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A G E N D A

**PHOENIXVILLE REGIONAL COMPREHENSIVE PLAN UPDATE – COMMITTEE WORKSHOP PRPC-8A**
November 29, 2017

1. Environmental Resource Plan – Revisions per PRPC-8 indicated on draft text in RED

    a. Scenic Rivers
    b. Floodplain regulations for protection of private property
    c. Measurement of Riparian Buffers
    d. Protection of small scale woodlands, specimen trees

2. Energy Conservation Plan – Initial draft review

    a. Goals, objectives
    b. Renewable energy systems
    c. Energy efficient construction
    d. Recycling, redevelopment, and reduced resource usage
    e. Transportation systems
    f. Electric grid
    g. Local initiatives
    h. Implementation

3. Announce Next Workshop – January 31, 2018 – Draft Housing Plan

4. Adjournment

1240 Elbow Lane • Chester Springs, PA 19425 phone 484-888-5574 email ed@theurkauf.com www.theurkauf.com

# CHAPTER FOUR – ENVIRONMENTAL RESOURCES PLAN

Located in the Piedmont physiographic region in northeastern Chester County, Pennsylvania, the Phoenixville Regional Planning Committee (PRPC) region covers 51.82 square miles (33,167 acres). More than 100 miles of rivers and streams flow through the region's high quality and exceptional value watersheds. 11,280 acres of mature woodlands cover the land, providing habitat for a wide variety of wildlife, while more than 11,730 acres of prime agricultural farmland are present within the region, serving as the basis for land use in the region since European settlement. The rolling topography is generally moderately sloping, with pronounced ridges and stream valleys that include steep slopes.

By preserving these resources through a sustainable approach to conservation and future development, the municipalities of the PRPC region will safeguard important quality of life factors for their residents and for future generations. Because these systems do no coincide with political boundaries, they are best managed on a larger scale. By working together through the PRPC, the constituent municipalities can realize a greater benefit from these resources than they would by managing them in isolation.

## 4.1 ENVIRONMENTAL RESOURCES PLAN GOAL AND OBJECTIVES

Protect natural resources as essential to public health, safety, and welfare and to maintaining the character of the Region. This goal is to be advanced through the pursuit of the following specific objectives:

1. Promote surface and groundwater quality through protection of floodplains, wetlands, stormwater infiltration areas, steep slope areas, and the creation of buffers.

2. Protect essential and vulnerable soil resources such as prime agricultural soils and erodible soils.

3. Protect habitats and species diversity through identification of critical areas including high quality forests and woodlands, riparian areas, specific microclimates, essential geological or physiological characteristics, and state and federally listed rare, threatened, and endangered species.

4. Promote remediation of degraded environments.

5. Organize resource protection into effective and integrated regional systems, such as greenways.

6. Develop uniform Regional resource protection regulations that incorporate strategies appropriate to differing existing land uses and conditions.

## 4.2 INVENTORY OF NATURAL RESOURCES

### Geology and Physiography

The underlying geology of the region informs the character of the landscape in a variety of ways. Geology and weathering dictate topography and hydrology. Through weathering of the underlying bedrock, climate (e.g. precipitation, wind, and solar radiation) and biological processes, the conditions that support varying plant and animal communities have developed over eons. These conditions in turn

dictate human history by presenting differing sets of opportunities and constraints to human activities, including settlement, agriculture, and resources.

The PRPC municipalities are located within the Piedmont physiographic province. Characterized by rolling hills, the Piedmont (French for "foothills") is so named for its location relative to the Appalachian Mountains. This region stretches from New York City to Birmingham, Alabama and sustains a relatively concentrated human population amid diverse wildlife communities and extensive natural areas.

Within the PRPC region, there are three separate geological sub-provinces: the Piedmont Uplands (approximately 22,400 acres in the southern portion of the region), the Gettysburg- Newark Lowland (nearly 10,624 acres along the Schuylkill River), and the Piedmont Lowland (a small 211 acre sliver to the south of Route 76). Corresponding to the division between the Piedmont Upland and the Gettysburg-Newark lowland, the geology of the region is divided between the harder gneiss rock to the west and south, and several softer formations of sandstone, mudstone, and quartz. These softer rocks, formed from river mud, and are easily erodible, resulting in a more gradual, gently sloping terrain. The bedrocks associated with the Piedmont lowland are also more porous than gneiss, allowing for greater recharge of the aquifer as water percolates through the sandstone.

The Piedmont Upland's underlying bedrock consists of gneiss (felsic gneiss & graphitic felsic gneiss), a relatively hard rock somewhat resistant to erosion. This leads to the rolling hill character of the area. In contrast to the Piedmont Upland, the Gettysburg-Newark Lowland is underlain by a variety of bedrock types. Generally softer than the Piedmont Upland, the bedrock of the Gettysburg-Newark Lowland is more susceptible to erosion, meaning this portion of the study area is flatter, though areas of erosion-resistant diabase rock has left hills and small elevated regions. The Piedmont Lowlands are comprised of even softer rock, such as limestone, dolostone, and phyllite, and is geologically younger than the surrounding uplands.

In the lowland, Stockton, Lockatong, Brunswick, and Chickies Formations are prevalent. Each formation is a mixture of rock types: argillite, sandstone, mudstone & quartzite. Argillite and mudstone are formed from lithified mud, while quartzite is formed from sand. These bedrocks are relatively porous and allow for greater percolation of water into the aquifer. As a group, they are softer than gneiss, meaning that erosion is more uniform and the character of the slope is less undulating. In fact, much of the lowland is relatively flat, especially as it nears the floodplain of the Schuylkill.

Topography

The overall topography of the region is characterized by a relatively gentle slope, moving from a highpoint of more than 810' in the gneiss hills of southern West Vincent Township, to the low point of less than 60' in the floodplain of the Schuylkill River in the west of Schuylkill Township.

There are areas of relatively steep slope, classified as moderate (15-25% grade) or steep (over 25% grade), particularly along Pickering Creek in Charlestown Township and to the western side of West Vincent Township where steep valley walls and stream banks are found (see Regulated Natural Resources Map). Consistent with patterns of land use, areas of steep slopes most often coincide with mature forest cover. Since the land is unsuitable for development, woodlands have been allowed to remain on these sloped areas. The woodlands are valuable for habitat, and the root systems of the native plant communities found on steep slopes hold soil in place, thereby limiting erosion and subsequent sediments into the region's water bodies. The shade provided by canopy cover also

contributes to cooling streams, thus helping promote a balanced ecosystem that allows for a variety of aquatic wildlife to flourish.

Disturbance of steep slopes and vegetation alters topography and drainage, contributes to slope instability and erosion, and diminishes the quality of groundwater supplies and surface water. It is important that natural vegetative cover be retained on steep slopes, especially adjacent to streams and wetlands.

Soils

There are two main soil associations within the region, Penn silt loam and Gladstone gravelly loam. Penn silt loam is the major soil type found in the Gettysburg-Newark Lowland. It is formed from the weathering of shale, siltstone, and sandstone, which are the major bedrock types found within the Gettysburg-Newark Lowland. Penn silt loam is a moderately deep, well-drained soil. Gladstone gravelly loam, the major soil group within the Piedmont Upland, is formed from the weathering of gneiss bedrock, the predominant bedrock type in the upland. It is a very deep, well-drained soil particularly suited to cultivation.

Beyond soil associations, soils in the region may be classified according to the regulatory framework governing their capabilities for use. These regulated soils, which are of particular concern in creating land use and development plans are prime agricultural soils and hydric soils.

Prime agricultural soils, identified as Classes I and II by the USDA, are soils whose chemistry, access to water, and exposure to sunlight make them particularly suited to cultivation. These soils, found in regions of relatively flat topography, are often desirable to developers for because of the same characteristics. However, they should be protected in order to maintain the viability of farming in the region, which in turn is responsible for much of the appealing visual character of the region.

Hydric soils, found in proximity to waterways and often indicative of wetlands, are not suited to development. Particularly in proximity to the region's special protection waterways, hydric soils should be accurately mapped and protected through the regulation of riparian buffer zones. In addition to wetlands subject to regulatory protection, hydric soils are also indicative of areas of groundwater recharge. There is therefore an interest in water quality protection associated with hydric soils. Where wetlands are not mapped, the presence of hydric soils can indicate a high probability for the presence of wetlands.

Soils located on steep slopes should be considered in planning for future development. Soils on steep slopes are not only unstable and prone to erosion, they are also home to native plant communities in the form of mature woodlands and should therefore be of particular consideration for protection through regulatory action. Two problems associated with soil are erosion and resultant sedimentation, which impairs water quality. By protecting forest cover on steep slopes, water quality and wildlife habitat are both safeguarded.

There is a general overlap between soils unsuited to development and other natural resources to be protected. For example, soils on steep slopes often overlap with areas of preserved mature woodlands. By protecting those woodlands from clearing through development, the soils are also protected from erosion due to stormwater runoff. As noted above, the protection of hydric soils from development as protects the quality of water present in those areas. And the preservation of farmland promotes

economic activity and local food source sustainability while retaining the bucolic character of the PRPC region.

Forests & Vegetative Cover

Forest cover represents an important natural resource in several regards. Healthy and mature woodlands provide a range of ecological services that benefit the region as a whole. Large stands of woodland provide habitat for a wide variety of wildlife. They clean the air through the process of photosynthesis and regulate climate by removing carbon dioxide from the atmosphere. They protect water quality through removal of pollutants, infiltration, and providing the structural integrity of streambanks by stabilizing soil and slowing stormwater runoff.

While any size woodland can have a positive effect on the environment, these functions are best realized when woodland is allowed to remain unfragmented. This means that large stretches of woodland are kept intact, with as large an area of undisturbed woodland as possible remaining on the interior of any given stand. The stable conditions that characterize interior forests are found a minimum of 300 feet from the nearest forest edge, and many plant and animal species require these conditions for survival. Such interior habitats are a rare and vulnerable resource in the Piedmont Region.

While much of the mature woodland once present was cleared for agriculture or other development, large contiguous stands of woods remain in the region. In West Vincent Township, around French Creek, and in Charlestown Township, along Pickering Creek, there are particularly large areas of relatively undisturbed woodland. Since woodlands coincide with other important ecological systems, they should be managed within the larger natural resource context of the region. By promoting land use patterns that allow for the preservation and enhancement of mature woodlands, fully functional ecosystems can remain intact. The region's forests should be managed in light of adverse impacts from pollution, clearing, invasive species, and stormwater runoff.

Hydrology

The hydrological system is comprised of waterways, wetlands, floodplains, and groundwater. Each of these elements contributes to the overall health of the hydrological system and impacts on any part of the system will have an effect on the overall function. As a natural system that corresponds to geology, topography, soils, and vegetation, the hydrological function of the region should be a major consideration in all future land use and development planning.

Negative impacts to the function of the hydrological system are posed by intensive development (particularly impervious surfaces such as roofs and parking lots) and associated concerns, such as stormwater runoff and wastewater systems. These impacts will be felt in the form of pollution, sedimentation, and erosion in the waterways.

Stormwater best management practices that strive to replicate predevelopment conditions in terms of infiltration and runoff are critical. The preservation of naturally vegetated areas and development which is responsive to the hydrological attributes will not only safeguard water quality but help mitigate flood damage and enhance the natural beauty of the region.

Waterways and Watersheds

Waterways are categorized by stream order, as they run from the smallest 1st order headwaters eventually out to the ocean. The Schuylkill River, which is a 6th order watercourse, borders the region to the east and flows north to south on its way to join the Delaware River in Philadelphia. French and Pickering Creeks, 5th order streams, bisect the region, flowing from west to east towards their confluences with the Schuylkill River, in Phoenixville Borough and Schuylkill Township, respectively. Lesser order waterways of the region include Birch Run, Valley Creek, Pigeon Run, Bull Run, and Black Horse Creek, which are all 4th order streams. Jug Hollow and Stony Run, 3rd order streams, flow directly into the Schuylkill.

Stream orders begin with the smallest headwaters in the region, the 1st order streams. Though they may seem less significant than larger water bodies, it is imperative to afford protections to these smaller waterways. Any deleterious impacts within headwaters are compounded as water flows successively to higher order streams on its way to the Schuylkill.

Water quality is another parameter by which streams are designated. The majority of the region falls within Special Protection watersheds designated by the state as either High Quality or Exceptional Value. The High Quality (HQ) designation protects surface waters "having quality which exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water by satisfying Water Quality Standards of the PA Code." The Exceptional Value (EV) designation goes a step further, protecting waters which not only satisfy the quality standards of the PA Code 93.4b, but are "of exceptional recreational significance, of exceptional ecological significance, or [are] located within a protected zone e.g. State Park." These designations are established to maintain present water quality by protecting from harmful effects associated with development and related stormwater runoff. The EV and HQ designations should be considered in planning for a regional approach to water management.

The waterways of the region are all associated with a particular watershed, or drainage basin. Watersheds are defined by ridgelines and the watercourses that drain the areas between them by way of surface flow and groundwater. Watersheds are classified by order and by water quality, so for example the upper end of the French Creek basin would be referred to as an Exceptional Value 5th order watershed, and each of its lower order tributaries would also be classified as Exceptional Value.

Wetlands

Wetlands (see Map 5 - Regulated Natural Resources) are areas of water at or near the surface. They are most often found in proximity to waterways and are delineated by the type of vegetation and soils found there. They play an important role in groundwater recharge, while simultaneously providing habitat for particular plant and animal species. Wetlands are protected by local, state, and federal regulations enabled by the Clean Water Act of 1972.

Floodplains

Floodplains are areas in proximity to waterways that are formed by the movement of water channels, and are subject to flooding in significant rain events. Though rivers may appear to be static shapes, they in fact meander and drift over time, thereby creating flat areas of alluvial soil known as floodplains. These areas, when uncompromised by development, allow for the containment of flood events and thus help to limit damage to life and property posed by periodic flooding during storm events.

The Federal Emergency Management Agency (FEMA), requires municipalities to regulate development impacts in floodways to preserve their function and to prevent hazards to human life and property. In order for municipalities to participate in FEMA's National Flood Insurance Program, they must delineate 100 year floodplains and strictly limit development within those areas. This includes promoting stormwater best management practices to promote groundwater infiltration and otherwise manage the amount of stormwater runoff reaching the floodplain.

Pennsylvania Scenic Rivers

**Pennsylvania Scenic Rivers** are rivers that are designated "scenic" according to the criteria of the Pennsylvania Scenic Rivers Act (P.L. 1277, Act No. 283 as amended by Act 110, May 7, 1982). The scenic rivers are managed by a variety of State agencies and local conservancies. For the purposes of the act, "river" is defined as "...a flowing body of water or estuary or a section, portion, or tributary thereof, including rivers, streams, creeks, runs, kills, rills, and small lakes."

According to the Act, Pennsylvania Scenic Rivers fall into one of five classifications, depending on the amount of development along the shore, access to the river, and diversion of flow:

- **Wild** rivers are rivers or sections of rivers that are not impounded and are usually not accessible except by trail. Their watersheds and shorelines are essentially primitive and the waters unpolluted.
- **Scenic** rivers are rivers or sections of rivers that are not impounded. Their shorelines or watersheds are largely primitive and undeveloped but they are accessible in places by roads.
- **Pastoral** rivers are those that are not impounded except for historic or restored mill dams. There may be diversions or withdrawals to support agricultural activities, for example agricultural ponds. Their shorelines or watersheds may support a variety of farm or farm-related activities, but these activities may not interfere with the pastoral nature of the landscape.
- **Recreational** rivers or sections of rivers are easily accessible, may have some development along their shorelines, and may have been impounded or diverted in the past.
- **Modified recreational** rivers (or sections of rivers) are those in which the flow may be regulated by upstream control devices. Low dams are permitted as long as they do not increase the river beyond bankfull width. These rivers are designated for human activities which do not interfere with public use of the streams or enjoyment of their surroundings.

The Pennsylvania Scenic Rivers in the PRPC Region are the Schuylkill River and French Creek. These waterways are so designated for recreational as well as scenic significance: French Creek for its Exceptional Value status and fishing, and the Schuylkill River for boating, fishing, and as a PA State Water Trail. The Schuylkill River provides the setting for the regionally important Schuylkill River Trail, a multi-use trail that upon completion will extend from Philadelphia to Pottsville. West Vincent Township has zoning regulations to protect the scenic and environmental quality of French Creek.

## 4.3 EXISTING MUNICIPAL ENVIRONMENTAL RESOURCE PROTECTION REGULATIONS

Each municipality within the Region prioritizes natural resource protection differently depending on natural resource characteristics of the community, historic development patterns, and community priorities. Regulations developed to protect natural resources can also vary greatly from one community to another. The following table summarizes existing natural resource regulations for each of the regional municipalities.

**Natural Resource Protection Standards Summary**

| | **Charlestown Township** | **East Pikeland Township** | **Phoenixville Borough** | **Schuylkill Township** | **West Vincent Township** |
|---|---|---|---|---|---|
| **Floodplain** | Y<br>Structures Prohibited | Y<br>Structures Prohibited | Y<br>Limits development | Y<br>Structures Prohibited except SWM | Y<br>Structures Prohibited |
| **Riparian Buffer** | Y<br>100-feet | Y<br>100-feet (30'- Zone 1 70'- Zone 2) | Y<br>35' | Y<br>100' min | Y<br>150' + (increases with steep slopes) |
| **Steep Slopes** | Y<br>>25%: no new struct. | Y<br>>25%: no new struct. | Y<br>>25%: no new struct. w/o CU | Y<br>15-25% (20% max regraded) (>25%)- no more than 10% regraded | Y<br>15-25% (max impervious varies) (>25%)- (no buildings; max impervious varies) |
| **Forests & Woodlands** | Y<br>Priority resource for open space | Y<br>No more than 25% disturbed. Tree replacement | Y<br>Limit removal to area needed for construction | Y<br>Prioritized in Cluster Option | Y<br>Clear-cutting prohibited on slopes >15% and w/in 100' of stream<br>Tree replacement |
| **Wetlands** | Y<br>50' buffer | Y<br>50-200' buffer | Y<br>25-foot setback | Y<br>50' buffer (10% disturbance) | Y<br>100' buffer w/ 20% disturbance |
| **Environmental Constraint Lot Area Net-Outs** | Y<br>Floodplain Steep Slopes Wetlands | Y<br>Floodplain Steep Slopes Wetlands | Y<br>Floodplain Wetlands | Y<br>Floodplain Steep Slopes Wetlands | Y<br>Floodplain Steep Slopes Wetlands |

| Natural Resource Protection Standards Summary | | | | | |
|---|---|---|---|---|---|
| | **Charlestown Township** | **East Pikeland Township** | **Phoenixville Borough** | **Schuylkill Township** | **West Vincent Township** |
| **Open Space** | Y<br>Prioritizes Natural Resources | Y<br>Natural Features Protection Chapter | | Y<br>Cluster Option requires 60% open space<br>Natural Resources Overlay-protects range of resources | Y<br>Greenway Lands required depending on Tier |
| **Water** | Y<br>Flushing Mechanisms | | | Y<br>150' buffer for Outstanding Water Resources | Y<br>Water Resource Overlay in recharge/discharge areas |
| **Solar Energy/Alternative Energy** | Y | | | | Y |

In general, existing resource protection standards are more lenient in Phoenixville than in the surrounding Townships. This is consistent with the higher development intensities in the Borough and historical land use and development practices that predated modern understanding of resources and their protection.

## 4.4 ENVIRONMENTAL RESOURCE PROTECTION POLICY

The Region should adopt uniform policies for environmental protection that are responsive to the goals and objectives of the Comprehensive Plan, with measures appropriate to the importance of specific resources, to existing and future land use conditions, and to practical considerations that advance sustainability. Thus, policies would be most rigorous in cases where maximum resource protection is achievable, but where there are compromised existing conditions, the focus is to be on the degree of protection that can reasonably be implemented and that creates measurable improvement over the existing condition. In practical terms, this means that resource protection regulation and strategy within a pristine forest setting would take a different form than in a denuded brownfield undergoing remediation and redevelopment.

### Steep Slopes

Steeply sloping land produces increased stormwater runoff and soil erosion potential, and also presents challenges to agriculture and development. Increased soil erosion and runoff can greatly impair surface water quality through diminished groundwater recharge, which is necessary to maintaining uniform stream base flows, and through direct deposition of soil and contaminants into streams. Agricultural practices must be modified on steep slopes to prevent severe erosion, and for the safety of farmers operating equipment. Development on steep slopes requires expensive interventions involving grading, retaining walls, and stormwater management, and can limit suitability for certain building types. The steeper the slopes, the more severe the negative impacts of inappropriate use or management. Thus, it is important that steep slopes be maintained in effective natural vegetative cover where possible. Where this is not possible, disturbance should be minimized and appropriate mitigation practices utilized.

In keeping with these considerations, the PRPC municipalities should maintain zoning provisions that minimize disturbance of steep slope areas. As such, open space and conservation uses are most suitable, followed by limited types of agricultural or silvicultural practices. Development should be prohibited or very severely limited on steeply sloping lands. Restrictions should be most stringent on “prohibitive” or “very steep” slopes of over 25%. In addition, “precautionary” or “moderately steep” slopes of 15-25% should have restrictions on use and disturbance.

Over the land use history of certain tracts, development and earth moving practices have led to the creation of steep slopes where none had naturally existed previously. In such cases, municipalities could consider exemption or relief from steep slope regulations, provided sufficient stormwater management and erosion control practices are in place concurrent with any use or development.

Recommended guidelines for steep slope protection in the Region are as follows:

#### Prohibitive Slopes 25%+

Uses – Conservation, Sustainable Forestry and Agriculture, Recreation
No buildings or cut/fill
Maximum impervious cover 5%, subject to Conditional Use
Maximum disturbance 5-15%, subject to Conditional Use
Exemption for artificial slopes

Precautionary Slopes 15-25%

Uses - Conservation, Sustainable Forestry and Agriculture, Recreation, Residential by Conditional Use
Buildings and structures associated with permitted uses by Conditional Use
Maximum impervious cover 10%
Maximum disturbance 15-30%, subject to Conditional Use
Exemption for artificial slopes

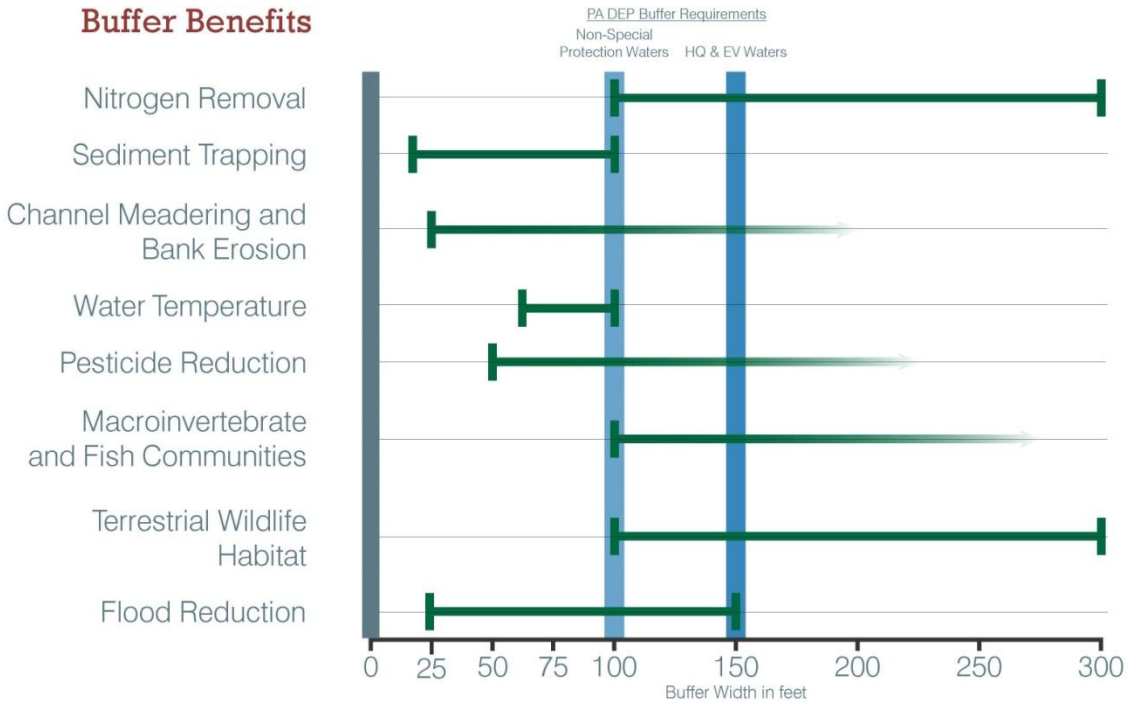
Floodplain and Riparian Areas

Floodplain areas and riparian corridors play a critical role in the water quality of streams and rivers, and improper development of these areas can threaten ~~both~~ the environment, private property, and human life. Thus, protection of these areas is of prime importance.

Floodplains are those areas occupied by streams and rivers during storm events. For planning and land use purposes, floods are categorized in terms of their average frequency or more accurately, their likelihood of occurrence in a given year. The Federal Emergency Management Agency (FEMA) establishes national flood and flood insurance policy based on the flood event with a 1% chance of annual occurrence, commonly known as a 100-year flood. FEMA and the Pennsylvania Department of Community and Economic Development (DCED) have recently revised their standards and mandated that all Pennsylvania municipalities adopt compliant regulations for existing structures and proposed development within the 100-year floodplain.

In addition to floodplains, it is important to protect riparian corridors with buffers. Riparian buffers are recognized by Pennsylvania Department of Conservation and Natural Resources (DCNR) and Pennsylvania Department of Environmental Protection (DEP), who define them essentially as naturally vegetated areas along waterways that act as filters and provide numerous other environmental benefits. These benefits include water quality protection, flood impact protection, erosion control, groundwater recharge, wildlife habitat, and water temperature moderation that is important to aquatic life. The most effective buffers are natural forest areas with structural and species abundance and diversity. However, managed woodlands and meadows can also provide significant buffer protection.

The following graphic represents specific empirically ~~measured~~ determined benefits provided by forested riparian buffers of various widths, measured from each stream bank. Buffer protection benefits are completely absent or negligible at widths below 100 feet in specific parameters, including removal of nutrients and certain pesticides, native macroinvertibrate and fish communities, and terrestrial habitat and migration corridors. The full array of benefits is not manifest until buffer with reaches 150 feet or more. It is for this reason that environmental researchers and many regulators advocate minimum riparian buffers of 150 feet, especially in Special Protection watersheds.




Section 102.14 of the Pennsylvania Code establishes 150 foot wide buffers along Exceptional Value (EV) and High Quality (HQ) streams, and 100 foot wide buffers along other streams. However, these guidelines apply only to land disturbances of one acre or greater, and there are other exceptions and relief available to land developers. In addition, changes to the PA Clean Streams Law (PA Act 162) enacted in October 2014 effectively nullify much of the buffer protection requirement by allowing the following in lieu of riparian buffers:

- Alternative best management practices (BMPs) for disturbance within required buffers that are "substantially equivalent" to a riparian buffer in terms of water quality
- Required offsetting replacement buffer areas in Special Protection watersheds for land disturbance within 100 feet of EV and HQ designated streams

It is evident that current statewide regulations do not provide buffer protection consistent with standards that empirical evidence would justify. In light of the Special Protection streams that are prevalent in Northern Chester County and within the Region, municipalities should at minimum enact regulations consistent with maintaining their quality. In addition, the non-Special Protection streams in the Region also sustain relatively good health and biodiversity and should be protected with generous buffers. Exceptions could be considered within municipal regulations for specified agricultural uses that maintain effective year round vegetative cover, historic buildings, trails, and permitted road or driveway crossings. Within currently urbanized areas and brownfield redevelopment sites on non-Special Protection streams, reduced buffer widths may be considered in conjunction with BMPs that improve water quality, reduce runoff, increase groundwater recharge, and promote habitat.

PRPC Member Municipalities should maintain minimum riparian buffers as follows:

- Special Protection Streams – 150 foot buffer. May consist of a 100 foot undisturbed forested inner buffer and a 50 foot outer buffer that allows certain management practices and very limited disturbance but no buildings or impervious cover.
- Non-Special Protection Streams - 100 foot buffer. May consist of a 50-75 foot undisturbed forested inner buffer and a 25-50 foot outer buffer that allows certain management practices and very limited disturbance but no buildings or impervious cover.
- Non-Special Protection Streams in Brownfield/Urbanized Conditions – 35-50 foot forested or managed buffer. Any proposed buffer of less than 100 feet width should be supported with site-wide BMPs.

Wetlands

Wetlands are defined by the Pennsylvania DEP (25 PA Code, Chapter 105) as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Wetlands contain three main components: (1) water at or near the surface for significant parts of the year, (2) hydric soils, and (3) wetland indicator vegetation such as cattails and skunk cabbage. Wetlands fulfill a number of critical ecological roles in providing habitat for species with specialized requirements, maintaining surface water quality, sustaining groundwater supplies and stream base flows, flood accommodation and absorption, and as the headwater source of first order tributary streams.

Wetlands inventory mapping is limited to that provided by the National Wetlands Inventory and the USGS. These sources identify only the largest and most prominent wetland areas. Smaller unmapped wetlands areas are no less environmentally significant than their mapped counterparts and are far more numerous. These unmapped wetland areas must be field identified and surveyed in order to assure protection.

Wetlands receive protection under the federal Clean Water Act, which regulates the discharge of dredged and fill material into waters, including wetlands. Activities that are regulated include fill for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry. Any proposed activity within a wetland must receive a permit from the U.S. Army Corp of Engineers.

The basic premise of the federal wetlands protection program is that no discharge or dredged or fill material can be permitted if a practicable alternative exists that is less damaging to the aquatic environment or if the waters would be significantly degraded. Permit applicants must demonstrate that they have taken steps to avoid wetland impacts where practicable, minimized potential impacts to wetlands, and provided compensation for any remaining unavoidable impacts through activities to restore or create wetlands (Source: US Environmental Protection Agency, Wetland Regulatory Requirements).

Municipalities should take steps to assure wetland protection, especially in light of the Special Protection and other biologically significant watersheds throughout the Region. Since wetlands are most frequently associated with specific plant species (known as wetland indicators) and hydric soil types, municipal ordinances should require a wetland determination and survey for any development or land disturbance application when either of those conditions is present.

In addition, buffers of natural vegetation surrounding wetland areas can protect them from the harmful impacts of sediments, nutrients, and other contaminants. Although the protection of wetlands from human activities such as agriculture, silviculture, and urban development is obvious, research has shown that terrestrial areas surrounding wetlands are core habitats for many semi-aquatic species that depend on mesic ecotones to complete their life cycle (Source: Conservation Biology, October 2003). Thus, forested or managed natural wetland buffers are recommended as follows:

- In Special Protection Watersheds – 100 foot buffer. May consist of a 50 foot undisturbed forested inner buffer and a 50 foot outer buffer that allows certain management practices and very limited disturbance but no buildings or impervious cover.
- In Non-Special Protection Watersheds - 50 foot buffer. May consist of a 25 foot undisturbed forested inner buffer and a 25 foot outer buffer that allows certain management practices and very limited disturbance but no buildings or impervious cover.
- In Non-Special Protection Watersheds in Brownfield/Urbanized Conditions – 15-25 foot forested or managed buffer. Any proposed buffer of less than 50 feet width should be supported with site-wide BMPs.

Forests and Woodlands

Forest cover provides numerous and irreplaceable benefits in terms of water quality, wildlife habitat and migration corridors, erosion control, recreation, and economic value. In addition, they are recognized for their role in carbon sequestration, an important factor in mitigation of climate change. This is especially true of large areas of contiguous forest that support interior habitats that are essential to a number of specialized plant and animal species, including some categorized as endangered or threatened. Fragmentation of forest vegetation leaves small, isolated island communities that degrade wildlife habitat and ecosystem health.

Among the Region's critical woodland areas is the Hopewell Big Woods, a globally significant resource area that covers large parts of northern Chester and Berks Counties and much of West Vincent Township. In addition, there are significant bands of contiguous woodland and forest throughout the Region that are associated with stream corridors, ridgelines, and steeply sloping areas. Even in urbanized settings, smaller forest and woodland areas play an important role in habitat, water quality, and microclimatic moderation, while contributing greatly to community aesthetics and human quality of life.

Forest fragmentation occurs when large, contiguous forest blocks are divided into smaller patches due to land clearing for non-forest use. Forest interiors create relatively stable conditions in terms of temperature, moisture, sunlight, and wind as compared with open and edge areas. These conditions favor highly specialized and interdependent species that cannot live in harsher and less consistent environments. Forest fragmentation for development and/or agricultural use severely threatens interior forest habitats by exposing more areas to variable edge conditions. For example, according to a 2013 report summarizing the resources of the Hopewell Big Woods, each mile of a 100-foot right-of-way disturbs approximately 12 acres and creates an additional 72 acres of new forest edge. Converting the interior forest environment into forest edge exposes that previously stable environment to increased light levels and soil disturbance; invasive plant species; and the effects of extreme weather. Invasive exotic species such as vines and climbing shrubs evolved to thrive in edge habitats. These plants strangle trees along forest edges, eventually killing them by cutting off the flow of nutrients and pulling them to the ground, particularly in winter when snow and ice accumulate on branches. Invasive plant

species also outcompete native understory and herbaceous plants, reducing species diversity and limiting food resources available to native wildlife - many of which, particularly native pollinating insects, have adapted to depend solely on specific species of native vegetation. These detrimental edge effects are present within forests up to 300 feet from the actual edge.

The creation of new forest edge also threatens plant and animal species that depend on large tracts of intact, secluded forest interior to feed and raise their young. They are at increased risk from parasitism and predation, because many parasitic and nest predator species thrive in edge habitats. These predators, which include raccoons, feral cats, jays, and crows, are typically associated with human developments, and can gain access to interior forest habitats via linear right-of-ways such as roads and utility cuts.

Forest edges mimic the conditions found in early successional forest areas, which are typically considered to be areas of high diversity. However, this diversity is limited to the immediate local area. Due to the increased pressure on interior species that results from edge creation, diversity at a larger regional scale might actually decline because area-sensitive species would disappear from the larger landscape.

Plant and animal species that require large forest interior habitat are specialists. Many are already rare, threatened, or vulnerable, due to habitat degradation from previous encroaching human development. According to the Cornell Lab of Ornithology, "Evidence from numerous studies indicates that the detrimental effects of an edge can extend from 150–300 feet (45–90 m) into the forest interior". Therefore, contiguous forests that include stands of forest at least 300 feet from the edge provide greater shelter opportunities for interior species. Certain species, such as bald eagles, great blue herons, and scarlet tanagers, require over 600 feet of forest buffer in order to successfully feed and raise young. Because the interior patches are larger in forests that are broad in both depth and width than in linear stands, the shape of forest habitat can be a crucial factor in protecting certain vulnerable species. In other words, in order for a forest to support interior habitat, it must be at least 6.5 acres in area, and with a minimum width of 600 feet in any direction.

In addition, smaller islands of forest and even individual trees impart ecological and cultural benefits. In an urban setting, individuals and groups of mature trees provide food and nesting habitat while providing microclimatic amelioration and air and water quality benefits. In less densely settled landscapes, hedgerows and small woodlots provide wind breaks, promote groundwater infiltration, decrease soil erosion, promote habitat, and can reduce energy demands and pollution. Individual specimen trees can provide important historical context and can serve as significant cultural icons in and of themselves. As long lived carbon sinks that can mitigate climate change impacts, trees should be cultivated and preserved wherever possible, whether in the form of urban forestry programs or in more traditional land stewardship and conservation efforts.

For these reasons, the Region should implement regulations that protect and enhance forest and woodland resources. These should focus on maximizing contiguous forested areas and in particular those with forest interior habitat in Special Protection watersheds, but also wooded areas of varying size in non-designated watersheds that provide other environmental, economic, and aesthetic benefits. Zoning and land development regulations should be considered that protect woodland and forest areas as follows:

- Establish provisions to qualify various wooded areas in terms of quality and ecological significance
- Limit allowable clearing of wooded areas, especially in areas of high significance
- Mitigate unavoidable woodland and forest disturbance with restoration planting areas
- Utilize open space and cluster zoning to maximize protection of wooded areas, and in particular contiguous forest
- Identify and protect specimen or heritage trees of exceptional ecological, cultural, or aesthetic value
- Prohibit to the extent possible introduction of invasive species
- Adopt timber harvesting regulations that include a re-establishment and management plan for species diversity, age stratification, and prevention of the establishment of invasive species

Critical Habitat Areas

The Nature Conservancy designated several areas of critical habitat in their 1994 inventory of natural areas in Chester County, which was prepared for the Chester County Planning Commission. The Conservancy chose these sites based on the quality of each site's habitat, the rarity of species or communities in each, and the threats to and management needs of each site's biodiversity. These areas were updated in 2015 by the Pennsylvania Natural Heritage Program (PNHP), a partnership of PA DCNR, State & Federal wildlife commissions, and the Western Pennsylvania Conservancy, to guide conservation work and land-use planning. The critical habitat areas were described for Chester County in the Chester County Natural Areas Inventory (CCNAI) and described as Core Habitats and Supporting Landscapes for plant and animal species and natural communities of concern.

**Core Habitat** – areas representing critical habitat that cannot absorb significant levels of activity without substantial negative impacts to elements of concern.

**Supporting Landscape** – areas directly connected to Core Habitat that maintain vital ecological processes and/or secondary habitat that may be able to withstand some lower level of activity without substantial negative impacts to elements of concern.

Full information for each area can be found in the PNHP's Natural Heritage Area (NHA) Factsheets. The PRPC Region in its entirety is classified in the PHNP as a Supporting Landscape to eight designated Core Habitats that support rare or threatened species. (See CCNAI MAP and Factsheets, Appendix __) The Core Habitats in the PRPC Region are:

| Core Habitat | Municipality |
|---|---|
| Bacton Mine Ridge | Charlestown |
| Beaver Hill Road Woods | West Vincent |
| Birch Run Woods | West Vincent |
| Constant Spring Lane Meadow | Charlestown |
| Horse-Shoe Trail Wetlands | West Vincent |
| Kimberton Meadows | East Pikeland |
| Pickering Creek Tributaries | Charlestown |
| Schuylkill River – Port Providence | East Pikeland, Phoenixville, Schuylkill |

Protection of habitat should be accomplished by maintaining and promoting the health and diversity of natural areas as follows:

- Require appropriate buffers and other protections. Protect as open space those properties that contain sites identified in the CCNAI
- Utilize the PNHP Conservation Explorer tool to determine whether there are critical species impacts related to any municipal application
- Protect critical habitats through protection of topography and geology, soils, forest and vegetative cover, wetlands, floodplains, watersheds and streams on which they depend
- Establish a networked system of large contiguous areas of open space
- Establish a network of riparian corridors and greenways

Prime Agricultural Soils

Prime agricultural soil is a finite and invaluable resource that has helped to determine the character of much of the Regional landscape. Because these are also the most easily developed soils, exurban sprawl has led to a rapid and irreversible depletion of this resource.

Among the methods for farmland protection is the deduction of USDA Class 1 and 2 soils from tract area calculations for allowable development intensity, so that farmlands can be preserved as agricultural open space. However, this provision cannot be applied in municipalities that net out environmentally constrained lands such as steep slopes, wetlands, floodplain, and riparian buffers from lot area and density calculations.

Alternatively, prime agricultural land can be preserved through land use and zoning policy that restricts areas with an abundance of Class 1 and 2 soils to agricultural and very low density residential use. In addition, by requiring cluster or open space zoning in these areas, prime agricultural lands can be permanently preserved as open space.

Prime agricultural soils should be protected in the Region as follows:

- Support of agricultural and conservation easement programs
- Low intensity zoning in areas with prime agricultural soils
- Class 1 and class 2 soils as prime candidates for inclusion in open space associated with development

## 4.5 IMPLEMENTATION STRATEGIES

The following policy recommendations will implement the goals and objectives of the Environmental Resources Plan:

**ER-1 Evaluate municipal steep slope protections and revise for consistency with Regional policy.**

Develop uniform Regional policy for protection of steep slopes with appropriate use and disturbance restrictions. Allow reasonable exemptions for artificially constructed pre-existing slopes and previously developed areas.

**ER-2 Evaluate municipal floodplain protection ordinances to assure consistency with FEMA and DCED requirements.**

**ER-3 Evaluate municipal riparian buffer ordinances and revise for consistency with Regional policy.**

Develop uniform Regional policy for riparian buffers along Special Protection streams and those without Special Protection status. Allow reasonable exemptions for certain uses and for urban and brownfield redevelopment, with appropriate mitigation for diminished width buffers.

**ER-4 Evaluate municipal wetland buffer regulations and revise to meet minimums consistent with Regional policy.**

Create buffer widths appropriate to watershed Special Protection status. Allow reasonable exemptions for certain uses and for urban and brownfield redevelopment, with appropriate mitigation for diminished width buffers.

**ER-5 Establish Regionally compatible ordinances for forest and woodland resource protection.**

Set disturbance limits on existing wooded lands and specimen or heritage trees consistent with environmental quality and resource value, with appropriate mitigation for clearing. Establish land development practices in zoning to maximize protection of valuable woodland resources as open space. Evaluate and revise municipal forestry ordinances to promote ecologically responsible harvesting and restoration practices.

**ER-6 Establish Regional zoning standards for protection of critical habitats.**

Utilize Chester County Natural Areas Inventory as basis to identify and protect Core Habitat Areas. Require municipal applicants to verify potential impacts on Core Habitats and modify plans or mitigate impacts accordingly.

**ER-7 Evaluate municipal lot and tract area net-out provisions to assure that lands with environmentally sensitive resources are not over-developed.**

Adopt appropriate net-out provisions to promote protection of steep slopes, floodplain and riparian corridors, and wetlands.

**ER-8 Coordinate municipal zoning along resource corridors to create open space greenways for environmental protection and recreation.**

Create greenways that respond to environmental conditions and that do not terminate based on municipal boundaries where sensitive resource lands extend across them.

**ER-9 Adopt zoning to promote preservation of lands with Prime Agricultural soils.**

Utilize low intensity and agricultural use districts, open space zoning, and transfer/purchase of development rights to protect agricultural lands.

**ER-10 Utilize Regional and municipal resources to promote conservation and agricultural land easements.**

Create online and printed municipal and Regional information banks for landowners to learn about easement programs and their benefits. Host educational events and showcase model examples and programs.

# CHAPTER FIVE – ENERGY CONSERVATION PLAN

Energy conservation is a necessary component of environmental sustainability. This Chapter focuses on methods of achieving greater efficiency and cleaner sources of energy generation for electricity, heating and transportation in order to reduce pollution, limit the depletion of and dependency on finite resources, and lessen the impacts of carbon-induced climate change.

## 5.1 ENERGY CONSERVATION PLAN GOAL AND OBJECTIVES

Advance strategies and practices that reduce energy consumption and promote renewable and non-polluting energy sources. This goal is to be advanced through the pursuit of the following specific objectives:

1. Increase utilization of renewable energy systems.

2. Develop regulatory and/or incentive-based standards for energy efficient buildings and construction.

3. Coordinate development with transportation systems, and in particular mass transportation.

4. Maximize energy efficiency of transportation systems.

5. Promote an efficient and flexible electric grid that includes local and regional clean power generation.

## 5.2 RENEWABLE ENERGY SYSTEMS

There are a number of renewable energy systems that have practical application in the PRPC Region. These systems provide substantial benefits in terms of reduced demand on polluting and nonrenewable resources, while providing mid-term to long-term economic advantages to residences and businesses. If State and Federal incentive programs are re-funded and augmented, the use of renewable energy and all of its attendant benefits will be dramatically increased.

### Solar Energy

Solar energy is derived from the sun's radiation and is classified as active or passive. Passive solar relies on building technologies that utilize thermal mass, orientation, light dispersal/absorption, and convection, and is discussed further in section 5.3. Active solar creates electricity or heats water. Because solar water heating applications are typically most practical at latitudes lower than 40 degrees, this section deals with solar electricity generation.

In the last two decades, photovoltaics (PV), also known as solar PV, has evolved from a pure niche market of small scale applications towards becoming a mainstream electricity source. It works through solar cells that convert light directly into electricity using the photoelectric effect. With rapid advances in solar panel and battery storage technology, solar electricity generation is becoming increasingly affordable and practical at small to large scale, and is expected to be the world's leading source of electricity production by 2050.

Figure 5-1 demonstrates that available solar resource in the PRPC Region is significant, with solar potential of up to 4.4 kWh/square meter/day. In practice, current solar panels currently produce about 15 watts per square foot, or about 265 watts per typical 65 inch by 39 inch panel. According to Philadelphia Electric Company (PECO), average electrical demand is approximately 17 kWh per day. Thus, even small solar panel arrays can produce a significant amount of needed electricity.

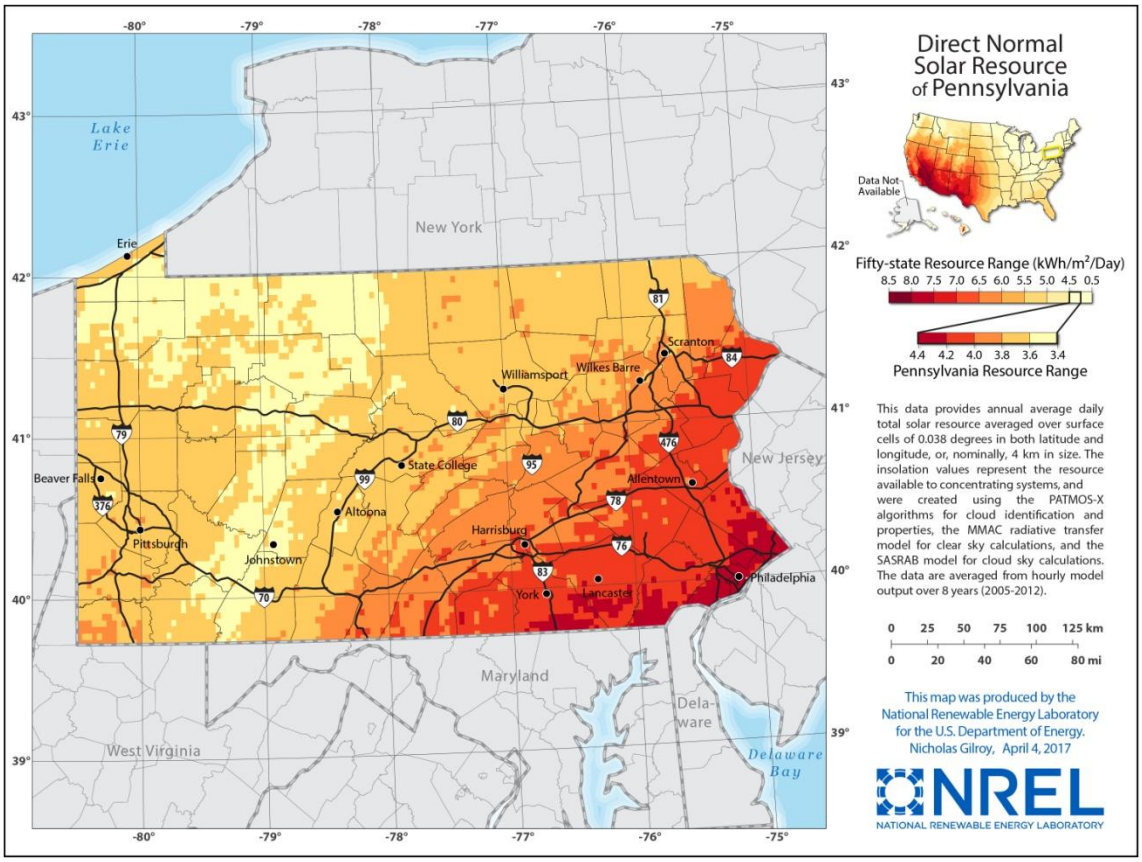



Figure 5-1. Solar Energy Potential in Pennsylvania

Also contributing to increasing practicality of solar electrical systems is dramatically improving battery storage technology. Current battery systems capable of sustaining typical residential demand over a period of days cost only slightly more than fossil fuel powered generator systems, and their cost is expected to decrease rapidly as their function improves.

Government incentives make solar PV systems more affordable to residences and businesses. There is currently a significant federal tax credit that would cover 15-20% of the system installation cost. In addition, Pennsylvania has a solar rebate program, although it is presently unfunded by the legislature.

Another alternative available to homes and businesses is leasing a PV system, whereby an individual pays a fixed or variable monthly rate to a solar company who owns and installs the system. This eliminates the upfront cost for the user and typically results in modest cost savings on electricity to the home or business, while greatly reducing demand on the non-renewable fueled electrical grid.

Ground Source Heat Pumps

Ground source heat pumps (GSHPs) are wells in the soil that greatly increase the efficiency of heating and cooling (HVAC) systems by providing an ambient heat source or sink with higher moisture content and more constant and moderate temperature than air sourced heat pumps. Since heating and cooling typically consumes up to 50% of residential energy demand, these systems can greatly save on cost and reduce environmental impacts over conventional fossil fuel or electrical systems. In fact, GSHPs are recognized as among the most efficient technologies for HVAC and water heating.

Installation costs for GSHP's are two or three times higher than for conventional systems, but this difference is returned in energy savings over a period of three to ten years, depending on comparisons with radiant electrical, oil, or natural gas. The working life of GSHP systems is estimated at 25 years for inside components and over 50 years for the ground source loops, so they are considerably more durable than conventional HVAC systems, which represents another source of savings in terms of cost and environmental impact. The return on investment period can be considerably shortened through Federal and State incentive programs.

Wind Energy

Wind energy consists of turbines of various sizes and designs that power electrical generators. It is a significant source of electricity in many parts of the world and the United States. Southeastern Pennsylvania, including the PRPC Region is marginal for wind power production in comparison with other parts of the State, as illustrated in figure 5-2. Thus, this discussion focuses on site specific application of wind power, as opposed to large commercial wind farms.

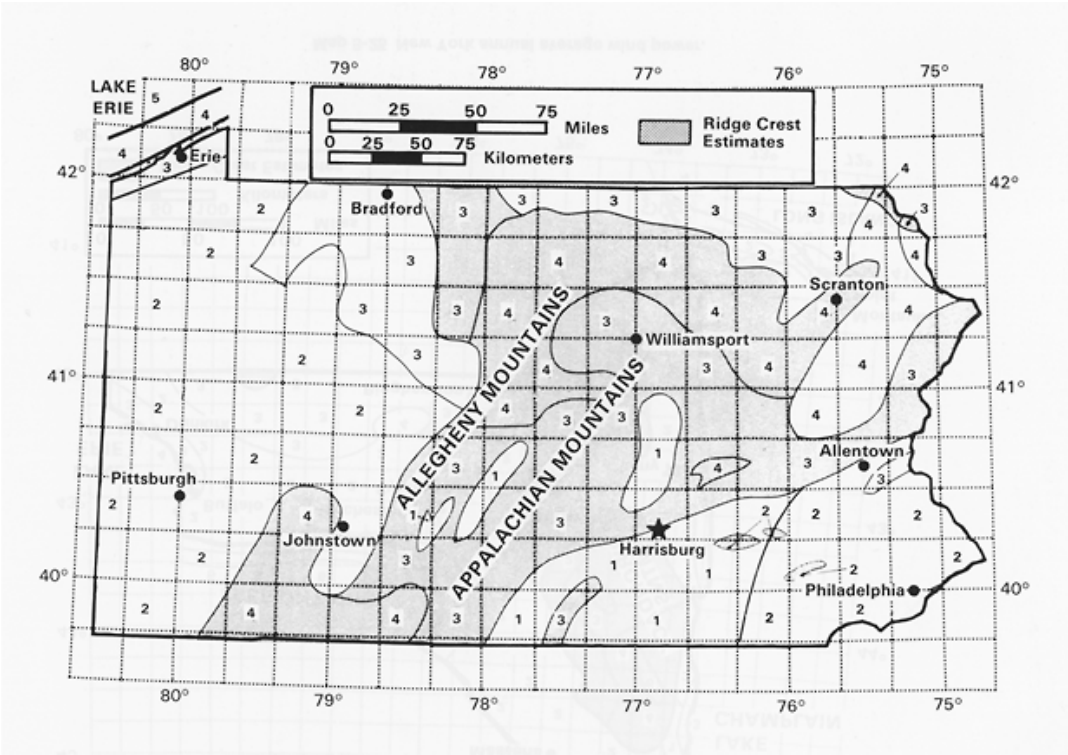



Figure 5-2. Wind Energy Potential in Pennsylvania. Wind power classes 3 and 4 are suitable, class 2 is marginal, and class 1 is generally unsuitable.

Wind power has historically been used in agricultural settings in southeastern Pennsylvania, and advances in turbine and generator efficiency have enabled this source to continue in farm and residential applications. As with solar, improved battery storage technology and cost have increased the capacity to utilize wind power.

Unfortunately, previous State and Federal wind energy tax credit programs for onsite wind power for residential and business application have been expired. Nonetheless, wind energy remains a technologically feasible supplemental power source for this region, if one is able to absorb a lengthy period of return on investment.

## 5.3 ENERGY EFFICIENT CONSTRUCTION

Energy efficient building layout and construction has been part of traditional building practices worldwide since the beginnings of civilization. However, with the advent of industrial age technology that produced cheap and abundant energy and economic systems that conceal costs through externalization, practices changed to favor a consumer-based method of development. The 20th century way of development has needlessly consumed resources, and has resulted in throwaway buildings and landscapes that become blight when their design lives of a scant few decades is exhausted.

This section explores technologies that reduce the environmental impacts of building and development, while improving livability, durability, and sustainability.

Recent advances in architecture, site planning, and consumer product certification have been created to encourage building and development that is more energy efficient and environmentally friendly.

LEED Certification

Leadership in Energy and Environmental Design (LEED) Green Building Rating System, developed in 1998 by the U.S. Green Building Council, provides a suite of standards for environmentally sustainable construction. It has since become a standard throughout the U.S. Practices that attain points on the LEED certification scale include such measures as:

- Siting to achieve passive or active solar benefit
- Thermal massing
- High performance insulation for walls, roofs, doors, and windows
- High efficiency HVAC and mechanical systems
- Renewable source energy
- Use of recycled and renewable building materials

SITES Certification

SITES is a sustainability-focused framework developed in 2009 that encourages landscape architects, engineers, planners, architects and other designers toward practices that protect ecosystems and enhance the mosaic of benefits they provide, such as climate regulation, carbon storage and flood mitigation. SITES is the culmination of work by leading professionals in the fields of soil, water, vegetation, materials and human health. Administered by Green Business Certification Inc. (GBCI), SITES offers a comprehensive rating system designed to distinguish sustainable landscapes, measure their performance and elevate their value. SITES certification is for development projects located on sites

with or without buildings—ranging from national parks to corporate campuses, streetscapes to homes, and more. (Source – Sustainable Sites Initiative, 2017) SITES is a points-based system that emphasizes performance objectives over specific practices. Typical measures consistent with SITES certification would include:

- Stormwater water quality and infiltration practices, such as rain gardens, meadows, level spreaders, riparian buffers, green roofs
- Habitat protection and enhancement
- Pervious paving surfaces
- Recycled, locally sourced, and sustainable building materials
- Coordination with mass and multi-modal transit
- Renewable energy
- Water conservation
- Soil management
- Pedestrian accessibility and interconnections
- Operations, maintenance, monitoring, and stewardship

Energy Star

Energy Star, created in 1992, is an international standard for energy efficient consumer products including computer products, kitchen appliances, buildings, and others. Energy Star certified products typically reduce energy by between 20 and 30 percent as compared to those that are non-certified.

## 5.4 RECYCLING, REDEVELOPMENT, AND REDUCED RESOURCE USE

Recycling

Recycling requirements were established by PA Act 101, The Municipal Waste Planning Recycling and Waste Reduction Act adopted in 1988. Each municipality within the Region works to comply with these requirements in varying ways. Opportunities to expand local recycling programs should be encouraged. Opportunities such as composting food waste should be pursued.

Redevelopment

Encourage redevelopment of vacant and underutilized parcels located nears population centers

Reduced Use of Resources

The United States population continues to use natural resources at a higher rate per capita than most other countries. Many opportunities exist to reduce the amount of resources used, but often a concerted effort to educate the population is required to help people change habits. Some examples of opportunities to reduce energy use include turning off lights in rooms when not being used, unplugging appliances and electronics when not in use, setting heating system slightly lower in the winter and wearing warmer clothes, washing clothes using cold water, insulating roofs and windows, and installing low-flow plumbing fixtures. Opportunities should be pursued to educate residents and businesses of the Region regarding ways to reduce energy and resource use.

## 5.5 TRANSPORTATION SYSTEMS

Transportation accounts for nearly 30% of total energy use in the US, and can therefore contribute significantly toward energy conservation efforts. Transportation planning will receive further attention in Chapter 10.

Transportation systems significantly impact energy use in our region. Single-occupancy vehicles account for the vast majority of commuting vehicles and miles driven. As summarized in the Chester County Landscapes2 Comprehensive Plan, the percent of employed residents who drove alone, based on the American Community Survey from 2008-2012, was 84-90 percent in East Pikeland and Schuylkill Township, 79-83 percent in Phoenixville and Charlestown Township, and 71-78 percent in West Vincent Township. As technology and innovation continue to develop, creative alternatives for reducing the miles driven by the single-occupant driver become available. Because much of the Region is developed at low densities, and is encouraged to remain that way through land use policies, a wide range of alternatives needs to be available residents. Mass transit that is feasible in the urbanized areas, may not be feasible in the rural areas where the population density does not support such services.

Within the Phoenixville Region there are organizations focused on transportation coordination between public sector transportation agencies and the Chester County business community. TMACC is a non-profit that was established in 1992 by the Pennsylvania Department of Transportation to serve as a liaison between public sector transportation agencies and the private sector on transportation issues affecting the Chester County business community. TMACC's focus is on Mobility Management and Sustainability through education, advocacy and special programs.

Another nonprofit doing work in the region advocating and promoting a viable transportation network for the region's economic vitality is the Greater Valley Forge Transportation Management Association (GVF). GVF is based in King of Prussia, but its mission is to achieve a desirable quality of life and a healthy, competitive economic environment by developing multi-faceted transportation strategies throughout the region.

Land Use Planning and Zoning Coordination

Local zoning and land development regulations provide opportunities to establish energy conservation standards and improved transportation systems for new development. Consideration of interconnections for both vehicles and pedestrians between existing and proposed development across municipal boundaries can be required in local ordinances to provide improved opportunities for people to make choices to reduce vehicle miles traveled and to choose to walk between businesses that are relatively nearby.

Mixed use development supports energy efficiency and a reduced impact on transportation systems by encouraging a mix of residential, commercial and office development in proximity to one another providing improved opportunities to walk or bike between uses. Coordinating zoning and requiring interconnections between mixed-use developments in adjacent municipalities supports such mixed-use areas.

Local ordinances can also be amended to require new development to provide bicycle storage and bicycle parking facilities near entrances to buildings, rather than remotely located on the property. Bicycle parking facilities should be covered, at a minimum, to protect bicycles from harsh weather. Walking facilities interconnecting to adjacent properties and trails should be provided to encourage walking to newly developed properties.

Consideration should also be given to requiring the dedication of a limited number of parking spaces to carpool/ridesharing.

Mass Transportation Planning and improvements

Mass transportation includes existing fixed route transportation systems typically consisting of buses, trolleys, and trains/rail service. In the Phoenixville Region mass transportation is currently limited to bus service, and this service is limited to Phoenixville, Schuylkill Township, Charlestown Township and East Pikeland Township. Phoenixville is served by two SEPTA bus routes, Route 99, which provides regular transit service between Royersford and King of Prussia including stops in Audubon and Norristown. Route 39 also serves Phoenixville, Schuylkill Township, and East Pikeland Township with stops along Route 724 in East Pikeland and stops along Route 23 in all three municipalities. The portion of Charlestown Township associated with the Great Valley Corporate Center is served by bus 206, which connects the Great Valley Corporate Center with the Paoli Train Station and points in-between. West Vincent Township does not have SEPTA service available.

SEPTA previously provided bus service between Phoenixville the Great Valley Corporate Center and the Paoli Rail Station, but ridership was low and the service was cancelled in 2014. Currently SEPTA Route 206 provides connection between the Great Valley Corporate Center and the Paoli Rail Station.

Providing transit opportunities throughout the region remains challenging because much of the Region is rural in nature and does not lend itself to opportunities for high volumes of riders outside the more urbanized areas. While increased frequency and coverage could help increase ridership, the SEPTA routes tend to be circuitous between major destinations such as Norristown and King of Prussia resulting in long commutes that are often not practical for employees who have other alternatives. Opportunities for express buses during peak hours should be considered.

Due to limited funding for mass transit, the amenities associated with bus stops tend to be minimal, further reducing the appeal of choosing transit. Improved amenities such as protected shelters at bus stops, bicycle parking, wifi on the buses, and more comfortable seating should be considered to increase ridership. Some amenities could be sponsored by the local municipality and/or businesses to make transit more appealing.

Rail Service

Phoenixville was served by commuter rail service until the 1980's when it was ended. Studies have been completed over the years to reestablish rail service between Phoenixville and Norristown, but adequate funding has not been allocated beyond conducting studies. The possibility of connecting Phoenixville with the Great Valley Corporate Center in Charlestown Township via rail was subsequently investigated, but again funding was not allocated and the project did not move forward.

Other Publicly Funded Transportation

While not having a fixed daily route, Rover Community Transportation is a transportation service available for residents throughout Chester County needing to travel within Chester County. While the service is available to anyone in Chester County, the emphasis is on providing a transportation alternative for Chester County seniors and disabled residents. The Rover transportation service is

subsidized for residents who are disabled, senior or who qualify for certain other government assistance programs. Residents who do not qualify for subsidies can use the service, but must pay the full rate which is dependent on the distance of the trip. Full price rates currently range from $11.75 (0- 4.99 miles) to $129.05 (41+ miles). To use Rover, a reservation must be made the prior day by 1 PM and routes may include picking up other passengers along the way to a destination. Given the high price for full-rate customers, Rover tends to be a better alternative for riders eligible for subsidies.

Because there is a fleet of vehicles associated with the Rover Community Transportation system already active in the Region, consideration should be given to potential partnerships between the Rover program and local employers to offer shuttle services between population and employment centers within the greater region.

Ride Sharing/Carpooling

Ridesharing or carpooling consists of two or more people with similar work schedules riding together to a similar area. Carpooling/ridesharing is typically done in a private vehicle and arrangements can vary from taking turns driving a private car, to compensating a driver for providing a ride. Challenges associated with carpooling/ridesharing including finding another person from your area with a similar commuting pattern and finding safe and secure meeting places from which to travel. Within the Region there are currently no park-and-ride parking lots to encourage ridesharing. Consideration should be given to identifying locations for park-and-ride lots in the Region to better improve opportunities for shared rides. Ridesharing websites exist, but without a better understanding by the general public how such an arrangement could work for them, it is often difficult for people to be willing to try such an alternative.

Alternative/Multimodal Transportation

Multi-modal transportation refers to a transportation system that involves various modes (walking, cycling, automobile, public transit, etc.) and connections among modes. To encourage use of multimodal transportation alternatives, the points of transition from one mode to another should support an easy, safe transition. This could range from waiting areas protected from harsh weather to adequate lighting and protected seating for people having to wait to adequate parking for cars or bicycles. As technology advances and innovative, energy efficient ways to get from one point to another are developed, municipalities within the Region should continue to find ways to encourage and support alternative mode of transportation.

Telecommuting

Telecommuting is a work arrangement that allows an employee to conduct work during any part of regular paid hours at an approved alternative worksite, such as at home. As technology improves and telecommuting becomes much more feasible for a wider range of businesses, telecommuting from home is a simple alternative that maximizes energy efficiency by eliminating the need to travel for work on the telecommuting days.

Complete Streets

Complete streets is a concept focused on requiring improvements within the public right-of-way to be designed and operated to enable safe access and passage for all users, including pedestrians, bicyclists,

motorists and transit riders of all ages and abilities. Municipalities are often challenged by developers requesting relief from certain aspects of complete street requirements due to an anticipated lack of pedestrian, transit or bicycle use. Granting such requests essentially eliminates the possibility of these alternative modes becoming established in the future. Granting such relief should be avoided. Throughout the Region gaps can be seen in the infrastructure for pedestrians and bicycles resulting in unsafe conditions for those who have no alternative to walking and bicycling. These gaps also discourage others from walking or bicycling due to the lack of safe facilities. Retrofitting rights-of-ways later to accommodate such infrastructure tends to be challenging and a significant financial burden to the tax payers within a community. Complete streets provide residents and employees with choices of alternative forms of transportation and enhance the livability of the Region.

Plug-in and Alternative Fuels

Significant progress has been made with plug-in car technology in the past several years, but challenges continue regarding public charging stations. According to resources available on the internet there are two charging stations within the Phoenixville Region, one at the Borough of Phoenixville municipal building and one at Main Line Animal Rescue on Route 113. However, according to Phoenixville Borough staff, the charging station at the Phoenixville municipal building was recently removed because the company servicing the unit went out of business. No plans are currently underway to replace that unit. Without charging stations in the Region, people with electric cars may be less likely to travel to the Region. Municipalities within the Region should consider opportunities to provide such stations at municipal buildings or encourage local businesses to provide charging stations.

## 5.6 ELECTRICITY GRID

The electricity grid system has traditionally been centralized. Centralized systems are typically dependent on a limited number of energy production facilities, utilizing energy sources such as natural gas, nuclear, or coal, which generates large quantities of electricity that is located a long distance from end-users resulting in transmission and distribution inefficiencies due to long distances required for distribution. Such systems are inefficient and vulnerable should the system be interrupted close to the source, resulting in the loss of power to a large area.

In an effort to reduce dependency on a centralized source of energy generation, distributed energy generation is playing a larger role in electricity distribution. A distributed energy system is one where there are multiple sources of energy production, both large and small. Sources of energy vary from wind turbines, solar panels, conventional fossil fuels and nuclear power plants. Transitioning to the distributed energy system provides opportunities for alternative sources of energy when one source becomes unavailable.

Support Modernized Grid

Within the Region the distributed energy system can be supported by encouraging new development to incorporate energy efficient technologies such as roof-mounted solar into development. Retrofitting existing buildings with solar also adds to the diversifications of the grid system.

## 5.7 LOCAL INITIATIVES

There are a number of actions that can be taken on the local level to advance energy conservation. These include regulatory strategies, municipal programs, and model projects.

Local and Community Regulations

PRPC municipalities should review local development and building codes to create incentives and eliminate barriers to energy conservation. Incentives could consist of various types of density bonuses for low impact design. Ordinances could be crafted in ways that walk applicants through various components and processes of green building, with established details and methodologies to expedite design and approval


Further, in order to promote sustainability through resource protection and energy conservation, it is critical that ordinances and rules made by local authorities and community associations do not counter these objectives. Municipalities should ensure that ordinance standards based on purely aesthetic or parochial concerns do not create unintended barriers to environmentally conscientious development, construction, or rehabilitation. In addition, where regulations are crafted with the intention of promoting the use of sustainable practices, permitting and cost hardships that would discourage those practices should not be invoked. Finally, community association covenants should be scrutinized to prevent the establishment of arbitrary and counterproductive prohibitions of sustainable practices.

Municipal Programs

Municipalities should advocate energy conservation throughout the community. These efforts can take a number of forms:

- Local recycling programs or participation in and expansion of existing regional programs
- Information gathering and dissemination through printed materials, public exhibits, and web content
- Implementation of sustainable practices at municipal facilities, such as LEED/SITES certification, stormwater/habitat projects, electric vehicle charging stations, and model projects using sustainable materials
- Use of alternative fuel and EV/hybrid vehicles
- Advocacy of multi-modal transportation
- Community fairs and events focused on energy and environmental sustainability
- Coordination with community and regional organizations dedicated to energy conservation

## 5.8 IMPLEMENTATION STRATEGIES

The following policy recommendations will implement the goals and objectives of the Energy Conservation Plan:

**EC-1 Assure that local ordinances promote use of renewable energy.**

Develop provisions to advance renewable technologies with straightforward processes and permitting, and eliminate provisions in the codes that act as deterrents. Emphasis should be placed on promoting solar PV and GSHP development.

**EC-2 Advocate use of energy efficient technologies in local building and development codes.**

Preferred practices should be advanced through simplified permitting and/or fee structures that favor those practices. Eliminate code provisions that prohibit or discourage sustainable building practices.

**EC-3 Establish guidelines for community associations to prevent arbitrary prohibitions of sustainable practices.**

Examples are aesthetically motivated outright prohibitions on solar panels, outdoor clothes lines, landscaping restrictions, etc. that are commonly found in community association covenants.

**EC-4 Create municipal resource centers for activities and information on energy conservation.**

Include energy conservation strategies for residents in utility bills or other forms of communication from municipalities to residents.

**EC-5 Create or expand municipal and/or regional recycling programs.**

Consider the development of food composting recycling programs within the region.

**EC-6 Develop municipal projects to serve as models of energy efficient practices for the community.**

Examples are sustainable building practices in municipal facilities, EV and high efficiency vehicles, multi-modal transportation and accessibility.

**EC-7 Continue to work with regional transit advocates and SEPTA to promote rail service to Phoenixville with stops in the Phoenixville Region as appropriate.**

**EC-8 Within the Region improve opportunities for residents to utilize alternative modes of transportation.**

Identify locations that can serve as park-and-ride facilities to better encourage carpooling and ride-sharing in the Region.

On municipal websites develop a list of resources for residents interested in ridesharing/carpooling.

Encourage SEPTA to provide incentives for those carpooling/ridesharing to rail stations by offering dedicated free or reduced parking for those carpooling.

Provide secure bicycle parking/storage at key multimodal locations to allow storage of bicycles while using another mode of transportation.

Have representatives of the Phoenixville Regional Planning Committee attend local meetings of community organizations such as Chambers of Commerce to promote opportunities for carpooling/ridesharing and other alternative transportation opportunities.

**EC-9 Encourage improved mass transportation service to the Region where feasible.**

Encourage SEPTA to develop express bus service to major destinations such as King of Prussia and Norristown during peak hours.

Work with SEPTA, other transportation organizations, municipal governments and local business organizations to promote available bus services, and newly proposed bus service, to residents and employees in the Region to improve ridership.

Encourage partnerships between SEPTA and large employers in the greater region to develop shuttles between population centers and major employers. Consider incorporation of the Rover vehicles as regular shuttle vehicles between key locations connecting population and employment centers.

**EC-10 Provide electric vehicle charging stations at municipal buildings and encourage local businesses to provide charging stations.**