



Township of

Solebury 
a natural choice

COMPREHENSIVE PLAN

SOLEBURY TOWNSHIP

BUCKS COUNTY, PENNSYLVANIA

December 16, 2014

COMPREHENSIVE PLAN SOLEBURY TOWNSHIP

Solebury Township Comprehensive Planning Committee

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Adopted December 16, 2014

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RESOLUTION NO. 2014-188

**A RESOLUTION OF THE BOARD OF SUPERVISORS OF
SOLEBURY TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA,
ADOPTING THE REVISED TOWNSHIP COMPREHENSIVE
PLAN.**

WHEREAS, the Pennsylvania Municipalities Planning Code ("MPC") requires that a Municipal Comprehensive Plan shall be reviewed at least every ten (10) years; and

WHEREAS, Solebury Township last adopted a comprehensive plan in 2002; and

WHEREAS, Bucks County Planning Commission under contract with the Township has prepared a revision to the Township's Comprehensive Plan; and

WHEREAS, the revised Comprehensive Plan has been reviewed by the Township Planning Commission and the Bucks County Planning Commission and both bodies recommend its adoption; and

WHEREAS, the Comprehensive Plan has been forwarded to the adjoining municipalities as well as the New Hope-Solebury School District for their review and comments; and

WHEREAS, pursuant to the MPC, the Board of Supervisors of Solebury Township have held a hearing on the below listed date to consider the adoption of the Comprehensive Plan; and

WHEREAS, the general public has set forth their comments concerning the Comprehensive Plan at the Board's hearing as well as other public meetings before Township bodies.

NOW THEREFORE IT IS HEREBY RESOLVED, by the Board of Supervisors of Solebury Township that the revised Township Comprehensive Plan is hereby adopted in full including all of the maps and charts set forth therein and all of the appendices attached thereto.

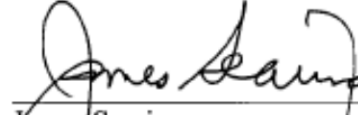
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SO RESOLVED THIS 16th day of December, A.D., 2014.

ATTEST:


Gretchen Rice, Secretary
Solebury Township

**SOLEBURY TOWNSHIP
BOARD OF SUPERVISORS**


James Searing


Paul Cosdon


Robert Heath


Edward McGahan



Helen Tai

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Chapter 1

INTRODUCTION

Solebury Township abounds with assets that inspire its residents and attract visitors from throughout the mid-Atlantic region. Residents enjoy a wide range of cultural, historic and natural resources. With gently rolling uplands, exquisite natural areas along stream valleys, scenic views of the Delaware River and canal, beautiful farmsteads, historic villages, good schools, abundant open space, parks, and recreation facilities, and proximity to major metropolitan areas, Solebury is an attractive blend of rural and suburban landscapes providing the feeling of living history. Perhaps the most important asset however is the character and commitment of its residents who recognize this special place and who work hard to protect, preserve and manage its natural and historic resources.

This Comprehensive Plan is the community's blueprint for preserving its resources and enhancing quality of life. It reflects the continued commitment by its residents to protect resources so that they are sustained for future generations of residents. The Comprehensive Plan outlines a set of strategies and measurable goals that recognize the limited nature of the resources and their vulnerability to unmanaged or unfocused growth. Sustaining the tangible and intangible features that make Solebury exceptional is dependent upon a comprehensive plan that can be used and referenced by any municipal official or resident interested in the future of the Solebury Township.

PENNSYLVANIA MUNICIPALITIES PLANNING CODE

Pennsylvania law has long recognized the comprehensive plan as an important land use tool. The legal basis for municipalities adopting comprehensive plans was established in 1968 when the Pennsylvania Municipalities Planning Code was enacted. The *Pennsylvania Municipalities Planning Code*, Section 301, sets forth the requirements for preparation of a comprehensive plan. The plan will typically contain a statement of community development objectives, which are goals and objectives for future development; a land use plan, which is a guide for the future development, redevelopment, conversion, and preservation of land; a community facilities plan; a plan for meeting the housing needs of present and future residents; a circulation plan

for the movement of people and goods; a statement of the interrelationships among the plan components; a discussion of short- and long-range plan implementation strategy; a statement indicating the relationship of existing and proposed development to development and plans in adjoining municipalities, to the objectives and plans for development in the county, and to regional trends; a plan for protecting natural and historic resources; and a water supply element.

A review of State statutes and case law was undertaken to ensure that recommended planning concepts and management strategies developed for Solebury are legally defensible and sound. The State Constitution entitles residents of Pennsylvania residents to a high quality environment, free of pollutants and absent of significant threats to public health, safety and welfare. Authority and responsibility to sustain a high quality environment and quality of life is delegated, to a large extent, to local municipalities by the Municipalities Planning Code. Courts have specifically said that the municipality has a responsibility to protect limited resources, natural or man-made. The courts have also said that the municipality must plan for its existing and future residents.

This updated plan addresses the requirements of the *Pennsylvania Municipalities Planning Code* and is consistent with applicable laws, the *Bucks County Comprehensive Plan*, and the plans of adjacent communities.

SOLEBURY TOWNSHIP'S COMPREHENSIVE PLAN

In updating and refining the Comprehensive Plan, the Comprehensive Plan Committee asked fundamental questions which served as the starting point for the committee which drew up the previous plan:

1. **Where is Solebury today?** What are its characteristics, both favorable and unfavorable? To answer this question, the plan contains information and data about the municipality's natural environment, man-made features, development patterns, and population trends, as well as survey results.
2. **Where is Solebury going?** What are the trends, forces, and development pressures both within and beyond the township that will affect our future and what can we learn about our ability to predict by comparing past assumptions to reality from the last comprehensive plan?

The plan looks at the probable future condition of the township by considering the development trends, population and development impact from surrounding areas, new technologies, state and federal policies leading to better use of natural resources (e.g., energy and waste management), and the anticipated needs of current and new residents.

3. **Where does Solebury want to be in the future?** What are the measured and achievable goals for Solebury as established by its residents? The plan contains goals and objectives based on the feedback from the residents and public meetings.
4. **How does the township reach its goals?** What steps need to be taken to achieve the future that we want for the community?

The Comprehensive Plan is a guide for the future, providing a strategy for the community to grow in its chosen direction. This plan is the basis for managing the future by providing a foundation on which all of the community's ordinances and planning process should be based.

PREVIOUS COMPREHENSIVE PLANS

Previous plans have taken different forms and reflect the sophistication of and pressures faced by the community. The earliest plans grew out of a gradual recognition that the area was undergoing a noticeable development spurt in the mid-1970s. The 1975 plan was brief and very general. As growth and development pressures accelerated, subsequent plans became more detailed and focused on how to address those pressures. The 1990 plan substantially revised and expanded the previous plan, reflecting the community's increased awareness of the Township's finite and valuable assets, and how the health, safety, and welfare of Solebury residents are dependent upon them. While recognizing that new development is inevitable, it set forth ways to protect the township's assets by emphasizing managed growth.

The 2002 Plan incorporated the concept of Sustainability, that the level and type of growth must be consistent with the ability of the township's natural resources to support and sustain it. In particular, that plan emphasized the protection and enhancement of the community's water resources.

This 2014 Comprehensive Plan is an evolution and expansion of the 2002 Comprehensive Plan. It reaffirms that commitment to a Sustainable Community, where the underlying principle of land use determination is to maintain, restore or enhance the natural and historical character of the township.

NEED FOR NEW COMPREHENSIVE PLAN – 2014

The need for this new Comprehensive Plan revision was based on several factors:

- In accordance with the Pennsylvania Municipalities Planning Code, a Plan should be reviewed and updated every 10 years to reflect current needs and community input.
- Substantial progress has been made in addressing the recommendations of the 2002 plan, and it is time to document progress made.
- Ten years have passed since a survey of township residents was conducted. The information collected in 2002 provided valuable guidance to the Board of Supervisors on township residents' priorities and concerns.
- New U.S. Census data is available and should be included in the update. The 2002 plan was based on a projected population increase of 16 percent, or about 500 new housing units; however, actual growth between 2000 and 2010 was 12 percent. The narrative and statistics are updated to reflect any housing and population shifts.
- The proposal to build a four-lane highway was a major concern in 2002, but this has been resolved with the construction of a two-lane parkway in accordance with a design developed with input from Solebury Township.
- The Plan reflects the preservation accomplishments since 2002, in open space, parks, and recreation, as well as issues associated with the future of farmland, farm markets, and open space uses.
- Work done on water resources by groups such as local watershed associations are included in background information and used to set development policies.
- Floods along the Delaware River have occurred repeatedly and at greater intensity over the last decade and the challenges of reducing flooding and storm damage are discussed in the Plan.

- Sustainability Indicators were developed for each of the policy areas. A plan update provides an opportunity to review them and see how the township performed by measuring progress against the indicators.

The objective is to revise the Comprehensive Plan based on updated data and utilize the full range of planning tools to minimize the impacts of land use changes and development consistent with the vision and goals of Solebury Township.

HOW THE COMPREHENSIVE PLAN WAS PREPARED

COMPREHENSIVE PLAN REVIEW COMMITTEE WAS ESTABLISHED

The Board of Supervisors appointed a Comprehensive Plan Review Committee in 2012, consisting of members from boards within the township, citizen volunteers and two liaisons from the Board of Supervisors. The purpose of the Committee was to review and update the Comprehensive Plan, and to provide recommendations for the plan's implementation consistent with the stated goals and objectives. This Committee's organization was developed to ensure communication and feedback from residents involved in township management activities throughout the process of plan revision and subsequent development of proposed ordinance revisions. The township sought assistance from the Bucks County Planning Commission to prepare a plan.

A resident survey was conducted. Goals, objectives, principles and policies from the 2002 plan were examined and reaffirmed or revised as determined by public input and consensus of the Committee members. New issues were addressed and added as appropriate. Information provided from the Bucks County Planning Commission provided additional perspective to the Committee on planning and environmental issues and management options that were incorporated into the updated Plan.

Copies of the Draft Plan were made available for public review and comment prior to the advertised public hearing and plan adoption.

COMMUNITY PARTICIPATION IN PREPARING THE COMPREHENSIVE PLAN

Together the Committee members represent a cross-section of the township residents. Committee members recognized that they were selected based on some particular expertise or experience with planning. The Committee actively sought community

input throughout the process to ensure the plan emerges from the collective vision of the community, facilitated by the Committee.

Press Release Prepared – The Committee prepared a press release announcing the Committee’s formation, its objectives, and need for public input. Several local newspapers and the township newsletter published articles about the process of revising the Comprehensive Plan.

Resident Survey Conducted – The Committee conducted a survey of the views of residents on planning related issues. Forty-three (43%) percent of all households, or 1,700 households, completed the survey, which was mailed to property owners and made available on the township website and at the township building.

Survey Results – A summary of the survey results is provided below. A more detailed summary of the survey and results is located in Appendix A and a copy is also available at the township building.

- Nearly one-half of the survey respondents have lived in Solebury for more than 15 years, 41 percent have resided in the township between 5 and 15 years, and 11 percent moved into the township within the last 5 years.
- Of the surveys received, 39 percent of the total household members are seniors (55 years or older). Twenty-four (24%) percent of the household members are under 20 years old. Young adults (20 to 35 years) make up 8 percent of the respondents’ household members and one or more adults (36-54 years) comprise 29 percent of the household members.
- Approximately 73 percent of respondents indicate that they are served by on-lot water supply and sewerage facilities.
- About one-half of the respondents reside in the central portion of the township between Upper York and Stoney Hill roads, one-third reside in the area north of Upper York Road and 14 percent reside south of Stoney Hill Road.
- One-half of respondent’s household members work outside of the Solebury/New Hope area, about 20 percent are retired, 18 percent work at home, and nearly 12 percent work in the Solebury/New Hope area.

- Of those employed, 70 percent travel 30 miles or less to worksite. However, it takes more than 30 minutes for 55 percent of those employed to get to their worksite and more than one-quarter travel for more than 51 minutes.
- About 22 percent of respondents had applied for a subdivision, land development or building permits within the last 5 years. Of those respondents, more than 60 percent were satisfied with the process and ordinances.
- *Open space/scenic beauty* and *rural setting* were selected the most often out of the nine choices provided for the reason the resident chooses to live in Solebury. The third most often selected choice was *Quality of schools*, followed by *Type of home*, *Housing value*, and *Taxes*.
- Out of 17 policy options provided, the overall top priorities were *Retention of rural character* and *Natural resources protection*. This was followed by *Taxes*, *Agricultural/open space preservation*, *Conservation of a quality water supply*, *Protection of historic sites and resources* and *Recreation opportunities*.
- *Wildlife management*, *Traffic management and Road improvements*, and *Park/recreation areas* were among the top responses selected for what is lacking or needed in Solebury. These choices were followed by *Senior citizen needs*, and *Library facility*.
- Specifically related to recreation, of the twelve selections provided, residents identified the need for more *Hiking Trails/Bike Paths* and *Additional Access to the Canal/Towpath* as the top two priorities. These were followed by *Sidewalks along roadways*, *River access for boating and fishing*, and a *Community center*.
- Support for planning to address the protection of the township's water supply was favored by 74 percent with approximately 23 percent of the respondents indicating the need for more information.
- Support for the continued protection of open space and farmland through the purchase of open space and easements was also supported by more than 73 percent of the respondents.

COMPREHENSIVE PLAN REVIEW OF PLANNING STRATEGIES

The Committee reviewed strategies that promote sustainability to manage, protect, and restore water resources and ecosystems and that promote the local food supply,

conserve energy, and preserve other important resources such as historic and scenic landscapes.

The Committee sought a balance between growth/land use and the limited or sensitive resources found throughout the township. Solebury's capacity for growth must not be exceeded by future demand, locally within the township or cumulatively over a larger portion of the township. Where capacity is exceeded, there will be an unacceptable adverse impact to the environmental quality and quality of life; natural and human resources will be diminished and not sustained for future generations. The Committee focused on policies and methods that would sustain a balance where it has been adversely impacted by previous growth, and then maintain that balance into the future.

THE COMPREHENSIVE PLAN AS A LIVING DOCUMENT

The written Comprehensive Plan is just a start. It is the foundation for attaining the goals and policies established within the plan, which can be realized only with the support of Township government, commissions, boards and committees, businesses, residents, and community organizations.

The purpose of updating the plan is to prepare a comprehensive planning document that will be used as intended, acting as a continually-accessed resource for the Board of Supervisors, the Planning Commission, and other groups within Solebury to guide their actions in attaining the community's goals. It presents a strategy to guide public officials and the private sector in making decisions that will assure that the Township will continue to be an attractive place in which to live and work. This Comprehensive Plan is not an ordinance or regulation, but is a basis for proposing regulations and pursuing specific functional studies and plans to implement the recommendations and policies established. Any future new ordinances and policies should be consistent with the principles set forth in this plan.

NEED FOR CONTINUING PLANNING

Planning is an ongoing process. This Comprehensive Plan must be continually reviewed in light of development trends, the state of the economy, unforeseen influences, changes in community goals, and the continued appropriateness of the plan's objectives, policies, and implementation programs.

Chapter 2

COMMUNITY VISION AND OBJECTIVES – A SUSTAINABLE COMMUNITY

The 2002 Comprehensive Plan emphasized a Sustainable Community and Sustainable Development philosophy and identified goals to establish and maintain sustainability. A sustainable community is most often defined as one that meets the needs of the present without comprising the ability of future generations to meet their own needs. Sustainability recognizes that natural resources and systems are essential to providing both economic benefits and improving the quality of life. Sustainability is broad in nature and links the issues of environment, economy, and social equity together. Sustainable communities are characterized by:

- Recognition of the interface between the natural and built environments
- Resource conservation
- Promotion of renewable energy
- A focus on improving community health and quality of life
- Local food production
- Waste reduction

The direction of the previous plan was to maintain, restore or enhance the natural and historical character of the township. Township land use planning and regulatory tools – the Zoning Ordinance, Subdivision and Land Development Ordinance, Stormwater Management Ordinance and Act 537 Sewage Facilities Plan – have been revised and amended to reflect these goals. Through these implementation steps and actions, Solebury has advanced toward achieving its goals.

The 2014 Comprehensive Plan acknowledges the need to further familiarize the concept of Sustainable Development at all levels by integrating environmental, economic, and social aspects and recognizing their interdependency, so as to achieve sustainable development in all its dimensions. Sustainability can only be achieved with a broad alliance of people, governments, community organizations, private sector, and residents all working together to secure the community's future for present and future

generations. The township encouraged public input and involvement of its residents in formulating this Comprehensive Plan through a community survey, multiple public meetings, and required formal meetings and public hearing.

The survey responses indicate that Solebury is special to those who live here. Residents have expressed their strong desire to retain and protect the rural character, natural resources, and open spaces as the township addresses current and future land use issues.

REGIONAL TRENDS AFFECT SOLEBURY TOWNSHIP

A number of township issues are influenced by changing global and regional conditions that affect the community. These include climate change, suburban sprawl, fragmentation of woodlands and open space, depletion of the quality and quantity of ground water resources, increases in stormwater runoff and flooding, stream quality degradation, school budget increases and tax shortfalls, and ever-increasing traffic congestion.

SOLEBURY'S VISION

A vision functioning as an overarching goal for Solebury has been reviewed and derived from this community-wide participation. The resident survey and public meetings have played a key role in shaping the community vision for implementing the various components of the Comprehensive Plan. The Vision Statement embraces the qualities deemed most important to residents.

SOLEBURY TOWNSHIP VISION STATEMENT

It is our choice to protect and preserve the beauty, unique character and natural resources of Solebury Township for our residents, both now and in the future.

While balancing the rights of the individual property owner with the good of the community as a whole, we will manage growth to promote sustainability of our natural resources, preserve our land, and protect and revere our historic heritage.

GUIDING PRINCIPLES FOR A SUSTAINABLE COMMUNITY

Solebury recognizes that a healthy environment, strong economy, and viable community social structure are not in conflict but are mutually dependent upon one another. It bases its vision on the goals of its residents, with the support of the goals, policies, and positions and proclamations of the Commonwealth (see Appendix B). The community has also expressed goals and policies consistent with county and regional policies and goals. The township will pursue its goal toward becoming a Sustainable Community.

Four key characteristics of sustainability include:

- Equitable sharing of resources among the current and future generations;
- Protecting and living within the natural carrying capacity;¹
- Minimization of natural resource use; and
- Satisfaction of basic human needs.

GOALS FOR A SUSTAINABLE COMMUNITY

The Comprehensive Plan identifies goals to establish and maintain a Sustainable Community. The distribution and nature of land uses must maintain, restore or enhance the natural and historical character of the township. Goals of the Plan are similar to those from the 2002 Comprehensive Plan and include the following:

PROTECTING THE NATURAL ENVIRONMENT AND OUR RESOURCES

- Conserve, protect and restore the rural setting and natural landscapes of Solebury Township, including woodlands, wetlands, floodplains, streams and riparian buffer/corridors, meadows and hedgerows, providing a healthy living environment for people, plants and animals.
- Conserve agriculture, agricultural lands, and soil resources by controlling growth, preserving farmland, minimizing soil disturbance, restoring disturbed

¹ Carrying capacity is generally defined as the amount of activity or use that can be handled by a system before it begins to deteriorate. Another way to describe carrying capacity is determining how much use a given location can absorb, before unacceptable impacts occur.

land and preventing accelerated erosion, especially in highly valued and sensitive areas such as on prime agricultural land and steep slopes.

- Conserve and enhance natural vegetative cover to promote conservation of soil, water resources, and animal habitats.
- Conserve, protect and enhance the quality and quantity of ground water resources for reasonable uses by the residents.
- Maintain, restore, and enhance the quality of Solebury waterways through the prevention of degradation from increased sediment loading, increased storm flows and decreased ground water discharges during low flow periods. Post-development runoff volumes from any land area should be minimized in relation to pre-development runoff, with permitted levels of impact related to the sensitivity of specific resource areas, such as Special Protection Waters, headwaters areas, and first order streams.
- Maintain the water budget on individual properties and throughout the township. To ensure protection of ground water resources and the processing capacity of subsurface soils for wastewater renovation, the volume of ground water recharge over any specific area must be maintained at predevelopment levels to the maximum extent feasible, through a combination of best management or engineering practices.
- Protect, establish and maintain greenways and open space corridors as natural linkages between and among open spaces and developed areas, allowing people, plants and animals opportunities to thrive and move through the diverse landscapes of Solebury Township.
- Establish baseline measures for monitoring progress toward the township's sustainability goals.

PROTECTING UNIQUE HISTORY AND CULTURE OF SOLEBURY

- Protect and promote the maintenance and continued economic viability of historic and cultural resources, including Solebury's villages and scenic landscapes.

ACCOMMODATING DEVELOPMENT IN A SUSTAINABLE MANNER AND ACHIEVING COMMUNITY BALANCE

- Maintain the flow of local traffic through a combination of traffic management techniques that protect the safety of residents as well as the scenic nature of the township roadways.
- Review and refine township land use planning and regulatory tools to promote patterns of activity and conservation that facilitate achievement of these goals, including the Zoning Ordinance, the Subdivision and Land Development Ordinance, the Park and Recreation Plan, Open Space Plan, the Act 537 Sewage Facilities Plan and its relationship with the Bucks County Water and Sewer Authority (BCWSA).
- Promote sustainable development that is designed to (1) conserve, maintain and enhance natural and cultural resources while providing opportunities to implement community development objectives and meet any future housing needs, (2) encourage energy efficiency and green technology to reduce carbon footprint, (3) minimize traffic impacts and encourage pedestrian travel and bicycling, (4) minimize impacts on public welfare, such as unreasonable increased demands on public services and schools, (5) ensure wastewater disposal services can be maintained indefinitely on any developed property, without endangering public health, safety and welfare, and avoiding discharge of wastewater directly to surface waters, and (6) ensure a reliable and safe source of water supply to sustain the water table of the township, preferably from water resources available on each property.
- Prevent cumulative impacts from new land use practices and infrastructure from diminishing the quality of life or property values of Solebury residents. Cumulative impacts result from the incremental impact of actions when added to other past, present, and reasonably foreseeable future actions, eventually resulting in adverse effects on water resources, wastewater management, solid waste, transportation, air quality, and stability of tax revenues in relation to budgetary needs.
- Maintain and develop needed community facilities accessible to all residents.

- Develop, maintain, and enhance parks and recreation facilities, preferably in proximity to where people live and that can be connected by public appropriate accessways or trails.
- Encourage development of a long term reclamation plan for sustainable use of land currently used for quarrying.

SUSTAINABILITY OBJECTIVES FORM THE FOUNDATION FOR THE PLAN

More specific objectives for achieving a sustainable community are developed from the broader goals.

AGRICULTURAL LANDS AND SOIL RESOURCES

- Protect agricultural lands from development, especially those with high percentages of prime agricultural soils.
- Support and strengthen the economic viability of farming activities including traditional farming operations and new agricultural trends that may arise in the industry.
- Encourage Integrated Pest Management (IPM), sustainable farming practices (permaculture) and reduced chemical usage.
- Minimize both the extent and intensity of soil disturbance and ensure appropriate restoration of any disturbed soil. Avoid soil exposure to concentrations of stormwater runoff, particularly on steep slopes, to prevent accelerated erosion of soils.
- Protect and maintain the processing capacity of wastewater in subsurface soils.

GEOLOGY

- Ensure that development is compatible with site-specific geologic conditions, particularly in limestone areas (Karst topography).
- Prevent ground water contamination in highly permeable limestone aquifers, particularly due to inappropriate placement of on-lot septic systems.
- Improve township knowledge and understanding of the location of Karst geology and the impacts of land use on the geologic conditions so that proper land use controls may be established.

WATER RESOURCES

- Work with state, federal and local government to minimize flooding impacts along the Delaware River and streams, and coordinate planning for the common purpose of eliminating flooding.
- Maintain, restore and enhance the quality and quantity of surface water and groundwater resources on a watershed basis (and overall) throughout the township, emphasizing the interconnectedness of water resources with other resources and with land use.
- Promote water resource management practices consistent with local stream quality designations; ensure maintenance of a water budget that can sustain current and reasonable future uses.
- Maintain or decrease volumes of stormwater runoff and peak flows at predevelopment levels.
- Maintain or improve the volume of ground water recharge at predevelopment volumes (for new development) and work to restore water quantity and quality affected by past development that did not meet that standard.
- Prevent the volume of ground water withdrawals from exceeding a safe (sustainable) yield.
- Ensure that water resource planning efforts reflect the unique issues associated with direct drainage into the Delaware Canal, the Delaware River, and other streams in the township.
- Manage the extension of water supplies, wastewater disposal, and stormwater systems to achieve the water resource conservation objectives discussed above.
- Seek ultimate conversion of wastewater and water services to means sustainable within the framework of the local water budget.
- Consider quantifying the water budget for each major watershed and periodically monitor changes.
- Consider improvements in stormwater management on existing systems through the permitting of new construction or changes to existing construction.

BIODIVERSITY

- Maintain and enhance local and township-wide biodiversity to provide a healthy living environment for people, plants and animals. Emphasize both preservation and restoration (including reforestation where appropriate) of a variety of natural landscapes/habitats, including woodlands, soils, successional lands (meadows, old fields, thickets), wetlands, springs and spring runs, streams and riparian corridors, ponds, the Delaware River and Canal, and specimen vegetation.
- Integrate the county's Natural Areas Initiative to enable preservation of critical natural areas through the township's Land Preservation Program.
- Provide for the restoration, maintenance, or enhancement of natural landscapes within development and infrastructure projects, seeking to prevent the destruction or fragmentation of notable or rare landscape features, and balancing unavoidable disturbance with enhancement of remaining landscape features, including stormwater management areas.
- Better manage and reduce deer population to protect the people, forests and plants, and natural habitats and resources that are identified in this Plan.
- Encourage programs to reduce or eliminate invasive plants and encourage planting of native vegetation.

SCENIC AND HISTORIC RESOURCES

- Conserve scenic landscapes to minimize development impacts wherever possible and mitigate impacts where not.
- Promote the conservation and continued economic viability of historical resources and their historical landscape integrity. Ensure that owners of historical properties are able to take advantage of conservation options and potential financial incentives.
- Promote realization of National Register status for individual properties and districts (Aquetong and Solebury) deemed eligible. Seek determination of eligibility for the National Register from the Pennsylvania Historical & Museum Commission for properties possessing architectural or historic significance

worthy of further study and for the other potential rural historic districts noted in this Plan.

RESIDENTIAL DEVELOPMENT

- Continue to allow for diverse housing types (single-family detached, twins, townhouses and multifamily) to accommodate any future housing in a balanced manner.
- Provide living options to meet the needs of the growing elderly population sector and to complement other efforts to mitigate the real estate tax impacts of conventional residential development.
- Focus residential development in the most appropriate locations, proximate to existing infrastructure, avoiding sprawl patterns, and consistent with conservation objectives. Coordinate diverse means to guide residential development pressure, including regulatory means and acquisition of conservation interests in open space lands.
- Consider implementing a preservation or incentive plan to encourage preservation of historic structures. This could include a voluntary landmark status program, alternative funding through state, federal or private sources and establishing tourism programs.

NONRESIDENTIAL (ECONOMIC) DEVELOPMENT

- Provide sufficient opportunities for nonresidential development to achieve balanced and sustainable land use, to help mitigate and balance the real estate tax impacts of conventional residential development, and to offer diverse economic activity, employment opportunities and commercial services that township residents desire.
- Encourage and support local and regional agriculture, artisans, businesses, institution and industry by strengthening connections and markets for local goods and services.
- Ensure design standards are appropriate to avoid sprawl and strip development patterns, mitigate aesthetic and environmental impacts, and provide development of diverse commercial and employment uses.

- Provide for the integration of limited commercial and special-use development opportunities within appropriate residential districts to offer basic commercial services close to home, carefully managed to minimize impacts to residential neighbors.
- Encourage the preservation and enhancement of historical buildings so that they can continue to be part of the township landscape.
- Encourage the reclamation of existing quarry operations for open space or recreational purposes or other sustainable economic use consistent with conservation and development objectives herein.
- Encourage small, diverse nonresidential businesses in the existing industrial and commercial zoning districts.

TRANSPORTATION AND CIRCULATION

- Seek to minimize the impacts of through-traffic originating outside the township on minor collector and local roads, especially those designated as scenic roads.
- Promote access management along all arterial and collector roads to minimize points of turning movement conflict, coordinating and channeling access from adjacent uses, and reducing the number of existing and substandard access points wherever feasible.
- Manage roadway improvements to balance improvement objectives with the intent to preserve scenic roadway character and to minimize negative impacts to wildlife habitat.
- Pursue alternative circulation opportunities, including bicycle and pedestrian links (trails and sidewalks), integrated with development site planning, to minimize need for vehicular trips and improve access for transportation dependent persons.
- Coordinate circulation planning efforts with neighboring municipalities to achieve township objectives.
- Coordinate circulation planning with land use planning so that land use decisions do not result in greater traffic or transportation burdens.

COMMUNITY FACILITIES AND SERVICES

- Provide adequate public facilities and the appropriate tools needed for township staff and departments to efficiently serve the public.
- Provide for development patterns and intensities that maximize use of current infrastructure and services, and minimize need for additional infrastructure development and increased services.
- Promote cost-effective and efficient community facilities and services to keep pace with and fulfill the changing needs of residents and businesses.

HAZARD MITIGATION

- Ensure new development is sited and constructed in a way to reduce impacts from potential hazards.
- Reduce the need for recovery efforts and costs associated with recovery, repair, and reconstruction through mitigation planning and practices.

PARKS, RECREATION, AND OPEN SPACE

- Pursue implementation of the recommendations of the current *Solebury Township Park and Recreation Plan* and the *Solebury Township Open Space Plan* in so far as they are consistent with this Plan.
- Advance the efforts of the township Land Preservation Program in continued pursuit of acquisition of conservation interests in open space lands.
- Focus conservation efforts in areas with significant natural, agricultural and cultural resource values to preclude potentially intense development in inappropriate locations and to complement regulatory approaches to mitigate development impacts throughout the township.
- Balance opportunities to provide for active and passive recreational pursuit and open space preservation with the habitat needs of wildlife and other resource protection objectives.

ENERGY CONSERVATION

- Reduce energy demand and decrease the utilization of non-renewable and consumptive sources of energy, and improve energy efficiency.

- Promote renewable energy resources consistent with the vision of sustainability of this Plan.

AIR QUALITY

- Consider measures to enhance air quality within the township working in concert with regional partners.

Chapter 3

COMMUNITY PROFILE AND BACKGROUND

POPULATION AND HOUSING

Solebury's population has fluctuated over the past 200 years for which data is available. In 1800, there were 1,524 residents of Solebury Township. In 1860 the population reached 3,014, and then steadily declined through 1930 when, at 1,564, it was almost as low as at the first census. Beginning in the 1940s and continuing to the present time, the population of Solebury has grown steadily, reflecting the township's evolving character and its proximity to the Philadelphia and New York metropolitan areas. Between 1960 and 2010, the population of Solebury Township has nearly tripled by adding a total of 5,720 people in the fifty-year period, an average gain of 115 people each year. The U.S. Census for 2010 shows Solebury's population at 8,692 persons.

Table 1
Solebury Township Population, 1960—2010

Year	Population	Density per Square Mile	Numerical Change	Percent Change
1960	2,972	110		
1970	3,547	131	+ 575	+ 19.4%
1980	4,827	178	+ 1,280	+ 36.1%
1990	5,998	221	+ 1,171	+ 24.3%
2000	7,743	286	+ 1,745	+ 29.1%
2010	8,692	322	+ 949	+ 12.3%

Source: U.S. Census

POPULATION CHARACTERISTICS

Similar to the region and the nation, the township's population has been aging, propelled by the baby boomers, members of the massive postwar generation born between 1946 and 1964, or those persons age 46 to 64 in 2010. Approximately 40 percent of the township's population in 2010 was in this age range, which had a direct bearing on the median age. The median age in the township in 2010 was 48.9 years, the oldest in Bucks County.

According to the U.S. Census, the number of children aged 19 and under accounted for 22.7 percent of the 2010 population; 19 percent of the population was school aged children (not including those under 5). Younger adults aged 20 to 29 made up 5.2 percent of the 2010 population, and the 30 to 44 age group comprised 14.4 percent of the township's population. Seniors age 65 and older accounted for almost 17 percent of the 2010 population.

The township should monitor these age groups in the township as they may affect the need for additional services and localized facilities in the future. For example, more area-wide employment opportunities and park and recreation facilities may be needed to attract or retain younger adults and families. Also, as the baby boomers move into the Senior category, the need for transportation, emergency aid, and social interaction and services may grow.

The population of Solebury is mostly white and native-born. The share of white residents was 94.3 percent, and residents born in the U.S. numbered 89.9 percent. The largest single minority racial group was Asian which represented 2.9 percent of the population. Black or African American (of any race), represented 0.9 percent of the population. Hispanics represented 2.7 percent of the population. The ancestry indicated most often was English (21.0 percent), Italian (19.5 percent), Irish (19.0 percent), and German (18.9 percent).

The number of households² in the township totaled 3,461 in 2010, and the median household size was 2.51. Household size has been declining nationwide in recent years due to later family formation, declining birth rates, rising divorce rates, and more people living alone. More than 63 percent of Solebury households were married couples, 28.8 percent of the households had at least one child under age 18, and 29.3 percent of the households had at least one member age 65 or older. Nearly 20 percent of the households were individuals living alone and nearly 7 percent were individuals over age 65 living alone.

Township residents had incomes and levels of educational attainment that were higher than those for the county as a whole. The median Solebury household income was

² A household is one or more persons living in a single housekeeping (dwelling) unit. A family household consists of a householder and one or more persons related to the householder by marriage, birth, or adoption.

\$116,364, the third highest for a municipality in the county. The median income for Bucks County was \$74,828. More than 98 percent of township residents over age 25 were high school graduates, and 62.9 percent held a bachelor's degree or higher. The educational attainment rate for Bucks was 91.9 percent of residents having earned a high school diploma with 34.5 percent having a bachelor's degree or higher. Solebury had the highest percentage of residents with graduate and professional degrees in the county.

In 2010, only 2.5 percent of the township labor force (population over age 16) was unemployed, the second lowest unemployment rate for a municipality in the county. Much of the labor force was employed in white-collar occupations, with 57.1 percent employed in management, business, science, and arts occupations and 29.3 percent in sales and office occupations. The industries that employed the Township labor force were primarily related to educational services, and health care and social services (23.2 percent), manufacturing (12.9 percent), or professional, scientific, and management, and administrative and waste management services (12.1 percent).

HOUSING CHARACTERISTICS

The number of dwelling units in Solebury has grown over the past 30 years, but the rate of units constructed per year has declined, as shown on the table below. Housing construction is expected to continue, but at a much lower rate due to less developable land available and less expensive alternatives found elsewhere, especially in the more urban areas where facilities are readily available.

Table 2
Dwelling Units³ in Solebury

Year	# Units	Unit Change	% Change
1980	1,744		
1990	2,503	759	43.5
2000	3,207	704	28.0
2010	3,747	540	16.8

³ Dwelling unit is defined as house, apartment, mobile home, a group of rooms, or a single room that is occupied (or if vacant, is intended for occupancy) as separate living quarters. Separate living quarters are those in which the occupants live and eat separately from any other persons in the building and which have direct access from the outside of the building or through a common hall.

While the single-family detached dwelling predominates, there are a number of other residential unit types in Solebury. In 2010, single-family detached housing accounted for nearly 80 percent (3,114 units) of the housing stock, while townhouses accounted for 14 percent (562 units) and multifamily units for 5 percent (200 units). The remaining units are twins/duplexes and mobile homes.

The housing stock in Solebury was largely constructed during the period from 1970 to 1999. These units represent 53.5 percent (2,090 units) of the total housing units. Only 16 percent (621 units) of the housing stock was constructed after 2000, and nearly 18 percent (698 units) was built before 1940. Of all the units in the township in 2010, nearly 90 percent were owner occupied, while housing occupied by renters accounted for 10 percent.

The cost of housing in Solebury reflects a number of factors, including proximity to regional employment centers, the desirable character of the community and its school system, and the housing market. The median value of owner-occupied housing in 2010 was \$565,900, the third highest median value in the county. The median rent was \$1,435 per month in 2010, the sixth highest median rent in the county.

FUTURE POPULATION AND HOUSING

Future growth of the township's population and housing stock is based in part on the vision of township officials and residents; policies on limited expansion of community facilities, retention of groundwater supplies, expansion of land preservation program; past development patterns; and land availability for future development.

Forecasts and projections from other sources are predicated on a continued outward expansion of urban and suburban growth, and do not consider important factors that will limit the population growth potential related to Solebury Township specifically. For instance, over time, there is less land available for development. Also, past development activity, as well as the township's open space conservation program, reduces the area that can be developed. Diminishing supply of land and the increasing cost of land may nudge development toward less costly areas beyond the bounds of Solebury that already contain public infrastructure to support growth.

In addition, the township is experiencing a slow pace of growth as shown by building permit and development proposal data. The U.S. Census estimates that building

permits for 587 dwelling units were issued in the township from 2000 through 2012. Building permits for more than 85 percent of those dwelling units (498 units) were issued from 2000 through 2003. Permits for only 89 dwelling units were issued in the 9 year period after (2004 through 2012).

Table 3
Dwelling Units Based on Recorded Building Permits, 2000-2012

2000-2003 Units	2004-2012 Units	2000-2012 Unit
498	89	587

At first glance, the downturn of building permits appears to reflect the national economic downturn and recession in 2008. Figures on development proposals, however, paint a somewhat different picture. Records from the Bucks County Planning Commission indicate that 748 dwelling units were proposed in the township from 1997 through 2013. Nearly 75 percent of those units (559) were initially proposed in 1997 and 1998. Only 189 units were proposed in the following 15 years (1999 through 2004). A substantial downturn was seen in the number of units proposed starting in 2004, with just 12 units proposed in 2004 and none in 2013. A total of only 16 units have been proposed since 2007.

The building permits issued from 2000 through 2003 are most likely associated with development proposed in 1997 and 1998. Moreover, there are some lots that have been approved over the past 15 years that have not been built upon, and in some cases lots may contain a form of conservation easement restricting them from further development. With the continuation of the Township's Land Preservation Program, fewer houses will be built.

Table 4
Proposed Dwelling Units, 1997-2013

1997-1998 Units	1999-2013 Units	2007-2013 Unit	1997-2013 Unit
559	189	16	748

Given these housing trends, this plan proposes to use a realistic and more conservative method of projecting housing needs that simulates population change based on extrapolating an estimated annual amount of building permits and estimated persons

per dwelling unit. The average number of dwelling units associated with building permits issued from 2004 through 2012 is approximately 10. This development pace would place Solebury in line with many other rural municipalities in Bucks County. Assuming this annual amount of dwelling units would be permitted and constructed, there would be an additional 150 units between 2010 and 2025 for a total projected housing of 3,897, a 4 percent increase.

Future population is determined by applying 2010 persons per dwelling unit rate of 2.32 to the projected 2025 housing⁴. The persons per dwelling unit rate accounts for a small percentage of the housing units that would be vacant. The resulting 2025 population projection or forecast would be 9,041, nearly a 350 person increase.

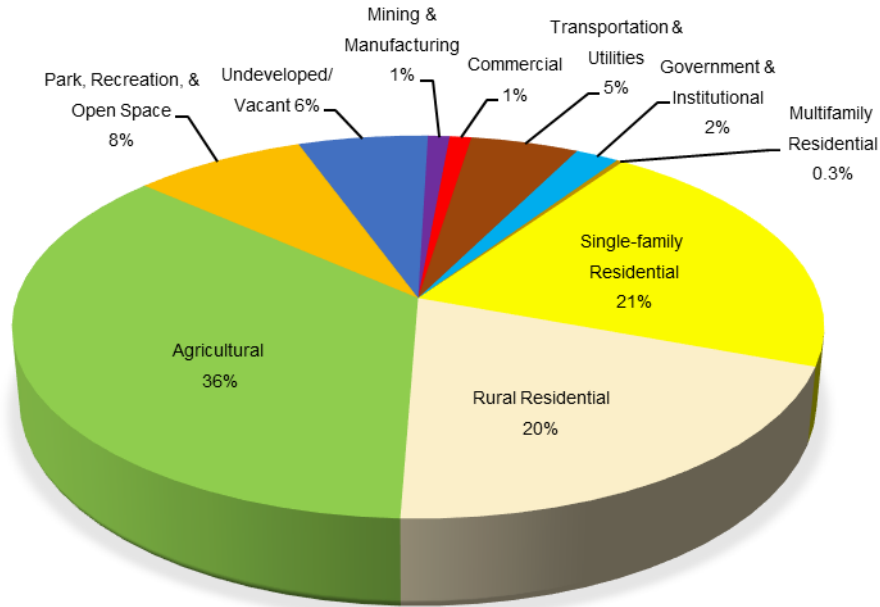
These projections assume no growth in seasonal homes or group homes. And it is noted that any projection of future growth is tentative and subject to a given set of assumptions holding true for a defined period of time and the constraints of the projection model employed.

EXISTING LAND USE/DEVELOPMENT PATTERNS

Solebury Township land area is 26.72 square miles or 17,102 acres. Existing land use patterns inventoried for the 2002 Comprehensive Plan were updated to reflect recent changes in land use. Sources for updated information included Bucks County Board of Assessment records, aerial photography, and knowledge of the planning committee and other township officials. Figure 1, and Map 1 Existing Land Use, illustrate the township's land uses by category.

⁴ The 2010 persons per dwelling unit (2.32) is calculated by dividing the 2010 population (8,692) by the number of housing units (3,747).

Figure 1
Solebury Township 2013 Land Use



Solebury Township continues to be predominantly rural, in spite of on-going suburban and exurban development. The underlying matrix of family farms and distinct village areas that characterize Solebury was determined by early agricultural and commercial activities over several centuries. Today, more than one-third of the land in the township remains agricultural; the majority of the remainder in single-family residential. Until recently, much if not most of the land in single-family residential use could still be characterized as rural, with relatively large lots and home sites tucked into the rural landscape. The residents of Solebury are concerned about protecting this character. While more than 50 percent of the respondents to the survey conducted as part of this comprehensive plan reported moving into the township within the last fifteen years, 43 percent of all respondents selected rural setting, open space, and scenic beauty as a principal reason for living in Solebury.

The rural landscape of Solebury is dotted with historical villages and crossroads hamlets. These include Aquetong, Carversville, Centre Bridge, Cottageville, Lumberville, Phillips Mill, and Solebury. An eighth hamlet-like cluster is found at Cuttalossa, essentially an extension of the village of Lumberville, and a ninth on Old Windy Bush

Road. The village of Lahaska in Buckingham Township also laps across the township line into Solebury. Some of Solebury's villages are clearly defined by natural or physical features; others have boundaries that are not so easily discerned. Villages and hamlets have evolved at relatively high densities and are critical elements in defining the overall rural character of the township.

Agricultural—Agricultural lands comprise more than 6,220 acres or more than a third of the land mass of Solebury Township. Land was considered agricultural wherever agriculture is a principal land use over broad landscapes, including lands with a residence on the same property, as well as areas of woodlots and old fields no longer farmed. Not included were woodlots, small tracts, or old fields that have been fragmented through subdivision and are no longer related to the original agricultural use.

Residential—Residential land uses account for more than 40 percent of Solebury Township, and fall into three subcategories - single family detached (including mobile home), multifamily, and rural residential. Single family detached and rural residential lots (single-family detached units on lots of 5 acres or more) dominate the housing stock. Mobile home uses are located on two small sites, one on Solebury Mountain Road and the other on the northwestern border adjacent to Plumstead.

Many ten-acre rural residential lots were created when there was a rural residency exemption from on-site wastewater disposal testing. Other residential types include single lots subdivided from larger properties and fully developed subdivision of large tracts of land. Residential development with smaller lot sizes have been strategically planned for and sited near New Hope where public infrastructure and amenities are situated. These multifamily and smaller single-family homes are concentrated in the area along Route 202 just west of the Borough and near Street Road at Lahaska. Smaller multifamily uses are found on Phillips Mill Road near the quarry, near Ingham Spring on Mountain Road, on Reeder Road, and Upper York Road, and Aquetong Road south of Peters Corner.

Government and Institutional—Under the general category of Government and Institutional land uses, there are four subcategories. These include land for government buildings or uses, religious uses, school or educational uses, and other tax-exempt uses. Examples include the municipal building on Sugan Road, the fire station, the Solebury

Elementary School, and several churches. Government and institutional uses comprise less than two percent of the total land area. Many additional institutional uses are also located nearby in New Hope.

Commercial—Hotels and motels, offices, restaurants, and retail establishments are included in this category and are concentrated along Route 202 west of New Hope Borough. A sewer tie-in to the Lambertville treatment plant set the stage for high-density residential and concentrated commercial development in this area. Other commercial uses are found on sites scattered throughout the township and are associated with the villages of Aquetong, Centre Bridge, Carversville, Lumberville, and Phillips Mill. Commercial uses also comprise less than two percent of the total land area.

Mining and Manufacturing—The major mining and manufacturing use in Solebury is the limestone quarry, located on Phillips Mills Road and covering 167 acres. Two other smaller industrial parcels are located along River Road. JDM Materials Co. extends into New Hope Borough at the access point to the Route 202 bridge to New Jersey. Delaware Quarries is located farther north just before Lumberville. These industrial uses comprise one percent of the total land area in the township.

Parks, Recreation and Open Space—Park, recreation, and open space lands include state, county, and municipal-owned properties, ranging from Bowman's Hill (Washington Crossing State Park) and the Delaware Canal, to Hal Clark Park, various township parks, and dedicated open space related to subdivisions. Parks, Recreation and Open Space occupy approximately eight percent of the total land area in the township. This category does not include preserved farmland.

Transportation and Utilities—Transportation and utility lines include roads, the New Hope & Ivyland Railroad, transmission corridors owned in fee, and the lands involved in the approaches to the Route 202 bridge to New Jersey. They total five percent of the township land area.

Undeveloped—Undeveloped or vacant land encompasses six percent of the total area of the township. These lands do not include buildings or land used for any other specific purpose including agricultural operations, although several small parcels (less than 5 acres in size) may be used at times for farming.

Chapter 4

NATURAL RESOURCE PROTECTION

Natural resources help define the character of the community and contribute significantly to the quality of life in Solebury. Resources such as geology, soils, forests, waterways, floodplains, wetlands, topography, and vegetation are natural elements that define Solebury. Understanding their importance guides land use planning and future development and can provide the framework within which more informed decisions are made regarding the accommodation of community needs. Flooding, water pollution, soil erosion, insufficient water supply and the loss of critical vegetation and habitat are a few of the consequences of development without regard to the natural environment.

The township has and will continue to place great importance on protecting valuable natural resources. And since resource protection issues transcend municipal boundary lines, the township's efforts will continue to be framed with a regional perspective, particularly where a regional view may translate into coordination of efforts with neighboring municipalities or the County.

State and federal regulations protect many of Pennsylvania's natural resources. Some of these regulations, such as those pertaining to wetlands protection, establish minimum protection standards that must be reflected in local government zoning ordinances. However, not all natural resources are protected by state or federal law.

The basis for local protection of natural resources is found in the Commonwealth's Constitution, in judicial decisions and in the *Pennsylvania Municipalities Planning Code* (MPC). In 1968, the Constitution was amended to state in Article 1, Section 27:

"The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic, and aesthetic values of the environment. Pennsylvania's public natural resources are common property of all people, including generations yet to come."

The MPC charges local governing bodies with the responsibility for protecting citizens' health, safety, and welfare through comprehensive planning and land use regulation.

Solebury's natural resources should be protected with the goal of achieving four elements of sustainability:

- Equitable sharing of resources among the current and future generations;
- Protecting and living within the natural carrying capacity;
- Minimization of natural resource use; and
- Satisfaction of basic human needs.

Important natural features and resources within the township are identified in the following section, along with a discussion of opportunities and strategies to promote natural resource protection.

GEOLOGY

The underlying geology is a major natural influence, affecting landforms and slopes, water supply, the quality and composition of soil, and, by extension, the suitability for human life. The geologic formations underlying Solebury lie in broad bands that continue across neighboring municipalities. Structural issues related to geology tend to be site specific, though from a regional planning perspective, the most critical geologic issues are related to groundwater quantity and quality.

There are eight geologic formations in Solebury Township - Stockton Sandstone; Allentown, Beekmantown and Leithsville Dolomitic Limestone; Brunswick Shale, Diabase Intrusions, Wisconsin Glacial Deposits, and Lockatong Argillite (see Map 3 Surface Geology).

STOCKTON SANDSTONE FORMATION

The Stockton formation, including a band of Stockton Conglomerate, underlies the northern third of the township and extends into Buckingham and also into neighboring Plumstead and Upper Makefield townships. The rolling fields seen along the northern end of Aquetong Road are characteristic of the Stockton formation. This formation is comprised of light-colored sandstone, arkosic sandstone, and conglomeratic sandstone. It also includes red to purplish-red sandstone, shale, and mudstone.

Groundwater supply from the Stockton Sandstone Formation is very good. Yields up to 300 gallons per minute have been obtained from wells drilled 500 feet deep. The

groundwater is of calcium bicarbonate type and of generally good quality. Surface drainage is very good.

The Stockton formation is considered to have the highest average permeability of any aquifer in Bucks County, although there is a wide range in specific permeabilities. The specific capacity of the Stockton ranges from 0.35 to 44 gallons per minute per foot.

ALLENTOWN, BEEKMANTOWN AND LEITHSVILLE DOLOMITE LIMESTONE FORMATIONS

A broad limestone belt, composed of three limestone formations, crosses the township from Buckingham to the Delaware River, creating a shallow valley that almost divides Solebury in half. Limestone varies greatly in its capacity of water supplies. It can be a strong producer of high-quality well water and provides for excellent recharge of surface waters to underlying aquifers, but its porous nature makes it susceptible to groundwater contamination, sinkholes, and solution channels. Ground water contamination is a particular problem because contaminated water can move rapidly through solution channels, threatening an extensive area in a short period of time. Equally important, the disturbance, movement and percolation of surface waters can result in underground erosion of limestone formations, creating the potential for sinkholes and land subsidence. Other carbonate valley phenomena include disappearing and influent streams, ghost lakes, land surface mottling, and cave formation. It is important for Buckingham and Solebury to address this resource issue in a cooperative manner as recommended in the *Conservation and Management Practices for Buckingham and Durham Carbonate Valleys* (1985).

BRUNSWICK SHALE FORMATION

The Brunswick formation underlies the southern one-third of Solebury and, similar to the Stockton Formation, extends into Buckingham, Plumstead and Upper Makefield townships. The formation typically consists of reddish-brown shale, mudstone, and siltstone. Beds of green shale and brown shale occur. It can be very fine-grained, but near its base, the rock is tough. Red argillite is interbedded sometimes with dark-gray argillite. The surface drainage associated with this formation is good.

The Brunswick formation is considered to be a reliable and important source of water for domestic, industrial, and municipal supplies. Reported well yields indicate a range of 0.3 gallons per minute (gpm) to over 500 gpm. Yields ranging up to 20 gpm can be

expected from wells located in fractured areas. Highest yields were obtained from wells ranging in depth from 200 to 550 feet. When wells were spaced less than 2,000 feet apart, interference was generally shown.

DIABASE FORMATION

Diabase, also known as traprock, is a metamorphic intrusion. It is characteristically a hard crystalline rock that has pushed through softer sedimentary rock. Diabase is usually black and consists of 90 - 95 percent labradorite and allgite. Because it is metamorphic, it is close-grained, hard, and essentially nonporous. The high density and lack of joints, fissures, and fractures in diabase translates to little storage capacity for water and low well yields. It offers inherent difficulty for excavation. The Diabase formation occurs in a long stretch across the southern part of the township, broken into two parts, associated with the high ridges known as Solebury Mountain and Bowman's Hill.

TRENTON GRAVEL

An area of Trenton Gravel is found on a terrace along the Delaware River and generally within the floodplain in the southern part of the township, below New Hope. This rock is outwash gravel from the Wisconsin glacial period along with coarse sand. It is usually overlain by a thin bed of sandy loess. Deposits are bright, light-yellowish-brown, dark yellowish-brown, and reddish-brown; gravels consist mainly of pebble, but large cobbles and boulders are also present. A large part of the sand is cross-bedded. Earlier geologic mapping showed more extensive areas of glacial outwash and alluvium in narrow bands along the Delaware, including the river islands.

The Wisconsin deposits and more recent alluvium provide good surface drainage, and where coarse sand is present, they are highly porous and permeable. The cobble portions plastered with clay and sand show little effective porosity.

Groundwater in the outwash deposits occurs under both water table and artesian conditions. The water table aquifer is composed of the sands, clays, and gravels. This aquifer is recharged mainly by local precipitation and subsurface drainage from nearby upland areas. Some water may be obtained by infiltration from the Delaware River. These unconsolidated sediments provide some of the largest and most reliable supplies of groundwater in Bucks County. Average well yields are 304 gpm.

LOCKATONG ARGILLITE FORMATION

A small wedged-shape area of the Lockatong formation occurs in the central portion of the township, near the New Hope border. This formation is comprised of dark gray to black argillite with occasional zones of black shale. Lockatong is a particularly hard rock with few fractures to allow for the downward or horizontal movement of groundwater. As such, it is not a strong well water producer.

GEOLOGIC RESOURCE ISSUES

Protecting water resources is essential to Solebury's vision of sustainability, which is the focal principle of this Plan. Because geologic resources are an essential element in protecting water resources, understanding the geology underlying any particular area of the Township is fundamental to establishing relevant land-use plans and resource protections. Understanding the hydrologic value of the geologic resources will enable Solebury to implement ordinances and protective policies (such as reducing impervious surfaces and encouraging ground water recharge) which will help ensure that domestic water yields are sustained and base stream flows are maintained. The local geology's development constraints must be factored into the Township's resource protection strategies, land-use allocations, regulations and ordinances. Geologic resources are also essential to understanding the possible impact of extracting sources of nonrenewable energy sources, such as natural gas, on water and other natural resources.

Those geologic formations that are typically good water producers for various land uses are Stockton Sandstone, Allentown, Beekmantown, and Leithsville Dolomite Limestone, Brunswick Shale, and the Trenton Gravel. Both the Limestone and gravel formations have development constraints that require special regulations to ensure that structures are both safe and habitable.

While the Stockton formation and the Brunswick Shale are good sources of potable water, caution must be taken with respect to the spacing of wells and the cumulative groundwater withdrawal impacts. Water supply to wells in this formation is dependent on the lateral movement of groundwater and generally occurs under artesian conditions. These hydraulic conditions make proper spacing of wells especially important because wells that are too closely spaced may have appreciable mutual interference. Also, because the township's streams and wetlands are often fed by groundwater discharges from these formations, aquifer withdrawals that exceed

recharge capacities can reduce low-flow water volumes to very low levels, seriously affecting plant and animal communities dependent on these surface water resources. Opportunities for groundwater recharge, including open space set-asides, should be promoted.

Because of its highly resistant, nonporous characteristics, the Diabase formation is a poor source of water. Excavation in this rock is difficult, requiring blasting in most cases. The Lockatong formation is not considered to be a reliable aquifer for high yield wells. (Wells yield an average of 10 gpm.) Low yield characteristics cause the Lockatong to be generally restricted to domestic water supply uses.

Natural gas exploration and development has occurred at break-neck speed in recent years in Pennsylvania. This is due primarily to advancements in new extraction techniques such as hydraulic fracturing—or fracking—that have allowed the oil and gas industry to access previously out-of-reach reserves. The Marcellus shale is a massive reserve of natural gas that sits thousands of feet below much of northern and western Pennsylvania. Shale gas has not been located under Bucks County; however geoscientists believe that the South Newark Basin, the deep shale that lies beneath most of Bucks and Montgomery counties, including Solebury Township, may be one of the largest untapped natural gas resources on the East Coast.

Many experts believe federal and state safeguards to protect people and the environment from the hazards of fracking have not kept up with the pace of the industry. In many instances, this development has proved to be dangerous, destructive, and polluting in some areas—from depleted and/or poisoned water wells, to contaminated rivers and streams, toxic air pollution and devastated property values. Concerns over these impacts led the Delaware River Basin Commission to institute a moratorium on natural gas development until adequate regulations could be developed to ensure protection of the Delaware River and its associated resources. More than 15 million people get their drinking water from the basin. These regulations have yet to be finalized and the moratorium continues.

The development of the Marcellus shale natural gas resource led to the enactment of Act 13 in February of 2012, the first comprehensive update of the state’s oil and gas laws in nearly 30 years. The new law created concerns by municipalities arguing that it takes away local zoning powers. A lawsuit challenging the zoning provisions and other

aspects of the law was considered by the state Supreme Court. In December 2013, the court struck down the statewide rules that preempted local zoning rules on oil and gas industries as well as the section that required local governments to allow oil and gas development in all zoning areas.

In the majority opinion, the court determined both those provisions violated the Environmental Rights Amendment of the state constitution, which guarantees Pennsylvanians the right to *“clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment.”*

The decision was hailed as a victory by environmental groups and local governments who argued Act 13 went too far in restricting local authority. Shortly thereafter (in February) the court denied a request to reconsider its decision in finding that portions of the state’s oil and gas law were unconstitutional. However there are still a number of unresolved issues due to the state Supreme Court’s decision. The court sent several matters back to the lower Commonwealth Court including whether the rest of Act 13 can stand without the sections deemed unconstitutional. It is expected that issues and regulations surrounding the oil and gas industry will not be resolved any time soon.

Currently, there is a state moratorium on natural gas drilling in southeastern PA. While the recent low price of natural gas has reduced the pace of exploration, extraction and production, Solebury’s location in the Newark Basin may indicate that there are oil and/or gas deposits within the township. The township should keep abreast of any applicable court cases or new rules or laws related to energy exploration, extraction, production and distribution and consider ways to ensure this industry’s impact on water quantity and quality, especially the Delaware River and the local water supply, is addressed and impacts minimized. Other impacts that are associated with energy production, such as large trucks, chemicals, pipelines, and other equipment will also need to be addressed by the township to ensure air quality, human health, water quality and availability, and public infrastructure (e.g., roads and bridges) are not negatively affected.

TOPOGRAPHY AND LANDFORMS

Solebury Township lies entirely within, and is typical of, the Piedmont Province of the Appalachian Highlands. This great band of rolling country stretches from New York to

Georgia and is comprised of gently rolling uplands with occasional low hills and ridges atop more resistant rocks. Piedmont soils, topography, and climate have fostered the eastern deciduous forests.

The topography of Solebury Township is an upland, with broad, rolling areas averaging 300 to 400 feet above sea level in the northern part of the township, 200 to 300 feet in the central Aquetong valley, and 100 to 200 feet in the southern Pidcock Creek valley. The Delaware River cuts an abrupt and relatively narrow valley through the upland, lined by dramatic palisades, particularly in the northern part of the township. Elevations along the river shore range from approximately 20 feet at the Upper Makefield border to 60 feet at the Plumstead border. The land gradually slopes southward and eastward toward lower Bucks County and toward the Delaware River, and comprises the headwaters of numerous small streams. These streams cut deep narrow ravines as they approach their confluence with the Delaware River, particularly the Paunacussing, Cuttalossa, and Copper Nose and Laurel Run. In the southern part of the township, the lower uplands are dramatically punctuated by long ridgelines nearing 500 feet in elevation. These ridges are found atop lines of resistant diabase, and are known locally as Solebury Mountain and Bowman's Hill (see Map 4 Topography and Steep Slopes). Buckingham Mountain in neighboring Buckingham is an extension of this same diabase area.

Although most of Solebury Township can be characterized as gently rolling, scattered areas of steep slope are found, particularly along the narrow ravines of the Delaware tributaries, the palisades of the Delaware, and the slopes of Solebury Mountain and Bowman's Hill. Other steep slopes occur in small areas throughout Solebury and help contribute to the variety and interest of the landscape.

Steeply sloped areas are often undevelopable, not only for the technical problems they pose, but due to their vulnerability to increased erosion when vegetative cover is removed or they are disturbed through grading. Although erosion is a natural process – it has created many of the earth's landforms – human activities can greatly accelerate this process. Accelerated erosion disturbs soils, water quality and wildlife resources, both locally and downstream.

When erosion washes soil particles into streams at a faster rate than the stream can handle, the resultant sedimentation loads damages the stream ecosystem and threatens

aquatic life. Sediment decreases stream capacity, worsening flooding problems. Sedimentation can also wreak havoc upon downstream water supply and industrial intakes. Construction on moderate and steep slopes requires careful attention to structural design, vegetation removal, landscaping, and stormwater management to minimize these effects.

SOILS

Soils are critical natural resources that contribute to basic human needs and are one of the most important factors in land use. Soils sustain the vegetation component of landscapes with minerals and stable base, serve as the foundation for buildings, and support the renewable production of crops. In the past, soils that had proper slope and sufficient moisture were farmed, and those that were too steep or too wet were used for grazing and woodlots. As local dependence on food and forage production decreased and our ability to reshape the landscape and change drainage characteristics increased, it changed the role that soil played in land use and development. The same qualities of soil that made it viable for agricultural production—slope, drainage and structural capabilities—also made it desirable for development.

Soil also has been one of the most abused resources because it has been viewed as limitless and, if scarred, able to heal itself over time. Experience has shown that soils are not renewable resources, and accelerated erosion or other degradation diminishes these resources and causes pollution of the township waterways and streams. In contrast, minimization of soil disturbance contributes to conservation of native habitat, maintenance of natural water regimes, and capabilities to accommodate storm- and wastewater infiltration and renovation.

The wide variations in the chemical and physical properties of the soil, along with the conditions under which they are found, make soils mapping a useful planning tool. Soils mapping, particularly detailed mapping specific to individual development plans, helps guide planning decisions, such as placement of roads and buildings, suitability for septic effluent renovation, potential ground water recharge, and preservation of wildlife habitats.

According to the U.S. Department of Agriculture, Natural Resources Conservation Service, Web Soil Survey, considerable variation exists in the types of soils covering

Solebury Township. For purposes of the Comprehensive Plan, the following soils groupings are highlighted:

- Prime Agricultural Soils
- Alluvial Soils
- Hydric Soils
- Soils with Shallow Depth to Bedrock

The Natural Resources Conservation Service (NRCS) has revised soils mapping for Bucks County. Some variations are noted, including a more narrowly defined area of alluvial soils along the Delaware River, a less extensive network of hydric soils (particularly in upland headwaters), and slightly less extensive area of soils with shallow depth to bedrock along the Paunacussing and Cuttalossa Creeks (see Map 5 Soil Resources).

PRIME AGRICULTURAL SOILS

A review of the Solebury Township soils reveals a fact well-known to local farmers: much of the area is widely covered by valuable agricultural soils. The NRCS classifies soils, among other characteristics, for their suitability for agricultural use. Prime agricultural soils (Classes I and II) are soils that are deep, not prone to erosion, nearly level, well-drained, and generally devoid of stones and rocks. The gently sloping topography of the upland areas in Solebury, combined with the nature of the soils, has allowed full development into mature, fertile soils. In the absence of agriculture, these soils could support a richly mixed forest of oak, beech, and hickory. Prime agricultural soils are especially predominant in the northern and central upland areas of the township. Productive agricultural soils are resources that are not renewable once removed for development. The township is committed to preservation of prime farmland soils, in accordance with the mandates of the *Municipalities Planning Code* (also see Chapter 5 Agricultural Preservation).

ALLUVIAL SOILS

Alluvial soils have resulted from the repeated deposition of floodwater sediments over millennia; they indicate not only past, but potential future flooding. Floodplains often comprise alluvial soils, and are low-lying areas of land, adjacent to bodies of water, and

often at risk for unpredictable, recurrent, and possibly life-threatening inundations of floodwaters. Floodplains provide a critical overflow area during particularly heavy storms; one clear hazard of settlement in a floodplain is danger to human life. But floodplains also support natural functions important to the long-term health of the ecological system, including: agricultural and timber productivity; groundwater recharge areas; fertile areas for the growth of vegetation (which stabilizes stream banks and traps sediment, minimizing sedimentation); and wildlife habitat corridors and resting areas. In Solebury, alluvial soils are found along the Delaware River and in major tributary stream valleys.

Floodplains, as mapped by the Federal Emergency Management Agency (FEMA) for the Flood Insurance Program, extend considerably farther up the reaches of the stream valleys than does the mapping of alluvial soils, incorporating considerable areas mapped as hydric soils. The updated FEMA mapping is currently under revision and the township will review the revisions and ensure its ordinances are compatible with any changes to the maps.

HYDRIC SOILS

Hydric soils are formed under anaerobic or saturated conditions; they are a strong indicator of possible wetlands (see separate discussion of wetlands and floodplains below). Hydric soils lie along the stream corridors and extend in finger-like branches into lower-lying areas, seeps and springs at headwaters throughout the township. Such soils frequently exhibit very shallow depth to seasonal water table. Hydric soils are not generally suitable for development. They may cause wet basement problems and will not adequately absorb wastewater. Pollutants of any sort can easily enter the groundwater system through these soils, potentially contaminating water supply sources or reappearing in surface waters downstream.

SOILS WITH SHALLOW DEPTH TO BEDROCK

Soils with shallow depth to bedrock are frequently unsuitable for any extensive development. Such soils are indicators of locations where wastewater disposal systems are unlikely to be permitted due to the potential for groundwater pollution through proximate fracture zones in the bedrock, along with insufficient soil depth to properly renovate wastewater.

Mapping of soils with shallow depth to bedrock also can indicate a need for significant excavation of rock and blasting, if even minor changes to existing grade are needed to accommodate development. In Solebury Township, soils with shallow depth to bedrock are concentrated along the steeply sloping valley “walls” of the Paunacussing and Cuttalossa Creeks, Coppernose Run, and the upper portion of the Delaware River. A large area of soil with shallow depth to bedrock is found atop the Brunswick geologic formation adjacent to New Hope Borough. This is the area of the most intense development in Solebury Township, but it also is the area where public wastewater service exists or is planned.

SURFACE HYDROLOGY – STREAMS, RIVERS AND WATERSHEDS

Surface hydrology refers to bodies of water and activity of surface water within watersheds, including stormwater runoff. The interrelationship between water resources, water supply, wastewater treatment and disposal, and stormwater management is discussed in more detail in Chapter 6 Water Resources and Related Facilities.

In Solebury, the regional focus of the hydrologic system is the Delaware River. The Delaware is an important water source for several metropolitan areas in the northeastern United States. It serves domestic, agricultural, and industrial needs. More locally, it is an important scenic and recreational resource, and it supports a diverse plant and wildlife community.

Several streams in Solebury are significant for their scenic and recreation value as well as their sensitivity to stormwater impacts and their contributions to wildlife. The Paunacussing, Aquetong, Cuttalossa, and Laurel Run creeks are notable for the topographic conditions surrounding them and for the attractive mature and contiguous vegetation that borders them. The streams contribute to the overall beauty of the landscape and quality of life. Wildlife and their habitats are dependent on the quality of the stream corridor.⁵ All of these issues are important to the protection of the health, safety, and welfare of Solebury residents. Water resources are shown on Map 6.

⁵ A stream corridor typically means the stream itself, the adjoining floodplain, wetlands and hydric soils and associated steep slopes that roughly parallel a stream for portions of its length.

WATERSHEDS

A watershed encompasses the land area that drains to a particular watercourse. There are three major watersheds that drain Solebury – the Paunacussing, Aquetong Creek, and Pidcock Creek, all of which flow into the Delaware River. These watersheds are relatively small and sensitive to increases in stormwater runoff from development. The township began watershed assessments in 2004 and by 2007 prepared a report titled: *A Municipality-Based Water Resources Management Report for Solebury Township, PA* and initiated the Solebury Township Water Resources Protection and Management Program. Several watershed management initiatives associated with the program are being implemented, including progressive water-resources protection ordinances, an aggressive and highly successful land preservation program, and ground water management planning which will significantly reduce the impacts of development on in-stream conditions.

The Paunacussing is a PaDEP Designated Use - High Quality, Cold Water Fisheries stream and drains the northwestern sector of the township from midway between Honey Hollow and Mechanicsville Roads west into Plumstead Township. There are numerous small tributaries in Solebury as well as Buckingham and Plumstead townships. Two branches merge in the center of the village of Carversville and flow to the Delaware River parallel to Fleecydale Road. Flooding in the Carversville area is a problem to which a satisfactory and affordable solution has yet to be found.

After significant assessment of conditions within the watershed, the Paunacussing Creek Watershed Stream Restoration Project was initiated in 2009 and 2010. The project was designed to restore the stream stability and improve riparian buffers of the middle branch of Paunacussing Creek, which would improve downstream areas and properties, by decreasing water temperatures and improving fish habitat. Focus was placed on four specific restoration areas, and on public education and outreach. More information regarding the restoration of the creek can be found in the Paunacussing Creek Watershed Stream Restoration Project report located at the township building and on the township's website.

The Aquetong Creek is a PaDEP Designated Use - High Quality, Cold Water Fisheries stream and its watershed is the largest in Solebury, measuring 7.6 square miles. This creek and watershed drains to the Delaware in New Hope Borough. There are many

small tributaries and minor branches, the most notable Honey Hollow, with a main branch becoming obvious east of Reeder Road. The creek's headwaters include two large springs (Ingham Spring and a large spring at Gateshead Farm). Ingham Lake and Burrell's Lake, both located in the Aquetong Creek watershed, are the largest in Solebury Township and are further discussed in the Vegetation and Wildlife (Biodiversity) subsection. The limestone geologic belt coursing throughout the township is located primarily within this watershed.

Solebury Township has purchased Ingham Lake and the surrounding land for the purpose of building a new park and educational facility. As the township more fully develops a master plan for this significant historic and environmentally sensitive site, it is important that action be taken to protect and enhance stream and fish habitat below the dam. In 2012, the Board of Supervisors decided to pursue a strategy to remove the dam and restore the creek to its original free-flow state as a cold water stream. Permits and approval from other entities, such as the state, county and Army Corps of Engineers, are being pursued to enable the safe removal of the dam and restoration of the stream and land surrounding the site.

Solebury Township has studied the ground water contribution to Ingham Spring to understand the sources and scope of the watershed area. The Ingham Spring recharge area consists of approximately 6.29 square miles as mapped by EPC (Environmental Planning Consultants) in 2009. The spring's ground water contribution area extends beyond the boundaries of the Aquetong watershed, crossing the township border at Street Road into Buckingham Township.

Commercial and residential development is continuing in the Aquetong watershed, particularly along the Route 202 corridor. This corridor is zoned residential and commercial and is serviced by several water supply systems (which have ground water as a source) and public sewer. Because the water is not locally recharged, this results in a net loss of water in the Aquetong watershed. This imbalance has the potential to alter ground water elevations (quantity) in the watershed, particularly in the Route 202 section where water withdrawal and use is most intensive. The Aquetong Creek Watershed when combined with the Ingham Spring recharge area creates an 11 square mile area that is sensitive to water resources, both in terms of supply and quality.

Consideration will be given to creating a special water protection zone to encourage more infiltration of water and reduce the expansion of impervious surfaces from new development (see Map 7 Aquetong Critical Water Planning Area).

The *Aquetong Creek Coldwater Heritage Plan* (2007) proposed by the Bucks County Trout Unlimited addressed the feasibility of reestablishing a sustainable coldwater fishery within the Aquetong Creek watershed. The plan outlines the following five broad recommendations in support of restoring a highly-functioning cold water fishery within the Aquetong Creek watershed.

- Mitigate thermal impacts from impoundments
- Provide a sustainable approach to managing development and associated infrastructure that protects stream habitats, in-stream flows, and prevents increases to stream temperatures
- Protect and enhance the existing stream corridor
- Establish a long term watershed monitoring program
- Establish/enhance sense of place

The Aquetong Watershed Association completed a two-year comprehensive assessment of the Aquetong Creek watershed, funded by a DEP Growing Greener grant. Volunteers from all the municipalities within the watershed worked with consultants to sample the watershed's entire 23 stream miles, compiling all new data. This data, along with existing studies from DEP and local governments, resulted in a comprehensive assessment. This study sets priorities for restoration and protection which will be coordinated with the township's action plan for local watersheds as prescribed in the Solebury Township Water Resources Protection and Management Program.

The tributaries of the Primrose Creek watershed originate just south and north from the intersection of Phillips Mill Road and Route 263 in the middle of the township. The main stem drains west along Phillips Mill until it discharges into the Delaware River a half mile north of the Route 202 bridge. Issues related to the quarry located within this watershed and its impact on Primrose Creek are discussed in Chapter 6 Water Resources and Related Facilities (PaDEP Designated Use - Trout Stocking Fisheries, tentatively non-attaining). Primrose Creek is designated as an impaired stream under

Section 303(d) of the Clean Water Act. The DEP is required to develop a total maximum daily load (TMDL) for each water body on the 303(d) list; however, they have until 2022 to complete this determination. TMDLs are designed to reduce pollutant loads and enable impaired waters to meet water quality standards.

Pidcock Creek drains the southeastern end of Solebury Township. The headwaters of the northern branch of the creek are in Buckingham Township. A southern branch begins in Wrightstown Township and flows through Buckingham and Upper Makefield Townships before it enters Solebury at Street Road. The Pidcock Creek joins the Delaware River in Washington Crossing State Park. (PaDEP Designated Use - Warm Water Fisheries)

Cuttaloosa Creek watershed is one of the smallest watersheds within the township, measuring 2.3 square miles. With no obvious tributaries, it drains directly from Aquetong Road northwest along Cuttaloosa Road and discharges directly into the Delaware River. (PaDEP Designated Use - High Quality, Cold Water Fisheries)

There are also several other minor watersheds that drain directly into the Delaware. They include the Copper Nose Creek, Laurel Run, Rabbit Run, and Dark Hollow Run.

A small area of the township, along its western boundary, is in the Neshaminy Creek watershed and drains into Buckingham Township. The watersheds are delineated on the Map 6 Water Resources.

WETLANDS AND FLOODPLAINS

Surface hydrology includes wetlands and floodplains. Wetlands are defined by a high water table, soil type, and vegetation. Hydric soils also may indicate wetlands because of their high water table and typical soil types. It is not always possible to use vegetation as an indicator of the presence of wetlands because the soils may occur in an area where vegetation was not allowed to grow (e.g., on a farmfield).

Wetlands are valuable for their aquifer recharge potential, and they also act as holding and cleansing areas for stormwater. They support vegetation and wildlife and are often part of breeding and travel corridors and are not suitable for development.

Floodplains are typically flat areas of land bordering streams or rivers that are periodically inundated by floodwaters. Severe rainstorms can cause the entire natural floodplain to flood. It is desirable to limit development on floodplains because of the damage flooding can cause. Floodplains are important as aquifer recharge areas, natural stormwater filters, and for wildlife habitat. Floodplains act as a natural buffer between a stream and developed areas and provide access points to the waterways for recreation.

Floodplain boundaries have been delineated on Map 6 Water Resources, based on mapping prepared by the Federal Emergency Management Agency (FEMA) as part of the National Flood Insurance Program. Left unmanaged, continued development on a floodplain – more pervious surfaces, more obstructions, greater volumes – could continuously increase the size of the floodplain. Similarly, increased runoff caused by development within the watershed can also increase the size of the floodplain. Chapter 10 Hazard Mitigation contains more information regarding flooding of the Delaware River and additional information is provided on stormwater management in Chapter 6.

VEGETATION AND WILDLIFE (BIODIVERSITY)

Human existence is part of a larger web of life. It is desirable to live within the context of a healthy green infrastructure and not depend upon technology to enable survival in an ecological desert. Conservation of the rich variety of native vegetation and wildlife, and the habitat conditions upon which they depend, contributes to maintenance of water quality and supply and to the enjoyment of the rich quality of life available to Solebury residents, including clean air, scenic attributes, passive recreational opportunities, and environmental education features.

Biodiversity (an abbreviation of biological diversity) can be described as “the rich variety of native vegetation and wildlife and the habitats on which they depend.” Solebury Township includes a rich natural landscape of woodlands, meadows, hedgerows, wetlands, ponds, lakes, streams, and a river that support thousands of species of native plants and wildlife. This diversity provides numerous benefits and ecosystem services to the residents of the township and should be evaluated for protection as part of the necessary green infrastructure of a healthy, growing community. The natural systems of plants, animals, soils and water that make up Solebury’s biodiversity are nature’s life-support systems, providing clean air and water, and regulating climate extremes and flooding. Local biodiversity directly supports

timber production and provides opportunities for residents and others to enjoy scenery, recreation, environmental education and stewardship, hunting, fishing, birdwatching, and outdoor activities. This section evaluates Solebury's vegetation and wildlife and their habitats, the community benefits they provide, and the issues affecting them, and prescribes strategies for ensuring their protection as part of balanced growth.

THE NATURAL COMMUNITIES OF SOLEBURY TOWNSHIP

Solebury is situated in the northern Piedmont section of the Eastern Deciduous Forest. Its dominant natural vegetation is mixed-oak and oak-hickory forest, with four main habitat types:

- Woodlands;
- Successional Lands (meadows, old fields, thickets);
- Wetlands;
- Streams (from small tributaries to the Delaware River).

These natural areas provide habitat for a wide variety of native vegetation and wildlife, particularly where they occur in large, interconnected networks. The most functional habitat networks for native species can best be understood as core reserve natural areas linked together by natural corridors. These natural areas and corridors are not distinct; they often overlap in places such as forested wetlands, forested stream corridors, wetland meadows. Some of the most diverse natural areas in the township are those areas where two habitat types come together.

The Natural Areas Inventory of Bucks County (2011) documents an incredible diversity of plants and animals in Solebury Township. These include: 2,038 species of plants (the greatest diversity of any Pennsylvania county); 135 species of breeding birds and 117 species of transient or occasional visiting birds; 10 species of turtles; 15 species of snakes; 11 species of frogs and toads; 12 salamander species and 2 lizard species; over 40 species of large and small mammals; a variety of cold-water and warm-water fish species; and a vast number of mosses, lichens, algae, fungi, microorganisms and invertebrates (butterflies – at least 30 species – other insects, freshwater mussels). From the smallest insects and lichens to top predators such as bobcats and bald eagles, Solebury plays an important role in supporting biodiversity along the lower Delaware River watershed.

The Bucks County *Natural Areas Inventory* was updated in 2011. The document re-examined the natural areas previously identified in the county and focused on “sustainable landscapes.” The intent of taking a landscape approach to open space preservation is to maximize the potential for long-term sustainability of individual sites by protecting the landscape context and enhancing connectivity. The landscapes, at several thousand acres each, are intended to be big enough to preserve important ecological functions critical to maintaining the life support system for the county as a whole.

The updated 2011 Natural Areas Inventory identifies thirteen conservation landscapes and ranks sites within each landscape on a scale of 1 to 4 that is used in the evaluation and prioritizing of applications to the Bucks County Natural Areas Program. The sites given a Priority #1 rank receive 100 points toward their application, based in part on a six-part, 200-point scale used in prioritizing applications for funding by the county Open Space Review Board.. Priority #2 sites receive 80 points, Priority #3 sites 60 points, and Priority #4 sites 40 points. The three conservation landscapes located in Solebury are indicated below and illustrated at the end of this chapter in Figures 2, 3, and 4.

- The Delaware River Conservation Landscape
- Paunacussing Creek Conservation Landscape
- Mid-county Ridges Conservation Landscape

The Delaware River Conservation Landscape is located along the eastern border of Bucks County extending from the Northampton County line to the Fall Line which marks the boundary with the Atlantic Coastal Plain. The ecological and scenic resources of the 26 mile-long river corridor includes islands, the floodplain along the river, and the cliffs and forested slopes that are part of the viewshed.

The landscape connects with the Atlantic Coastal Plain, Paunacussing Creek, Tinicum Creek, Lower Tohickon Creek, Cooks Creek, and Coffman Hill Conservation Landscapes. It includes the following sites identified in the 1999 Bucks County NAI: Braided Channel Islands, priority #1; Nockamixon Cliffs, priority #1; Delaware Canal State park *Ellisia* site, priority #3; Hal Clark Park, priority #3; Hendrick Island, priority #3; Indian Rock Ravine, priority #3; Lynn Island, priority #3; Monroe Border Fault,

priority #3; Scudders Falls Islands, priority #3; and Kintnersville – Gallows Run Floodplain, priority #4.

The river corridor defining the eastern boundary of Solebury Township is characterized by some of the most diverse and interesting stretches of the river, in terms of scenic and historic values and vegetation and wildlife communities. It forms a critical link in the Atlantic Flyway, the major migratory route for birds in eastern North America.

Solebury is part of the Delaware River watershed. Of the sub-basins draining Solebury, the Paunacussing and Pidcock Creeks also drain portions of neighboring municipalities. An anomaly in the surface water system draining Solebury is the Delaware Canal, an artificial waterway that receives direct stream flow from a number of sub-basins in and beyond the township, diverting that flow from its historical locations of confluence with the Delaware River. The canal is particularly subject to degradation due to sedimentation as faster flowing stream water is slowed in the artificial canal bed, dropping its sediment load. The cumulative impacts of conventional stormwater management approaches upstream can contribute significantly to downstream flooding and sedimentation.

The Mid-county Ridges Conservation Landscape is a series of long largely-wooded diabase ridges extending from Upper Makefield Township at Bowman’s Hill across the southern part of Solebury, forming Solebury Mountain, and extending into Buckingham as Buckingham Mountain. It covers 5,531 acres and includes four sites from the 1999 NAI: Buckingham Mountain – NW side, vernal pools and successional forest, priority #1; Buckingham Mountain, priority #2; Bowman’s Hill and Pidcock Creek, priority #3; and Jericho Mountain, priority #3.

These ridges, while fragmented by the Pidcock Creek valley, occasional roads, utility and rail lines, farm fields and residential developments, still represent one of the largest and most interconnected woodland habitats remaining in Bucks County and are critical habitats for migrating songbirds. Bowman’s Hill is discussed in more detail in the following section.

The Paunacussing Creek Conservation Landscape covers the entire Paunacussing Creek watershed. The Paunacussing is classified as a high quality stream, one of only five streams in Bucks County that receive the highest rankings from the Pennsylvania

Department of Environmental Protection. The Paunacussing is also part of the National Wild and Scenic Rivers System administered by the National Park Service.

The landscape covers 4,990 acres in Buckingham, Solebury, and Plumstead townships and links with the Delaware River Conservation Landscape at the village of Lumberville where the Paunacussing Creek enters the Delaware River. It includes the Paunacussing Creek, priority #2 site, and part of the Fieldstone Farms, priority #3 site, from the listing in the 1999 Natural Areas Inventory.

WOODLANDS

Woodlands in Solebury occur as a scattered patchwork quilt of various sizes, shapes, ages and types. Topography, hydrology, and soils are the most influential natural factors in determining woodland types and are important in supporting Solebury's rich diversity of plants and animals species. Woodlands help to filter pollutants and recharge ground water as well as reduce stormwater runoff and flooding by intercepting rainfall and directing it into aquifers through root systems and forest soils. Solebury's woodlands promote clean air by producing oxygen and reducing carbon dioxide and moderating temperatures and winds. Woodlands and riparian corridors are depicted on Map 8.

Large Upland Forest (> 100 acres)—The wooded diabase ridge in the southern end of the township (Solebury Mountain) supports a dry, acidic red oak-mixed hardwood forest type with rich hemlock – mesic hardwood forest slopes that represent one of the largest and most interconnected remaining woodlands in Solebury. Though fragmented by occasional roads, utility lines and residential developments, the series of woodlands of 50 to 100 acres or more along this ridge form a nearly continuous corridor from the Delaware River at Washington Crossing State Park to the Buckingham Mountain area at the township line just below Lahaska. *The Natural Areas Inventory of Bucks County (the Inventory)* identifies Bowman's Hill and Pidcock Creek together as one of thirty-nine Priority #3 sites of county-wide significance for conservation. The *Inventory* describes the site as follows:

Bowman's Hill, a slightly disjunct continuation of the diabase ridge that forms Jericho Mountain, straddles the boundary between Upper Makefield and Solebury Townships. The forested slopes on the north and east sides are the site

of the Bowman's Hill Wildflower Preserve, established in 1934. A stone observation tower commemorating a Revolutionary War lookout is located on the eastern end of the hill. Bowman's Hill has been suggested as a potential geological natural landmark. It is also a site well known by birders who have recorded 59 bird species, including 11 rare breeders. In addition to the many native plants introduced to the site, Bowman's Hill has a naturally occurring stand of a rare native orchid, Spring coralroot.

The Wildflower Preserve also includes the lower portion of the Pidcock Creek Valley. Pidcock Creek drains the area between Jericho Mountain and Solebury Mountain and is known for its high bird diversity, 67 species, including eight rare breeders and one species of special concern.

Supporting and recognizing the importance of these areas is the designation of Solebury Township as a "Bird Town" by the Audubon Society. Solebury and other municipalities in the County and in Pennsylvania promote conservation and community-based actions to create a healthy, more sustainable environment for birds and people. Audubon provides the tools for the municipality to engage residents, schools and businesses in making more ecologically-friendly decisions, conserving energy and in the process, saving money. A Bird Town makes efforts to restore valuable ecosystem services to create a culture of conservation where everyone is a potential steward of nature in their backyard and beyond.

A second major block of upland forest is situated on a narrow plateau above the Delaware River just south of Center Bridge and adjacent to the Laurel Run valley. This woodland is valuable as part of the upland forest habitat bordering the Delaware River corridor, providing excellent habitat and an important stopover point for migratory birds. Woodlands of this size, known as deep woods or forest-interior habitat, support conditions of shade, dense understory vegetation, and moist soils that are closest to those found throughout the region prior to European settlement in the late 17th century. These refuges from intensive human activity are important habitats for species of native plants and wildlife, including migratory songbirds such as warblers and wildflowers such as orchids.

FORESTED STREAM CORRIDORS

Solebury's natural landscape includes several of the most pristine forested stream valleys in Bucks County, constituting some of the most important habitat for native plants and animals. Riparian woodlands provide shade and organic matter to support aquatic organisms such as larvae and nymphs that form the base of the food web in a stream. Forested stream corridors provide important habitats to support stable populations of species such as mink, Louisiana waterthrush, freshwater mollusks, native brook trout and spotted salamander.

Red maple-sycamore is the forest type frequently found in the broader floodplains along limestone streams in the central portion of the township, whereas the steeper stream valleys in the Stockton Sandstone Formation in the northern half of the township have narrow floodplains and support more of a mixed-hardwood forest type with some hemlock.

The Paunacussing Creek, Cuttalossa Creek, and Laurel Run corridors bordering the Delaware River each support healthy, diverse forested slopes and narrow ravines with relatively high quality stream ecosystems. The Cuttalossa Creek valley is identified as a Priority 3 site in the *Natural Areas Inventory of Bucks County* due to its forested stream and sloping woodlands habitat, which supports at least 59 bird species including 8 rare breeding bird species. Along Laurel Run, *The Inventory* describes the David R. Johnson Natural Area as a State-managed Priority 4 site, three-quarters of a mile northwest of Center Bridge. The site is noted for its rich hemlock – mesic hardwood forest, red oak – mixed hardwood forest and a variety of amphibians in the stream.

DELAWARE RIVER CORRIDOR

The Delaware River supports steep forested slopes with mixed hardwoods, hemlock, and rhododendron, sloping down abruptly to the floodplain forests of sycamore-river birch-box elder along the river's edge. The corridor forms a critical link in the Atlantic Flyway, the major migratory route for birds in eastern North America. Federally-listed species such as Bald Eagle and Osprey can both be found nesting and feeding along the Delaware River.

The Natural Areas Inventory of Bucks County lists Hendrick Island and the Hal Clark County Park and adjacent areas of Delaware Canal State Park as Priority 3 sites for

conservation. Hendrick Island is noted for its diverse vegetation, including silver maple floodplain forest, sugar maple-basswood forest, young river birch-sycamore floodplain forest, river beach bar community, and the largest butternut (*Juglans cinerea*) tree in Pennsylvania. *The Inventory* describes Hendrick Island as follows:

This 112 acre Delaware River island is located just north of Centre Bridge. It was formerly inhabited and farmed, a bridge linking it to the Pennsylvania shore was washed out in 1955. The island is the site of archaeological studies focusing on use by native tribes from 3000 BC to 1000 AD. As is typical of river islands, it is wedge-shaped with scoured sand and cobble deposits at the upper end and elevated bluffs and ridges with mature forest toward the lower end. The interior of the island contains riparian Sugar maple (*Acer saccharium*) forest and a diversity of other mature trees along the eastern edge. Many nonnative weedy species are present in successional old fields that were previously farmed. Hendrick Island became part of Delaware Canal State Park in 1996.

Hal Clark County Park and adjacent areas of Delaware Canal State Park are prioritized in the *Natural Areas Inventory* due to the combination of riparian forest (sugar maple-basswood and red maple-black gum) and floodplain forest (sycamore-river birch-box elder) along the shores of the Delaware River, successional old fields, forested wetlands, and a portion of the Delaware Canal. A large population of Common hop-tree, a shrub listed in Pennsylvania as threatened, was also noted.

SMALL WOODLAND NETWORKS

The majority of the woodlands in Solebury are small (2 to 20 acre) woodlands commonly found in the central and northern sections of the township. Many of these are woodlots managed for lumber and firewood by local landowners. These woodlots have boundaries that follow roads and property lines and are often interconnected by hedgerows following fence lines. While trees have been regularly harvested in these woodlots, these may be among the oldest continuously-managed woodlands in the township. The network of small woodlands linked by hedgerows and streams plays an important role in connecting the natural fabric of habitat found in larger woodland networks. Without them, even larger woodland networks become more isolated and their diversity can be expected to decline.

WETLANDS

Solebury Township's network of lakes, ponds, emergent wetlands, wet meadows, scrub-shrub wetlands, and forested wetlands represent a variety of habitats for plants and animals created by the intersection of soil and water. Over 50 percent of the wildlife species inhabiting Pennsylvania depend on wetland habitats for at least a portion of their food, cover, or reproduction requirements. The diversity of birds, reptiles and amphibians in the township would be greatly diminished without a healthy number of wetlands of all types.

The most unusual of these wetlands, listed for countywide importance in the *Bucks County Natural Areas Inventory* happen to be man-made lakes. Aquetong Lake and Ingham Spring are together listed as one of thirty-three Priority 2 Sites in the *Natural Areas Inventory of Bucks County*, indicating county-wide significance due to their overall quality and diversity and the importance of their resources.

Burrel's Lake is listed in the *Inventory* as one of the thirty-nine Priority 3 sites of county-wide significance in Bucks County. As described in the *Inventory*, "This site consists of a six-acre lake formed by a dam on Aquetong Creek. Rich deciduous forest clothes the slopes above the lake and includes diverse spring herbaceous flora. Waterfowl are abundant.

Solebury includes a number of wetlands associated with limestone sinkholes, primarily along the western boundary of the township and near Solebury School by the quarry. These are areas where the underlying limestone geology has deteriorated and collapsed, causing subsidence of soils at the surface. These sinkholes frequently form wetlands with high water table. Forested wetlands, open marshes, or wet sedge meadows may result. These areas also provide important habitat for reptiles and amphibians such as frogs, salamanders, and turtles.

Other wetland habitats can be found where seeps and springs emerge at the headwaters of streams or along broader floodplains. Forested wetlands tend to grow in areas without recent disturbance, whereas open wet meadows or emergent marshes tend to occur in areas that have been historically cleared and drained for agriculture. The occasional recolonization of beavers in the area reintroduces one of the original natural creators of open wetland habitats. By cutting trees and building dams, beavers remove

riparian woodlands and create flooded environments that favor herbaceous plants such as sedges, rushes and wetland wildflowers. Beaver dams may also create wet meadows in streamside areas previously supporting pasture, cropland or lawn areas.

SUCCESSIONAL LANDS

Successional lands in Solebury Township can generally be described as areas that have recently been abandoned from agricultural use and that have reached various stages of regrowth. Successional lands ranging from meadows to old fields to thickets are important habitats for vegetation and wildlife, particularly where they provide buffers or corridors between other natural areas. They add to the variety of ecosystem services provided by other habitat types, particularly as natural alternatives to lawn or paved areas.

Open space areas in the early stage (1 to 5 years) of succession are generally considered meadows or grasslands. Some landowners prefer to manage these areas by once or twice annual mowing, to encourage grassland habitat for species such as wildflowers, butterflies and grassland nesting birds, and to maintain the aesthetics of an open, rural landscape without the cost and environmental impacts associated with lawn care.

Without disturbance such as mowing over a 5 to 10 year period, abandoned fields will reach the old field stage of succession, with a mixture of grassland vegetation, shrubs and young trees that supports a diversity of wildlife species and excellent bird habitat.

Between 10 and 15 years, the woody trees and shrubs become dominant, forming thickets as the last stage before becoming a young woodland. These thickets include fast growing pioneer trees such as black walnut, black cherry, ash, sassafras and red maple that help to establish a young woodland. Many thickets are dominated by non-native invasive vines and shrubs such as oriental bittersweet, Japanese honeysuckle, mile-a-minute weed, and multiflora rose. Without selective management, these species will out-compete young trees and prevent establishment of woodlands.

THREATS TO BIODIVERSITY

The greatest threat to biodiversity in Solebury is the destruction, fragmentation, and degradation of habitat due to development or mismanagement of resource. The *Natural Areas Inventory of Bucks County* (1999) states that “the most important threats to the

conservation of natural resources and biological diversity in Bucks County are incompatible land use resulting in destruction or degradation of habitat, fragmentation, altered hydrology, pollution, invasive exotic species, and excessive browsing by overly abundant deer.” The natural landscape of forests, streams, and wetlands and the species it supports has undergone centuries of intensive alteration. Forests have been cleared, streams have been dammed, and wetlands have been drained.

For the past 50 years, however, Solebury’s natural areas have been experiencing a dual trend – a process of regeneration and fragmentation. Much of the land cleared for farming has been left to regenerate as woodland and wetland areas. Abandoned agricultural fields are growing up with grasses, wildflowers, trees and shrubs. Wetlands once drained for agriculture are reverting back to wetlands. Old mill and pond dams are no longer in use, allowing streams to once again flow freely and better management techniques have been implemented to help restore and enhance natural resources. Yet amidst all of this regeneration, suburban development continues to fragment and isolate those newly expanded natural areas.

The construction of new roads, large residential lots, highway commercial shopping areas and office/industrial parks fragment the habitats that have rebounded over the last half-century. Increasing numbers of woodlands, successional lands, streams and wetlands are becoming fragmented by development, resulting in isolated pockets of habitat that may be too small, too isolated, too irregular in shape, or too poor in quality to support viable populations of the native plants and animals that once inhabited the area. Lawns and pavement are biological deserts compared to the rich habitats they replace. The resulting environment favors the hearty habitat generalist species such as white tailed deer, Canada geese and Japanese honeysuckle that can adapt to urbanized areas, and excludes the more vulnerable habitat specialists such as minks, bald eagles, and native orchids that depend on specific, undisturbed habitats. For example, the white tailed deer can diminish the natural landscape through overgrazing and also poses a hazard to motorists on township roads.

ENVIRONMENTAL IMPACT ASSESSMENT AND SITE ANALYSIS

For any tract of land proposed for development, the Biological Resources Inventory component of the Environmental Impact Assessment required by the Zoning Ordinance could be used as a tool to also provide identification of natural resources and any

critical and sensitive resources listed in the Bucks County Natural Areas Inventory. The application process in the subdivision and land development ordinance is structured to require a pre-application meeting, an Existing Resources and Site Analysis Plan, a site visit, a pre-plan conference, and a four-step design process, which will assist in developing a plan that is responsible/responsive to protecting natural resources, minimizing site disturbance and vegetation removal.

Once identified, the applicant should be required to reserve these areas as part of the protected open space for the plan. Applicants who successfully demonstrate that protection of a critical or sensitive resource listed in the Bucks County Natural Areas Inventory is not feasible must propose Mitigation Measures that accommodate the development plan while maximizing the ecological function of the natural area as habitat for native vegetation and wildlife. Examples of Mitigation Measures for natural areas include reducing forest fragmentation by limiting development in a woodland to an area within 100 feet of a woodland edge with minimal tree clearing, or protecting a stream corridor by reforesting a minimum of 75 feet on either side of the stream.

The inclusion of a land management plan would also be beneficial to educate the property owner on how to best manage natural resources on the lot.

VARIABILITY IN CLIMATE

In the United States, temperatures are rising, snow and rainfall patterns are shifting, and more extreme climate events—like heavy rainstorms and record-high temperatures—are affecting society and ecosystems. Scientists are confident that many of the observed changes in the climate can be linked to the increase in greenhouse gases in the atmosphere, caused largely by burning fossil fuels.

According to the U.S. Environmental Protection Agency (EPA) over the last several decades, the Northeast area of the United States has experienced noticeable changes in its climate. The region extends from the coast to inland plateaus and mountains. Its climate varies as much as its geography. Since 1970, the average annual temperature rose by 2°F and the average winter temperature increased by 4°F. Heavy precipitation events increased in magnitude and frequency. For the region as a whole, the majority of winter precipitation now falls as rain, not snow.

Changes in precipitation patterns and timing affect streamflow, stream temperature and water availability, while more severe storms and floods damage property and infrastructure (e.g., roads, bridges, and utilities) and may even cause loss of life. Higher temperatures affect the length of the growing season as the timing between the last (spring) and first (fall) frost has expanded by nearly two weeks over the last 100 years in the United States.

Ecosystems provide humans with food, clean water, and a variety of other services that can be affected by climate change. Changes in climate can affect ecosystems, water supplies, agricultural productivity, forests, air quality and migration patterns for birds, animals and plants. While species have adapted to environmental change for millions of years, the climate changes being experienced now could require adaptation on larger and faster scales than current species have successfully achieved in the past.

The more the climate changes, the greater the potential effects on society and ecosystems. The nature and extent of climate change effects, and whether these effects will be harmful or beneficial, will vary regionally and over time. The extent to which climate change will affect different ecosystems, regions, and sectors of society will depend not only on the sensitivity of those systems to climate change, but also on their ability to adapt to, or cope with, changes in the microclimate.

Key human health impacts and vulnerabilities associated with changes in climate include:

- Possibly worse conditions for air quality, including exposure to ground-level ozone, which can aggravate lung diseases.
- A warmer climate could increase the risk of heat-related illness.
- Likely increase the frequency and strength of certain extreme events (such as floods, droughts, and storms) that threaten human safety and health, as well as damage structures and properties.
- Changes in temperature and precipitation may spread or shift the geographic range of certain diseases and alter the seasons for pollen, affecting human exposure to infection, asthma, and other respiratory diseases.
- With the associated changes in the growing season, the food supply from regional farmers will be altered.

The EPA continues to explore opportunities to work with climate and health experts to develop indicators that communicate the effects of changes in climate on health and society more broadly. Climate health indicators will aid in identifying areas where the protection of public health is needed most.

Solebury should evaluate risks associated with climate change as it could affect the township infrastructure and, in particular, potential costs to local taxpayers for repair and replacement of storm-related damage. Not only should the township devise an appropriate emergency response to increased weather-related disasters, but also devise a fiscal action plan. Energy conservation and use of renewable resources (see Chapter 11 Energy Conservation) and the continued preservation and enhancement of natural resources and sensitive ecosystems can also assist in addressing this issue.

Figure 2
Delaware River Conservation Landscape

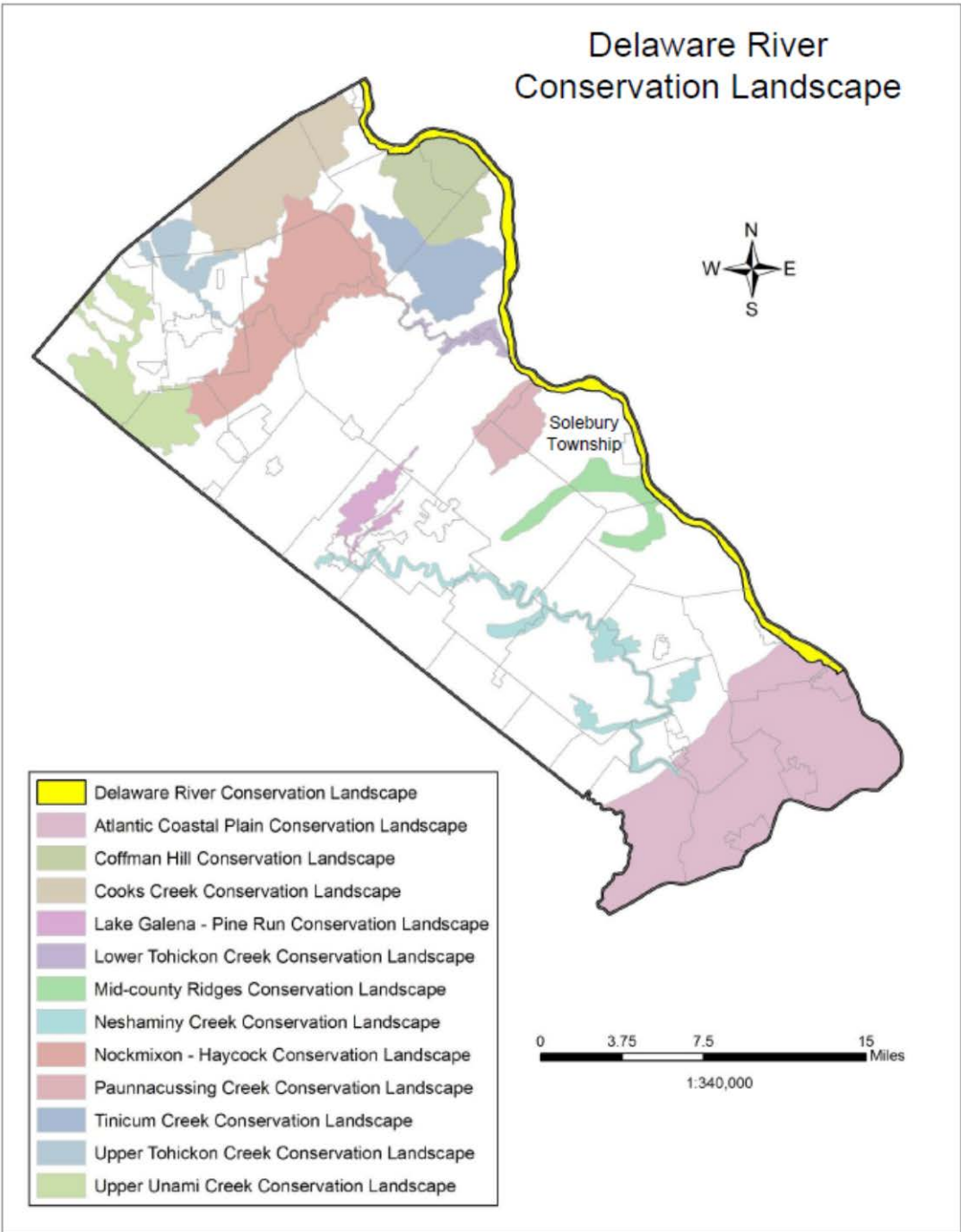


Figure 3
Mid-county Ridges Conservation Landscape

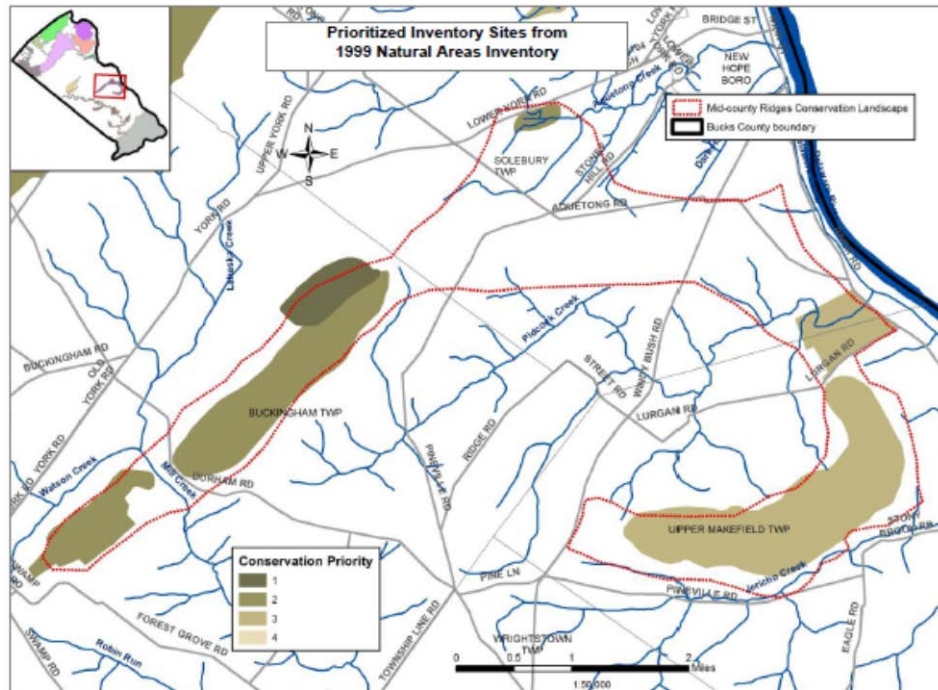
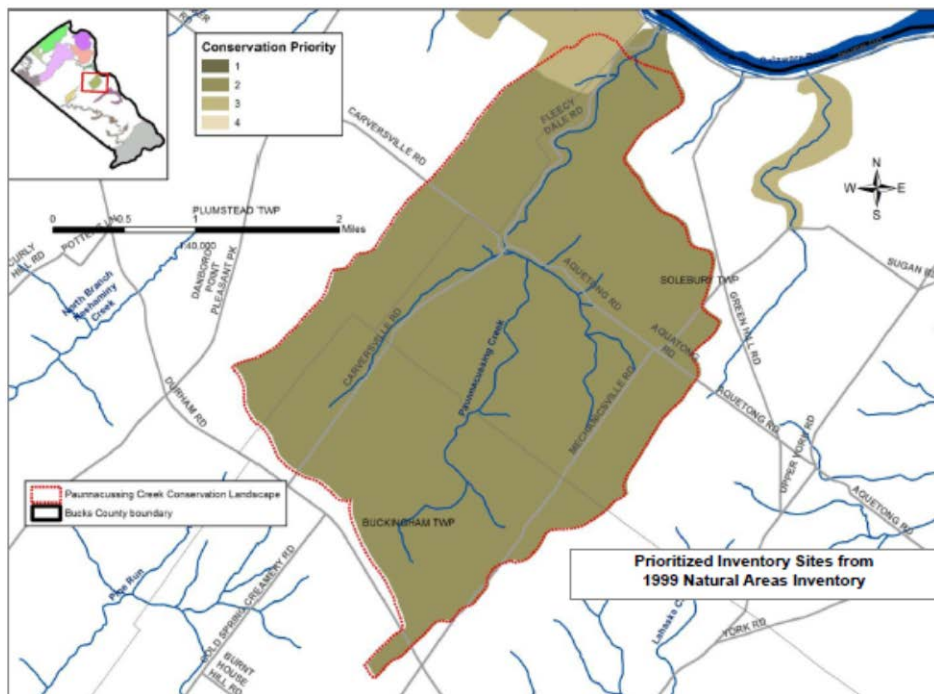


Figure 4
Paunacussing Creek Conservation Landscape



Chapter 5

AGRICULTURAL RESOURCES

Agriculture is the leading industry in the Commonwealth of Pennsylvania and plays a major role in the economy of Bucks County. Data from U.S. Department of Agriculture's National Agricultural Statistics Service (NASS) shows the significance that agriculture plays in the regional economy, with Solebury being one of Bucks County's most significant farming communities. According to NASS's 2012 Census of Agriculture, Bucks County contained 827 farms totaling 64,024 acres. Since 2007, this is a decrease of 107 farms and decrease of 11,856 acres. The average size of a farm in 2012 was 77 acres, down slightly from 81 acres in 2007. Bucks County ranks 31st out of 67 counties in the State in terms of total value of agricultural products sold and 7th in regards to the total value of crops sold (including nursery and greenhouse). The County's market value of production was \$62,418,000.

SOLEBURY'S AGRICULTURAL TRADITION

Due to its underlain geology and abundance of rich soils, Solebury is well-suited for farming (see Map 5 for Soil Resources). For almost three centuries agriculture has shaped the land uses, rural and scenic character, and economic development in Solebury. Agricultural and agricultural-related uses are the primary industry in Solebury and contribute to the local economy in terms of food and plant production, employment opportunities, tourism and sustainability. Agricultural land occupies over 36 percent of the land area in the township or over 6,220 acres of the 17,102 total acres that comprise the township.

Beyond any economic measure, Solebury's agricultural resources provide other inherent values to the community associated with its rural character and extensive open spaces, scenic vistas, and a certain security and pride in the recognition that Solebury residents can become more self-sustaining in food production on their own land.

AGRICULTURAL SOILS

A review of the Solebury Township soils reveals a fact well-known to local farmers: much of the area is widely covered by valuable agricultural soils. About 70 percent of

the township's soils are considered important for agriculture by the U.S. Department of Agriculture, Natural Resource Conservation Service (NRCS). The best soils, Prime Agricultural Soils, constitute over 33 percent (5,590 acres) of the Solebury's total land area and are located throughout the township, with higher concentrations in the northern and central portions of the township. Prime agricultural soils (Classes I and II) are soils that are deep, not prone to erosion, nearly level, well-drained, and generally devoid of stones and rocks. Prime farmland is land best suited for producing food, feed, forage, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed according to modern farm methods.

The gently sloping topography of the upland areas in Solebury, combined with the nature of the soils, has allowed full development into mature, fertile soils. In the absence of agriculture, these soils could support a richly mixed forest of oak, beech, and hickory. Prime agricultural soils are especially predominant in the northern and central upland areas of the township. Productive agricultural soils are resources that are not renewable if removed for development. The township is committed to preservation of prime farmland soils, in accordance with the mandates of Act 247, the Pennsylvania Municipalities Planning Code, as amended.

Agricultural Capability Classes I and II, and Class III soils (soils that do not qualify as Agricultural Prime Soils) are considered Farmlands of Statewide Importance and comprise more than 37 percent of Solebury's total area. These soils are also located throughout the township.

AGRICULTURAL SECURITY AREA (ASA)

Act 43 of 1981, created the Agricultural Security Area (ASA) program to help protect the agricultural industry from issues arising from new development occurring in areas historically used primarily for farming. Participation in an ASA is voluntary for a landowner or group of landowners, whose parcels together must comprise at least 250 acres. Parcels must be viable agricultural land and may be comprised of non-contiguous tracts at least 10 acres in size and consist of at least 50 percent of Class I through IV soils based upon NRCS's classification. ASAs promote viable farming operations by protecting farmers from nuisance ordinances and by enabling them to participate in

state farmland preservation programs. Properties in agricultural security areas are not necessarily preserved farms, although many have been preserved.

Solebury established an ASA in 1986, the fourth municipality to establish a security area in Bucks County. One hundred twenty-three properties and 5,375 acres are enrolled in the ASA program. This acreage represents areas engaged in active farming in Solebury Township and represents about one-third of the total land area of the township. There are other farms not yet enrolled in the ASA but that are active and successful farms. These farms should be actively solicited for inclusion into the township's Land Preservation Program.

PREFERENTIAL ASSESSMENT

Numerous landowners in the township have chosen to enroll their property into a preferential assessment program under Act 319, the Pennsylvania Farmland and Forest Land Assessment Act of 1974, also known as the “Clean and Green” Act. Under the program, soil classification and yield per acre determine a property’s tax assessment, and properties that qualify for differential assessment under Act 319 are assessed at current use, instead of full market value. To be eligible for the program, the land must have a designated use of agricultural, agricultural reserve or forest reserve⁶. In addition to the use classification requirement, the agricultural use land must also be at least 10 acres or generate at least \$2,000 annually in farming-related income; agricultural reserve and forest reserve land must also be at least 10 acres. Enrollment in the program is continuous, unless a property is removed from the program by the landowner, or if it is determined eligibility requirements are not met in some manner. Act 319 lands lack permanent conservation mechanisms; however, use of the Act shows the desire of the landowner to maintain properties as farms or woodlands. Farmland that is permanently protected through municipal or county preservation programs can be preferentially assessed under Act 319 if the landowner applies and qualifies.

⁶ Agricultural use land is land that has been producing an agricultural commodity or has been devoted to soil conservation under an agreement with the federal government for at least three years. Agricultural reserve land is open space that is free and open to the public to use for outdoor recreation. Forest reserve land is land rented out to produce timber and wood products.

COUNTY AGRICULTURAL LAND PRESERVATION PROGRAM

In 1989, the Bucks County Agricultural Land Preservation Program (BCALPP) was created to purchase agricultural conservation easements on viable farms throughout the county. An agricultural conservation easement is a legally binding document filed with the deed of a property, restricting its use to agricultural and directly associated uses. Restrictions carry with the land and are binding upon current and future owners. A conservation easement allows the landowner to use farmland for agricultural uses while retaining private ownership.

The BCALPP compensates farmers for the difference between the fair market value (development value) and the agricultural value of their land. To be eligible for this program, the following criteria must be satisfied:

- Size requirement: 50 acres (minimum for individual parcel or group of contiguous parcels). Tract size may be less if located adjacent to other preserved farmland;
- Location: within an Agricultural Security Area;
- Soil criteria: 50 percent (minimum) of Class I through IV soils;
- Harvest criteria: 50 percent (minimum) harvested cropland/pastureland;
- Plan approval: approved U.S.D.A. Soil Conservation Plan in effect.

As of November 2013, eight farms totaling 976.6 acres have been permanently preserved by the Bucks County Agricultural Preservation Program or the Bucks County Open Space Program in conjunction with Solebury Township:

Glen Oaks Farm (Kale)	94.7 acres
Bradshaw Farm (Fest)	181.2 acres
Spring Hill Farm (Imperatore)	187.9 acres
Henze Farm	180.8 acres
Zaleski Farm (Todd)	62.2 acres
Hasky Farm	93.3 acres
Crosscreek (Welch)	94.5 acres
Farbotnik Farm	82.0 acres

TOWNSHIP AND PRIVATE LAND PRESERVATION

As part of their duties, the Solebury Township Land Preservation Committee addresses the township's open space vision to continue a well-planned program of preservation of farmland, natural areas, scenic areas and other open spaces. The Land Preservation Committee and Board of Supervisors are responsible for the implementation of the following action steps:

- Farmland should be preserved through the use of farm preservation easements, by donation, and by using township funds and/or county and state farmland preservation programs and other grants. These programs enable the farmer to retain ownership of the land;
- Evaluation criteria developed by the Land Preservation Committee should continue to be used;
- Farmers should be encouraged to join the Agricultural Security Area and to prepare the required soil conservation plans;
- Properties eligible for preservation through the Bucks County Agricultural Land Preservation Program should be encouraged to apply. The township should continue its cooperative efforts with the county program.
- Land Preservation Committee should continue its successful efforts with landowners;
- Easements should be provided in perpetuity whenever possible, and monitoring measures should be provided.

The township has developed target areas for farmland preservation that includes the following:

- Gateway area—entrance to Solebury Township along Route 263;
- Farming areas along Stony Hill Road, along Windy Bush Road, and extending to the Delaware River;
- Areas in the Mechanicsville Road corridor where there are preserved farms and large farms that could be preserved, including lands in the Paunacussing Watershed;

- Paxson/Laurel Road area;
- Parcels adjacent to preserved lands;
- All properties enrolled in the Solebury Township Agricultural Security Area.

On lands containing conservation easements, the owner retains the use of the land and is responsible for maintenance. The township and Bedminster Regional Land Conservancy are responsible for monitoring and enforcing the easement.

As of November 2013, there were 112 farm parcels consisting of 3,384 acres that contain an agricultural or conservation easement held by either Solebury Township, Heritage Conservancy, Bedminster Land Conservancy, or Natural Lands Trust. (Refer to Chapter 8 Park, Recreation, and Open Space for more information).

LOCAL AGRICULTURAL PLANNING AND ZONING

Section 603(5) of the Pennsylvania Municipalities Planning Code (MPC) authorizes zoning provisions “for the protection and promotion of natural resources, and agricultural lands and activities.” One of Solebury’s goals is to preserve farmland and agricultural soils. Recent Court decisions (see box below) have made it clear that agricultural land is not considered land held in reserve for development but rather a

Court Decision Summary

Heritage Building Group, Inc. v. Plumstead Township Board of Supervisors.
Commonwealth Court of Pennsylvania. No. 3020 C.D. 2002. October 17, 2003.

This case involved Heritage Building Group, Inc. substantive challenge to the validity of Plumstead Township’s zoning ordinance, alleging that the township failed to provide for its fair share of land for multi-family housing. In 2001, the Board of Supervisors issued a decision and order denying Heritage’s validity challenge and rejecting its proposed curative amendment. The Court of Common Pleas of Bucks County affirmed the decision of the Plumstead Township Board of Supervisors. On appeal, the Commonwealth Court agreed with the Board that the term “developed” for purposes of the *Surrick* analysis should include active agricultural uses (e.g., crop farming, general farming, farm support, nursery and horticultural uses). As the Board noted, nothing in *Surrick* suggested that land developed for agricultural purposes could not be considered “highly developed” for the purposes of determining how much land was available in a municipality for construction of housing. The effect of this ruling is that agricultural land in Pennsylvania is a legitimate land use with a specific purpose and value to a municipality.

legitimate land use with a specific purpose and value. Solebury Township supports this philosophy and supports the land use policy of preserving the function and vitality of its agricultural community. Productive agricultural soils are resources that are not renewable once removed for development.

Solebury allows agricultural uses and buildings in several zoning districts that embody the majority of the land area of the township. Agricultural uses are permitted in the RA Residential/Agricultural District, RB Residential/Agricultural District, and RD-C Residential Development – Conservation District. Within these zoning districts, the Resource Protection Standards in the zoning ordinance require that 80 percent of Prime Agricultural Soils (Class 1, 2, and 3) be protected. This requirement can be reduced to 50 percent by conditional use if additional resources are protected. The zoning ordinance states that the Board of Supervisors may grant conditional use approval to permit certain natural resources to be preserved in a percentage less than 50 percent, if the applicant satisfies the application procedures that includes the preparation of an Existing Resources and Site Analysis Plan and Resource Conservation Plan and consideration of prescribed standards and guidelines.

Solebury's current zoning provisions function as a form of agricultural preservation zoning.

SUSTAINABLE FARMING

Sustainable agriculture refers to an integrated system of plant and animal production practices having a site-specific application that will, over the long term:

- satisfy human food and fiber needs;
- enhance environmental quality and the natural resource base upon which the agricultural economy depends;
- make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls;
- sustain the economic viability of farm operations; and
- enhance the quality of life for farmers and society as a whole.

Sustainable farming is based on an understanding of the unique agricultural capabilities and carrying capacity of the site, considering factors such as slopes, quality of soil, air drainage, and water availability, so that a uniquely suitable farm plan can be developed for each site.

The increasing consumer interest in sustainably-raised specialty crops, organic foods, and gourmet farm products provides new opportunities for local farmers to serve the local market and to supply nearby regional markets.

Sustainable farming practice includes mitigating runoff from nutrient-laden farm fields by good management practices that reduce surface runoff and soil sedimentation. To reduce the risk of contamination from pesticides, farmers reduce the use of fertilizer and use no-till practices and Integrated Pest Management techniques based on specific soils, climate, pest history, and crop conditions.

Solebury Township will continue to promote sustainable farming practice that is mindful of the carrying capacity of the land while protecting the environment, so that the township can support farming for future generations in harmony with the surrounding residential community and consistent with the intent of Act 38, the Agriculture, Communities, and Rural Environment (ACRE) legislation. ACRE legislation took effect in 2005 and is important for farms because it helps to balance the legitimate business interests of agriculture with the environmental concerns of local citizens and elected officials. Municipalities are prohibited from adopting ordinances that restrict normal farming operations if those restrictions are in conflict with state law.

CHALLENGES AND EMERGING OPPORTUNITIES

The loss of prime agricultural soils and conversion of farmland to development has long been a trend affecting farmers throughout the county. Farmland tends to be flat- to moderately-sloped and well-drained, making it suitable for development. Challenges to sustainable farming include preserving fertile farmland soil and attracting new farmers. In 2007, the average age of a farmer in Bucks County was 57.2 years of age, and few young people choose agriculture as their lifetime vocation, although there has been a rise in niche farming operations typically managed by younger business owners. Fragmentation of farms and services has been occurring over several decades in the Delaware Valley region as new development radiates into the countryside.

Development of rural areas requires remaining farmers to travel farther to farm leased farmland. Farmers must also travel farther for product processing and equipment services.

AGRICULTURAL ACCESSORY USES

More farmers are becoming engaged in value-added processing of farm products and farm-based businesses to increase dwindling profit margins. The diversification of agricultural crops, including the development of vegetable and specialty crops, has expanded and strengthened the locally-grown food supply. Niche and specialty markets have emerged from the traditional farm stand and increases have been seen in the number of farmer's markets throughout the County.

Solebury has a variety of farming operations including crop farms and farms providing local food supplies. A group of farm markets with retail components are important parts of the township's economy and community and include: Beech Tree Farm; Manoff Market Gardens; Solebury Orchards; and Spring Hill Farm. These farmer's markets provide fresh produce and goods directly to the consumer. Local restaurants purchase local farm produce.

Many farmers are providing special and unique products, services, and entertainment to local and regional patrons, who often are not able to experience the pleasures of rural life where they live. Solebury's zoning ordinance defines "accessory use" as "the use conducted on the same lot as a principle permitted use to which it is related. A use that is clearly incidental to and customarily found in connection with a particular principle permitted use." As long as a farm stand remains incidental, it is not likely to evolve into the resemblance of a full-scale large supermarket, generating excessive traffic in a residential area.

Pick Your Own produce, seasonal hayrides, corn mazes, and other agri-tourism and agri-business enterprises are part of local farming trends to keep farms profitable. Allowing for agricultural-related businesses that are incidental to the agricultural use, with safeguards to reduce impacts on the surrounding properties, will benefit farmers. Permitting agricultural-associated services, such as farm supply stores, machinery and parts suppliers, and feed operations may also be warranted in appropriate areas to serve the existing farming community.

For properties held under agricultural easements, providing flexibility for its continued use should be examined. Assessing the terms and conditions of existing agricultural easements to ensure that any new or innovative farming activities are encouraged may be particularly useful. Expanding accessory uses to include farmer's markets, farm businesses, and accessory structures such as temporary tunnel greenhouses, could be explored for those lands held under easement.

Additionally, since farming is labor intensive, Solebury may consider allowing a reasonable provision of accessory housing for farm employees, giving preference to adaptive reuse of existing farm structures.

To strengthen and diversify agriculture operations in the township, officials will evaluate the addition of appropriate agricultural accessory uses.

ALTERNATIVE ENERGY SOURCES

Another emerging regional farm trend is the demand for agricultural crops that are used in the production of alternative energy sources such as ethanol. The demand for crops such as corn, soybeans, and switchgrass for the use in energy production may help farmers growing these types of crops.

Other alternative energy facilities associated with farm uses include accessory wind turbines and solar panels that help meet on-site electricity needs to operate the farm. The development of anaerobic digesters on farms, which capture methane gas from cow manure to create electricity, also have been used to supplement the Commonwealth's mandate for utility companies to provide a portion of power from renewable energy sources.

SOLEBURY FOOD SUPPLY

The northern area of the township has seen the introduction of very successful fruit farms. These farms and other types of farms are producing healthful food, creating social assets for residents and visitors, and are a very distinctive part of the Solebury experience.

By purchasing from local farms, Solebury residents can support their own local farm economy. As Solebury consumers become more self-reliant for food, they are less vulnerable to disruptions in food pricing and supply. Solebury can provide assistance

in bringing together the local farmer with the local consumer, by publishing local sources for produce, or through the sponsorship of a local farmer's market.

Community Supported Agriculture (CSA) makes an economic and working partnership between a farm and the farm retail market, as consumers purchase shares in the seasonal harvest. For the farmer, part of the cost of raising capital is reduced, along with part of the risk of a poor harvest, while shareholders gain a greater sense of community with the farm and benefit from fresh foods locally grown. Recently, Roots to River Farm opened as a CSA within the township.

A Community Agricultural Area (CAA) is open space land that is set aside and dedicated by easement to community share agriculture in new subdivisions or greenbelt areas buffering villages. For open space of good soils, residents can lease plots seasonally, with the provision of a common irrigation source and fencing provided by the township or volunteer efforts.

New residential subdivisions could be designed with a provision of open space land to accommodate different types of farming. The Open Space Development option may be designed to accommodate horse farming, with open space in pasture, and a community barn and turn-out area, with loop riding trails. Or, a subdivision may be planned for orcharding, where land is leased to a farmer, and subdivision residents share in the harvest and harvest chores.

FARMLAND BUFFERS

Increased residential development in a rural community can cause friction between farms and new neighbors. Suburbanites might react unfavorably to farm noises at early hours in the morning, or barnyard odors. Planning and zoning should not restrict lawful farming operations, but should seek to reduce residential densities in farming areas, and provide buffering and setbacks between farms and new residences.

Section 1814.D of the zoning ordinance requires the provision of a special setback for new development located adjacent to preserved farmland. Buildings and principle structures are required to be at least 200 feet from the lot line of the preserved farm. A buffer yard that includes planting and a split rail fence is required on the development side of the lot line to prohibit encroachment on farmland, interference with farming operations, and disposal of yard waste. Since not all farms may be designated as

'preserved farmland,' township officials will consider expanding the context of farmland buffers to all working farms.

Chapter 6

WATER RESOURCES AND RELATED FACILITIES

WATER RESOURCES: CENTRAL TO A SUSTAINABLE COMMUNITY

The township is completely dependent on ground water for water supply. Public health, safety and welfare can be protected when no degradation of quality or diminishment of quantity of water occurs.

The ability to obtain ground water for water supply is a function of underlying geology. Recharge of the ground water reservoir is a function of soil infiltration capacity, land cover, topographic characteristics, and management of stormwater runoff and methods of wastewater disposal.

Solebury Township recognizes the importance of water resources with its *Solebury Township Water Resources Protection and Management Program*, designed to ensure that water resources meet the needs of current and future residents, with an emphasis on both surface water and ground water quantity and quality.

WATER SUPPLY/WASTEWATER DISPOSAL/ STORMWATER MANAGEMENT INTERRELATIONSHIP

Sustaining water resources requires management of water supply, wastewater, and stormwater facilities. Ground water resources are vulnerable to disruption of recharge capabilities as a result of development, through a combination of water withdrawals, increases in impermeable surfaces, exportation of wastewater, and the collection and discharge of stormwater runoff when recharge opportunities are bypassed. Extensions of wastewater and central water services have implications for development potential as well as for water resource protection.

On-lot wastewater disposal systems such as septic systems and sand mounds provide a ground water recharge benefit, provided no system failures occur that contaminate underlying aquifers or surface waters. Stream discharge of any wastewater effluent into surface waters should be avoided.

The township requires the infiltration of stormwater runoff for all new development to achieve no net change in the water budget locally and in any watershed in Solebury Township. Practices such as conservation design, where impervious surfaces are limited and natural vegetation is conserved on the site, will continue to be encouraged. The Traditional Neighborhood Commercial (TNC) district has incentive provisions to conserve water and maximize groundwater recharge. The township will investigate potential ordinance provisions similar to the sustainable design incentives provided for the TNC district that could be applied to other areas in the township. Ordinance provisions and management strategies can be applied to maintain the ground water reservoir and stream baseflow.

WATER SUPPLY FACILITIES

Solebury's residential and nonresidential properties rely on community wells and individual on-site wells, privately owned and operated by each lot owner. Even though the township's eastern border is the Delaware River, it is not a public drinking water source for the township.

Several residential areas are served collectively by community water systems supplied by one or more wells. Aqua Pennsylvania, Inc. owns and operates a community water system that serves Peddler's View development and uses a well with a safe yield of 109,000 gallons per day and a current use of 34,000 gallons per day. Six other small community systems in Solebury have pumping capacities of over 800,000 gallons per day.

The Bucks County Water and Sewer Authority (BCWSA) operates the largest community water system in Solebury and provides water to 638 connections in an area that is approximately the same as the municipal sewer service area (discussed below). The BCWSA uses ground water from four wells with safe yields ranging from 49,400 to 208,800 gallons per day. The system contains two storage tanks with a combined storage of 794,000 gallons of water.

Whether the water system is an individual on-site or a larger community system, water withdrawals constitute a subtraction from the groundwater reservoir. Pumpage will create a cone of depression⁷ surrounding the wellhead where the most significant

⁷ For more on cones of depression see p. 14 USGS W.R.

withdrawal of groundwater occurs. At the same time the entire water table level in the system is reduced. Such reductions to groundwater can result in reductions to stream baseflow.

As part of the township's environmental impact assessment, ground water and surface water impact studies are required with plans for proposed development.

State laws do not require testing of private domestic water supplies, and regulatory agencies do not regularly monitor the quality of private wells. However, the Bucks County Department of Health began certifying new private wells in 2005 to prevent residents from drinking contaminated water. The township conducted a well survey in 2013 to collect data on total coliform, fecal coliform and nitrate. Results of this survey are available in the township's Act 537 Sewage Facilities Plan.

The protection of water supply systems can involve a wellhead protection program that delineates protection areas for wells and springs, the identification of potential sources of ground water contaminants, and the development of management measures to reduce the potential for contamination of the ground water supply. Development of a wellhead protection program is voluntary, but PADEP regulations do include some basic wellhead protection measures for new public water supply wells and springs or areas of infiltration. The creation of a wellhead protection program will allow for coordination of water resources, wastewater facilities, and land use planning to help achieve the goals of integrated water resources planning.

A factor with significant impact to Solebury's ground water supply has been the continuous pumping at the New Hope Crushed Stone and Lime Company. This quarry is located off Phillips Mill Road, adjacent to the Primrose Creek. The quarry operation and its impacts to groundwater levels and surrounding wells was the subject of a study entitled "Primrose Valley Groundwater Level Study, 1997-1998, Solebury Township, Pennsylvania" prepared by Vincent Uhl Associates, Inc. for the township. The quarry began operations in the 1800's. The report notes that the long-term pumping for quarry dewatering has resulted in the development of a hydrologic sink for ground water and surface water. Ground water flow in the immediate vicinity is directed from all four compass directions to the quarry pumping center. The report concludes, "The data and historical record are definitive in their depiction of a deep cone-of-water-level depression present in the valley as a result of the quarry pumpage. This cone reaches

outside the valley itself and extends into a small drainage basin to the northeast of the quarry.” The report recommends monitoring water levels in the area (immediate and long-term), further study of the water balance in the area, and action to correct imbalances.

A second study was completed in 2009 by Environmental Planning Associates, titled “Assessment of Primrose Creek and Watershed in relation to the New Hope Crushed Stone Quarry, Solebury Township, Pennsylvania.” The study found the average reported discharge from quarry pumpage averaged 1.99 million gallons per day and that, between the years of 1974 and 2008, the pumping from the quarry lowered the water table by 100 feet below the surface of the ground. The report concludes that activities from the quarry have significantly altered the flow regime in Primrose Creek, with diminished flows upstream and higher flows downstream with discharges affecting both the macro-invertebrate community and chemical composition of the stream. Suspended solids were 75 times higher below the stream than equivalent reference stream locations. The study recommends a restoration of the natural stream flow pattern, which will be achieved only after a cessation of quarry pumping.

The Primrose Creek Watershed Association (PCWA) and Citizens for Pennsylvania’s Future (PennFuture) have entered into a Consent Order and Agreement with the Pennsylvania Department of Environmental Protection and New Hope Crushed Stone (NHCS). The consent order resolves an appeal filed by PCWA and PennFuture that contested PaDEP’s issuance of a permit revision in 2011 allowing NHCS to dig to a deeper level at its quarry. While allowing the permit revision to remain in place, the consent order requires NHCS to perform remedial work that PCWA and PennFuture could not have obtained through their appeal. Specifically, the consent order sets deadlines for NHCS to undertake work relating to:

- Stabilization work on sinkholes that are impacting Primrose Creek
- Stream channel stabilization and restoration
- Cleaning and maintaining the culvert under the PECO right-of-way which impacts stream flow below the quarry
- Monitoring the quality of the water being discharged from the quarry into Primrose Creek.

Solebury Township entered into a settlement agreement with NHCS and DEP, and agreed to drop the appeal of the NHCS permit to the PA Environmental Hearing Board. However, Solebury School is in on-going litigation with NHCS and the DEP regarding possible damage on the school's property due to the quarry operations. As of July, 2014, the Environmental Hearing Board (EHB) has rescinded the depth correction to the Surface Mining Permit issued by the DEP allowing the quarry to mine to a depth of 170 feet below mean sea level (Source: Adjudication in EHB Docket No. 2011-136-L). The EHB found that the quarry was creating a public nuisance, causing and perpetuating a hazardous condition on its neighbor's property that endangered public health, safety and welfare. This ruling is likely to be appealed.

The township has allocated a reasonable amount of land zoned for mining operations and does not plan to expand its industrial district. Additional provisions for Best Management Practices⁸ for quarry operations could include strategies to minimize water usage, improve wastewater collection and treatment, water reuse, and sludge management, as well as reclamation planning for sustainable reuse of the site when quarrying is complete.

WASTEWATER FACILITIES

Preserving sustainable water resources is dependent on how wastewater is handled. Wastewater collection and conveyance systems can drain ground water discharging off-site. One key to sustainability of water quantity is to rely on land-based treatment systems which recycle treated wastewater effluent water back to its source, as close to the point of "origin" as possible. Of course, this is not always possible. Where soils are poor and impermeable (shallow depth to bedrock, high water table, and other constraints), they are not likely to be acceptable for various approaches to land application of wastewater effluent. Nevertheless, there are opportunities to achieve ground water sustainability objectives by integrating land-based wastewater treatment. New technologies such as drip irrigation are expanding the wastewater management toolbox and allowing for greater flexibility even at problem sites.

Much of Solebury Township is dependent on individual on-lot wastewater disposal systems. On-lot sewage disposal systems such as septic fields and sand mounds

⁸ FMI visit:

[www.genuinestone.com/content/file/Best%20Practices/QuarryBestPractice020809\(1\).pdf](http://www.genuinestone.com/content/file/Best%20Practices/QuarryBestPractice020809(1).pdf)

provide a ground water recharge benefit. Regular maintenance and rehabilitation of failing systems are required to prevent contamination of ground water and streams. The township's Act 537 Sewage Facilities Plan confirmed the location of 36 on-lot disposal system malfunctions and indicates that there are an additional 194 suspected and potential malfunctions. To reduce failure rate of on-lot systems, the Act 537 Plan provides action alternatives to ensure the continued use of these disposal systems through the following measures:

- Sewage management program,
- Public education,
- Well alteration,
- Administrative component, and
- Sewage management program data analysis to identify other needs areas.

In addition to individual on-lot sewage disposal systems, community sewer service is provided to 214 lots in the Peddlers View development by a lagoon system operated by Aqua Pennsylvania, Inc. There are also a few individual and non-municipal DEP permitted sewage systems such as the facility that serves the section of Washington Crossing State Park within the township.

The more densely developed portion of the township, on either side of Route 202 and all of New Hope Borough, are served by a municipal wastewater treatment system operated by the Bucks County Water and Sewer Authority (BCSWA). Approximately 750 lots in Solebury, including the Fox Run, Ingham Mews, Yorkshire Meadows, North Pointe, Wilshire Hunt, and Fieldstone developments and the Logan Square Shopping Center, are served by this system. Wastewater effluent is collected and conveyed through pump stations and force mains across the Delaware River to a treatment plant located in New Jersey and operated by the Lambertville Municipal Utilities Authority (LMUA).

The wastewater treatment plant is permitted for 1.5 million gallons per day, with flows averaging 855,000 gallons per day. In addition to Solebury Township and New Hope Borough, it serves Lambertville, Stockton, and Delaware Township in New Jersey. The BCWSA has contracted for 625,000 gallons per day of the plant's treatment capacity,

and as of 2012, had utilized 461,000 gallons per day, of which 200,000 gallons per day is attributed to Solebury connections.

The township prepared an Act 537 Sewage Facilities Plan in 1970, revised it in 1992, and again in 2014. The 1992 plan revision reported the need for several wastewater conveyance improvements including pump station upgrades, a force main extension, and reconstruction of the Delaware Canal cast-iron pipe crossing. The 2014 plan revision reports that several upgrades have been made to the system including replacement of the main transmission Pump Station No. 3 on East Randolph Street in New Hope, and with a new pump station located along the Delaware River on East Bridge Street. The installation of a new 12-inch force main to route the discharge directly into the Lambertville Municipal Utilities Authority wastewater treatment plant has also been constructed. The Authority made improvements to the wastewater treatment plant and a pumping station to address discharge permit violations. Because of the recent improvement projects, no known conveyance, treatment or capacity issues have been identified by BCWSA or LMUA.

The township should continue to prohibit small-flow treatment facilities with direct discharge into creeks, streams and the Delaware River. This is especially relevant in Exceptional Value (EV) and High Quality (HQ) designated streams. The Act 537 Plan outlines the priority of alternatives to be considered for both new and malfunctioning on-lot sewage disposal systems. The Plan's intent is to specify the desired methods of on-lot systems to be utilized and to require applicants to substantiate why a higher ranked method will not function before proposing to employ a lower-ranked method of disposal.

Conveyance and discharge of Solebury and New Hope sanitary wastewater effluent to the Lambertville Municipal Utilities Authority for direct discharge into the Delaware River is a missed opportunity for recharge of the township's ground water resources. The 1992 Act 537 Revision looked at two alternative solutions to the anticipated wastewater treatment capacity shortfall: expansion of the Lambertville Sewage Treatment Plant, and construction of a new treatment plant in Solebury Township. The Plan Revision concluded that a second treatment plant built in Solebury was considered to have greater adverse environmental impacts than an expansion of the Lambertville

plant since a new Delaware River discharge source would be required. The 2014 Act 537 Plan reaffirmed this conclusion.

A Selection of Sewage Disposal Alternatives and Alternatives Evaluation of New or Improved Wastewater Disposal Facilities is required by the Act 537 Plan, and includes the following:

1. Public Sewage Facilities – Progression of public sewer within the designated public sewer service areas shall be consistent with existing service agreement.
2. Individual and Community On-lot Sewage Facilities – Lots outside of the public sewer service areas shall continue to utilize on-lot sewage disposal systems. Extension of public sewers into a non-sewered area of the township shall be permitted only to abate an existing public health concern and only after approval of the township Board of Supervisors.
3. Private Sewer Systems - Privately owned sewage facilities which comprise of state-owned treatment facilities with National Pollutant Discharge Elimination System (NPDES) permitted stream discharges and small flow treatment facilities with NPDES permitted discharges will continue to operate in accordance with their system life expectancy until the facilities need to be upgraded or public sewer service becomes available. On-lot sewage disposal is not an option for these facilities due to site constraints.
4. On-lot Sewage Disposal Priority Alternatives – This section provides a hierarchy of system types for new on-lot disposal systems and community on-lot disposal systems.

STORMWATER MANAGEMENT

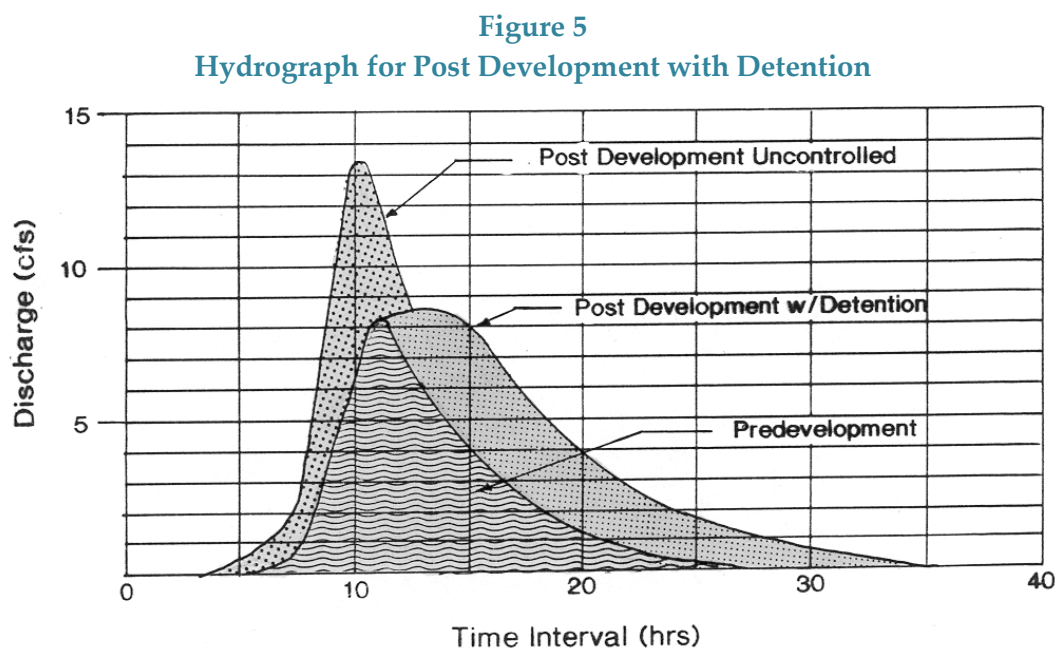
When stormwater is not properly managed, the increased volume of runoff flowing into the local waterways can cause serious impacts to the stream system, affecting its very nature and the health of the aquatic community within that system. Impacts can include:

- Flooding,
- Stream bank erosion,
- Bank undercutting,

- Elimination of meanders in waterways,
- Changes in the essential morphology of the stream, including channel widening and straightening,
- Increased sedimentation and deposition,
- Elimination of pools and riffles, and
- Reduced stream ecological value.

Over time, these impacts can transform a high quality stream, with excellent species diversity and richness, into a functional storm sewer.

Traditionally, controlling the peak rate of runoff through detention (commonly in basins) has been the preferred method to slow down runoff and prevent flood damage. Detention basins allow runoff to move through both manmade and natural watercourses in a reasonable timeframe and keeps large volumes of runoff from converging in the main stem of a stream at one time. Figure 5 shows how detention controls the volume of runoff to reduce the rate.



While basins are effective at slowing down the rate of runoff to prevent flooding and do allow some pollutants to settle during larger storms, the practice presents some challenges. Most often the basins are lined with turf grass which provides little to no infiltration or evapotranspiration. They are commonly designed with concrete channels

down the center which provide little opportunity for sediment to settle during small storm events. And if not properly maintained, standing water can accumulate and breed mosquitoes.

The newest movement within the field of stormwater has moved away from the use of stock-engineered solutions, such as detention basins and piped conveyance systems, and instead aims to treat stormwater as a water resource and uses practices which protect the runoff quality. These practices are known as Best Management Practices (BMPs) and the techniques are designed to keep the stormwater onsite by controlling the volume through infiltration, storage, evapotranspiration, and groundwater recharge. These practices reduce pollutants and attempt to mimic the natural hydrologic cycle by practicing low impact development design before resorting to structured stormwater facilities.

A wide array of impact reduction and site design techniques can be used to create stormwater control mechanisms that function in a manner similar to that of nature to create a hydrological balanced development site. These often involve volume reducing non-structural BMPs. These practices are required by Solebury Township's stand-alone Stormwater Management Ordinance, which was adopted to enable the Township to comply with Act 167, the Pennsylvania Stormwater Management Act of 1978, and the associated county stormwater management plan.

The township's Stormwater Management Ordinance requires any new development or re-development project proposing over 1,000 square feet of impervious surface to evaluate the use of non-structural controls and must follow the ordinance criteria to infiltrate or evapotranspire the stormwater on-site to protect ground water recharge, water quality, and reduce the likelihood of streambank erosion, as well as reduce the peak rate flows to pre-development levels. Requiring innovative stormwater management practices for all new development and re-development assists in recharging ground water supply. The ordinance institutes these measures including rain gardens. The township will continue to encourage innovative non-structural stormwater management practices which mimic the natural water budget through BMPs to capture, reuse, infiltrate, and evapotranspire the runoff. In addition, periodic review of new techniques and BMPs should occur, and the township ordinances should be revised accordingly.

Although stormwater runoff is required to be controlled by the standards and criteria in the Stormwater Management Ordinance, the ordinance only regulates new development or redevelopment. Existing runoff problems are only corrected if the township or individual property owners attempt to remediate these drainage problems on their own initiative. Some of the existing problems, especially when it involves retrofitting aging infrastructure, requires extensive planning and re-engineering, a significant cost to the township or a property owner. Funding for improvements may be available through grants from federal, state or private agencies. Some sources of funding for municipal stormwater retrofit projects include the state's Pennsylvania Department of Environmental Protection (PaDEP), the Department of Conservation and Natural Resources (DCNR), the Environmental Protection Agency (EPA), or PennVEST, and Pennsylvania's Infrastructure Investment Authority. As on-going stormwater issues arise, the township should consider applying for funding to fix the area(s).

One relatively easy improvement to consider to enhance runoff quality discharging from a storm sewer system, is to naturalize older grass-lined stormwater detention basins. Naturalizing a basin involves removing concrete channels, planting native trees, shrubs and grasses and creating buffers to redirect the stormwater to meander throughout the whole basin. Retrofitting the basin in this way helps to treat the stormwater from small storms as it increases the time the runoff stays in the basin which allows for the settling of sediment and encourages the uptake of the excessive nutrients by plants. Naturalizing basins also eliminates the need for periodic mowing, reducing the overall maintenance cost. And with the proper vegetation, a naturalized basin can become an aesthetic amenity in the community.

As mentioned above, it is essential that stormwater not just be controlled to reduce flooding, but to be treated as a water resource. Stormwater runoff quality should be prioritized to protect streams and waterways. The following section discusses the importance of reducing pollutants flowing into the township's streams and what Solebury is doing to address this problem.

WATER QUALITY AND STORMWATER

When stormwater flows over land affected by human activities such as farming, manufacturing, land excavation/grading, treated lawns, and impervious surfaces, it picks up and carries sediments, oil, debris and pollutants into the streams. These

pollutants either come from a specific source, known as ‘point source pollutants’, or the source or cause may come from many different places or land activities, i.e., ‘nonpoint source pollutants’. Non-point source pollutants are often cited as the primary water quality problem in the nation today. They vary with type of land use and intensity of land use and have been shown to include bacteria, suspended solids (including sediment), nutrients such as nitrates, hydrocarbons, metals, herbicides and pesticides, toxins, and organic matter. Pollutant loads are generated both from paved and impervious areas which are created “hot” spots (e.g., gas stations, parking lots, and heavily traveled roadways) as well as from pervious zones, such as chemically-treated lawns and ground near salt treated walkways and roadways. Some nonpoint pollutants are even air-borne, deposited onto the land surface and then washed into receiving water bodies. Examples of sources of nonpoint pollution include:

- Vehicles (oil, grease, antifreeze, gasoline)
- Road surface applications (salt, sand, oiling, repaving, etc.)
- Vegetative decay (leaves, grass clippings etc.)
- Direct atmospheric deposition (acid rain)
- General litter, including pet litter
- Soil erosion
- Fertilizers and pesticides/herbicides

Based on the 2009 study of the township’s water resources, it was found the following streams are experiencing water quality problems. Downstream from the quarry, Primrose Creek has tested for suspended solid concentrations more than double than that observed in other locations of the creek. The sediment loading would classify as a point source pollutant as it is a direct source from mine drainage. The study found that the high concentrations of sediment has degraded the habitat quality, decreasing the diversity of fish and macroinvertebrates. In addition, nitrate concentrations are a concern in Cuttalossa and Aquetong creeks. The nitrates can be attributed to a number of sources including, fertilizer, manure, and failing septic systems or natural sources. Bacteria (fecal coliform and *E. coli*) concentrations are highest in the middle branch of the Paunacussing Creek, at a location downstream from an agricultural property in a neighboring township, and in Primrose Creek, where the source could be from animal feces such as livestock.

These examples from the water resources study demonstrate pollutant-laden stormwater brings obvious water-quality impacts to receiving streams. Some of water quality problems identified in the study (problems downstream from the quarry) need remediation strategies that may go beyond the basics of everyday best management practice techniques. Overall, however, it is generally accepted that stormwater BMPs that promote ground water infiltration and the uptake of stormwater by vegetation through evapotranspiration, can reduce pollutant loads and improve the quality of runoff before reaching the stream system.

The water resource study also makes recommendations on how to address the existing water quality problems. In addition to utilizing proper stormwater management practices, the study recommends conducting streambank erosion assessments and restoring riparian buffers along stream segments currently at risk. Riparian buffers are required for any new development or re-development within the township's Riparian Corridor Conservation District. This district includes properties adjacent to any of the creeks and tributaries of the major watersheds in the township (Aquetong, Pidcock, Paunacussing, Primrose, and Cuttaloosa) on the property. It also applies to properties adjacent to the Delaware Canal and those which contain exceptional wetlands. Any other riparian buffer restoration within the township on existing properties would have to be undertaken on a voluntary basis.

To protect water quality, the state requires the township to fulfill requirements in the National Pollution Discharge Elimination System Permit (NPDES), a two-phased federal program that seeks to establish local regulations resulting in a nationwide reduction of the pollutants in waterways. Solebury has complied with the NPDES program by submitting annual reports to DEP signifying how the municipality is meeting incremental elements of the program, part of which is engaging in public education and outreach through the township website and newsletter.

To meet the NPDES requirements, Solebury has also instituted an Illicit Discharge Detection and Elimination (IDDE) program. As part of the program, the township mapped, and each year screens, their stormwater outfalls to monitor and detect any discharges that are not entirely composed of stormwater. Illicit discharges are regulated in the stormwater management ordinance (Article VIII). The ordinance lists certain discharges which are permitted (those which have been found to not significantly

contribute to pollution of surface waters). Examples of such discharges include firefighting activities, water from crawl space pumps, dechlorinated pool water, landscape irrigation, and air conditioning condensation. In addition, the program includes the development of a stormwater management operation and maintenance (O&M) manual which Solebury follows and re-evaluates annually. The manual details the regularly scheduled inspections and maintenance of all the township-owned stormwater management facilities.

To reduce the likelihood of excess sediment flowing from land development sites, the township provides educational packets on proper procedures to follow to meet the erosion and sedimentation control (E&S) requirements, and an official will meet one-on-one with residents to answer questions about stormwater and erosion control, free of charge. They also utilize the EAC and encourage local watershed groups to educate residents on the importance of stormwater management.

After stormwater facilities are constructed, it may be difficult for township officials to monitor privately-owned facilities which are privately-owned. While the above education efforts are helpful, they may not ensure that landowners are fulfilling their maintenance responsibilities. The stormwater management ordinance requires that all new BMPs have established operation and maintenance (O&M) agreements to ensure someone is responsible to conduct the necessary work for the facility to function properly. In cases where the proper O&M is not taking place, there are provisions provided in the ordinance to permit the township to take action against a landowner. But often, by the time the township discovers there is a problem, the infrastructure may already be in disrepair. In order to better detect failing infrastructure, it is recommended that the township begin to track privately-owned BMPs as a part of the IDDE program.

WATERSHED ASSOCIATIONS

The following four independent watershed associations work within the township to protect and enhance water resources:

- Aquetong Watershed Association,
- Paunacussing watershed Association,
- Pidcock Creek Watershed Association,

- Primrose Creek Watershed Association.

These organizations perform vital services, including the following:

- advising municipalities on ordinances to strengthen water protections,
- tree planting and riparian corridor improvements,
- community outreach and education,
- water testing,
- implementing Best Management Practices (BMPs), and
- obtaining grants for studies and improvement projects.

Solebury's citizens play a vital role in safeguarding water resources through their support and participation in these organizations.

Chapter 7

HISTORIC, CULTURAL AND SCENIC RESOURCES

Historic and Cultural resources – scenic and historic landscapes and local artistic heritage, though less clearly linked to basic human needs, play a major role in defining the quality of life. Their conservation clearly bears on the question of equitable sharing of resources with future generations, and once displaced, they cannot be renewed.

Historic and cultural resources help maintain the sense of place that has attracted residents to Solebury Township, as demonstrated by the results of the resident survey. These findings and the overwhelming approval of the referendums to preserve open space and farmland underscore the importance of Solebury's natural, scenic and historical landscapes. These landscapes constitute the unique natural and cultural resources that have inspired numerous artists, provided food and shelter to generations dating back to colonists and indigenous peoples, and continue to draw residents and visitors.

The township is an important trustee of the natural and cultural resources that characterize Solebury. The township desires to conserve and maintain these resources in a sustainable manner for the benefit of all of the residents, current and future.

HISTORIC RESOURCES

Not many places share Solebury's wealth of unique and irreplaceable historic resources. Despite some change in the landscape, from Bowman's Hill to Ingham Spring to the village centers, there remains in Solebury almost a timeless sense of history. Conservation of historic resources is not just for Solebury today; it is for future generations who may learn from and appreciate their past. Historic resources, which include structures, sites, and landscapes, are central to the definition of Solebury's special sense of place: they impart the area's heritage and guide and inspire new development.

A wealth of historic resources date from the advent of European settlement in the seventeenth century. The area had earlier been inhabited by the Wolf Tribe of the Lenni-Lenape Indians. Although there are few obvious reminders of pre-European settlement,

areas adjacent to a watercourse often yield artifacts, based on the general settlement patterns of Native Americans in this region.

In 1681, King Charles II conveyed a large tract of land to William Penn, creating the first boundaries in the area. Many English Quakers settled in the area around the year 1700, at which time Solebury was part of Buckingham Township. The exact date of separation from Buckingham is not known, but it is believed to have occurred before 1703, when Solebury consisted of 28 tracts of land, distributed among 23 landowners. Agriculture played a dominant role throughout Solebury's development. Solebury has the highest number of well-preserved large stone farmhouses and barns in Bucks County, including one of the highest concentrations of eighteenth-century stone structures. Early highways, such as the Upper and Lower York Roads and Pennsylvania Canal, played a significant role in the development of the township. Numerous buildings and places are associated with the American Revolution.

Seven villages or hamlets developed in a scattered pattern across Solebury Township. These include Aquetong, Carversville, Centre Bridge, Cottageville, Lumberville, Phillips Mill, and Solebury. An eighth hamlet or cluster of historical structures is found at Cuttalossa, essentially an extension of the village of Lumberville. Each village has a distinctive quality and contributes to establishing the character of the area that immediately surrounds it, as well as the township as a whole. Some villages are defined by natural or physical features; others have boundaries that are not so easily discerned. The historical and architectural characteristics of each village are unique, irreplaceable, and worthy of preservation.

Historically, the predominant land use in many of the villages was residential; however, a few were more commercially oriented. Building types associated with commerce mostly fall into the category of agricultural service activities. Businesses included taverns, hotels, blacksmith shops, general stores and combination shops. Many of these old commercial structures have survived with good structural integrity.

Religion also wrought a legacy on the historical landscape. Some of the churches that held services for the original Quaker, Episcopalian, and Presbyterian settlers survive today.

In 1992 the Heritage Conservancy (then Bucks County Conservancy) completed the Bucks County Historic Resource Survey. The survey documented all pre-1941 historic resources not already listed on the National Register of Historic Places (individually or in districts). In all, there are four individual properties in Solebury Township listed on the National Register and 311 located within National Register districts or National Historic Landmarks.

George Nakashima Woodworker complex was placed on the National Register of Historic Places in 2008, and in 2014 was designated as a National Landmark as by the U.S. Department of the Interior. The internationally-renowned furniture designer and woodworker is recognized as one of America's preeminent furniture designer craftsmen. The George Nakashima Woodworker complex is significant for its innovative Japanese-influenced International Style structures designed by Nakashima and built under his direct supervision. As a self-proclaimed "woodworker," Nakashima became an important voice for the artist craftsmen helping to create a new paradigm for studio furniture production in the postwar period. The Honey Hollow Watershed, comprising 17 properties, was designated a National Historic Landmark in 1969, as authorized by the Historic Sites Act of 1935. This honor recognizes the significance of earlier efforts by Honey Hollow landowners to manage soil, water, forest, and wildlife in accordance with a total watershed conservation plan. Although the Landmark status does not afford any special protection for the site, it does imply a preservation commitment on the part of Honey Hollow residents. The Delaware Division of the Pennsylvania Canal and Washington Crossing State Park also are listed as National Historic Landmarks.

In addition to the above noted historic landmarks, there are five National Register historic districts in Solebury, including Carversville (95 properties), the Upper Aquetong Valley (32 properties), Centre Bridge (59 properties), Lumberville (82 properties), and Phillips Mill (16 properties).

The Conservancy's 1992 Survey concluded that another 33 individual properties were clearly eligible for National Register designation. In addition, both Aquetong village and Solebury village have had preliminary studies done to have them listed as districts on the National Register. The Survey concluded that both villages appear eligible. There are other collections of buildings that do not appear immediately eligible as districts

based on architecture alone. They are the small hamlet in the northwest corner of the township known as Cottageville and a collection of buildings on Old Windy Bush Road. Both areas are worthy of future study as possible National Register historic districts.

The Survey also concluded that as many as 48 individual properties did not appear to be immediately eligible for listing on the National Register, but possessed architectural or historic significance worthy of future study. Some of these were documented as pre-Revolutionary while others exhibit segmental relieving arches above the window openings – a feature common to the c. 1740-1770 period. Several properties were associated with the nineteenth-century poet John Greenleaf Whittier and twentieth-century artists such as Daniel Garber, Ethel Wallace, and George Nakashima. As noted above, the George Nakashima Woodworker complex was designated as a National Landmark in 2014.

Further areas were deemed worthy of future study as possibly contributing to multiple resource property nominations as rural historic districts. Several such areas that have both a common history and maintain their historical associations include:

- The area encompassing Paxson, Comfort, and Laurel Roads, settled by the Paxson family and containing an unusual number of eighteenth-century stone houses.
- The area between Upper and Lower Mountain Roads as an extension of the agricultural belt which spans central Buckingham Township. The two largest properties in this area have been rated as being individually National Register eligible.
- The area extending from Buckingham Township between Sawmill and Mechanicsville Road, which retains farmsteads surrounded by agricultural lands and was originally part of the same property.
- The area around the intersection of Greenhill and Mechanicsville Roads, including several large farms with fine collections of vernacular rural architecture.

In addition, the area paralleling the Cuttalousa Creek and Cuttalousa Road, noted above as the eighth village in Solebury, was deemed worthy of future study for a multiple resource property nomination to the National Register based on the theme of milling.

This collection of properties is one of the best preserved areas in the township and has witnessed little intrusion upon its historical character.

PLANNING IMPLICATIONS

While Solebury boasts an amazing concentration of resources on the National Register, including National Historic Landmarks, such listings do not provide protection. For the most part, these designations simply express national recognition of the worthiness for preservation. Protection under the National Preservation Act of 1966 is limited and is not adequate to guarantee preservation. It does, however, mandate an additional level of review (known as Section 106 Review), should a federal action, or federally funded action impact the property physically or visually. Examples of actions that would trigger a Section 106 review include a project funded with money from one of the federal grant programs, a project that would involve a permit from the Army Corps of Engineers, or a project which would involve Federal Highway money (which would trigger a review called a Section 4F review, the transportation equivalent of Section 106).

Overall, the greatest threat to historic resources is not federally funded projects such as road widening or urban renewal, but destruction or alteration by private property owners or demolition by neglect. Many agricultural buildings are threatened or have been destroyed, as traditional farmland becomes residential subdivisions. Surviving buildings have often lost most of their rural context. In many other situations the integrity of the historic buildings themselves has been compromised. Many farmhouses that were owned by a family for multiple generations are being sold to more affluent purchasers. These buildings often undergo unsympathetic alterations, modernizations, or additions. In addition, underused outbuildings, if not razed, have been neglected and allowed to deteriorate.

Listing on the National Register does enable the owner of a listed property to rehabilitate the property for income-producing purposes and take a 20 percent Investment Tax Credit on his/her Federal Income Taxes. Additional regulations - the Secretary of the Interior's Standards for Rehabilitation - apply to this process and must be stringently adhered to in order to qualify for the credit. A similar but lesser credit (10 percent) is also available for owners who rehabilitate older structures not on the National Register.

At the local level, the Solebury Township Zoning Ordinance requires that a 175-foot setback be provided around the boundary of each village on the National Register. The Open Space Options provide for additional density, beyond that otherwise stipulated, for dwelling units created through rehabilitation of historic structures. The township also has established a Historical Architectural Review Board (HARB) which has purview within the villages of Carversville and Phillips Mill. Within those districts, HARB reviews all exterior changes and new construction for historical appropriateness and advises the Board of Supervisors upon the issuance of a Certificate of Appropriateness, a prerequisite to issuance of a building permit within those districts. No other formal protection for historic resources exists in Solebury.

Conservation and preservation of historic areas, buildings, and sites do not mean the area must remain unchanged and the setting static. They do not mean an end to development. They do suggest, however, that ongoing care is required to assure the protection of historic resources. A number of additional approaches might be taken to encourage protection efforts, including the creation of an overlay district, special use provision or conversion standards for historic structures, expansion of architectural review, delay of demolition, or bonus density or use opportunities where resources are preserved.

Potential archaeological sites have even less protection from land disturbances. The prime exception to this is the Act 537 sewage facilities planning process; sites proposed for development that require wastewater facilities approval must be evaluated for the potential existence of archaeological resources. These potential resources should be given enough attention, on a site-by-site basis, to assure that important opportunities for research and discovery are not lost.

ARTISTIC HERITAGE

Along with its neighbors on both sides of the Delaware River, Solebury Township has enjoyed more than a century as a nationally recognized arts community. Since painters began moving here from Philadelphia in the late 19th century, the migration of artists to the area has continued virtually unabated. Now, as in the past, the area's attraction stems both from its proximity to Philadelphia and New York and its unique mix of natural beauty, historic charm, and cultural vitality.

THE NEW HOPE IMPRESSIONISTS BLAZE THE TRAILS

Historians note that two real estate transactions – concerning the same property – probably sparked the creation of the New Hope arts colony. In 1894, a young Philadelphia surgeon purchased the Phillip’s Mill (located on present-day River Road) but, unable to spend much time there, decided to rent the property to a friend, the painter William Lathrop. Lathrop and his wife purchased a portion of the mill property the following year and soon began hosting Sunday afternoon teas where artist friends gathered to discuss their work. At the Lathrops’ encouragement, many of these weekend guests ultimately settled nearby.

William Lathrop and his friends, most of whom were affiliated with the Philadelphia Academy of Fine Arts (PAFA), had been working in a style known as *Tonalism*. As the group began experimenting with Impressionism, which emphasized *en plein air* (in the open air) painting directly from life, they found Solebury’s charming landscapes and old stone mills ideal subject matter for their pursuits.

In 1929, several of the local painters who came to be called the New Hope Impressionists or Pennsylvania Impressionists formed the Phillips Mill Community Association. There, they began holding the annual Phillip’s Mill art exhibitions that continue to this day. Known for boldly painted views of the Delaware River and the surrounding countryside, these artists soon achieved a regional (and, in some cases, national) reputation for their uniquely American take on the French Impressionist style. The most well-known members of the group were Lathrop, Edward W. Redfield and Daniel Garber, who each won awards for the work they exhibited at such institutions as PAFA, the Carnegie Institute in Pittsburgh and the National Academy of Design in New York. Another member of the group, William Francis Taylor, made a different type of impact: concerned about the effects of industrial pollution on the area, Taylor wrote about the need for conservation in a local publication, *The Towpath*, and founded one of the area’s first environmental organizations.

Viewed by art historians today as a notable group of regional painters, the New Hope Impressionists left behind a large, impressive body of work. Perhaps more importantly, they opened the door to successive generations of artists seeking a lifestyle rarely enjoyed outside a major city.

MODERNIST PAINTERS RAISE A CHALLENGE

In the early 20th century, as the Impressionist movement gave way to Modernism, a new generation of painters moved to the area, sharing the New Hope Impressionist's love of the landscape if not their aesthetic principals. Like the Impressionists, many of these artists had studied at PAFA; but some also had traveled to Europe, where they were exposed to *avant-garde* movements such as Cubism and various abstract and non-objective styles. Upon returning to the area, these artists soon found their commitment to Modernism a barrier to winning academic awards or obtaining the patronages that would have provided a means of financial support. In Solebury, they sought an affordable place to live and work as artists and a supportive community generally open to new ideas.

When the Modernists attempted to exhibit alongside the New Hope Impressionists, however, the conflict between the two groups quickly grew apparent. The pivotal moment came in 1930, when Lloyd R. Ney was refused entry to the annual Phillip's Mill exhibition; Ney's colleague, C.F. Ramsey, reacted by founding the New Group, composed strictly of Modernists. The group (which later reformed as the Independents) opened its first exhibit on May 16, 1930, just one day before the Phillip's Mill show opened its doors.

While most of the Independents achieved recognition only locally, a few earned national and even international reputations. Lloyd R. Ney exhibited at the Guggenheim for many years before opening his own museum in the area. Lee Gatch's work was shown at many New York galleries, the Whitney Museum of American Art and the Venice Biennales of 1950 and 1956. B.J.O. Nordfeldt, Isamu Noguchi and Ralston Crawford each achieved recognition throughout the U.S.

At a time when there was much concern about forging a truly American art, these local artists made an important, if not widely acclaimed, contribution to the nation's cultural scene. Like the Impressionists, they helped establish the area's reputation as a creative enclave, laying the ground work for future generations of artists.

BROADWAY COMES TO MAIN STREET

While painters and sculptors established the area's reputation as an arts colony, it was the performing arts that brought in the tourists and arts enthusiasts. Legend has it that,

in the early 1930s, soon after S.J. Perelman and Nathaniel West bought a farm along the Delaware, a few savvy realtors decided to capitalize on the area's reputation to attract wealthy theater types from New York. Among those who took the bait were Moss Hart, Kitty Carlyle, George S. Kauffman and Oscar Hammerstein. Their proximity would prove instrumental to the success of the Bucks County Playhouse in New Hope as a major summer stock theater.

The Hope gristmill (for which New Hope purportedly was named) was facing demolition when the playwright Kenyon Nicholson and St. John (Sin'-Jun) Terrell, a young actor and producer, decided to sell locals on the idea of converting the mill into a theater. Terrell succeeded in attracting financing and, on July 1, 1939, the Buck's County Playhouse's production of *Springtime for Henry* opened to rave reviews – and an audience that included the caricaturist Al Hirschfeld and other New York theater *glitterati*. Before long, the theater was regularly staging plays by Hart and Perelman, performed by legends like Helen Hayes, Lillian Gish, Burgess Meredith and Bela Lugosi – and soon-to-be legends like Grace Kelly and Robert Redford.

The Buck's County Playhouse changed hands many times over the years, but remained an important summer stock theater through the 1970s. In 1949, Terrell moved on to create the Lambertville Music Circus, one of the country's earliest theaters-in-the-round. Each summer, Terrell would pitch his giant circus tent and stage Broadway musicals like *Oklahoma* and *South Pacific* to large, appreciative crowds. Over the years, Terrell also booked such major music acts as Louis Armstrong, Duke Ellington, Ella Fitzgerald, Stan Getz, Liberace, Stevie Wonder and the Supremes.

In addition to establishing the area as a center for the performing arts, the Buck's County Playhouse and the Music Circus provided a catalyst for the rise of tourism in and around Solebury. As crowds of theatergoers from outside the area became regular weekend visitors, local businesses quickly capitalized on the opportunity to provide bed, board and trinkets, launching a commercial boom in New Hope arguably just as important to the area's artsy reputation as the artists themselves.

ARTISTS OF ALL TYPES SETTLE IN

Its reputation as an arts community firmly intact by the late 1930s, the area became a magnet for an ever-growing number and variety of artists. Seeking the solitude and

inspiration necessary for their work, writers, photographers, craft artisans and musicians joined the swelling ranks of painters, sculptors and actors who took up residence in and around Solebury.

One of the many Buck's County towns comprising what the New York press dubbed the genius belt, Solebury also has been home to many prominent writers. Among them were Budd Schulberg, best known for his screenplay *On the Waterfront*; Arthur Koesler, author of the 1941 novel *Darkness at Noon*; Jerome Chodorov, co-author of the play *My Sister Eileen* (about the wife of Nathaniel West); Stanley Kunitz, who won the 1959 Pulitzer Prize for Poetry; Patricia Highsmith, a prolific novelist who wrote about the area; and Edmund Schiddel, author of a trilogy of novels about Bucks County, two of which became bestsellers. The area also attracted scores of craft artisans, including the internationally acclaimed architect-turned-furniture-maker George Nakashima, whose family continues to work and live in Solebury today.

THE ARTS CONTINUE TO THRIVE IN THE 21ST CENTURY

Evidence of Solebury's continued creative energy is well documented in the 1995 video, *Art of the River Towns*, produced by local writer Doris Brandes and New Hope painter William Selesnick. The film aptly points out the unusually large number and variety of artists living and working in the area, the proliferation of such successful visual arts collectives as *Artsbridge* and the wealth of cultural programs sponsored by organizations like the New Hope Arts Commission. As noted by Robin Larsen, Production Director of the 1991 exhibit (and companion book) *The New Hope Modernists 1917 to 1950*, today, Solebury remains a culturally sophisticated area with the "inclusive, open attitude that is necessary for the prosperity of art." Solebury also retains a rich palette of natural habitats, rural landscapes and historic settlements that have inspired the arts for many years and which, if conserved, can continue to do so in the future.

SCENIC LANDSCAPES

The Scenic landscapes in the township continue to draw residents to the area. Characteristic landscape elements have derived over time as a result of natural processes and historical settlement patterns specific to Solebury. A scenic landscape can simply be judged as either characteristic or not. From the standpoint of the public interest, scenic or characteristic landscapes can be defined as visually significant based

on their visibility from public vantage points, primarily public roads. Map 10 Scenic Landscapes shows the features described below.

Broad farmland characterizes much of the township, comprising areas of moderate topographical relief and broad agricultural landscapes. This landscape type is laced by tree lines, hedgerows, and shallow stream valleys, punctuated by farm complexes, occasional small clusters of houses, ponds, and wet meadows. Building setbacks vary greatly; some structures are within a few feet of the public road while others stand back several hundred feet.

Stream valleys combine with other natural resources as an important part of the characteristic landscape. They are often deep and narrow, framed by steep, wooded hillsides, which form the valley walls and tend to conceal or soften the view of ground-level detail. Here, both landform and vegetation create what is perceived as a linear landscape. In a number of places, stream valleys are followed by narrow roadways, enhancing visual access to what otherwise can be a hidden landscape. Structures tend to occupy hollows in the hillsides or natural terraces running perpendicular to the direction of the slope; perceived density is extremely low, structures and small groupings tend to be viewed as singular, isolated objects, and building placement is irregular. Notable examples include the valleys of Cuttalossa Creek, Paunacussing Creek, Pidcock Creek, Coppernose Creek and Laurel Run.

The Delaware River/Canal Corridor is an exceptional landscape, framed by very steep hillsides on one side and the wide river corridor. On the far side of the river, wooded hillsides in New Jersey form a backdrop. The linear nature of this landscape is accentuated as one travels along River Road by glimpses of narrow bands of water and a towpath that remains from the historic canal. The landscape is punctuated by historical settlements as it alternates between the pastoral and the wild, flat open fields giving way to stretches enclosed by woodland between steep hills and river. Where streams meet the Delaware River, the corridor opens perpendicularly with views into the steep narrow ravines.

Wooded hillsides/ridgelines are an important visible landform beyond the confines of the stream valleys, such as along Solebury Mountain. Where woodlands top ridgelines, they create the perception of added height, the top of the trees appearing as the top of the ridge, from a distant view. These locations are particularly vulnerable to development, as any holes cut into the woodland mass will be very obvious. In contrast, on the face of a

moderate slope, below the crest, or on relatively flatter land, development can be tucked in the woods. Woodlands tend to be in the age range of 40-70 years, and are frequently dominated by tulip poplar, not one of the dominant trees of the virgin forest (oak, chestnut, etc.). Single larger specimen trees occasionally are found within younger woodlands, such as the large sour gum recently noted on the Lahaska Woods tract, indicating that, prior to recent periods of reforestation, open fields had been highlighted by individual large trees or groves of trees. Because, for the most part, even the oldest forests are relatively young, dense undergrowth often impairs views from the public roads. Even in more developed areas, patches of old field, thickets on steep roadside banks, tree lines and hedgerows often conceal actual development patterns, retaining a sense of the former rural landscape.

Visual accents add particular distinction to scenic quality. To be considered a visual accent, a landscape element must be: (1) characteristic - a typical representative of the local landscape, as described above; and (2) represent a distinctive visual focal point in its specific landscape context. Among them are the following types of characteristic landscape features.

Historic structures are the most frequently encountered visual accent and are integral to the way in which we perceive the landscape. Fieldstone (often covered in stucco), log, frame, and brick buildings are the characteristic building materials of this region. The architecture of most older buildings can be classified simply as vernacular with no particular dominant underlying design motif. Historical placement of structures in the landscape was derived from the character of the landscape itself. Buildings were sited to take advantage of opportunities in the landscape, particularly relative to slope and climatic exposure. Building siting seldom attempted to mold the landscape to fit the building as is more common today.

Special vegetation includes occasional tree-lined drives, individual great trees, and unique stands of understory vegetation such as mountain laurel and rhododendron. Great trees are individual specimen trees located prominently in a field, or alongside roads or stream banks. Ponds, as flat, open water bodies, often offer strong visual foci; sharply contrasting both the rolling upland and the steep-sided stream valleys. Their value to wildlife cannot be underestimated. Other visual accents include rock outcroppings and historical man-made features such as stone walls, bridges, and canal aqueducts.

Visual intrusions, in contrast, are objects which noticeably detract from the scenic quality of the landscape. To be considered a visual intrusion, an object must be a disjunctive visual element – an element of the landscape which would not normally be considered characteristic; or just as an accent, be located in such a way as to provide a focal point (albeit negative or intrusive) for the public view. Visual intrusions may include some industrial or commercial uses, intrusive utility rights-of-way, water towers, transmission lines, junk yards, buildings in styles disjunctive to their landscape context or neighboring buildings, etc.

Scenic vistas can be mapped from vista points along public roads where relatively long views are attained – a mile or more, often overlooking immediate roadside landscapes. Magnificent views may be seen from upland areas, looking over long rolling landscapes toward distant hills or focal points. Solebury has established standards for scenic roads to help preserve these township vistas.

SCENIC ROADS

Prior comprehensive plans created a definition of most scenic and moderately scenic roads and designated those roads that met either definition. The designation “most scenic” was attached to those roads which pass through woodlands, watershed areas or other environmentally sensitive areas showing minimal change to their virgin state, documented by the age and species of trees, steep slopes, wetlands, viewsheds, and fertile farmland that they pass through. The roads in this most scenic category are, in whole or in part:

- Armitage Road
- Cuttalossa Road
- Fleecydale Road
- Laurel Road
- Meetinghouse Road
- Old Carversville Road
- Paxson Hill Road
- Paxson Road
- Pidcock Creek Road (East of Route 232)
- River Road

The designation “moderately scenic” was attached to those roads that in themselves are very beautiful, but have been altered by development and are, in some cases, quite built up. Those roads have, nevertheless, retained an overall feeling of lovely country roads. The roads in the category are, in whole or in part:

- Aquetong Road
- Comfort Road
- Covered Bridge Road
- Creamery Road
- Ely Road
- Greenhill Road
- Lower Mountain Road
- Old Windy Bush Road
- Phillips Mill Road
- Pidcock Creek Road (West of Route 232)
- Sawmill Road

The township zoning ordinance has been updated to require a 150-foot setback along designated scenic roadways to help protect the special natural features that comprise the scenic landscape. Consideration should be given to designating additional roads as scenic, particularly Route 263 from River Road to the western edge of Solebury.

Chapter 8

PARKS, RECREATION AND OPEN SPACE

Recreational and open space resources are an important part of a community's identity and quality of life. Park and recreation facilities provide an avenue for residents to interact, exercise, and create a sense of community. Open space contributes to the township's rural and agrarian character and preserves the natural ecosystems upon which residents depend. (Open space resources related to preserved agricultural lands are discussed in Chapter 5 Agricultural Resources).

The open space, parkland, and farmland that has been preserved in Solebury by state, county, township programs, and private initiatives is shown in Table 5. The table also lists the type of recreational facilities provided, if any. There are more than 6,000 acres of land preserved in the township, and many recreational facilities are provided in the various parks. Many of the township park land facilities and open space lands have been procured and developed in line with the recommendations of township park and open space plans (see Map 11 Parks, Recreation and Open Space).

Table 5
State, County and Township Parks and Open Space

Parks/Open Space	Recreation Facilities	Preserved Acres
State Parks		
Delaware Canal State Park (Solebury Portion)	Multiuse Trails	57.2
PA State Forest Preserve	Hiking	56
Hendrick Island	Conservation Area, Fishing	135.4
Washington Crossing Historic Park/ Bowman's Hill Wildflower Preserve	Hiking Trails, Picnic Areas, Flower Preserve, Historic Structures	220.5
Ingham Spring (springhead)		0.3
Subtotal		469.4
County Parks/Open Space		
Hal Clark Park	Undeveloped at this time	27.5
River Road Tract	Undeveloped at this time	7.4
Subtotal		34.9

Parks/Open Space	Recreation Facilities	Preserved Acres
Township Parks/Open Space		
Canal Park	Multi-purpose Playing Field, Walking Trails (includes footbridge to the Delaware Canal towpath)	11.9
Laurel Park	Baseball Fields, Softball Field, Tee-Ball Fields, Batting Cages, Soccer Field, Football Field, Walking Trails	17
Magill's Hill Park	Sledding, Snowboarding, Picnic Area	4.9
Pat Livezey Park	Soccer Fields, Multi-purpose Field/Concert Area, Playground, Walking Trail, Picnic Area	18
Solebury Township Trail	Pedestrian Walkway & Bicycle Path (p/o PECO right-of-way)	
North Pointe Park / Marshall Tract	Undeveloped at this time	104
Solebury Park (Roeser Property)	Undeveloped at this time	80
Ingham Spring	Proposed Recreational and Educational Opportunities	48.3
Cuttalossa Road	Open Space	34
Laurel Run	Open Space	17.7
Limeport	Open Space	4.8
Reeder Road	Open Space	1
Subtotal		341.6
Township Conservation Easements		
98 parcels (purchase or donation)	Subtotal	1,963
Bucks County Land Preservation and Municipal Open Space Programs and Solebury Township		
15 parcels (state/county/township conservation easements)	Subtotal	977
Conservancy Properties – Owned or Protected with Conservation Easements		
Heritage Conservancy Properties		
Easements		945
Owned		192
Natural Lands Trust		983
Bedminster Conservancy (farmland)		115
Subtotal		2,235
TOTAL PRESERVED LANDS		6,021

Source: Solebury Township, Bucks County Planning Commission (2013)

Much of the following narrative summarizes the analyses and recommendations from the *Solebury Township Parks & Recreation Plan Update*, and the *Solebury Township Open Space Plan* (2008). These planning documents and any updates are incorporated into this comprehensive plan by reference and are available through the township administration office. The purpose of the park plan was to inventory the existing parks and recreation facilities available to the residents of Solebury Township, to evaluate the recreational needs of current and future residents, and to assess the potential for expansion of the township's park and recreation system to meet those needs. The purpose of the open space plan was to set a strategy for continued open space preservation. (Chapter 5 Agricultural Resources discusses open space resources related to preserved agricultural lands.)

ASSESSMENT OF PARK AND RECREATION NEEDS AND RECOMMENDATIONS

Much of the existing township park land and associated facilities have been procured and developed in line with the recommendations of past park and recreation planning. The *Solebury Township Parks & Recreation Plan Update* indicates that one of the long-term recommendations of the 2006 plan was acquisition of a 30-acre parcel of land to accommodate four to six athletic fields and one gym/community center to meet current and future growth. With the acquisition of North Pointe Park, Solebury Park, and Ingham Springs, the township now has more than 230 acres with which to meet its future active and passive recreation needs.

The park and recreation plan update was constructed to recognize themes important to township residents including not restricting traffic flow, maintaining quality of life and property values, protecting the township's rural setting, enhancing natural vegetation, and incorporating the historic and artistic heritage of the township.

The plan update indicates that the surveys that were used in the 2000 and 2006 parks and recreation plans to measure the interest of township residents in recreational activities showed passive activities such as walking and hiking were top priority for residents. Passive recreation has long been a favorite of Solebury residents. The 2012 survey conducted as part of this comprehensive plan update process supports the sentiments expressed in previous surveys. Respondents indicated that park/recreation areas are one of the top three needs to address in the township, and that hiking

trails/bike paths and additional access to the canal/towpath and sidewalks along roads are the three top recreation enhancements needed in the township.

Although sidewalk/trails are listed as a priority by residents in the survey undertaken for the comprehensive plan, it was determined an unrealistic task to include sidewalk construction projects under the purview of the Parks and Recreation Board. A more appropriate oversight for the inclusion of sidewalks would be during the land development planning process. Since existing sidewalks are already used for walking and biking in areas with higher population densities, the addition of sidewalks throughout the township would need to be planned for in a manner that takes location, safety, linkage needs, and cost into consideration. Both the Transportation and Circulation and Energy Conservation chapters discuss the need for appropriate pedestrian connections along roadways to various destinations. In both of these chapters, it is recommended that consideration be given to the future need of sidewalks in the community prior to granting a waiver from the Subdivision and Land Development (SALDO) provisions.

As a result, the plan update recognized the top recreational considerations as 1) trails and access to trails, 2) river access for boating, and 3) a community center. The park and recreation plan update also tries to recognize the recreational needs of all age categories, including the school age population between the ages of 5 and 19, and young adults (ages 20-29) to make Solebury more desirable in attracting and/or maintaining the residency of this demographic.

The township park and recreation plan update indicates that many residents and their families participate in the active recreational opportunities that are available and that there was a major shift in public opinion between 2000 and 2006 surveys reflecting an increased level of interest in active/organized recreational activities. This interest has continued to build since 2006 with a record number of children participating in youth soccer, basketball, baseball, and newly added football and wrestling programs. The increase in active recreation participation is from families with children residing in the densely populated developments in the township. The school district and the township have been working to add facilities and recreation programs to address growth in the youth population. Recent demographics may indicate the youth population has plateaued.

A study by the Solebury Township Park and Recreation Sub-Committee in 2010 used existing scheduling data for athletic fields and participation levels to determine availability of individual facilities. This review suggested that five additional playing fields would help to accommodate projected field needs. The type of fields needed remain consistent with previous park and recreation plans. In addition to playing fields, both the township and the school district identified and re-affirmed the need for another indoor basketball gym facility/community center in the Solebury.

The *Solebury Township Parks & Recreation Plan Update* recommends the following actions for the Solebury Parks and Recreation Department.

Short Term (1 to 2 years)

1. Create a document to be both printed and available on the township website highlighting existing trails and access to the Delaware Canal and river.
2. Complete the trail from Canal Park to North Pointe Park through Kitchens Lane and the North Pointe development assuming Solebury obtains grant funding.
3. Improve navigation and place signage on existing trails.
4. Confirm the need, identify placement and build 2 additional fields for multi-purpose use. Seek public and private funding. In addition to the multi-purpose fields, explore other recreational uses for alternate age groups.
5. Implement a Solebury Community Day events that fosters community pride, promotes township programs, and encourages volunteerism.
6. Restore Aquetong Creek as a cold water system and develop a plan for recreational use of Ingham Spring Park. Seek alternative funding for completion of the project.

Mid Term (3 to 5 years)

1. Create and implement the recreational plan for Ingham Spring including the Judy House.
2. Develop a plan for the current public works site.
3. Identify the feasibility of Delaware River access through Washington Crossing State Park.

4. Continue to expand and interconnect the trail system for walking and biking in the township. Systematically fund engineering of sections or phases, followed by seeking grants to build extensions over a number of years.
5. Identify funding source and interest to support a dog park in the township.

Long Term (over 5 years)

1. Monitor river access through Washington Crossing State Park.
2. Validate community support and identify and construct a Community Center incorporating an indoor gymnasium and meeting rooms for resident use.
3. Establish the need for additional outdoor recreational facilities.

Additional recommendations, many that remain relevant from previous plans, involving coordination of park and recreation planning with land use planning, coordination with other park, recreation and open space providers, and operation of park and recreation facilities include the following:

- The Board of Parks and Recreation should continue to review all major residential subdivisions submitted to the township for approval. Such review should occur at the sketch plan and preliminary plan stages.
- The Board of Parks and Recreation should review all pertinent development plans to evaluate:
 - the suitability of any open space for dedication or payment of a fee
 - the adequacy of pedestrian circulation and the internal trail system(s), when applicable
 - the adequacy of proposed connections to, or expansion of, the township trail system
 - the need for on-site recreation facilities
- The township and the Board of Parks and Recreation should annually examine the schedule for the payment of a fee-in-lieu of dedicating land in residential developments to ensure the fee keeps pace with current land values and recreation needs.

- The township should require any new large residential developments to include a mini-park that may include tot-lots, playfield for unorganized activities and passive recreation areas, as appropriate for the development.
- New residential developments should be required to include a connection to the township trail system and provide an internal pedestrian and bicycle circulation system, when appropriate.
- Coordinate with the open space preservation program to help implement the plans for a township-wide trail network. In those instances where the planned trail system crosses a property that is being considered for preservation, the implementation of the trail should be considered in the negotiations.
- The Board of Parks and Recreation should maintain an active liaison with the township Planning Commission and the Land Preservation Committee.
- The Board of Parks and Recreation should continue to maintain existing, as well as develop additional working partnerships with other park and recreation providers to ensure that opportunities are fully realized. Relationships with other organizations include the following:
 - New Hope – Solebury Soccer Club
 - New Hope – Solebury Baseball Association.
 - Bucks County Department of Parks and Recreation
 - Delaware Canal State Park
 - Washington Crossing State Historic Park (Bowman's Hill Wildflower Preserve)
 - Honey Hollow Environmental Education Center
 - New Hope – Solebury School District
 - Solebury School
 - New Hope Borough
- The Board of Parks and Recreation should undertake the following operational activities on an on-going basis:

- Implement a maintenance program for all parks and recreational facilities and report any potential safety issues to Public Works Department for inspection and repair.
- Undertake master planning for park facilities including appropriate navigational signage and ensure handicapped accessibility for all ages.
- Continue to ensure that adequate funding is available for the maintenance of existing parks, improvements to parks, and the development of new park facilities by 1) a continuation of policies that require that a fee that is paid in lieu of dedicating land in residential developments and 2) the procurement of grants for land acquisition and development of facilities as opportunities arise.
- Prepare and maintain a capital improvement program for park and recreation facilities, including both short- and long-term projects.
- Explore alternative funding means such as dedicated funding tax or service tax.
- Ensure that all new recreational facilities are designed with cost effectiveness in mind, including initial cost, durability of facilities, and short- and long-term maintenance costs.
- Provide information relative to park and recreational programs via a combination of the township newsletter and website, publishing of articles in local newspapers, and the development of a brochure with a map and information on parks and recreational facilities throughout the township.

REGIONAL PARK AND RECREATION ISSUES AND RECOMMENDATIONS

Provision for community parks and recreation services are regional in nature, serving both Solebury and the Borough of New Hope. Regional recreational facilities, as well as specialized facilities such as Bowman's Hill and the Delaware Canal, serve a much broader population base covering much of Bucks County and beyond. Because of their regional significance, such parks are usually provided by federal, state or county governments. They typically provide a variety of outdoor recreation opportunities – both active and passive, particularly those requiring large land or water areas. Emphasis is often placed on recreation opportunities beyond the scope of those

typically provided at local parks, including, for example, camping, boating and swimming.

Solebury residents are served by regional recreational facilities at Nockamixon, Tyler and Ralph Stover State Parks, Dark Hollow, Core Creek, Peace Valley, Tohickon Valley and Lake Towhee County Parks, and State Game Lands #56 and #157, as well as regional facilities nearby in New Jersey. Specialized facilities which help to fulfill the regional park role include Pennsylvania's Delaware Canal Park and Washington Crossing State Park, including the Bowman's Hill Wildflower Preserve.

Solebury residents participate in recreational programs including special community events, organized sports, arts and crafts, nature activities, and social activities. Due to geographic location and relatively limited local population density, many such programs are offered beyond the bounds of Solebury Township, even where oriented to local community service. Local recreational programs make use of both public and private lands and facilities, but are operated by quasi-public agencies, including youth and adult athletic leagues, social organizations, health clubs, schools, churches, YMCAs, senior centers, and so on. Most programs are offered based on local demand and are flexible to meet changing needs over time.

Recreational trails become regional facilities by nature of their linear character connecting destinations beyond municipal boundaries. The well-used tow path along the Delaware Canal is a significant local example. The *Solebury Township Park and Recreation Plan Update* and *Solebury Township Open Space Plan* (2008) continue to support establishment of a township-wide system of recreational trails. The township also should monitor and coordinate trails planning efforts with adjacent municipalities. For example, the Delaware Canal towpath and the trail under PECO Energy Company's utility wires on Route 202 (Lower York Road) serve as connectors into New Hope Borough and to the school property. These trails accommodate different users such as pedestrians, bicyclists, hikers, and joggers. Crosswalk improvements, traffic signalization, and construction of a new pathway are intended as part of the plan approval for the Rabbit Run townhouse development located across Route 202 (Lower York Road) adjacent to the spur road in New Hope Borough. These future improvements will enhance recreational opportunities for residents by further encouraging walking and bicycling.

There is the potential to extend the bikeway along Route 202 to connect into the new Route 202 Parkway path. The two-lane parkway contains an off-road bikeway that continues into Montgomery County providing connections to other bikeways along the Schuylkill River and to Valley Forge. An on-road bike lane has been proposed to extend from the end of the Parkway Path, to the Delaware River.

The Delaware River also provides for linear recreational uses on the water. Upper Makefield's *River and Canal Access Study* suggested cooperative ventures with Solebury Township, due to the location of Bowman's Hill, as a significant recreational destination straddling the township line. That study recommended that Upper Makefield explore a potential joint venture with Solebury Township and the Commonwealth of Pennsylvania in the development of a canoe launch along the canal within Washington Crossing State Park, as well as a boat launch on the Delaware River. Partially in response to this recommendation, a limited-access boat ramp for official use only by the Washington Crossing Historic Park, local emergency response and river rescue organizations, was officially dedicated on December 17, 2010. Use of the ramp by the general public is prohibited, and options for providing public access to the Delaware River should continue to be explored.

ASSESSMENT OF OPEN SPACE PRESERVATION NEEDS AND RECOMMENDATIONS

The township's program for open space and farmland preservation has been extraordinarily successful. Even before the completion of the initial open space plan in 2001, the township and its elected officials had embraced the goal of preserving the land and landscape of Solebury through land use regulations and cooperative activities with land conservancies. Township voters have supported the expenditure of taxpayer funds through four municipal bond issues to preserve farmland and open space. These preservation efforts continue to be championed by township residents as evidenced by the 2012 survey conducted as part of the comprehensive plan update process. Respondents indicated that open space/scenic beauty is one of the top three reasons for living in Solebury and that open space/agricultural preservation is one of the five highest ranked priorities to consider for Solebury's future.

The *Solebury Township Open Space Plan* (2008) was prepared for several specific reasons:

- To become eligible to participate in the Bucks County Open Space Program (BCOSP), including the municipal grant program and Natural Areas Program funding. The BCOSP has earmarked \$641,983 for Solebury's use in preserving farmland, natural areas, or recreation land.
- To complement the township's Comprehensive Plan.
- To provide a guide for the township Land Preservation Program.
- To support the township's request for public and private grants.
- To help coordinate open space efforts with surrounding municipalities the Delaware Canal State Park, and the Delaware Wild and Scenic Greenway Program.

The township's open space vision is to continue a well-planned program of preservation of farmland, natural areas, scenic areas, and other open spaces. The goals and their associated general recommendation and target areas of the adopted *Solebury Township Open Space Plan* (2008) are listed below. Many of the plan's action steps relating to amendments to Township zoning and land use controls have been addressed along with several of the recommended acquisition/preservation actions (e.g., Ingham Springs/Aquetong Lake). Those specifically relate to preserving farmland are discussed in Chapter 5 Agricultural Resources.

Protect Ground Water Resources – Integrate open space preservation, municipal planning, and growth management to support land use that protects the quality and quantity of ground water, recharge areas, and prevent nonpoint source pollution. Many of the recommended action steps relate to specific zoning and land use controls. Some important areas cannot be preserved by using zoning or land use controls alone, and should be further addressed through open space preservation efforts.

Targeted Areas

- Watersheds/Riparian Corridors
- Limestone/Carbonate area

Protect Critical Natural Resources – Protect important environmental features such as forest, floodplains, the stream and river corridors, slopes, wetlands, and

limestone/carbonate areas. Again many of the recommended action steps relate to specific zoning and land use controls. Other action steps include:

- Encourage donation of easements by property owners
- Apply for funding through the Bucks County Natural Area program to preserve critical natural areas identified in the Natural Areas Inventory
- Receive donations and purchase easements on important natural areas
- Complete the process of restoring the Aquetong Creek as a cold water stream
- Encourage landowners and watershed groups in critical areas to work together to preserve lands cooperatively

Targeted Areas

- Honey Hollow, Paunacussing, Cuttalossa, Coppernose, Laurel Run, Primrose, and Pidcock watersheds
- Aquetong Lake/ Ingham Spring
- Delaware Canal corridor
- Limestone/Carbonate area
- Solebury Mountain

Provide Greenways and Trails – Preserve greenways along stream corridors and establish trails for recreation as part of the open space strategy to link parks and open space.

Targeted Areas

- Paunacussing, Honey Hollow, Aquetong, Primrose, Cuttalossa, Coppernose, Laurel Run, and Pidcock watersheds and their stream valley greenways
- Bowman's Hill Wildflower Preserve
- Delaware Canal State Park (with township interconnections at Virginia Forest/Hendrick Island, Paunacussing-Black Bass, Center Bridge, Canal Park, Washington Crossing State Park)
- Improved connections between the township and the Canal, coupled with the upgrading of the Canal towpath

- Utility Right-of-Way - PECO has two major transmission lines and owns the right of way of the New Hope and Ivyland Railroad
- Conceptual Trail Planning - As part of the township's Park and Recreation Plan, a four-phase trail plan:
 - Connecting Livezey, Magill and Canal Parks
 - Connecting utility right-of-way with the Marshall Tract
 - A loop trail using utility right-of-way connecting Honey Hollow and the Aquetong Valley
- Connections to sensitive resources, greenways and trails in adjacent communities

Protect Scenic Views – Preserve visually significant landscapes.

Targeted Areas

- Delaware River and Canal Scenic Corridor
- Historical villages/hamlets
- National Register historic districts
- Open farmland
- Ridgelines
- Scenic stream valleys

Protect Scenic Roads – Preserve roadside viewsheds and other monitor the scenic roads maintenance and planting guidelines to protect scenic roads and corridors.

Targeted Areas

- Identified roadside viewsheds
- Scenic corridors

Work with Landowners – Pursue the best method of preservation for the township, taking into account available funding, landowner needs, and township goals. Specific actions include:

- Continue successful program established by the township and the Land Preservation Committee that identifies important properties and works with

willing landowners

- Continue to encourage donation and sale of easements
- Continue educational effort to promote conservation and value of conservation easements

Targeted Areas

- Entire Township

Support Overall Land Use Planning - Integrate open space preservation with other planning and growth management programs to support land use plans. Specific actions include:

- Continue to make necessary revisions to ordinances
- Continue to target properties for preservation that complement land use planning
- Promote use of Open Space Options ordinance
- Preserve 50 percent of the township land in open space use such as park, recreation, agriculture and environmental conservation

Targeted Areas

- Entire Township

These open space goals and recommended actions are consistent with the overall vision for the township comprehensive plan.

Chapter 9

COMMUNITY FACILITIES, SERVICES, AND UTILITIES PLANNING

Community facilities, services, and utilities comprise the public and semi-public infrastructure established to support township residents, businesses, and governmental functions. Some of these infrastructure needs are met locally while others are met through systems established to serve the larger region. Regardless of how they are provided, existing utilities and community facilities in Solebury need to be assessed in the Comprehensive Plan to understand current and future demands and potential impacts on both natural systems and the developed land. Under a “sustainable community” approach, their efficient use, management, and long-term availability must be ensured to meet future needs.

Solebury is served by various community facilities and services such as police and fire stations, township administration and public works buildings, schools, religious institutions, post offices, a library, public utilities, telecommunications, solid waste disposal, and recycling service. Many of these facilities are located both within and outside of the township borders, primarily serving residents of Solebury and New Hope (see Map 12 Community Facilities and Utilities).

A number of community facilities are centrally located in the township near the intersection of Sугan Road and Upper York Road in the village of Solebury. These include the municipal building that houses the township administration, police, and road departments, Eagle Fire Company substation, the New Hope–Solebury School District’s Lower Elementary School, Solebury Post Office, and Trinity Episcopal Church.

Another concentration of community facilities that serve Solebury residents is located near Route 179 on Bridge Street and on Sугan Road in the Borough of New Hope. These consist of the Eagle Fire Company Main Station, New Hope Post Office, places of worship, Free Library of New Hope and Solebury, and the New Hope–Solebury Upper Elementary School, Middle School and High School.

Other facilities are located throughout the township including the Carversville Post Office, the private Solebury School, and several places of worship.

In addition to the Eagle Fire Company, the township is served by the Midway Fire Company in Lahaska (Buckingham) and Point Pleasant Fire Company in Point Pleasant (Plumstead). Ambulance services are provided by New Hope-Lambertville Rescue Squad located in New Hope and the Lingohocken Fire Company in Wycombe also serves Solebury. Across the Delaware River, in Lambertville, New Jersey, a fire station and ambulance squad serve Solebury in the event of an emergency.

A summary of these facilities, services, and utilities is provided below. Map 12 shows these community facilities and utilities. Public water and wastewater utilities are discussed in Chapter 6 Water Resources and Related Facilities.

TOWNSHIP ADMINISTRATION

The Township Administration Department supervises the daily operations of municipal government. The department employs a manager, assistant manager, finance director, park and recreation director, zoning officer zoning/code administrator, building inspector, and an administrative assistant and Environmental Advisory Council (EAC) and Historic Architectural Review Board (HARB) administrator.

PUBLIC WORKS DEPARTMENT

The Solebury Township Public Works Department employs a director, foreman, three workers and two seasonal employees and is responsible for:

- Maintenance of the 65 miles of township-owned streets, and 23 bridges, swales and culverts,
- Tree trimming in the rights-of-way,
- Maintenance of directional, traffic control, and street identification signs on township roads,
- Traffic striping on township roadways,
- Snow plowing and ice control,
- Preventive maintenance and repair of vehicles and equipment,
- Maintenance and repair of township-owned buildings.

The existing public works department building is in need of an upgrade and expansion to aid the staff in their activities and to provide adequate storage for the functions of the department.

POLICE DEPARTMENT

Solebury has approximately one police officer for every 620 residents with a police force comprised of 18 officers (13 full-time, 4 part-time, and a chief). New Hope's police force also provides assistance when needed. Likewise, Solebury's Police Department cooperates with other nearby departments in the Central Bucks Emergency Response Team and Major Incident Response Team. The department is involved in community policing, youth aid panel, and truck inspection.

Police protection and related services are the largest single annual budget expense to township taxpayers.

FIRE PROTECTION

The Eagle Fire Company district encompasses 12 square miles and serves more than 10,000 residents in Solebury Township and New Hope Borough. The fire company retains more than 20 volunteer firefighters and operates out of two stations, one located in the Borough on North Sugan Road and a substation in Solebury Township on Laurel Road. The company provides fire protection, vehicle rescue, water/land/search/rescue, primary hazardous materials response, and emergency services during natural and man-made disasters. The company's equipment includes a tower truck, two engines, tanker and various other vehicles including an airboat for water rescues.

In addition to the Eagle Fire Company, the township is served by the Midway Fire Company in Lahaska (Buckingham) and Point Pleasant Fire Company in Point Pleasant (Plumstead). Ambulance services are provided by New Hope-Lambertville Rescue Squad located in Lambertville NJ and by Central Bucks Emergency Medical Services with facilities in Doylestown, Wycombe and an Advanced Life Support (ALS) Unit at Eagle Fire Company in New Hope. Across the Delaware River, in Lambertville New Jersey, a fire station and ambulance squad also serve Solebury in the event of an emergency.

Funding for the fire companies is provided by 1.5 mill real estate tax divided among the companies based on the size of their fire response area in Solebury. The fire companies also receive funds from rental of fire halls for outside events and other fundraising activities.

The two major issues regarding fire protection are ensuring adequate volunteer staffing and steady funding. Fire company squads are staffed by volunteers. Costs for firefighting equipment, operation, training and maintenance of facilities are supported by taxes, fund-raising, and facility rentals.

EMERGENCY MEDICAL SERVICES

The Eagle Fire Company expanded its facilities at the N. Sугan Road site in 2012 by constructing a 4,000 square-foot addition that houses equipment for an advance life support paramedic unit. The township also is served by Central Bucks Ambulance and Rescue Units based at the Eagle Fire Company and the squad based in Doylestown, and at the Lingohocken Fire Company. The Lambertville-New Hope Ambulance and Rescue Squad, based in Lambertville, and the Stockton Fire Company First Aid Squad also provides service to Solebury.

The Lambertville-New Hope squad provides Basic Life Support (BLS) emergency services 24 hours a day to the township. The squad is staffed by a paid daytime crew, along with volunteers covering weekends and nighttime shifts. The squad in New Jersey does not provide Advanced Life Support in Pennsylvania.

Advanced Life Support is provided 24 hours a day, seven days per week from the Lingohocken (Wycombe) substation. Since 2010 the Central Bucks unit has provided one paramedic on duty at the Eagle Fire Company during the day seven days a week outfitted with a utility vehicle to provide quicker response to ALS calls. The average response time from the Eagle Fire Company is approximately 7 minutes.

MEDICAL AND HEALTHCARE FACILITIES

The township lies within 10 miles of both Doylestown Hospital in Bucks County and Hunterdon Medical Center in Flemington, NJ. There are no medical facilities within Solebury other than individual health care offices.

SCHOOLS

Solebury is served by the New Hope-Solebury School District. U.S. News & World Report's 2014 ranking of Best High Schools ranked New Hope-Solebury High School as 3rd out of 690 high schools in Pennsylvania, and 337 out of 19,400 high schools in the nation.

There are four public schools in the district. The lower elementary school, located on Sугan Road accommodates kindergarten through second grade. An upper elementary school (grades 3-5), middle school (grades 6 through 8), and a high school (grades 9 through 12) are situated on one campus in New Hope Borough on Bridge Street.

The table below indicates that the schools have sufficient capacity for increased enrollment.

Table 6
New Hope-Solebury Schools (2013-2014)

School	Enrollment	Capacity
High School	514	608
Middle School	418	534
Upper Elementary	379	625
Lower Elementary	280	475
Total	1,591	2,242

There were 1,591 students enrolled in the public school system during the 2013-2014 school year according to District's Final Budget (June 3, 2013). The number of students is projected to remain steady over the next 5 years with slight fluctuations in enrollment for each school.

The Community School of New Hope-Solebury offers continuing education through creative, physical and intellectual opportunities in partnership with New Hope-Solebury School District.

A private college preparatory school, the Solebury School, located on Phillips Mill Road serves students in grades 7 through 12. The enrollment is about 235 students.

Formal day care is available at the Club House for Kids, Trinity Episcopal Church, Solebury United Methodist Church and the Tiny Tots Nursery School.

LIBRARY SERVICES

The Free Library of New Hope and Solebury serves both the township and the Borough. The library collection contains 30,056 items to serve a population of approximately 11,000. This exceeds the American Library and the State Library of Pennsylvania standard of 1.5 volumes per person. Circulation rates have been increasing in recent years. Public access computer terminals and Wi-Fi are available. Three full-time paid staff and volunteers provide services to patrons.

The library is supported by Pennsylvania Commonwealth Libraries, Solebury Township, New Hope Borough, and the Bucks County Free Library system with various levels of administrative and funding support, interlibrary loans, cataloging, purchasing services, program support, reference resources, and professional training. In 2011 the township contributed \$60,000 to support the library, through a one-quarter mill library tax. The library receives less than half its operating budget from government sources, raising more than half through local fundraising.

The possibility of a larger space with more parking has been discussed as part of future library planning. A tentative site located across from the middle school has been discussed in conjunction with a land development plan proposed in New Hope.

POWER SUPPLY

Local electric service is supplied by the PECO Energy Corporation (PECO) via overhead lines along roads within the township. PECO pays for and extends service to new developments when requested. New developments are typically provided service through underground lines.

The Plan's Utilities Map shows the location of two overhead high voltage electric lines owned by PECO. One 500,000 volt line comes from Plumstead Township at the northwestern edge of Solebury and continues across the township, crossing the Delaware River at a point near the U.S. Route 202 interchange. It has a 200-foot right-of-way. The second line is a 220,000 volt line which runs from a substation in Buckingham Township through Solebury and across the river at a point just northwest of the Solebury - New Hope border. It has a 150 to 180 foot right of way. These lines do not provide direct electric service to Solebury Township.

GAS SERVICE

PECO provides gas service to a portion of the township. PECO monitors development activity to determine the demand for electric and gas, but relies on municipal assistance to obtain specifics about land use planning.

Township residents are served with natural gas via two high-pressure gas lines. One gas line runs from Peddlers Village along Route 202 to New Hope. The second line runs from Route 202 to Route 263 to Aquetong Road. These lines are shown on the Utilities Map and are owned by PECO. Natural gas service is supplied to developments by PECO when requested.

Two twenty-inch gas pipelines owned by Texas Eastern traverse the township from Buckingham Township to, and under, the river. Texas Eastern also has 24-inch, 30-inch, and 36-inch lines that run from Buckingham to and under the river. These pipelines do not provide any type of local service; their location is noted for land use planning purposes.

Pipeline companies establish easements and own land around the facilities to ensure that development does not occur within these areas. However, these corridors have provided trail opportunities for communities.

TELECOMMUNICATIONS

Telecommunications services are important components of community infrastructure, supporting public safety and economic development and Solebury contains four cell towers. A 2011 National Health Interview Survey indicated that three of every ten American homes (30.4 percent) had only wireless (mobile) telephones. This percentage has dramatically increased since then with heavier reliance upon cell phones, and carriers are continually upgrading their services in the township.

TELEVISION AND INTERNET SERVICES

TV service is provided by Comcast Cable, and Direct TV and Dish Network Satellite. Over the air reception is still a viable source of reception. Internet service is provided by Comcast, Verizon DSL and satellite. FIOS Service is available in specific areas in the township.

There are service gaps in Solebury which places underserved residents and businesses at a disadvantage. The township will keep abreast of new technologies and support a coordinated expansion of broadband, cable and internet services.

SOLID WASTE DISPOSAL AND RECYCLING

The management of solid waste includes storage, collection, transport, processing, and disposal, and involves many different types of facilities including landfills, transfer stations, material recovery, recycling, composting, and waste-to-energy facilities.

Municipalities with populations greater than 5,000 with a population density of greater than 300 residents per square mile are required by state law to implement recycling programs. A source-separation and curbside collection program for recyclable materials and leaf waste in the community, a litter prevention program, a special materials collection program, and educational outreach are all components of this requirement. Pennsylvania Act 101 gives mandated communities the opportunity to adopt local ordinances requiring residents and businesses to recycle at least three materials and to separate leaf waste from other waste. Commercial, institutional, municipal establishments must separate high-grade office paper, aluminum, corrugated paper and leaf waste.

PLANNING AND REGULATION

The Pennsylvania Solid Waste Management Act (Act 97) was passed in 1980 to require planning and regulation of solid waste storage, collection, transport, processing, treatment and disposal. Counties and municipalities were required to plan for the collection and disposal of municipal solid waste (MSW) generated within their borders. Eight years later, Act 101, the Municipal Waste Planning, Recycling, and Waste Reduction Act, was passed to address recycling, planning, permitting, and operation of processing and disposal facilities for municipal waste. Counties, instead of townships and boroughs, were specifically given the responsibility of municipal waste planning and disposal. Both Act 97 and Act 101 authorize PaDEP to comprehensively plan for and regulate solid waste management via county solid waste management plans. Only PaDEP may license waste haulers. The Act precludes municipalities from continuing to license haulers or initiating any new licensing programs.

The *Bucks County Municipal Waste Management Plan* was adopted in 1990, after it was ratified by a majority of the municipalities and approved by PaDEP. The facilities and data were updated in 2004. The purpose of this plan is to develop an integrated countywide waste management system. The system consists of strategies for waste reduction, recycling, volume reduction and resource recovery through incineration, and landfills.

SOLEBURY TOWNSHIP'S CURRENT APPROACH AND POTENTIAL IMPROVEMENTS

The estimated waste generation rate for Solebury Township is 1.25 tons per capita per year based on total tons disposed and recycled. Statewide, that number is closer to 0.90 tons per person. Pennsylvania's recycling standard is to recycle 35 percent of the total waste stream.

The township, in its Recycling Ordinance 2011-03, places the responsibility for compliance on the individual property owner (whether resident, landlord, or business owner). This approach requires each owner to contract for recycling services. It also includes a similar requirement for the collection of leaf waste. The penalties for non-compliance fall to the property owner.

There are options available inside and outside the county for the processing and marketing of recyclables. Haulers, businesses, institutions, and individuals may choose to deliver materials to any facility that processes materials for recycling or composting. A statewide list of recycling markets is available from the PaDEP.

ILLEGAL DUMPING

Illegal dumping tends to be more prevalent in rural areas and involves items that are difficult or costly to dispose of, such as tires, furniture, electronics and appliances. Illegal dumping creates concerns for public health and safety, property values, and the general quality of life. When they are ignored, these sites often become chronic dumping areas.

Keep Pennsylvania Beautiful conducted an illegal dumping audit of Bucks County and identified many illegal dumping sites in 2011 with a high volume of yard waste and brush at these sites. Although no sites were identified in the township, Solebury may want to consider actions to continue the abatement of dumping in the future such as:

- Ensuring that residents have access to bulk waste collection,
- Promoting local and regional hazardous waste collections, shredding events, and recycling opportunities,
- Ensuring that residents have sufficient options for leaf and yard waste,
- Conducting education/public outreach campaigns,
- Strengthening ordinances and enforcement activities if needed.

Schools and other public institutions and businesses should be encouraged to participate in recycling and collection efforts to ensure Solebury remains litter free.

WASTE BURNING

Regulating burning and enforcement is the responsibility of municipalities. Solebury Township adopted “Guidelines for Open Burning of Yard Waste” in October 2012 in an effort to protect the residents’ health and safety. All residents are asked to observe the following guidelines:

- **Composting** – compost yard waste whenever possible, burning only as last alternative.
- **Residential Burning of Yard Waste** – setbacks for open fires and burning of yard waste.
- **Burning Time** – restricted hours and only during best weather conditions.
- **Safety Requirements** – attendance, availability of fire extinguishers and water, and maintenance of fire location.
- **Homeowner Associations** – association rules and regulation apply.
- **Commercial Burning** – no burning by commercial uses or in commercial districts.
- **Container Burning** – container and material specifications.
- **Prohibited Material** – harmful material are prohibited.

Chapter 10

HAZARD MITIGATION

Since 1955 there have been many Gubernatorial Proclamations of Disaster Emergency and Presidential Disaster and Emergency Declarations in Pennsylvania. Most in Bucks County are related to flooding, hurricanes, tropical storms and snow events. The emergency management community, elected officials, citizens and other stakeholders in the County and municipalities recognize the impact of disasters on their community and support proactive efforts needed to reduce the impact of natural and human-caused hazards. Solebury Township also recognizes the importance of hazard mitigation and related planning needed to address both natural and human-made hazards.

Hazard mitigation describes sustained actions needed or taken to prevent or minimize the long-term risks to life and property from hazards. Pre-disaster mitigation actions are taken in advance of a hazard event and are essential to breaking the disaster cycle of damage, reconstruction, and repeated damage. With careful selection, mitigation actions can be long-term, cost-effective means of reducing the risk of loss to life and property.

Hazard Mitigation Planning is developed for the purpose of:

- Providing a blueprint for reducing property damage and saving lives from the effects of future natural and man-made disasters.
- Qualifying the County and its municipalities for pre-disaster and post-disaster grant funding;
- Complying with state and federal legislative requirements related to local hazard mitigation planning;
- Demonstrating a firm local commitment to hazard mitigation principles; and
- Improving community resiliency following a disaster event.

The Disaster Mitigation Act of 2000 requires that local governments (i.e., counties and municipalities), as a condition of receiving federal disaster mitigation funds, have an

official mitigation plan that describes the process for identifying hazards, creating a risk assessment and vulnerability analysis, identifying and prioritizing mitigation strategies, and developing an implementation schedule. Part of this process involves identifying critical infrastructure and facilities, such as assets that would either increase the likelihood of greater damage or slow the recovery process. For example, in Solebury, these include fire and police stations as well as other structures necessary for evacuation and rebuilding (see Chapter 9 Community Facilities, Services, and Utilities Planning for more information on emergency services).

Solebury Township adopted the Bucks County Hazard Mitigation Plan (BCHMP) in January of 2012. The plan was formally approved by FEMA in March 2013. The updated BCHMP is a pre-disaster, multi-hazard mitigation plan that not only guides the County toward greater disaster resistance, but also respects the character and needs of communities. The plan provides a blueprint for reducing property damage and saving lives from the effects of future natural and man-made disasters and improving community resiliency following a disaster event. Moreover, the plan qualifies the County and its municipalities for pre-disaster and post-disaster grant funding.

The BCHMP identifies the following hazards as being prevalent in Bucks County:

- Dam Failure
- Environmental Hazards
- Flood
- Ice Jam
- Hurricane
- Nor'easter
- Lightning Strike
- Subsidence
- Tornado
- Transportation Accidents
- Utility Interruption
- Drought, Earthquake
- Extreme Temperature
- Flash Flood
- Hailstorm
- Tropical Storm
- Landslide
- Structure Collapse
- Sinkhole
- Wind Storm
- Urban Fire and Explosion
- Wildfire
- Winter Storm

Of these, Solebury Township has been, and is most likely to be, affected by weather-related events (e.g., winter storm, hurricane, tropical storm, etc.) and to a lesser extent, manmade hazards (e.g., fire, transportation accidents, utility interruption etc.). Some of

the manmade hazards are a result from extreme storms and winds, such as flooding or utility interruption from downed utility poles and trees during extreme storms and winds.

Due to its location on the Delaware River and a large percentage of forest and agricultural land in the township, hazards such as flooding, drought, and to a lesser extent, wildfires could have more of an impact on Solebury than other communities in the county. Since Solebury's primary water supply is provided by individual private wells, a drought/fire event could have a cascading effect of the drought accelerating the speed of a fire. The lack of a township-wide public water distribution system and potential lack of water supply may also increase the time to contain a fire or wildfire.

Solebury has 40 properties classified by the Pennsylvania Emergency Management Agency as "Severe Repetitive Loss" properties. These are structures that have been damaged several times in several different flood events and needed Federal assistance to rebuild. Of those properties, 33 were single family homes and 7 were business structures. Overall, Solebury ranks 5th highest in the number of repetitive loss properties, and 4th in severe repetitive loss properties in Bucks County. Although the ranking may seem high, only 150 structures out of a total of 4,266 are in a high risk flood plain area.

HAZARD MITIGATION REGULATION AND OTHER MITIGATION PLANNING

There are numerous regulatory and planning mechanisms in place at the state, county, and municipal levels of government which support hazard mitigation planning efforts. These tools include the *Pennsylvania Municipalities Planning Code*, *Bucks County Comprehensive Plan*, *Commonwealth of Pennsylvania Standard All-Hazard Mitigation Plan*, *Bucks County Hazard Vulnerability Analysis* and Solebury Township's *Facility Emergency Action Plan* (EAP),⁹ as well as Solebury's own floodplain management ordinance, stormwater management ordinance (discussed in Chapter 6 Water Resources and Related Facilities), zoning ordinance, subdivision and land development ordinance, and comprehensive plan. Furthermore, incorporating hazard mitigation language into this Comprehensive Plan update results in a greater and more permanent

⁹ Solebury Township's *Facility Emergency Action Plan* (EAP), January 2013, documents the proper procedures for Township employees to follow in the event of workplace emergencies.

“institutionalization” of hazard mitigation into the township’s development processes, practices, and pattern.

The Bucks County Commissioners established the Bucks County Delaware River Flood Task Force in 2007 after three severe storm events occurred within a two-year time frame causing unprecedented flooding along the Delaware River. The Task Force was charged with investigating flooding along the Delaware River and recommending actions to minimize flood damage to the 17 riverfront communities. Supported by county staff and representatives from Pennsylvania’s 8th Congressional District office, municipalities from Riegelsville to Bristol appointed members to serve on the Task Force. After a year of interviewing experts and reviewing studies and flood records, it concluded that the amount of water in the New York City reservoirs has an effect on flood levels in Bucks County. The Task Force issued a final report with its recommendations in 2011, and they are listed below.

- Pennsylvania should support, and the Delaware River Basin Commission should adopt, a policy of maintaining adequate safety voids in the New York City reservoirs, located north of Bucks County.
- Support and expedite impartial studies that will quantify the impact of reservoir operations and assess flood control options, including, but not limited to, the expansion and updating of existing reservoirs.
- Support and expedite new federal floodplain mapping.
- Support stronger municipal land use tools to control development in the floodplain.
- Support significant federal and state funding for buyouts, elevations, and floodproofing, where appropriate.
- Improve emergency management operations and assist first responders, where necessary. The use of warning calls to residents in flood prone areas should be continued and improved.

To address recurring flooding along the Delaware River in Solebury, some buildings have been elevated above the level of the 100-year base flood. While the trend of building higher and elevating structures in the floodplain does help mitigate property damage, other damage to the infrastructure and lots (e.g. roads, power lines, soil

erosion) can still negatively impact these properties. In addition, elevations of buildings should be considerate of, and minimize impact to, the historic context of structures and/or scenic views along the river.

While flooding along the Delaware and its impacts are of primary concern, the township has also been impacted by the effect of flash flooding along other streams and drainageways. The locations and causes of flash flooding need to be further investigated and a determination should be made of the appropriate mitigation efforts to prevent reoccurrences.

Another danger that is unique to Solebury and some of its immediate neighbors is subsidence or sinkholes in areas of limestone (Karst) geology. Subsidence and sinkhole events may occur gradually or abruptly, resulting in a range of impacts from minor elevation changes to deep or gaping holes in the ground surface. The PA Department of Conservation and Natural Resources (DCNR) lists one sinkhole due to Karst geology in the township located at the Solebury School property, and 151 surface depressions due to Karst geology in the limestone area. The township has addressed the issues of subsidence and sinkholes through its zoning regulations limiting development in the limestone areas. Although a sinkhole underneath a main roadway or critical infrastructure (transmission, communications, or pipelines) could cause significant damage, subsidence is not considered to be a major threat in Solebury when compared to other hazards, especially flooding.

The township adopted a new floodplain ordinance in 2014 to conform to FEMA's guidelines. Updated FEMA floodplain maps are expected to be issued by the federal government in 2015 or 2016, and the township officials plan to update its land use ordinances accordingly.

HAZARD MITIGATION ACTIONS

There are six categories of mitigation actions that were considered in developing the County's Mitigation Action Plan:

- **Prevention:** Government regulations that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning, zoning, building codes, subdivision regulations, hazard specific regulations (such as floodplain regulations), capital

improvement programs, utility placement (above and underground) and open-space preservation and storm water regulations.

- **Property Protection:** Actions that involve modifying or removing existing buildings or infrastructure to protect them from a hazard. Examples include the acquisition, elevation and relocation of structures, structural retrofits, flood-proofing, storm shutters, and shatter-resistant glass. Most of these property protection techniques are considered to involve “sticks and bricks;” however, this category also includes insurance.
- **Public Education and Awareness:** Actions to inform and educate citizens, elected officials, and property owners about potential risks from hazards and potential ways to mitigate them. Such actions include hazard mapping, outreach projects, library materials dissemination, real estate disclosures, the creation of hazard information centers, and school age/adult education programs.
- **Natural Resource Protection:** Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, forest and vegetation management, wetlands restoration or preservation, slope stabilization, and historic property and archeological site preservation.
- **Structural Project Implementation:** Mitigation projects to lessen the impact of a hazard by using structures to modify the environment. Structures include stormwater controls (culverts); dams, dikes, and levees; and safe rooms.
- **Emergency Services:** Actions that typically are not considered mitigation techniques but reduce the impacts of a hazard event on people and property. These actions are often taken prior to, during, or in response to an emergency or disaster. Examples include warning systems, evacuation planning and management, emergency response training and exercises, and emergency flood protection procedures.

Solebury Township has committed to take on the following specific mitigation actions expressed in the BCHMP within the next ten years.

EVALUATION

One of the identified weaknesses in the *Bucks County Hazard Mitigation Plan* is a detailed database on the properties within a given threat area. For example, the National Flood Insurance Program (NFIP) requires detailed information on properties using Pennsylvania's All-Hazard Mitigation Tool (PA Tool). This includes identifying structures with basements, exact first floor elevations for better flood modeling, and elevations of roadways most likely to be impassable in a flood event. Since Solebury and the majority of Bucks County municipalities participate in the NFIP, communities have pledged to complete this task within the next two years.

To better assess the risks in flood-prone areas Solebury is attempting to identify all storage of hazardous materials in floodplains (including structures such as propane tanks) within three years.

IMPLEMENTATION

Acquisition, elevation and buy-out can greatly reduce the number of severe repetitive loss properties. This is important as flood insurance rates rise and Federal assistance falls. If the buy-out method is chosen for a property, a clear plan of ownership, maintenance, and property renovation (park, naturalized basin, etc.) needs to be undertaken. Solebury Township has committed to evaluating these and other methods of disaster mitigation, and will implement the most effective ones if funding is available.

The township will also review the prevalence of transportation accidents and known infrastructure deficiencies and advocate for projects and funding that will increase safety. PennDot could be a partner in the transportation review process and also may provide funding for a designated project. The township should coordinate with utility companies, such as PECO, to investigate ways to minimize potential service interruption produced from natural and man-made hazards. Burying utility lines and other methods to protect essential services to homeowners and businesses should be considered.

The township could develop a voluntary registry to identify residents with the highest relative vulnerability to the effects of severe weather and prepare an implementation

plan and, if warranted, implement additional storm shelters and warning systems near vulnerable communities, including:

- Identifying structures that can be used as tornado safe rooms (some may require structure modifications);
- NOAA weather radios for vulnerable populace.

EDUCATION

One of the best defenses against an emergency situation is a well-educated community. If residents have some pre-emergency preparations, local first responders can more effectively react to the most critical needs. Having people aware of the closest evacuation shelter, where to tune for information updates, and other important tips (e.g., don't drive through flooded roadways) can all minimize danger and assist a community in recovering.

The National Fire Protection Agency, DCNR, and the Bureau of Forestry have partnered together to create the "Firewise" program. It is a program designed to educate people about things they can do to become more resistant to wildfires. With Solebury in an area that could be at risk for such fires, the township should review the recommended activities of a "Firewise" program and evaluate potential benefits for implementation.

Chapter 11

ENERGY CONSERVATION

An important component in building a sustainable community is investing in energy efficiency and renewable energy resources. This approach can save money, strengthen local economies and improve the natural environment. Communities should look for new and innovative approaches to improve their energy efficiency and educate the residents to energy effective techniques in the home, at work and in their choice of transportation. The availability of energy resources is essential to residents, businesses, institutions, and all levels of government. Energy is required to heat and cool indoor environments, fuel vehicles, and power computers, appliances, and equipment. Energy is critical to modern personal, vocational and professional lifestyles and, as continuing technology advancements are made, reliance on energy resources increases.

Energy conservation is important because consumption of nonrenewable sources impacts the natural environment. The use of fossil fuels contributes to air and water pollution. Carbon dioxide, produced when oil, coal, and gas combust in power stations, heating systems, and motor vehicle engines, acts as a transparent blanket that contributes to change in our air quality.

The township can have some effect on the amount of fuel required for transportation through infrastructure and its ability to control land use via zoning and subdivision ordinance provisions. For example, allowing carpooling lots in central locations and providing parking for public transit facilities will help reduce the overall amount of miles driven by individuals. Also, as plug-in hybrid electric vehicles and battery electric vehicle ownership expands, there will be a need for publicly accessible electric vehicle (EV) charging stations. Allowing for these types of facilities can help in reduction of carbon emissions.

Several zoning districts allow a diversity of housing types, including accessory dwelling units that create the potential for multiple generations to reside in proximity to one another, reducing the number of vehicle trips needed. Home based businesses and dwellings in combination with business uses in the Traditional Neighborhood

Commercial (TNC) District assist in reducing vehicle miles by eliminating mileage associated with commuting to work and accessing services.

The township's Subdivision and Land Development Ordinance (SALDO) requires that sidewalks and pedestrian paths be required where necessary to provide access to community facilities. The SALDO permits bicycle/pedestrian trails to be used instead of sidewalks along perimeter roads to help encourage non-motorized transportation. In many cases the township has waived these provisions due to the lack of nearby facilities to connect into. In situations where the township does not see the need for the immediate installation of sidewalks or trails, an easement should be considered so that area for future paths can be assured. The SALDO incorporates language encouraging the use of solar energy resources for subdivision and land development plans and the protection of solar access for lots and buildings, but the ordinance does not include specific recommendations or standards.

The township will continue to encourage new methods and technologies to be explored and implemented to create a more sustainable community. Additional actions to encourage energy conservation associated with transportation, buildings, as well as municipal operations include the following topics:

TRANSPORTATION

- Ensure that schools, parks, and public facilities are accessible via bike paths or sidewalks;
- Establish requirements for bicycle parking (such as a bike racks or poles) as part of new commercial and retail development;
- Retrofit older developments to incorporate on-road bike lanes, sharrows,¹⁰ sidewalks, or bike paths;
- Limit the use of culs-de-sac and promote interconnected street patterns;
- Provide central locations for those wanting to carpool to congregate and to leave their vehicles.
- Allow for EV charging stations in appropriate locations, such as public or commercial parking areas.

¹⁰ A sharrow is a shared lane with bicycle markings on the road.

BUILDING AND DEVELOPMENT

- Provide incentives (such as reduced building permit fees) for developers who develop according to green building standards, such as United States Green Building Council LEED, Green Building Alliance - Green Globes, Passive House, Net Zero Energy Building, Energy Star Home, or Keystone Green Building Initiative standards (see summary of these standards in the following text boxes);
- Encourage new buildings, and retrofit existing buildings, to be outfitted with Energy Star compliant products, compact fluorescent light bulbs, tankless water heaters, programmable thermostats, and high levels of insulation;
- Encourage the use of high reflectance roofs on buildings;
- Encourage homeowner associations to eliminate restrictions on energy efficient features or practices, such as clothes lines;
- Incorporate provisions for renewable energy, including wind and solar, and encourage geothermal energy, in municipal ordinances (see the renewable energy subsection below).

MUNICIPAL

- Develop target decreases for energy consumption associated with municipal operations;
- Conduct energy audits on township facilities;
- Provide information to township residents and businesses on energy conservation techniques and energy audits;
- Replace inefficient municipal vehicles with more energy efficient/lower carbon footprint vehicles;
- Upgrade lighting fixtures to use compact fluorescent light bulbs;
- Replace incandescent signs, traffic control and other such fixtures with light-emitting diode (LED) technology.

Green Buildings

– also known as healthy and high-performance buildings –

Provide a response to traditional building methods that contribute to poor occupant health, natural resource depletion, unnecessary maintenance and operational costs, and numerous negative environmental impacts. The following provides a summary of several green building initiatives:

LEED

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System encourages and accelerates global adoption of sustainable green building and development practices through the creation and implementation of universally understood and accepted tools and performance criteria. LEED rating systems exist for new construction; existing buildings focused on operations & maintenance; commercial interiors; core & shell construction; schools; retail; healthcare; homes. Additionally, a pilot program for neighborhood development (LEED-ND) integrating the principles of smart growth, urbanism and green building has just been completed.

Energy Star Home

This is a program developed by the United States Environmental Protection Agency. To earn the ENERGY STAR, a home must meet strict guidelines for energy efficiency set by the U.S. Environmental Protection Agency. Energy Star qualified homes are at least 15% more energy efficient than homes built to the 2004 International Residential Code (IRC), and include additional energy-saving features that typically make them 20–30% more efficient than standard homes.

Keystone Green Building Initiative

The Keystone Green Building Initiative is a program developed to promote and facilitate practical approaches to green construction. This program is based on the National Association of Home Builders (NAHB) Model Green Home Building Guidelines which includes a green home certification program, that address key green construction areas including – Lot & Site Development, Resource Efficiency, Energy Efficiency, Water Efficiency, Indoor Environmental Quality, and Homeowner Education

Net Zero Energy Building

The International Living Future Institute (ILFI) provides a certification option for a Net Zero Energy Building (NZEB) under its umbrella of the holistic Living Building Challenge (LBC) certification. Such buildings have 100% of their energy needs supplied by on-site renewable energy on a net annual basis. The NZEB designation verifies that a building is truly operating as claimed, harnessing energy from the sun, wind, or earth to exceed net annual demand. To earn this certification, a building must actually meet five requirements of the LBC: Limits of Growth, Net Zero Energy, Rights to Nature, Beauty and Spirit, and Inspiration and Education.

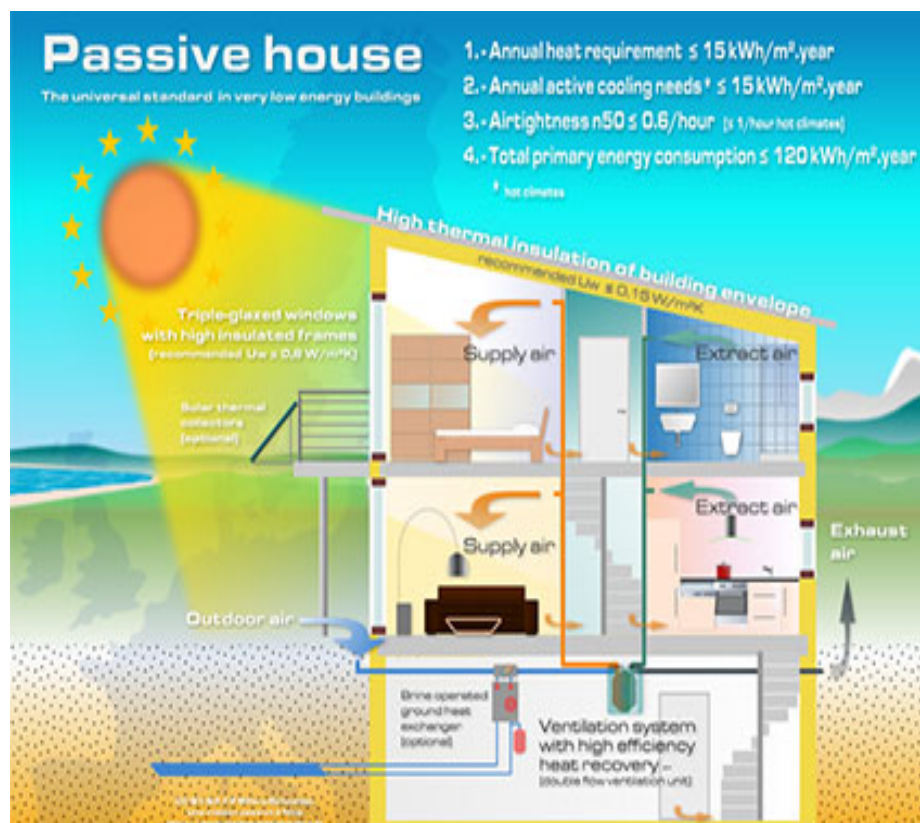
Green Globes

Green Globes seeks to assess a building's environmental and energy performance by creating improvement plans throughout various stages of project delivery, providing certifications and awards for green building design and management, and enhancing awareness towards environmental issues among building stakeholders. It also credentials professionals based on their knowledge of green building practices and technologies.

Passive House

The *Passivhaus* standard was developed in Germany in the early 1990s, and in 2007, the Passive House Institute US (PHIUS) was founded stateside, offering Passive House certification. According to PHIUS, the “passive” in “passive house” refers to achieving overall energy savings of 60%-70% and 90% of space heating without applying expensive “active” technologies such as photovoltaic or solar thermal hot water systems. Energy losses are minimized and gains are maximized. The PHIUS+ Certification program combines a thorough passive house design verification protocol with a stringent quality assurance and quality control program performed on-site by highly skilled and specialized PHIUS+ Raters. The two main components of the PHIUS + certification process are:

- Certification based on the energy model
- On-site quality assurance and quality control



RENEWABLE ENERGY

The reliance on non-renewable sources of energy and the rapid rate of consumption of resources cannot be sustained if we are to benefit future generations. As fossil fuel prices rise and climate change looms, interest in renewable energy is increasing. Energy from water, wind, sun, and heat from the Earth's core are all renewable energy sources. Renewable energy is used to replace fossil fuel at the power plant and at the home or business of the end user by using solar collectors, wind turbines, or hydro turbines.

Access to affordable, secure supplies of energy is required for everyday activities of government, business, and residents. The goal of the township's energy policy should be to assure and enhance the near-term and long-term quality of life for all current and future residents at the lowest costs to energy users and the environment. This can be accomplished by supporting the development of energy systems which are sustainable and locally based, including those that can be built on the site of a home or commercial property.

SOLAR ENERGY

One of the simplest and most easily adopted renewable energy sources is solar. This encompasses not only the use of photovoltaic panels and solar water heating systems, but also includes the placement of buildings on the lot to provide for optimal solar access, as well as minimizing and taking advantage of solar heat gain through windows.

Provisions to allow solar panels as an accessory use in appropriate zoning districts and encouraging the maximum solar access through site orientation and landscape placement standards could be provided in the land use ordinances. Greater flexibility relative to maximum building height and setbacks as they relate to the incorporation of solar panels could also be considered in ordinances. If solar panels are to be permitted on historic structures or in a historic district, suitable provisions and design standards should be provided for panel locations to ensure the historic integrity of the building and area.

WIND ENERGY

According to the American Wind Energy Association, wind energy is one of the fastest growing forms of new electricity generation in the U.S. Electric utilities are adding wind

power to their power supply portfolios as a clean, inexhaustible, and domestic source of electric generation, primarily via the establishment of large-scale wind farms.

In Pennsylvania, elevation directly relates to wind speed and wind power. Wind power classes of 1 or 2 are generally suitable for a small wind project. Small wind refers to turbines with blades of 4 to 8 feet in length with enough power output to power a single home. These require only moderate wind speeds. Wind power classes from 3 and above are those that can produce enough energy to make the installation of a mid to large scale wind turbine economically feasible. Mid-to-large-scale wind turbines have blades of 30 to 100+ feet in length with enough power output for 40 to 600 homes. These require much faster and more consistent wind speeds. Given the relatively low elevation of the township, the potential for wind energy production is greater for small-scale wind generation.

A typical small-scale wind energy system is suitable for meeting the electricity needs of a household or small business. Turbines may be employed for specific purposes, such as pumping water (for farm stock or irrigation) or running lights and appliances in a remote cabin. Connecting to the electric grid allows a turbine owner to use electricity from the local utility when the wind does not blow, but also allows any surplus electricity - energy produced in excess of consumption, such as when winds are strong and usage is low - to be sent back into the grid and used by other customers. But unlike large turbines that power entire cities, small wind systems are used to produce power primarily on-site for a single user.

An appropriate site for a small wind turbine is about three acres in size. In general turbines must be mounted at least 30 feet above any physical wind barriers (i.e., trees, buildings, or bluffs) and at least 300 feet away from obstructions to avoid air turbulence. Wind power increases exponentially with wind speed, so the same size turbine can generate up to one-third more power if it is mounted at 100 feet than if it is mounted at 65 feet.

The zoning ordinance grants the Board of Supervisors the authority to exempt windmills from the height regulations of the zoning ordinance. However, the zoning ordinance does not contain any provisions regulating wind energy systems. Examples of provisions that could be incorporated into the zoning ordinance include:

- Establishing minimum setback requirements from adjacent properties and aboveground utility lines;
- Specifying a maximum blade diameter and a maximum height.
- Determining if wind energy systems will be a by-right use or conditional use, and identify which zoning districts they shall be allowed in.
- Establishing minimum lot sizes based on the proposed size of the tower.

Additional provisions that could encourage wind energy include:

- Allow small turbines in a wider range of zoning districts with large minimum lot sizes;
- Reduce or eliminate the zoning permit fee for small-scale wind turbines;
- Ensure appropriate regulations are in place to regulate shadow flicker and the noise level at the property line as well as other potential nuisances (color, lighting, signage and the like).

GEOTHERMAL ENERGY

Geothermal heat pumps (GHPs) use the natural heat storage capacity of the earth or groundwater to provide energy efficient heating and cooling. GHPs should not be confused with air-source heat pumps that rely on heated air. Geothermal heat pumps use the relatively constant temperature of the ground or water several feet below the earth's surface as source of heating and cooling. Geothermal heat pumps may be appropriate for retrofit or for new homes, where both heating and cooling are desired. In addition to heating and cooling, geothermal heat pumps can provide domestic hot water.

A geothermal heat pump system consists of indoor heat pump equipment, a ground loop, and a flow center to connect the indoor and outdoor equipment. The heat pump equipment works like a reversible refrigerator by removing heat from one location and depositing it in another location. The ground loop, which is invisible after installation, allows the exchange of heat between the earth and the heat pump.

Geothermal heat pumps can be open-loop or closed-loop. Open-loop systems draw well water for use as the heat source or heat sink, and after use, return the well water to a

drainage field or another well. Closed-loop or earth-coupled systems use a water and antifreeze solution, circulated in a ground loop of pipe to extract heat from the earth. The type of system employed depends on many factors including the availability of groundwater, soil type, energy requirements, and size of the lot.

Geothermal systems do have a minimal risk of contaminating groundwater because of their placement into the ground or use of groundwater from wells. Water quality is an important issue with open-loop systems.

There are no township ordinance regulations regarding the use of geothermal energy. Geothermal system construction requirements might include regulations on water well construction, specifying the types of pipes that can be used in the underground system (e.g., avoiding the use of copper pipes in highly acidic soils due to their susceptibility to corrosion), requiring the use of biodegradable mixtures such as food grade propylene glycol instead of methanol or ethylene for the antifreeze used to circulate the water through the pipes, and establishing isolation distances from drinking water wells, septic systems, and property lines.

COORDINATION OF RENEWABLE ENERGY WITH HISTORIC PRESERVATION AND OPEN SPACE POLICIES

To address green building technologies for historic resources or in the historic district, design guidelines could be updated. Wind energy devices or solar panels are effective in reducing a building's energy consumption; however, on historic structures or in the historic district, wind devices or roof-mounted solar panels visible from the street may overshadow the historic amenity. Design guidelines for green technology could provide recommendations for locations and size or area thresholds for green building construction as well as the required type of green devices permitted (i.e., building integrated devices, solar roof shingles, one small wind device that looks like a weathervane, etc.). These guidelines could encourage the careful placement of energy efficient systems as new applications emerge while ensuring that the historic integrity of the structure remains intact.

Consideration should be given to establishing policies and regulations for the use of renewable energy technology on preserved open space and farmland. The use of preserved open space for wind or solar arrays should be discussed in anticipation of

potential applications. See Chapter 5 Agricultural Resources for more discussion related to energy production on farmlands.

Chapter 12

ECONOMIC DEVELOPMENT

Solebury's goal for economic development is to achieve balanced and sustainable land use, to help mitigate and balance the real estate tax impacts of conventional residential development, and to offer diverse economic activity, employment opportunities and commercial services that residents desire. The township is tied to the regional economy through residents' employment, spending patterns, and tourist trade. Nonresidential uses in the township contribute directly and indirectly to the municipal tax base and into the localized economy. In evaluating the value of any particular economic development, the direct contribution to the tax base should be factored against any negative impact on those characteristics that attract residents to Solebury which in turn lead to high property values.

According to the Bucks County Board of Assessment data, in 2014, Solebury Township, at 128.9152 total combined township and school district millage, has the lowest total tax rate of any township in the county. On average, Solebury's combined property taxes are 19 percent lower than the surrounding townships of Buckingham (151.50 millage), Plumstead (159.940 millage), and Upper Makefield (150.07250 millage). This is due to a much lower school tax on property owners (86.15520 millage) than any other school district in the county. The township's tax rate of 19.560 millage, however, is somewhat higher than most municipalities in the county. This is due in part to the cost of principle and interest on borrowings for the voter approved township land preservation program.

FISCAL IMPACT OF DEVELOPMENT

New development is often considered good for economic growth because of anticipated additional tax revenue to a municipality. But this is just looking at one side of the picture - all new development brings additional costs to a municipality in the form of additional demands for services. When those additional costs exceed the tax revenue, that development is no longer a fiscal benefit for the municipality.

While it is important to consider future economic growth, it is just as important to preserve the things the community values. Smart growth focuses new development

where services and infrastructure are already in place and protects sensitive natural resources and important open spaces that create the character of the community. Smart growth is about shaping the future of a community; and it starts with a good natural resource-based comprehensive plan and follows through with land use regulations that will implement the plan.

New people moving into a community from residential development can bring a renewed vitality and energy, and enhance a community in many ways. Our communities wouldn't exist without its residents. A number of localities have calculated the fiscal impacts associated with different types of land use and found the more developed the community, the higher the taxes needed to support the demand from services. Studies continue to show that residential land use costs more in services than it pays in taxes, particularly increasing education costs from an increased school-age population. On average the amount of local tax dollars to educate one child in a community exceeds the taxes paid on a typical home.

In addition, although undeveloped land may not generate much in the way of tax revenue, the demand for municipal services is extremely low. The revenue generated by open space and farmland usually far exceeds the cost for related services. A study conducted for the GreenSpace Alliance and the Delaware Valley Regional Planning Commission documents multiple economic benefits from open space preservation including increased property values, higher levels of tourism, increased employment opportunities, and higher tax revenues. The study focused on the five county region of southeastern Pennsylvania (Economy League of Greater Philadelphia 2010). A case study in the report, using Peace Valley Park, revealed that homes within one-quarter mile have an estimated \$35,155 of additional value based on their proximity to the park.

To balance the fiscal impact of residential development, municipalities frequently turn to commercial and industrial development. The immediate fiscal impact is usually positive, as generally there is minimal demand for additional services. However, the full fiscal impact of commercial and industrial projects is usually not felt for a few years. Some increased municipal costs are easy to identify. New infrastructure such as roads or sewer lines may be needed, and there may be increases to the police and fire department budgets. Other costs are more difficult to identify, such as the loss of tax revenue from businesses closing because of competition from new businesses; increased

residential development that follows commercial development; slow property appreciation - commercial property appreciates at a slower rate than residential.

A 2006 Penn State College of Agricultural Sciences study¹¹ examined the fiscal impacts of commercial, industrial, residential, and open space¹² land uses and found that residential land generally costs local governments, while commercial, industrial, farm, and open lands help local governments by paying more than they require back in services. Although residential land use provides a majority of overall revenues, it does not pay its own way, as the costs to educate school children are very high. Commercial and industrial land uses may provide more revenue to the school district and municipality than they require in expenditures, although as indicated above, over time, commercial buildings and properties may appreciate in value or close. Farmland and open space land uses also provide more revenue to the school district and municipality than required in expenditures (except for exempt properties), although the amount of revenue and cost of services is less for this land use category. It could actually cost a municipality more in the long-term by not preserving farms and open space lands.

Fiscal issues are not the only criteria by which municipal land use policies should be based. While different land uses vary in their potential fiscal impact on a community, the overall form and function of the community and its physical, social, and economic health is more important.

This principle is supported by responses obtained from the resident survey. Respondents considered taxes to be one of the top five reasons for living in the township and one of the most important issues to consider when planning for the future of the township. Yet the township's rural setting, open space, and scenic beauty ranked higher in reasons for living in the township and retaining the rural character was felt to be the most important planning issue. Economic development was considered by respondents as one of the least important planning issues; and when asked what was lacking in the township, small business center for employment was considered the least lacking and commercial areas for local shopping needs was ranked 9th out of 13 potential choices. Nonetheless, to help maintain a low tax burden on

¹¹ Kelsey, Timothy W: The Fiscal Impacts of Different Land Uses. The Pennsylvania Experience in 2006 (College of Agricultural Sciences, Penn State University, 2006.)

¹² Including farmland.

residents and address economic needs (jobs, goods, services), maintaining a variety of nonresidential land uses continues to be encouraged in the township in areas that already support such uses without negatively affecting traffic patterns, natural resources, or residential uses.

LOCAL AND REGIONAL ECONOMIC DEVELOPMENT

Solebury's attraction derives from its proximity to New Jersey, Philadelphia and New York City, and its unique mix of natural beauty, historic charm and cultural vitality. The historical landscape of the township, dotted with farm fields, villages and rural crossroads, is shared with its neighbors that have also made conservation of historic landscapes and natural resources a priority. As Solebury and its immediate neighbors attempt to manage growth to conserve resources and community character, their desirability is enhanced. Regional growth is subject to many forces well beyond the control of municipal planning, including regional economic health, state and federal policies, and the impacts of various forms of taxation.

Agriculture, as an economic activity, contributes significantly to retention of the historical landscape in Solebury. Agricultural uses abound in Solebury and contribute to the local economy in terms of food and plant production, employment opportunities and sustainability. More information on this topic is provided in Chapter 5 Agriculture Resources.

Most of the commercial uses in Solebury are concentrated along the Route 202 corridor (Lower York Road). More conventional nonresidential uses in the township range from personal services to office, retail, and eating establishments. Logan Square contains the greatest concentration of retail shops serving the day-to-day needs of residents. Small-scale commercial uses are also located in the villages. More intense commercial/industrial uses exist in the township including auto repair, building materials supply, and quarry operation.

Institutional uses (nonprofits uses) and recreational uses/activities can contribute to the local economy and the tax base through employment opportunities and providing an additional customer base to support local businesses. These uses include religious facilities, public and private schools, the Bucks County Audubon Society (education

center), Bowman's Hill Wildlife Preserve and the Delaware River and the canal towpath. Trails and bikeways also enhance recreational facilities, attracting more users.

Solebury is part of the greater regional tourist area which includes New Hope Borough and Peddler's Village, located mostly in neighboring Buckingham Township. In addition to serving residents, some commercial entities in Solebury cater to the tourist industry, such as a hotel, antique shops and Rice's Market.

Both the hotel and bed and breakfast inns accommodate tourists who stay to visit sites in Bucks County. Capitalizing on the tourist assets in the township and traffic from other nearby tourist destinations is important to sustaining Solebury's economy and tax base.

Land use change at the regional level can impact resource protection issues within Solebury Township. Demand for changes in land use is a function of regional population growth and redistribution at the hands of market forces as well as differential growth management practices around the region. Most commercial enterprises are subject to locational factors, market forces, transportation access, and commuter patterns beyond the scope of municipal planning control. Except on a small scale, Solebury's population on its own does not and will not support development of large commerce uses. Markets exist in the broader central Bucks County region and in New Jersey to support such uses. Business uses, such as high tech uses with low impact on natural resources and transportation systems, will continue to be encouraged in the township.

Recognizing that development and land use changes may take place, the township has honed its regulatory and plan review processes to create opportunities to enhance sustainability in the commercial zoning district. The Traditional Neighborhood Commercial (TNC) District was developed to enhance the rural and historic context of the commercial center by encouraging the protection of natural resources and stormwater infiltration, while promoting a unified development theme. The TNC district allows a mix of commercial and office uses and allows for a dwelling in combination with business uses. The district dictates an attractive streetscape along the Route 202 corridor with access control improvements to better define and separate traffic movements.

Commercial zoning regulations have been created for the villages of Carversville and Aquetong. These districts include design standards to ensure future development is compatible with the historic character of the village. Design regulations address placement of building additions, parking, access, and landscape buffers.

While the need for extensive economic development initiatives is minimal, efforts could be taken to foster and promote small, diverse, low impact nonresidential businesses, including office, high-tech, and incubator uses, in the existing commercial and industrial districts. The township could assist in supporting local businesses and marketing vacant and underutilized commercially zoned properties through partnerships with the New Hope and Central Bucks Chamber of Commerce and civic organizations and through media they use (e.g., website, newsletter, brochures).

Chapter 13

TRANSPORTATION AND CIRCULATION PLANNING

The purpose of transportation and circulation planning is to create policies that will achieve the goals of Solebury Township by enhancing the efficiency and safety of the current road and circulation system while preserving the rural character of the community. A principal means for achieving this goal is to use highways functionally designed to accommodate through-traffic and to refrain from implementing major changes to local roads that serve local traffic needs.

This section addresses the elements of Solebury Township's transportation system. At present, that system is comprised almost exclusively of the public road system. Important for moving goods and people, the road system also is important for influencing land use decisions because of their character, condition, and capacity. Conversely, land use patterns both within and outside Solebury can affect the use and efficiency of roads within the township. Traffic circulation throughout the township is an issue of increasing concern. Conditions along the main highway corridor that traverses the township – Lower York Road (U.S. Route 202) – are well known. This highway exhibits the highest traffic volumes and the highest accident frequencies in the township. Several other roads in the township have experienced difficulties caused by traffic, deficient road surface in areas, limited sight distance, and improper alignments.

Despite localized traffic problems, residents and visitors to Solebury experience the scenic nature of its rural roads. Roads are typically narrow, winding, curbless. They often have hilly byways; lined in some areas by trees, in some areas by steep embankments, and in other areas, by historic homes or buildings. Ditches along the sides drain rainwater, hedgerows mark the borders of adjoining fields, and scenic landscapes provide a rhythm and scale that is unmistakably rural. This rural character experienced along the roadways, to many people, epitomizes Solebury. Significant portions of the local road network are especially picturesque as described in the Historic, Cultural and Scenic Resources chapter. The preservation of these scenic resources needs to be balanced against improvements of roadways such as widening and alignment issues.

From a safety perspective, it is desirable to discourage the use of local roads for the movement of through-traffic. By promoting improvement projects aimed at maximizing capacity along the major road corridors in the township, local roads will be able to function more efficiently since the through-traffic currently using local roads as short-cuts will not be as attracted to these roads if the major routes are more convenient for travel.

FUNCTIONAL CLASSIFICATION

Solebury Township has about 100 miles of public roads within its boundaries, some of which are maintained by the township and others by the State. State roads consist primarily of major and minor collector roads, including Route 202 (Lower York Road). Township roads comprise a combination of other local roads and streets within residential neighborhoods.

Roadways have been classified according to the function they serve in the overall network. Each classification is based on volumes of traffic, travel speed, accessibility, relationship to places, and relationship to other roadways. Some carry higher speed through-traffic, some carry local traffic between neighborhoods, and some provide access to and from individual residential driveways. Road function helps to define the character of the road, and ultimately, the appropriate design and access treatment. The roads in Solebury Township are classified as Principal Arterial, Major Collector, Minor Collector or Local Road.

PRINCIPAL ARTERIALS have as their major function the movement of large volumes of traffic at relatively high rates of speed. They provide higher types of service and facilitate traffic over longer distances on an intercounty or interstate basis. Access points are generally limited and controlled.

U.S. Route 202 (Lower York Road), while largely two-lanes and with little access limitations, serves the function of Principal Arterial through the township. Traffic is carried over the Delaware River to New Jersey via the New Hope-Lambertville Route 202 Toll Bridge.

MAJOR COLLECTORS connect municipalities and population centers. These roads are the major contributors to arterial traffic and carry fairly heavy traffic volumes at

moderate rates of speed. Access points are somewhat controlled on collector roads. It is not uncommon for major collector roads to span the entire length of a community.

River Road (PA Route 32), Upper York Road, (PA Route 263), and Windy Bush Road (PA Route 232), are considered to be major collector roads in Solebury Township. River Road provides an important link to Interstate 95 in Lower Makefield Township and is an important scenic highway along the Delaware River, attracting tourist traffic.

MINOR COLLECTORS facilitate relatively low volumes of traffic at lower speeds. They gather traffic from local roads and direct it to the arterials and major collector road networks. Minor collectors often provide traffic circulation between and within larger residential neighborhoods.

The minor collectors in Solebury Township include Aquetong Road, Greenhill Road, Mechanicsville Road, Phillips Mill Road, Sугan Road/Kitchens Lane, Stony Hill Road, Street Road and the short leg of PA Route 179 leading from Route 202 into New Hope Borough.

LOCAL ROADS provide the greatest access to adjacent properties. Local roads provide for short distance, low speed travel, and make up the majority of township-owned roads. The number of access points is greatest on local roads. Any roads not classified as Principal Arterial, Major Collector or Minor Collector are classified as local roads. Their prime function is to disburse local traffic, and they are primarily used by residents in the community.

LEVEL OF SERVICE

Level of service analysis is used to establish the level of efficiency that is being obtained on a roadway segment, intersection, or roadway interchange. Level of service is a comparison between the volumes of traffic that use a road or intersection and the maximum capacity that the same road or intersection is able to handle. The capacity of an intersection or roadway is based on a number of factors:

- number of lanes;
- width of the lanes;
- presence or absence of any turning lanes;
- percentage of trucks present; and,
- type of traffic control device.

ROADWAY CONDITIONS

The existing roadway network serving the township is comprised primarily of two-lane rural-type roadways, ranging from 16 feet to 24 feet in width. An exception is Lower York Road (U.S. Route 202) whose width, including shoulders, varies from 34 to 45 feet within the township.

The conditions of the roadway network in the township are adequate for the current traffic and population of the area. There are notably issues associated with larger traffic volumes on Route 202 and at its intersections. Except for intersections along Lower York Road, the levels of service encountered on roads and at intersections throughout the township are generally acceptable due to the limited number of signalized intersections and the rural character along many of the roadways. Ongoing maintenance including pothole repair and resurfacing should be coordinated with PennDOT and utility companies that may have planned projects affecting the roadway.

Since 1990, the Township Engineer has continued to study intersections along Route 202, particularly in association with review of recent development proposals. Traffic volumes have continued to increase. This includes the intersections at Shires Drive and Logan Square and at Route 179 leading into New Hope. Poor levels of service occur not only during weekday peak hours, but also on the weekend (from late morning to early and mid-afternoon) due to tourist traffic destined for Peddler's Village and New Hope. Recently Solebury was awarded a \$165,000 grant by PennDOT to monitor and improve the safety of three major traffic intersections along Route 202 in the township. Traffic signal monitoring and communication improvements will include the intersection with Kitchen's Lane and Route 179; where 202 meets Logan Square and Shire Lane, and at Suga Road.

In addition to intersections on Route 202, the intersection of Upper York Road (Route 263) and Street Road at Lahaska operates at a poor level of service during the weekend peak. However, signalization of the Route 202 intersections at Sugan Road and Street Road has improved the level of service for turning movements along this major roadway.

The intersection of Mechanicsville Road and Greenhill Road reportedly operates at a poor level of service when Rice's Market is open. In addition, as traffic has increased on Route 202, there have been noticeable increases in cut-through traffic on local roads which offer a scenic alternative to Route 202, particularly on Mechanicsville Road, Sugan Road-Kitchens Lane, and Phillips Mill Road.

FUNCTIONAL CLASSIFICATION/ANTICIPATED IMPROVEMENTS

The functional classification of the road network is a useful guide for the placement of future land use. Although Solebury desires to preserve the rural character of the local road network, there are some roads where preserving the roadway existing characteristics may be challenging because of the current or future function they will serve. Those roads that serve a higher function are Lower York Road (U.S. Route 202), River Road (PA Route 32), Upper York Road (PA Route 263), Windy Bush Road (PA Route 232), Aquetong Road, Greenhill Road, Mechanicsville Road, Phillips Mill Road, Sugan Road/Kitchens Lane, Stony Hill Road, Street Road, and the short leg of PA Route 179 leading from Route 202 into New Hope Borough. Nearly all of these roads are scenic along most or some of their lengths.

To maintain efficiently managed access and promote safety, future land development needs to be guided into areas with collector road access to the arterial network. Most larger developments underway or anticipated are located in areas with direct access to the collector and arterial road system. The township does not envision any changes to functional classification across the planning horizon for this plan.

Further consideration should be given to modifying land use controls in order to focus future development to areas where road function and design are most appropriate.

As a follow-up to this plan, it is recommended that the circulation system of the township be studied in greater detail. The study should perform the following:

- determine current traffic volumes and levels of service;
- project traffic impacts of current and anticipated new development within the township and short- and long-term increases in background traffic originating outside the township, coordinating such study with surrounding municipalities;
- study relationship between congestion on Route 202 and traffic volumes on alternative through-routes utilizing the collector road system;
- assess community impacts, potential limitations and improvements needed for effective accommodation of alternative through-traffic movements on the collector road system;
- study feasibility of improved cross-section on Route 202 and potential land-use and environmental impacts of such improvement;
- identify critical intersections and assess major improvements for traffic flow, including intelligent transportation system (ITS) facilities;
- assess traffic impacts from the Route 202 Parkway connecting Doylestown to Montgomery County;
- assess potential future (direct, indirect, induced, and cumulative) of on-going development in the context of the Plan for Land Use.

ACCESS MANAGEMENT

Controlling access from residential, commercial, institutional and industrial properties can help traffic flow and safety along main highway corridors, particularly Route 202. An overabundance of access points can exacerbate congestion and create safety issues. The development of residential, commercial or industrial properties can generate increased traffic volumes entering and exiting the highways. The interaction of traffic entering and exiting needs to be planned and regulated to enable a safe and efficient vehicular flow.

Ordinances and site plan considerations can limit direct access to major roads and guide development access toward interior/common access circulation roads. There are many ways to channelize traffic, ranging from simple methods involving a single parcel or lot, to creating a plan for future development of an area. Some of the methods that could be used to direct traffic include:

- Relocate or eliminate existing access points;
- Establish one-way traffic patterns;
- Provide access from lower order roads;
- Combine access points; and
- Install reverse frontage roads.

TRAFFIC CALMING

Traffic calming measures may be used to address speeding and high cut-through traffic volumes on local roads and neighborhood streets. By addressing high speeds and cut-through volumes, traffic calming can increase both the real and perceived safety of pedestrians and bicyclists while continuing to handle the vehicular volumes that the roadway is experiencing. Traffic calming features are self-policing because they force traffic to slow down in the absence of police presence. PennDOT has been addressing this issue on a number of state-owned roadways throughout the township by establishing four-way stop intersections, which provide a safety improvement by stopping traffic and providing an effective way to improve capacity with signage.

Other traffic calming measures which could achieve similar results include: speed humps, speed tables, chicanes, planted medians, and roundabouts. These techniques all affect driver behavior and improve the safety of the street for all roadway users, including pedestrians and bicyclists, and when correctly designed, do not impede emergency access, large trucks and/or farm equipment.

Traffic calming techniques are useful at intersections with poor geometry, poor sight distances, and or skewed approaches. Roundabouts or other traffic calming techniques can control speed and limit driver confusion caused by poor intersection geometry. The township should look to incorporate traffic calming techniques where appropriate and develop design standards for traffic calming in new residential developments.

PRESERVATION OF LOCAL ROAD CHARACTER

The survey of township residents revealed that the major reason residents live in Solebury is due to its *Open space/scenic beauty* and *Rural setting*. However, *Traffic management and Road improvements* were top responses selected in the survey for what is lacking or needed in Solebury. Therefore, a balance is needed between retaining the

rural nature of the area when road improvements are considered. An inventory of scenic landscapes has been developed and is included as part of this Comprehensive Plan. Scenic landscapes have been inventoried as viewed from public roads. Often the character of the roads themselves is a critical element of scenic landscape quality. Narrow winding cartways, confining earthen banks, ample landscaping, low traffic volumes and speed limits, and the absence of developed road frontage make these roads pleasurable to drive.

While appropriate land use and open space planning efforts are critical to maintenance of scenic landscape qualities, retention of rural character also can be enhanced through the continuance of the rural road character. Road design standards in township ordinances should be reviewed for their adherence to broad circulation and land planning objectives and their compatibility with rural character. Access management provisions, viewed principally for their role in reduction of turning-movement conflicts, can extend to regulation of the placement and number of curb cuts on local roads to limit scenic disturbance.

Care should be taken to maintain the rural character of the road network as improvements respond to safety concerns and the impacts of additional development. Critical aspects of rural roadway character also should be extended into new development, particularly at their entrances, avoiding unnecessarily harsh contrast. This can be achieved through the use of flexible roadway treatment and design. Rote imposition of existing standards may not be appropriate for all types of development or in all situations. Low density residential development or village-scale residential development should not require the same design standards as commercial or industrial development.

Unnecessarily wide roadways contrast sharply with their scenic predecessors. Road width should be reviewed in the context of other safety concerns, such as characteristics of the roadside edge (i.e., flat shoulder vs. steep bank), sight distances and, whether or not on-street parking should be permitted. Grassy swales along roadways are preferred over curbing to increase or maintain infiltration and recharge to ground water.

The preservation of existing roadside vegetation can help preserve the rural character of an area. Clear sight triangles should be interpreted liberally to allow retention of existing mature vegetation where feasible. Introduced vegetation, including shade trees,

can be placed along new and existing roadways to help frame views and diminish the visual prominence of the asphalt. Placement of new vegetation along roads should be mindful of utility locations in or along rights-of-way to limit the potential for future interference and conflicts. Regulations to limit disturbance and promote the preservation and use of native vegetation should continue to be pursued. Roadside signage and paving materials should be evaluated on a case-by-case basis to determine their cultural impact to a road corridor.

The township also can promote other initiatives to aid in the preservation of rural and scenic qualities, including township-wide roadway litter pick-up programs.

PUBLIC TRANSPORTATION

SOUTHEASTERN PENNSYLVANIA TRANSPORTATION AUTHORITY

The closest SEPTA bus service terminates in Doylestown Borough, which is located approximately 7 miles from Solebury. The nearest commuter rail station is located in Doylestown Borough (Doylestown Station—Lansdale-Doylestown Regional Rail Line—7.5 miles). The population density in the township is not a cost efficient option for public transportation service from SEPTA at this point. However, the township is served by the Trans-Bridge bus line with a park and ride facility located in the Logan Square Shopping Center. This line connects to many points in New Jersey and stops at Port Authority in New York City. It also travels west in Pennsylvania and connects to the Doylestown Train Station.

In addition to the bus line, Bucks County Transit (BCT) will provide public van service within the county with 48 hours prior notice.

NEW HOPE AND IVYLAND RAILROAD

A rail corridor traverses Solebury Township between the existing SEPTA service which ends at Warminster Station and the Borough of New Hope. This rail corridor is owned and operated as a tourist train by the New Hope & Ivyland Railroad. This line also provides freight service to several commercial customers. The corridor is a valuable asset and could provide a link between New Hope Borough and regional rail service in Warminster Township in the future. Providing rail service along this corridor could mitigate some of the traffic congestion that exists along Route 202 and therefore, the

township should ensure that the potential for passenger rail service along this line remains a feasible option.

ALTERNATIVE TRANSPORTATION

The rural and scenic characteristics of Solebury Township make it an excellent place to utilize alternatives to the automobile for transportation, particularly for recreational activities. The Delaware Canal towpath is a major trail resource, and the township has made strides in connecting walkways and trails in the vicinity of New Hope Borough.

Further efforts should be undertaken toward developing a local trail or pathway network for recreational uses such as hiking, biking or horseback riding. These can range from providing access to an informal trail network to establishing designated bike lanes along local roads. Regional planning efforts should also be considered to coordinate recreational trail planning on a regional or multi-municipal scale.

In areas designated for higher density development, such as the Mixed Use Rural-Suburban Center area, design concepts can help to create a development pattern with an appropriate density and mix of uses and services to give residents the opportunity to walk or bike between them.

The Solebury Township Subdivision and Land Development Ordinance (SALDO) requires that sidewalks and pedestrian paths be required where necessary to provide access to community facilities. The SALDO permits bicycle/pedestrian trails to be used instead of sidewalks along perimeter roads to help encourage non-motorized transportation. In many cases the township has waived these provisions due to the lack of nearby facilities to connect into. In situations where the township does not see the immediate need for the installation of sidewalks or trails, an easement should be considered so that area for future pathways can be assured. Priority areas for pedestrian paths and linkages could be developed to help guide township officials in deciding whether or not to waive sidewalk or trail provisions in whole or in part.

Bucks County adopted the *Bucks County Bicycle Master Plan* in 2013. The purpose is to inventory existing conditions, advance opportunities for the improvement and expansion of a broader network of multimodal routes serving residential and business areas of the County, enhance the outreach and education of bicycle safety, and leverage

the recreational resources in the communities at large. This document is a master plan for an interconnected network of bicycle facilities for Bucks County and the region and is a resource for municipalities in planning and implementing bicycle facilities across the county. It identifies priority roadways for bike lanes and shared-use paths.

The plan identifies an on-road bike lane facility on U.S. Route 202 that connects Doylestown to New Hope Borough. This link is a “Priority Spine” within the plan, which means it would provide a connection between activity centers, central business districts, recreational facilities and tourist destinations. Solebury Township supports the development of the U.S. Route 202 Bike Lane and is working with neighboring municipalities and the County on right-of-way issues and environmental clearances.

Pedestrian and bicycle circulation should be considered in every type of development. Pedestrian/bike access can take the form of informal paths, macadam walk/bikeways, or constructed sidewalks, depending upon the location and the uses to be served. Pedestrian improvements should be required within major developments by planning and providing an easement for such facilities. Consideration should also be given to interconnection of walkways or paths between proposed developments.

FUNDING OPPORTUNITIES

To implement roadway improvements, it is necessary to have appropriate funding. The funding source for circulation-related projects depends on such factors as: ownership of the road (state or municipally owned); the type of project, whether it is a road or bridge project; and the magnitude of the project (resurfacing, widening, or road relocation project).

Municipalities receive funds directly from the state under the Liquid Fuels Fund program. These funds are acquired by the state through taxes received through the purchase of fuel. The funds are allocated according to a legislative formula that takes into consideration mileage of municipal roads and municipal population. Liquid Fuel Funds are used by municipalities to maintain roads and to make minor improvements.

DVRPC TRANSPORTATION IMPROVEMENT PROGRAM

The Delaware Valley Regional Planning Commission (DVRPC) produced the *FY 2013 Transportation Improvement Program (TIP)* for Pennsylvania for Bucks, Montgomery,

Chester, Delaware and Philadelphia counties. DVRPC and its member governments prepare a program of projects every two years that responds to the needs of the region and complies with federal and state policies. This list of transportation priorities must be financially constrained per the requirements of the *Moving Ahead for Progress in the 21st Century* (MAP-21). In southeastern Pennsylvania, the TIP contains approximately 370 projects which total almost \$3.7 billion over the four years of the program. There are no projects programmed for funding in Solebury Township at this time. The township should make a list of priority projects and submit them to DVRPC for TIP funding.

BRIDGES

The township has 32 bridges greater than 20 feet in length that are owned either by the state or county. The significance of the length is that bridges more than 20 feet long are eligible for federal funding for 80 percent of the costs associated for reconstruction or rehabilitation. Based on state bridge inspections reports, there are 12 that are rated as structurally deficient.¹³ Unless these deficiencies are addressed in a timely manner continued use may force closures or restricted weight ratings. This would create re-routing to other roadways which creates more wear and tear on existing roads and impediments for emergency and larger vehicles. Maintenance of township, county and state bridges is important for all levels of government.

The township has a number of historic bridges which add to the area's attractiveness and sense of place. They can present special challenges when they no longer meet the requirements of vehicles utilizing the local roads. The township has one covered bridge which is county owned and several stone arch bridges which are state, county and locally owned, in addition to a number of culverts with stone headwalls. These historic bridges are a valuable resource and should be treated as such. The township should ensure that rehabilitation or reconstruction of a historic bridge should be given priority over replacement as long as it can be designed to balance the preservation needs to that of the public traffic safety needs. When an historic bridge is determined to require replacement or significant maintenance which could alter its integrity, such as the bridge on River Road in Centre Bridge, it should be done in accordance to context-

¹³ PennDOT considers a bridge structurally deficient when the condition of the bridge deck, superstructure, or substructure rating is 4 or less. A rating of 3 or 4 means the bridge is in poor or serious condition and has a light load rating. A bridge rated 0, 1, or 2 is closed until corrective actions are taken due to its critical or failed condition.

sensitive design. This takes into account the bridge's original design, its construction materials, workmanship and appearance of the bridge and its approaches.

The township is also served both directly and indirectly by several bridges over the Delaware River operated and maintained by the Delaware River Joint Toll Bridge Commission. These bridges provide connections to points in New Jersey and beyond and are vital for interstate commerce and for township residents to commute to job and commercial centers in New Jersey and New York. The joint toll bridge commission operates a multi-lane toll bridge at Route 202 which is located entirely in the township in addition to a free, two lane suspension bridge connecting Centre Bridge to Stockton New Jersey. Township residents also benefit in the use of the free bridge connecting New Hope to Lambertville, New Jersey.

Another bridge that is located outside of the township that serves Solebury commuters is the I-95 bridge over the Delaware River at Scudders Falls, just several miles south of the township's border. The Joint Toll Bridge Commission plans to construct an entirely new set of crossings which will expand the carrying capacity of the bridge, including a redesign for the approach ramps and adding more lanes on I-95. The expansion when completed will add needed capacity, but could impact nearby communities in terms of development pressure due to their accessibility. Another impact the bridge reconstruction may have during the lengthy construction period is that users may be pushed to adjacent bridges to avoid the construction zone. This will place an additional burden on bridges in Washington's Crossing, New Hope and Solebury. It is important for the township to be involved in the construction management process to provide input and plan for appropriate detours, and to understand the impacts on township residents and the long term impacts of the capacity improvements as a result of its completion.

The Joint Toll Bridge Commission also maintains a suspension footbridge in Lumberville. Aside from its historical significance, this pedestrian bridge provides a recreation link to Bulls Island and to the entire Delaware River Corridor for area residents. The bridge underwent a significant rehabilitation project and is open for use. This bridge is important for the bicycling community as it allows for greater recreational opportunities in New Jersey and along the canal system and towpath trails.

The bridge is an important component of the township park and recreation system and should be a factor in planning for future on road and trail connections.

DEVELOPMENT REVIEW AND REGULATION INITIATIVES

Major subdivision and land development applications should continue to be required to develop a Traffic Impact Study as required by the SALDO. A Traffic Impact Study should identify the amount of traffic expected to be generated by a development and how the traffic will be distributed over time to the surrounding roads. Traffic Impact Studies also should identify road improvements that would be needed to handle the increased traffic volumes, as well as potential pedestrian, bicycle and other alternative transportation means. Based on these studies, responsibility for implementation of improvements needed on site can be identified.

Chapter 14

FUTURE LAND USE PLAN

The Plan for Land Use for Solebury Township establishes a policy guide for land use in the township over the next ten years and beyond. It provides a vision for municipal policy and action, integrating the planning issues and factors addressed throughout this Comprehensive Plan. A foundation for the Plan for Land Use includes previous plans and other studies undertaken for the township, as well as, the Community Survey and the Vision Statement articulated during the Comprehensive Plan review and revision process. The factors most relevant to future land use planning are:

- projected population growth and housing demand;
- existing land use and development patterns;
- existing zoning;
- existing and planned infrastructure, particularly water and sewer services;
- regional development influences and transportation patterns;
- natural scenic, historic and cultural resource conservation and sustainability objectives;
- environmental constraints; and
- assumptions made with regard to the cumulative and induced impacts that will accompany the changes in future land use.

The Plan for Land Use is a general and long-term guide for land use based upon sustainable community planning objectives and reflecting anticipated changes in population, housing, and public facilities and services over the life of the Plan. Specific land use regulations such as the zoning ordinance, subdivision ordinance, official map, and building codes are immediate and implementation devices, utilized to regulate land use on a day-to-day basis. A direct relationship between the Plan for Land Use and specific land use regulations is established by the township as it works toward fulfillment of the comprehensive plan objectives over a ten year, or longer, planning horizon. The Plan for Land Use should be reviewed periodically to ensure that the desired goals of the

township are being achieved. The Plan is designed to meet the requirements of the Municipalities Planning Code.

PLANNING FRAMEWORK FOR FUTURE LAND USE DESIGNATION – FACTORS TO CONSIDER IN LAND USE PLAN

EXISTING LAND USE PATTERNS

Planning for future land uses must consider existing land uses as well as the land use implications of zoning designations. Future uses should be compatible with existing residential neighborhoods and commercial and industrial uses, as well as, historical village development centers. The future land use designations proposed in this Plan reflect existing development patterns and respect the land use implications embodied in existing zoning district designations, and in consideration of Solebury's proximity and relationship to surrounding municipalities.

TRANSPORTATION AND COMMUNITY FACILITIES

The location, classification, and capacity of the transportation network and access to community facilities, such as wastewater and water services, are major considerations in the location of higher intensity nonresidential uses and higher-density residential uses. Route 202 serves as the major transportation corridor through Solebury, and the majority of nonresidential uses in the township are located on or near this road. The need for safe mobility, access management (e.g., managing the number of entry and exit points to a road), and reduced traffic congestion is part of the planning process for future land uses along the Route 202 corridor.

Public wastewater and water serve properties along the Route 202 corridor adjacent to New Hope Borough. Extension of public sewer and water service beyond the current service areas, is contrary to the objectives of this Comprehensive Plan to achieve a sustainable community. Other community facilities and services, such as the schools, police, recreational facilities and public administration, are centrally located in the village of Solebury or in New Hope in proximity to higher-density uses. Existing and probable locations of community facilities are a consideration for future land use designation.

NATURAL AND HISTORIC RESOURCE CONSERVATION

Future land use designations, and the regulatory provisions which aim to implement them, must take into consideration the extent and location of environmentally constrained lands and the natural and cultural resource conservation objectives essential to maintaining the quality of life and preserving the beauty, unique character and natural resources that characterize Solebury.

Resources to be protected are: water resources, prime agricultural soils, floodplains and alluvial soils, wetlands, steep slopes, streams and riparian corridors, headwater areas, the Delaware River and canal, carbonate geologic formations, woodlands, and scenic and historical landscapes. The density and intensity of land disturbance associated with the future land use designations should be closely tied to the constraints posed for development and the sensitivity necessary for resource conservation and sustainability. The land use recommendations are designed to fit natural resource protection concerns foremost by directing development into appropriate areas and away from sensitive environmental resources. Likewise, historic features, including their historic context and landscape, should be preserved to maintain the character of the township.

FUTURE LAND USE DESIGNATIONS

For the purpose of planning land use, the township has been divided into four land use categories. Each is described below and displayed on the Plan for Land Use Map. The categories are not intended to be discrete zoning districts but to suggest the predominant character of the landscape and a focus for ongoing land use planning. Although some density ranges are recommended for future development, specific regulatory densities will be applied through the zoning ordinance. The four land use categories are:

1. Rural Conservation
2. Site-Responsive Rural
3. Mixed Use Rural-Suburban Center
4. Historic Villages

RURAL CONSERVATION

The Rural Conservation land use category covers the largest percentage of the township and includes farmland and a range of rural and rural-residential landscapes, including

extensive acreage protected through public and private means as permanent open space. Conservation of natural and cultural resources is important, including soils, woodlands, riparian corridors, headwaters areas, and ground water, as well as a broad range of scenic and historical landscapes which define the essential character of Solebury.

The broad Rural Conservation land use designation is the logical focus for continued township attention by the Land Preservation Committee to promote public and private conservation efforts. This will involve formal and informal liaisons among the township and individual landowners, local conservation organizations, and county and state programs for open space and farmland conservation.

Most of the Rural Conservation area is zoned RB, the provisions of which are consistent with the intentions of this land use designation in terms of density of development. Scattered across this land use category are extensive areas where large-lot residential development patterns have been set. Under appropriate design constraints, this pattern could continue. Critical issues involve minimization of soil disturbance and vegetation removal, reforestation of open riparian corridors, maximum recharge of ground water and retention of storm water, and careful placement of development to conserve scenic landscapes. Natural resource requirements and open space options provided by the zoning ordinance address these issues. The Existing Resources and Site Analysis Plan, and the site disturbance minimization and landscape requirements of the subdivision and land development ordinance also address these issues for development on individual large lots.

Smaller areas zoned RDC Residential Development/Conservation and RA districts, which allow for moderate density development fall within this designation. Most of the OR Outdoor Recreation districts that have been established in recognition of state and township-owned parkland, land owned by a landconservancy, and lands of the Honey Hollow Watershed Association (owned jointly by the Bucks County Audubon Society, Heritage Conservancy and the Crooks family) are located in the Rural Conservation area, in addition to the QA Quarry/Agricultural district. That district conforms to the quarry and is intended for alternative land uses, including low density residential, on lands that has either been reclaimed or not yet affected by quarry operations. A large portion of the mobile home overlay district is also located in this Rural Conservation area.

In contrast to the large-lot residential development that has predominated across much of the Rural Conservation area, creative use of flexible design approaches at low gross densities of development, such as the Single-Family Detached Open Space Options permitted by the zoning ordinance, can provide a means to fit development into the landscape while guaranteeing conservation of large expanses of permanent open space. The township should continue to ensure that criteria for selection and management of open space are consistent with resource protection and sustainability objectives articulated by this Plan. Standard policies for open space management, such as riparian reforestation, meadow management, natural recreational uses (such as trails and parks), etc. might be developed for use during the plan review process. Developer applicants are required to demonstrate how proposed open space management methods address resource issues and impact mitigation identified in the required Environmental Impact Assessment Report and the Existing Resources and Site Analysis Plan.

SITE-RESPONSIVE RURAL

The Site-Responsive Rural category encompasses those areas that have been substantially developed in conventional one-to- three acre single family development patterns, as well as a number of open or agricultural properties in the vicinity of existing development. Much of the area within this land use designation is zoned RA, allowing for moderate development density. Areas zoned in the lower-density RB district fall within portions of this designation, reflecting existing patterns of development. Portions of this land use category are also zoned within the Mobile Home Park overlay district.

Throughout this rural-suburban area, a fingery pattern of lands constrained by steep slopes, water courses or wetlands still remain, offering natural habitat, cover, and travel ways for wildlife, as well as scenic and, potentially, recreational open space values. Remnant historical landscapes dot this area, helping to link the contemporary rural-residential landscape with its historical roots. Density and design criteria for development will be site responsive, based on location relative to arterial roads, capacity of sewer and water infrastructure, effective stormwater management, thorough site analysis, consideration of natural and cultural resources, groundwater recharge, relationships to adjacent land uses, and protection of neighboring property values and community character. The application process in the subdivision and land development ordinance is structured to require a pre-application meeting, an Existing Resources and Site Analysis

Plan, a site visit, a pre-plan conference, and a multiple-step design, including stormwater management, process to assist in developing a responsible/responsive plan.

The Comprehensive Plan Committee recognizes that some development could occur on some of the remaining tracts of land that may continue the conventional subdivision pattern experienced in the past. Thus there is a need to place even greater attention to conservation of open space resources and community character on a site-by-site basis. Particularly on larger undeveloped parcels, flexible development approaches must be considered. An average density of one dwelling unit per 1.5 to 3 acres is required throughout the Site-Responsive Rural Development category, with greater permitted density and a variety of dwelling units available only through use of Single-Family Detached Open Space Options and links to implementation of specific community infrastructure needs.

Most development across this land use category will be dependent upon individual wastewater disposal systems, although development of community/public wastewater disposal system should not be ruled out, especially if realization of the open space and groundwater recharge objectives of this Plan might be achieved through the use of wastewater land application systems. Existing provisions should be reviewed to ensure that they adequately relate overall permitted density of development to natural constraints.

Age-restricted development and retirement communities, including opportunities for assisted living, could be considered in portions of the Site-Responsive Rural area located in proximity to portions of the Mixed Use Rural-Suburban Center, potentially offering a variety of housing types and other services to serve the growing sector of the population beyond normal retirement age. This population sector tends to place fewer demands on community facilities and services, with little or no generation of school-age population. Densities and development intensities for age-restricted communities should be the same as in other residential developments in this area.

MIXED USE RURAL-SUBURBAN CENTER

In the east-central portion of the township, adjacent to New Hope Borough and along Route 202, is an elongated area designated as Mixed Use Rural-Suburban Center. This area responds to existing development trends and is intended to provide for two land uses:

1. the location of higher-intensity nonresidential development, including larger scale commercial uses, as well as employment generating uses such as office development; and
2. the location of specialized residential development not in character with conventional residential neighborhoods. The latter might include, for example, nursing homes, assisted living opportunities, and high-density multifamily development.

In the Mixed Use Rural-Suburban Center area, further development of higher-intensity nonresidential uses, as well as any high-density residential use, should be conditioned upon several planning and design criteria:

- provision for roadway improvements, enhanced mobility through connector roads/driveways and access management to facilitate arterial highway functions and preclude conflicting traffic movements;
- provision for adequate parking in number and paving materials and non-vehicular access;
- provision for connection to-public wastewater and water or acceptable alternative system(s) only after consideration of other alternatives that could provide ground water recharge;
- conservation of notable (small-scale) open space and historical resources within development areas;
- structural design and landscape plantings that will maintain or enhance visual landscape qualities and/or buffer incompatible uses;
- hardscaping features such as bike racks and benches;
- sustainable design measures to encourage green buildings, conservation of water and energy, implement alternate energy strategies, and maximize ground water recharge.

Most of the land area in Mixed Use Rural-Suburban Center lies within three higher-intensity zoning districts: the LI Light Industrial District at the intersection of Routes 32 and 202; the Traditional Neighborhood Commercial District on the south side of Route 202 immediately west of New Hope Borough; and the RD Residential Development

District on the north side of Route 202 adjacent to New Hope. The development area within the RD-C Residential Development-Conservation District (Aquetong Preserve Lot #10) also falls within this land use designation.

The TNC Traditional Neighborhood Commercial zoning district is designed to enhance the rural and historic context of the community by encouraging protection of natural resources while promoting a unified development theme with consideration of retaining appropriate streetscape along a portion of the Route 202 Corridor. Design guidelines help to achieve this unified theme. A mix of commercial and office uses in addition to cultural and institutional uses are permitted in the district.

HISTORIC VILLAGES

The landscape of Solebury is dotted with several historical villages and crossroads hamlets. Larger villages like Carversville and Lumberville exhibit clear traditional village development patterns and host a mixture of land uses. The village of Solebury is a mixed cluster of historical and contemporary uses and hosts several community facilities. Phillips Mill and Centre Bridge are significant historically, but represent rural clusters of historical buildings, or hamlets, rather than extended village development patterns. The areas shown as Historic Villages designation on the Plan for Land Use Map are an extension of village landscapes along River Road just north of New Hope Borough.

The township has, as part of its planning review process, begun to update its village zoning districts of Carversville, Aquetong, Solebury, Centre Bridge and Lumberville. The historic village area also includes the MS Municipal Services zoning district that conforms to the township municipal facility in the village of Solebury.

The Historic Villages land use designation recognizes the spatial and land use characteristics of the existing hamlets and villages. The conservation of village character is an important consideration in this Comprehensive Plan. Factors to address include: potential preservation of open space immediately around the villages, the continuation of village lot patterns, and the protection of existing historic structures. Conservation of historical structures, to be economically viable, may require conversion from historical uses. Conversion should be conditioned upon preservation of historic character, including consideration of the impacts of access, setbacks and parking.

Conservation of historical character need not be limited to conservation of the existing built environment, but might extend to the design of adaptive reuse, additions, and entirely new development that builds upon or extends existing village patterns. Revisions to the zoning ordinance should ensure that the traditional development pattern is allowed to continue. Incorporation of further historic preservation regulations and incentives, such as the special setbacks and buffers required for historic villages in the zoning ordinance, is recommended to address village conservation issues, along with design review for new development.

In addition to residential development at traditional village scales, small-scale convenience-commercial, professional office, community institutional, and other non-residential development also might be considered in the Historic Villages, but only where designed to fit into the character of the village. Design criteria, parking standards, and bulk and area requirements must be carefully articulated for nonresidential uses to ensure both economic and physical integrity of predominantly residential properties.

The township plan is designed to meet the mandate of the *Pennsylvania Municipalities Planning Code* to protect and preserve historic resources.

MANAGEMENT OF ENVIRONMENTAL AND CULTURAL RESOURCES

ZONING ORDINANCE PROVISIONS

Important natural, historic, and cultural resources exist throughout Solebury Township across all land use designations. These resources must be protected on an individual basis by resource protection standards that apply throughout the township. Current zoning regulations offer protection of resources through provisions for the Flood Hazard District, Riparian Buffers Areas, and the Steep Slope Conservation District, all of which are overlay districts with township-wide applicability. The Zoning Ordinance provides for increased setbacks from the Delaware Canal, from the boundaries of National Register historic districts, from carbonate geologic features, and from identified scenic roads. Zoning regulations should be evaluated to address the recreation aspects of open space, the canal and the sensitive water contribution area to Ingham Spring and the Aquetong Creek Watershed, an important water source for the township that necessitates preserving and protecting potentially through an overlay district.

Most development plans are subject to extensive site analysis and Environmental Impact Assessment study, but no requirements specifically link development approval to minimization or mitigation of identified impacts. Impact mitigation might be required as a condition of plan approval, particularly where conditional use approval is required, or as a qualifying condition for use of special development options. Additional overlay zoning provisions or criteria for development under the Open Space Development Option could be developed to promote protection of scenic, natural and cultural resource values. Enhanced performance standards could be applied to development within these areas to reduce woodland removal, to require additional landscaping to promote the desired historic/scenic landscape, or to increase the conservation of natural resources.

SUBDIVISION/LAND DEVELOPMENT ORDINANCE PROVISIONS

The Subdivision and Land Development Ordinance contains requirements for hydrological study, and design standards for carbonate geologic areas and for stormwater management, and ground water recharge. The township has made progress in its study of ground water resources and upon completion, needs to take the next step of linking permitted development intensity with achievement of groundwater recharge objectives.

HISTORIC RESOURCES AND THE HISTORICAL ARCHITECTURAL REVIEW BOARD (HARB)

The township has established the Historical Architectural Review Board, as authorized by Pennsylvania Act 167, which allows for review of building changes proposed within the certified historic districts of Carversville and Phillips Mill. The township should assess potential interest and the benefits of additional historic districts, as a means to offer additional opportunities for protection of villages and historic clusters.

Because historic resources are not limited to discrete village landscapes, the township should consider expanding incentives for conservation of historic structures and landscapes throughout Solebury, as required by the planning code. Added design standard flexibility or allowance for certain additional uses, beyond those otherwise authorized within the zoning district, could be considered. Use of bonus provisions, as a way to make preservation of historic structures feasible, could be linked to the Secretary of the Interior's *Standards for Rehabilitation* or imposition of conservation

easements to guarantee appropriate and permanent conservation. The purpose would be to make conservation as financially feasible as demolition and replacement.

The township will continue to discourage the demolition of historic resources through its process for granting demolition permits, including an alternatives review prior to permitting demolition. During such a period, the applicant might have the opportunity to explore potential opportunities to re-use historical structures, particularly where additional use opportunities or other provisions have been afforded to historic resources, such as adaptive reuse.

Three areas in Solebury Township are deemed potentially worthy of nomination to the National Register of Historic Places. These include the area between Upper and Lower Mountain Roads as an extension of the agricultural belt which spans central Buckingham, the area extending from Buckingham between Sawmill and Mechanicsville Road, still retaining farmsteads part of the original land patent, and the hamlet of Cottageville. These resources should be revised and updated.

RELATIONSHIP TO SURROUNDING MUNICIPALITIES AND THEIR PLANS

Solebury Township is situated along the Delaware River in central Bucks County and surrounds the Borough of New Hope. Solebury also borders the townships of Plumstead to the south, Buckingham to the east, and Upper Makefield to the north. Development impacts do not stop at municipal boundary lines. This Plan encourages a cooperative approach to address regional issues such as flooding, water quality, groundwater recharge, and traffic management.

NEW HOPE BOROUGH

The land uses located along Solebury's border are generally consistent with uses in New Hope's. The township designates the area along the Route 202 corridor to the north and west as Mixed Use Rural-Suburban consistent with the commercial and institutional uses located in the borough. Historic Village is designated for the area along River Road directly north of the borough which contains industrial use. The area to the south of New Hope is planned as Rural Conservation similar to the types of low density residential use found in that area. The Kingswood residential development traverses both the borough and township to the west.

Solebury's RA-Residential/Agriculture, Light Industrial and RB-Residential/Agriculture zoning along New Hope's northern boundary are compatible with existing zoning and uses on adjoining properties in New Hope. Much of this area in Solebury is already developed with single-family homes or is preserved land. New Hope's planning areas along this border include Neighborhood Commercial, High Density Residential, Limited Industrial, and Moderate Density Residential. A coordinated trail system also exists in this area.

To the west of New Hope, Solebury's zoning includes VR Village Residential, RD Residential Development, TNC Traditional Neighborhood Commercial, RA-Residential/Agriculture (mobile home overlay). Much of this area is already developed and is compatible with New Hope's planning area designations of Neighborhood Commercial, Rural Conservation, and Low Density Residential.

Along the southern boundary in Solebury is the Township's RA-Residential/Agriculture (which allows a mobile home overlay). The densities are compatible with New Hope's and conservation easements exist on several large properties in this area of Solebury.

UPPER MAKEFIELD TOWNSHIP

Solebury's Plan for Land Use designates all future land use adjacent to Upper Makefield as Rural Conservation, the lowest intensity designation in the township.

Solebury Township lies immediately north of Upper Makefield Township. This township is part of the Newtown Area Joint Municipal Planning Council, which updated their Comprehensive Plan in 2009. The land use recommendations of the 2009 Comprehensive Plan did not change for those lands adjoining Solebury Township. Two land use categories – Conservation Management and Jericho Mountain Resource Protection Area – still apply and are intended for natural and cultural resource protection and very low density residential use. There is an additional area, Public Purpose Area, intended for parks and open space.

Upper Makefield Township has opposed public water and sewer infrastructure improvements within its Conservation Management District, and is in the process of adopting a new sewage facilities plan.

Upper Makefield's River and Canal Access Study published by Upper Makefield's Environmental Advisory Committee discussed cooperative ventures with Solebury Township due to the locations of Washington Crossing State Park and Bowman's Tower Park in Solebury. That Committee recommended that they explore a joint venture with Solebury Township and the Commonwealth of Pennsylvania in the development of a canoe launch along the canal within Washington Crossing State Park. A future boat launch for the Delaware River is being considered as part of the Washington Crossing Park master plan.

BUCKINGHAM TOWNSHIP

Solebury abuts Buckingham to its west along Street Road. Lands along Solebury's western border south of York Road are designated by the Comprehensive Plan as Conservation Management areas. Rural areas are considered appropriate for lower density forms of residential development, utilizing on-site or on-lot sewage disposal and large lots or clustered developments to retain open space, natural resources, and agricultural practices. Buckingham Township's zoning for Rural areas (except for those older neighborhoods) is AG-2, Agricultural District, and allows for a 1.8-acre minimum lot size for conventional subdivisions. Flexible lot size, clustering, and Transferable Development Rights (TDR) options also exist within the AG-2 District.

Conservation Management areas are characterized by the township's environmentally sensitive lands, and remain largely in agriculture, woodlands, or other open space uses. Residential development in Conservation Management areas would be very low density, or preferably either proposed as part of a rural village expansion, or sent to a more appropriate receiving area as part of the township's TDR program. Buckingham's zoning for these Conservation Management areas is AG-1, Agricultural District, and allows for a 1.8-acre minimum lot size for conventional subdivisions. Flexible lot size, clustering, and Transferable Development Rights (TDR) options also exist within the AG-1 District.

Lahaska contains Peddlers's Village, a tourist-oriented shopping center, located primarily in Buckingham which extends into Solebury. On the Buckingham side, the zoning is VC-2 (Village Center) and VC-3 districts. The VC-2 district allows village commercial uses; the VC-3 district contains a townhouse development. Solebury's portion of the village contains small commercial uses and designated as Rural

Commercial. The R1 zoning district (Small Lot Residential) in Solebury is located to the east of the village and contains a residential subdivision. These designations, and corresponding zoning, are consistent with Solebury's future land use designation of Historic Village and recognize the Peddler's View development in Solebury Township.

The townships also share the limestone valley geologic formation. It extends about 10 miles, averaging one and one-half miles wide. Both townships have zoning overlay ordinances that limit development near features such as sinkholes, fracture traces, caverns and other carbonate geology features.

PLUMSTEAD TOWNSHIP

The portion of Plumstead adjacent to Solebury is rural in nature, with farms and large residential lots, extensive woodlands, steep slopes forming the western side of the Delaware River valley, and within that valley, the continuation of the Delaware Canal State Park. The Future Land Use Plan chapter of the *Plumstead Township Comprehensive Plan Update* (2011) designates those lands adjoining Solebury as Rural Area and Resource Protection Area. The purpose of Rural Area is to maintain and enhance the rural character, provide low-density residential development, and protect the agricultural industry and inherent natural resources. Due to its high concentration of sensitive natural resources, the Resource Protection Area protects the natural and scenic beauty of this area. Future development should only include uses and activities that will complement sensitive resources and heightened protection standards are required.

The Rural Area and Resource Protection Area correspond to the zoning districts by the same name and permit residential lots of sufficient area to provide on-lot water and sewage disposal (2 acres or larger).

A portion of the area adjacent to Solebury Township is designated Delaware River Management Area Overlay District whose purpose is to provide additional protection measures for the sensitive resources located along the Delaware River and its tributaries, which is consistent with the township's environmental protection policies and supporting plans including the *Delaware River Wild and Scenic River Management Plan* (1997) and the Bucks County, Pennsylvania, Natural Areas Inventory Update (2011). This overlay provides resource protection standards in addition to those

required in the underlying RO, Rural Residential and RP, Resource Protection zoning districts.

These designations are consistent with this Land Use Plan, which calls for Rural Conservation along the Plumstead boundary. Solebury's only exceptions along the Plumstead line are the Historic Village designations at Carversville and Cottageville.

The township's Rural Residential Land Use category is implemented through the Rural Residential (RO) zoning district and the Resource Protection (RP) zoning district, adopted in 2001.

The RP District has a 3-acre minimum lot size and does not provide the cluster option. This district is specifically intended for agricultural and resource uses and low-intensity residential development. It incorporates a riparian buffer requirement as well as the recommendations of the *Lower Delaware Wild and Scenic River* designation.

A portion of Plumstead Township is part of the Bucks County Water and Sewer Authority service area. The portion of Plumstead bordering Solebury is outside the authority's service area, and no public infrastructure exists.

Plumstead Township adopted an Open Space Plan in 2010. In the eastern portion of Plumstead Township, several parcels adjacent to Solebury contain state, county, or township conservation easements.

RELATIONSHIP TO COUNTY AND REGIONAL PLANS

The Bucks County Planning Commission and the Delaware Valley Regional Planning Commission (DVRPC) plans include Solebury and provide a context for planning at the municipal level and help to provide consistency among municipalities.

BUCKS COUNTY COMPREHENSIVE PLAN

The *Bucks County Comprehensive Plan* (2011) seeks to coordinate and assist the county's municipalities, agencies, and general public in the planning, development, and management of its natural and built environment. The Plan places a strong emphasis on sustainability and smart growth development strategies. The *Solebury Township Comprehensive Plan* is consistent with this focus, through its policies of natural and historic resource protection, water resources planning, open space and farmland

preservation programs as well as its vision—to protect and preserve the beauty, unique character and natural resources for residents now and in the future.

Solebury’s plan is consistent with the county’s future land use plan, which indicates the township as a Rural Resource Area and Natural Resource/Conservation Area, except for the immediate area surrounding New Hope (along Lower York Road and Route 202) and the area of Lahaska (Rural Center). Environmental standards play an important role in the township’s ordinances and the current standards are consistent with those recommended by the county. In addition, the township zoning ordinance provides for a variety of residential housing types and arrangements consistent with housing policies outlined in the county plan.

DVRPC CONNECTIONS 2040: PLAN FOR GREATER PHILADELPHIA

The Delaware Valley Regional Planning Commission (DVRPC) developed *Connections 2040: Plan for Greater Philadelphia* (2013) as an update to *Connections 2035: The Regional Plan for a Sustainable Future*. The purpose of the plan is to carry out DVRPC’s defined mission, which is to plan for the orderly growth and development of the region. Four core principles are established in the plan:

1. Manage Growth and Protect Resources
2. Develop Livable Communities
3. Build an Energy Efficient Economy
4. Establish a Modern, Multimodal Transportation System

The plan designates Solebury Township as a Rural Area. Rural Areas possess large natural areas and key policy approaches should target open space preservation, limited development, agricultural support, and natural resource protection. Solebury’s comprehensive plan is consistent with land use element of *Connections 2040: Plan for Greater Philadelphia*.

Chapter 15

IMPLEMENTATION RECOMMENDATIONS

MEASUREMENT OF PROGRESS

TOWARDS A SUSTAINABLE COMMUNITY

Based on review of the 2002 Comprehensive Plan, background information gathered for this plan update, and an analysis of issues documented in various chapters, policies were developed to provide progress toward a sustainable community. The Planning Principles are grouped into several categories of key interconnected topics in planning a sustainable community. These planning Principles are recommended to be incorporated into the township ordinances and used as guiding factors in the review of land use decisions. The sustainability indicators detailed below should be actively tracked and evaluated on an annual basis to gauge the township's progress in achieving sustainability and protecting the public health, safety and welfare.

To achieve the vision of a sustainable community, the residents of Solebury Township must strive to restore and enhance the local environment, while responsibly managing community development. Diligent stewardship of the township's natural and historic resources must be a constant focus to avoid the cumulative adverse impacts that can accompany development and land use changes. To do less would lead to significant threats to public health, safety and welfare. This chapter addresses the *Municipalities Planning Code* requirements regarding implementation strategies (Section 301(a)(4.2)).

AGRICULTURAL RESOURCES POLICY

Preserve prime agricultural soils, in accordance with the mandate of the *Pennsylvania Municipalities Planning Code*, and preserve the farming industry in Solebury. This is necessary to sustain the prosperity of the township by protecting one of its major industries and to provide local and regional food supplies.

RECOMMENDED ACTION STEPS

- Continue the township's land preservation program, focusing on farmland preservation.

- Enact zoning regulations that support the farming industry, including provisions for agricultural uses (e.g., niche farming-related markets, farmers' markets, community-supported agriculture), accessory uses (e.g., farm-related businesses, greenhouses, alternative energy structures), and associated agricultural services (e.g., farm supply stores, machinery and parts suppliers, feed operations).
- Provide assistance in bringing together the local farmer with the local consumer by promoting local sources for produce and sponsoring local farmer's markets.
- Assess the terms and conditions of existing agricultural easements to ensure that sustainable farming activities are permitted and encouraged.
- Explore allowing a reasonable provision of accessory housing for farm employees, giving preference to adaptive reuse of existing farm structures.

SUSTAINABILITY INDICATORS

- Number of farms preserved through farm easements.
- Long-term health and vitality of farm markets.
- Number of new farms and agricultural-oriented businesses.
- Acreage of prime agricultural soils preserved and protected.

SOILS AND GEOLOGICAL RESOURCES POLICY

Conserve soil resources and their productive capabilities by minimizing permanent soil disturbance and preventing accelerated erosion, especially in highly valued and sensitive areas such as prime agricultural land and steep slopes. Ensure that development is compatible with site-specific geologic conditions, particularly in limestone areas (Karst topography). Prevent groundwater contamination in highly permeable limestone aquifers, particularly due to inappropriate placement of on-lot septic systems.

RECOMMENDED ACTION STEPS

- Consider critical topographical resources (i.e., natural steep slopes, prime agricultural soils, alluvial and hydric soils) for determining maximum density or intensity of development.

- Encourage site development practices such as clustering and low impact development practices.
- Maintain buffers around disturbance areas; encourage no-mow practices, native plants, meadows, and soil restoration.
- Improve understanding of Karst geology and incorporate strict standards for development around limestone areas that span across Solebury and Buckingham Township on a scientific study of the Karst areas.

SUSTAINABILITY INDICATORS

- Acreage of natural vegetative cover preserved and protected.
- Number of site-specific combinations of Best Management Practices (BMPs) employed on disturbed soil areas, especially those required to have Soil Erosion and Sediment Control Plans.
- Rate and amount of sediment from erosion entering streams near the Delaware River.

WATER RESOURCES POLICY

Conserve, maintain, restore and enhance the quality and quantity of all water resources in the township; recognizing the township's complete dependence on ground water for water supply and the importance of high quality water in maintaining human uses and ecological community integrity of surface waters in the township. The interconnectedness and interrelatedness of water resources with other resources and land use must be emphasized in order to ensure no cumulative degradation.

RECOMMENDED ACTION STEPS

- Continue to implement the recommendations of the township's 2009 Water Resources Program and other watershed projects identified in recent studies, such as conducting streambank erosion assessments, restoring riparian buffers along stream segments currently at risk, and protecting sensitive watershed areas (Special Protection Waters, headwaters).
- Promote practices that attempt to restore the natural water budget.
- Evaluate water resource related ordinances to ensure maintenance of a water budget.

- Prohibit new transfers of water out of a watershed and reduce existing transfers.
- Discourage businesses and industries that use or discharge large quantities of water (e.g., industries using or related to fracking practices).
- Support stormwater educational outreach efforts by Solebury's Environmental Advisory Council and local watershed associations.
- Conduct occasional spot-checks on privately-owned stormwater facilities and establish stringent post-development monitoring and maintenance requirements.
- Identify flood-prone areas and determine if remediation measures are feasible.
- Identify and develop a program to naturalize older stormwater detention basins by replacing turf with meadow grasses.
- Maintain and restore riparian buffers along the stream corridors.
- Develop a wellhead protection program for the public and community water systems.

SUSTAINABILITY INDICATORS

- No potable wells going dry for the first time or with increasing frequency.
- No progressive increase in the amount of periodic flooding along watercourses compared to the range of magnitude or duration encountered historically.
- No increase in the incidences of water borne illness found locally or throughout the township.
- Less than 10 percent increase over a 10-year period in the volume of runoff per equivalent unit of rainfall in streams during significant storm events.
- Maintained level of baseflow in streams compared to background data or reference streams.

RIVERFRONT FLOODPLAIN AND HAZARD MITIGATION POLICY

Promote the conservation of the Delaware River and its floodplain by reducing hazards to life and property due to flooding conditions. Recognize the potential impacts of other natural and man-made hazards and promote appropriate mitigation efforts to prevent or reduce repeated damage.

RECOMMENDED ACTION STEPS

- Continue to support the recommendations of the Delaware River Flood Task Force in so far as they are consistent with the goals and objective of this Plan.
- Support stronger municipal land use tools to control development in the floodplain.
- Devise an action plan and conduct a cost-benefit analysis of adding protection to repetitive-loss assets, and collect detailed information on all properties.
- Continue hazard mitigation education outreach efforts to increase public awareness of actions to be taken during an emergency and opportunities for mitigation.
- Support federal and state funding for buyouts, elevations, and floodproofing consistent with the goals and objectives of this Plan.
- Ensure that elevations of buildings respect the historic nature and context of the structure.
- Support emergency management operations.
- Investigate locations and causes of flash flooding and determine necessary mitigation efforts.
- Coordinate with utility companies to investigate ways to minimize potential service interruption produced from natural and man-made hazards such as the placement of utility lines underground.
- Develop a long-term strategy to lessen the impact of storms on the electric supply system and increase emergency preparedness.

SUSTAINABILITY INDICATORS

- Decrease in the magnitude of repetitive loss from property damage associated with flooding.
- Reduction in the number of emergencies related to flooding and extreme weather events.
- Maintained level of baseflow in streams compared to background data or reference streams.

NATURAL LANDSCAPES (BIODIVERSITY) POLICY

Conserve, protect, and restore the natural landscapes of Solebury Township, with a focus on the rich variety of native vegetation and wildlife and the habitats on which they depend, including soils, woodlands, wetlands, ponds, floodplains, streams and riparian corridors, springs and spring-runs, the Delaware River and canal, meadows, hedgerows, and successional lands (old fields and thickets), providing a healthy living environment for people, plants and animals.

RECOMMENDED ACTION STEPS

- Evaluate and prioritize natural landscapes for conservation and restoration.
- Protect from further fragmentation large open and forest areas that serve as wildlife habitat and high priority landscape features and notable landscape features (specimen trees, large hedgerows, etc.). Protect rare landscape elements, guiding development toward areas suitable to accommodate future development.
- Land Preservation Committee will continue to explore the availability of funding sources for preservation and promote public/private conservation efforts, facilitating connections between the township and individual landowners, local conservation organizations, and county and state programs for open space conservation.
- Continue the policy of supporting conservation easements as a means to achieve community open space and environmental resource protection objectives, supporting landowners' ability to utilize charitable gift provisions in the tax code while meeting public conservation objectives.
- Continue to reduce deer population through an effective management program.
- Ensure that criteria for selection and management of open space in the Open Space Design Option are consistent with resource protection objectives; develop standard policies for open space management.
- Link required open space management planning to resource identification and impact mitigation per the required Environmental Impact Assessment Report (EIAR) and the Existing Resources and Site Analysis Plan (ERSAP).
- Require that all land use changes and development result in the restoration, maintenance, or enhancement of the natural landscape of the project area.

Balance the need for road improvements with the habitat needs of wildlife and the preservation of scenic viewsheds.

- Encourage incorporation of wildlife cover (native plantings) into the design of developments.
- Use available land use tools, such as the zoning and subdivision ordinances as well as the environmental assessment requirements to protect significant natural areas.
- Adopt a Forest Management Ordinance to govern the proper management of woodlands consistent with best management practices for forestry.
- Adopt a Natural Landscaping Ordinance with requirements for planting schedules, mowing schedules, removal of invasive species, buffers along property lines, and fire hazards avoidance.

SUSTAINABILITY INDICATORS

- The amount of land protected from development increases through time.
- The acreage of forest land remains constant or increases in order to mitigate for recent and past losses; forestry practices are sound, where forestry occurs.
- Changes in the ratio of developed land to undeveloped land occur slowly and eventually the ratio becomes constant.
- The net quality and quantity of high quality and notable natural landscapes should be maintained.

SCENIC AND HISTORIC RESOURCES POLICY

Conserve scenic landscapes through inclusion in the township Open Space Program and through regulatory means to minimize development impacts wherever possible and mitigate impacts where not. Promote the conservation and continued economic viability of historical resources and their historical landscape integrity, extending regulatory means where appropriate.

RECOMMENDED ACTION STEPS

- Develop overlay zoning provisions to promote protection of scenic and cultural resource values, with specific focus on identified Visually Significant Landscapes and the Delaware River and Canal Heritage Corridor.

- Promote National Register listing for individual historic resources and historic districts, focusing on those resources deemed eligible or potentially eligible for the National Register.
- Consider periodic re-evaluation of the inventory of historic resources and its assessment of relative historical significance, under the purview of the township HARB and the Solebury Historical Society.
- Identify vulnerable historic buildings and explore funding programs to help restore deteriorating conditions.
- Adopt zoning regulations to preserve and protect individual historic structures outside National Register historic districts.
- Adopt zoning overlay district for established HARB districts which could potential include expanded incentives for conservation of historic and architecturally significant structures and landscapes (e.g., added design standard flexibility, allowance for certain additional uses) and establish an evaluation of alternatives based on identified criteria prior to permitting demolition.
- Explore potential interest and relative benefits of establishment of additional historic districts in accordance with Pa. Act 167.
- Adopt HARB districts for the township historic districts that currently do not have them.

SUSTAINABILITY INDICATORS

- The amount of land mapped as Visually Significant Landscapes that is permanently protected as open space increases over time.
- The number of historic structures on the National Register or in National Register Districts increases over time.
- The number of historic resources and the degree to which historical landscape settings are included in permanent open space/conservation lots increases over time.
- The number of demolition requests remains small; and the level of maintenance and reuse of historic structures increases over time.
- Economic reinvestment in historical structures keeps pace with the overall rate of growth in the township.

RESIDENTIAL DEVELOPMENT (HOUSING) POLICY

Provide appropriate area for residential development to the extent necessary to accommodate future population growth. Continue to allow for diverse housing types to accommodate various living arrangements.

RECOMMENDED ACTION STEPS

- In the Site-Responsive Rural future land use area, provide for in-fill development consistent in character with existing residential uses and that favors flexible approaches linked to resource protection and buffering between new and existing development.
- Review the extent and nature of remaining development opportunities within the R-D high-density residential zoning district and the MHP Mobile Home Park Overlay District, as well as opportunities for provision of multifamily housing to ensure a balance of diversity in housing units remain.
- Consider opportunities for age-restricted retirement and assisted living communities sited in proximity to public infrastructure and amenities.
- Periodically review and update building codes to ensure quality of housing construction for the safety of its occupants.
- Encourage Keystone Green Building and Green Building Alliance initiatives for LEED, Passive House, Energy Star, Green Globes, and Net Zero Energy design and certification for new construction.

SUSTAINABILITY INDICATORS

- Resource Sustainability Indicators are achievable in the context of each development plan to the extent applicable.
- Development applications, particularly in the Rural Conservation area, result in significant open space protection.
- Cumulative results of on-going residential development is consistent with future housing projections.
- Dwelling unit mix (single-family, multi-family, age-restricted, etc.) results in average household size consistent with population projections and in sustainable proportion of school-age population relative to real estate tax revenue generated by new development.

- Periodic review determines that opportunities remain available to meet requirements for diverse housing types and densities.

ECONOMIC DEVELOPMENT POLICY

Provide sufficient opportunities for nonresidential development to offer diverse economic activity, employment opportunities and commercial services for township residents; and promote on-going economic viability of historic structures and tourist areas.

RECOMMENDED ACTION STEPS

- Support the agricultural community, including means to promote long-term economic viability of agricultural uses.
- Focus sustainable commercial and employment enterprises along Route 202 in areas where higher-intensity development patterns exist and where sewer and water infrastructure is available.
- Implement design standards and restrict large-scale enterprises in favor of smaller-scale development.
- Monitor the results of the TNC zoning district created along a portion of the Route 202 corridor.
- Allow mixed uses in the villages consistent with traditional village land use and intensities. Provide no-impact office and special-use development opportunities such as internet based businesses within residential districts.
- Provide for the reclamation of existing quarry operations for open space or recreational purposes or other sustainable economic use.

SUSTAINABILITY INDICATORS

- Resource Sustainability Indicators (previous sections), particularly those related to water resources, are achievable in the context of new nonresidential development plans to the extent applicable.
- New nonresidential development avoids stereotypical strip-center design and minimizes or mitigates the visual prominence of large single-story buildings and proportionately large parking lots.

- Periodic review determines that opportunities remain available to meet MPC requirements for all reasonable land uses.

TRANSPORTATION AND CIRCULATION POLICY

Maintain and enhance the efficiency and safety of the circulation system while preserving the rural character of the community. Encourage through-traffic to use roads functionally designed to accommodate through-traffic, avoiding through-traffic impacts on local roads.

RECOMMENDED ACTION STEPS

- Promote access management planning along all arterial and collector roads.
- Minimize the impacts of through-traffic originating outside the township on minor collector and local roads, especially where designated as scenic roads.
- Manage roadway improvements to balance improvement objectives with the intent to preserve scenic roadway character.
- Coordinate circulation planning efforts with neighboring municipalities to ensure that township goals, as well as regional transportation goals are met.
- Actively work with government agencies to maintain bridges and upgrade and resurface state roads in the township.
- Encourage bicycle/pedestrian facilities and linkage to destinations.
- At the land development stage, consider the establishment of easements for future pathways in areas that do not necessitate the immediate installation of such facilities.
- Monitor availability of funding for transportation improvements, including funding for alternative transportation opportunities and related improvements.
- Ensure that the potential for passenger rail service along the New Hope-Ivyland Rail Line remains a feasible option in the future.
- Upgrade intersection signals using intelligent transportation systems (ITS) and other means.

SUSTAINABILITY INDICATORS

- Acceptable levels of service are maintained at intersections on local and collector roads.
- Turning movement conflicts are reduced over time and access management improved through coordination of development planning, particularly along Route 202.
- Road improvements along scenic roadways are accomplished with minimal disturbance to scenic qualities.
- Alternative circulation opportunities, particularly bikeways and trails, are extended through coordination with development planning efforts.

ENERGY CONSERVATION POLICY

Encourage reduction in the use of nonrenewable energy sources and promote greater use of alternative and renewable energy sources.

RECOMMENDED ACTION STEPS

- Require bicycle parking structures as part of new commercial and retail development.
- Retrofit older developments with on-road bike lanes or sidewalks and bike paths where feasible.
- Provide for central carpooling locations and electrical vehicle (EV) charging stations.
- Incorporate provisions for renewable energy (geothermal, solar, wind, etc.) as accessory uses in ordinances.
- Consider requiring new buildings to provide Energy Star compliant products, compact fluorescent light bulbs, tankless water heaters, programmable thermostats, and high levels of insulation.
- Provide incentives (e.g., reduced permit fees) to developers using green building standards.
- Provide information to township residents and businesses on energy conservation techniques and energy audits.

- Replace inefficient municipal vehicles with energy efficient/lower carbon footprint vehicles.
- Upgrade all lighting fixtures to use compact fluorescent light bulbs.
- Replace incandescent signs, traffic control & other fixtures with light-emitting LED technology.
- Encourage location of solar panels on roofs or as shading on parking lots.

SUSTAINABILITY INDICATORS

- Electricity consumption, as measured by kilowatt hours used, decreases over time.
- The percentage of, or absolute number of, building and renovation permits associated with energy improvements such as insulation, solar power, geothermal, wind, etc. increases over time.
- The miles/length of bicycle lanes, trails, and paths increases over time.

COMMUNITY FACILITIES AND SERVICES POLICY

Provide or facilitate provision of adequate public facilities, services, and utilities, accommodating anticipated population growth while observing natural resource limits.

RECOMMENDED ACTION STEPS

- Coordinate development patterns and intensities which maximize utility of current infrastructure and minimize need for additional infrastructure development.
- Standardize the items to be recycled and standardize the collection schedule for leaf waste.
- Develop a waste and recycling outreach and education program.
- Develop a five-year plan for expanding the program to accommodate additional materials and hard-to-recycle items.
- Provide a new public works facility to replace the current obsolete facility.
- Encourage public power companies to review electrical grid structure to minimize wide-spread outages.

SUSTAINABILITY INDICATORS

- Existing community services and facilities continue to meet the needs and demands of a growing population.
- Where necessary to serve new development, community services are extended in coordination with development planning.
- The amount of recyclable materials collected is increased over time.

PARKS, RECREATION, AND OPEN SPACE PLANNING POLICY

Preserve and expand the township's park and recreational resources and be proactive in the planning and land acquisition of open space to satisfy the needs of township residents.

RECOMMENDED ACTION STEPS

PARK AND RECREATION

- Pursue implementation of the recommendations of the *Solebury Township Park and Recreation Plan* as adopted by the Board of Supervisors and the *Solebury Township Open Space Plan* (2008).
- Balance opportunities to provide for active and passive recreational pursuit with the habitat needs of wildlife and other resource protection objectives.
- Create a consistent funding source for on-going maintenance and future improvements to parks and recreational areas.
- Monitor community recreation needs, paying particular attention to potential gaps in recreation service to specific population groups, such as the disabled, children, young adults, and the elderly.
- Continue to utilize developer contributions for recreation and community park development through the fee-in-lieu of land option.
- Expand the township-wide Community Trail Program to Promote Open Space Linkages through a combination of public and private efforts, using existing township rights-of-way and a mapped route for pedestrians and cyclists.
- Work with neighboring municipalities to meet community park, and recreational facility and program needs.

SUSTAINABILITY INDICATORS

- Recreational opportunities are increased over time consistent with the recommendations of the Park and Recreation Plan as adopted by the Board of Supervisors.
- Acreage of preserve open space land and/or easements is increased.

IMPLEMENTATION REQUIREMENTS

Successful implementation of these policies and recommendations is dependent upon an enhancement of the township planning program and plan review processes, including the following:

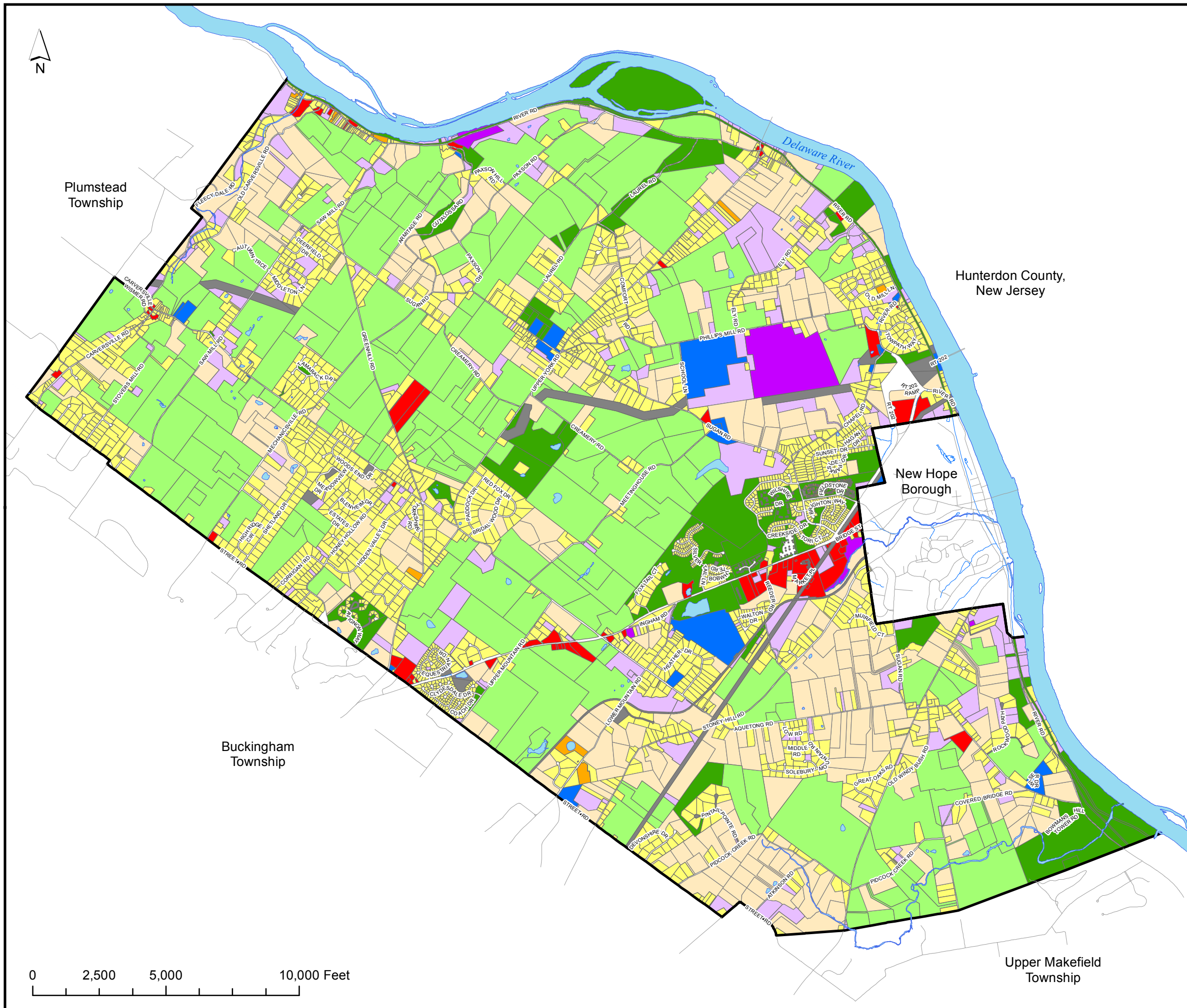
- Appropriate township staff for the management of administrative details (fiscal, grant writing, contracts, technology, record keeping, etc.) and coordination of boards, commissions, committees and supporting contractors/consultants within the township, as well as coordination with other municipalities.
- Develop funding necessary to meet the township's Vision and Objectives, through a diversity of local, regional, and national sources.
- Commitment on the part of the township (elected and non-elected officials) to:
 - Strive for vigilant administration of regulatory provisions to protect critical environmental resources, monitoring performance of existing regulations and administrative procedures relative to resource protection objectives including the goals of the plan in the annual budget and strategic planning process.
 - Promote effective use of the Sketch Plan concept by convening committee meetings to engage potential applicants in productive evaluation of a development site as early in the process as possible.
 - Evaluate the environmental impacts of all projects in relation to the township's policies and respond to such proposals in specific reference to those policies.
 - Coordinate local planning efforts that affect or have impacts across municipal boundary lines with neighboring townships, New Hope Borough, Bucks County, and other regional organizations.

- Educate developers and residents regarding resource-sensitive and open space-oriented land use options, using the township newsletter, website, local media, and informational meetings.
- Adopt ordinance revisions that provide a definitive framework of inducements and prohibitions consistent with sustainable growth management objectives.
- Encourage sustainable building standards such as LEED, Passive House, Green Globes, Net Zero Energy, or Energy Smart.
- Educate and interact with residents regarding comprehensive plan.
- Establish a process to track implementation of recommendations including a “Progress Book” containing recommendations and actions taken or attempted over time that could be used by staff and various township boards.
- Use Plan often as a reference when considering the business of the township.

MAPS



Existing Land Use Solebury Township Bucks County, Pennsylvania



- Agricultural
- Undeveloped
- Rural Residential
- Single Family Residential
- Multifamily Residential
- Parks, Recreation & Protected Open Space
- Government and Institutional
- Commercial
- Mining and Manufacturing
- Transportation and Utilities

Zoning Solebury Township Bucks County, Pennsylvania



Plumstead
Township

Hunterdon County,
New Jersey

New Hope
Borough

Buckingham
Township

Upper Makefield
Township

0 2,500 5,000 10,000 Feet

- ul>
- RA- Residential/Agricultural
- RB- Residential/Agricultural
- R1- Small Lot Residential
- RD- Residential Development
- RDC- Residential Development/Conservation
- VR- Village Residential
- VR-C- Village Residential
- VC- Village Commercial
- VC-C- Village Commercial
- VC-1- Village Commercial
- RC- Rural Commercial
- TNC- Traditional Neighborhood Commercial
- MS- Municipal Services
- LI- Light Industrial
- QA- Quarry/Agricultural
- OR- Outdoor Recreational
- Carbonate Geology Overlay District
- Mobile Home Overlay District

Source: Solebury Township Zoning Ordinance,
1998 as amended
Prepared by: Bucks County Planning Commission
December 16, 2014

Surface Geology Solebury Township Bucks County, Pennsylvania



- Allentown Formation
- Beekmantown Group
- Brunswick Shale Formation
- Diabase Formation
- Leithsville Dolomite Formation
- Lockatong Argillite Formation
- Stockton Conglomerate
- Stockton Formation
- Trenton Gravel

Source: Solebury Comprehensive Plan, 2002
Prepared by: Bucks County Planning Commission
December 16, 2014

Topography and Steep Slopes Solebury Township Bucks County, Pennsylvania



Slopes

- Class 1- 8 to <15%
- Class 2- 15 to 25%
- Class 3- >25%

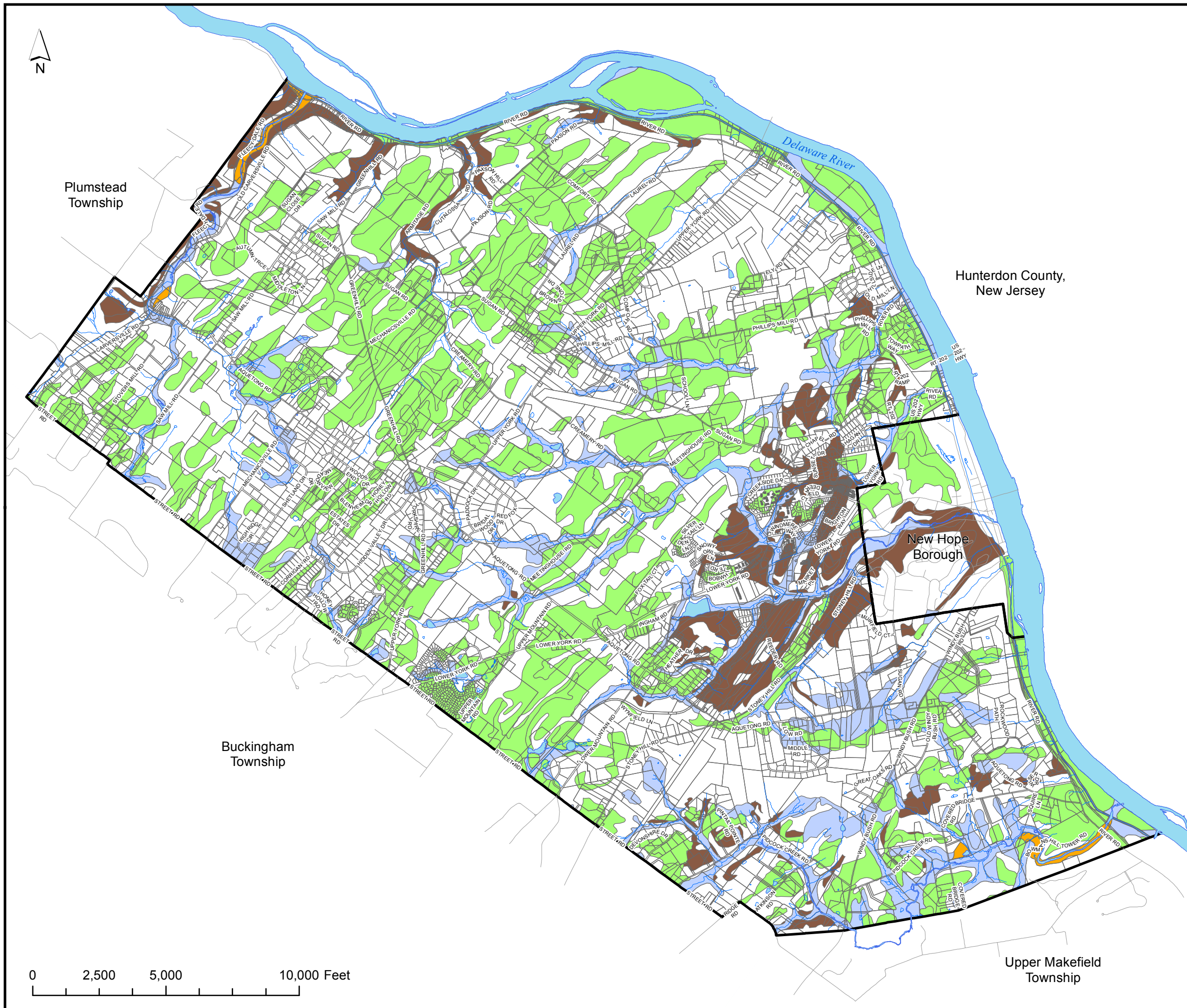
— 20 ft interval contours

0 2,500 5,000 10,000 Feet

Source: PA Department of Conservation and Natural Resources PAMAP Program, 2008

Prepared by: Bucks County Planning Commission
December 16, 2014

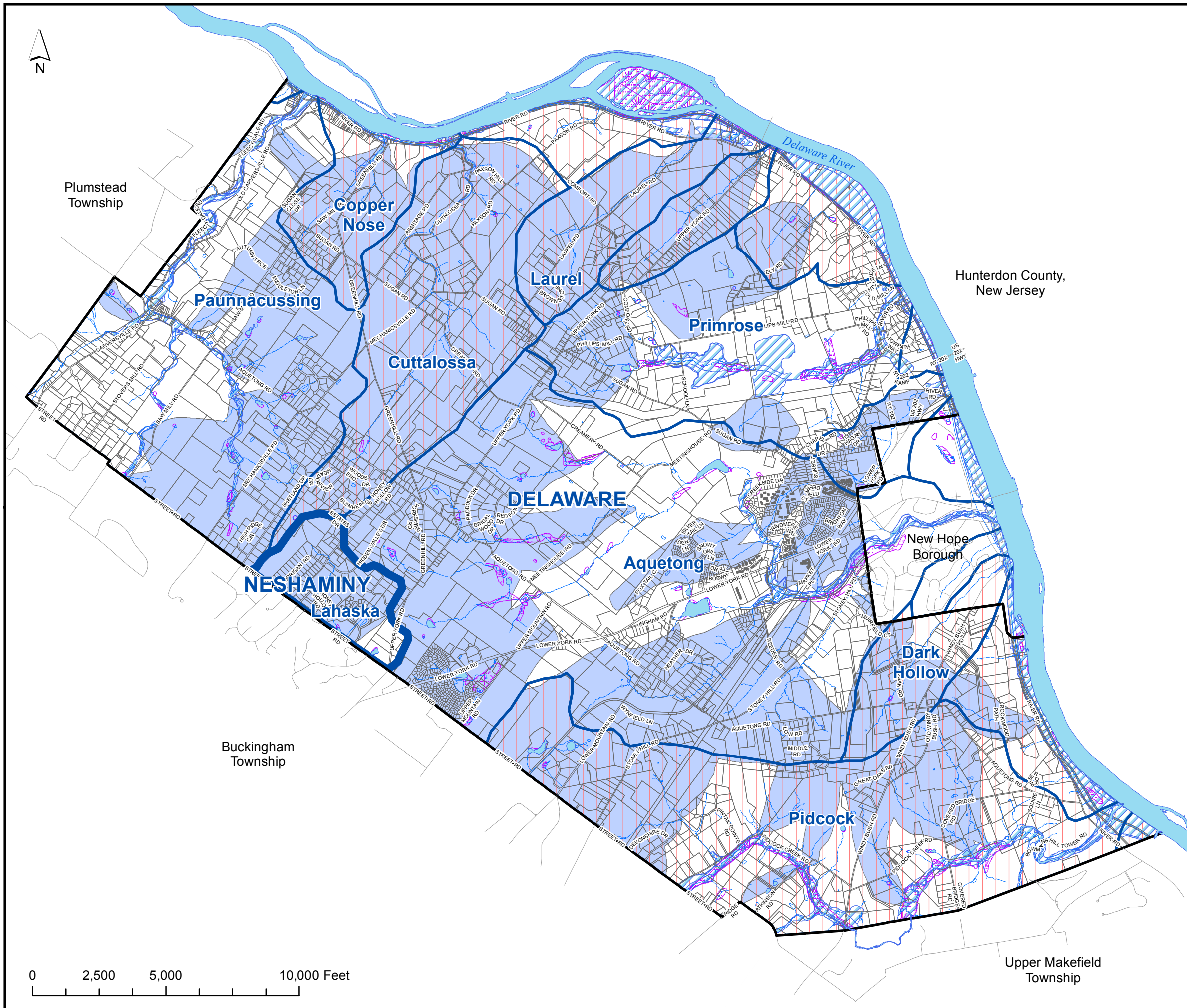
Soil Resources Solebury Township Bucks County, Pennsylvania










- Hydric
- Soils with shallow depth to bedrock
- Alluvial/Floodplain
- Prime agricultural
- Other soils not classified above

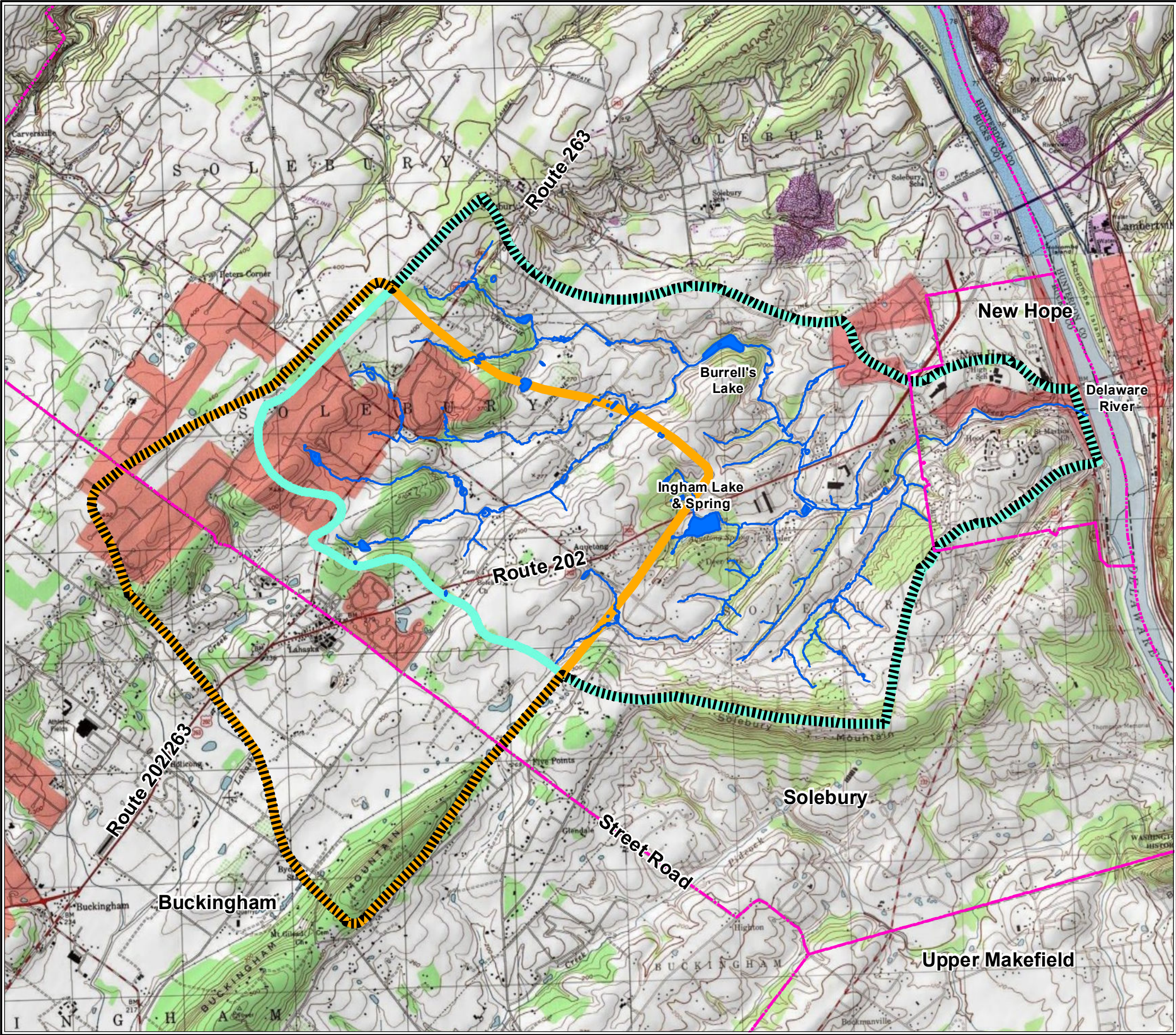
Source: USDA, Natural Resources Conservation Service
Prepared by: Bucks County Planning Commission
December 16, 2014

Water Resources Solebury Township Bucks County, Pennsylvania



-  Streams
-  Wetlands
-  FEMA floodplain
-  Minor watersheds
-  Major watersheds
-  Drainage to Delaware Canal
-  Headwater areas

Source: Federal Emergency Management Agency, 2010
National Wetlands Inventory, 2009
Solebury Comprehensive Plan, 2002
Prepared by: Bucks County Planning Commission
December 16, 2014



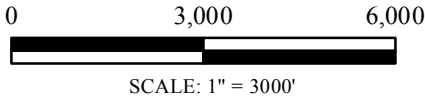
LEGEND

- Aquetong Creek
- Aquetong Creek Watershed
7.64 Square Miles (Approximate)
- Ingham Spring Recharge Area
6.29 Square Miles (Approximate)
- Proposed Critical Water Planning Area
11.14 Square Miles (Approximate)
- Municipal Boundaries

Map 7

SOURCE:
1. U.S.G.S. Topographic 7.5 Minute Quadrangles for
Buckingham, PA; Lambertville, NJ; Lumberville, PA;
and, Stockton, NJ.

NOTES:
1. Preliminary Ingham Spring Recharge Area developed
by Uhl, Baron, Rana, 2007.



TITLE: FIGURE 1
PROPOSED CRITICAL WATER PLANNING AREA

LOCATION:
SOLEBURY TOWNSHIP,
BUCKS COUNTY,
PENNSYLVANIA

DATE: 1/7/2010

FILENAME: WatershedFigure_Final.mxd



ENVIRONMENTAL
PLANNING
CONSULTANTS
4920 YORK RD.
SUITE 290
HOLICONG, PA 18928
www.EnvPlanConsult.com

Woodlands & Riparian Corridor Solebury Township Bucks County, Pennsylvania



- Woodlands
- Riparian corridor**
 - Fully wooded
 - Partially vegetated
 - Opportunities for reforestation

Source: Solebury Comprehensive Plan, 2002
DVRPC Land Cover Data Set, 2010
Prepared by: Bucks County Planning Commission
December 16, 2014

Historic Resources Solebury Township Bucks County, Pennsylvania



National Historic Landmarks

- George Nakashima Woodworker Complex
- Delaware Division, Pennsylvania Canal
- Honey Hollow Watershed
- Washington Crossing State Park

National Historic Districts

- National Register (NR) Historic District
- Potential Village NR District
- Potential Rural NR District

Other Historic Resources

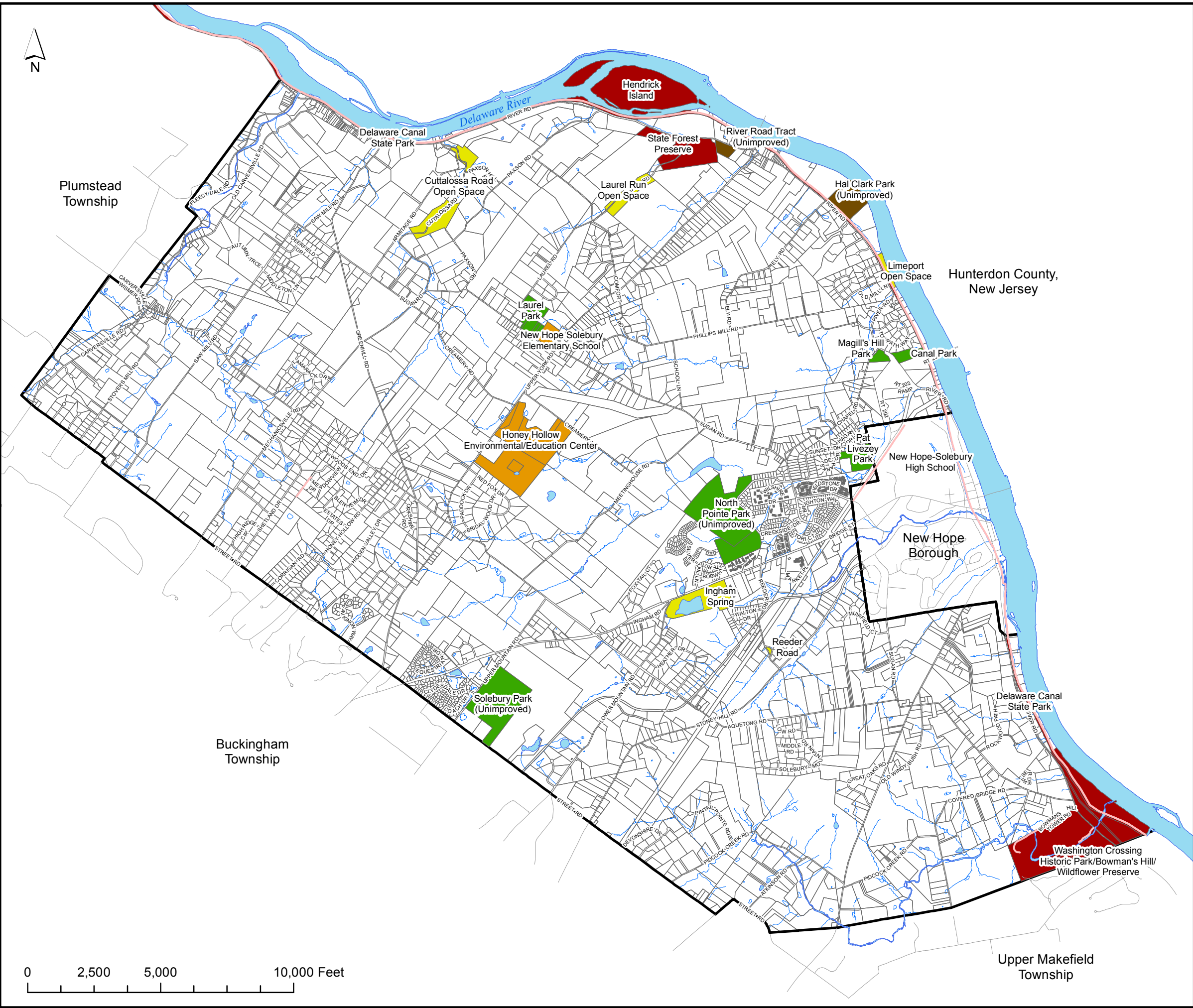
- Structures included in Honey Hollow Watershed
- Historic Sites (outside National Register District except Aquetong Valley)

Scenic Resources Solebury Township Bucks County, Pennsylvania



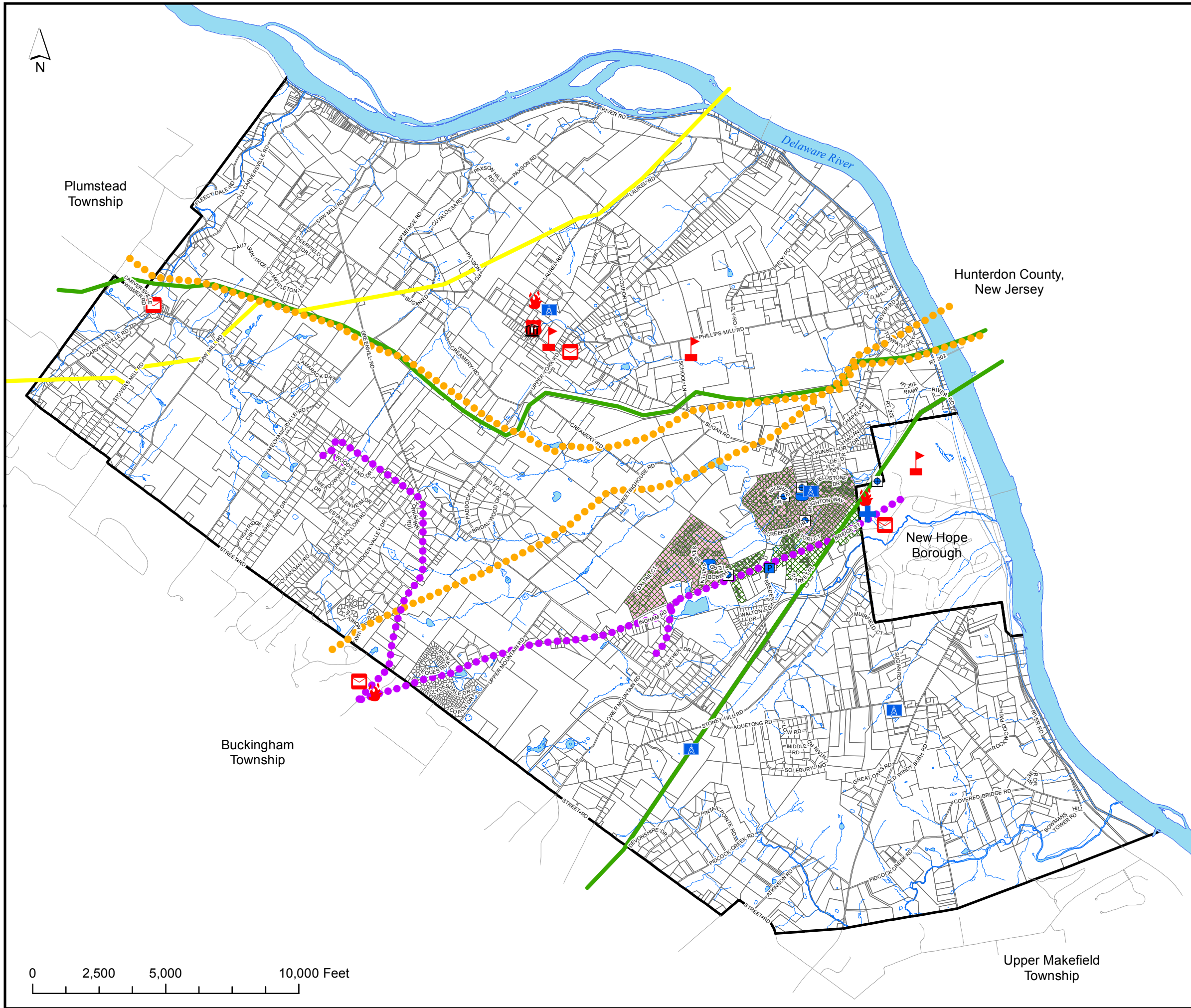
- Woodlands
- Visual Accents**
 - Historic Sites (outside National Register District)
 - Vista points
- Visually Significant Landscapes**
 - Delaware River & Canal Scenic Corridor
 - Scenic stream valley
 - Open farmland
 - Ridgeline
 - National Register Historic Sites
 - Other Historic villages/hamlets

Parks, Recreation, and Open Space Solebury Township Bucks County, Pennsylvania



- Township Park
- Township Open Space
- County Park
- State Park and Forest Preserve
- Public School and Education Center
- Existing Trail





Community Facilities & Utilities Solebury Township Bucks County, Pennsylvania







Community Facilities

-  Municipal
-  Post Office
-  Fire
-  Ambulance
-  Police
-  School



Utility Points

-  Water Storage Tank
-  BCW&SA Well
-  Waste Water Pump Station
-  Telecommunications Tower/Antenna

Utility Lines

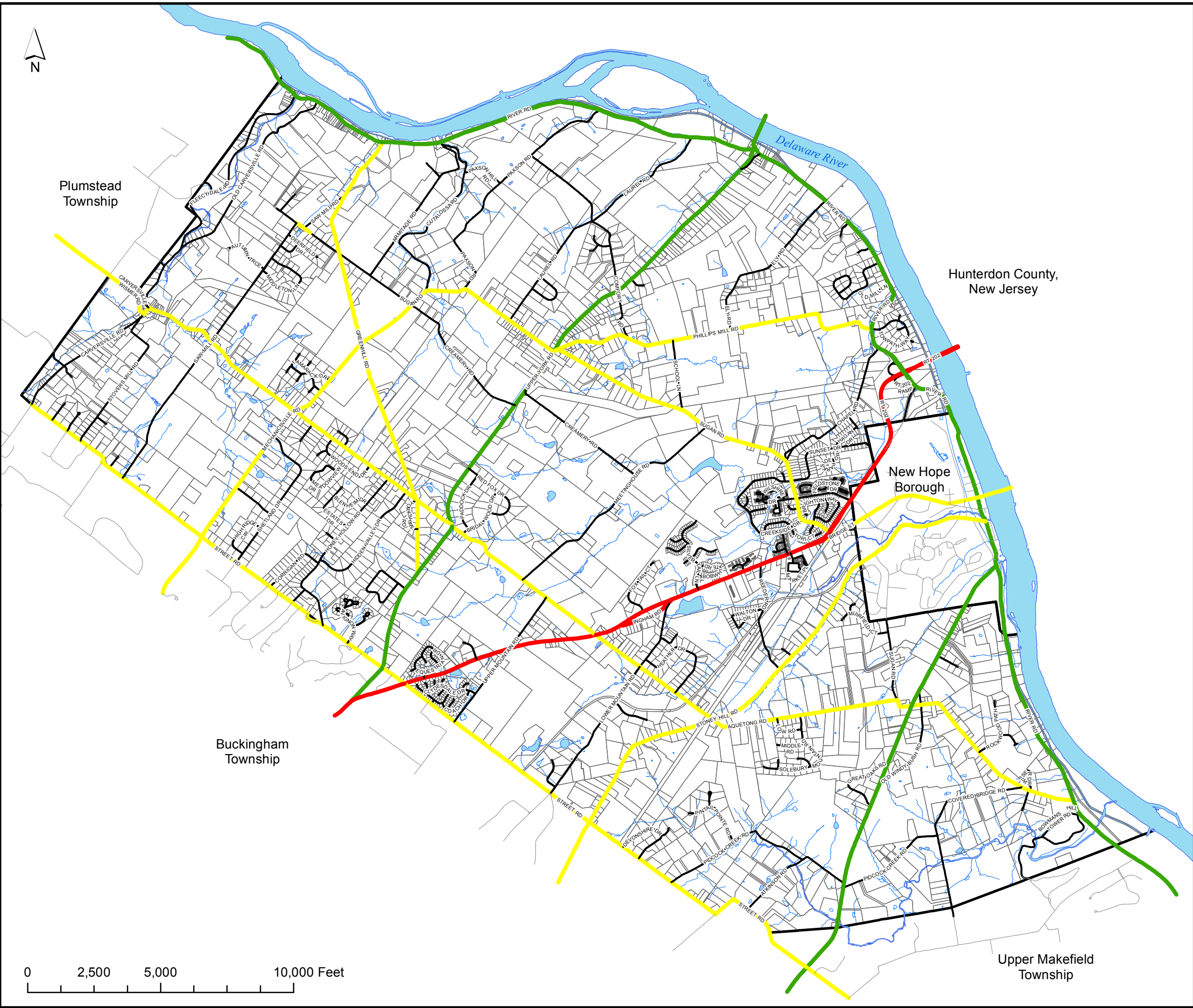
-  Telephone Cable
-  Overhead High Voltage Electric Line
-  Gas Pipe Line
-  High Pressure Gas Line

Utility Areas

-  BCW&SA Sewer Service Area
-  BCW&SA Water Service Area

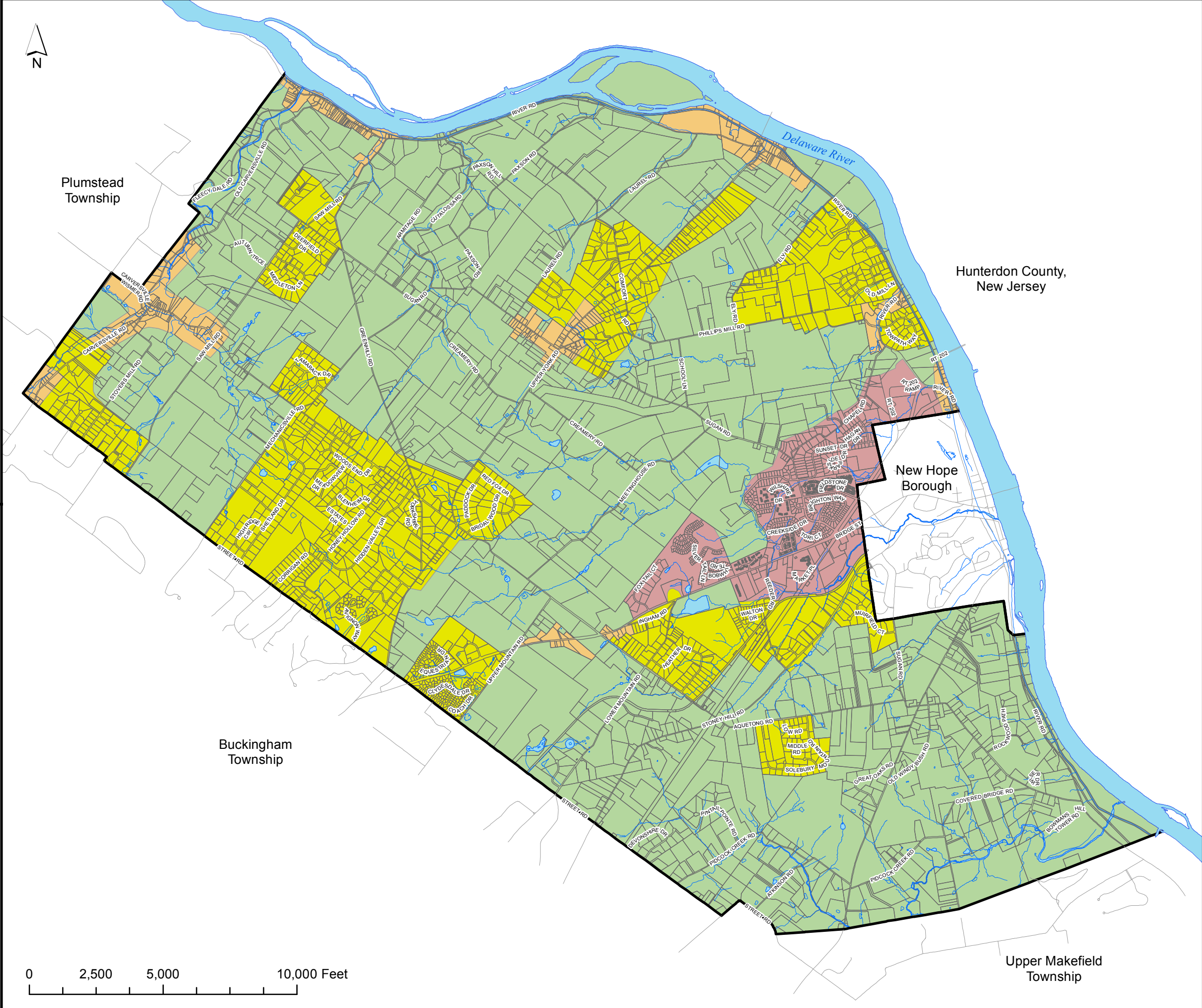
Source: Bucks County Planning Commission, 2013
Solebury Township Act 537 Sewage
Facilities Plan, 2013
Prepared by: Bucks County Planning Commission
December 16, 2014

Road Classification Solebury Township Bucks County, Pennsylvania



- Principal arterial
- Major collector
- Minor collector
- Local road

Plan for Land Use
Solebury Township
Bucks County, Pennsylvania



- Rural Conservation
- Site-Responsive Rural
- Mixed Use Rural-Suburban Center
- Historic Village

APPENDICES



APPENDIX A: SOLEBURY TOWNSHIP RESIDENT SURVEY RESULTS

To generate public input in the comprehensive planning process, a survey consisting of 12 questions and space for additional comments was developed by the Comprehensive Planning Committee. The survey was mailed to 3,990 property owners based on tax records in the fall of 2012 by the Township Administration staff. The staff of the Bucks County Planning Commission tabulated the 1,711 surveys that were received back (43 percent response rate). The public input from the surveys was examined by the Planning Committee and used to form the community vision, goals and policies outlined in this Plan. A summary of the respondent's characteristics and survey results are provided below, followed by a detailed tabulation of the survey responses.

CHARACTERISTICS OF SURVEY RESPONDENTS

Nearly one-half of the survey respondents have lived in Solebury for more than 15 years, with approximately 11 percent of the respondents having moved into the township within the last 5 years and 41 percent living in Solebury between and 5 and 15 years.

Of the surveys received, 39 percent of the respondent's household members consisted of one or more Seniors (55 years or older). Adult members (36 to 54) comprised 29 percent of the respondent's households. One or more young adults (20 to 35 years) made up 8 percent of the members in a respondent's household, and 24 percent of the respondent's household members comprised of one or more persons less than 20 years old.

Approximately three-quarters of the respondent's properties are served by on-lot water and sewerage facilities. About one-half of the respondents reside in the area located between Upper York and Stoney Hill roads, one-third in the area north of Upper York Road, and 14 percent south of Stoney Hill Road.

One-half of the adult members in a respondent's household work outside of the Solebury/New Hope area, and the other 50 percent either are retired, work at home, or within the township/borough. Of the adult household members that work, nearly 70

percent travel 30 miles or less to their worksite. However, approximately 55 percent travel more than 30 minutes to their worksite, with about one-quarter indicating a travel time of 51 minutes or greater.

SUMMARY OF SURVEY RESULTS

- Nearly 22 percent of respondents indicated that they had contact with the township within the past 5 years regarding planning, zoning, or permit applications. More than 60 percent of these respondents were satisfied with the current township regulations, 37 percent thought they were too strict, and about 1percent felt they were not strict enough.
- The three top reasons for living in Solebury include:
 - Open space/scenic beauty
 - Rural setting
 - Quality of schools
- The overall five highest ranked priorities to consider for Solebury's future are:
 - Retention of rural character
 - Natural resources protection
 - Taxes
 - Agriculture/open space preservation
 - Conservation of a quality water supply
- The top three needs to address in the township include:
 - Wildlife management
 - Road improvements
 - Park/recreation areas
- The top three choices for recreation enhancements to add in the township are:
 - Hiking trails/bike paths
 - Additional access to the canal/towpath
 - Sidewalks along roadways
- The majority of respondents 74 percent feel that the comprehensive plan should address the protection and quality of the township's water supply. Approximately 23 percent of respondents felt that additional information on this topic was needed before deciding.

- The majority of respondents 73 percent feel that the township should continue to preserve open space & farmland through the purchase of open space and easements.

QUESTIONS AND RESPONSES

1. HOW LONG HAVE YOU BEEN A RESIDENT OF SOLEBURY?

Less than five years	183	10.8%
5-15 years	694	40.9%
16 to 25 years	367	21.6%
More than 25 years	452	26.7%
¹⁴ Total Response:	1,696	

2. HOW MANY PERSONS IN THE FOLLOWING AGE GROUPS LIVE IN YOUR HOUSEHOLD?

This table provides the number of persons in each of the age categories per household that responded to the survey. For example, of the total responses, 388 households contain one senior adult (55 years or older), 651 households contain two senior adults members (a total of 1302 people in the category), and 8 households contain three senior adult members (a total of 24 people).

Age Group	1	2	3	4	Total	
Babies/toddlers (0 to 2)	58	5	0	0	68	1.6%
Preschoolers (6 to 12)	75	17	1	0	112	2.6%
Young Children (6 to 12)	182	105	18	0	446	10.2%
Teenagers (13 to 19)	174	99	18	1	430	9.8%
Young Adults (20 to 35)	184	69	9	0	349	8.0%
Adults (36 to 54)	264	490	3	1	1,257	28.7%
Senior Adults (55 or older)	388	651	8	0	1,714	39.2%
Total Number of Persons in Households	4,376					

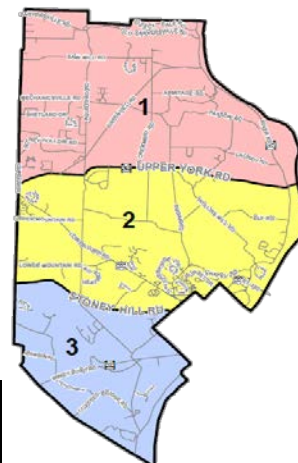
3. IS YOUR RESIDENCE SERVED BY PUBLIC WATER AND SEWERAGE?

Yes	449	26.6%
No	1,224	72.6%
Not Sure	14	0.8%
Total Response:	1,687	

¹⁴ "Total Response" includes all responses that were provided in accordance with survey directions. Responses that were left blank or not answered in the manner consistent with the survey instructions were not counted or used in the calculation of results.

4. PLEASE INDICATE THE AREA OF THE TOWNSHIP YOU RESIDE.

Area 1	568	34.1%	(North of Upper York Road)
Area 2	866	52.0%	(between Upper York & Stoney Hill roads)
Area 3	232	13.9%	(South of Stoney Hill Road)
Total Response:	1,666		



5. WHAT ARE THE EMPLOYMENT LOCATIONS OF THE ADULT MEMBERS OF YOUR HOUSEHOLD?

	Self	Spouse	Total	
At home	383	69	452	18.3%
Retired	422	69	491	19.9%
Within Solebury/New Hope	204	83	287	11.7%
Outside Solebury/New Hope	628	612	1,240	50.2%
Total Response	1,637	833	2,470	

IF YOU TRAVEL TO YOUR PLACE OF EMPLOYMENT, APPROXIMATELY HOW LONG IS YOUR COMMUTE?

Minutes		
10 min or less	102	9.3%
11 – 20 minutes	180	16.3%
21 – 30 minutes	211	19.1%
31 – 40 minutes	158	14.3%
41 – 50 minutes	162	14.7%
51 plus minutes	290	26.3%

Miles		
10 miles or less	172	21.6%
11 – 20 miles	233	29.3%
21 – 30 miles	147	18.5%
31 – 40 miles	71	8.9%
41 – plus miles	175	21.7%

6. HAVE YOU APPLIED FOR A SUBDIVISION, LAND DEVELOPMENT, ZONING OR BUILDING PERMIT WITHIN THE LAST 5 YEARS?

Yes	369	21.8%
No	1,321	78.2%
Total Response	1,690	

IF YES, WERE YOU SATISFIED WITH THE PERMITTING REGULATIONS IN SOLEBURY?

Satisfied with current regulations	218	61.2%
Unsatisfied-current regulations too strict	133	37.4%
Unsatisfied-current regulations not strict enough	5	1.4%
*Total Response	356	

*As noted in the previous footnote 14, Total Response includes only those responses that were provided in accordance with survey directions.

7. WHY DO YOU CHOOSE TO LIVE IN SOLEBURY?

Respondents were asked to rank up to three of the most important characteristics from 1 to 3, with 1 being the highest priority. A weighting system was applied to each of the responses to ascertain the ranking for each response.

Priorities by Rank	Weighted Percentage
Open space/scenic beauty	23.90%
Rural setting	21.34%
Quality of schools	12.18%
Housing value	9.21%
Taxes	8.80%
Type of home	8.65%
Family or friends nearby	6.93%
Close to work	3.82%
Lived here all my life	3.65%
Other*	1.53%
Totals	100.00%

*One space was provided for any “other” responses.

The chart below indicates the total number of responses for each of the three categories. In some cases, respondents only chose one characteristic as important, whereas others ranked 2 items or all 3 choices.

	1		2		3		Total	
Rural Setting	324	23.8%	235	19.0%	206	17.6%	765	20.3%
Housing value	85	6.3%	152	12.3%	152	13.0%	389	10.3%
Open space/scenic beauty	370	27.2%	269	21.7%	198	16.9%	837	22.2%
Taxes	70	5.2%	155	12.5%	160	13.7%	385	10.2%
Close to work	47	3.5%	48	3.9%	58	5.0%	153	4.1%
Lived here all my life	78	5.7%	13	1.1%	22	1.9%	113	3.0%
Type of home	93	6.8%	125	10.1%	138	11.9%	356	9.5%
Family or friends nearby	77	5.7%	101	8.2%	102	8.7%	280	7.4%
Quality of schools	192	14.1%	129	10.4%	107	9.1%	428	11.4%
Other*	23	1.7%	11	0.9%	27	2.3%	61	1.6%
Totals	1,359		1,238		1,170		3,767	

*Other includes the responses not assigned to one of the above categories. In many cases, the response in this category related to quality of life and historic nature.

8. WHAT IS MOST IMPORTANT TO CONSIDER WHEN PLANNING FOR THE FUTURE OF SOLEBURY?

Respondents were asked to rank up to five issues as the most important on a scale of 1 to 5, with 1 being the highest priority. A weighting system was applied to each of the 5 chosen responses to ascertain ranking.

Priorities of Ranking	Weighted Percentage
Retention of the rural character	16.93%
Natural resources protection	13.84%
Taxes	12.90%
Agricultural/open space preservation	10.40%
Conservation of quality water supply	9.21%
Protect historic sites & resources	5.64%
Recreation opportunities	5.35%
Improving traffic flow & roadway	4.48%
Stormwater management/flood control	4.42%
Managed development	4.25%
Emergency services	3.14%
Air quality control	1.76%
Economic development	1.64%
Renewable energy alternative	1.27%
Flex. zoning & dev. ordinances	1.25%
Diversity of housing types	1.22%
Other 1*	1.13%
Employment opportunities	1.02%
Other 2*	0.15%
Totals	100.00%

*Two spaces were provided for any “other” responses.

The chart below indicates the total number of responses for each of the five categories. In some cases, respondents only chose one characteristic as important, whereas others ranked 2, 3, 4 or all 5 choices.

	1		2		3		4		5		Totals	
Natural resources protection	247	15.1%	205	13.8%	194	13.3%	178	13.2%	130	9.6%	954	13.1%
Stormwater manage/flood control	55	3.4%	72	4.9%	64	4.4%	80	5.9%	82	6.1%	353	4.8%
Retention of the rural character	376	22.9%	255	17.2%	183	12.5%	129	9.6%	113	8.4%	1056	14.5%
Agr./open space preservation	127	7.7%	188	12.7%	187	12.8%	144	10.7%	110	8.2%	756	10.4%
Conserve quality water supply	150	9.1%	124	8.4%	153	10.5%	126	9.3%	121	9.0%	674	9.3%
Protect. of historic sites & resources	29	1.8%	89	6.0%	125	8.6%	128	9.5%	141	10.5%	512	7.0%
Recreation opportunities	105	6.4%	67	4.5%	65	4.5%	74	5.5%	72	5.3%	383	5.3%
Diversity of housing types	17	1.0%	18	1.2%	19	1.3%	19	1.4%	24	1.8%	97	1.3%
Employment opportunities	10	0.6%	21	1.4%	14	1.0%	14	1.0%	26	1.9%	85	1.2%
Improve traffic flow/roadway cond.	57	3.5%	66	4.5%	74	5.1%	71	5.3%	98	7.3%	366	5.0%
Economic development	23	1.4%	23	1.6%	29	2.0%	23	1.7%	29	2.1%	127	1.7%
Taxes	303	18.5%	145	9.8%	143	9.8%	130	9.6%	125	9.3%	846	11.6%
Emergency services	23	1.4%	59	4.0%	58	4.0%	60	4.5%	63	4.7%	263	3.6%
Managed development	47	2.9%	66	4.5%	73	5.0%	76	5.6%	89	6.6%	351	4.8%
Flexible zoning & develop. ord.	8	0.5%	17	1.1%	28	1.9%	29	2.2%	31	2.3%	113	1.6%
Air quality control	27	1.6%	32	2.2%	16	1.1%	29	2.2%	27	2.0%	131	1.8%
Renewable energy alternative	12	0.7%	18	1.2%	18	1.2%	24	1.8%	52	3.9%	124	1.7%
Other *	25	1.6%	18	1.2%	16	1.1%	14	1.1%	16	1.2%	89	1.2%
Totals	1,641		1,483		1,459		1,348		1,349		7,280	

*Other includes the responses not assigned to one of the above categories.

9. WHAT IS LACKING OR NEEDED IN SOLEBURY?

(Select up to 3 responses. No priority listing was requested for these 3 responses, therefore, responses were not weighted or ranked in any particular order).

Senior citizen needs	368	9.4%
Diversity of housing types	82	2.1%
Activities for youth	282	7.2%
Commercial areas for local shopping needs	238	6.1%
Small business center for employment	73	1.9%
Park/recreation areas	429	11.0%
Wildlife management	567	14.5%
Road improvements	489	12.5%
Traffic management	313	8.0%
Library facility	319	8.2%
Renewable energy conservation educ. & dev.	221	5.7%
Quality of telecommunication services	287	7.4%
Other	230	5.9%
Total Response	3,898	

10. WHAT WOULD YOU ADD TO SOLEBURY'S PRESENT RECREATIONAL OPPORTUNITIES?

(Select up to 3 responses. No priority listing was requested for these 3 responses, therefore, responses were not weighted or ranked in any particular order).

Hiking trails/bike paths	954	24.1%
Sidewalks along roadways	459	11.5%
Athletic fields	243	6.1%
Additional access to the canal/towpath	477	12.0%
River access for boating and fishing	370	9.3%
Dog park	213	5.4%
Community vegetable garden	203	5.1%
Public swimming pool	263	6.6%
Playgrounds	83	2.1%
Tennis courts	93	2.3%
Community center	330	8.3%
Gymnasium (indoor activities)	209	5.3%
Other	75	1.9%
Total Response	3,972	

11. SHOULD SOLEBURY'S COMPREHENSIVE PLAN ADDRESS THE PROTECTION & QUALITY OF THE TOWNSHIP'S WATER SUPPLY?

Yes	1,238	73.6%
No	62	3.7%
Need more information	383	22.8%
Total Response	1,683	

12. THROUGH THE PURCHASE OF OPEN SPACE AND EASEMENTS, SHOULD SOLEBURY CONTINUE TO PURSUE PRESERVING OPEN SPACE AND FARMLAND?

Yes	1,242	73.4%
No	223	13.2%
Need more information	228	13.5%
Total Response	1,693	

OTHER COMMENTS YOUR OFFICIALS SHOULD CONSIDER IN PREPARING THE COMPREHENSIVE PLAN?

Total Response	130
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Due to their number and length, these responses are available at the township building and website.

APPENDIX B:

POLICIES OF THE COMMONWEALTH OF PENNSYLVANIA

Article I, Section 27 of the Pennsylvania Constitution, which provides:

The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and aesthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain these for the benefit of all the people.

The Pennsylvania Municipalities Code Act of 1968, P.L.805, No.247 as reenacted and amended, the purpose of the Act (Section 105):

... to promote the conservation of energy through the use of planning practices and to promote the effective utilization of renewable energy sources; to promote the preservation of this Commonwealth's natural and historic resources and prime agricultural land; ...to ensure that municipalities adopt zoning ordinances which are generally consistent with the municipality's comprehensive plan; to encourage the preservation of prime agricultural land and natural and historic resources through easements, transfer of development rights and rezoning; to ensure that municipalities enact zoning ordinances that facilitate the present and future economic viability of existing agricultural operations in this Commonwealth and do not prevent or impede the owner or operator's need to change or expand their operations in the future in order to remain viable; ...; and to permit municipalities to minimize such problems as may presently exist or which may be foreseen and whenever the provisions of this act promote, encourage, require or authorize governing bodies to protect, preserve or conserve open land, consisting of natural resources, forests and woodlands, any actions taken to protect, preserve or conserve such land shall not be for purposes of precluding access for forestry.

The findings of the Governor's 21st Century Environmental Commission that recognized:

Goals of environmental quality, personal and community well-being and economic prosperity are not in conflict but, mutually dependent.

That after having corrected the undesirable legacies of past actions, we protect our natural resources and systems, husbanding them as assets to be used in a sustainable manner that lets our children and grandchildren enjoy the same rewarding quality of life that we desire.

Commonwealth of Pennsylvania Keystone Principles and Criteria

The Commonwealth's Economic Development Cabinet adopted the *Keystone Principles and Criteria for Growth, Investment and Resource Conservation* on May 31, 2005. The Keystone Principles and Criteria represent a coordinated interagency approach to foster sustainable economic development and conservation of resources through the state's investments in Pennsylvania's diverse communities.

The Keystone Principles and Criteria lay out general goals and objectives for economic development and resource conservation, and are designed to encourage multifaceted project development that will integrate programs and funding sources from a variety of state agencies into a comprehensive strategy to address issues affecting whole communities. The ten principles outlined by the state's Keystone Principles and Criteria listed below were considered in the development of Solebury Township Comprehensive Plan and are concepts that the land use plan strives to implement.

1. **Redevelop First**—Support revitalization of Pennsylvania's many cities and towns. Give funding preference to reuse and redevelopment of "brownfield" and previously developed sites in urban, suburban, and rural communities for economic activity that creates jobs, housing, mixed use development, and recreational assets. Conserve Pennsylvania's exceptional heritage resources. Support rehabilitation of historic buildings and neighborhoods for compatible contemporary uses.
2. **Provide Efficient Infrastructure**—Fix it first: Use and improve existing infrastructure. Make highway and public transportation investments that use context sensitive design to improve existing developed areas and attract residents and visitors to these places. Provide transportation choice and intermodal connections for air travel, driving, public transit, bicycling and walking. Increase rail freight. Provide public water and sewer service for dense development in designated growth areas. Use on-lot and community systems in

rural areas. Require private and public expansions of service to be consistent with approved comprehensive plans and consistent implementing ordinances.

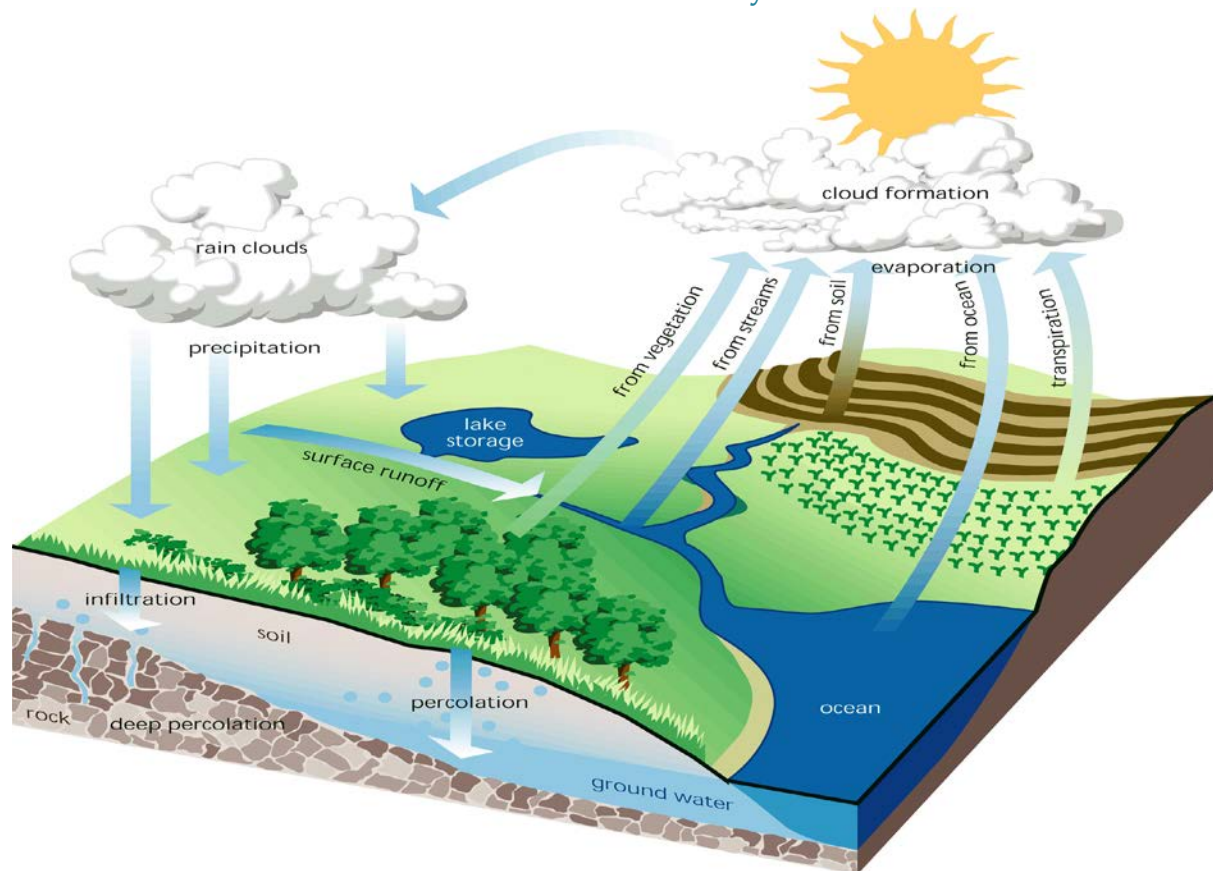
3. **Concentrate Development**—Support infill and “greenfield” development that is compact, conserves land, and is integrated with existing or planned transportation, water and sewer services, and schools. Foster creation of well-designed developments and walkable, bikeable neighborhoods that offer healthy lifestyle opportunities for Pennsylvania residents. Recognize the importance of projects that can document measurable impacts and are deemed ‘most ready’ to move to successful completion.
4. **Increase Job Opportunities**—Retain and attract a diverse, educated workforce through the quality of economic opportunity and quality of life offered in Pennsylvania’s varied communities. Integrate educational and job training opportunities for workers of all ages with the workforce needs of businesses. Invest in businesses that offer good paying, high quality jobs, and that are located near existing or planned water and sewer infrastructure, housing, existing workforce, and transportation access (highway or transit).
5. **Foster Sustainable Businesses**—Strengthen natural resource-based businesses that use sustainable practices in energy production and use, agriculture, forestry, fisheries, recreation and tourism. Increase our supply of renewable energy. Reduce consumption of water, energy and materials to reduce foreign energy dependence and address climate change. Lead by example: support conservation strategies, clean power and innovative industries. Construct and promote green buildings and infrastructure that use land, energy, water and materials efficiently. Support economic development that increases or replenishes knowledge-based employment, or builds on existing industry clusters.
6. **Restore and Enhance the Environment**—Maintain and expand our land, air and water protection and conservation programs. Conserve and restore environmentally sensitive lands and natural areas for ecological health, biodiversity and wildlife habitat. Promote development that respects and enhances the state’s natural lands and resources.

7. **Enhance Recreational and Heritage Resources**—Maintain and improve recreational and heritage assets and infrastructure throughout the Commonwealth, including parks and forests, greenways and trails, heritage parks, historic sites and resources, fishing and boating areas and game lands offering recreational and cultural opportunities to Pennsylvanians and visitors.
8. **Expand Housing Opportunities**—Support the construction and rehabilitation of housing of all types to meet the needs of people of all incomes and abilities. Support local projects that are based on a comprehensive vision or plan, have significant potential impact (e.g., increased tax base, private investment), and demonstrate local capacity, technical ability and leadership to implement the project. Coordinate the provision of housing with the location of jobs, public transit, services, schools and other existing infrastructure. Foster the development of housing, home partnerships, and rental housing opportunities that are compatible with county and local plans and community character.
9. **Plan Regionally; Implement Locally**—Support multi-municipal, county and local government planning and implementation that has broad public input and support and is consistent with these principles. Provide education, training, technical assistance, and funding for such planning and for transportation, infrastructure, economic development, housing, mixed use and conservation projects that implement such plans.
10. **Be Fair**—Support equitable sharing of the benefits and burdens of development. Provide technical and strategic support for inclusive community planning to ensure social, economic, and environmental goals are met. Ensure that in applying the principles and criteria, fair consideration is given to rural projects that may have less existing infrastructure, workforce, and jobs than urban and suburban areas, but that offer sustainable development benefits to a defined rural community.

APPENDIX C: WATER CYCLE

Water resources are broadly defined as the totality of various components, which we understand as part of the water cycle. These components include precipitation, stormwater runoff, infiltration, water supply from groundwater, and stream flow. Each of these components is linked and a change in one will (by laws of physics and nature) cause a change in another. The concept of the water cycle is key to understanding water resources. Figure C1 illustrates in simplified form the essential dynamics of the water cycle.

Figure C1
Generalized Water Cycle

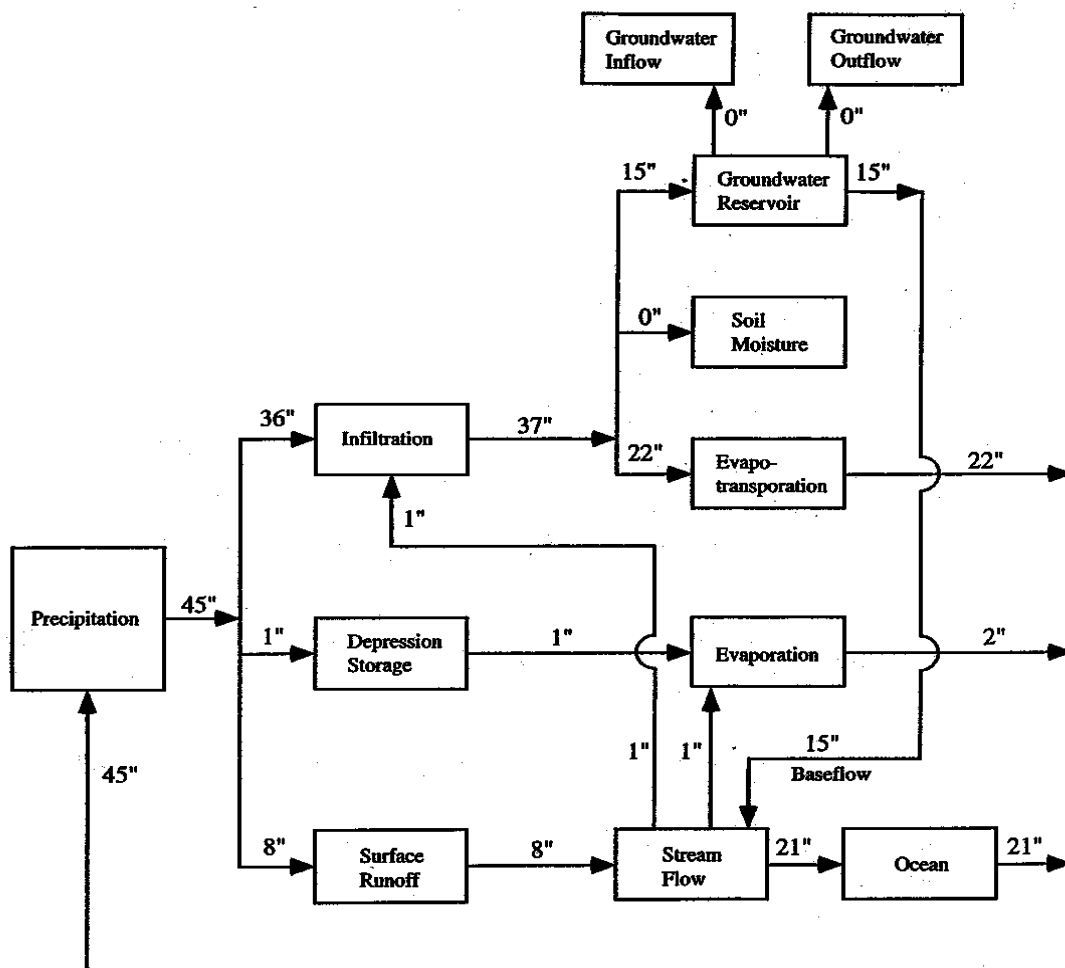


The water cycle arrows make the point of continuous movement. The water system itself is a closed loop, a giant continuum interrelating precipitation, groundwater, and surface water. What goes in must come out. Impacts on one part of the cycle by definition create comparable impacts elsewhere in the cycle.

The quantity of water moving through the water cycle is calculated through what is known as a water budget. Water budget estimates the relative distribution of rainfall movement using annual rainfall and stream flow gauge records. Although simplified, generally it can be assumed that precipitation (P) moves through the watershed in three ways; through evapotranspiration (ET), groundwater recharge (R), and runoff (Q), as shown in Figure C2 and in the equation below.

$$P \text{ (inches)} = ET \text{ (inches)} + R \text{ (inches)} + Q \text{ (inches)}$$

Figure C2
Detailed Water Cycle/ Water Budget



Based on available records, the average annual rainfall in Bucks County is forty-five inches (which is an average year in Solebury Township). Using stream flow gauge

records from the last 100 years, the estimated mean-annual recharge is twelve inches (Risser, 2005).

The following generalization is made about the water balance for Bucks County in its natural state based on the following studies, *Relation Between Ground Water and Surface Water in the Brandywine Creek Basin Pennsylvania* (USGS, 1962), *Water Budgets for Selected Watersheds in the Delaware River Basin, Eastern Pennsylvania and Western New Jersey* (USGS, 2005) and the *Neshaminy Creek Watershed Stormwater Management Plan* (BCPC, 1992); fifty-five percent of the annual rainfall in the watershed is returned to the atmosphere through evapotranspiration from surface vegetation and trees, twenty-seven percent of the annual rainfall in the watershed moves through the soil horizon vertically until it reaches the zone of saturation or the water table, and eighteen percent of annual rainfall leaves the site as runoff:

$$P (100\%) = ET (55\%) + R (27\%) + Q (18\%)$$

As stated previously, a water budget is a closed loop, what goes in must come out. If inputs to infiltration are decreased by 30 percent, then inputs to surface runoff and/or depression storage must be comparably increased by this amount. When stormwater is properly managed, the percentage of water leaving the site through infiltration, evapotranspiration and runoff should be similar, if not the same, as the percentage values above. Planning and management actions that do not account for the critical interdependence of all of the different components of the water cycle are likely to be seriously flawed.

PRECIPITATION

The water cycle begins with precipitation. Precipitation data is based on a Official weather station precipitation data from the nearby station at Neshaminy Falls, PA and reports average annual rainfall (1981-2010) of 48.71 inches. Precipitation can vary dramatically from year to year, as indicated in Figure C3, which shows annual precipitation between 1981 and 2010. Rainfall tends to be rather evenly distributed across the months of the year, as indicated by average monthly precipitation, charted below.

Table C1
Average Monthly Precipitation (inches) in Neshaminy Falls, PA, 1980-2010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
Average	3.43	2.89	4.33	4.13	4.32	4.51	5.08	3.98	4.52	3.82	3.69	4.00	48.71

Source: http://nowdata.rcc-acis.org/PHI/pubACIS_results

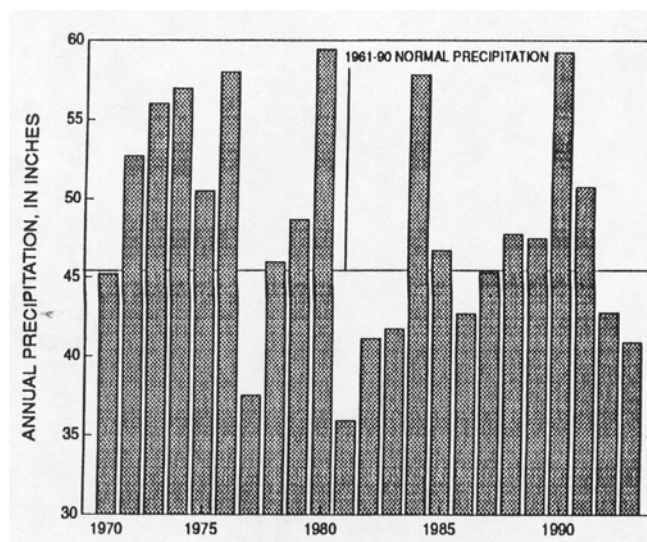
Also important to understand is the distribution of rainfall by size of event. Studies of precipitation patterns generally indicate that precipitation occurs mostly during relatively small storm events. If rain gauge records are examined over an extended period for this region, it is apparent that the vast bulk of storms tend to be smaller than the 1-year storm (a storm which has a 100 percent chance of occurring once during any particular year; the 1-year storm in Bucks County happens to be 2.71 inches of precipitation during a 24-hour period). Collectively, those small events also account for as much as 85 percent of total annual precipitation. Using long-term precipitation records, recurrence intervals for different size storms have been estimated, typically defined as precipitation occurring during a 24-hour period, as follows:

Table C2
24-Hour Storm Event for Doylestown, PA

Year	1	2	5	10	25	50	100
Precipitation (in)	2.71	3.26	4.11	4.8	5.82	6.68	7.61

Source: http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=pa

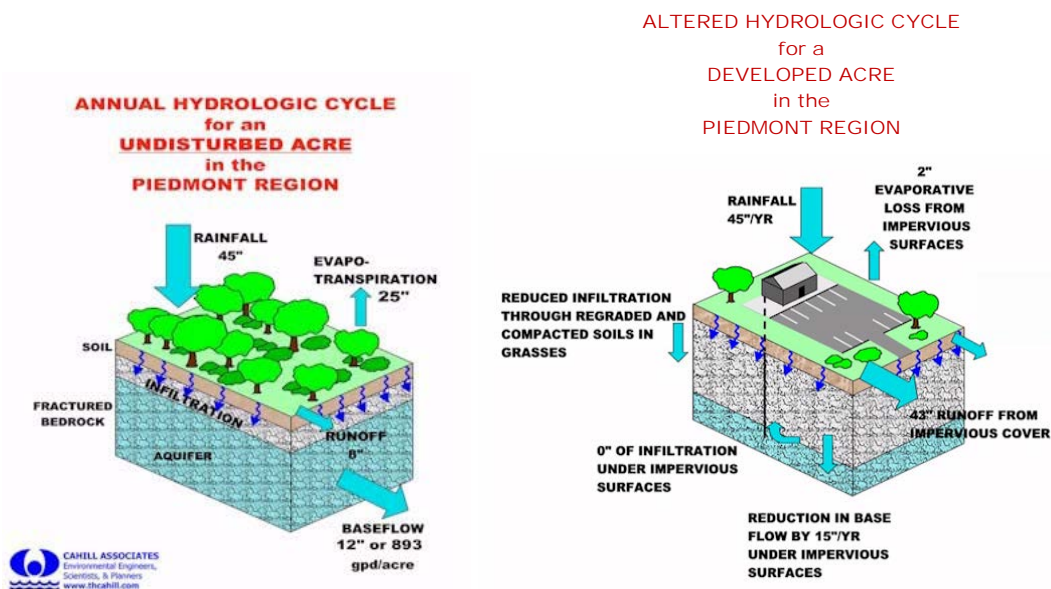
Figure C3
Annual Precipitation at Lambertville NJ (USGS 1994a)



GROUNDWATER AND STREAM BASEFLOW

As indicated in the water cycle diagrams, precipitation can take several routes after falling to earth. Infiltration and surface runoff are of most interest. Infiltration is defined as that precipitation which is absorbed into the ground. It is clear from the diagram that infiltration and runoff work in opposition—that any action which increases surface runoff means infiltration decreases and vice versa. Land development creates both impervious surfaces and pervious surfaces such as lawns, both of which result in reduced quantities of infiltration when compared with the pre-development condition. Important here is the pre-development vegetation at the site; existing stands of forest or meadow and even scrub vegetation allow for considerably more infiltration than will occur with a post-development lawn on a disturbed and at least partially compacted soil base. Land development has come to mean a significant change in the natural landscape, including creation of impervious surfaces, clearing of dense vegetation and replacement with far less absorbent lawns, plus substantial compaction of the soil mantle. The result is increased surface runoff. Figure C4 (below) demonstrates the impact, contrasting an undisturbed acre (natural ground) with a developed acre. Increasing surface runoff volume translates into significantly reduced volumes of infiltration, with significant consequences later in the water cycle.

Figure C4
Stormwater Runoff Impacts Resulting from Land Development



Source: http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-48473/03_Chapter_2.pdf (pg 4 and 5)

A critical water cycle issue here involves the groundwater reservoir component, also commonly referred to as groundwater or aquifer recharge. Decreases in infiltration by definition mean decreases in recharge of the groundwater reservoir. Groundwater moves gradually through a myriad of pathways, ultimately flowing out steadily in the form of stream baseflow. “The movement of groundwater normally occurs as slow seepage through the pore spaces between particles of unconsolidated earth materials or through networks of fractures and solution openings in consolidated rocks. A velocity of one foot per day or greater is a high rate of movement for groundwater, and groundwater velocities can be as low as one foot per year or one foot per decade. In contrast, velocities of stream flow generally are measured in feet per second.”¹⁵

In southeastern Pennsylvania, the direction of groundwater movement, while slow, otherwise tends to mirror surface water flow. This is in contrast to other parts of the country where geological conditions give rise to underground rivers or vast confined underground reservoirs, put in place millions of years ago. Exceptions to the normal similarity between surface and groundwater flow patterns also exist in this region and in Solebury Township, most notably when limestone formations are encountered. The porosity of such geology, compounded by the presence of open underground channels, can significantly alter normal groundwater flow patterns.

A relatively small proportion of stream flow is comprised of stormwater runoff. Much of the time, stream flow consists of stream baseflow discharged from the groundwater system. “The contribution of groundwater to total streamflow varies widely among streams, but hydrologists estimate the average contribution is somewhere between 40 and 50 percent in small and medium-sized streams.”¹⁶ While stormwater causes sudden surges in stream flow at isolated points in time, stream baseflow discharged from groundwater occurs continuously, a reflection of the continuous movement occurring within the groundwater system.¹⁷

Reduction in the infiltration component of the water cycle will result in reductions in the groundwater reservoir. As such, reductions continue acre-by-acre, development-by-development, and their cumulative effect grows larger. As the effects accumulate,

¹⁵ P. 8 USGS W.R.

¹⁶ p. 7 USGS W.R.

¹⁷ p. 8 USGS W.R.

groundwater reservoir depletion grows more serious, and the water table, the uppermost surface of this groundwater reservoir, will decline. Figure C5 (below) illustrates a simplified pre-development situation in cross-section, where normal precipitation patterns combine with natural vegetation to produce a particular groundwater reservoir or aquifer condition. In the post-development Figure C6 (below), well water supply and impervious surfaces have been developed, resulting in reduced inputs to and subtractions from the groundwater reservoir. The water table declines. If the effect of drought further reducing groundwater reservoir inputs and further lowering the water table is added into the equation, the cumulative effects of development and drought become quite significant. Springs and streams—especially headwaters streams—are jeopardized and may even dry up. Wells, especially older shallow wells, may fail, and wetlands, fed by groundwater discharge, will be adversely affected. In addition, public safety is endangered when the water table drops below the porous surface soils where sewage effluents and loam chemicals are not evenly attenuated (dispersed). When the water table is in the bedrock, the time water spends in the porous soils decreases substantially, leading to higher concentrations of pathogens and chemicals in groundwater supplies.

Figure C5
Pre-Development Water Cycle in Cross Section

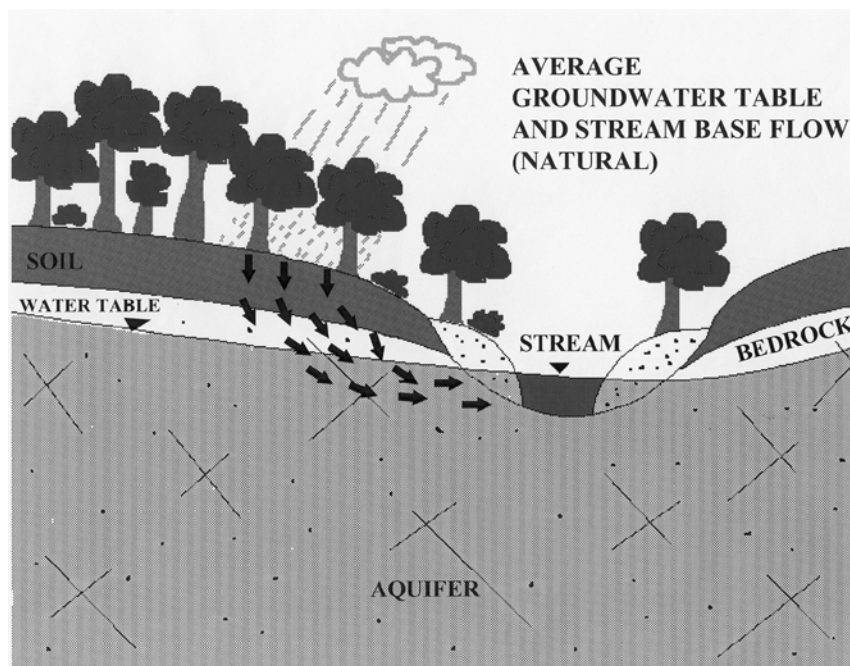
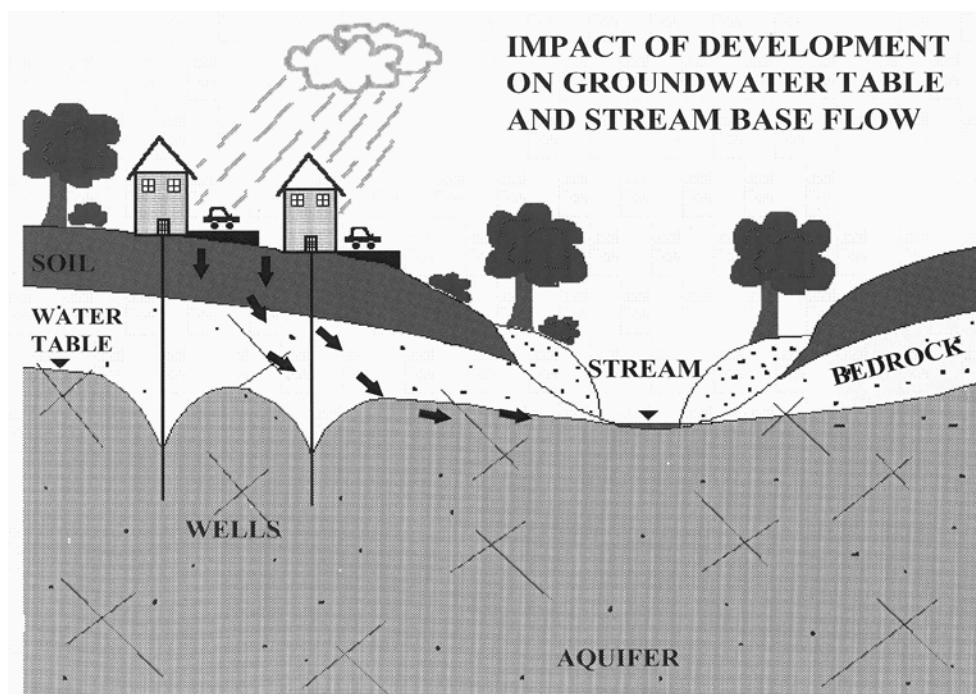


Figure C6
Post Development Water Cycle in Cross Section



Adding to the seriousness of the problem is the fact that these impacts are magnified in the headwaters of the total stream system. Headwaters are defined here as “first-order” perennial streams, where the stream system along with its aquatic community originates. In headwaters, stream baseflow is modest even in pre-development and non-drought conditions. Runoff as a stream flow component drains off most rapidly. Therefore, any subtraction from baseflows in these small streams proportionally has greatest adverse impact. Headwaters are the locations of critical ecological functioning where exchange of energy from land to water occurs most directly and is most ecologically vital. Even if stream baseflow is not entirely eliminated, due to reductions in infiltration, reductions in flow can occur which also adversely stress the aquatic community in a variety of ways, well before total depletion occurs.

In some cases the groundwater reservoir does not discharge to a stream, but rather to a wetland. Typically, wetlands are zones of groundwater discharge and are in fact “fed” and kept alive by the groundwater reservoir. Some wetlands, where located in perched water table conditions, may occur at higher elevations and may not be intersecting groundwater. The persistence of wetness for many wetlands is dependent on a relatively stable influx of groundwater throughout changing seasonal and annual

climatic cycles.¹⁸ In most cases, reduced infiltration and a lowered water table ultimately translate into loss of wetlands themselves, if not reduced wetland extent, reduced wetland vibrancy and richness, and other wetland functional losses.

It should be noted that this presentation of the water cycle and the groundwater phase of this cycle has been highly simplified. In fact, Solebury's hydrogeological context can be quite complex, as rock types vary from higher capacity formations to tighter and less water-yielding rock. Such variations and complexities notwithstanding, the basic dynamics of this simplified hydro-geological model described above remain valid.

STORMWATER RUNOFF

The most visible portion of the water cycle, after precipitation, is stormwater runoff. The type of land cover, soils characteristics and slope of the land affect the volume (amount), rate (speed), and quality of runoff. Runoff from any particular property combines with water from adjoining lands and flows overland until it reaches the nearest waterway (ditch, stream, or river). There are cumulative impacts on both land and waterways from the combined runoff flowing from multiple properties. If existing patterns of runoff are altered on one or more properties, there will be impacts upon the entire system. As discussed in prior sections, the alteration of runoff patterns will affect groundwater supplies as well as stream flow. It is the increased amount and rate of runoff that is responsible for some of the localized flooding and drainage problems associated with stormwater runoff.

Runoff starts occurring earlier post-development because portions of a site have been made impervious and immediately start to discharge runoff as rain begins to fall. Impervious surfaces are created when the natural landscape is covered by solid pavement, rooftops, buildings and other surfaces that do not allow stormwater runoff to penetrate. Rather than soaking into the ground (or infiltrating), stormwater rapidly flows over it and picks up debris, sediment and dissolved pollutants. It is important to note that post-development uncontrolled runoff rapidly increases and reaches its peak discharge level at a considerably higher pace than the peak rate of runoff for pre-development. (See Figure B7). The extent of this peak rate increase is very much linked to the amount of impervious surface and other land cover changes involved in the development process. If only ten percent or so of a development site were to be made

¹⁸ p. 42 USGS W.R.

impervious, for example, then the increase in peak rate would not be so great. If fifty percent of the site is made impervious, the extent of increase in peak rate will be dramatic.

Figure C7
Hydrograph for Pre Development and Post Development Uncontrolled

