township as well as significant plants and animals that have been identified for special protection. Biotic resources are key features when establishing what natural resources exemplify the character of a community.

Natural or Biodiversity

Native ecosystems along the East Coast, including wetlands, stream corridors, and woodlands, are facing increasing fragmentation and various negative impacts as a result of human encroachment. One serious impact of this encroachment is the loss of biodiversity. Biodiversity is the total variety and variability of living organisms and the ecological habitats in which they occur. Simply, what lives and grows naturally in a given area. Human activities that involve the modification and adaptation of the natural environment decrease biodiversity. Protection of the diverse communities of species and habitats native to the area depends on knowledge of their extent and diversity, their locations, their habitat requirements, and their interrelationships as part of the natural ecosystem in which they exist.

Undeveloped lands can be roughly classified into three categories: open field, forest, and wetlands (for the purposes of this analysis include floodplains, stream corridors etc.). To continue the sustainability of a healthy and diverse landscape, it is especially critical to reserve sufficient areas of each of these habitats as interconnected habitat networks throughout the Township and surrounding region. In the Chester County Open Space Plan, *Linking Landscapes*, these habitat networks are referred to as “Wildlife Biodiversity Corridors.”

Woodlands

Although the native woodlands of East Goshen Township have been disturbed or partially destroyed as a result of ongoing development, a significant amount of woodland remain and continues to provide shade, wildlife habitat, screening, windbreak and beauty to the residents of the Township. Woodlands are generally scattered throughout the community with larger areas concentrated around the Ridley and Chester Creeks and East Goshen Park.

Chester County is located in the eastern deciduous forest biome, a large ecological community. Within this biome, the forests of East Goshen, and the wider southern Chester County region, are part of the Oak-Hickory association forest. This forest association produces large amounts of mast (nuts) and is generally dominated by the species shown in Table D-4.

Table D-4: Typical Trees and Shrubs of the Southern Chester County Region

	Canopy Trees	Understory Trees and Shrubs
Upland Areas	Red, White, Black, and Scarlet Oaks; Mockernut, Bitternut, and Pignut Hickories; American Beech, White Ash, and Tulip Poplar	Flowering Dogwood, Sassafras, Ironwood, Spicebush, and Blackhaw, Mapleleaf, and Arrowwood Vibernums, Pumplonium, Palonium
Riparian Zones	Red and Silver Maples, Sweet Gum, Red Ash, and Eastern Sycamore	Silky Dogwood, Box Elder, Common Witch Hazel, Spicebush, and Northern Arrowwood Viburnum

Source: Chester County Soil Survey, USDA Soil Conservation Service, 1963.

On a more local level, the Township Open Space, Recreation, and Environmental Resources Plan identifies Ash, Beech, Cherry, Larch, Hickory, Maple, Oak, Sycamore, and Poplar as species typically found naturally in East Goshen. The more mature woodlands occur in greater size and offer the best opportunity for wildlife habitat.

Woodlands provide protective ground cover and stability for soils on steep slopes and contribute to stream water quality. Canopies of trees also play an important role in reducing the intensity of rainfall, providing shade, and reducing the impacts of temperature extremes. Woodlands provide scenic quality and improve land value, as well as serve as buffers from the cold northwesterly wind, from visual infringements, and from noise.

Woodlands are a critical component in maintaining the natural diversity of the Township and provide vital habitat for native species of vegetation and wildlife. Large and mature forest stands, though greatly modified by human activities over time, are likely to support a large variety of species which would not occur in other habitats. In some cases, a healthy forest ecosystem is critical in the survival of certain species of forest plants and wildlife. Form example, several species of songbirds, such as the colorful warblers, are specifically adapted to forest interior conditions and will not nest in any other location. In addition, various species of wildflowers will only bloom on the rich, moist soils that make up the forest floor.

Threats to Woodlands – Currently, three serious problems affect the long-term health and quality of woodland ecosystems: 1) infestations of invasive, non-native plant species, 2) large white tailed deer populations and 3) development. As is the case in much of Chester County, woodlands are being overrun by aggressive, introduced non-native species. Characteristics of these non-native species include a rapid growth rate, adaptability, high reproduction rate, and a lack of control mechanisms in the local environment. Species including the Norway Maple, Multiflora Rose, Autumn Olive, Oriental Bittersweet, Japanese Honeysuckle, and Mile-a-Minute Weed are overrunning the existing native species and becoming the dominant species in the Township and throughout the County and region. While they

provide cover and food for some wildlife, introduced non-native invasive species have displaced much of the native vegetation, resulting in a reduction of plant and wildlife diversity.

Non-native invasive species impair forest regeneration by creating such dense masses that tree species will not grow or their growth is impeded. They replace native understory species by creating such dense growth that nothing can grow underneath it. An example is the multiflora rose, especially where it grows along streams, because it is an unsuitable food source for local wildlife and limits the amount of suitable detritus (matter produced by erosion) reaching the stream. Overall, invasive plant growth can impede the lifespan of a woodland by decreasing the capacity of the woodland to regenerate itself.

The white tail deer population in the County and surrounding region has exploded for several reasons related to human influence. Agriculture and suburbanization have provided the deer with excellent habitat in the form of “edge” conditions and browse areas as exemplified by the disconnected area of woodlands located in East Goshen Township. Several of the introduced, invasive plant species provide the deer with an excellent food source, and natural deer predators have been eliminated by direct human action. The increased deer population threatens the land’s “carrying capacity”, or sustainability, due primarily to the increase in browsing in forests on the young buds, seedlings, and shoots of native species. As a result, the forest is increasing incapable of regenerating itself. The deer problem presents a long-term impact on the forests because it increases the likelihood of further intrusion of aggressive, non-native plant species, thus further reducing biodiversity.

There are several innovative options available for the protection of woodlands and they are discussed in detail in Chapter Four - Natural Resources Protection Plan.

Pennsylvania Natural Diversity Sites

The Pennsylvania Natural Diversity Inventory (PNDI) provides information describing significant natural resources of the Commonwealth. The inventory locates and identifies the most uncommon natural features which create Pennsylvania’s unique natural diversity. A detailed study of these sites specific to Chester County, the *Chester County Natural Areas Inventory*, was compiled and written by the Pennsylvania Science Office of the Nature Conservancy and published by the Chester County Planning Commission in 1994. This inventory contains information on the locations of rare and threatened, and endangered species and of the highest quality natural areas in the County. The inventory further provides general management recommendations for the protection of the identified species. Exact locations and species are not identified for their protection; however, this additional information can be obtained from the Pennsylvania Science Office of the Nature Conservancy upon request by the municipality or landowner.

There are no guarantees that these important natural sites will be protected. State level priority and limiting funding leaves protection to the local municipality in most cases. If the Township desires to protect these special areas, they can utilize their regulatory authority under the Municipalities Planning Code. At a minimum, developers should be required to identify these sites on subdivision or land development plans and provide an impact statement indicating possible adverse effects on the species and proposed mitigation efforts. The use of lot averaging and cluster development can be used to direct development away from sensitive natural sites. These options are discussed in detail in Chapter Four - Natural Resources Protection Plan. PNDI sites in the Township are discussed in the Township Open Space, Recreation, and Environmental Resources Plan.

Locally Important Vegetation

Locally important vegetation may be considered to include those types of resources that add character, beauty, and a sense of history to East Goshen Township. Locally important vegetation was required to be identified by individual municipalities in the County funded Open Space Plans. The Open Space, Recreation, and Environmental Resources Plan refers to several historic trees (200 years or older) located throughout the Township with a concentration near the Ridley Creek on Boot Road and Route 352. Hedgerows, such as the stand of Beech trees along Line Road, create a sense of history, separation, and Township character. Focal points, such as the magnificent Mazard Cherry Tree (awarded as a “Big Tree of Pennsylvania”) create a sense of place and pride for community residents. Protection measures for significant vegetation, such as the establishment of Tree Protection Zones, will be discussed in detail in Chapter Four - Natural Resource Protection Plan.

Interested parties should consult East Goshen Township’s Open Space, Recreation and Environmental Resources Plan for location and more detailed information on locally identified resources.

Habitat Areas and Biodiversity

The term habitat refers to a region or area where a plant or animal naturally grows or lives. There are several major habitats found in this general area of the County. The need for natural diversity is reflected in the summaries provided below.

Streams and Wetlands – Stream corridors and wetland areas have a very high habitat value, as they feature the largest total amount of living organic material. The variety of trees, shrubs, and herbs which grow naturally along stream corridors and in floodplain and wetland areas provide structural complexity, cover, and an assortment of food sources immediately adjacent to water. These characteristics taken in combination make the stream and wetland ecosystem an extremely valuable habitat for many species of plants and wildlife native to East Goshen. Since riparian forest buffer areas are typically undeveloped and interconnected, they serve a critical function as important wildlife corridors through which wildlife can pass unharmed and reach other habitat areas. Due to their importance to water quality and wildlife, any disturbance of these areas should be avoided wherever possible or minimized and mitigated when disturbance must occur.

Open Lands – Open lands, including fields, meadows, and pastures, are also an important habitat for plants and animals. Though they are the only habitats created by regular maintenance, they add to the diversity of East Goshen as a whole. Open lands, which are managed as meadows, are often abundant in native grass, sedge, and wildflower species. This rich vegetation provides food consisting of seeds, herbaceous material, and insects for local wildlife. Where situated next to forests, the edge between both habitat types provides a unique combination of food and cover for wildlife.

Agricultural lands, including field crops, orchards, gardens, pastures, and hayfields, provide food not only for humans and livestock but also food and habitat for wildlife. Meadows and hayfields provide an additional habitat to the overall ecosystem. These areas provide a food source for browsers, rodents, and several species of seed eating birds. Tall meadow provides suitable habitat and nesting sites for birds (pheasant and numerous songbirds) and small rodents, a base element in the food chain. Prior to harvest, crops are consumed by wildlife whenever possible, as farmers know. However, the more important element in the process follows harvest, when many species of wildlife pick over the remains of field crops in search of leftover seeds and grains. This is a particularly important source of food in the fall and winter, when other sources of food are scarce, for several species of game birds including pheasant, Canada geese, and several other species of waterfowl.

Hedgerows – Hedgerows are one of the most important features in the farm landscape and, judging by the general decrease in quality and quantity, are one of the least understood. Hedgerows, or thickets, are typically found along and define property lines, lining roads, protecting small streams and drainageways, and defining pastures and fields in the interior of a single property. Hedgerows function as windbreaks which help to impede erosion of adjacent agricultural lands and stabilize streambanks. Hedgerows provide a variety of fruits, buds, and insects, and provide nesting sites and a means of escape from predators for animals that normally feed in adjacent open fields and meadows. Fields and meadows with hedgerows tend to support a more numerous and varied population of wildlife than those that lack hedgerows.

Invasive species are a bigger threat to hedgerows than woodlands, because the invasive species typically thrive in high sunlight conditions, and thus tend to overrun the understory of the hedgerow with species such as multiflora rose, oriental bittersweet, Japanese honeysuckle, and mile-a-minute weed. The overstory component of hedgerows continues to consist largely of native species, including such species as black cherry, mulberry, tulip poplar, and sassafras.

Existing Protection Measures

The following summary of existing natural resource protection measures in East Goshen Township is based on the Township Zoning and Subdivision and Land Development Ordinances. This information provides guidance concerning where East Goshen ordinances could be made more comprehensive in the protection of natural resources.

The following protection measures are specified in the Township Zoning Ordinance (1998), as amended:

Resource	Protection Measure
Steep Slopes	<p>Limitations and requirements for development on steep slopes (15-25%) including minimum buildable area and vegetation preservation.</p> <p>Significant limitations on development of very steep slopes (25+%)</p>
Wetlands	A setback of at least 20 feet is required for a principal building from any area identified as a wetland.
Resource	Protection Measure
Floodplains	Significant limitations on permitted uses based on impact to the existing flood elevation.

The following protection measures are specified in the Township Subdivision and Land Development Ordinance (1998), as amended:

Resource	Protection Measure
Woodland	Protection measures are included for trees that are to be preserved during the development process.

Resource	Protection Measure
General	The Township requires that all primary resources including, but not limited to: floodplains, wetlands, and steep slopes be included on all plan submission through the plan process.

The Township has taken positive steps to include resource protection standards in their ordinance language. We will include additional measures that the Township can implement to increase that degree of protection in Chapter Four – Natural Resource Protection Plan.

References:

East Goshen Comprehensive Plan. West Chester, Pennsylvania. 1992.

East Goshen Open Space, Recreation and Environmental Resources Plan. Bethlehem, Pennsylvania. 1993.

A Plan for the Protected Open Space Network in Chester County, Pennsylvania. Chester County Planning Commission. West Chester, Pennsylvania, 2002.

Watersheds. An Integrated Water Resources Plan for Chester County, Pennsylvania and its Watersheds. Chester County Water Resources Authority, West Chester, Pennsylvania. 2002.

Geology, Hydrology, and Ground-Water Quality of Chester County, Pennsylvania. Chester County Water Resources Authority, in cooperation with the U.S. Geological Survey. West Chester, Pennsylvania. 1994.

Figure Sources:

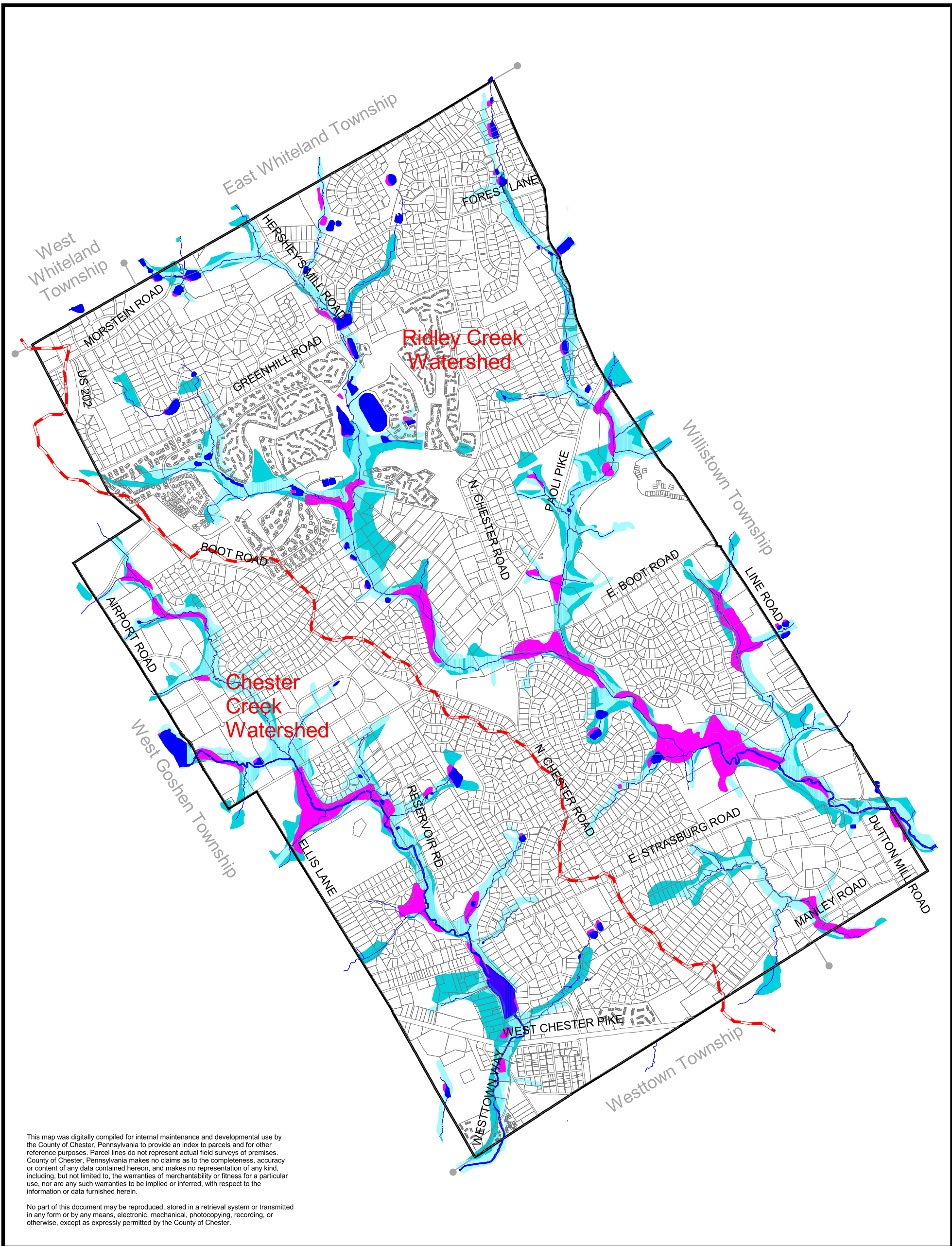
Figure D-1: *An Integrated Water Resources Plan for Chester County, Pennsylvania and its Watersheds.* Chester County Water Resources Authority, West Chester, Pennsylvania. 2002.

Figure D-2: Chester County Planning Commission, West Chester, Pennsylvania. 2004.

Figure D-3: *Cluster Subdivision Design Guide.* Chester County Planning Commission. West Chester, Pennsylvania. 2003.


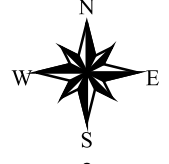










Figure D-4: *Watersheds, An Integrated Water Resources Plan for Chester County, Pennsylvania and its Watersheds.* Chester County Water Resources Authority. West Chester, Pennsylvania. 2002.

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This map was digitally compiled for internal maintenance and developmental use by the County of Chester, Pennsylvania to provide an index to parcels and for other reference purposes. Parcel lines do not represent actual field surveys of premises. County of Chester, Pennsylvania makes no claims as to the completeness, accuracy or content of any data contained hereon, and makes no representation of any kind, including, but not limited to, the warranties of merchantability or fitness for a particular use, nor are any such warranties to be implied or inferred, with respect to the information or data furnished herein.

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MAP D-1	<h1>East Goshen Township</h1> <h2>Comprehensive Plan</h2> <p>June 2005</p>	  	<h3>Water Resources Map</h3> <p>RESOURCE INFORMATION</p> <ul style="list-style-type: none">  Watershed Boundary  Stream Corridors  100 Year Floodplain  Wetlands  Hydric Soils  Ponds <p>BASE INFORMATION</p> <ul style="list-style-type: none">  Parcel Lines  Municipal Border  Surrounding Municipal Boundaries
	<p><small>Data Source: Municipal Border, Parcels - Chester County Bureau of Land Records, 1999; Roadways - Chester County Bureau of Land Records, 2002; Streams, Ponds - Aerial Data Reduction Associated Inc. provided through sublicense agreement to the County of Chester, 1994; Chester County Planning Commission, 2002; Floodplains - Q3 Flood Data, Chester County, Pa; Federal Emergency Management Agency, 1996; ChesCO-LRS; Wetlands - National Wetlands Inventory (NWI) digital files, US Fish and Wildlife Service, 1996; Hydric Soils - Soil Survey Geographic Database for Chester County, Pa, U.S. Department of Agriculture, Natural Resources Conservation Service, 1997; Small Watersheds - Digital Drainage basin boundaries of named streams, Pa Department of Environmental Protection, 1997. East Goshen Township, 2003; Chester County Planning Commission, 2003.</small></p>		