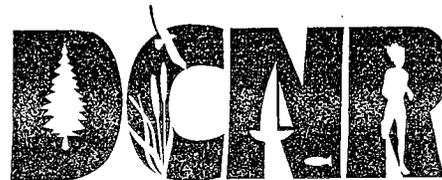
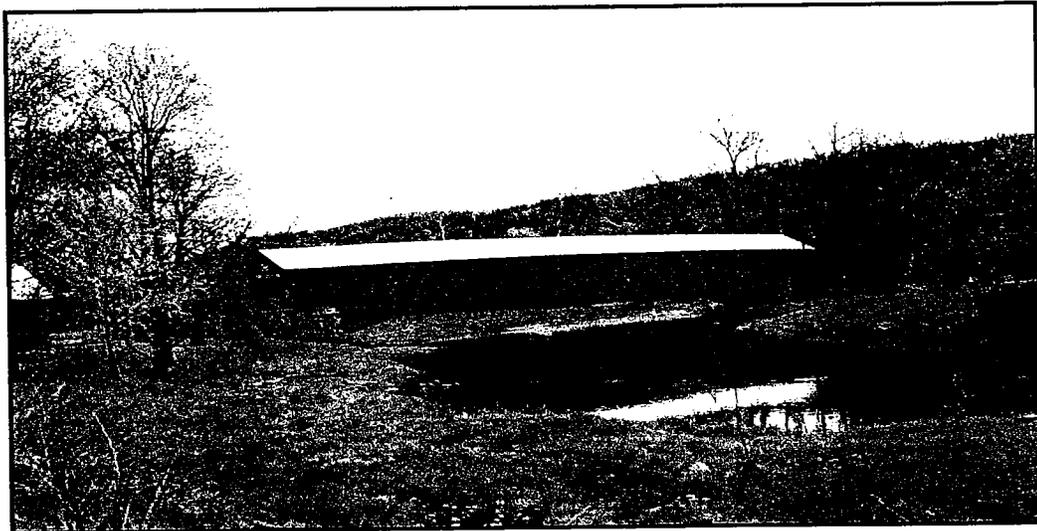


Executive Summary Manatawny Creek Watershed Conservation Management Plan

Including the Sprogels Run and Sanatoga Creek Watersheds

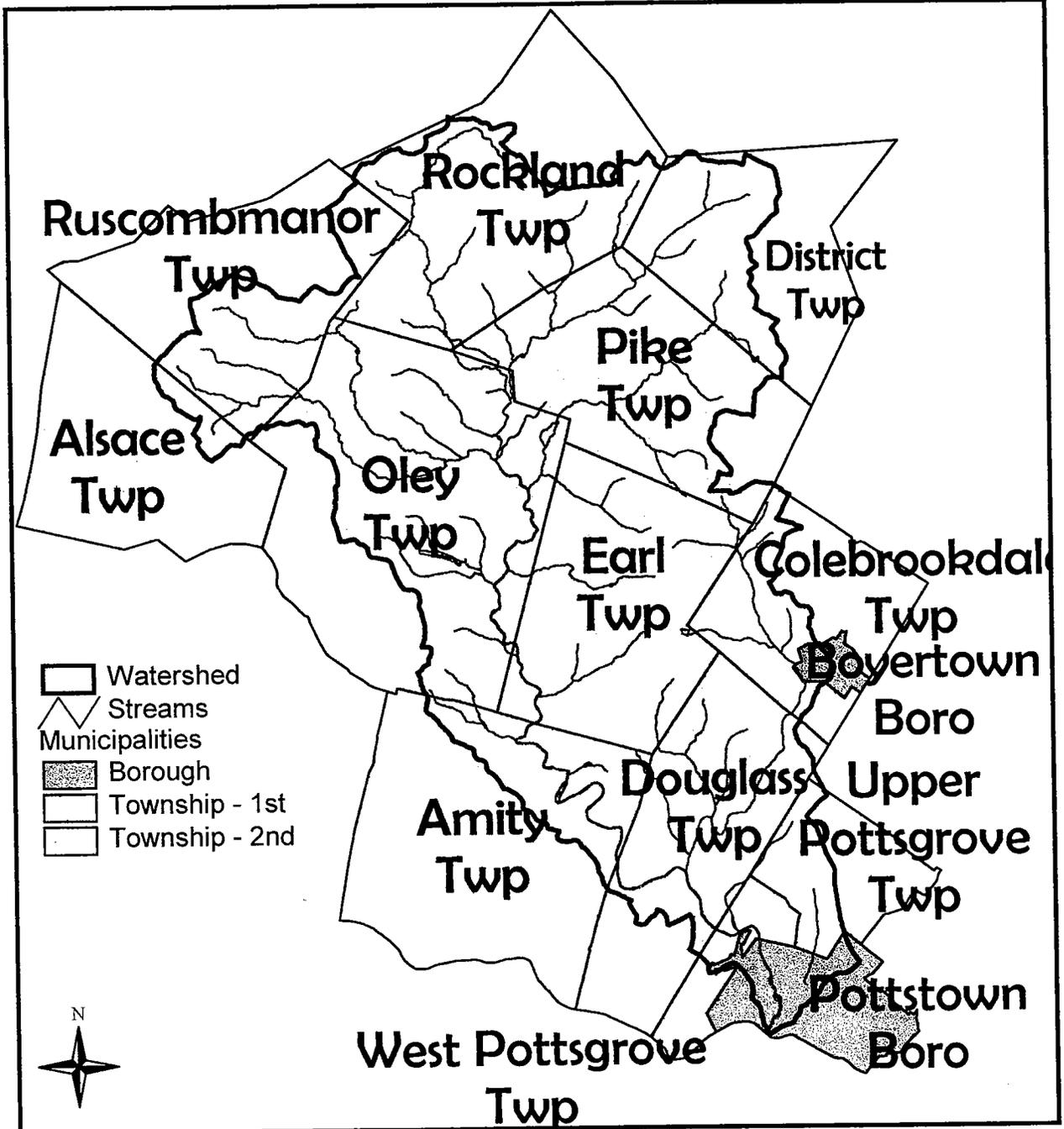
December 2001



"This project was financed in part from a grant from the Keystone Recreation, Park, and Conservation Fund, under the administration of the Department of Conservation and Natural Resources, Bureau of Recreation and Conservation."

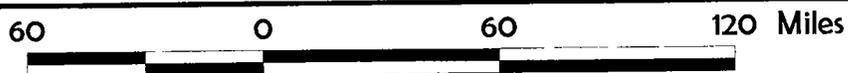
*This plan was prepared by the staff of the Berks County Conservancy
Contact Phoebe Hopkins at manatawnycreek@aol.com or
Tami Jo Shimp at 610-372-4992 or tami@berks-conservancy.org*

Manatawny Municipalities



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Manatawny Watershed Location



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PROJECT AREA CHARACTERISTICS

Location and Watershed Size

The Manatawny Creek watershed is located in the southeastern part of Pennsylvania in Berks and Montgomery Counties. The Manatawny Creek rises in the hills of eastern Berks and flows approximately 17.0 miles in a generally southeasterly direction to its confluence with the Schuylkill River at Pottstown.

The Manatawny drains approximately 91.5 square miles. It includes portions of ten townships and one borough in Berks County, and parts of two townships and one borough in Montgomery County.

Table 1. Municipalities in the Manatawny Creek Watershed, including total square mileage and percentage within the watershed.

Municipality	Total Sq. Mi.	Sq. Mi. in Watershed	Percent of Total in Watershed
<i>Berks County:</i>			
Alsace Twp	12.1	0.77	6.4%
Amity Twp	18.4	4.98	27.0%
Colebrookdale Twp	8.7	3.91	44.9%
District Twp	11.6	5.57	48.0%
Douglass Twp	13.6	9.36	68.8%
Earl Twp	13.8	13.8	100.0%
Oley Twp	24.2	17.61	72.8%
Pike Twp	14.3	12.05	84.3%
Rockland Twp	16.2	11.55	71.3%
Ruscombmanor Twp	14.8	6.17	41.7%
Boyertown Boro	0.8	0.3	37.5%
Berks Totals	148.5	86.07	58.0%
<i>Montgomery County:</i>			
West Pottsgrove Twp	2.4	1.27	52.9%
Upper Pottsgrove Twp	4.96	2.3	46.4%
Pottstown Boro	4.89	1.82	37.2%
Montgomery Totals	12.25	5.39	44.0%
Watershed Totals	160.75	91.46	56.9%

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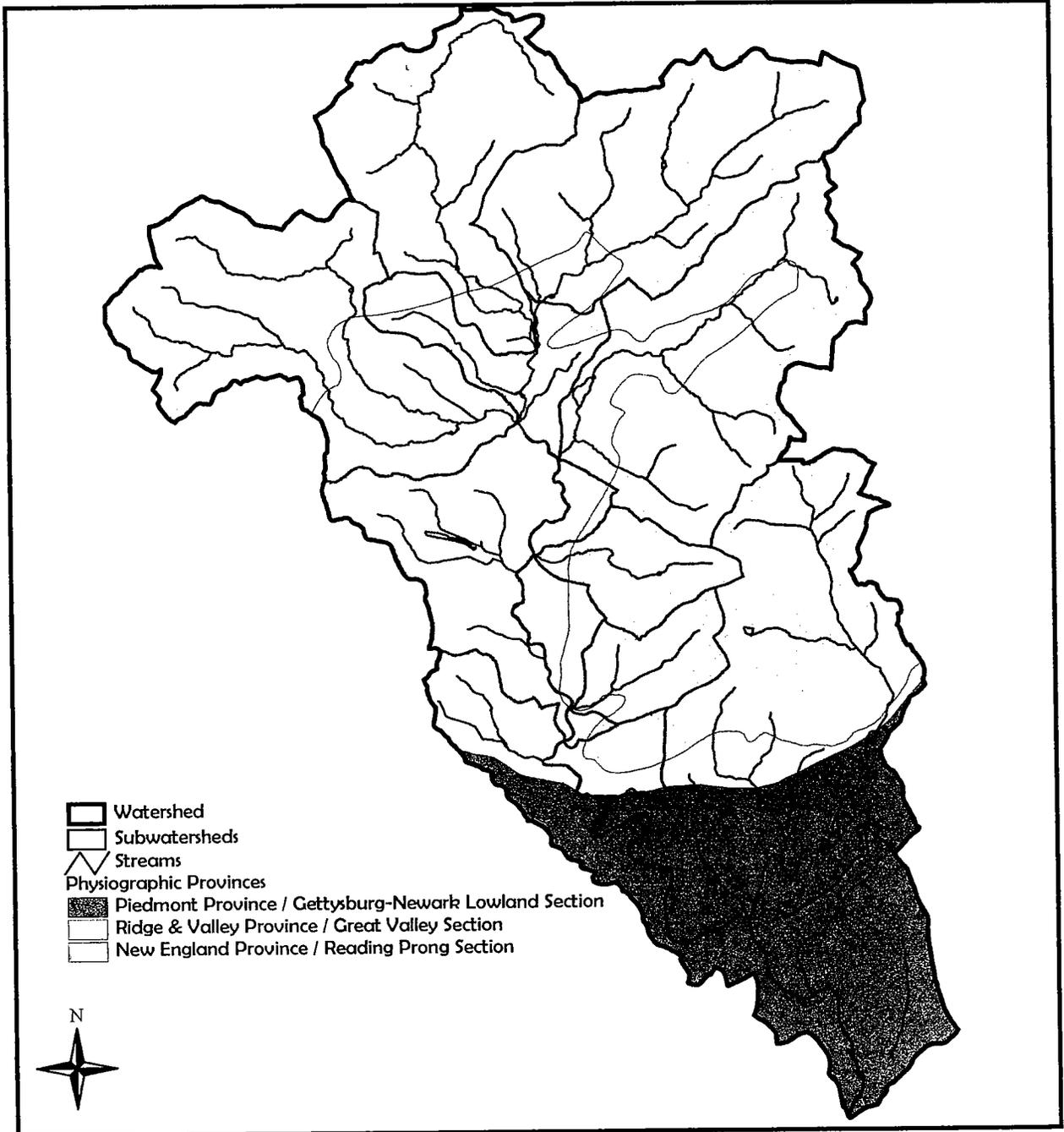
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Physiographic Provinces & Sections



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Subwatersheds

As the watercourses in the Manatawny Watershed can be divided into tributaries, the land areas drained by the tributaries can be divided into *subwatersheds*. This plan divides the watershed into subwatersheds in accordance with the named tributaries that directly enter the main stem of the Manatawny. Please refer to the Manatawny Subwatersheds Map that illustrates the division of nine subwatersheds of the Manatawny.

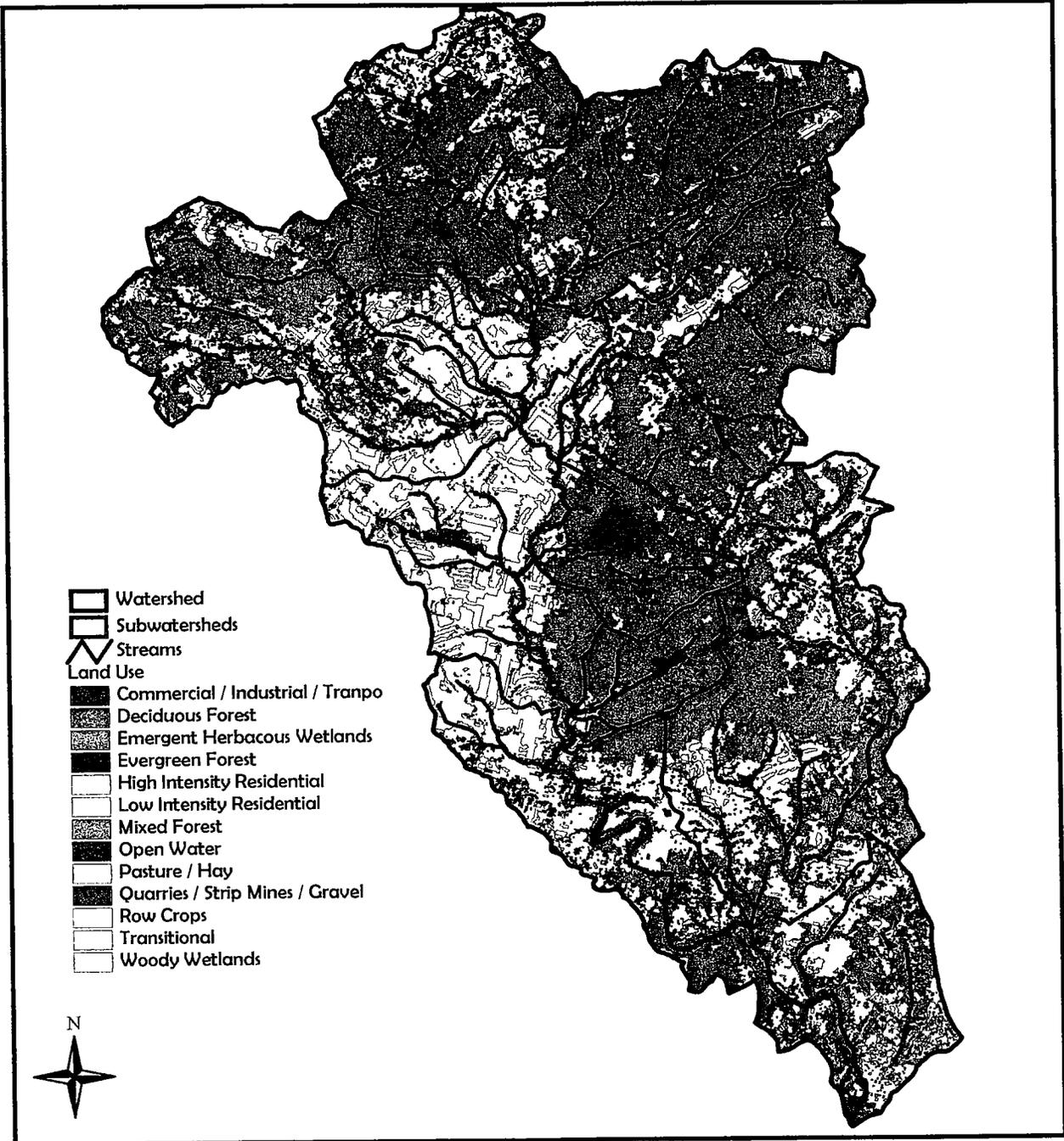
Table 3. Locations of the Subwatersheds in the Manatawny Creek Watershed.

<u>Subwatershed</u>	<u>Location (township)</u>
Pine Creek	District, Rockland, Pike, Oley
Bieber Creek	Rockland, Ruscombmanor, Pike, Oley
Little Manatawny & Furnace	Alsace, Ruscombmanor, Rockland, Oley
Oysterville Creek	District, Pike, Earl, Oley
Furnace Run	Earl, Oley
Trout Run	Earl
Upper Manatawny	Oley, Earl, Amity
Lower Manatawny	Amity, Douglass, West Pottsgrove, Upper Pottsgrove, Pottstown
Ironstone Creek	Pike, Earl, Colebrookdale, Douglass

Table 4. Elevation, length, and drainage area of streams in the Manatawny Creek Watershed.

Stream	Head (ft)	Mouth (ft)	Drop (ft)	Length (miles)	Sq. Miles
Pine Creek	1000	340	660	6.3	11.19
Bieber Creek	840	340	500	8.1	9.39
Little Manatawny	800	320	480	6.4	7.2
Furnace Creek	820	340	480	6.6	4.9
Oysterville Creek	900	315	585	5.9	12.24
Furnace Run	800	300	500	2.8	2.63
Trout Run	700	280	420	2.1	2.36
Ironstone Creek	700	200	500	8.5	15.53
Upper Manatawny	340	240	100	7.3	11.79
Lower Manatawny	240	140	100	9.7	14.27
Total	-	-	-	63.7	91.5

Manatawny Land Use



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Land Use

The map on the previous page illustrates Land Use in the Manatawny Watershed today. The predominance of the green color depicts the large tracts of woodland in the hills of the Reading Prong, featuring mixed deciduous woods, much as it was two centuries ago, the existing forestland has been cut over for farming, charcoal making, and lumbering at various times. The other major land use component is farmland, hay and pasture in yellow, and row crops in tan. Much of the farmland is concentrated in Oley Township, although Pike, Rockland, Amity, Douglass, and Colebrookdale have smaller farm areas. The most concentrated residential areas are Pottstown, Boyertown, and Oley Village environs. The two landfills, Rolling Hills, in Earl Township, and the Pottstown Landfill show as large spots on the map.

Agriculture has continued to be a mainstay of the economy of this region for over 250 years. The Oley Valley is one of Berks County's most productive farming areas and has helped agribusiness hold its position as the number one industry in the county and the state. All three segments of the agri-business system; farming, farm supply and processing-marketing, are well established in Berks County. However, modern development patterns and pressures are making it increasingly difficult for family farms to survive. Farming is capital and labor intensive and is subject to fluctuating and competitive markets. Farms in rapidly developing areas, such as Amity Township, are increasingly being sold for housing subdivisions. On the other hand, farmers in Oley Township have protected over 6,000 acres through the sale of development rights. The continued viability of farming is a major issue in this region.

Manufacturing is an important economic activity in eastern Berks and western Montgomery Counties. In the Manatawny Creek Watershed the major centers of industry and commerce are Pottstown and Boyertown. Both are older boroughs built on an industrial heritage. Although manufacturing is undergoing transitions from heavy industry to modern technologies, these areas continue to attract many business enterprises. The more rural sections of the watershed have scattered manufacturing sites ranging from steel fabrication, to furniture making, to quarries producing construction materials.



Population

Centers of population are found in the boroughs of Pottstown and Boyertown, their suburbs, rural villages and rural housing developments. Whereas the older urban areas are already “built out”, and offer little space for population growth, the rural farmland and open space areas have seen significant growth in the past several decades. Comparison of population statistics between the 1990 and 2000 Census counts illustrates where this growth is occurring. Census figures also reveal the population density per square mile, and the number of housing units built or approved in each municipality.

Population growth during the past decade varies greatly by municipality. The percentage of change ranges from negative population growth in Douglass and Colebrookdale Townships to 37% – 40% growth in Amity and Rockland Townships. Pike, District and Ruscombmanor Townships grew in the 20% – 25% range. The growth is due to the increasing number of residential subdivisions within commuting distance of Reading Allentown, and King of Prussia and other employment centers, both inside and outside of Berks County. Housing is more affordable than in the counties to the east, hence, the eastern section of Berks County has become a target area for developers of affordable housing tracts.



Table 5. Population Density of Municipalities in the Manatawny Creek Watershed.

Municipality	1990 Census	2000 Census	% Change	Change	Land Area Square Miles	Population Density/Sq. Mi.
<i>Berks County</i>						
Amity Township	6,434	8,867	37.81	2,433	18.40	481.90
Boyertown Borough	3,759	3,940	4.82	181	0.80	4,925.00
Colebrookdale Township	5,469	5,270	-3.64	-199	8.70	605.70
District Township	1,211	1,449	19.65	238	11.60	124.90
Douglass Township	3,570	3,327	-6.81	-243	13.60	244.60
Earl Township	3,016	3,050	1.13	34	13.80	221.00
Oley Township	3,362	3,583	6.57	221	24.20	148.10
Pike Township	1,359	1,677	23.40	318	14.30	117.30
Rockland Township	2,675	3,765	40.75	1,090	16.20	232.40
Ruscombmanor Township	3,129	3,776	20.68	647	14.80	255.10
<i>Montgomery County</i>						
Pottstown Borough	21,811	21,839	0.13	28.0	-	-
West Pottsgrove	3,829	3,815	-0.36	-14.0	-	-
Upper Pottsgrove	3,315	4,102	23.74	787.0	-	-

SPROGELS RUN WATERSHED

The Sprogels Run Watershed is located in Montgomery County. It rises in Upper Pottsgrove Township and flows in a southeasterly direction through Lower Pottsgrove Township where it meets the Schuylkill River. A portion of the Borough of Pottstown is considered part of the watershed as it is immediately adjacent to a portion of the stream.

These two townships have experienced heavy growth over the last decade. For example, Upper Pottsgrove Township's population increased by almost 24% from 1990 to the year 2000. Development pressure continues and the townships are recognizing the importance of greenways and open space.

The Sprogels Run Watershed consists of 6,225 acres that include a variety of uses. The four primary land uses are broken down as follows; 55% Forested lands, 29% Agricultural lands, 13% Residential Use, and 2% Commercial/Industrial Use.

A majority of the developed areas in the Sprogels Run Watershed lie near the stream corridor. Sections of the stream corridor are surrounded by a mix of High Intensity, Low Intensity Residential, and Commercial & Industrial Use, with the exception of the upper reaches of the stream surrounded mostly by deciduous forest and the middle reach of the stream which consists of primarily pasture/hay lands.

The watershed is home to a few areas of Prime Agricultural Lands, mostly within the headwaters. Fortunately this headwater region with prime agricultural soils is still fairly undeveloped. The Management Options in this summary contains examples of tools that can be used so agricultural land and open space can be permanently protected from development. Officials of Lower and Upper Pottsgrove Townships should encourage landowners in this headwater region to consider the permanent protection of these deciduous forests and agricultural lands. This would in turn provide protection of the water resources in the townships which include not only Sprogels Run itself, but groundwater resources as well.

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The Sprogels Run watershed is home to numerous historic resources and is fortunate to have an active Lower Pottsgrove Township Historical Society to recognize and promote these resources.

SANATOGA CREEK WATERSHED

The Sanatoga Creek originates in New Hanover Township and flows in a southwesterly direction through Lower Pottsgrove Township where it meets the Schuylkill River immediately upstream from PECO's Limerick Nuclear Power Plant. Hartenstine Creek is a major tributary of the Sanatoga Creek. It rises in Limerick Township, flows west and meets the Sanatoga Creek in Lower Pottsgrove Township. These townships have grown tremendously over the last decade.



The Sanatoga as it enters the Schuylkill River



Sanatoga Park

The Sanatoga is much more rural in nature than Sprogels Run and is a significantly larger watershed. The watershed consists of 9,955 acres and is primarily agricultural in nature (5,868 acres or 59%). Forested lands are the other primary land use in the watershed, consisting of 3,648 acres or 37%. Residential use makes up 3.4% of the watershed (340 acres). As shown on the Land Use Map, the headwaters of the Sanatoga Creek are primarily wooded and the region surrounding the Sanatoga Memorial Park is open space as well. Hartenstine Creek travels through agricultural lands and some low intensity residential before it meets the Sanatoga Creek in Lower Pottsgrove Township.

There is great potential for a greenway and trail connection project surrounding the Sanatoga Creek and the Schuylkill River. The Montgomery County Lands Trust has recognized this potential and is working with the townships on creating this 'green network'.

ISSUES, CONCERNS, AND OPPORTUNITIES

Residents of the Manatawny Creek, Sprogels Run, and Sanatoga Creek watersheds feel strongly about issues concerning resource protection and quality of life. A long list of issues and concerns was voiced at public meetings in Berks and Montgomery Counties, in personal visits to landowners, in questionnaires mailed to owners of large parcels along the Manatawny Creek, and in discussions with local citizens who visited a display on the Manatawny Watershed Planning Project at the Oley Valley Community Fair 2001.

Community Concerns

Throughout the region, the overriding concern is dealing with change. The area is experiencing rapid growth, termed by many residents “uncontrolled development”, which is raising concerns about supply of groundwater, loss of farmland, inadequacy of roads to handle increased traffic, need to build new schools, need to increase community services, and the consequent need to raise additional tax revenues to meet these demands. There is also concern with the ability of local municipalities to deal effectively with growth and change. The lack of communication among adjacent municipalities in the watershed is regarded by citizens as detrimental to coordinated efforts to deal with problems that cross municipal boundaries.

Water Issues

Population and housing growth has raised questions about water quality and water quantity. People have reported increased bacteria counts in private wells; lowering of the water table; springs and streams going dry; and lower levels in the Manatawny Creek during dry seasons. Flooding seems to be more frequent and more severe. Stormwater runoff is bringing pollutants into the streams, culverts are backing up the stormwater into farm fields, and the force of flooded waterways is causing bank erosion and changes in the stream channel. Floods have also washed out dams and weakened bridge abutments.

The surface water quality of the Manatawny Creek and its tributaries is important to local residents who use it for recreational fishing, swimming, canoeing, and observing wildlife. At the same time these streams accommodate the discharge of treated effluent from sewage plants, landfills, industries, and community waste disposal systems. People in Pottstown cited the dumping of untreated wastes into storm sewers. People in Oley Township questioned the application of biosolids to fertilize farm fields.

Farmers who live along the Manatawny have a special interest in the health of the stream. They depend upon it for livestock watering, irrigation, and general farm uses. They have a great stake in protecting its quality because it directly affects the health of their farm animals and crops, and ultimately, their livelihood. It is therefore important for farmers to use conservation practices that control erosion and excess nutrients that can degrade the water. On the other hand farmers do not want to be burdened with restrictive regulations. Farming is the major industry in this area, and “permitting farmers to do their jobs” is important. A commonsense approach to Best

Management Practices is recommended. Exploring ways to bolster the farm economy is in everybody's best interest.

Working with Home Builders and Developers was also identified as important in devising methods of safeguarding water quality. Housing tracts increase impervious surfaces, diminish aquifer recharge areas and increase the types and amounts of nutrients and chemicals that have a potential for getting into surface or groundwater. Tracts that abut the stream can be designed with natural buffers adjacent to the stream, rather than backyard lawns that interrupt the existing corridor habitat. This is especially true in Amity Township, where several new developments along the Manatawny are in the planning stage and along Sprogels Run and the Sanatoga Creek.

Stream bank restoration is an issue at numerous sites along the Manatawny and its tributaries, but none more important to the public than the Memorial Park stream restoration project in Pottstown. Removal of the dam at this site has resulted in a large area of un-vegetated and eroded land formerly covered by the silted-in pond, and the current challenge is to stabilize and seed this area and to introduce natural vegetation to the buffer area.

Land Issues

Sprawling development takes a toll in the conversion of farmland and forestland into housing subdivisions. This is a major concern expressed by many who responded to the project's outreach activities. Much of the land being developed in Amity Township is prime farmland. Here, at the western end of the Route 422 Pottstown By-pass, market forces have made the land attractive to developers, and unattractive to farmers looking to buy land. In Oley, on the other hand, land preservation efforts have resulted in farmers' interest in purchasing protected land, feeling that a stable farming region exists in this township. The enactment of effective agricultural zoning and the sale of Agricultural Conservation Easements by many farmers under the State-County Agricultural Preservation Program have brought about that stability.

Sustaining a viable agricultural industry for the future is the top issue for area farmers, feed businesses, and equipment dealers, who are all active in this area. Pike Township's farm supply businesses serve local farmers, and those over a wide region, as the agricultural land base diminishes in neighboring counties to the east. It is also a leading concern for residents who want to preserve the historic setting and the many rural historic properties. Farmland protection to preserve the land base is essential to the continued sustainability of farm economy.

Protection of natural areas is also a popular cause, especially in Exceptional Value watershed areas. Several local organizations have embraced this challenge, and are seeking to work with local landowners to encourage voluntary land protection actions. These organizations include the Pine Creek Valley Watershed Association, the Pike-Oley-District Coalition, and the Berks County Conservancy.

The Montgomery County Lands Trust is working in collaboration with Lower Pottsgrove and Upper Pottsgrove Townships to establish a green riparian corridor along Sprogels Run. The two townships have experienced heavy growth over the last decade. The potential greenway will

follow Sprogels Run from the Schuylkill River through the western edge of Lower Pottsgrove and then bisecting Upper Pottsgrove from the southeast to the northwest corner of the township.

Similarly, New Hanover Township and Lower Pottsgrove Township are interested in creating a trail system and green infrastructure along the Sanatoga Creek. The Montgomery County Lands Trust has been advising and working with both townships to craft a strategy to complete this greenway.

The Borough of Pottstown has been working with the Montgomery County Lands Trust over the past four years to establish and expand their green infrastructure, with an emphasis in the open space/greenway along the Schuylkill River and its connection with the borough and Memorial Park. Two key acquisitions have been completed to achieve this Pottstown Schuylkill Greenway, and this will be integrated into the Schuylkill River Greenway, which is a priority project for Montgomery County.

Maintaining and improving transportation facilities is an issue for local, county and state governments, and a concern for area citizens. Major routes are experiencing increased commuter traffic during rush hour. Routes 12, 73, and 662 are especially congested at times. Road widening is difficult because of lack of adequate right-of-way space. Probably the biggest transportation issue, locally, is the Pleasantville Covered Bridge Restoration Project. The bridge was closed after the collapse of an abutment in July 1993. Penn DOT commissioned studies, which determined the bridge achieved top Historical Ranking in the state, and that restoration could be done at far less cost and far more appropriateness than replacement. An Agreement was reached with Oley Township and Berks County for the state to do a historically faithful restoration, and subsequently transfer ownership to the county. The restoration process has been delayed repeatedly, while costs have escalated. Oley Township Supervisors and the Oley Valley Business Association keep pushing for action, which now is promised in 2002.

Other concerns expressed by landowners are trespassing, dumping trash along roads, use of ATVs on private lands, and general disregard for private property rights. Also, people are concerned about damage done by invasive species of plants, such as purple loosestrife and multiflora rose, and overpopulation of animals such as White-tailed Deer and Canada Geese, which are causing significant damage to woodland, cropland, ponds and stream banks throughout the region.

Education, Communication and Planning

There exists a general feeling in the watersheds that there are many unanswered questions about the state of the environment. What is the quality of the water supply, both in surface and groundwater? What changes are occurring in groundwater levels, and is there an adequate supply to support all the new development that is being planned? How safe are the landfills, the biosolids being put on farm fields, the air being breathed in Pottstown? Many questions arise, and they all point to a need for greater knowledge, communication, education, and planning. Asking these questions, finding answers to them, and communicating the information to the general public can help formulate actions to deal with environmental problem situations in a proactive or preventative mode.

Studies of groundwater, monitoring of water quality, and coordinating land use planning will yield better results if done regionally, as such studies deal with regional resources. Regional planning is being sponsored by the Berks County Planning Commission, and is presently under discussion by various groups of municipalities in the Manatawny Watershed. Participation in regional planning will help the region formulate and coordinate ways to deal with growth and change.

Opportunities and Goals

Identifying issues and concerns is the first step in seeking opportunities to address them. For the purpose of this Plan, these issues have led to the formulation of goals that will be addressed in the Management Options section of the Plan. The goals are:

- *Protect and Sustain Water Quality and Water Quantity*
- *Protect and Preserve Important Agricultural and Natural Lands*
- *Encourage Stewardship of Natural and Cultural Resources*
- *Encourage Coordinated Regional Planning Initiatives*

Please note: The Goals and Management Options in this plan relate to the Manatawny Creek Watershed, Sprogels Run, and Sanatoga Creek – with more emphasis placed on the Manatawny Creek Watershed due to its size and characteristics.

GOALS AND MANAGEMENT OPTIONS SUMMARY

GOALS

- ***Protect and Sustain Water Quality and Water Quantity***
- ***Protect and Preserve Important Agricultural and Natural Lands***
- ***Encourage Stewardship of Natural and Cultural Resources***
- ***Encourage Coordinated Regional Planning Initiatives***

MANAGEMENT OPTIONS

Protect and Sustain Water Quality and Water Quantity

- Establish riparian buffers
- Stream bank fencing
- Water management
- Nutrient management
- Stormwater management
- Stream bank stabilization and restoration
- Wetlands Management and Protection
- Groundwater Research and Protection
- Water Quality Monitoring
- Improve Impaired Areas
- Upgrade streams to EV and HQ Classifications

Protect and Preserve Important Agricultural and Natural Lands

- Institute effective Agricultural Preservation Zoning
- Establish Agricultural Security Areas
- Encourage participation in the County Agricultural Preservation Program
- Protect Natural Areas
- Protect Environmental Hazard Areas
- Develop program to fund stream buffer and wetlands protection

Encourage Stewardship of Natural and Cultural Resources

- Develop educational programs about resource protection
- Encourage identification and monitoring of natural resources
- Develop outreach programs for landowners and municipalities
- Encourage Forestry Stewardship Plans
- Encourage Conservation Plans
- Encourage enrollment in Conservation Reserve Program
- Encourage enrollment in Clean and Green Program
- Encourage Historic Preservation Initiatives

Encourage Regional Planning Initiatives

- Participate in Berks County Regional Planning Program
- Encourage planning on a watershed or subwatershed basis
- Watershed Conservation Management Plans

MANAGEMENT OPTIONS

Protect and Sustain Water Quality and Water Quantity

Riparian Buffers

Establishing a permanently protected riparian buffer along the Manatawny Creek, Sprogels Run and Sanatoga Creek and their tributaries is one of the best actions that can be taken to protect water quality for the future. A riparian buffer is the area of natural vegetation maintained adjacent to a stream. It is managed to protect the integrity of the stream channel and reduce the impact of upland sources of pollution by trapping, filtering and converting sediments, nutrients, and chemicals, and to supply food cover, and thermal protection to fish and other wildlife. Buffers can be either forested or herbaceous. Forested buffers, with trees and shrubs, provide added benefits in shading the stream and providing more diverse wildlife habitat.

The greatest loss of riparian buffers is occurring through the conversion of farms and open lands to suburban development. Municipal ordinances can require retention of riparian buffers in developments along stream banks. This will assure a continuous conservation corridor along the length of a watercourse that will be an important action to protect water quality and habitat from the impacts of development.

Landowners can voluntarily conserve or restore such buffers. It is also possible to develop a conservation easement program for stream buffers, either through the donation of easements or the purchase of easements. Such a program would designate the width of the buffer strip and provide maintenance guidelines. The guidelines can include recommendations for establishment of wildlife habitat and control of noxious weeds and invasive species. Much of Manatawny Creek already has a natural floodplain buffer, which could be made a more attractive and desirable area through the attention of landowners. Some suburban and rural lot owners have demonstrated these principles by maintaining their stream frontage areas as nature preserves, complete with trails, bird feeders and nesting boxes, and have enjoyed spectacular results. The Manatawny corridor is an excellent wildlife area.

Stream Bank Fencing

In farmland, riparian buffers can be established by stream bank fencing, a *best management practice* to enhance water quality. There are many farms along streams in the Manatawny watershed that utilize the land along the stream as pasture for livestock. It is common to see cows standing in the stream or crossing from one side to another, breaking down the bank and discharging wastes into the water. Where the number of cows is excessive, or feedlots are located near the waterway, degradation of water quality occurs. Where streams have been fenced and cattle crossings constructed there has been dramatic improvement in the condition of the stream. Because this program has been proven successful in farming areas, there are

incentives for farmers to participate. Cost share programs will support stream bank fencing, cattle-crossings, and water management projects.

Water Management

The installation of *best management practices* for water management is recommended in this watershed plan. These practices include barnyard watershed management systems, storm water management systems, and spring development systems. Collecting rainwater from roofs and impermeable surfaces, directing it away from barnyards, and providing watering facilities for livestock that are out of floodplain and wetlands areas can provide cleaner conditions for cattle as well as cleaner water entering the streams. Funding incentives are available.

Nutrient Management

Under Act 6 of 1999, the Nutrient Management Act, certain agricultural operations are required to have nutrient management plans that specify how livestock waste is managed. The purpose of the law is to prevent pollution from animal feeding operations. Improper nutrient management can be a significant source of ground and surface water pollution. Nutrient management plans are therefore an important tool for protecting water quality. Plans are developed through consultation with the County Conservation District. Cost share funds are available.

Stormwater Management

Inadequate management of accelerated stormwater runoff resulting from development throughout a watershed increases flood flows and velocities, contributes to erosion and sedimentation, overtaxes the carrying capacity of existing streams and storm sewers, greatly increases the cost of public facilities to convey and manage stormwater, reduces groundwater recharge, and threatens public health and safety. For these reasons, municipalities are charged with the responsibility of enacting a comprehensive program of stormwater management.

Model ordinances have been designed to assist municipalities in meeting these obligations.

Stream Bank Stabilization and Restoration

Stream banks are vulnerable to erosion as a result of human activities along streams, such as removal of trees and natural vegetation, urbanization, overgrazing of livestock, cultivation too close to the stream, and earthmoving and paving for development. These activities promote changes in stream bank structure, increased sediment in stream channels, and increases in the flow of stormwater.

Stream bank stabilization measures can reduce nonpoint source pollution caused by sediment and the contaminants that accompany soil particles into waterways, including heavy metals, phosphorus and other nutrients. They can improve aquatic habitat by reducing the level of suspended and deposited sediments in streams, which impact the ability of fish to breed and reproduce.

A number of programs exist to assist landowners in stabilizing and restoring stream banks. Trout Unlimited specializes in projects to design and implement stream improvement and bank restoration using volunteer labor. County Conservation Districts conduct a wide range of programs to improve water quality, including improvement of riparian corridors and stream bank stabilization. Among the techniques is the installation of fiberlogs at the base of the bank to provide a good medium for the planting of shrub seedlings. The fiberlogs trap sediment and build up a stable foundation for revegetation.

Wetlands Management and Protection

Wetlands are critical resources that provide important wildlife habitat and play a key role in flood prevention, surface water management, groundwater recharge, and ground and surface water quality. They provide biofiltration, or the removal of sediment and pollutants of ground and surface water.

The Manatawny and its tributaries have extensive wetlands connected to flood plains near the stream, and also in more remote areas. Wetlands are found in meadows, pastures, woodland, and open space areas. Some of these wetlands provide habitat for species of special concern, and are considered top priorities for protection.

Federal and state regulatory programs protect wetlands by requiring permits for activities in or affecting wetlands. Wetlands management tools may be included in municipal zoning, subdivision, and land development ordinances. Townships can designate natural resource based zoning overlay districts and nonprofit conservation organizations can work with property owners to protect important wetland areas with conservation easements.

Groundwater

Groundwater wells furnish nearly all the drinking water in the Manatawny watershed, except for the boroughs of Pottstown and Boyertown. It is important that this water supply be kept free from pollutants. Activities and land uses that have the potential for harming groundwater include: agriculture, storage tanks, home lawns, golf courses, chemicals used on highways, landfills, quarries, malfunctioning on-lot septic systems and improper disposal of used motor oil. While the soil acts to filter out harmful substances, an excessive amount of pollutants can overcome the soils self-cleaning capacity. Detection of pollution is difficult and clean up is expensive. Dealing with these issues demands preventative measures to protect groundwater by both government entities and citizens.

Programs that deal with protection of groundwater quality are wellhead protection measures, nutrient management and pesticide regulation. The testing of public water sources is regulated, but the testing of private wells is left up to the property owners. Past surveys in rural Berks County have indicated that a significant percentage of private wells have unacceptable levels of bacteria and nitrates, which require treatment by the homeowners. Unless regular periodic testing is done, most homeowners are not aware of this risk.

The quantity of groundwater is perhaps more of an unknown factor than the quality. There have been very few hydrological studies to determine the amount of groundwater that is available for residential, commercial and industrial uses. Yet a safe and plentiful water supply is essential for any development to take place. Some property owners consider groundwater a major concern, citing evidence of lower levels in wells and springs going dry. In many areas of the country there are strict water use controls and water rights are valuable commodities. In this area more effort to collect and interpret groundwater supply and variables is needed as part of the planning process.

A study of the Water Resource in Oley Township by the United States Geological Survey (U.S.G.S.), based on data collected in 1981-82, determined that the Manatawny Creek is directly connected to groundwater aquifers, and that pumping from wells near the stream could substantially reduce the flow of water within the stream. The study found a great variation of the yield of wells in different geological formations, and that certain areas in the northern section of the township with rocks of low permeability did not have an adequate on-lot water supply for domestic purposes. It also found pollution problems in the higher-yielding carbonate rocks in southern Oley Township. Carbonate rocks are particularly susceptible to contamination, because bacteria-laden recharge water may enter these aquifers relatively unimpeded. High-density housing with on-lot septic systems in areas underlain by the more permeable carbonate rocks has the potential for producing serious ground-water quality problems. These findings point up the need for an assessment of ground water quantity as well as quality when making land use development decisions.

Continue Water Quality Monitoring

Monitoring of water quality in the Manatawny Creek, Sprogels Run, Sanatoga Creek and their tributaries has been carried out by numerous agencies and organizations during the last several years. It is the recommendation of this Plan to continue this monitoring in a more coordinated way, so that the sharing and interpretation of results may result in a better understanding of the dynamics of water quality in the stream systems, and can point to remediation of known problems, and prevention of incipient problems. The Berks County Conservancy can assist in coordinating such an effort.

Improve Impaired Areas

Two small streams in the Manatawny Watershed were judged to be *impaired* in the Pennsylvania DEP Stream Water Quality Assessment. One is the unnamed tributary which enters the Manatawny south of Spangsville in Oley Township. This is impaired due to fluctuations in flow that causes an unstable condition for aquatic habitat. The stream is dependent to a large extent upon groundwater levels, because the source of its main branch is the inactive Lehigh Portland Cement Company quarry. If groundwater in the quarry lowers, the stream flow is interrupted. The other impaired stream is a tributary that enters the Manatawny at Memorial Park in Pottstown. Part of this stream is piped underground through the urban area. The specific causes of impairment should be determined and a means of addressing these causes formulated. Other areas of stream bank degradation, flood damage, or cases of point or non-point pollution should also be identified and addressed. In some situations, a property owner can deal with the problem. In other cases, local or state government assistance may be required.

Upgrade Streams to HQ and EV Classifications

Results of the DEP Stream Quality Assessment revealed that many of the Manatawny tributaries support sensitive aquatic life, and compare favorably with other subwatersheds that have achieved Exceptional *Value* and *High Quality* rank. If this is true, it is worth the effort to conduct further studies and analysis of the opportunities for stream upgrades. Gaining Special Protection status for all streams that qualify will go a long way toward sustaining water quality in the Manatawny Watershed, because the quality of the headwaters streams greatly enhance both surface water and ground water resources for the future.

Protect and Preserve Agricultural and Natural Lands

Institute Effective Agricultural Preservation Zoning

The Manatawny Watershed is one of Berks County's best farming regions, and it is a goal of the County and the Watershed to sustain the existing agricultural industry by assuring that there will be enough farmland to support local agricultural services. The best way to do this, in most municipalities, is through Effective Agricultural Preservation Zoning. Effective agricultural zoning stabilizes the agricultural land base by keeping large tracts of land relatively free of non-farm development. The particular zoning technique should be based on a variety of factors, including sizes of existing farms and local land use priorities. Area-based allowance can use a specific number of acres per dwelling (usually from 20 to 50 acres), or can utilize a sliding scale that bases the number of dwelling permitted upon the size of the farm. Other types are based on a large minimum lot size, or a percentage figure for the land to be developed.

Oley Township enacted "Sliding Scale" agricultural zoning in 1992 in the southeastern portion of township, not without controversy, and this has lessened the encroachment of non-farm uses. It has also played a large part in bolstering the confidence of landowners and encouraging their subsequent initiatives to permanently protect their farms through the sale of Agricultural Conservation Easements.

It is a Berks County priority to preserve the most viable agricultural land for agricultural use, and support agriculture as a primary land use and a valued element of the County's economy. While respecting individual property rights, the overriding objective is to maintain the agricultural economy and to conserve farmland for future agricultural use. A target area for sustained agricultural use is the fertile limestone region in the Manatawny Watershed. This land extends beyond Oley Township into Pike to the north and Earl, Amity and Douglass to the south. The hilly land in Colebrookdale, Earl and Pike Townships includes well-established orchards. Also, highlands sections of District, Rockland and Ruscombmanor Townships have many scattered farms that add to the county agricultural base. All Berks County municipalities in the watershed could support effective agricultural zoning, based upon acceptance by the farming community and the citizens at large. Both the Berks County Planning Commission and the Penn State Agricultural Extension Service can assist in helping define these areas.

The County has established its Agricultural Zoning Incentive Program (AZIP), which will give local municipalities technical and financial assistance to encourage them to enact effective agricultural zoning regulations in Agricultural Preservation Areas. Berks County will pay the costs associated with either amending or revising the municipality's zoning ordinance. The Berks County Planning Commission will be the sole judge of whether a municipality has met the standard of effective agricultural zoning.

Establish Agricultural Security Areas

Most rural municipalities in the Manatawny Watershed have already established Agricultural Security Areas (ASAs). This program was established under the Agricultural Area Security Law, PA Act 43, in 1981. A landowner or group of landowners whose parcels together comprise

at least 250 acres may apply to a municipality for the designation of an ASA. The parcels must be viable agricultural land and may be comprised of non-contiguous tracts of at least 10 acres. The ASA gives a landowner protection from local ordinances that restrict farm practices, protects against nuisance ordinances, and limits land condemnation procedures. The ASA also is a requirement for application to the County-State Agricultural Preservation Program for purchase of agricultural conservation easements. It is not a permanent designation, and is reviewed every seven years.

Encourage Participation in the County Agricultural Preservation Program

The County administers the County-State Agricultural Conservation Easement Program through the Berks County Agricultural Land Preservation Board. It purchases easements on parcels of suitable farmland, giving priority to parcels located in Agricultural Preservation Areas, where farms are clustered, and where an active farming community exists. Applications from landowners are accepted and reviewed on an annual basis. Farms are scored on criteria that include soil capabilities, farm location, productivity, zoning, the presence of other protected farms in the area, etc. The Applications are ranked, and offers of easement purchase are made in rank order.

The value of an easement is determined by appraisal, and represents the difference between the value of land for “highest and best use” and its value for agricultural use. At present there is a cap of \$2,000/ acre in Berks County. If the easement value is greater than the price offered, the difference can be considered a charitable deduction for income tax purposes.

Protect Natural Resource Areas

Natural Resource Areas include environmentally sensitive areas such as prominent forest cover, slopes greater than 15 percent, ridgelines, headwaters for streams, springs, rock outcrops, scenic vistas, and PNDI sites. These areas are important to sustain ecological resources, such as native plants and animals, and also to protect scenic and aesthetic qualities of the watershed. With a few exceptions, these properties are privately owned and are not restricted from development.

A combination of municipal action and landowner initiative is recommended to protect high priority natural areas. Overlay zoning or Natural Resource Preservation zoning can restrict those land uses that would compromise the environmental or ecological value of the prescribed area. A more permanent means of land protection is through a program encouraging the landowner’s donation or sale of conservation easements that protect individual properties. Private non-profit land protection organizations such as Berks County Conservancy, Pine Creek Valley Watershed Association, Montgomery County Lands Trust, Wildlands Conservancy, Montgomery County Lands Trust, or Natural Lands Trust can work with property owners to discuss mutual goals for the long-term protection of such lands.

Protect Environmental Hazard Areas

Environmental hazard areas are lands that cannot, and should not, be developed because of their proximity to water, slope or soil conditions. Areas in this category consist of slopes greater than

25%, wetlands, floodplains, watercourses, aquifers, and those watersheds used as a public drinking supply. Although self-limiting to a large extent, these areas should be further protected from development through municipal regulations or ordinances.

New structures and on-site septic systems should be prohibited on slopes of 25% or greater. Growth should be restricted on soils or slopes that have been identified as hazardous for structures with on-lot sewage disposal systems or in areas where geology limits the availability of water from on-site wells.

National Wetlands Inventory maps and hydric soils maps identify areas that may contain wetlands. In addition to restricting any building or development in wetlands, buffer areas should be established to further protect them. In a similar fashion, floodplains should be maintained in natural vegetation with a protective buffer.

Public water supplies should be protected by their municipal owners. A good example is the Borough of Boyertown, which maintains a 520-acre hilltop watershed around its two reservoirs. This large tract of woodlands, with many springs and seeps, maintains the high quality of the water that is impounded for use by the residents of Boyertown and vicinity. Publicly owned watershed protection properties should be retained in forest cover. Forestry management principles should be structured to provide optimum protection for the water resources.

Develop Program to Fund Stream Buffer and Wetlands Protection

Establishing streamside buffers and protecting wetlands areas have been recommended to enhance water quality and natural resource values in the watersheds. Yet many landowners feel that giving up recreational and agricultural uses in such areas is a hardship, and that maintenance of the buffers is expensive and time consuming. A special funding or management program should be devised to encourage landowners to protect their streamside buffer or wetlands areas, and to identify compatible uses of these areas.

Encourage Stewardship of Natural and Cultural Resources

Develop Educational Programs about Resource Protection

Resource Protection is an important issue in the Manatawny Watershed, as the region is primarily rural, but is undergoing rapid growth and change. Citizens living in the watershed are concerned with issues affecting their quality of life and the degradation of natural and cultural resources. In conducting surveys and talking with local residents during the course of this planning project, it has become apparent that people are very concerned about protecting water quality, learning more about groundwater resources, protecting farmland and natural areas, and preserving the historic countryside. There exists a great need to increase public awareness of resource protection issues through community education about these topics, and to foster better communication among all those who have an interest or involvement.

Among those with interest and involvement are private landowners, citizens groups, nonprofit organizations, local government officials, developers, local and state agencies, schools, civic groups, sportsmen's clubs, etc. There are many organizations that can help coordinate educational forums and projects. There is much that can be done in cooperation with the public schools.

In addition to education, there is a need for action programs. When a specific natural resource problem is identified, it needs to be addressed. Coordinated citizen action can be a powerful force to address local concerns. There have been numerous case studies that illustrate a grassroots response to environmental threats and issues in this watershed. Three successful examples will be briefly cited here:

Case Study One: Oley Township Resource Conservation Project 1980-83

Oley Township was one of two communities chosen for the Rural Conservation Demonstration Project of the National Trust for Historic Preservation. Technical assistance was provided by the Trust and many existing agencies. Funding came from public and private sources. Local citizens organized themselves into five study groups to address issues concerning water resources, agricultural resources, historic resources, scenic resources, and land use. About 100 community volunteers conducted studies and action projects. Results were: 1) USGS groundwater study; 2) 5,000 acre Agricultural Security Area; 3) National Register nomination for whole township; 4) Photograph and slide inventory; 5) Set of maps and draft comprehensive plan. This grassroots-planning project formed the foundation for subsequent conservation-oriented municipal ordinances.

Case Study Two: Protection of Lobachsville Trout Hatchery 1995-2000

The Wissahickon Water Company of Philadelphia leased the 42-acre Lobachsville Trout Hatchery, applied for DEP and Delaware River Basin permits to extract water for bottling, and applied to Pike Township for a zoning change. The permits were routinely issued, but Pike and Oley Townships and local citizens vehemently objected, seeking legal recourse. A new citizens

group, Pike Oley District Preservation Coalition, was formed to raise funds and raise awareness. An existing non-profit organization, the Pine Creek Valley Watershed Association, funded scientific studies to contradict data included in the permit applications. After a series of legal hearings, costing local groups \$150,000, the PA Environmental Hearing board ruled in favor of the “Oley Objectors” and the permit was remanded because it failed to recognize the impact of a large sustained water withdrawal on the Exceptional Value stream and wetlands at the site. As a follow-up, Oley and Pike Townships, the local conservation groups, and the Berks County Conservancy raised more money and purchased a conservation easement on the property, permanently protecting its land and water resources.

Case Study Three: Memorial Park Dam Removal, Pottstown 1998-2002

The Greater Pottstown Watershed Alliance spearheaded an effort to remove Dam #46-017 from the Manatawny Creek just below Memorial Park in Pottstown. The dam had filled with silt, forming a nutrient laden pool and a severe erosion problem where the stream formed new channels through the park. The plan for dam removal included a scientific research component, carried out by the Philadelphia Academy of Natural Sciences, to measure before and after effects on water quality and aquatic biota. After the dam was removed the effort to restore the stream channel and revegetate its banks began.

Encourage Identification and Monitoring of Natural Resources

An excellent impetus for citizen involvement in watershed stewardship is the development of projects for the identification and monitoring of natural resources. Not only can this provide valuable data and a better understanding of the status of the resources, but also it enables local citizens and/or students to become active participants in resource protection. Pennsylvania is putting great effort into establishing a Citizen’s Volunteer Monitoring Program, believing that volunteers are an essential element in statewide watershed protection and restoration. The state program groups monitoring into two broad categories: *Watershed ecosystem monitoring*, which collects data on characteristics that determine the health and functioning of the ecosystem; and *Monitoring human users and uses*, which investigates characteristics that determine whether the water supports human uses, and whether the uses themselves are supporting public health, safety and welfare. Although monitoring has occurred in the watershed, it has not been coordinated, and its results have not led to the next step – actions to correct problem areas.

Develop Outreach Programs for Landowners and Municipalities

This Plan and other watershed plans feature many recommendations concerning actions that can be taken by landowners and municipalities in protecting land, water, biological and cultural resources. Some actions are listed as priorities, and these should be the first to be pursued. To communicate these findings and recommendations to those who can do something about them, it is further recommended that an outreach program be initiated to conduct personal visits to landowners, and to make formal presentations to municipal officials. Such a program could be conducted on a subwatershed level by local citizens groups, or on a municipal level by the Berks County Conservancy. Information and maps from this Plan could be used as points of discussion, and copies could be distributed at these meetings.

Encourage Forest Stewardship Plans

Sustainable forestry practices provide both current and long-term benefits to a watershed. Proper timber management encourages the preservation of open space by providing a local landowner with income from standing timber and a market-driven incentive to maintain their property as forestland. Timber management also promotes forest health, lessens the potential of wildfire, protects sites of special significance, provides a rich and diverse wildlife habitat and encourages recreational opportunities.

The Pennsylvania Forestry Stewardship Program assists property owners in managing their forestland for sustained, productive use without having negative impacts on the ecological balance of the forest community. This program helps private landowners better manage, protect and utilize their forests through assisting with the development of multi-resource forest stewardship plans. The landowner's statement of goals and objectives for his woodland forms the foundation of the management plan. It includes a description of the property based on an overall inventory of its resources. The property is then broken into smaller management units, which are inventoried and described in more detail. A map of the property is drawn to illustrate significant features and the forest management units. Finally, there is a list of activities or projects to meet the stated objectives. The Pennsylvania Bureau of Forestry sponsors a cost share program to pay major costs of plan preparation by a professional forester.

Encourage Conservation Plans

Conservation Plans are recommended for working farmland and other large tracts in the Manatawny watershed. The Natural Resource Conservation Service (NRCS) provides technical assistance to farmers and landowners in the development of Conservation Plans that analyze and map soils, topography, drainage, productive capability and recommend practices to best utilize the land for productive agriculture or to meet the landowner's objectives for their property. Conservation Plans promote good stewardship of the land and water resources that are essential for sustainable agriculture and wise land use.

Encourage Enrollment in Conservation Reserve Program

Farmers in Berks County can enroll marginal farmland in the Conservation Reserve Program (CRP) administered by the Farm Service Agency (FSA). The purpose of the program is to improve water quality and wildlife habitat by converting highly erodible land and/or riparian areas from agricultural production to conservation uses. To be eligible, land must have been cropped two of the previous five years, or be marginal pastureland. Participants must agree to establish and maintain eligible practices under a ten to fifteen year contract. CRP practices include planting of permanent grasses, hardwood trees, or wildlife habitat; establishing grassed waterways, filter strips, contour grass strips, or riparian forested buffers; and restoring wetlands. The Federal Government will pay up to 50% of the cost of installing conservation practices, and an additional annual rental payment based on the soil rental rate per acre as calculated by FSA.

Encourage Enrollment in Clean and Green Program

The Pennsylvania Farmland and Forest Land Assessment Act of 1974 (Act 319) provides for preferential assessment of tracts of farmland and forest land over ten acres. To be eligible land must meet qualifications for agricultural use, agricultural reserve, or forest use. If enrolled in the program, land will be assessed at its actual use value, rather than its market value for highest and best use. This usually results in a significant property tax reduction. Application forms are available at the County Assessment Office.

Encourage Historic Preservation Initiatives

There is great interest in historic preservation in the Manatawny watershed. Most owners of historic buildings have expended time, research, and considerable financial investment into restoration of their own unique properties. This area is truly one of the premier historic areas in the state, due in large part to the stewardship already practiced here over many generations.

In addition to interested and knowledgeable property owners, this region has excellent craftsmen, skilled restoration specialists, experts in fields such as milling technology, antiques, quilts, fractur, graveyard preservation, genealogy, historical research and the Pennsylvania German culture. There are historic preservation organizations in Oley and Amity Townships, Boyertown and Pottstown. There are historic sites open to the public such as the Bahr Mill, the Boyertown Museum of Historic Vehicles, Pottsgrove Manor, and properties of the Historic Preservation Trust of Berks County. All of these individuals and organizations seek to preserve heritage values.

Several new projects or initiatives can augment the ongoing preservation activities in this region. These include:

- National Register Nominations of individual buildings or historic districts, including districts that have already been declared eligible such as the Pikeville-Lobachsville Historic District
- Updates of historic site surveys and inventories
- Publication of books, articles and manuscripts dealing with local historic topics
- Appointment of Historic Preservation Commissions in townships and boroughs
- Development of municipal Historic Preservation Plans pursuant to Act 68 of 2000
- Development of historic resource overlay districts on municipal zoning ordinances

Encourage Regional Planning Initiatives

Participate in Berks County Regional Planning Program

Many issues local municipalities deal with are regional in nature, such as planning and zoning, sewer and water provision, agricultural preservation, and transportation. Neighboring municipalities frequently face the same problems, yet do not communicate with one another about them. To improve this situation, the Berks County Planning Commission initiated a Joint Comprehensive Planning Program in 1992. This program has been very successful, achieving participation from one-third of the municipalities in the county. Since then the County has developed a Joint Zoning program for municipalities that have prepared joint comprehensive plans. The County has also completed a sewer and water regionalization study that explores potential regional solutions to sewer and water provision and infrastructure maintenance. Municipalities in the Manatawny region could benefit from these programs.

Two or more municipalities are eligible for the regional planning program. The county will fully fund the cost of preparing the plans and ordinances. Municipalities select the planning consultants from a list approved by the County. Ordinances must conform to the Pennsylvania Municipalities Planning Code and must be consistent with the County Comprehensive Plan.

Planning on a Watershed Basis

Sustaining the water quality and quantity of the Manatawny Creek, Sprogels Run, and Sanatoga Creek watersheds is mutually beneficial for all municipalities. Actions that occur in one area of the watershed have impacts on other areas. Protecting surface and ground water resources is a goal throughout the watersheds, and requires intermunicipal communication and cooperation. One example of watershed-based planning involves stormwater management.

Watershed Planning for stormwater management is being undertaken by the Berks County Planning Commission. Under PA Act 167, the Stormwater Management Act, all counties, in consultation with its municipalities, must prepare and adopt a stormwater management plan for each of its designated watersheds. In Berks County the designated watersheds are: Tulpehocken Creek, Maiden Creek, Manatawny Creek, and Schuylkill River. Within six months following adoption and approval of the plan, each municipality is required to adopt or amend stormwater ordinances as laid out in the plan. These ordinances must regulate development within the municipality in a manner consistent with the watershed stormwater plan. Developers are required to manage the quantity, velocity, and direction of resulting stormwater runoff in a manner that adequately protects health and property from possible injury. They must implement control measures that are consistent with the provisions of the watershed plan and the Act. The Act also provides for civil remedies for those aggrieved by inadequate management of accelerated stormwater runoff.

Development in a watershed causes an increase in stormwater runoff and a reduction in groundwater recharge. A number of negative effects result from uncontrolled stormwater runoff. These include: downstream flooding, erosion and sedimentation problems, reduction in stream quality, increase in stream temperature, impairment of the aquatic food chain, and reduction in

the base flow of the stream during the dry summer months. Stormwater management entails bringing surface runoff caused by precipitation events under control. This is not simply a site-specific problem, but requires an understanding of the dynamics of the whole watershed. It involves proper planning, engineering, construction, operation and maintenance.

Watershed Conservation Management Plans

The PA Department of Conservation and Natural Resources provides funds for local governments and private non-profit conservation organizations to prepare Watershed Conservation Management Plans on a watershed basis. In 2000 the Schuylkill River Conservation Plan was published.

The Schuylkill Watershed River Conservation Plan presents a broad overview of the 1,916 square mile watershed with its primary focus on water quality, landscape sustainability and institutional assessment. It provides a summary of recommendations and issues by subwatershed. It identifies the Upper Manatawny subwatershed as one of the most-threatened watersheds for population growth in the next decade. Its recommendations for the Manatawny Creek watershed include:

- Maintain the integrity of the “Reading Horseshoe” habitat zone
- Protect first-order streams
- Proactively protect PNDI sites

This Manatawny Creek Watershed Conservation Management Plan provides a more focused overview of this 92 square mille subwatershed of the Schuylkill River. The Plan includes: descriptions and GIS maps of watershed characteristics, a listing of issues and concerns, and management options to address watershed conservation priorities. Inclusion in both Watershed Conservation Management Plans opens the way for matching implementation grants to carry out recommended projects.

The Berks County Conservancy has now completed Watershed Conservation Plans for the County’s major tributaries of the Schuylkill River: Tulpehocken Creek, Maiden Creek and Manatawny Creek. Future projects will address other Berks County watersheds: Hay Creek, Wyomissing Creek, and other Schuylkill River Tributaries. Each plan will seek to identify local concerns and issues and to recommend actions that will meet community watershed goals. All Plans demand follow up actions and efforts to be carried out by a broad spectrum of partners – state, county and local agencies, municipalities, non-profits, schools, and the general public.

Prioritized Potential Projects Related to the Management Options of the Manatawny Creek Watershed Conservation Management Plan

- Develop a prioritized list of Manatawny Creek Watershed municipalities to contact and provide education and information to encourage the development or amendment of ordinances to protect the resources of the watershed, such as buffer ordinances.
- Partner with organizations and agencies to hold public educational meetings for the residents and municipal officials in the Manatawny, Sprogels Run, and Sanatoga Watersheds.
- Encourage Ag and/or Open Space Zoning to townships throughout the watersheds.
- Develop implementation projects that can address each subwatershed as a whole.
- Work with Earl and Pike Townships to develop a township-wide purchase of conservation easements program.
- Partner with organizations such as the Pine Creek Valley Watershed Association, the Pike Oley District Preservation Coalition, the Greater Pottstown Watershed Alliance, The Nature Conservancy, and the Montgomery County Lands Trust for land preservation and educational activities.
- Upgrade headwater streams within the Manatawny Creek watershed to EV & HQ status.
- Work with Trout Unlimited on stream restoration projects in the Pine Creek watershed, such as the assessed Coult and Wallace Properties.
- Work with Amity Township to conduct groundwater studies in relation to new development.
- Encourage townships to develop projects to increase and/or improve recreational facilities in the Manatawny Creek Watershed
- Support the development of a greenway along Sanatoga Creek in New Hanover and Lower Pottsgrove Townships in Montgomery County
- Increase levels of funding sources for habitat management of PNDI sites in the watershed
- Encourage greater participation in the Berks County Student Watershed Council.
- Hold public workshops on the management of invasive species as part of the *Natural Habitat Workshop Series*.

- Work with Lehigh Portland Cement Company to encourage a continuous discharge into the stream to improve the impaired stream at Spangsville.
- Partner with DEP and the County Planning Commission on educating the municipalities about stormwater management issues.
- Reinvigorate the Oysterville Valley Conservation Easement Program
- Recommend sensitive timbering, if any, and minimal development within the Trout Run subwatershed through the use of zoning ordinances and forest stewardship plans
- Develop a Virtual Tour of the Manatawny Creek Watershed
- Conduct a feasibility study to address the development of an 'ATV Park' in the region.
- Address the two historic dams in the Manatawny Creek Watershed
- Encourage the completion of the Pleasantville Bridge restoration project
- Develop a PL566 cost share funding program for the Manatawny Creek Watershed
- Conduct a 'Biosolids' Education Project in the Manatawny, Sprogels Run, and Sanatoga Creek Watersheds
- Complete National Register Nominations for the Pikeville-Lobachsville historic district



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PROJECT AREA CHARACTERISTICS

Location and Watershed Size

The Manatawny Creek watershed is located in the southeastern part of Pennsylvania in Berks and Montgomery Counties. The Manatawny Creek rises in the hills of eastern Berks and flows approximately 17.0 miles in a generally southeasterly direction

to its confluence with the Schuylkill River at Pottstown.

The Manatawny drains approximately 91.5 square miles. It includes portions of ten townships and one borough in Berks County, and parts of two townships and one borough in Montgomery County.

Table 1. Municipalities in the Manatawny Creek Watershed, including total square mileage and percentage within the watershed.

Municipality	Total Sq. Mi	Sq. Mi in Watershed	Percent (%) in Watershed
Berks County:			
Alsace Twp	12.1	0.77	6.4%
Amity Twp	18.4	4.98	27.0%
Colebrookdale Twp	8.7	3.91	44.9%
District Twp	11.6	5.57	48.0%
Douglass Twp	13.6	9.36	68.8%
Earl Twp	13.8	13.8	100.0%
Oley Twp	24.2	17.61	72.8%
Pike Twp	14.3	12.05	84.3%
Rockland Twp	16.2	11.55	71.3%
Ruscombmanor Twp	14.8	6.17	41.7%
Boyertown Boro	0.8	0.3	37.5%
Berks Totals	148.5	86.07	58.0%
Montgomery County:			
West Pottsgrove Twp	2.4	1.27	52.9%
Upper Pottsgrove Twp	4.96	2.3	46.4%
Pottstown Boro	4.89	1.82	37.2%
Montgomery Totals	12.25	5.39	44.0%
Watershed Totals	160.75	91.46	56.9%

Topography and Physiographic Provinces

The watershed exhibits a diverse topography, being situated in three different physiographic provinces. Its headwater streams originate in the steeply wooded *Reading Prong* section of the New England Province with elevations of 400 to 1,100 feet. At the base of these hills is the limestone valley region, which features a fairly gentle profile with 300 to 400 foot contours. This *Oley Valley* area is an isolated section of the Great Valley region in the Ridge and Valley Province. The southern section of the watershed, nearer the Schuylkill River corridor, is part of the Pennsylvania Piedmont. Its land has generally rolling topography, with hills that reach a height of 500 feet ranging to lowlands at the mouth of the Manatawny Creek in the Schuylkill River floodplain at Pottstown, which is 140 feet above sea level.

Please refer to Physiographic Provinces & Sections Map.

The Manatawny Creek Watershed is mapped topographically in USGS 7.5 Minute Series Quadrangles: Fleetwood, Manatawny, Birdsboro, Boyertown and Pottstown. These maps depict headwaters originating at 700 to 1,000 feet in elevation, and entering the Manatawny at 340 feet or less. The main stem of the Manatawny, whose course meanders through the Oley Valley and Lower Manatawny Valley, changes in elevation from 340 feet at the confluence of Bieber and Pine Creeks, to 140 feet where it joins the Schuylkill River in Pottstown. The following chart shows the stream elevations lengths of the main stems of the Manatawny Creek and its major tributaries, a well as the area of the subwatersheds.

Table 2. Elevation, length, and drainage area of streams in the Manatawny Creek Watershed.

Stream	Head (feet)	Mouth (feet)	Drop (feet)	Length (miles)	Sq. Miles
Pine Creek	1000	340	660	6.3	11.19
Bieber Creek	840	340	500	8.1	9.39
Little Manatawny	800	320	480	6.4	7.2
Furnace Creek	820	340	480	6.6	4.9
Oysterville Creek	900	315	585	5.9	12.24
Furnace Run	800	300	500	2.8	2.63
Trout Run	700	280	420	2.1	2.36
Ironstone Creek	700	200	500	8.5	15.53
Upper Manatawny	340	240	100	7.3	11.79
Lower Manatawny	240	140	100	9.7	14.27
Total	-	-	-	63.7	91.5

Tributaries and Stream Classifications

There are nine named tributaries of the Manatawny Creek, all in Berks County. These are the *major tributaries* listed in the Pennsylvania State Water Plan. Each of the

named tributaries has unnamed tributaries, and the main stem of the Manatawny has unnamed tributaries entering it directly, forming a branching system of watercourses within the watershed area. The smallest streams, having no tributaries, are called

first order streams. Two first order streams join to form a second order stream. A third order stream is formed when two second order streams come together, and a fourth order stream is fed by at least two third order streams. The Manatawny is a fourth order stream, while its named tributaries are second and third order streams.

In Pennsylvania, streams or stream reaches are classified under water quality standards regulated by the Pennsylvania Department of Environmental Protection. There are five protected use designations awarded to streams that support the maintenance and propagation of fish species and suitable habitat for flora and fauna. The two highest designations, High Quality (HQ) and Exceptional Value (EV) mandate special water quality protection, as they embody outstanding ecological resources that are required to be maintained at existing quality.

The Manatawny Creek and its tributaries have achieved high rankings for water quality. *Four* streams are classified EV, the highest designation, reserved for the most pristine waters in the state. These streams are: Bieber Creek, Pine Creek, upper Oysterville Creek, and Trout Run. Lower Oysterville Creek is listed as HQ. One tributary, Ironstone Creek is classified a Trout Stocked Fishery (TSF), supporting the maintenance of stocked trout from February 15 to July 31 and the propagation of fish species and flora and fauna that are indigenous to a warm water habitat. The Manatawny's main stem, and all other major tributaries, are rated Cold Water Fisheries (CWF), which support trout and native flora and fauna in a cold-water habitat. The map on the opposite page displays classifications of streams in the Manatawny Creek Watershed.

Table 3. Stream Classifications in the Manatawny Creek Watershed.

Stream	Zone	County	Classification	Exceptions
Manatawny Creek	Main Stem	Berks	CWF	None
Unnamed Tributaries to Manatawny	Basins	Berks	CWF	None
Pine Creek	Basin	Berks	EV	None
Bieber Creek	Basin	Berks	EV	None
Little Manatawny Creek	Basin	Berks	CWF	None
Furnace Creek	Basin	Berks	CWF	None
Oysterville Creek	Source to Carl Rd	Berks	EV	None
Oysterville Creek	Carl Rd to Mouth	Berks	HQ	None
Furnace Run	Basin	Berks	CWF	None
Trout Run	Basin	Berks	EV	None
Ironstone Creek	Basin	Berks	TSF	None
Goose Run	Basin	Montgomery	CWF	None

Subwatersheds

As the watercourses in the Manatawny Watershed can be divided into tributaries, the land areas drained by the tributaries can be divided into *subwatersheds*. This plan divides the watershed into subwatersheds in

accordance with the named tributaries that directly enter the main stem of the Manatawny. Please refer to the Manatawny Subwatersheds Map that illustrates the division of nine subwatersheds of the Manatawny.

Table 4. Locations of the Subwatersheds in the Manatawny Creek Watershed.

Subwatershed	Location (township)
Pine Creek	District, Rockland, Pike, Oley
Bieber Creek	Rockland, Ruscombmanor, Pike, Oley
Little Manatawny & Furnace	Alsace, Ruscombmanor, Rockland, Oley
Oysterville Creek	District, Pike, Earl, Oley
Furnace Run	Earl, Oley
Trout Run	Earl
Upper Manatawny	Oley, Earl, Amity
Lower Manatawny	Amity, Douglass, West Pottsgrove, Upper Pottsgrove, Pottstown
Ironstone Creek	Pike, Earl, Colebrookdale, Douglass

Each subwatershed has its own characteristics. In the State Water Plan, the Upper Manatawny and the Lower Manatawny are listed as distinct subwatersheds. The Upper Manatawny includes the tributaries that enter it in the following order: Pine and Bieber Creek, Little Manatawny, Oysterville Creek, Furnace Run, and Trout Run. All of these tributaries originate in high elevations of the Reading Prong and flow through forested habitat before descending to the valley floor. As such, they bring high quality water to the Manatawny. All of these tributaries have important ecological sites listed in the Berks County Natural Areas Inventory, and the Pennsylvania Natural Diversity Inventory. This means that species of plants and animals that are considered rare, threatened or endangered are located in the watersheds. The streams in these watershed support trout

and in some of them are considered Class A coldwater tributaries.



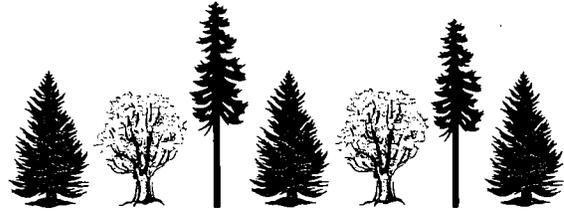
The Lower Manatawny has one major tributary, the Ironstone Creek, which originates in the hills of Pike, Earl, and Colebrookdale Townships, in the Reading Prong Formation. The Boyertown Reservoir impoundment is one source of the Ironstone Creek. The Lower Manatawny has several large meanders in Amity Township, an area that also supports some rare plant communities. In Montgomery County, the Lower Manatawny flows through suburban and urban environments, although there are several parks along its banks, the largest being Memorial Park in Pottstown.

Corridor

The stream corridor includes the stream and adjacent land running along the stream. Stream characteristics and water quality are greatly dependent upon the natural features of this land, as well as the modifications that have occurred over time. The land closest to the Manatawny Creek and its tributaries that is subject to periodical flooding during storms is the floodplain area. This land is usually flat and contains alluvial soils that may be wet a portion of the year. It often supports wetland vegetation that can serve as excellent areas for wildlife habitat. Floodplain areas vary with the topography and the size of the stream, increasing with stream order and drainage area. The Manatawny Creek floodplain varies in width from 50 to 200 feet or more. Much of the floodplain is wooded or features hydric soils with natural wetlands vegetation. The floodplain serves as a natural buffer area along the creek. This greatly aids in protecting the stream banks and absorbing the impacts of runoff and nutrient loading.

Much of the land along the Manatawny Creek is farmland. In many farming areas, the creek corridor area is used for pasture, meadowland, or cropland. The impact upon water quality varies with the intensity of the use. Intensive livestock grazing or animal feedlots can overburden the stream with nutrients, while intensive cultivation can increase erosion and sedimentation. Other areas along the creek are being developed as residential housing tracts. Here again, there can be serious water-related problems associated with earth moving activities and increased impervious surfaces can cause runoff carrying sediments, nutrients, and chemicals that degrade water quality. In areas where natural buffering cannot handle these impacts, non point source pollution is the result. To sustain water quality in

streams in these areas, best management practices are designed to alleviate those conditions that pollute the stream.



Many of the Manatawny Creek's headwater tributaries flow through forested habitat, which enhances the water quality of the stream system as a whole. The first and second order streams make up a major percentage of the total stream length and total corridor area in the watershed. The fact that these streams are primarily in wooded, hilly, sparsely developed regions points up the importance of protecting these source areas of clean water.

The Manatawny Hydric Soil, Floodplain, and Wetlands Areas Map shows the floodplain and hydric soil areas that should be protected for their environmental value in filtering and purifying water, and their ecological value in providing habitat for a rich variety of plants and animals that cannot exist in drier areas.



Ironstone Bridge, Douglass Township

Social / Economic Profile

The Manatawny Creek watershed is a region of contrasts. In Berks County, it is a predominantly rural area with extensive expanses of contiguous woodland and open farmland that is experiencing ever-increasing growth pressure. Its traditional development patterns of farms and villages had its roots in the 18th century, and although these features persist in some communities, economic and societal changes since 1950 have resulted in the increasing rural development pattern of suburban sprawl. This pattern features the subdivision of farms and other large properties into housing tracts with internal systems of roads, on-lot wells and septic systems. Rural zoning ordinances in most municipalities encourage this type of development. In Montgomery County, on the other hand, the region is primarily urban and suburban, extending from downtown Pottstown through its suburban neighbors, West Pottsgrove and Upper Pottsgrove Townships.

Historically, this was an area of early settlement dating from the first decades of the 18th century. Immigrants represented a melting pot of European nationalities: English, German, French, Swiss, Dutch and Swedish. The excellent farming soils and temperate climate furnished a special enticement to farmers from the German Palatinate region driven from their homes by religious persecution. Farming in the Manatawny Valley became the principal industry and way of life for succeeding generations. The colonial Iron Industry also had its start in this region, with the establishment of the first iron forge in Pennsylvania in 1715 and the first iron furnace in 1720, both along the Manatawny Creek. Here again, the right combination of

natural resources, waterpower and knowledge and skill of the early industrialists brought success and growth to this important industry. By the end of the 18th century, Berks County led the state in the number of iron works, and lines of commerce were opened to Philadelphia for the export of both iron and wheat.

Please refer to the Manatawny Land Use Map following Page 20. The predominance of the green color depicts the large tracts of woodland in the hills of the Reading Prong, featuring mixed deciduous woods, much as it was two centuries ago, the existing forestland has been cut over for farming, charcoal making, and lumbering at various times. The other major land use component is farmland, hay and pasture in yellow, and row crops in tan. Much of the farmland is concentrated in Oley Township, although Pike, Rockland, Amity, Douglass, and Colebrookdale have smaller farm areas. The most concentrated residential areas are Pottstown, Boyertown, and Oley Village environs. The two landfills, Rolling Hills, in Earl Township, and the Pottstown Landfill show as large spots on the map.



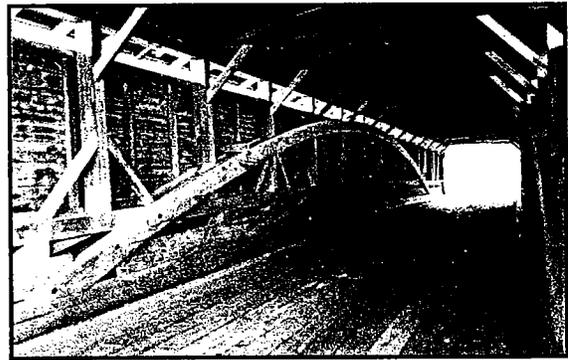
Agriculture has continued to be a mainstay of the economy of this region for over 250 years. The Oley Valley is one of Berks County's most productive farming areas and has helped agribusiness hold its position as the number one industry in the county and the state. All three segments of the agribusiness system; farming, farm supply and

processing-marketing, are well established in Berks County. However, modern development patterns and pressures are making it increasingly difficult for family farms to survive. Farming is capital and labor intensive and is subject to fluctuating and competitive markets. Farms in rapidly developing areas, such as Amity Township, are increasingly being sold for housing subdivisions. On the other hand, farmers in Oley Township have protected over 6,000 acres through the sale of development rights. The continued viability of farming is a major issue in this region.

Manufacturing is an important economic activity in eastern Berks and western Montgomery Counties. In the Manatawny Creek Watershed the major centers of industry and commerce are Pottstown and Boyertown. Both are older boroughs built on an industrial heritage. Although manufacturing is undergoing transitions from heavy industry to modern technologies, these areas continue to attract many business enterprises. The more rural sections of the watershed have scattered manufacturing sites ranging from steel fabrication, to furniture making, to quarries producing construction materials.

The major highways through the center of the watershed are Route 662, Route 562 and Route 73. These are two-lane arterial roads with intersections at Boyertown, Yellow House and Oley. They are heavily used by commuter traffic going to Reading, Boyertown, or to Route 422 which is a regional limited access highway connecting to King of Prussia and the Schuylkill Expressway. Traffic counts at Yellow House and Oley showed that Route 73 is the most heavily traveled road with a count of 12, 591 vehicles a day at the Friedensburg Road intersection. At Yellow House, Route 562 had a daily count of 5,908, and Route

662 totaled 4,722 vehicles/day. Local roads form a transportation network throughout the region, connecting villages and rural properties. The most heavily used are the collector roads, which carry traffic from local areas to the arterials. These roads are identified on the following map. They are Douglass Drive, Old Airport Road, Manatawny Road, and Powder Mill Valley Road. There are two covered bridges across the Manatawny in Oley Township. One of these, the Pleasantville Covered Bridge, is closed pending repair and historic restoration. The following map shows the road network and bridges.



Pleasantville Covered Bridge

Two major highways, Business Route 422 (E-W) and Route 100 (N-S) intersect near the mouth of the Manatawny in Pottstown. Business 422 forms High Street, the main commercial center through downtown Pottstown, running roughly parallel to the Schuylkill River in this vicinity. A Norfolk Southern railroad line serves Pottstown and also follows the course of the Schuylkill River. Route 100 runs north to Boyertown along the southeastern edge of the watershed.



Looking East on High Street in Pottstown.

Population

Centers of population are found in the boroughs of Pottstown and Boyertown, their suburbs, rural villages and rural housing developments. Whereas the older urban areas are already “built out”, and offer little space for population growth, the rural farmland and open space areas have seen significant growth in the past several decades. Comparison of population statistics between the 1990 and 2000 Census counts illustrates where this growth is occurring. Census figures also reveal the population density per square mile, and the number of housing units built or approved in each municipality.

Population growth during the past decade varies greatly by municipality. The percentage of change ranges from negative population growth in Douglass and Colebrookdale Townships to 37% – 40% growth in Amity and Rockland Townships. Pike, District, Ruscombmanor, and Upper Pottsgrove Townships grew in the 20% – 25% range. The growth is due to the increasing number of residential subdivisions within commuting distance of Reading Allentown, and King of Prussia and other employment centers, both inside and outside of Berks County. Housing is more affordable than in the counties to the east,

hence, the eastern section of Berks County has become a target area for developers of affordable housing tracts.

An analysis of population trends was undertaken for the Schuylkill Watershed River Conservation Plan. A linear regression was performed on the 1990 population of each municipality to project the population for 2010. Population density, the number of people per unit area, was coordinated with the GIS mapping of watershed boundaries to calculate the number of people per subwatershed. Based upon projections, the Upper Manatawny Subwatershed was in the top category for continued population growth, achieving a projection of greater than 30% growth between 1990 and 2010. As such, it was identified as a *most threatened* region for continued population growth. The other two subwatersheds in the *most threatened* category were Pickering Creek in Chester County, and Swamp Creek in Berks and Montgomery Counties. The Lower Manatawny was considered a *low threat subwatershed*, projected at a growth of 10% or less. The fact that much of the watershed is already heavily populated, and the relative lack of large tracts of developable open space may account for this finding.



Comparison of Berks County census data for the number of Housing Units in 1990 and 2000, along with Subdivision Plans for 1999 and 2000 indicate that the growth trend is continuing in this region, with Amity and Ruscombmanor Townships leading the way. Please refer to the following tables for this census data.

Table 5. Population Density of Municipalities in the Manatawny Creek Watershed

MUNICIPALITY	2000 Census	2000 Population	2000 Change of Census	2000 Change of Census	Land Area (Sq. Mile)	Population Density/Sq. Mi.
Berks County						
Amity Township	6,434	8,867	37.81	2,433	18.40	481.90
Boyertown Borough	3,759	3,940	4.82	181	0.80	4,925.00
Colebrookdale Township	5,469	5,270	-3.64	-199	8.70	605.70
District Township	1,211	1,449	19.65	238	11.60	124.90
Douglass Township	3,570	3,327	-6.81	-243	13.60	244.60
Earl Township	3,016	3,050	1.13	34	13.80	221.00
Oley Township	3,362	3,583	6.57	221	24.20	148.10
Pike Township	1,359	1,677	23.40	318	14.30	117.30
Rockland Township	2,675	3,765	40.75	1,090	16.20	232.40
Ruscombmanor Township	3,129	3,776	20.68	647	14.80	255.10
Montgomery County						
Pottstown Borough	21,811	21,839	0.13	28.0	-	-
West Pottsgrove	3,829	3,815	-0.36	-14.0	-	-
Upper Pottsgrove	3,315	4,102	23.74	787.0	-	-

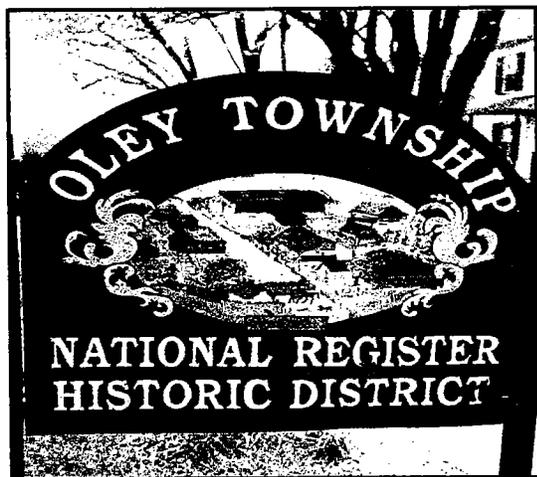
Table 6. Housing Units and Subdivision Plans for Municipalities in the Manatawny Creek Watershed.

MUNICIPALITY	HOUSING			SUBDIVISIONS					
	Housing	Housing	%	Plans	Housing	Acres	Plans	Units	Acres
	Units 1990	Units 2000	Change	1999	Units 99	1999	2000	2000	2000
Berks County									
Amity Township	2,422	3,323	37.2	13	129	101	10	81	62.83
Boyertown Borough	1,713	1,885	10.0	0	2	0.33	1	2	0.23
Colebrookdale Twp	1,943	2,030	4.5	3	1	45.1	4	28	20.24
District Township	461	548	18.9	3	4	132.69	1	0	0
Douglass Township	1,228	1,239	0.9	2	1	15.47	2	0	1.92
Earl Township	1,108	1,202	8.5	2	4	9.15	4	2	12.48
Oley Township	1,281	1,425	11.2	2	4	9.15	2	0	40.88
Pike Township	516	627	21.5	5	2	2.47	4	2	45.28
Rockland Township	989	1,368	38.3	3	1	31.33	3	4	5.06
Ruscombmanor Twp	1,163	1,421	22.2	12	20	92.36	8	57	66.45
Montgomery County									
Pottstown Borough	9,700	9,973	-	-	-	-	-	-	-
West Pottsgrove	1,500	-	-	-	-	-	-	-	-
Upper Pottsgrove	1,196	-	-	-	-	-	-	-	-

Outstanding and Unique Features

The Manatawny Creek Watershed has an outstanding natural and cultural heritage, which has resulted in a unique rural landscape in Berks County, and a unique urban landscape in Pottstown.

The topography of the Manatawny region with the steep wooded hills of the Reading Prong embracing and sheltering the Oley Valley serves to set this area apart and give it a special identity. The Oley Valley is nationally recognized as a premier historic area, featuring Oley Township as the largest municipality in the state listed in its entirety on the National Register of Historic Places. The township achieved this designation because of the integrity and significance of its historic buildings, its well-preserved farmsteads, and its expansive agricultural landscape. Although field patterns have changed, the historic roads, lanes, limekilns, locust groves, family burial plots, churches, villages and over 160 farmsteads with houses, barns and outbuildings constitute a unique record of 250 years of rural life in this predominantly Pennsylvania German region.



This has consequently furnished a source area for historic research, genealogy, photography and heritage tourism. Although National Register listing does not

protect a historic region, the people who live there do. The efforts of private landowners to preserve their historic buildings, and more importantly, the initiative of farmers to permanently protect their land have accomplished a remarkable preservation feat – protection of some 6,000 acres of farmland, and hundreds of historic buildings. This, in itself, is unique.



Farmland in the Oley Valley

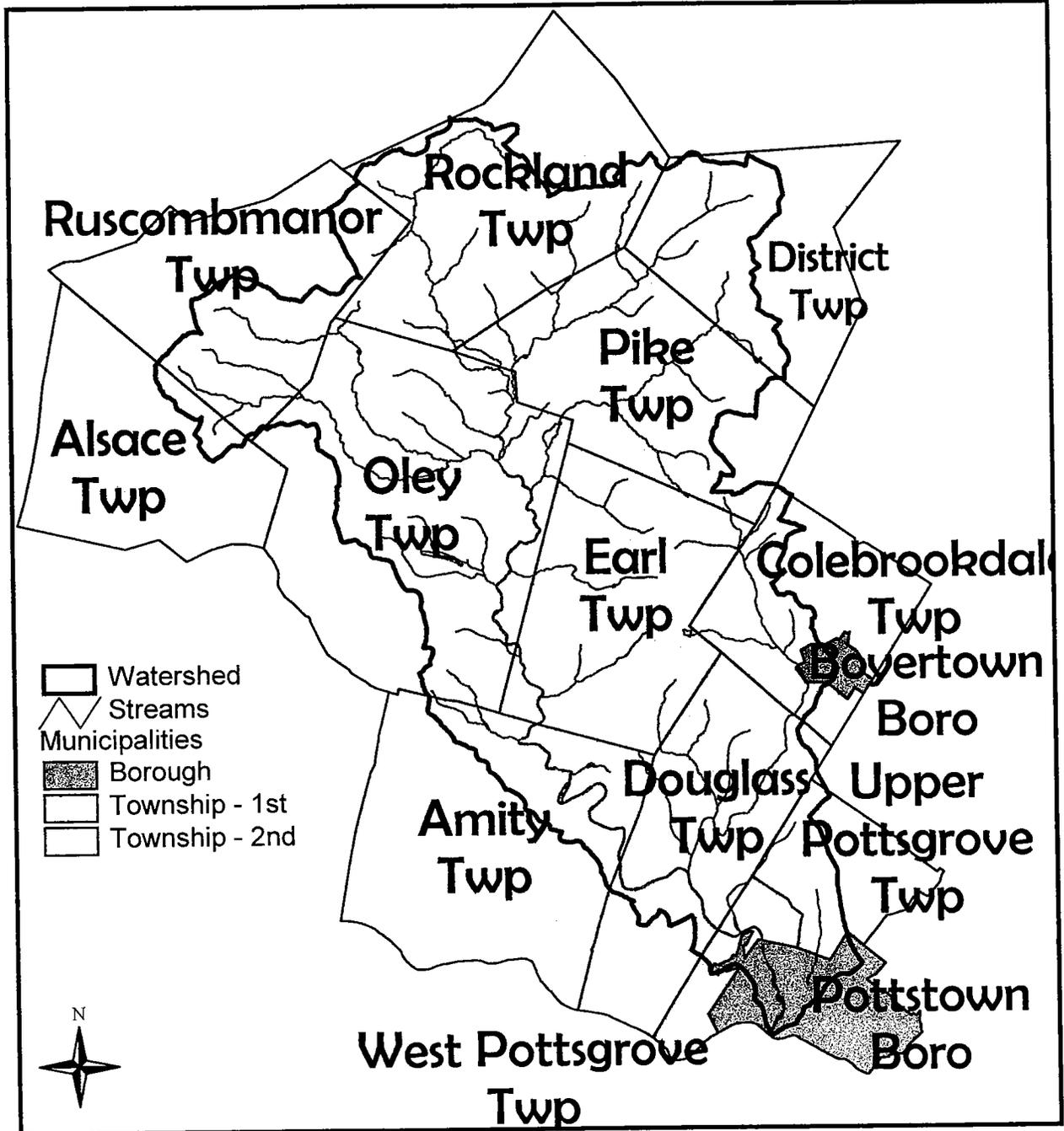
The natural character of the Manatawny's forested uplands complements the historical character of the adjacent farming region. The woodlands, wetlands, streams, and wildlife habitats make this a place of distinctive natural resource values. The prevalence of large uninterrupted expanses of wooded hills and green space supports the continued propagation of native species and biodiversity. The area provides habitats for populations of extremely sensitive flora and fauna, listed in the Pennsylvania Natural Diversity Inventory. The entire Pine Creek Watershed is identified as a sensitive Natural Community, which supports several sub-sites for a PA-endangered animal species, as well as a good quality population of a plant species of special concern. This region is ranked as a top priority for protection in the Berks County Natural Areas Inventory (CNAI). The watershed of the Little Manatawny - Furnace Creek is

also listed as a priority in the CNAI due to the presence of both a special plant and special animal species. The region contains four Exceptional Value (EV) Streams, as well as EV Wetlands, identified as outstanding national, state or local resources of substantial ecological significance. The water resources throughout the region are outstanding, and it is possible that additional streams could achieve EV ranking.

Pottstown is a historic borough that has experienced the common cycles of boom and bust, having suffered the loss of much of its industrial base and downtown commercial vitality due to changes in economic geography with suburbanization of industrial parks and shopping centers. But Pottstown has regrouped and is defining a new role that builds upon its historic background and the natural attributes of its location along the Schuylkill River and the Manatawny Creek. In cooperation with Montgomery County it is revitalizing its

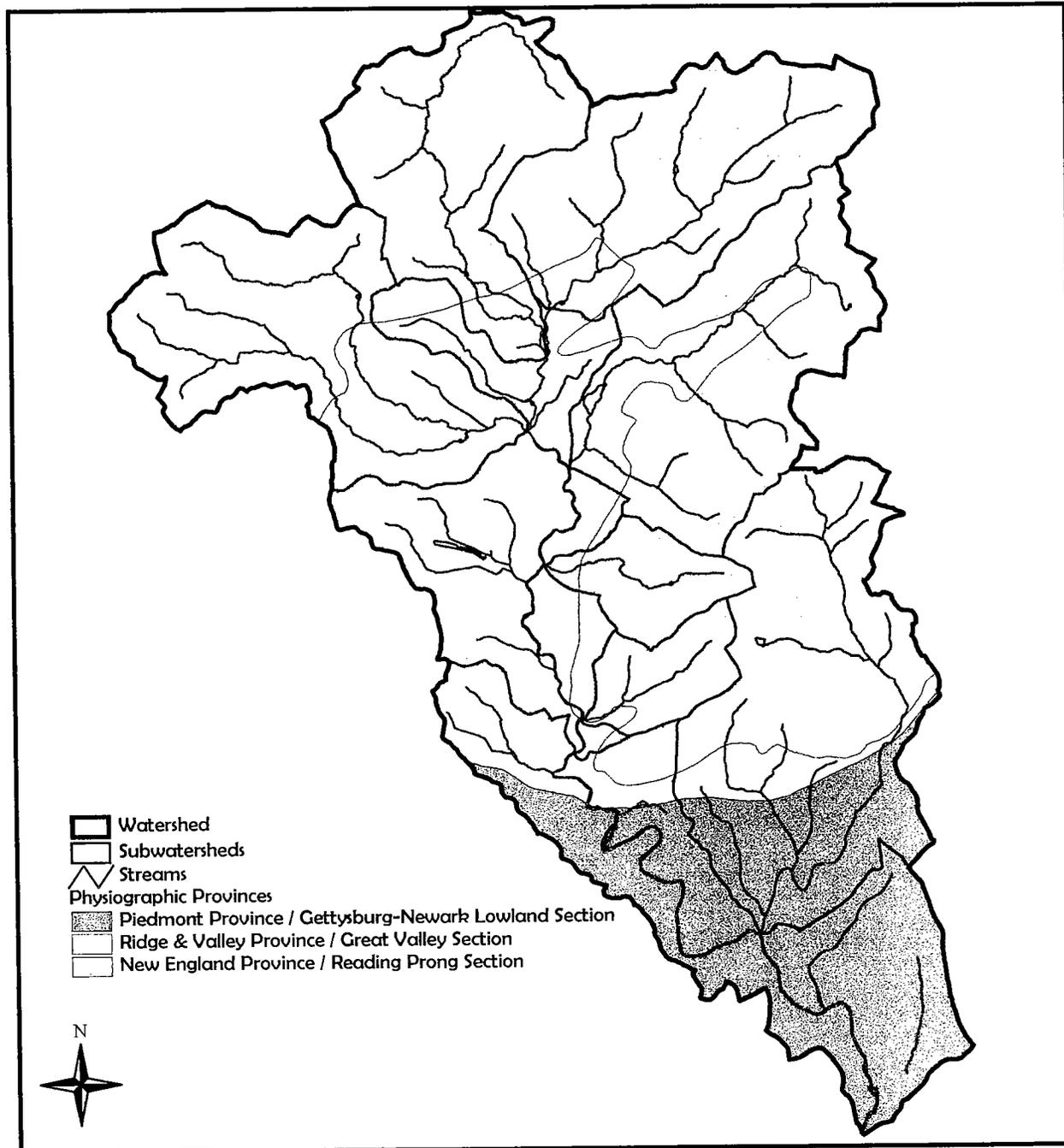
riverfront, building a linear park with bike trails, recreation areas and natural areas. This will connect with a park at the confluence of the Schuylkill River and Manatawny Creek. Nearby is Memorial Park, where an old dam has been removed and the stream banks are being restored to form a more natural and healthier waterway. This is near the historic site, Pottsgrove Manor, built by Ironmaster John Potts in 1752. This property has undergone major restoration, under the ownership of Montgomery County, and it is one of the premier historic sites representative of the Colonial Iron Industry along the Manatawny. Many historic buildings in downtown Pottstown have been restored through the efforts of Historic Pottstown and interested property owners. Plans are underway for restoration of the Pottstown Railroad Station as a potential stop on the proposed Schuylkill Valley Metro, which will provide passenger rail service to Philadelphia.

Manatawny Municipalities



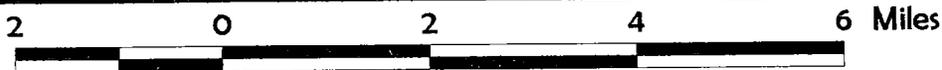
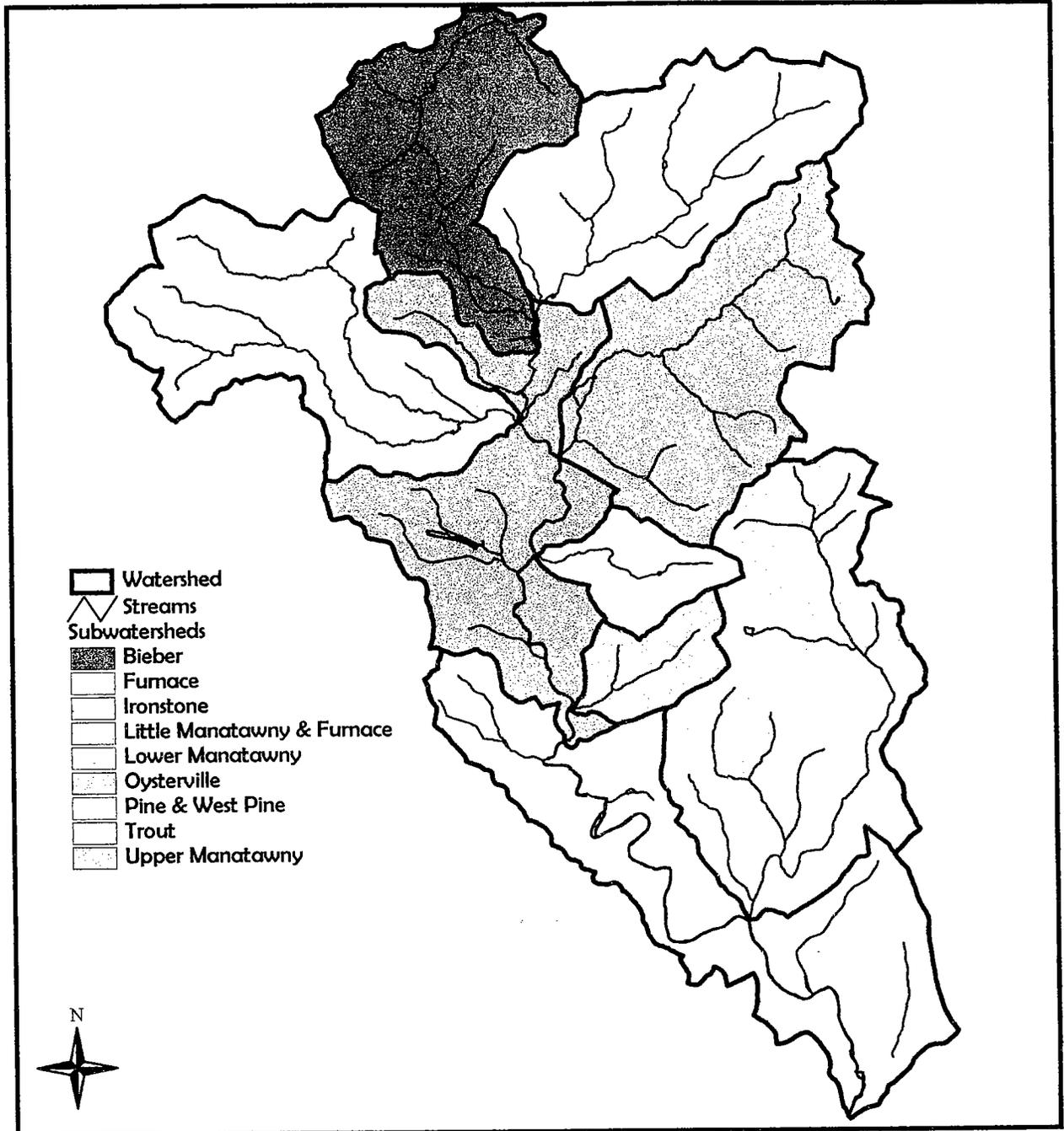
Berks County Conservancy
25 N. 11th Street
Reading, PA 19601
610-372-4992
info@berks-conservancy.org

Physiographic Provinces & Sections



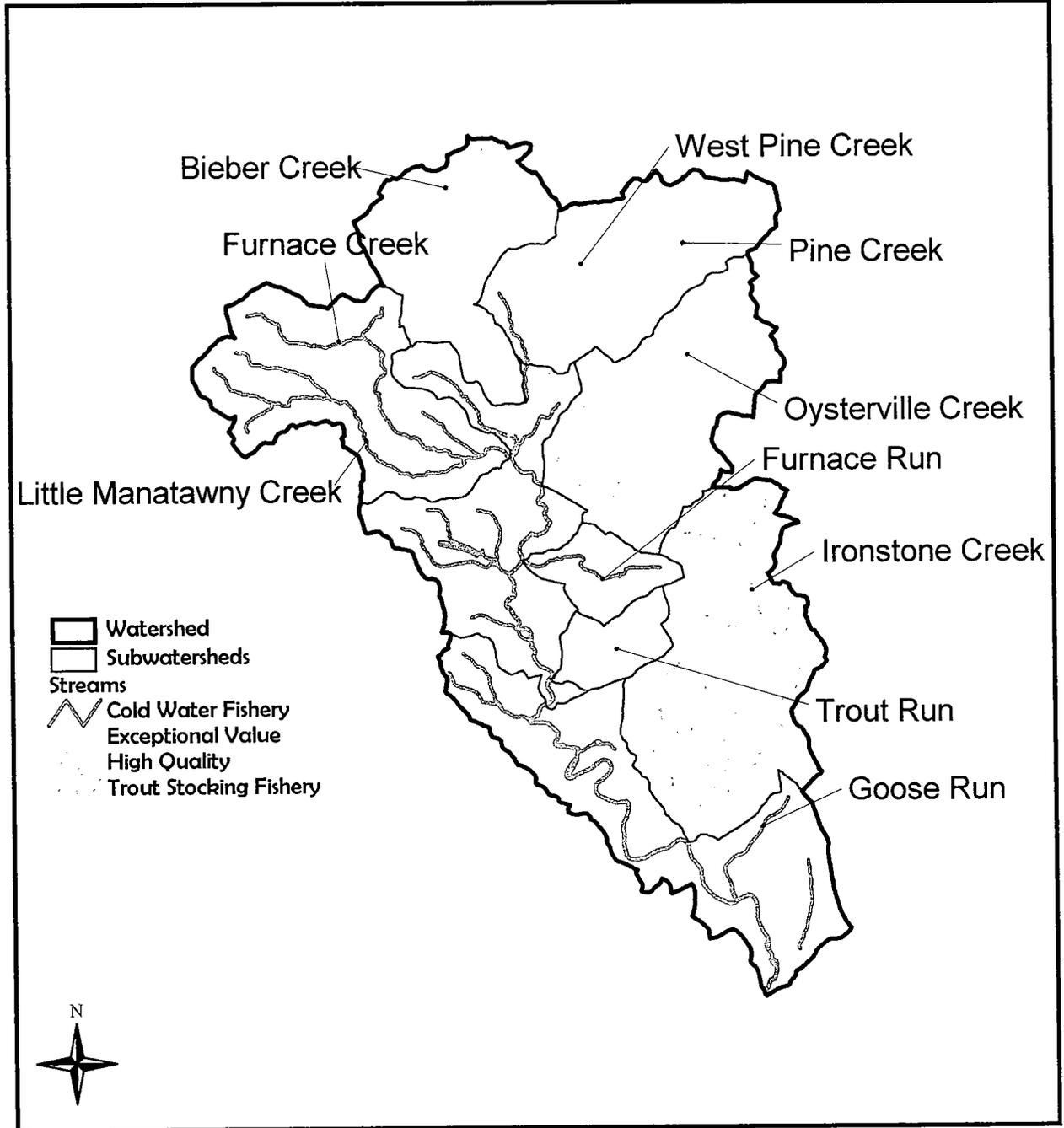
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Manatawny Subwatersheds



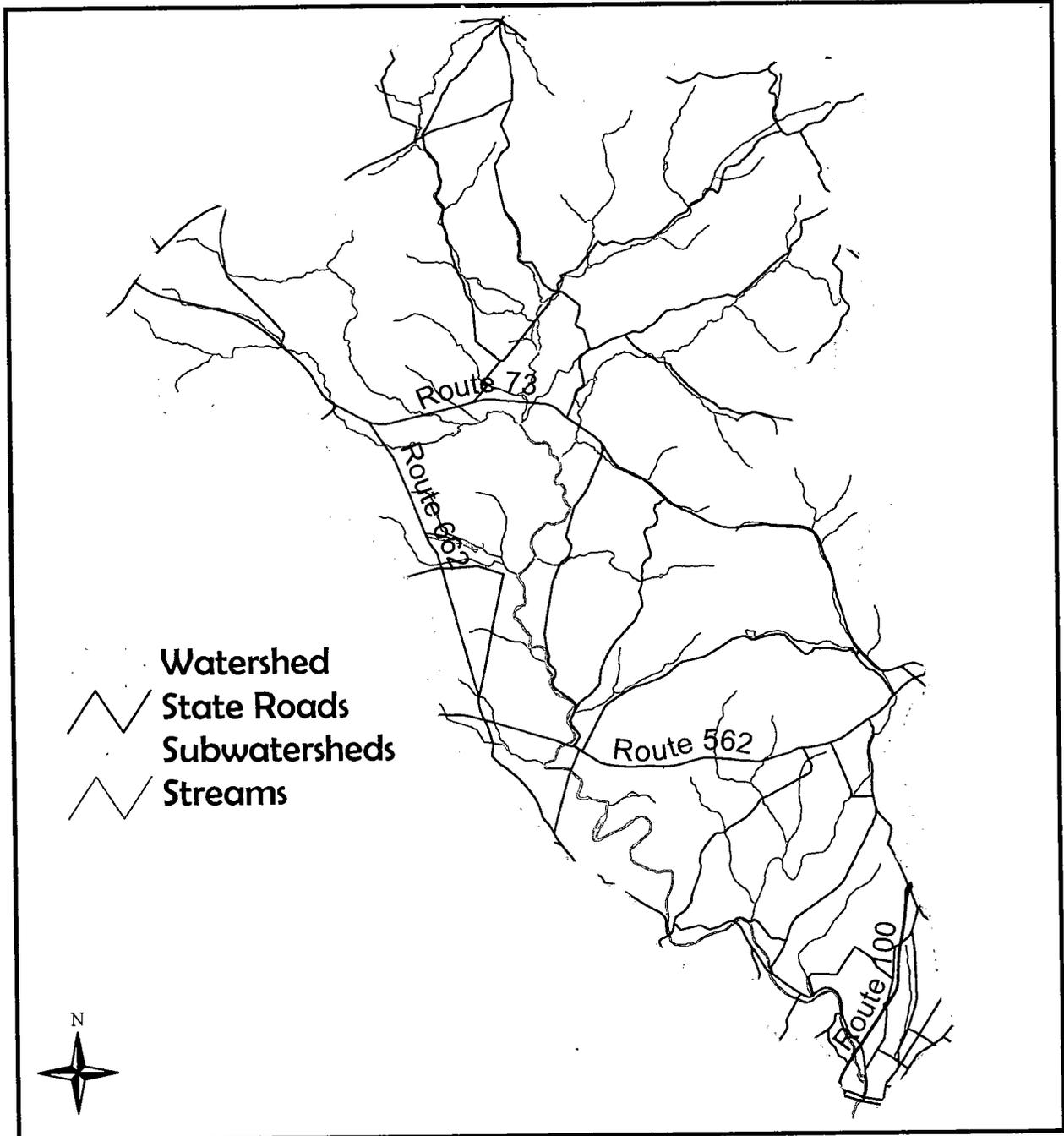
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info@berks-conservancy.org

Manatawny Protected Uses



Berks County Conservancy
25 N. 11th Street
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Manatawny Transportation



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November 2001

LAND RESOURCES

Geology and Landform

Geology and landform vary greatly between the headwaters and the mouth of the Manatawny, representing three different physiographic regions. The northern boundary of the watershed follows ridges of the Reading Prong, a prominent topographic feature that stands out in clear relief as a green-forested area on the land cover map. This geologic province begins in New England (which gives it its name), and continues in a southwesterly course through New York, New Jersey and Pennsylvania to its Berks County terminus, the Reading Prong. At the head of the Manatawny watershed, the formation divides into a large, semi-circular, two-tined "prong," which embraces the Oley Valley, and separates it from the larger East Penn Valley of the Great Valley formation. The hills and ridges of the Reading Prong, made up of granitic gneiss, granodiorite, and quartzite, are very resistant to erosion and stand higher than the softer sedimentary rocks that surround them. The slopes of these hills are steep, primarily wooded, and sparsely populated due to the inherent development limitations of steep rocky terrain. Most of the Manatawny's headwater streams arise in these uplands where they flow clear and swift, tumbling over rocky beds, shaded by native deciduous forests. They furnish high quality source water to the main branch of the Manatawny Creek.

At the foot of the Reading Prong lies the Oley Valley, a limestone based, gently sloped region of prime agricultural land. An isolated section of the Great Valley formation, the Oley limestones cover the eastern two-thirds of Oley Township, with

connecting smaller valleys in southern Pike Township, and northern Amity - Earl Township areas near the base of the eastern "prong." Here the main stem of the upper Manatawny and its valley tributaries become pastoral streams, flowing through a lush farming area, within a broad landscape pattern of cultivated fields, fencerows, scattered farmsteads and villages. There are also several limestone quarries in this region.

The landforms of the southern portion watershed consist of low hills and valleys developed on red sedimentary rocks in the Gettysburg-Newark formation of the Piedmont Province. The topography is more varied here, with narrower valleys than the Oley Valley and lower hills than the Reading Prong. The Manatawny Creek follows large meanders as it moves from the limestone region into the sandstone conglomerates and red shales. The landscape consists of open farmland, hilly woodland, and encroaching suburban development in Berks County, and progressive suburban development approaching the Borough of Pottstown.

Soil Characteristics

The underlying geology furnishes the basis for the watershed's soil associations and soil characteristics in each physiographic region. The Reading Prong features rolling and hilly soils formed in material weathered from granitic gneiss and other igneous or metamorphosed rocks. They belong to the Chester-Glenville-Brandywine association, and are deep to moderately deep and well-drained. In many places they have large stones and boulders on the surface. Soils in

the Chester series are prevalent in Alsace, Ruscombmanor, Rockland, District, Pike, Earl, and Colebrookdale Townships. These soils are suitable for agriculture at 0 to 8% slopes, being easily tilled with slow to moderate runoff and high moisture capacity. At higher slopes, erosion is a problem. Mountainsides at slopes of 25 to 55 % typically have many stones and boulders, and rapid surface runoff. This topography is too steep and stony for pasture or for residential use, and is best retained in forest where it is suitable for recreation, wildlife habitat and protection of the watershed.

The Oley Valley's principal soil type is the Duffield-Washington association, found in eastern Oley Township and extending into southern Earl and northern Amity townships. This association consists of deep, well-drained soils formed from limestone. Natural fertility and available moisture capacity are high and the soil is mellow and easily worked. This is excellent farmland, and most of this area is farmed intensively. The main limitations of these soils are sinkholes. Southern Oley Township also includes a band of the Ryder-Fogelsville association of deep well-drained soils formed in material weathered from shaly limestone or cement rock. This is the area in which limestone quarries have been developed as surface mines for high-calcium limestone to be used for cement manufacture.

Soils of the southern Manatawny watershed in Amity, Douglass, West Pottsgrove and Upper Pottsgrove townships are weathered from red shale and sandstone, and are primarily associated with the Penn-Reaville soils group. Penn soils are gently sloping to moderately steep, easily tilled, low in natural fertility, moderate in available moisture capacity. They are generally used for crops and pasture. On steep slopes, they are

susceptible to erosion. Reaville soils are moderately deep and are found on land nearly level to gently sloping. These soils can be farmed, with limitations of a seasonal high water table. The predominant soil in northern Amity Township is known as the Athol association, consisting of deep, well-drained, reddish soils that are undulating or rolling and formed in material weathered from calcareous conglomerate. They are deep in most places, but rock outcrops are common. In areas where the Manatawny Creek cuts through this formation, rocky ledges and cliffs are present along the banks of the stream. Runoff varies with slope, available moisture capacity is generally high, and the soils are easily tilled. This is Amity Township's principal farmland soil. The wooded ridges in Douglass Township derive from another type of soil association, the Neshaminy Series. These soils were weathered from diabase rocks, have a reddish brown color, and contain many fragments of stones. In this region, they are found on ironstone ridges, both along the Ironstone Creek and Manatawny Creek near Pine Forge. Because this hilly land is mainly in trees, little erosion has taken place. If the trees are cleared, the hazard of erosion is high, depending upon slope.

Floodplains along the Manatawny and its tributaries are composed of poorly drained nearly level soils of the Atkins and Melvin series. These soils have been formed in alluvial sediment derived from acid and calcareous rocks. Surface runoff is slow and the water table is high. Flooding is a hazard during periods of heavy rain. Other soils with limitations due to high water table and poor drainage are Baile and Burgin soils. Baile is commonly associated with Chester soils, found in the valleys of the Reading Prong. Burgin soils are found in limestone areas such as the Oley Valley. These soils have a high clay content and slow

permeability, making them unsuitable for farm crops. These soils are commonly used for pasture, woodland, or wildlife habitat. A floodplain is best left as a natural area of open space. Constructing any type of structure on a floodplain is not recommended, as it is subject to periodic

flood damage and interrupts the normal processes of the stream. Floodplains can be used for some agricultural purposes, passive recreation, wildlife habitat, and as a natural stream buffer. Please refer to the Manatawny Soil Units Map.

Table 7. Principal Soils and Land Use by Township

Township	Principal Soils	Principle Use	Residential Use	Limitations
District	Chester ChD	Woodland		Slope, Stones
	Chester ChB2	Farmland	Rural	
Pike	Baile	Floodplain		High water table
	Chester ChB2	Farmland	Rural	
	Chester CnD	Woodland		Slope, Stones
Rockland	Edgemont EdD	Woodland		Slope, Very Stony
	Chester CnD	Woodland		Slope, Stony
Ruscombmanor	Chester ChB	Farmland	Rural	
	Chester ChB2	Farmland	Rural	
Oley	Chester CnD	Woodland		Slope, Stones
	Duffield DfB2	Farmland	Rural	
	Berks BkB2	Farmland	Village	
	Murrill MuB2	Farmland	Rural	
Earl	Melvin Ml	Floodplain		Drainage, Flooding
	Edgemont EdD	Woodland		Slope, Stones
	Chester CnD	Woodland		Slope, Stony
Colebrookdale	Chester ChB2	Farmland	Rural	
	Chester ChC2	Orchards	Rural	
Amity	Athol AsB2	Farmland	Developments	
	Murrill MuB2	Farmland	Developments	
	Duffield DfB2	Farmland	Rural	
Douglass	Penn PeB2	Farmland	Rural	
	Neshaminy NsD	Woodland		Slope, Stony

Agricultural Capability

Soils are arranged by capability classes to show their general suitability for most types of farming. Soils in Capability Class I are the best for farming because they have the fewest limitations, the widest range for use and suffer the least damage when used.

Soils in Class VIII have the most limitations, produce lower yields, and are most subject to degradation. The U.S.D.A Natural Resource Conservation Service uses Soil Capability Class information when preparing Farm Conservation Plans for individual farmers. These plans map the soils characteristics in determining use of

different lands, appropriate farming practices, and conservation practices to be applied.

Prime Farmland soils, classified as Soil Classes I and II, are level to gently rolling, well drained, with generally high available moisture capacity and high natural fertility. These soils are capable of producing high yields with less input of fertilizer, erosion control, irrigation, and labor expenditures for the farmer.

Suitability for Community Development

Soil survey maps and soil characteristics can help in planning community development and engineering projects. The U.S.D.A. Soil Survey includes tables that show the kind and degree of limitations that affect the use of land for various purposes. Soil features that are related to community development requirements are: depth to bedrock, degree of slope, permeability, incidence of flooding, depth to a seasonal high water table, texture of soils, and stoniness. Ratings of *slight*, *moderate*, and *severe* have been used to describe the degrees of limitation. A rating of *slight* indicates that the degree of limitation can be none to slight, but few soils have no limitations.

Land Use and Land Cover

The three main categories of land use in the watershed are agriculture, forests, and development. The Land Use Map shows 23,888 acres in farmland, 32,141 acres in woodland, 414 acres in high intensity residential development, and 371 acres in Industrial/Commercial development. However, the fastest growing use of land is low intensity residential development, which primarily encroaches on existing farmland, as well as wooded areas along roads. There are currently 1016 acres of low intensity

residential development and this number continues to rise.



Agricultural Lands

Agriculture is the principal industry in the Manatawny Creek Watershed, especially in the Oley Valley. It is a business based upon the naturally fertile, tillable soil, the abundant water supply, and the skill and stewardship of farm families over many generations. This strong agricultural heritage is integral to the cultural and economic base of the community. Farmers want to continue to farm, despite the current challenge of higher operating costs and lower profit margins. The community wants to preserve this way of life for economic, cultural and aesthetic values. For the continued viability of Agriculture, it is necessary to protect land and water resources and to accommodate the needs of the farmers.

Oley Township is the only municipality in the watershed that has addressed this issue. Township officials adopted an effective Agricultural Preservation Zoning Ordinance in 1992. This ordinance establishes a sliding scale formula to permit limited subdivision of building lots based upon overall acreage of the tract. This area includes the section of the Manatawny Creek Watershed south of Route 73 and over 7,500 acres township-wide. In 1984, the Township had

established an Agricultural Security Area, which was subsequently increased to include over 11,000 acres. Being included in an Agricultural Security Area (ASA) provides right-to-farm benefits, guards against eminent domain proceedings, and is a prerequisite for application for the Berks County Agricultural Land Preservation Program. Oley Township farmers were among the first to take advantage of the County-State program for the purchase of Agricultural Conservation Easements, and have been the most successful, as a region, in protecting their land through the sale of these easements, or development rights. To date, about 50 landowners in Oley have sold development rights on a total of approximately 6,000 acres.

Overall, there are approximately 4800 acres of preserved farmland and open space in the Manatawny Creek Watershed which have been protected through the Berks County Conservancy or the Berks County Agricultural Land Preservation Program. Agricultural conservation easements are the ultimate farmland protection tool, as they assure permanent protection. In addition, the Pennsylvania Game Commission owns 117 acres of land in the watershed that is managed as open space. The Manatawny Conservation Lands Map shows properties that have been permanently protected with conservation easements and state game lands.

Woodland

Historically, forests are the dominant form of vegetation in Pennsylvania. In the Manatawny Creek Watershed, forests continue to be the dominant land cover in the headwater sections. The slopes and ridges of the Reading Prong region consist of over 70% woodland, giving the upper

subwatersheds a very different character than the lower reaches of the watershed.

Most of these forests have regenerated after former types of land use and development. Throughout these hilly woodlands there is evidence that much of the land was farmed or pastured at one time. Land was cleared. Trees were used for timber and surface stones were used to build walls around fields. Farmers of early periods met many of their needs through raising their own food and livestock, despite hilly terrain. Later, many valley farms, which were intensively cultivated, maintained mountain tracts as woodlots, using the trees for both lumber and fuel.

Mining for iron ore was prevalent in the eighteenth and early nineteenth centuries. Ironmasters owned huge tracts of woodland and developed extensive mines or ore pits near iron-works sites, in the hills along Ironstone Creek, Furnace Creek, Furnace Run, Pine Creek and Bieber Creek. Their need for charcoal as fuel resulted in the cutting of large areas of woodland. Their other needs, limestone for flux and water for power, were found in abundance along the Manatawny and its tributaries.

Today, small farms and open clearings exist in upland areas where slopes are moderate, and road access is available. In other areas, the forest has regenerated, and there are large tracts of contiguous woodlands that create an important wildlife resource. Such uninterrupted natural areas sustain a healthy mix of plants and animals, including species of special concern. Not only are these regions important for biodiversity, but in addition, they are important to water quality, furnishing a natural filter for rainwater, and numerous seeps, springs and small rivulets, which collect into the high quality tributaries that feed the Manatawny Creek.



Riparian buffers of trees and shrubs provide shade for streams and food for aquatic life. Cool water temperatures benefit wild trout and other species of aquatic life that inhabit the watershed. Species of trees and shrubs that are beneficial to wildlife should be selected for riparian buffer zones, such as eastern white pine, spruce, silky dogwood, bigtooth aspen, willow, river birch, pin oak, winterberry holly, hazelnut, crabapple, hawthorn, and serviceberry.

Development

The patterns of development in the Manatawny Creek Watershed are similar to those in other areas of southeast Pennsylvania, with agricultural tracts of eighteenth century origin, towns and villages from the mid-nineteenth century, and patterns of sprawl emerging the late 20th century. As we enter the 21st century, dealing with growth issues is the number one concern in the watershed. There are three areas of concentrated development shown on the land use map: Pottstown, Boyertown, and Oley Village. The western half of the borough of Pottstown falls within the watershed. It contains the downtown commercial district along High Street, industrial sites between the river and the railroad, and a mixed residential area north and east of the business area. Only about 10% of Boyertown is included in the watershed, comprising the southwest area of the borough. This is primarily residential and mixed commercial. Nearby suburban communities in the watershed are Morysville along Route 562 and Gablesville, on Route 73. Oley Village is a nineteenth century linear village along Main Street in Oley Township. It has about 160 houses

served by public water and sewer. It is bypassed by Route 73, which is the location of its commercial district. There are several nearby compact suburban developments that are also served by public water and sewer.

Nearly all recent development in the watershed consists of residential subdivisions. There are a few small suburban shopping centers, but no large shopping malls in the region, since these are accessible along major commuter routes such as Routes 422 and 222 near Reading, Route 422 at Douglassville, and Route 100 near Pottstown and Boyertown.

All municipalities have grown in recent years and there are few impediments to continued growth. Two of the fastest growing municipalities in Berks County have been Rockland Township and Amity Township, each having seen a population increase at close to 40%. Amity's development has taken place on farmland throughout the township, where the economic returns of farming cannot compete with the offers from developers. Amity's strategic location at the western end of the Route 422 Pottstown By-Pass has expanded the market for homes. Rockland's development is less obvious. Most of its increase resulted from several wooded subdivisions along Pricetown Road and Orchard Road in the Manatawny Creek Watershed, and other sections north of Pricetown Road.

Land Ownership

There is little public land ownership in this region. The largest tract is the 520-acre watershed tract owned by the Boyertown Water Authority. This is located along Powder Mill Road in Earl Township. Two reservoirs, Boyertown and Trout Run, provide municipal water for the borough.

The Pennsylvania Game Commission owns a 117 acre tract in District Township, which is open to the public for hunting and fishing. Other tracts of public lands are owned by municipalities, as follows: District Township, 37 acres; Douglass Township, 25 acres; Earl Township, 69 acres; and Oley Township, 14 acres. Privately owned recreational properties are scattered throughout the watershed.

Nearly all watershed land is in private hands including large farms and woodlots, commercial/industrial properties, and smaller residential lots. A property boundary map for the watershed land in Berks County clearly shows comparisons of lot size and development patterns in the different municipalities. In Oley Township moderate-density housing is clustered near Oley Village where municipal water and sewer exists. In Ruscombmanor and Rockland Townships, there are low-density subdivisions convenient to the Pricetown Road. District Pike, Earl and Douglass Townships have a mix of large and small single-family lots with larger tracts of farmland and woodland. Amity and Colebrookdale Townships have more concentrated areas of development.

Landfills

There are two major landfills in the watershed: Rolling Hills, in Earl Township, and the Pottstown Landfill, in West Pottsgrove Township. Both are municipal waste landfills operated under DEP regulations in compliance with environmental protection standards. Both are located adjacent to tributaries of the Manatawny Creek. Furnace Run originates in the hills above the Rolling Hills Landfill, and flows in a westerly direction through landfill property along Furnace Run Road.

Goose Run flows near the Berks/Montgomery County border at the base of the Pottstown Landfill in Douglass and West Pottsgrove Townships.

Rolling Hills Landfill is operated by the Delaware County Solid Waste Authority, which purchased the land in 1985. Formerly the site of a small trash disposal business, it was greatly expanded over the years to serve as the repository for all Delaware County trash in addition to some refuse from Berks County. In 1992, the Delaware County waste was changed from trash to ash, processed at the Chester Resource Recovery incinerator. Ash takes significantly less space, reducing the density of volume by one-half, and thus, extending the life of the landfill. The ash has low organic content and low ammonia, but higher salt than regular trash, increasing the Total Dissolved Solid (TDS) content of the leachate. The landfill has an extensive leachate-treatment system, and storage tanks for both untreated and treated leachate to accommodate regulating the discharge of treated effluent with stream flow conditions. The treated leachate is piped over landfill property and a GPU right-of-way to the Manatawny Creek south of Fisher Mill Road. It also has a collection system for landfill gas, and is designing a facility to convert the gas to electricity in cooperation with GPU Energy.

During the construction phase of “the Colebrookdale Landfill”, as it was called, in the mid-1980s, local citizens were concerned about the degradation of Furnace Run, and other environmental consequences of the drastic change of land use from forest to landfill. A Citizen Advisory Council was formed that met regularly with DCSWA officials to review operations and discuss issues. Today, after 16 years, this group is still meeting, and it is composed of mostly the same people. It has witnessed many

changes and many improvements, including a good working relationship with the landfill management, and the recovery of Furnace Run to a clean stream that again supports trout and cold-water aquatic species.



The Pottstown Landfill is operated by Waste Management Disposal Services of Pennsylvania, Inc. who purchased this former “family dump site” in 1984. It is located in West Pottsgrove Township, except for a 20-acre parcel in Douglass Township. It has 303 permitted acres, of which about 200 are currently used as landfill. This portion has about two years of space left, after which an expansion may be planned. Most of the trash is generated in Montgomery County, although trash is also accepted from Berks, Chester, Lehigh, Bucks and Philadelphia. It disposes municipal waste and non-hazardous industrial waste. It does not accept ash. It has a leachate-collection system and a pre-treatment plant on the premises, which discharges to the Pottstown Sewage Treatment Plant for further treatment, and eventual discharge into the Schuylkill River. It has a stormwater collection system of sediment basins which discharges the clean water into tributaries of the Manatawny Creek, Goose Run and an unnamed tributary in West Pottsgrove Township. It utilizes landfill gas for power generation, and that which is not used to generate electricity is sent to a flare on site.

Quarries

The Lehigh Portland Cement Company owns over 580 acres in Oley Township where quarrying has taken place during the past 40 years. During this period, the company (formerly known as Allentown Cement Company) quarried high calcium limestone of the Annville formation from its three Oley quarries, and has processed this rock at its cement plant at Evansville, Berks County, near Lake Ontelaunee. At the present time none of these quarries is in active use, other than the minimal operations required to keep the permits active. No pumping is taking place, and the groundwater is being permitted to seek its own level within the three quarries. Because of the high quality of the limestone and the relative lack of overburden, however, the site may be reactivated in the future. The land that is not part of the quarries is leased for farming. The locations can be seen on the Manatawny Quarries and Landfills Map, as follows: #1) north of Oley Turnpike and east of Route 662, #2) south of Oley Turnpike and west of Route 662, and #3) north of Oley Turnpike and west of Rt. 662. A small tributary of the Manatawny that originates north of Oley Turnpike near the quarries along Route 662 has experienced water loss and intermittent flows dating from the late 1970s, when quarry activities may have contributed to a sudden decrease in water table levels in the vicinity of Griesemersville, possibly due to a perched water table at this location. This is the one small section of the Manatawny in Berks County that is listed as *impaired*.

Rolling Rock Building Stone, Inc., operates a surface mining quarry in the Oysterville Creek watershed in Pike Township. The company is regulated by DEP, having 129 acres bonded for quarrying and the processing of rocks for building and

landscaping use. The surface mining operation is conducted on the lower slopes of a rocky hillside. After removing the topsoil, the surface layer is excavated and the larger stones selected for processing. The small stones, six inches and under in diameter, are returned to the ground, which is configured to its original contour. Later, the disturbed area is covered with soil, and reforested with diversified species of deciduous and coniferous trees. In this manner, a limited amount of land is cleared for excavation each year, while a previously quarried area is reforested. The company also owns surrounding woodland and farmland, which it maintains as a buffer area.

Please refer to the Manatawny Quarries and Landfills Map to see the location of these areas.

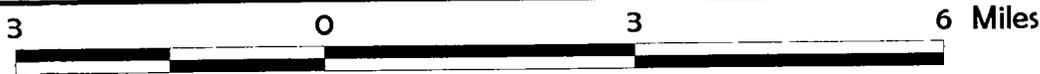
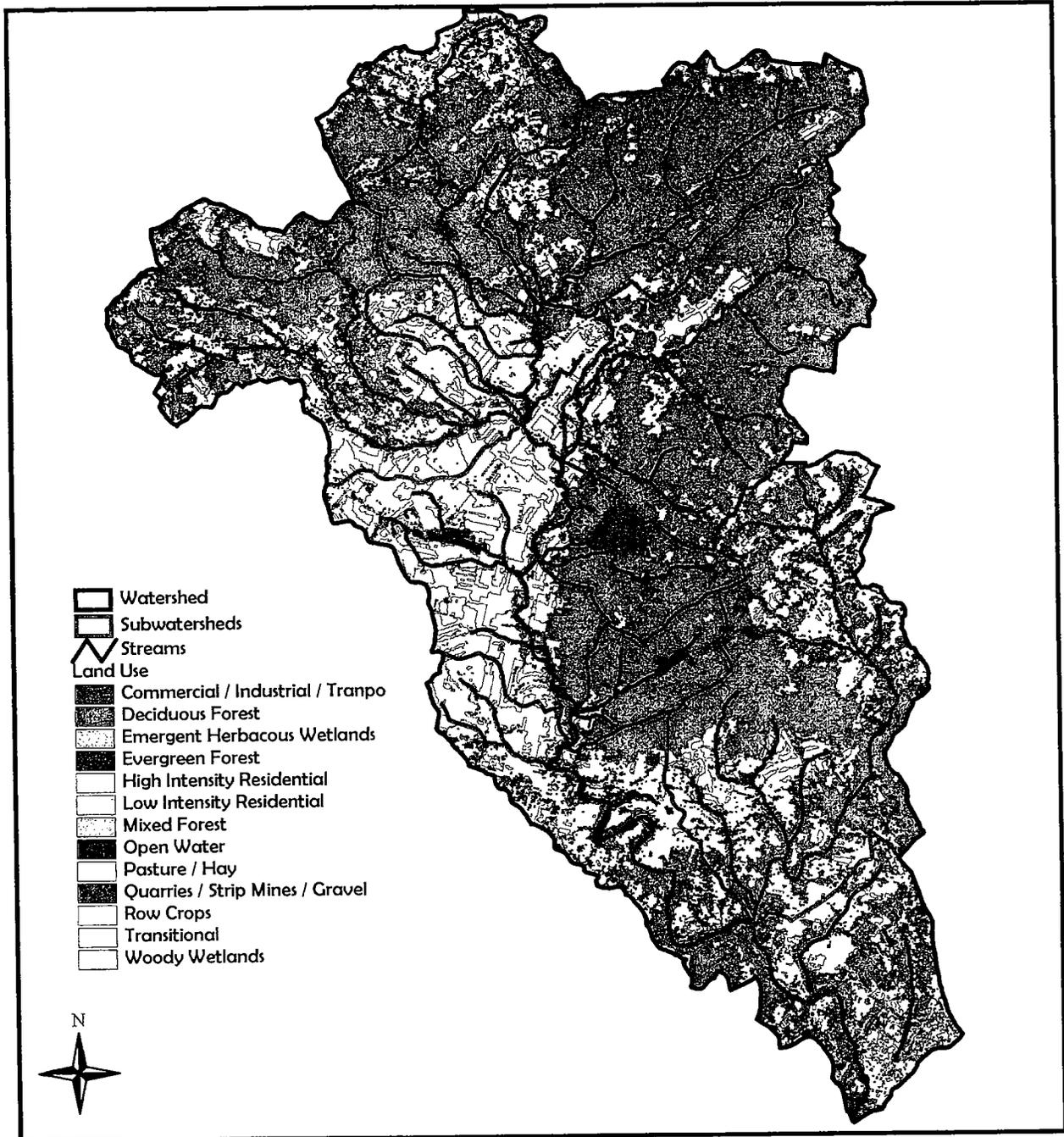
Sinkholes

Sinkholes occur in carbonate rock formations (limestone and dolomite) that are

common in the Oley Valley. Carbonate bedrock is highly porous, soluble and easily weathered. This presents two problems. First, it does not filter pollutants through a slow percolation process to the extent that more solid rock does. Secondly, these rocks tend to have an abundance of surface depressions and sinkholes. Both of these characteristics need to be taken into account in land use planning, as groundwater pollution and land subsidence are issues that need to be considered. Development densities should be limited in these areas when conventional on-lot septic systems are used. The most appropriate land use is agriculture.

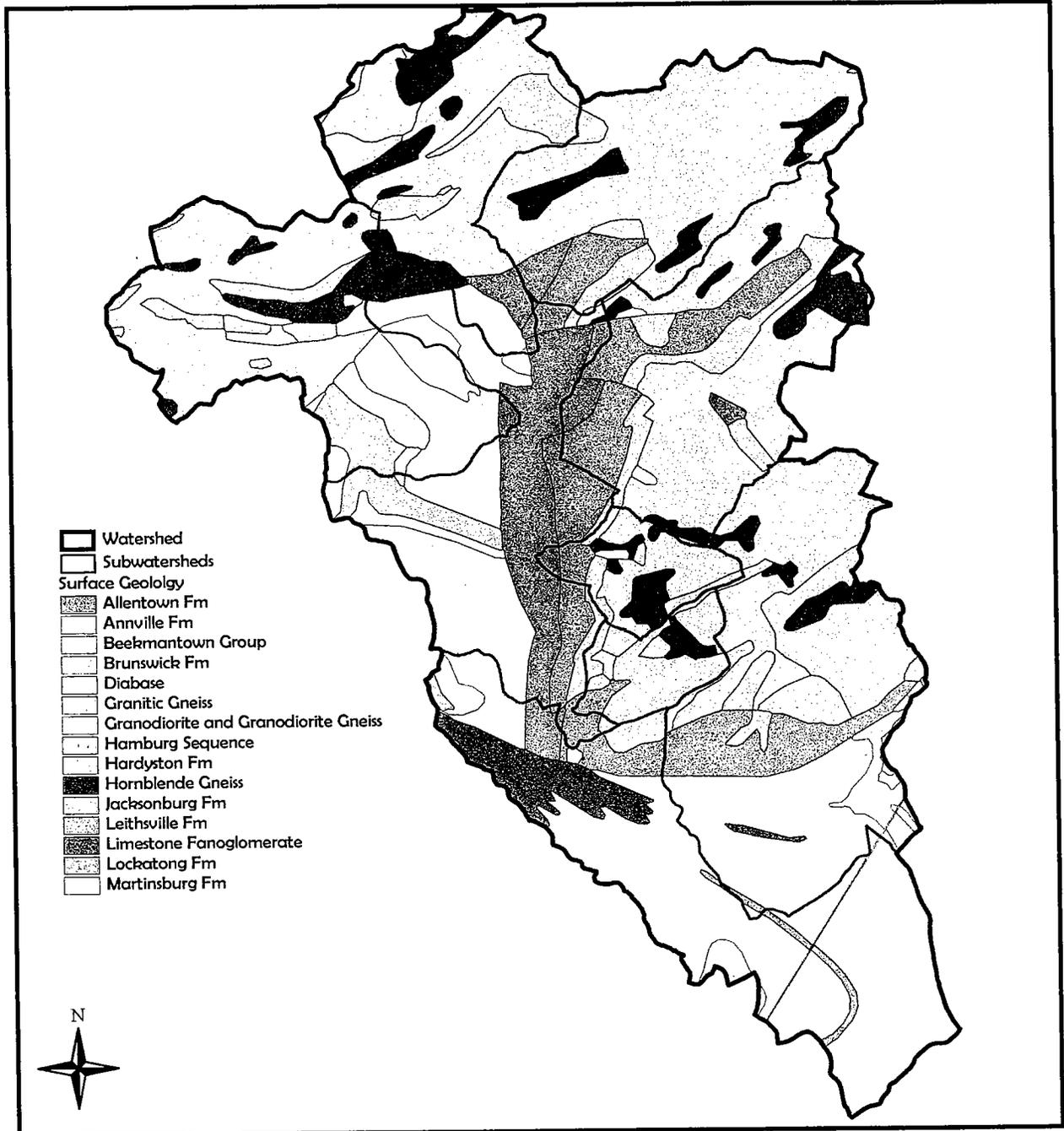
In the Manatawny Watershed, the most prevalent carbonate rock areas are located on the farmlands of the Oley Valley, and in the areas owned by cement companies. Sinkholes frequently occur on farmland, and are dealt with by the farmers who are aware of the sites, and take measures to fill them in or avoid them in their farming operations.

Manatawny Land Use



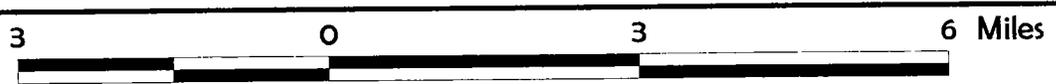
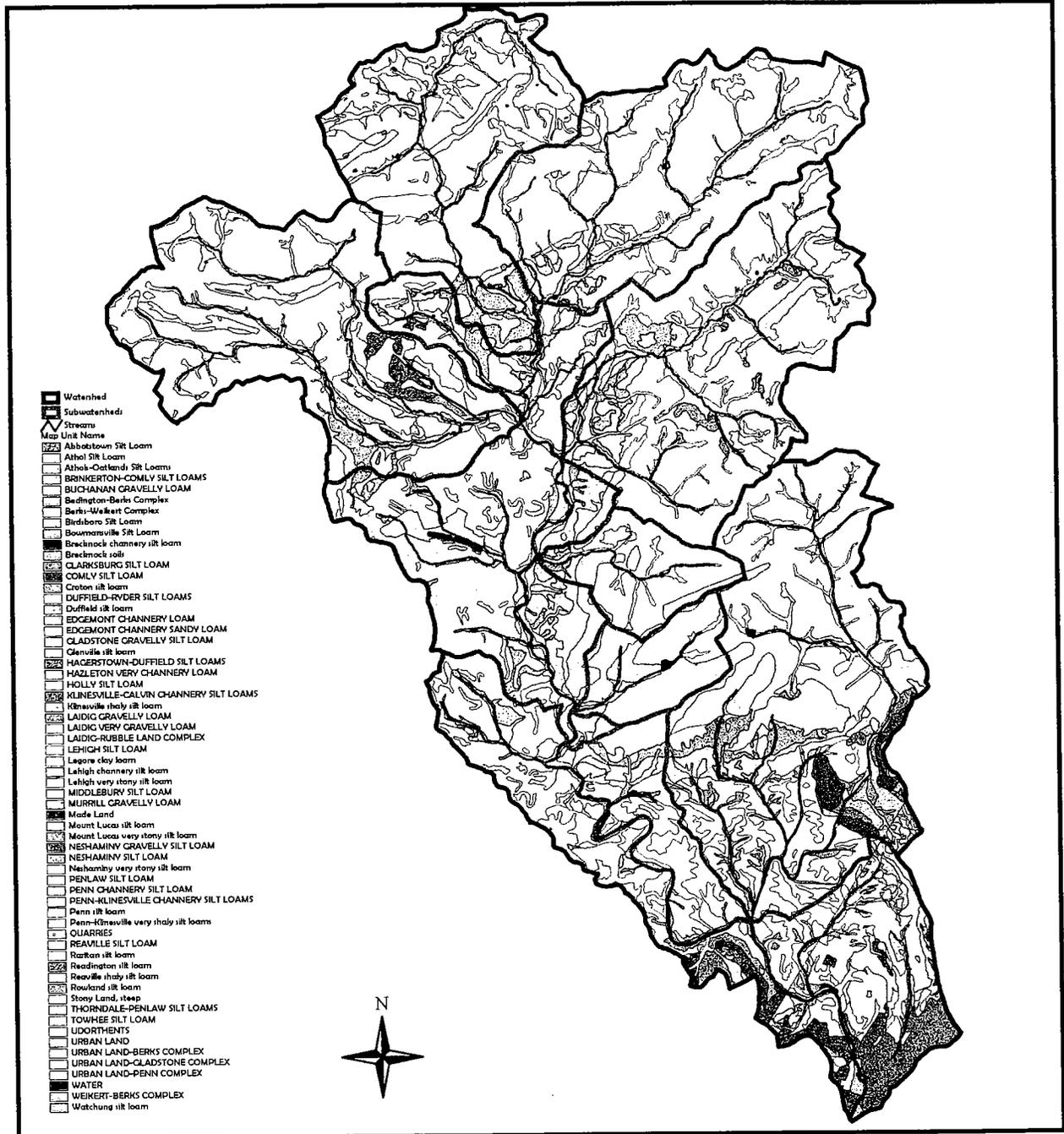
Berks County Conservancy
 25 N. 11th Street
 Reading, PA 19601
 610-372-4992
info@berks-conservancy.org

Manatawny Surface Geology



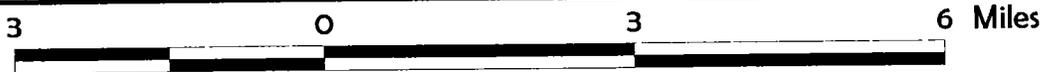
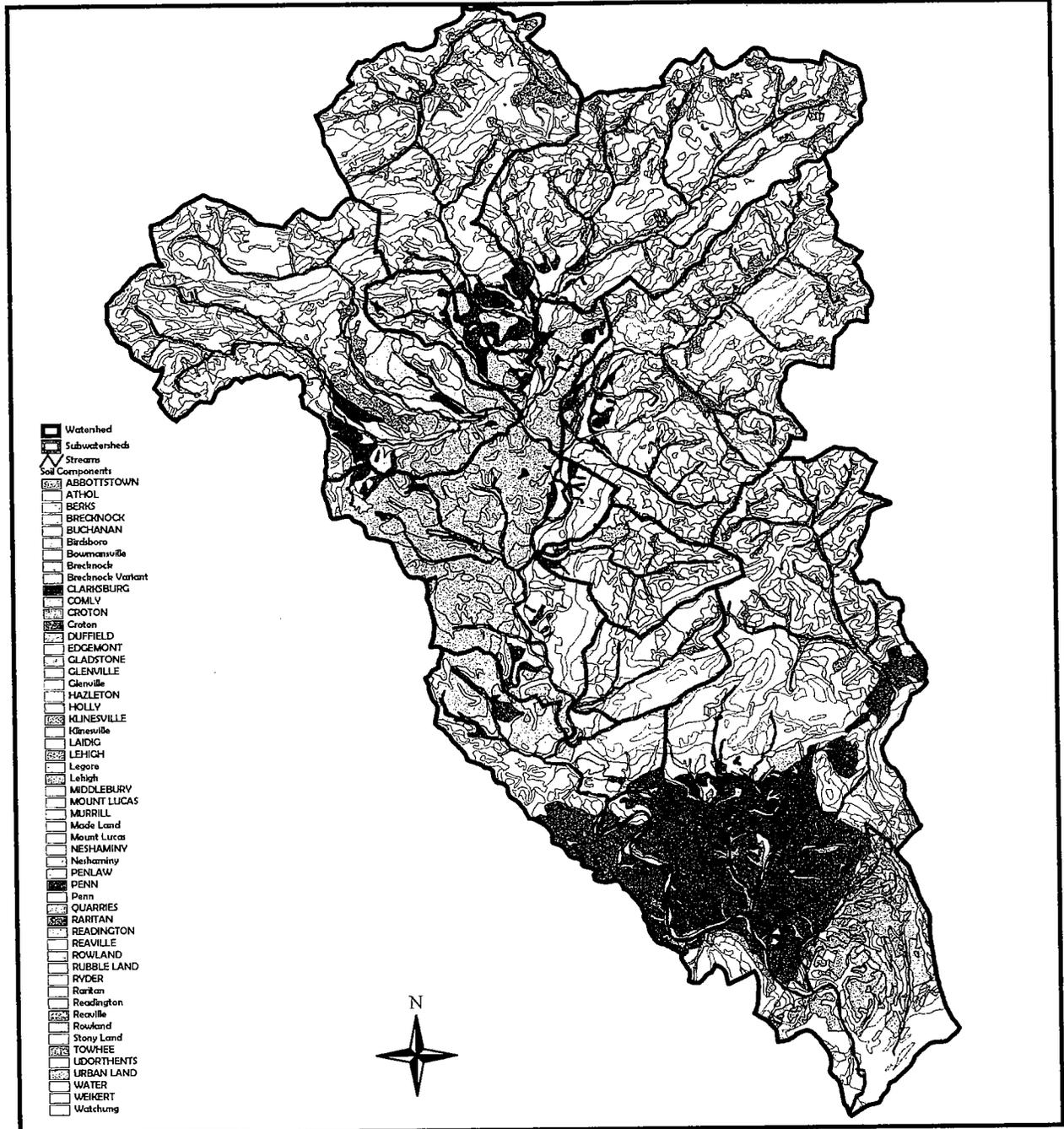
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Manatawny Soil Map Units



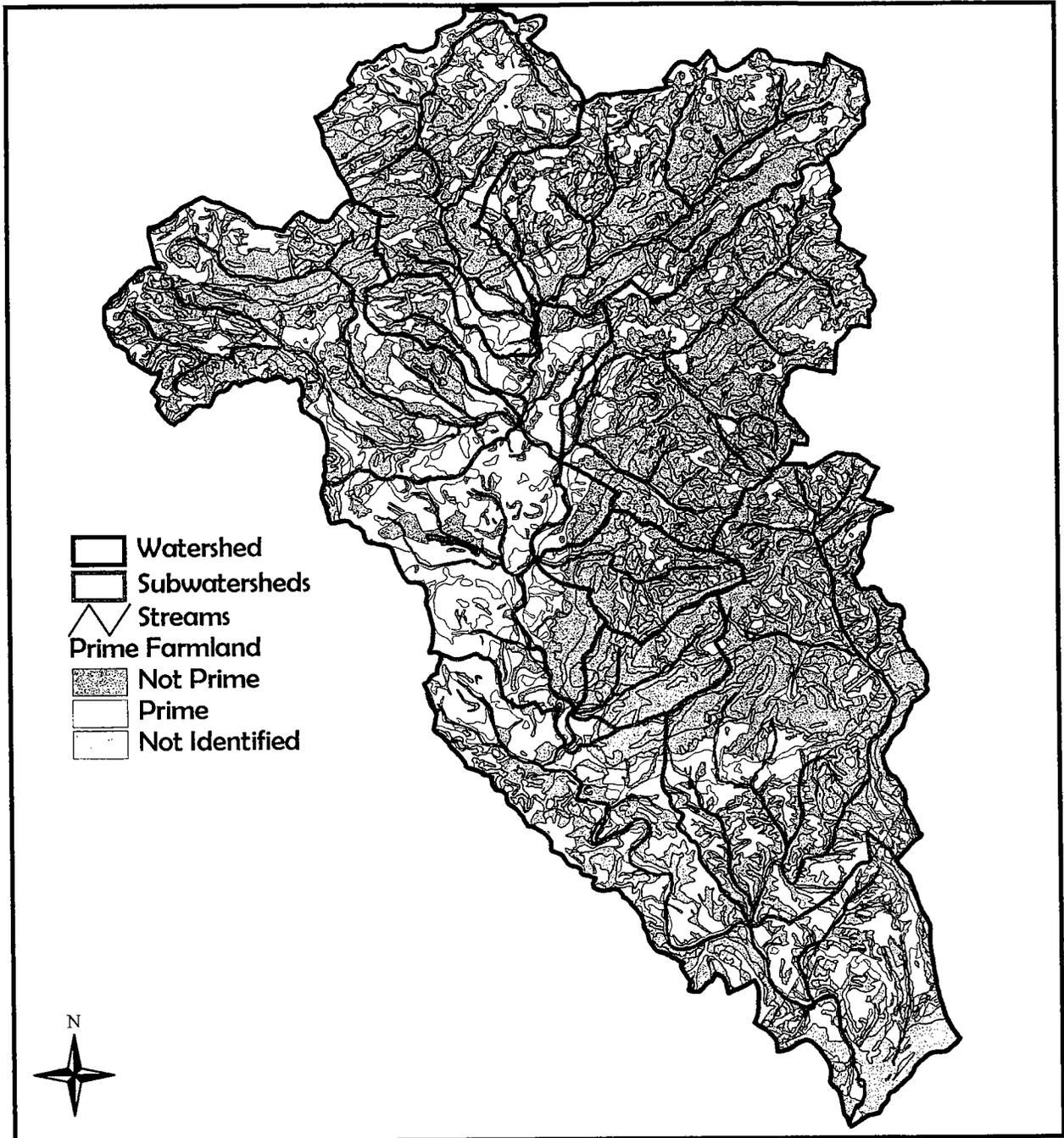
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Manatawny Soil Components



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Manatawny Prime Agricultural Lands



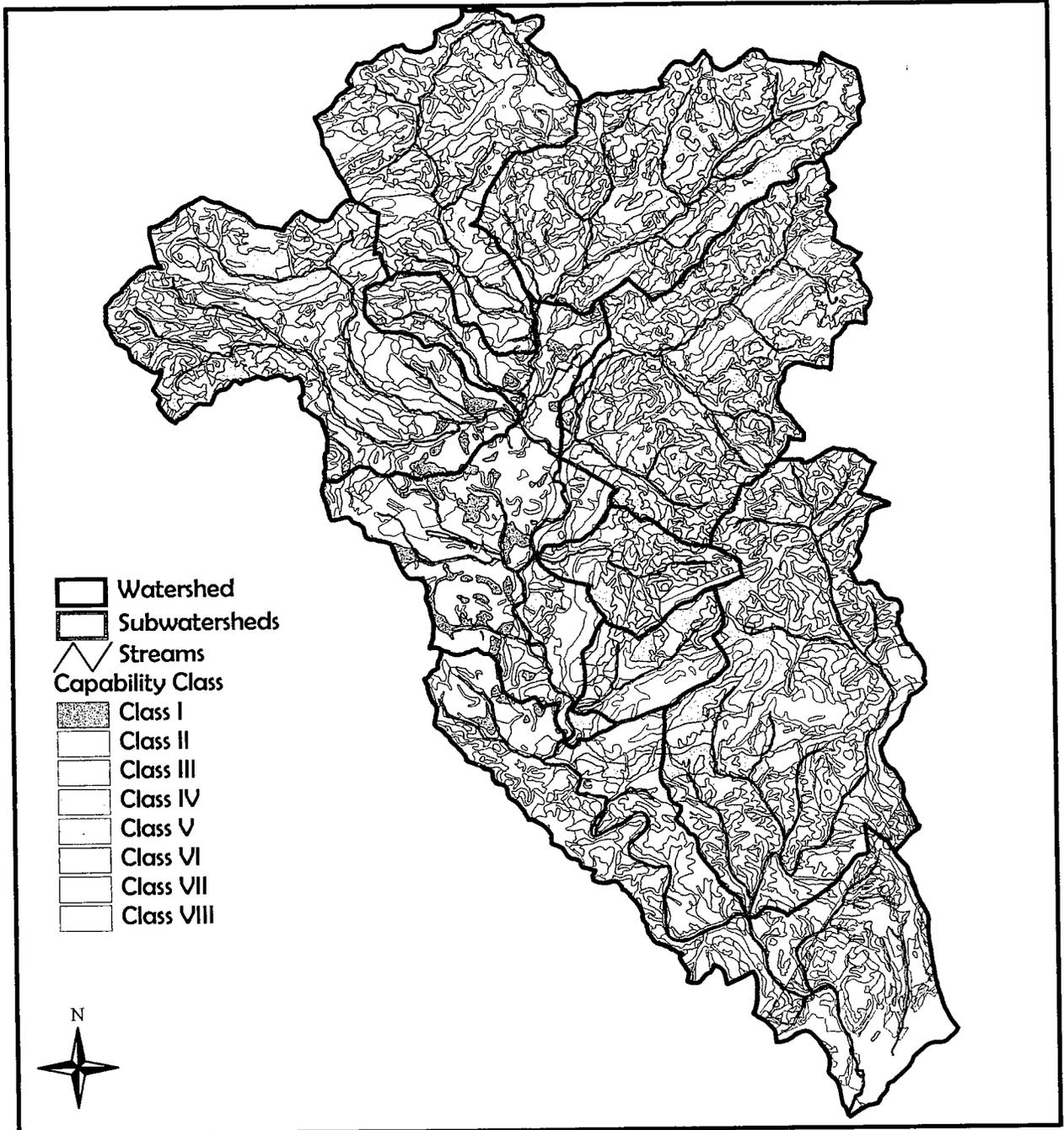
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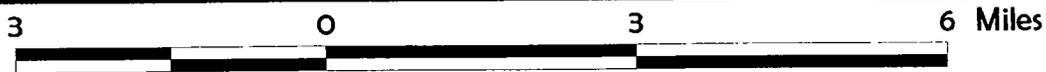
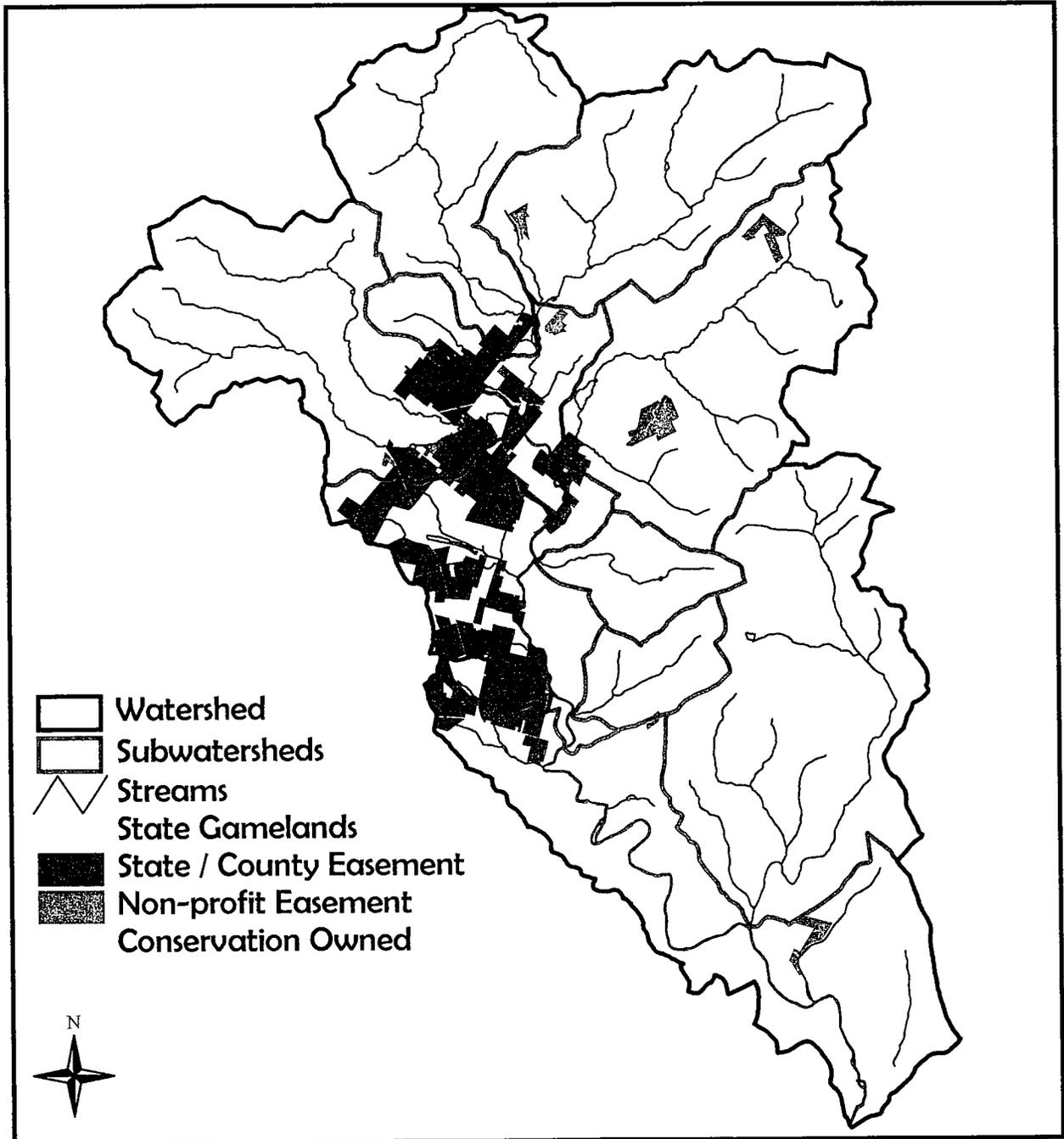
November 2001

Manatawny Non-Irrigated Soil Capability Class



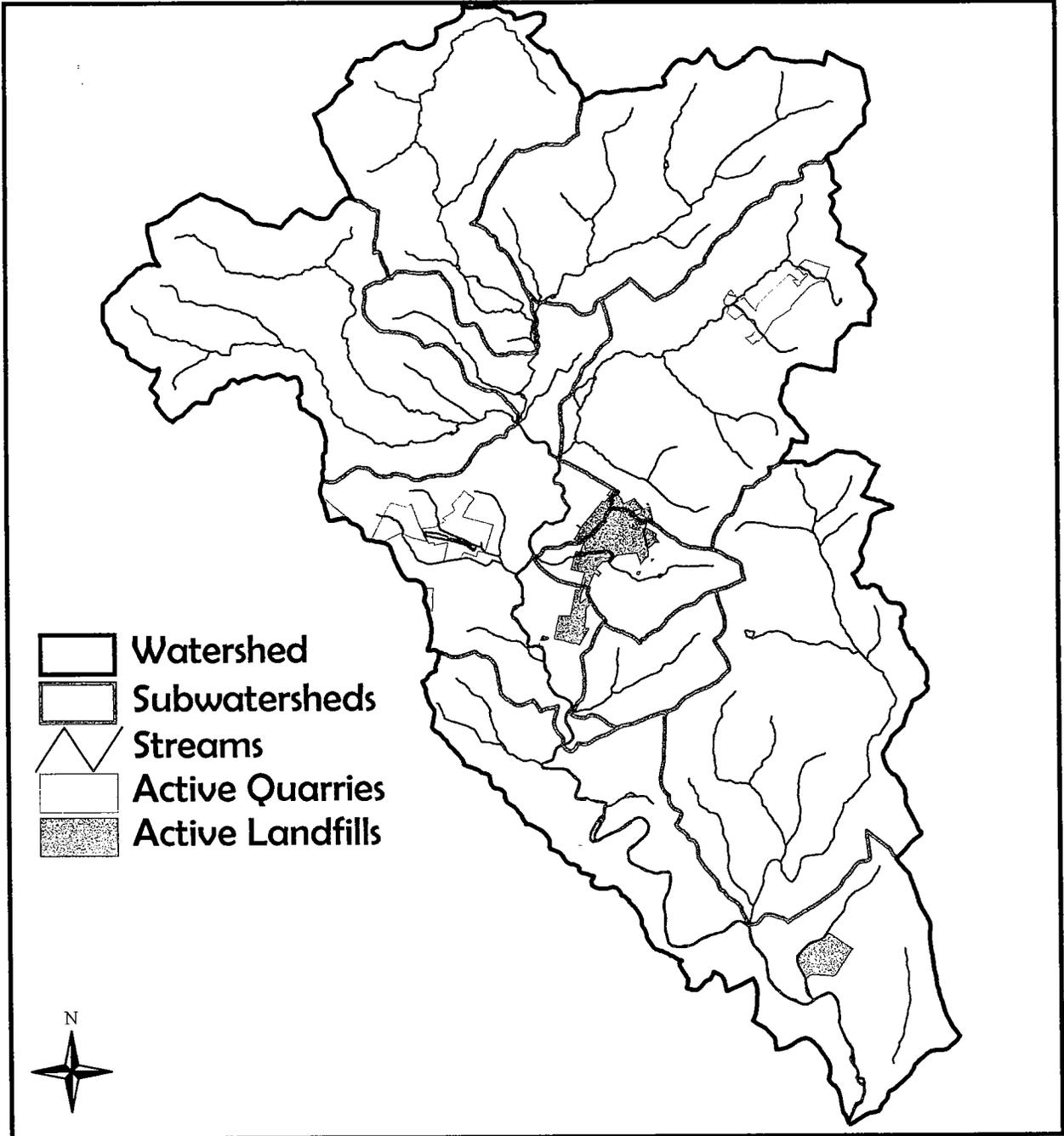
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Manatawny Conservation Lands



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Manatawny Quarries & Landfills



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WATER RESOURCES

Protecting Water Resources

Achieving and maintaining high quality water resources is a goal and a challenge for state, county and local governments and for landowners and residents throughout the commonwealth. Pennsylvania has over 83,000 miles of streams, more stream miles than any other state except Alaska. Over the years, development and agriculture have removed natural forest canopies that once covered and protected thousands of stream miles. In the past decades, sprawling residential growth has accelerated in Southeast Pennsylvania, including the Manatawny Creek region. There is a very strong economic and moral incentive to address water quality issues on a watershed basis. It makes economic sense to prevent degradation rather than remediate pollution, to plan protection strategies rather than to react to problems, and to work across municipal boundaries to protect irreplaceable water resources. The health of our ecosystem, and our own quality of life, will be the beneficiaries.

To assist with this challenge, Pennsylvania has implemented statewide watershed activities including the proper classification and protection of Pennsylvania's waters. State water quality standards, mandated by the Clean Water Act, are regulated and set by the Pennsylvania Department of Environmental Protection with approval from the Environmental Protection Agency. These standards are specified in Chapter 93 of the Pennsylvania Code. As part of Chapter 93, stream reaches for protected uses are designated based upon specific water quality and biological conditions. There are designations and protected uses

for the stream reaches within the Manatawny Creek watershed. They are defined as follows:

TSF: Trout Stocking Fishery – Maintenance of stocked trout from February 15 to July 31 and maintenance and propagation of fish species and additional flora and fauna that are indigenous to a warm water habitat.

WWF: Warm Water Fishery – Maintenance and/or propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat.

CWF: Cold Water Fishery – Maintenance and/or propagation of fish species, including the family Salmonidae and additional flora and fauna, which are indigenous to a cold-water habitat.

HQ: High Quality Waters – A stream or watershed that has excellent quality waters and environmental or other features that require special water quality protection.

EV: Exceptional Value Waters – A stream or watershed that constitutes an outstanding national, State, regional, or local resource, such as waters of national, State, or county parks or forests, or waters which are used as a source of unfiltered potable water supply, or waters of wildlife refuge or State game lands, or waters which have been characterized by the Fish Commission as "Wilderness Trout Streams," and other waters of substantial recreational or ecological significance

The classifications **HQ** and **EV** are special protection waters, required to be maintained at their existing quality. Local government

ordinances should incorporate good design techniques and buffer zones for the continued protection of the areas in these designated watersheds. Limiting erosion and sedimentation on construction sites and maintaining as much natural vegetation on the site as possible are two basic things that can be done. Maintaining buffers along stream and creek banks and reducing the amount of impervious surfaces are additional items that can be incorporated into local ordinance regulations.

Table 3, in Project Area Characteristics, depicts the protected use designations within the Manatawny Creek watershed. Pine Creek, Bieber Creek, and Trout Run are classified EV. Oysterville Creek (above Carl Road in Pike Township) has been approved for a use designation of EV.

Exceptional Value Tributaries

The Manatawny Creek Watershed has excellent headwater streams, in fact a greater acreage and percentage of EV subwatersheds than any other stream system in Berks County. This is a significant advantage, since the first and second order headwaters streams represent a major proportion of total stream length in a watershed. These streams provide invaluable habitat for aquatic biota and form the most direct connections with their surrounding ecosystems. Smaller streams tend to be most impacted by human activities and the most susceptible to local degradation. Consequently to have the majority of tributaries of the Upper Manatawny attain EV status, and Special Protection standing is an ideal foundation for the health of downstream water resources.

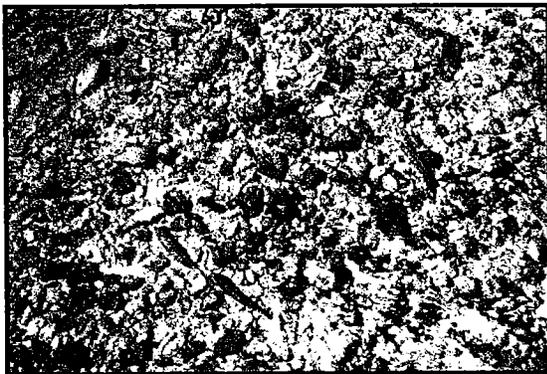
Bieber Creek is 8.1 miles long and has a 9.3

square mile drainage basin. It originates in Rockland Township, flows northwest for 1.3 miles to the village of Dryville, thence south and southeasterly of 6.8 miles to its confluence with Pine Creek in Oley Township. The confluence of Bieber Creek and Pine Creek forms the main stem of the Manatawny Creek. Bieber Creek can be located on the Fleetwood and Manatawny Quadrangles. The underlying geology consists of granitic gneiss, Hornblende gneiss, and the Hardyston Formation. Bieber Creek undergoes several dramatic changes in gradient while flowing through a drainage basin that exhibits multiple land use types. From its origin to Boyer's Junction, the stream flows across a relatively flat plateau composed of farmland with encroaching residential subdivisions. The streambed is generally unshaded, and the streambed is heavily silted. From Boyer's junction, the stream enters a wooded hollow where it tumbles over a rocky bed for the next 2.2 miles. Although it runs along Forgedale Road, with houses spaced out along the road and stream, its banks are shaded with trees and shrubs. This was a historic iron-making area. Finally it reaches the Oley Valley floor, where it flows 2 miles through farmland and meadow. It supports native brown trout. Bieber Creek was recommended for upgrading to EV classification by the Pennsylvania Fish and Boat Commission to further protect its headwater region.



Bieber Creek

Pine Creek is 6.3 miles long and has a 10.8 square mile drainage basin. It is located in District, Pike, Rockland, and Oley Townships. It joins Bieber Creek in northern Oley Township to form the Manatawny Creek. The main stem of Pine Creek originates from springs in a wooded wetland area near DeLong Road in District Township at an elevation of 980 feet. It flows in a southwesterly direction on a fairly straight course through deciduous woodland habitat, crossing under Baldy Hill Road and running parallel to Long Lane about 4.6 miles to its confluence with West Pine Creek east of Lobachsville at an elevation of 400 feet. Its bed is very rocky at places, and the stream forms divided channels as it flows through boulder fields. It travels along a narrow valley, almost entirely forested with the exception of scattered residential properties and several farm fields off Long Lane. Both sides of the stream are steeply sloped to an elevation of 1000-1,100 feet. There are many riffles and areas where the stream cascades over rocks. Below its confluence with West Pine Creek, it has a gentler slope and more open landscape, flowing through farmland and the village. Nevertheless, the stream is shaded by wooded buffers, and much of this area consists of an extensive Exceptional Value wetlands.



Wild brown trout in Pine Creek

Pine Creek has six EV tributaries. Tributary #1 enters from the north just east of Baldy Hill Road. It is short and steep, descending from an elevation of 1,000 feet over about .7 mile. It has a rocky bed, and flows beneath large boulders over much of its course. Tributary #2 enters from the southeast, flows for about 1.5 miles through woodland with some openings. It is fed from the southern slope of the ridge dividing Pine and Oysterville Creek watersheds, which contains many seeps. Tributary #3 is about 2 miles long, entering from the north. It originates in woodland near Five Points in Rockland Township, flows through wooded wetlands into a large pond with an earthen dam, thence into Pike Township where it follows a steep and extremely rocky downhill course to its confluence with Pine Creek at Long Lane. Tributary #4 enters from the south near Heilig School Road. It originates east of Mine Road and flows through woodland and wetland areas. Tributary #5 is West Pine Creek, a named tributary that flows through Rockland and Pike Townships. It is 2.7 miles long, originating in highland woods and meadows, and following a rocky downhill course from Day Road to Rupert School Road. It has two tributaries, which also are steep wooded streams. Tributary #6 enters from the north at Lobachsville, west of Long Lane. It runs parallel to Lobachsville Road through a steep wooded ravine into a wetlands area south of Keim Road. It is 1.7 miles long. Pine Creek is classified as a Class A Wild Trout Stream. Its whole watershed is listed as a PNDI Natural Community.

Oysterville Creek is a 5.9-mile long stream with a drainage basin of 12.2 square miles located in District, Pike and Oley Townships. The upper portion of 3.1 miles, from the source to Carl Road is classified EV, while the remainder of the stream is classified HQ. The EV section originates

from a spring near Keim Road in District Township. It flows through a wetlands meadow and mixed deciduous and coniferous forest in a southerly direction to the head of a scenic agricultural valley at the Pike Township boundary at Oysterville Road. It continues along the floor of the valley through farmland and wetlands in a southwesterly direction to Carl Road. This section of the stream has two tributaries, both originating in the highlands of the Mountain Mary ridge. Tributary #1 originates on parkland owned by District Township along Hill Church Road near Lutz Road in a wooded wetlands location. It descends very steeply through woods to the main branch in the valley. Tributary #2 begins near Lutz Road and Stone Roll Road in Pike Township. This also descends a steep wooded slope. There is some surface mining for building and landscaping stone on this rocky hillside. There is also farming in the valley. Operators of these businesses have used good conservation practices and have made special efforts to protect water quality. The stream supports native trout and PNDI-listed species. Just south of Carl Road is the Pike Township Sportman's Association, which has trout raising facilities and sponsors fishing rodeos.



Oysterville Creek

Trout Run is a 2.1-mile long stream with a 2.0 square mile drainage basin located in Earl Township. It originates from springs on property owned by the Boyertown Water Authority. It is impounded near its headwaters by Trout Run Reservoir, a 42-acre water supply and recreational lake owned by the borough of Boyertown. The Pennsylvania Fish and Boat Commission manages Trout Run Reservoir for both coldwater and warmwater fishes. The reservoir has multi-level release capabilities, but generally discharges from the spillway. The multi-level release lines are 4 inches in diameter and are used only when needed to achieve the conservation release of 115,000 gallons per day. Trout Run is classified EV, which was granted following a 1983 survey by the DEP, which cited excellent water quality, an abundance of sensitive aquatic macroinvertebrates, a reproducing brown trout supply, and limited potential for future development.



Trout Run, Earl Township

Wetlands

Wetlands are areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support vegetation adapted for life in saturated soil conditions, including swamps, marshes, bogs and similar areas. Most wetlands are recognized by the growth of

characteristic plants, occurrence of standing water, and the existence of moist soils. These soils usually have high organic content.

Wetlands have a variety of functions and uses. They can be extremely rich areas for plant growth and animal habitat, often serving as breeding places for many organisms. Wetlands also act as natural filters in removing pollutants such as bacteria and sediment from the water. Organisms living in the wetland consume the pollutants trapped by plants. The soils in a wetland are often acidic. This allows a wetland to receive acidic infiltrations and remain relatively unaffected.

Please refer to the Manatawny Hydric Soil Floodplain & Wetland Areas Map. The wetlands area is based upon the National Wetlands Inventory overlay map (USFWS 1981). It shows that a high percentage of wetlands in the watershed are located in the headwaters tributaries in Pike, District and Rockland Townships. Some of these extensive wetland areas are found at high elevations, at the sources of Oysterville, Pine and Bieber Creeks. Others are found in the valley areas of these streams, and along Furnace and Little Manatawny Creeks.

Wetlands possess three essential characteristics: hydrophytic vegetation, hydric soils, and wetland hydrology. Wetland hydrology creates permanent or periodic inundation, or soil saturation to the surface, at least seasonally. The presence of water for a week or more during the growing season typically creates anaerobic conditions in the soil, which affect the types of plants that can grow and the types of soils that develop. Numerous factors influence the wetness of the area, including precipitation, groundwater discharge or periodic flooding. Typical wetlands of the Manatawny

headwaters are characterized by numerous small springs and seeps, derived from groundwater. Studies conducted at many of these wetlands areas have identified them as important habitat for both plant and animal species of concern. Accordingly wetlands should be preserved and maintained not only for their role in improving water quality, but also as key areas to sustain biodiversity and protect rare and endangered species.

Floodplains

A floodplain is the land that lies adjacent to a river or stream that is periodically flooded by overflow. It acts as a natural barrier to prevent flooding of surrounded developed areas. This land is usually flat and contains alluvial soils that may be wet a portion of the year. It often supports wetlands vegetation that can serve as excellent areas for habitat and biodiversity. The floodplain areas vary with the topography and size of stream, increasing with stream order and drainage area.

The main stem of the Manatawny Creek is nearly level, and features large meanders as it travels through different geological formations. The streambed is shallow, especially in the riffle areas. There are numerous islands that have formed in the middle of the stream, and areas of wetlands along the stream in low lying areas. The floodplain varies in width from 50 to 200 feet or more. Much of the floodplain is wooded or features natural wetlands vegetation. The floodplain serves as a natural buffer area along the creek through much of its length. This greatly aids in protecting the stream banks and absorbing the impacts of runoff and nutrient loading.

Floodplains do not contain flash floods that occur after heavy downpours or extended periods of stormy weather. Certain areas

along the Manatawny and its tributaries are flood prone, and here water temporarily flows well beyond floodplain boundaries. These flash flooding incidents often occur in areas when the normal drainage channels are not adequate to carry excessive volumes of flow. Such areas may be at bridges, culverts, and dams.

Designating the allowable uses of a floodplain is an important step for local municipalities. In most area along the Manatawny and its tributaries, a 100-year floodplain has been delineated by FEMA, the Federal Emergency Management Agency. Flood insurance can be purchased through the National Flood Insurance Program, but building any type of permanent structure on a floodplain can result in property loss and other problems. A floodplain is best left in natural open space

Ponds and Dams

Lakes and ponds do not occur naturally in the watershed. The largest impoundments in the Manatawny Watershed are two reservoirs constructed by the Boyertown Water Authority in Earl Township. The Boyertown Reservoir and Trout Run Dam furnish drinking water for Boyertown and vicinity. Numerous privately owned small ponds range in size from <1 acre to >5 acres. Some of these were built as farm ponds or fish ponds and they furnish recreation and water supply for use in fire fighting, watering plants and crops, or watering livestock.

Some existing historic ponds were built for waterpower to run grist and saw mills. These mill ponds were connected to a stream by a system of races, a head race to carry water to the pond, and thence to the mill wheels or turbines, and a tail race that

carried the water from the mill back to the stream at a lower level. These primitive waterpower systems were actually quite sophisticated, as they required intricate engineering to determine the exact place along the stream to start the millrace so it carried sufficient water and entered the mill at the right level to provide an adequate head and force to turn the waterwheels.



In addition to ponds, which are constructed as separate water bodies, there are also a number of dams, built across the Manatawny or a tributary to create an enlarged pool of water for recreation or for waterpower. There are two remaining dams across the Manatawny, others having been breached or removed. Please refer to the Dams in the Manatawny Creek Watershed Map.

Water Quality Assessment

In 1997 the Pennsylvania Unassessed Waters Program was initiated by DEP to evaluate wadeable streams on a local scale while progressing towards a complete statewide assessment of Pennsylvania's water quality within ten years, including the documentation of Point Source and Non-Point Source impairments and their causes. The state was divided into manageable assessment regions based upon the 104 State Water Plan (SWP) watershed management units. The Manatawny Creek – French Creek region is designated Section 3D, which represents the Schuylkill River Watershed between Birdsboro and Phoenixville. Assessment for this region

was completed in 1999 and 2000, carried out by the South East Regional Office of DEP. A map illustrating the 3D Assessment shows that the region has good water quality overall, with nearly all streams meeting standards for their use designation (You can find this map, titled SWP 3D Manatawny, in Appendix A along with a listing of DEP's Water Monitoring Stations in the Manatawny Creek Watershed). The stream segments not attaining these standards are listed as *impaired* and shown in red. In the Manatawny Creek the unnamed tributary which originates as an outflow from the Allentown Cement Company abandoned quarry east of Route 662 undergoes periods of "reverse flow", when the level in the quarry is lower than the stream bed, and the groundwater flows back into the quarry.

Biological monitoring of a stream serves to determine the relative health of the aquatic environment by determining the biodiversity of the habitat and the percentage of sensitive organisms that are found there. Bottom dwelling aquatic insects called *benthic macroinvertebrate organisms* are used as indicators of water quality. These insects as a group are wide ranging in their sensitivity to physical and chemical changes in their habitat. Ranking each kind of insect's sensitivity on a scale allows its use in interpreting the health of the stream. Indexes have been developed to rate a stream based on the pollution tolerance of its bug population, and to compare the numbers and varieties of types of invertebrates.



Monitoring

In addition to the DEP Watershed Assessment, monitoring of the Manatawny and its tributaries has been performed by USGS, PA Fish & Boat Commission, Landfills, Sewer Plants, the Greater Pottstown Watershed Alliance, The Pine Creek Valley Watershed Association, The Berks County Conservancy, and others. Appendix A contains a variety of USGS data for the Manatawny Creek Watershed. Other data related to Manatawny water quality studies is available for review at the offices of the Berks County Conservancy.

Point Sources

According to the National Pollutant Discharge Elimination System (NPDES) established as part of the Clean Water Act, the US EPA issues permits that allow discharges of regulated amounts of cooled effluent into water bodies. The EPA regulates and monitors the amount of effluent discharged by permit holders. The NPDES permit holder is responsible for maintaining and updating the permit on a regular basis. Table 8 shows the list of NPDES permitted discharges within the Manatawny Creek watershed.

Table 8. National Pollutant Discharge Elimination System (NPDES) sites within the Manatawny Creek Watershed.

Discharge Site	Stream	County	Municipality	Water Testing
Upper Pottsgrove Twp.	Tributary to Goose Run	Montgomery	Upper Pottsgrove	Daily
Allentown Refrigerated Terminal	Tributary to Ironstone Creek	Berks	Colebrookedale	Daily/Monthly
Morysville Treatment Plant	Ironstone Creek	Berks	Colebrookedale	Daily/Weekly
Boyertown Water Filtration Plant	Tributary to Ironstone Creek	Berks	Earl	Weekly
Fishermans Paradise	Ironstone Creek	Berks	Colebrookedale	Weekly
Allegheny Eastern Conference	Manatawny Creek	Berks	Douglas	Monthly
Earl Township Elementary School	Tributary to Oysterville Creek	Berks	Earl	Weekly
Delaware County Solid Waste Authority	Manatawny Creek	Berks	Oley	Daily
Oley Township Municipal Authority	Manatawny Creek	Berks	Oley	Daily
Golden Oaks Country Club	Furnace Creek	Berks	Ruscombmanor	2x Monthly

Non-Point Sources

Pollution caused by erosion and runoff from farms, businesses and residential properties are non-point sources of stream degradation. Pollutants can be nutrients, such as nitrogen and phosphorus that are used in fertilizers used on farms, lawns and golf courses. Nutrients can also come from manure and human wastes. Nutrient management practices can reduce these causes of pollution that produce excessive plant growth in streams and ponds.

Probably the greatest non-point pollutant in the Manatawny Creek watershed is sediment, small particles of soils or other insoluble materials washed into the stream after rain and storm incidents. Every significant rainfall induces runoff and erosion that results in muddy stream conditions in the Manatawny. Large storms and downpours that produce flooding can result in serious damage to the stream banks and the streambed. The summer of 2001 had several severe storm events, which not

only caused extensive flooding, but also washed out vulnerable sections of the Manatawny and its tributaries. Undercut banks collapsed, sandbars shifted, islands were reconfigured and silt and stones washed into fields beside the stream. Although heavy rains cannot be prevented, stormwater controls can minimize the amount of sediment that enters the stream under normal conditions. Conservation best management practices on farms, erosion and sedimentation controls at all earth moving sites, detention basins in residential developments, use of streamside buffers of natural vegetation, and enactment and implementation of stormwater management ordinances are measures that address sediment loading in streams.

Groundwater Quality

Groundwater wells supply nearly all the water for domestic use and human consumption in the Manatawny Creek Watershed with the exception of the public water supplies of Boyertown, which uses surface water from its reservoirs, and Pottstown, which uses treated water from the Schuylkill River. Yet groundwater is seldom tested by individual property owners or municipalities unless a health problem is suspected. One exception took place in Oley Township in the 1980s, when several township-wide water studies tested well water for water quality parameters. The result of these tests found a generally potable water supply, with water quality problems being: excessive hardness, locally elevated nitrate levels, and, in several dug wells, the presence of a high count of fecal streptococci bacteria.

Hardness of ground water is often associated with carbonate areas, which contain soluble calcium and magnesium carbonate. Water from the noncarbonated sedimentary rocks

and the crystalline rocks typically is softer because those rocks contain much smaller amount of calcium and magnesium minerals. However, other factors, such as residence time of the groundwater, topography, land use, and human activities, may be as significant as geology in controlling hardness. Ground water movement across geological contacts also may explain some of the lack of agreement between hardness and geological contacts.

High nitrate concentrations are also prevalent in carbonate formations. Infiltration and overland runoff carrying nitrate from various sources may enter aquifers directly through solution cavities, sinkholes, and fractures. Nitrate at concentrations greater than 10 mg/L in drinking water may be toxic to children under three months of age by causing methemoglobinemia – a reduction of oxygen supply in the blood. Fertilizers, barnyard wastes, and wastewater from on-site disposal systems or leaky sewers are potential causes of increased nitrate loads. Measures to correct such problem areas are implementation of land use practices that minimize infiltration.

Contamination of groundwater by bacteria can result from barnyard wastes and wastewater from on-site disposal systems. When recharge water migrates through soil and rocks toward the ground-water reservoir, the bacteria it contains generally are filtered out. In parts of Oley Township and other carbonate areas where the unsaturated soil mantle is thin or absent over solution cavities, bacteria-laden recharge water may flow directly to the water table with little reduction in the number of bacteria.

High density housing with on-lot waste water treatment in areas underlain by the

more permeable carbonate rocks probably will produce serious groundwater problems – notably elevated nitrate concentrations and bacteria counts. Use of community sewer systems with a high degree of treatment will prevent most groundwater contamination.

Groundwater supply

Both natural and human factors affect groundwater quantity. The most important natural factors in a given region are precipitation, climate, and the type of geologic formations present. Ground water is present in and moves along and through bedding planes and joints, faults, and other fractures in the bedrock. In carbonate rocks, some of these openings have become enlarged by solution, but most are only a fraction of an inch wide. Aquifer characteristics can be identified for different geological formations. Well yields depend upon the permeability, storage coefficient, a real extent of the aquifer, sources of induced recharge, the length of the well exposed to the aquifer and the well diameter.

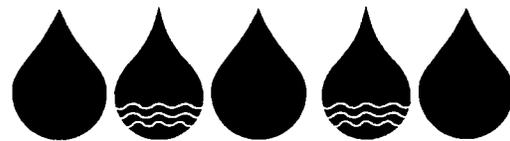
Topography also has a significant effect on well yield. The highest median specific capacities are obtained from wells in valleys. Valleys are probably formed in areas of intense fracturing that are able to transmit more ground water than hilltop and hillside areas, where fewer fractures are present.

Precipitation and temperature influence the hydrologic cycle and determine how much water is present as groundwater, surface water, or atmospheric water vapor. Human factors include land use and water use. Natural vegetation and grassy areas provide optimum recharge areas for aquifers, while impervious cover and developed areas increase runoff to storm sewers and waterways, which can result with lowering of the groundwater.

Although the underlying geology of a region can be helpful in predicting well yields and availability of groundwater, it is important to do actual groundwater studies to ascertain specific information that can assist a municipality in making land use planning decisions. A study of the Water Resource in Oley Township by the United States Geological Survey (USGS), based on data collected in 1981-82, determined that the Manatawny Creek is directly connected to groundwater aquifers, and that pumping from wells near the stream could substantially reduce the flow of water within the stream. The study found that the southern and eastern parts of the township are underlain by highly permeable carbonate rocks, which yield adequate flows for domestic and agricultural purposes. On the other hand, land north of route 73 is underlain by rocks of low permeability. Some wells in these areas will fail to yield sufficient quantities of water for small domestic supplies. These areas are not suited for extensive development of individual wells.

Public Water Supplies

There are three municipal public water supplies within the watershed: Pottstown, Boyertown, and Oley. Oley uses groundwater from municipal wells in Oley Township, Boyertown is supplied by surface water reservoirs in Earl Township, and Pottstown gets its water from the Schuylkill River.



The Borough of Pottstown has used the Schuylkill River as its source of water for over a century. The present treatment plant

was built in 1964, on the Old Reading Pike at Stowe, just east of the Berks County line. Water from the river is treated by disinfection and filtration, and then distributed to Pottstown, West Pottsgrove, Upper Pottsgrove, Lower Pottsgrove, and parts of Chester and Berks Counties. About 40,000 households and businesses are served.

The Boyertown Reservoir was built in 1920 by building a dam across a gorge at a headwaters tributary of Ironstone Creek. Located at an elevation of about 700 feet, tucked into the valley between Fancy Hill and Long Hill which both rise to heights over 1,000 feet. The reservoir is fed by many springs in the wooded land surrounding it. One and one-quarter miles to the west is Trout Run Reservoir, at the head of Trout Run, which is located in another subwatershed at a slightly lower elevation. This site was developed by the Municipal Authority in 1975 as a supplement to the main reservoir. Water is pumped over the divide (about 800 feet elevation) from the Trout Run impoundment to the Boyertown Reservoir. The water undergoes surface water treatment by sedimentation and filtration in a plant at the Reservoir before being piped through its distribution system. It supplies the borough of Boyertown, as well as developed areas of Colebrookdale, Earl, Douglass-Berks, and Douglass-Montgomery Townships. The average amount distributed is 600,000 gallons/day. The water quality is very good, as the source area is the forested highlands of the Reading Prong. Some naturally occurring minerals produce fairly high iron and manganese levels in Trout Run water, but not enough to require treatment. The Boyertown Municipal Authority owns 520 acres directly adjacent to the reservoirs that are maintained under a forestry management

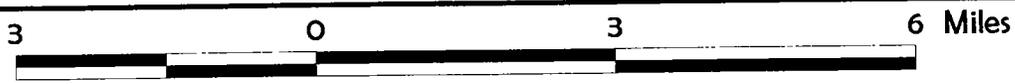
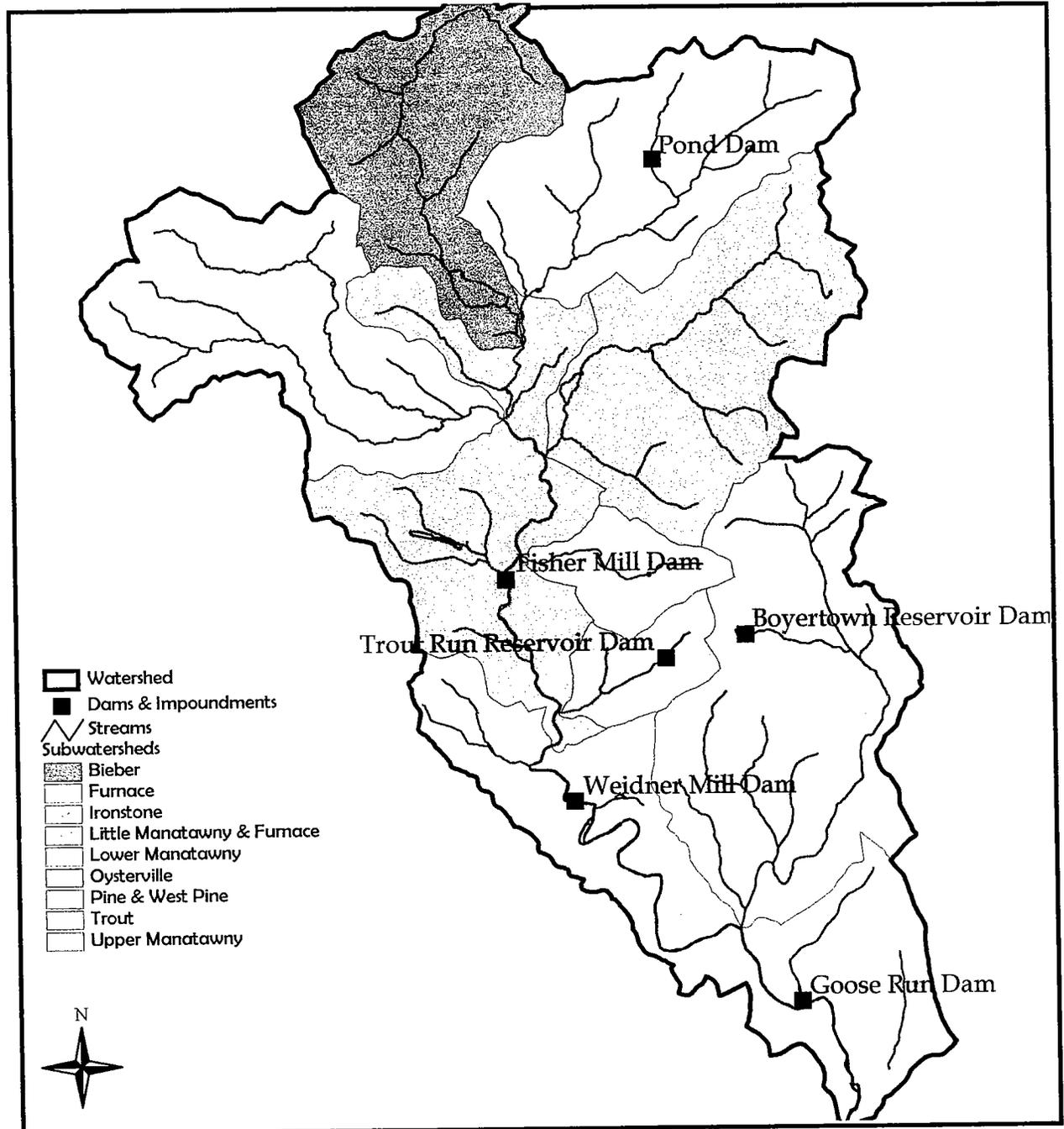
plan to sustain its long-term health. There is a diversified mixture of deciduous and coniferous trees. Although the service area is undergoing significant population growth at the present time, the water supply is adequate to continue to meet the needs of the locality.

Public water in Oley Township serves the village of Oley and surrounding suburban area. Water service dates to the mid-1950's when the Oley Water Company was formed to supply water to Oley Village, with 250 customers. In 1972, the Township Municipal Authority acquired the private company and expanded coverage to the larger developed area, providing public water to 625 customers. The Township utilizes three wells, one southeast of Oley Village, and the others north of the village. A fourth well is being permitted by DEP to relieve the load on the other wells. The water is chlorinated, and one well is also treated with soda ash. It is stored in a 225,000-gallon tank. The water quality and supply have been adequate to meet community needs and no significant problems have been encountered.



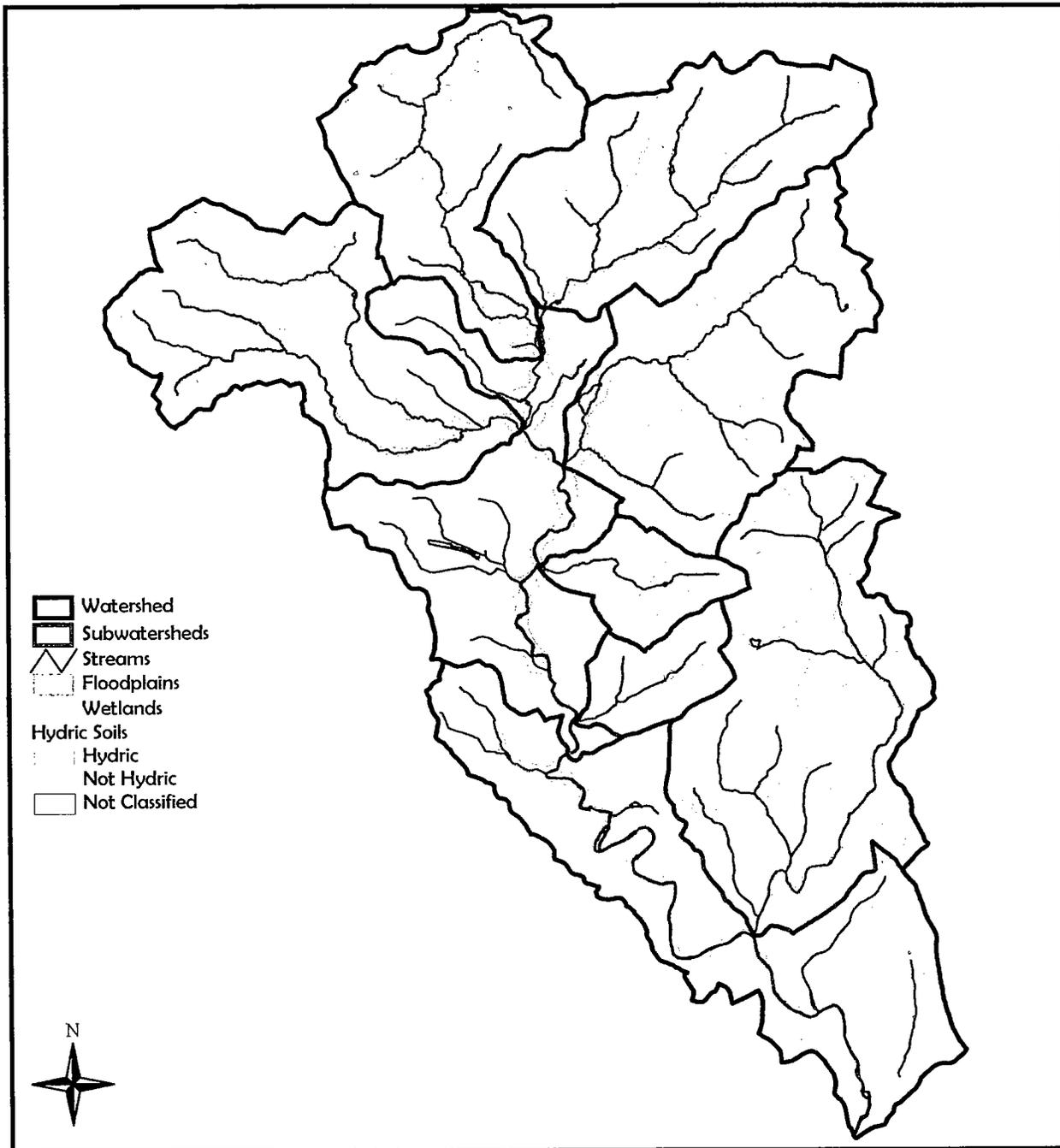
Volunteers studying macroinvertebrates in the Manatawny Creek

Manatawny Creek Impoundments



Berks County Conservancy
 25 N. 11th Street
 Reading, PA 19601
 610-372-4992
info@berks-conservancy.org

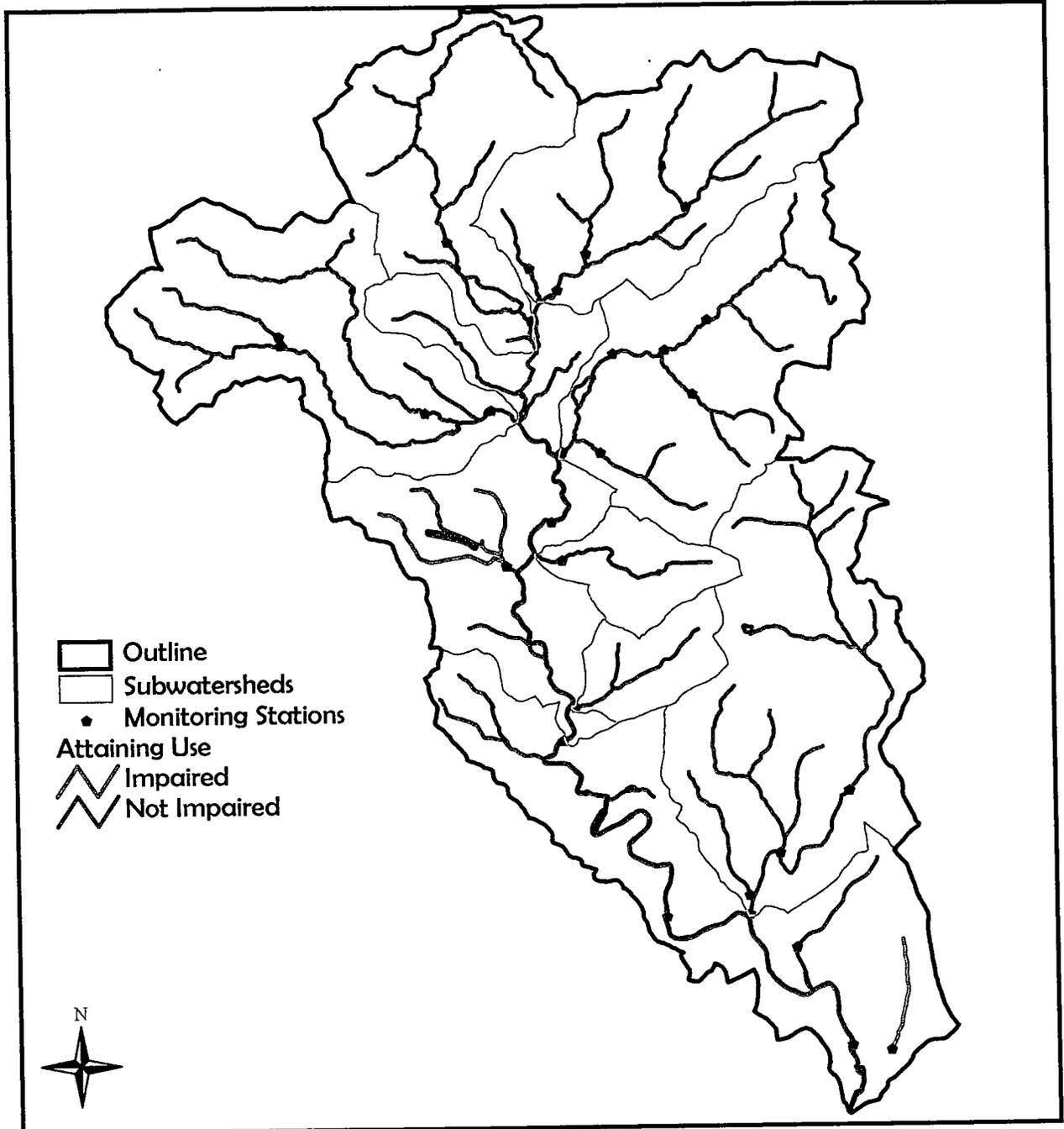
Manatawny Hydric Soil Floodplain & Wetland Areas



Berks County Conservancy
25 N. 11th Street
Reading, PA 19601
info@berks-conservancy.org

November 2001

Manatawny DEP Stream Monitoring



Berks County Conservancy
960 Old Mill Road
Wyomissing, PA 19610
610-372-4992
info@berks-conservancy.org

BIOLOGICAL RESOURCES

Biological Communities

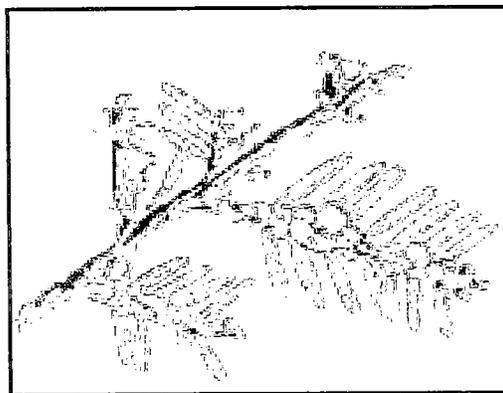
The Manatawny Creek Watershed is home to communities of plants and animals that depend upon the health of the environment for their continued existence. We can look to the diversity of native plants, wild animals and aquatic species as indicators of environmental health for the larger community of living things, including humans. Biological diversity encompasses the variety of life and the web of interrelationships among living things and their environments.

Plants and animals exist in habitat communities, such as different types of forests, wetlands, and grassland regions. Diversity in biological communities promotes stability and equilibrium. Lack of diversity reduces stability, as in a large area of land planted in a single crop that can be devastated by insect or fungus diseases. In a diversified area of plants, this threat is minimized. For example, during the past century, two major tree species were decimated, the American chestnut, in the early 1900s and the American elm, in the mid-1900s, yet the character of the forest maintains its vigor. A pest that is currently a threat to Hemlock Trees is the Woolly Adelgid.

The hemlock woolly adelgid, *Adelges tsugae* Annand, has been recorded as a pest in Oregon, California, Virginia, Delaware, Maryland, New York, and Pennsylvania. Generally, this pest has not caused severe damage in the western United States. However, in eastern Pennsylvania it has caused significant damage to ornamental plantings of Canada hemlock, *Tsuga canadensis*.

The most obvious sign of a hemlock woolly adelgid infestation is the copious masses of white filaments of wax produced by females. These "cottony" masses normally persist throughout the season and into the following year, even after the insects are dead.

Moderate hemlock woolly adelgid populations may cause a reduction in tree health. Severe infestations may result in premature needle drop, reduced twig growth, dieback, or death of trees. The hemlock woolly adelgid is *not* a significant threat to the forests in the Manatawny Creek Watershed. Less than 3% of the watershed consists of evergreen forests compared to deciduous forestland which makes up nearly 48% of the watershed. We may see instances where ornamental plantings of Canada Hemlock are affected by this pest, however, the watershed is not home to large stands of Hemlocks that would be at risk.



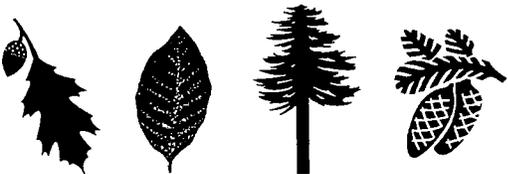
Hemlock woolly adelgid "cottony" masses.

Biological communities of natural vegetation yield many benefits. They furnish habitat for a wide variety of wildlife, provide protection against floods, replenish groundwater supplies, prevent erosion on slopes and uplands, and aid in reducing air

pollution and noise pollution. Yet, in an ever-changing world, biological communities face many threats. The growth of human population and the increasing demand for natural resources greatly impacts natural communities and brings about habitat fragmentation. Any imbalance of chemicals in soil or water can affect the organisms that inhabit these areas. Sensitive species will be the first to react to a change of environment.

Forests

Wooded areas of the Manatawny Creek Watershed consist of mixed deciduous forest, the most common forest type in temperate zones of the eastern U. S. This forest type has a preponderance of broad-leaved trees with dozens of species competing for light and space, nutrients and water. In comparison with more northern forest types, it is immensely diverse and productive.



The composition of the forest varies as a result of selective climate, soil and topographical features. Its canopy commonly contains mixtures of chestnut oak, sweet birch, scarlet oak, red oak, white oak, black cherry, tulip tree, American beech, red maple, and white ash. Wet, lowland areas may include red maple, black ash, pin oak, black walnut, black gum, American beech, shagbark hickory, basswood, sycamore, and river birch. Understory trees and shrubs include ironwood, dogwoods, viburnum, winterberry, blueberry, spicebush and witch-hazel. The forest floor features a wide variety of ferns, mosses and wildflowers

such as trout lily, bloodroot, trillium, violets and mints.

The deciduous forest is rich in species not only because of the cycling of nutrients, but also because numerous organisms can coexist in the same space. All trees and understory plants need sunlight. The herbaceous layer blossoms in the early spring and completes a large portion of its reproductive process before the leaves of the canopy trees shade the forest floor. Such adaptations allow a host of species, such as the spring wildflowers, to share the same ground as the trees.

It has been estimated that each year up to ten million leaves fall on one acre of a productive deciduous forest. Limbs also fall, as do twigs, bark, whole tree trunks, and animal carcasses. All this amounts to thousands of pounds of biomass that is decomposed by billions of microscopic decomposers, bacteria, fungi, and protozoans. Other converters of forest materials are earthworms, beetles, millipedes, and insect larvae. Small mammals such as mice and shrews find food in decomposing vegetation and animal matter. Frogs, toads, and salamanders consume worms, larvae and small invertebrates. Snakes, skunks and raccoons are nighttime predators of smaller animals. Squirrels gather seeds from the forest canopy, while rabbits, fox and woodchucks dig dens in the ground. Bird species are specialized in the niche each occupies, many being year-round residents, while others are migratory. The largest mammal is the white-tailed deer, which browses on twigs, buds, leaves and seeds.

Open Fields

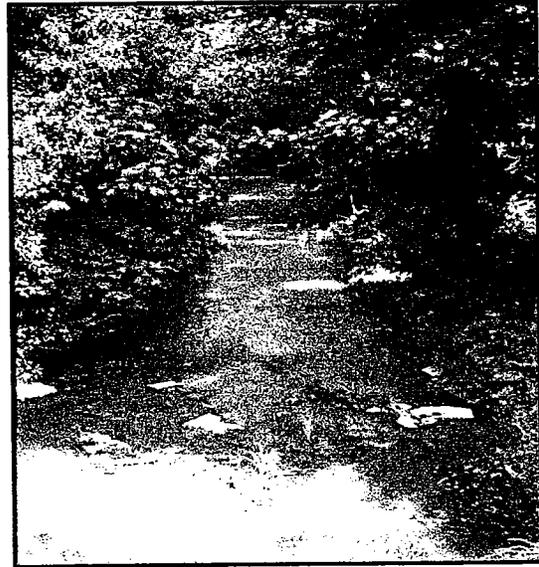
Open fields are abundant in the Manatawny Creek Watershed. An open field can be

active or inactive farmland, pastureland, meadows, and recreation areas. These areas furnish important habitat for all sun-loving plants. Many varieties of perennial wildflowers thrive throughout the growing season wherever there is suitable light and soil. Meadows, floodplains, rights-of-way, borders of fields, and even roadsides, sport a succession of showy blooms from spring to fall. Open wetland areas have specialized plants such as sedges, reeds, and cattails. Often well-drained open lands are maintained by periodic mowing or trimming. Otherwise, there will be a gradual succession from grasses and other soft-stemmed plants to woody plants to trees as the forest begins to re-establish itself.

Open wetlands are home to frogs, turtles, snakes, salamanders, crayfish, muskrats, insects, wading birds, ducks and geese. Fields are the preferred habitat of rodents such as field mice, voles and woodchucks. Rabbits nest in the grasses, and foxes and birds of prey find sustenance here. Small game species are prevalent in fields and thickets, attracting many human hunters during its season. Ring-necked pheasants were once numerous, but have experienced a crash in population, and are now rarely seen. On the other hand Wild turkey have made a strong comeback. Bluebirds, swallows and wrens are increasing in numbers, aided by the provision of nesting boxes in many open areas. Other birds encouraged by grassy habitat areas are meadowlarks, bobolinks and killdeer.

Natural riparian buffers of trees, shrubs and wetland vegetation are found in many areas immediately adjacent to the Manatawny Creek. These natural areas protect stream banks and provide shade for streams and food for aquatic life. Cool water temperatures benefit wild trout and other species of aquatic life that inhabit the

watershed. Connected buffer areas serve as wildlife corridors. Many species of trees and shrubs are beneficial to wildlife for food and cover. Common plants are sycamore, willow, river birch, pin oak, winterberry holly, hazelnut, crabapple, hawthorn, serviceberry, dogwood, and viburnum.



Certain species of plants and animals have reached serious overpopulation. White-tailed deer leave their forest domain to graze on farmers' crops and homeowners' shrubbery. Canada geese over-winter here and find nesting sites along streams and ponds and feeding areas in farm fields. Both are causing severe damage and economic hardship. In addition, invasive non-native plant species are out-competing native species and threatening the ecological balance of habitats. These plants include multiflora rose, Japanese honeysuckle, and purple loosestrife.

Wetlands

Wetlands are found throughout the Manatawny watershed, with the largest wetlands areas in the headwaters tributaries of Pine Creek, Oysterville Creek, and Bieber Creek. Wetlands connected with EV

streams can also be classified as Exceptional Value when they provide habitat for protected species of plants and animals listed as Endangered or Threatened in Pennsylvania.

As an example, a detailed study of a 26-acre spring-fed EV wetlands along the floodplain of Pine Creek in Pike and Oley Townships was undertaken in 1996 to determine the potential effect of the installation of a bulk water supply well which would pump 288,000 gallons a day at the edge of the wetlands complex. The site is a forested wetland with a canopy of 60 to 70 feet, and a typical diameter at breast height of 20 inches or more. The plant species identified included 95 kinds of herbs, 20 shrubs, and 23 trees. Dominant trees are red maple and black ash, and other common species are black gum, American elm, pin oak, musclewood, eastern white pine, northern red oak, and eastern red-cedar. Small hummocks support tuliptree, American Beech, sweet birch, white ash and shagbark hickory. The understory is composed of northern spicebush, highbush blueberry, southern arrow-wood, brookside alder, American elderberry, eastern leatherwood, poison sumac, downy service berry and maleberry. The herbaceous layer includes yellow marsh marigold, American's golden saxifrage, watercress, log fern, royal fern, broad-leaf cattail, Solomon's seal, cinnamon fern, swamp lousewort, and white nodding ladies-tresses. PNDI *endangered* species are log fern and swamp lousewort; *threatened* is rigid sedge; *rare* are wooly-fruited sedge, and crippled-cranefly orchid. Studies of the biology and hydrology of the wetlands area concluded that operation of a large water extraction well at its edge would effectively dewater the wetlands, altering habitat conditions for their populations of rare and endangered wetlands plants, and also impacting the flow of Pine Creek, an

Exceptional Value, Class A Trout stream. These studies were used in the PA Department of Environmental Protection hearings which resulted in remanding of the permit for the spring water extraction proposal. The wetlands continue to be monitored regularly by Albright College botany students.

Other wetlands in the watershed are known to furnish habitat for breeding populations of a Pennsylvania Endangered animal, the Bog Turtle. Some of these areas have been the subject of scientific studies by the Nature Conservancy (TNC) and others. The Nature Conservancy is an international conservation organization whose mission is to preserve and protect rare, threatened and endangered species and the land and waters they need to survive. TNC has initiated an outreach program to expand awareness about the need for biodiversity conservation in Pennsylvania. It has selected high ranking biodiversity sites for Conservation Site Planning, in cooperation with the property owners, and local conservation organizations. One of selected sites, known as the Muhlenberg Site, is a wetlands area in the Pine Creek watershed. TNC's local partner for this project is the Berks County Conservancy.

Aquatic Biota

The Manatawny and its tributaries support coldwater aquatic species, including both native and stocked fish, adding to the region's importance for recreational fishing. The Pennsylvania Fish and Boat Commission has conducted many surveys of the area's streams. An example of the biota is the 1999 survey of the Oysterville Creek, which lists the following fishes: Brown trout, Rainbow trout, Redfin pickerel, Common shiner, Cutlips minnow, Blacknose dace, Longnose dace, Fallfish, creek chub,

White sucker, Bluegill, Smallmouth bass, Tessellated darter, Margined madtom, and Yellow bullhead. Benthic macroinvertebrate samples showed good taxonomic diversity, including several genera that are sensitive to water quality degradation. This stream supports a wild brown trout population.

Rare, Threatened and Endangered Species

The Pennsylvania Natural Diversity Inventory (PNDI) is a listing of the Commonwealth's rarest and most significant ecological features. These features include plant and animal species of special concern, rare and exemplary natural communities, and outstanding geological features. The PNDI information is continually updated to include recently discovered locations and to describe environmental changes affecting known sites. The PNDI classifies species as Endangered, Threatened or Rare. Natural communities can be located through species records and other sources including aerial photos, soil surveys and geological maps. Field surveys are conducted to further verify and describe the resource. Sites rich in diversity are identified and monitored for future conservation efforts.

PNDI sites in the Manatawny Creek Watershed have been identified and mapped. They have also been given priority ranking by the County in the Berks County Natural Areas Inventory. Sites are ranked from 1 (the highest priority for protection based on state or national significance) to 5 (the lowest priority for protection). Ranks take into account potential threats, management needs, and existing protection. Descriptions and rankings of the sites follows:

Lobachsville Wetland/Pine Creek Watershed – Rank 1

This Pine Creek watershed, in its entirety, is listed as a significant Natural Community. Within this site is a series of connected wetlands of the West Pine Creek and Main Branch of Pine Creek. The wetlands are open with varied vegetation including cattail marshes, sedge marshes and some shrubby areas. Several sub-populations of a PA-Endangered animal species have been found within this site, including an excellent quality breeding population. All of the wetlands within this site provide potential migration or breeding habitat.

Protection of the Pine Creek watershed is very important for this species in PA. A good quality population of a plant species of concern was found in a wet meadow under a canopy of ash elm, and swamp white oak, growing with blue lobelia, horsetails, mountain mint, water hemlock, ironweed, asters and ladies-tresses.

Long Lane Site – Within Pine Creek Watershed

This is a forested wetland along Pine Creek where an animal species of concern was found. More surveys are needed to evaluate the habitat and the population.

Bitting Road Site – within Pine Creek Watershed

An animal species of concern was found here in a wetland adjacent to Pine Creek. Additional survey work is needed.

West Branch Pine Creek Seeps – Within Pine Creek Watershed

The headwaters area of the West Branch of Pine Creek located in Rockland Township

supports a forest of mature tulip poplar. Although logged in the past, the forest maintains a high diversity of plant species because of the various wet and dry microhabitats. The area does not contain natural communities or species of special concern, but is significant at the county level and should be preserved in order to protect the water quality of Pine Creek. Pine Creek and its watershed are designated Exceptional Value.



West Branch Pine Creek

Bieber Creek Wetlands – Within Lobachsville Floodplain Forest

A fair population of a PA-Threatened sedge grows in a wet meadow south of Lobachsville, in Pike and Oley Townships, within the Lobachsville Floodplain Forest near Bieber Creek. Beech dominates part of the forest with white ash, tulip poplar, and sugar maple. Spicebush, the most common shrub, grows amid a diverse herbaceous layer. Natural disturbances include deer browse and flood scouring which have allowed some exotic species to become established. Deer may also be suppressing natural regeneration of the floodplain forest. Although development of the forest is unlikely, other disruptive activities such as logging pose a threat. Human disturbance should be minimized so that the forest can continue to provide open space, as habitat

for wildlife, flood storage capacity, and water quality protection of Bieber Creek.

Oley Valley Watershed – Rank 2

An animal species of concern was found in an extensive wetland area. The open canopy includes sugar maple, bitternut hickory, American elm, red maple, ash beech, black walnut, and swamp white oak. The population is healthy and reproducing. No special management is needed. A good population of a plant species of concern is also found within this site. The water quality of Furnace creek and Little Manatawny Creek should be protected.

Boyer's Junction Seeps – Rank 5

A PA-Endangered grass grows in a seepage wetland near the village of Boyer's Junction in Rockland and Ruscombmanor Townships. The seep occurs along a stream flowing through a closed-canopy forest of red maple, common alder, and skunk cabbage. Another site for this PA-Endangered plant occurs in a similar circumstance along the east side of Bieber Creek in Rockland Township. The grass grows with skunk cabbage in a wooded wetland characterized by scattered streamlets and seeps, mossy hummocks, and rocks. Although the population is small, the site is little disturbed and there are no apparent threats to the grass at present.

New Jerusalem Cemetery Woods–Rank 5

A poor quality of a PA-Endangered shrub species was found here growing adjacent to several small ponds, associated with other shrubs including high-bush blueberry, winterberry, chokeberry, and serviceberry. Disturbance of the pools by development or logging is a potential threat to the species of concern.

Trout Run – Locally Significant

Trout Run is an Exceptional Value Stream located in Earl Township, flowing off the uplands of the Reading Prong in Earl Township. Logging and development within the watershed of Trout Run should be minimized to protect the stream and its biota.

Shenkle Hill Forest – Locally Significant

Pinnacle Point Slope; located in Shenkle Hill Forest in Earl Township is a steep, rocky, northwest-facing slope developed on quartzose/feldsparic sandstone and conglomerate. The forest covering the slope is locally significant because it offers a reasonable representation of the native dry oak woods. It is mature enough to have a well-developed structure with distinct canopy, shrub, and herb layers and contains at least two orchids – pink lady’s slipper and rattlesnake plantain. The woodland provides habitat for a variety of birds including the pileated woodpecker whose distinctive oblong holes were observed. Chestnut oak, red oak, and black birch dominate the 50 to 60 foot canopy of 80% cover. The shrub layer of 50% cover consists of witch hazel, maple leaf viburnum, huckleberry, mountain laurel, and pinxter flower. A sparse herb layer includes wild sarsaparilla, smooth Solomon’s seal, and associated ferns such as wood fern and rock-cap fern. The slope should be protected from logging.

Amityville Floodplain Forest – Locally Significant

The Amityville Floodplain includes a large island and steep northwest-facing slope on Manatawny Creek east of Amityville. The floodplain and island have similar plant species. Trees include sycamore, beech,

tulip tree, red maple and several others. Spicebush, hornbeam, and ironwood as well as some weedy species are prominent in the shrub layer. A high diversity of herb species (more than 30) reflects the abundance of microhabitats associated with floodplain areas. Virginia cowslip was very abundant in late April. The slope above the creek faces north. This cool, mesic slope has a plant community dominated by a 60-70’ canopy of beech, hemlock, and tulip tree, with some black birch, white ash, and red oak. Witch hazel and maple-leaf viburnum are dominant shrubs with small patches of American yew growing atop rock outcrops.



Habitat Protection

Protecting natural habitat areas is essential for the long-term environmental quality of the Manatawny Creek watershed. The PNDI sites are significant statewide because they provide habitat for rare and endangered species. However, all natural areas are subject to development pressure. Working with landowners and land developers to protect stream corridors and retain native vegetation can help sustain biological diversity and enhance quality of life for residents.

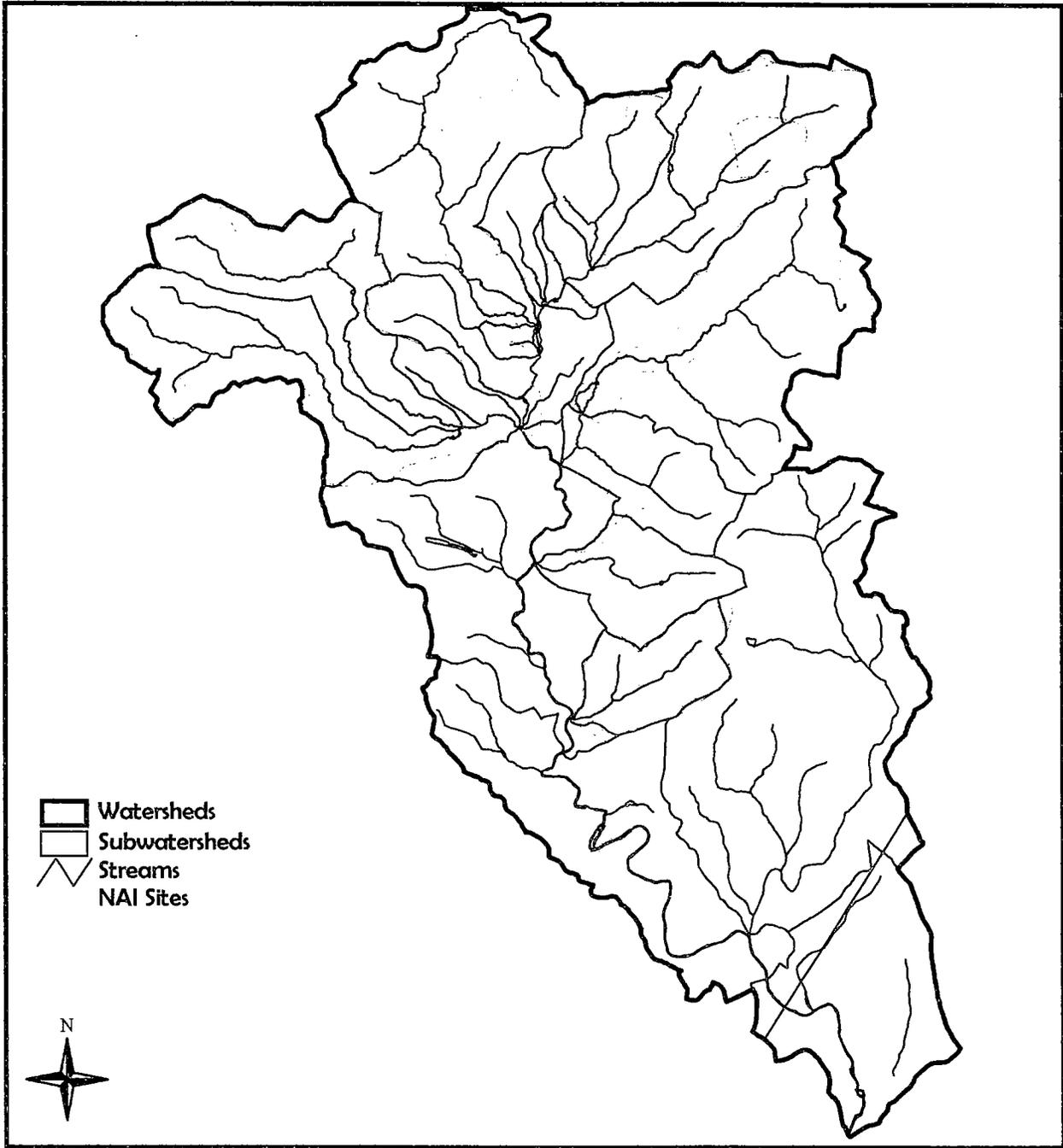
Please refer to Table 9 for a listing of PNDI sites that are within the boundaries of the Manatawny Creek Watershed.

Table 9. PNDI Sites in the Manatawny Creek Watershed.

District	County	Site Name	Benefits	Area
District	Manatawny	Landis Store Site	SA525, SA526	193.65
Oley, Pike	Manatawny, Fleetwood	Lobachsville Wetland/Floodplain	NC512, SP520, SA516, LSA	697.21
Oley, Alsace, Ruscombmanor, Rockland	Fleetwood, Birdsboro, Manatawny	Oley Valley Watershed	SP529, SA533	7686.86
Rockland	Fleetwood, Manatawny	New Jerusalem Cemetery Woods	SP539	117.41
Earl	Boyertown	Shenkel Hill Forest	Locally Significant	245.69
Earl	Boyertown	Trout Run	NC510	1609.08
Amity	Boyertown	Amityville Floodplain Forest	Locally Significant	53.25
District	Manatawny	Long Lane Site	SP502	403.90
Longswamp, District	Manatawny	Pine Creek Headwaters	SA507	17.48
Rockland	Manatawny	West Branch Pine Creek Seeps	Locally Significant	111.69
District, Pike, Rockland	Manatawny	Pine Creek	NC512	5442.75
Ruscombmanor, Rockland	Fleetwood	Boyers Junction Seeps	SP503	534.94
Rockland	Fleetwood	Bieber Creek Wetlands	SP504	204.66
Oley, Pike	Manatawny	Oysterville Creek Site	SA517, SA527	634.39



Manatawny Natural Areas Inventory Sites



Berks County Conservancy
25 N. 11th Street
Reading, PA 19610
610-372-4992
info@berks-conservancy.org

CULTURAL AND HISTORIC RESOURCES

The Manatawny region was the first settlement area in Berks County, dating from 1701 when William Penn granted a warrant for a tract of 10,000 acres in Amity Township to a group of Swedes who chose land along the Schuylkill River at “Morlatton”, now Douglassville. This opened a new territory to a melting pot of European immigrants, German, Swiss, French and English to the Schuylkill and Oley Valleys so that by 1750 most the land was occupied by some 150 landowners of large tracts in Amity and Oley.

Through the mid-1700s, this became a region of prosperous farms. The area was ideally suited to the production of wheat, which became a prime export commodity. The “wheat boom” lasted from the 1740s to the Revolutionary War period, accounting for 69% of Philadelphia’s exports. This was a cash windfall for southeast Pennsylvania’s farmers, and was especially significant to the Oley Valley’s agricultural and architectural heritage.

In addition to its agricultural prominence, the Manatawny became a leading iron-making region. The first iron works in the Pennsylvania was Thomas Rutter’s Pool Forge, built about 1716 along the Manatawny Creek in Douglass Township. This “bloomery forge” produced wrought iron by heating the ore to a very high temperature and beating out the impurities with a tithammer. In 1719 Colebrookdale Furnace was built along the Ironstone Creek by Thomas Rutter and Thomas Potts. This was the first iron furnace in the Commonwealth. In the following decades Potts, Leshar, Hunter, Udree and related families established other

ironworks along the Manatawny and its tributaries. The continued expansion of this industry promoted Berks County to have the greatest number of iron-works in Pennsylvania by the end of the 18th century.

Not only did the Manatawny Creek and its tributaries furnish power for iron forges, but numerous grist mills, paper mills, sawmills and oil mills were established by farmers and industrialists, using and adapting milling technology to their own streamside location. Thus, the Manatawny Creek system was integral to the development of a strong rural economy at an early period.

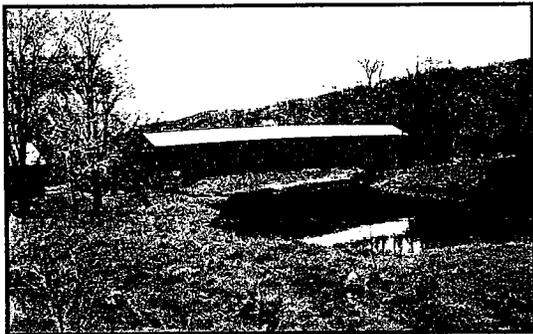


Pottsgrove Manor 1752, W. High Street Pottstown

Reminders of this waterpower industrial heritage are evident today in the many historically significant buildings and sites along the stream corridor. Especially notable are Ironmasters mansions: “Pottsgrove Manor” in Pottstown (John Potts, 1752); “Pine”, Pine Forge (Thomas Rutter, 1720); “Popodickon”, Gablesville (Thomas Potts, 1720); “Oley Forge”, Spangsville (John Leshar, 1750); “Spang Mansion”, Spangsville (Frederick Spang, 1808); “Hunter Mansion”, Covered Bridge

Road (Nicholas Hunter, 1805); and “Oley Furnace Mansion”, Oley Furnace (General Daniel Udree, 1801). Most of these fine manor houses have been restored, and one, Pottsgrove, is open to the public as a Montgomery County Historic Site.

The number of surviving gristmills is remarkable, as none have been used for their original purpose for over fifty years. Most stand vacant, many are deteriorating, and several have been converted to residential use. The most intact examples of these mills were listed on the National Register of Historic Places in 1992, having been nominated after an extensive survey by the Berks County Conservancy. These National Register Mills are: Udree Mill (1823), Furnace Creek, Oley Township; Bertolet Mill (1841), Little Manatawny Creek, Oley Township; Griesemer Mill (1847), Manatawny Creek, Oley Township; Weidner Mill (1855), Manatawny Creek, Amity Township; Yoder Mill (1888), Oysterville Creek, Pike Township; Mill at Lobachsville (1887), Pine Creek, Pike Township; Bahr Mill (1897), Ironstone Creek, Colebrookdale Township. The Bahr Mill Complex, in Gablesville, is open to the public as a local historic site. It features a rare example of an overshot wooden water wheel, thirteen feet high and five feet broad, made in the 1920s by a Reading millwright. The Bahr Brothers, owners of the mill until the late 1990s, operated a wooden rake factory there.

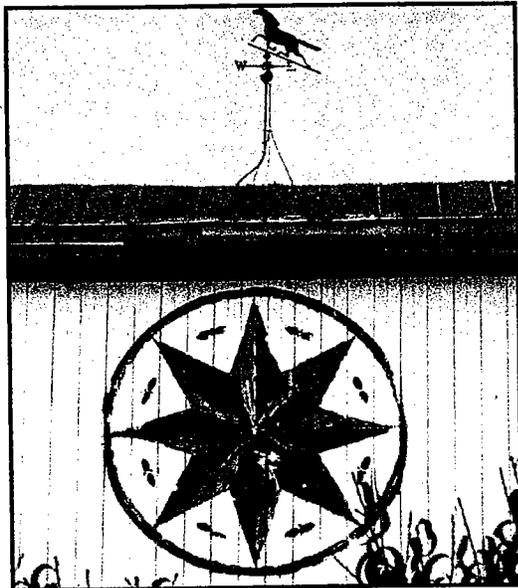


Griesemer Mill Bridge, Spangville Road

At most historic industrial sites in the watershed, the waterpower system included dams across the streams to impound the water and a millrace to carry the water to the waterwheel housed in the mill or forge. Remnants of these water power adjuncts are found at many sites, the most intact being Weidner Mill in Amity Township (also called Manatawny Mill), which has a large dam across the Manatawny Creek, and a series of gates along the race directing water to the wheel pit of the mill building. Another dam along the Manatawny is the Fishers Mill Dam, with a functioning race that carries water to the former mill site at Fishers Mill Road. Races leading to millponds can be found at the Pike Township gristmills, Yoder Mill at Pikeville and the Mill at Lobachsville. There has been some recent controversy concerning permit requirements for the dredging of the Yoder millrace in order to maintain the level of water in the millpond. There also has been some controversy about the issue of dam-removal in general. Periodic flooding of the Manatawny has breached most old milldams, and those that remain have been maintained to a certain extent by the property owners of the adjoining land.

Probably the most compelling historic attribute of the Manatawny Watershed is its well-preserved cultural landscape. This is most evident in the Oley Valley. Oley is considered a *cultural hearth*, a region which developed a distinct architectural and folk-cultural identity, which then was transferred to other regions when families took their traditions to new locations. The whole township of Oley is the largest National Register Historic District in Pennsylvania. It represents a Pennsylvania farming community where existing architectural and cultural heritage illustrate 250 years of rural life. Oley has about 160 historic farm complexes that represent the evolution of farming

practices through the centuries. It has six historic villages. Its preservation ethic derives from Pennsylvania German values to build for permanence and to keep what can be used. Thus a farmstead may have many outbuildings, of different periods and functions, and the farm landscape includes limekilns, old quarry sites, family burial grounds, locust groves, woodlots, meadows, cropland, fencerows, and some very old oak trees.



There are many excellent examples of Period architecture throughout the Manatawny Watershed. From log and stone cabins, to large steep-roofed “Germanic” manor houses, to Georgian mansions, to Victorian village homes, to the hundreds of vernacular houses, churches, schoolhouses, mills, and farm buildings, the region exhibits integrity of structure and design. These are the buildings that were inventoried by the Berks County Conservancy in the 1980s, and which are recorded with the Pennsylvania Historical and Museum Commission. The cut-off date for historical data is 50 years prior to the survey, as proscribed in National Register criteria. The past 50 years have brought a different type of construction, both in terms of building style, and use of land.

Suburbanization of rural landscapes presents a new cultural pattern that in many ways conflicts with historic integrity.

Preservation of historic buildings is a private property owner’s prerogative, involving an appreciation for traditional values and workmanship, and a constant need for maintenance. Pride of ownership is very evident throughout the region. Homes are well cared for and beautification of gardens and landscape plantings lend a special touch. Preservation of a large historic landscape is another matter. In a rural area it depends to a large extent upon the continued use of the land for farming, and on the retention of historic buildings on the farms, themselves. This retention of farmland and farm buildings has made the greater Oley Valley a nationally recognized historical area of great distinction. Continuing a healthy economic environment for farming is essential in maintaining this important cultural resource area.

Please refer to the following map of Historic Resources in the Manatawny Creek Watershed, as well as Table 10 on Pages 44-51 which lists all of the recognized historic sites in the watershed by name and township.

Each year the Berks County Conservancy sponsors a *3 Centuries in Berks* Tour, which is a self-guided tour of historic properties throughout a particular region of Berks County. In October 2001 the tour focused on the Oley Valley and included nine sites of fascinating historical significance.

Two of these sites lie near the Manatawny Creek, one of which is the Oley Forge Ironmaster’s Mansion. This c.1750 mansion currently serves as a bed and breakfast. A privately-owned 20th Century

log cabin along Manatawny Road was also featured on the tour.



Recreation

The Manatawny Creek Watershed is fortunate to have over 50 different recreational facilities. These include a mixture of municipal land and parks, religious camps and groves, public and private school grounds, golf courses, Pennsylvania State Game Lands, sportsman clubs, and various lands under private ownership.

Currently, continuous public trails along the upper reaches of the Manatawny's stream corridor do not exist. Much of the land along the corridor is privately-owned,

unlike other local streams such as the Tulpehocken and Hay Creeks that have local government-owned land along much of the corridor which provide for ideal public recreation facilities.

However, near the mouth of the Manatawny Creek lies the Pottstown Memorial Park in the Borough of Pottstown. This facility has much potential for trail connections to the Schuylkill River Corridor and beyond. The Montgomery County Lands Trust is partnering with municipalities and organizations to establish a green network along the Schuylkill River in this region.

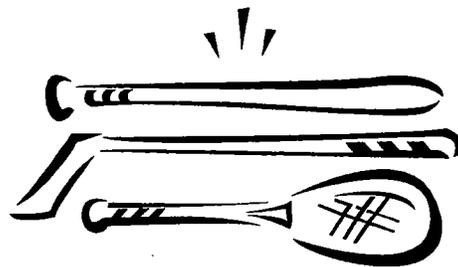


Table 11 on Pages 52-54 lists the recreational facilities, including location, acreage, and uses within the Manatawny Creek Watershed, Berks County.

Table 10. Recognized Historic Sites in the Manatawny Creek Watershed.

Historic Name	Register	Municipality
Boyer Farm	PHMC	Ruscombmanor
Hill Homestead	NR Eligible	Ruscombmanor
Fox Homestead	PHMC	Ruscombmanor
Old Baptist Society	PHMC	Ruscombmanor
Gaube, Martin House	PHMC	Ruscombmanor
Snyder Farm	PHMC	Ruscombmanor
Bush Tavern	PHMC	Ruscombmanor
Kennedy, Ann & Richard Property	PHMC	Ruscombmanor
Schwoyer, Dale & David Property	PHMC	Ruscombmanor
Wegman, Douglass & Linda	PHMC	Ruscombmanor
Hartman Farm	PHMC	Ruscombmanor
Baum Farm	PHMC	Ruscombmanor
Klein's Tree Farm	PHMC	Ruscombmanor
Holyoke, J. Foundry	PHMC	Ruscombmanor
Link's School House	PHMC	Ruscombmanor
Link Farm	PHMC	Ruscombmanor
Derolf, Daniel D. Property	PHMC	Ruscombmanor
Oley Furnace Tract	PHMC	Rockland
Shaner, Richard & Eleanor Proper	PHMC	Rockland
Stony Point (Village of Dryville)	PHMC	Rockland
Bieber Creek Church	PHMC	Rockland
Dry Store	PHMC	Rockland
Farmers & Drovers Hotel	PHMC	Rockland
New Jerusalem (Village of)	PHMC	Rockland
Snyder, Luke Property	PHMC	Rockland
New Jerusalem Church	PHMC	Rockland
New Jerusalem Hotel	PHMC	Rockland
Lendaki, Jerome Property	PHMC	Rockland
Nieznay, Stanley Property	PHMC	Rockland
Delong Bridge	PHMC	Rockland
Hollowbush, Robert & Sue Propert	PHMC	Rockland
Forgedale Rd Property	PHMC	Rockland
Readinger, Wayne Property	PHMC	Rockland
Reinert Equipment Shop	PHMC	Rockland
Stolz, Paula & Deborah Property	PHMC	Rockland
Rockland Forge Farm	PHMC	Rockland
Stonehill	PHMC	Rockland
Angstadt Homestead	PHMC	Rockland
Lengel, James Property	PHMC	Rockland
Huff, Alfred Property	PHMC	Rockland
Moyer Farm	PHMC	Rockland

Rupperts School	PHMC	Rockland
Paddock Property	PHMC	Rockland
Pott, William Homestead	PHMC	Pike
Yoder, Jacob House	PHMC	Pike
Keim Homestead	NR Listed	Pike
Lobachsville (Village of)	PHMC	Pike
Breitegam Property	PHMC	Pike
Yarrison, Charles Property	PHMC	Pike
Lobachsville General Store	PHMC	Pike
Keim, Hoch House	PHMC	Pike
Mill at Lobachsville	NR Listed	Pike
Yoder, Solomon House	PHMC	Pike
Rhoads, Rudolph Property	PHMC	Pike
Walborn, Earl Property	PHMC	Pike
Addock, Gladys Property	PHMC	Pike
Reichert, Mrs. Homer Property	PHMC	Pike
Reider Gristmill	PHMC	Pike
Pikeville (Village of)	PHMC	Pike
Haas, Stanley Property	PHMC	Pike
Polansky, Margie & Martin Proper	PHMC	Pike
Landis Stable	PHMC	Pike
Pikeville Hotel	NR Eligible	Pike
Shade, Leroy Property	PHMC	Pike
Yoder Mill	NR Listed	Pike
Lobach House	PHMC	Pike
Lobachsville Hotel	PHMC	Pike
Reinert House	PHMC	Pike
McCarthy, John House	PHMC	Pike
Lobach Woolen Factory Site	PHMC	Pike
Keim, A.C. House	PHMC	Pike
St. Paul's Union Church	PHMC	Pike
Keim, Johannes Homestead	PHMC	Pike
Standhardt, W. Property	PHMC	Pike
Oysters' Farm	PHMC	Pike
Miner, Joel Property	PHMC	Pike
Drumheller School	PHMC	Pike
Drumheller Farm	PHMC	Pike
Dunkelberger Property	PHMC	Pike
Hartline Property	PHMC	Pike
Mountain Mary Farm	PHMC	Pike
Dotterer Homestead	PHMC	Pike
Old Carl Farm	PHMC	Pike
Hill Church Store & Post Office	PHMC	Pike
Shaneline, Hazel Property	PHMC	Pike
Moser Farm	PHMC	Pike

Gulden, Samuel Settlement	PHMC	Oley
Steppleton, J. & A. Property	PHMC	Oley
Fisher's Mill	PHMC	Oley
Baum, Daniel Farm	PHMC	Oley
Houp, Gerald Property	PHMC	Oley
Hunter, Nicholas House	PHMC	Oley
Leshner House	PHMC	Oley
Griesemer, Enoch Inn	PHMC	Oley
Misiaszek, Michael J. Property	PHMC	Oley
Spangsville Store	PHMC	Oley
Spang House (Spangsville Mansion	PHMC	Oley
Oswald Estate	PHMC	Oley
Fegley, Dr. Property	PHMC	Oley
Hoch, Elwood Sr. Property	PHMC	Oley
Wagner, Henry Property	PHMC	Oley
Zook, Omar Property	PHMC	Oley
Rhoads, Earl Property	PHMC	Oley
Kurtz, Lowell Property	PHMC	Oley
Corson, Guy Estate	PHMC	Oley
Whitner House	PHMC	Oley
Richard, Wilmer Property	PHMC	Oley
Rothenberger Farm	PHMC	Oley
Shelley, Donald Property	PHMC	Oley
Rhoads, Samuel Property	PHMC	Oley
Griesemersville Hotel	PHMC	Oley
National Gypsum Property	PHMC	Oley
Eyrich, Elmer Property	PHMC	Oley
Kaufman House	PHMC	Oley
Stahler, Katherine Property	PHMC	Oley
Schlegel, George Property	PHMC	Oley
Lechner, Paul Property	PHMC	Oley
Dunn, Samuel Property	PHMC	Oley
Covered Bridge Rd House	PHMC	Oley
Hartz, Jacob Property	PHMC	Oley
Locust Ford Farm	PHMC	Oley
Bertolet, John Homestead	PHMC	Oley
Rutter, Thomas Property	PHMC	Oley
Bertolet, Abraham Property	PHMC	Oley
Bertolet, Tenant House	PHMC	Oley
Schaeffer, Charles Property	PHMC	Oley
Christman's	PHMC	Oley
Bertolet Gristmill Farm	PHMC	Oley
Guldin, Samuel Settlement	PHMC	Oley
Hunter Settlement	PHMC	Oley
Lichenstein, Edwin Property	PHMC	Oley

Knabb 'Picnic Woods'	PHMC	Oley
Trout Farm	PHMC	Oley
Angstadt Homestead	PHMC	Oley
Kemp's Tavern	PHMC	Oley
Hunter, Daniel Home	PHMC	Oley
Deturk House	PHMC	Oley
Deturk, Issac Homestead	PHMC	Oley
Miller, Donald Property	PHMC	Oley
Youse, Mary Property	PHMC	Oley
Eyrich, Elmer Property	PHMC	Oley
Knabb-Kauffman Grist Mill	PHMC	Oley
Williamson, Barrie Property	PHMC	Oley
Zackson, Bernard Property	PHMC	Oley
Wentzel Tannery	PHMC	Oley
Knecht, Tom House	PHMC	Oley
Holcraft	PHMC	Oley
Laucks Homestead	PHMC	Oley
Hoch, Estella Property	PHMC	Oley
Heffner Farmstead	PHMC	Oley
Udree, General Daniel Mansion	PHMC	Oley
Furnace Hill	PHMC	Oley
Homan, Arthur Property	PHMC	Oley
Oley Furnace Boarding House	PHMC	Oley
Kohout, Addison Property	PHMC	Oley
Eshelman, Martin Property	PHMC	Oley
Galambos, Franklin Property	PHMC	Oley
Yoder Homestead	PHMC	Oley
Heinbach, Dr. Wilfred Property	PHMC	Oley
Heinbach, Dr. Wilfred Property	PHMC	Oley
Herbein, Carl Property	PHMC	Oley
Stitzer Rd House	PHMC	Oley
Geissenhainer, Richard Property	PHMC	Oley
Breil Homestead	PHMC	Oley
Howard, Leroy Property	PHMC	Oley
Levan Homestead	PHMC	Oley
Richard, Ralph Property	PHMC	Oley
Lebe, Regina Property	PHMC	Oley
Hoch, Mark Property	PHMC	Oley
Conrad Raymond Property	PHMC	Oley
Lunt William Property	PHMC	Oley
Hoppes, Paul Property	PHMC	Oley
Levan, Herbert Property	PHMC	Oley
Labe, Paul Property	PHMC	Oley
Miller, Victor Property	PHMC	Oley
Richard, Ralph C. Property	PHMC	Oley

Yoder Rd House	PHMC	Oley
Labe, Paul Property	PHMC	Oley
Glase's General Store		Oley
Oley Inn		Oley
Crawley Property		Oley
Jones Property		Oley
Kohn Property		Oley
McCarthy Property		Oley
Reider Cabin	PHMC	Earl
Cleaver, Jonathon House	PHMC	Earl
Weiss, Warren Property	Demolished	Earl
Shall, Tobias House	PHMC	Earl
Moyer, Harvey & Regina Property	PHMC	Earl
Shanerville Orchards	PHMC	Earl
Brumbach Farm	PHMC	Earl
Montgomery. William G. Property	PHMC	Earl
Merkle Farm	PHMC	Earl
Shanesville (Village of)	PHMC	Earl
Heidelbaugh, John Property	PHMC	Earl
Weiss Farm	PHMC	Earl
Woodchoppertown	PHMC	Earl
Krause, S. Property	PHMC	Earl
Federoff. L Property	PHMC	Earl
Mathias	PHMC	Earl
Hill, Richard Property	PHMC	Earl
Mininger Log Cabin	PHMC	Earl
Dotterer Farm	PHMC	Earl
Fretz, Barry Property	PHMC	Earl
Endy, Mary & James House	PHMC	Earl
Spring Forge	PHMC	Earl
Spring Forge	PHMC	Earl
Weiss Tavern	PHMC	Earl
Cook's Antiques	PHMC	Earl
Scheifley, Sarah Property	PHMC	Earl
Apler Stone Cabin	NR Eligible	Earl
Rahn, George Property	PHMC	Douglass
Little Oley Hotel	PHMC	Douglass
Briar Cliff	PHMC	Douglass
Snyder, Peter Property	PHMC	Douglass
Sell, Francis Property	PHMC	Douglass
Willow Glen	PHMC	Douglass
Reinert, Elenora Property	PHMC	Douglass
Simmons, Elmer Property	PHMC	Douglass
Borneman, Ralph Property	PHMC	Douglass
Lipton, Mr. & Mrs. Morris Proper	PHMC	Douglass

Gresh Property	PHMC	Douglass
Shirley, David Property	PHMC	Douglass
Creamery	PHMC	Douglass
Cerbulis, Janis Property	PHMC	Douglass
Gilbert Mill	PHMC	Douglass
Wilcox, Gene Property	PHMC	Douglass
Reed, Mrs. Edwin V. Property	PHMC	Douglass
Northrup, Jack Property	PHMC	Douglass
DeAngelo, Rocco Property	PHMC	Douglass
Keim, William Property	PHMC	Douglass
Wells, Kenneth Property	PHMC	Douglass
Bowers, Bruce Property	PHMC	Douglass
Hanley, Daniel Property	PHMC	Douglass
Hoffman, William Property	PHMC	Douglass
Cinaglia, Ruth Property	PHMC	Douglass
Romich, Harry M. Property	PHMC	Douglass
Schlick, Fred & Magda Property	PHMC	Douglass
Moore, Alanzo & Lillian Property	PHMC	Douglass
Rhoads, Ralph & Ruth Property	PHMC	Douglass
Wagner's Mill	PHMC	Douglass
Frick, Edna Property	PHMC	Douglass
Hockel, Ed Property	PHMC	Douglass
Hill Creek Rd House	PHMC	Douglass
"Golden Rule" Chapel	PHMC	Douglass
Swist, Scott Property	PHMC	Douglass
Luicana, Donald Property	PHMC	Douglass
Thomas Rutter Mansion	PHMC	Douglass
Adams, Donald Property	PHMC	Douglass
Little Oley (Village of Colebroo	PHMC	Douglass
Gresh Store	PHMC	Douglass
Glendale (Village of Pine Forge)	PHMC	Douglass
Nagle Mill	PHMC	Douglass
Limestone (Village of Greshville	PHMC	Douglass
Fredericksville Hotel	Berks County	District
Leshar Cabin	PHMC	District
Leshar Forge	Berks County	District
Weidner Farm	Berks County	District
Rohrbach Farm	PHMC	District
Spohn House	Berks County	District
Eddy, Paul & Diane Property	PHMC	Colebrookdale
Lea, John & Gretchen Property	PHMC	Colebrookdale
Grim's Mill Farm	PHMC	Colebrookdale
Gabelsville (Village of)	PHMC	Colebrookdale
Bahr Mill Complex	NR Listed	Colebrookdale
Popodicon Mansion	PHMC	Colebrookdale

Bahr, A.M. Estate	PHMC	Colebrookdale
Houck, Aaron Farm	PHMC	Colebrookdale
Morysville (Village of)	PHMC	Colebrookdale
Mory Homestead	PHMC	Colebrookdale
Snyder, Dora Dearoff Property	PHMC	Boyertown
Kline, Claude Property	PHMC	Boyertown
Conrad, Mrs. Reynold Property	PHMC	Boyertown
Pritchard, Robert Property	PHMC	Boyertown
Rode, Horst Property	PHMC	Boyertown
Gibson, Gerald Property	PHMC	Boyertown
Schaeffer, Arlan Property	PHMC	Boyertown
Yellow House Store & Tavern	PHMC	Amity
Charles, T.B. Property	NR Eligible	Amity
Body, Henry Property	Berks County	Amity
Body, Henry Property	PHMC	Amity
Spotts Mill	PHMC	Amity
Easterly, John Property	PHMC	Amity
Easterly / Stetler Property	PHMC	Amity
Campbell, Charles Property	PHMC	Amity
Rt 562 House	PHMC	Amity
Levengood, Earl E. Property	PHMC	Amity
Drumheller, Mr. Property	PHMC	Amity
Terry, Jesse Property	PHMC	Amity
Arnold, Jane Property	PHMC	Amity
Levengood Rd House	PHMC	Amity
Walters, Joseph Property	PHMC	Amity
Terry, Jesse Property	PHMC	Amity
Ebert, Leonard Property	PHMC	Amity
Worthington's Mill	PHMC	Amity
Balthaser, Durwood Property	PHMC	Amity
Womelsdorf Homestead	Berks County	Amity
Levengood, Ralph Property	PHMC	Amity
Rt 662 House	PHMC	Amity
Schlegel, Christian Property	PHMC	Amity
Haas, Harold Property	PHMC	Amity
Guthrie, James House	PHMC	Amity
Weidners Mill	PHMC	Amity
Plowfield, Harvey Property	PHMC	Amity
Morrow, Kenneth Property	PHMC	Amity
Ellis, William Property	PHMC	Amity
Frey, Steve Property	PHMC	Amity
1090 Manatawny Road	PHMC	Pottstown
1044 Manatawny Road	PHMC	Pottstown
Albright, John farm	PHMC	Pottstown
305 Manatawny Street	PHMC	Pottstown

Pottsgrove Manor	NR Listed	Pottstown
338 York Street	PHMC	Pottstown
32 East Fifth Street	PHMC	Pottstown
First Church of the Brethern	PHMC	Pottstown
34 to 52 West Fourth Street	PHMC	Pottstown
Cedar Manor	PHMC	Pottstown
550, 552 Willow Street	PHMC	Pottstown
Frederick Brothers Lumber Mill	PHMC	Pottstown
212, 214 East Street	PHMC	Pottstown
452 Spruce Street	PHMC	Pottstown
Charlotte Street Historic District	NR Eligible	Pottstown
232-242 Oak Street	PHMC	Pottstown
399 North Evans Street	PHMC	Pottstown
284 North Hanover Street	PHMC	Pottstown
Old Pottstown Historic District Boundary	NR Listed	Pottstown
Mrs. Smith's Pies	PHMC	Pottstown
Reading Railroad- Pottstown Station	NR Listed	Pottstown

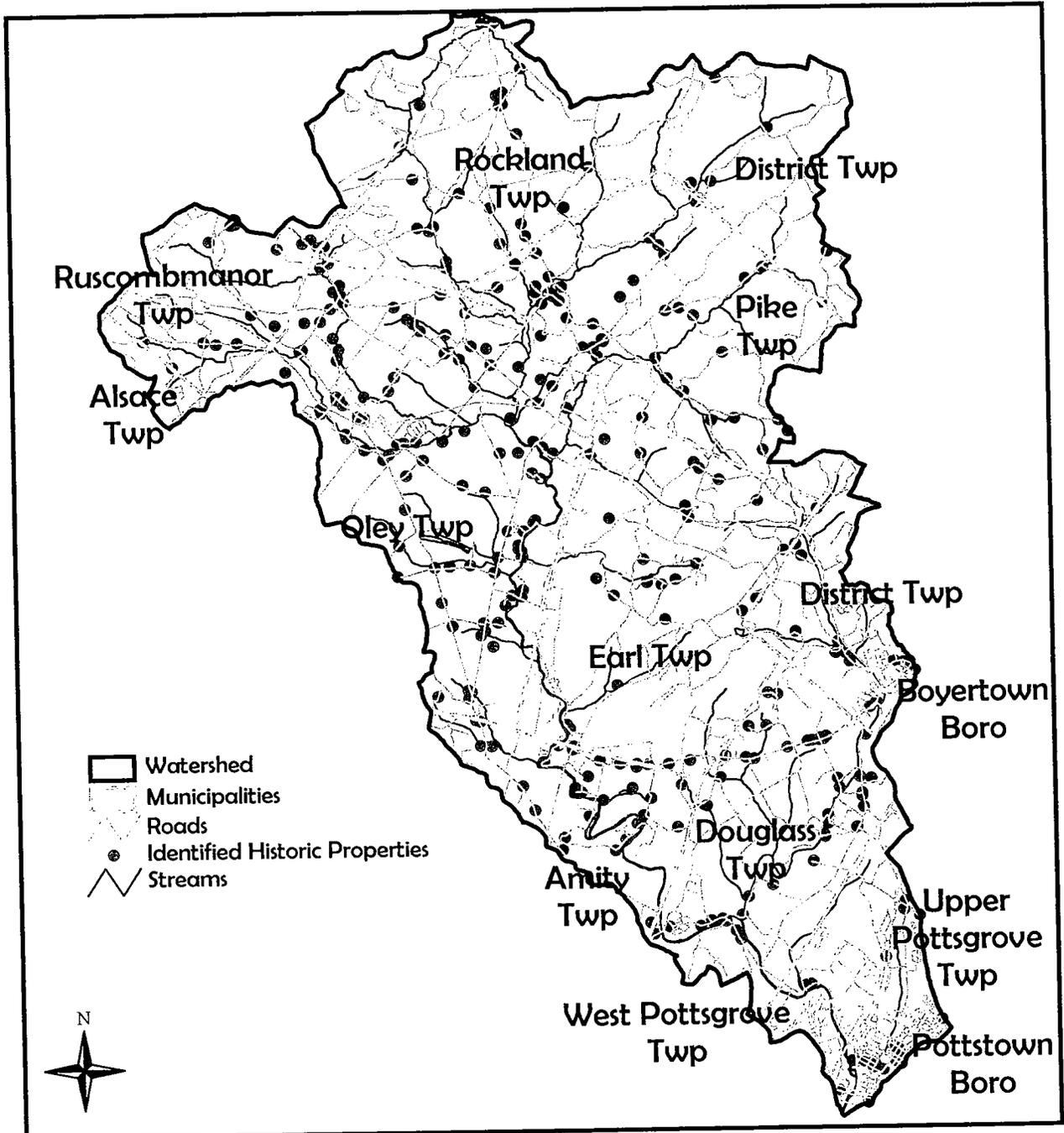
Table 11. Recreational Facilities within the Manatawny Creek Watershed, Berks County.

Earl Township	Name of Facility	Location	Acres	Uses
Municipal	Boyertown Municipal Water Authority	Pine Road		fishing, hiking, horseback riding, nature study and picnicing
Municipal	Boyertown Municipal Water Authority	Powdermill Road	240	fishing, hiking, horseback riding, nature study and picnicing
Municipal	Boyertown Municipal Water Authority	Powdermill Road	520	fishing, hiking, horseback riding, nature study and picnicing
Municipal	Boyertown Municipal Water Authority	Laurel Road	95	fishing, hiking, horseback riding, nature study and picnicing
Township Park	Harvey Moyer Sports Complex	Mountain Road	69	field sports - soccer, etc.
Township Park	Earl Township Municipal Park	Mountain Road		playground, picnic pavillion, hiking trails
Public School	Boyertown Area School District	Schoolhouse Road	13	school grounds
Private	Boyertown Road & Gun Club and Leni-Lenape Pistol Club	Sunset Hill Road	60	hiking, rifle and archery range
Religious organization recreation facility	Camp Harner	Woodchoppertown Road	18	camping
Religious organization recreation facility	Delaware Co. Christian Camp - Camp Manatawny	Camp Road	50	camping, fishing, hiking, picnicing, swimming
Pike Township	Name of Facility	Location	Acres	Uses
Religious organization recreation facility	Lobachsville Grove	Mill Road	4	church picnics
Private Organization	Pike Township Sportsmans Club	Long Lane / Oyster Creek	89	rifle & archery range, fishing
Privately owned by non-profit organization	Keim Homestead - Historic Preservation Trust of Berks County	Boyer Road	12	Colonial German Farmstead circa 1730 - historic site & open space
Ruscombmanor Township	Name of Facility	Location	Acres	Uses
Township Park	Reuben Strause Park	Pricetown - 662 and Pricetown Rd.	3.5	Fieldsports, picnic, tennis, totlot/playground, volleyball
Private Golfcourse	Ruscombmanor Municipal Ballfield Golden Oaks Country Club - owned by National Golf Operating Partnership, Santa Monica, CA 90405	Pricetown - 662 and Pricetown Rd. Route 662 East of Pricetown	2.27	Fieldsports Golf

Rockland Township	Name of Facility	Location	Acres	Uses
Community Park	Jim Moore Park	Pricetown Rd & Forgedale Road	21	Picnic pavilion, fishing, hiking trails.
Public School	Rockland Elementary School	Lyons Road, Dryville	10	Playground
District Township	Name of Facility	Location	Acres	Uses
Private- non-profit organization	Woodland owned by Pine Creek Valley Watershed Association	Long Lane along Pine Creek	44	Not accessible to public, too steep for recreation use
Pennsylvania State Game Lands	Managed by the Pennsylvania Game Commission	Long Lane	117	Hunting
Boyetown	Name of Facility	Location	Acres	Uses
Municipal	Boyetown Tot Lot	Madison Street, Boyertown	0.3	playground
Municipal	Municipal Park	Madison Street, Boyertown	47	swimming pool, picnic groves, field sports, bandshell
Municipal	Municipal Playlot	Madison Street, Boyertown	0.7	playground
Public School	Boyetown Elementary	Madison Street, Boyertown	13	playground
Public School	Boyetown Jr. High School	Madison Street, Boyertown	3	fieldsports
Colebrookdale	Name of Facility	Location	Acres	Uses
Private	Gablesville Athletic Assoc	Route 73 - Philadelphia Pike	10	fieldsports
Private	Church of God Campground	South of Boyertown on Farmingdale Road	37	Camping, field sports, picnicing
Oley	Name of Facility	Location	Acres	Uses
Municipal	Volunteers Park	Route 73, Oley	14	Field sports
Private	American Legion Grove		11	Picnicing
Private	Oley Fairgrounds	Main Street, Oley		Grounds for historic Oley Fair
Private	Oley Fire Company	Main Street, Oley		Outdoor concerts, picnic
Private	Oley Fire Company Grounds	Main Street, Oley	15	Fairgrounds
Private	Reading Motorcycle Club	Stitzer Road, Oley	16	
Private	Oley Valley Youth League	Mud Run Road, Oley	20	
Church grounds	Friedens Lutheran Church	Meeting Lane		volleyball, field sports, baseball
Public school	Oley Valley High School	Main Street, Oley		Field sports

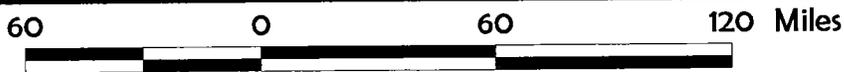
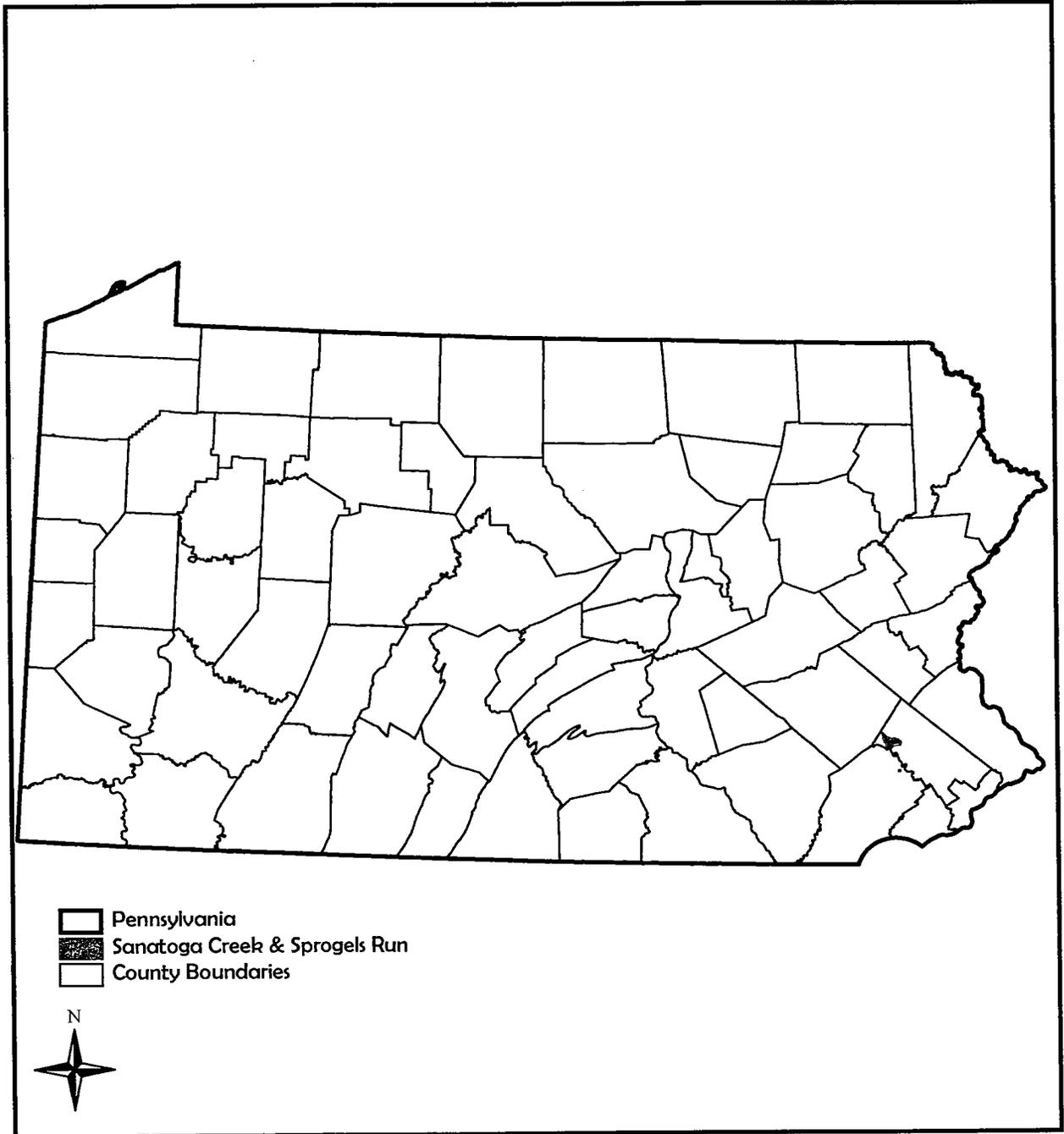
	Berks Vo-Tech School	Freidensburg Road, Oley	Open space
Public school		Freidensburg Road, Oley	Field sports
Public school	Oley Valley Elementary Center		31
Amity Township	Name of Facility	Location	Uses
Municipal	Locust Grove Recreation Area	Boyertown Pike, Earlsville	Basketball, picnicing, tennis, tot-lot/ playground
Municipal	Amityville Recreation Area	Weavertown Road	Fieldsports
Public School	Amity Elementary Center	Airport Road, Amityville	Basketball, nature study/picnic area, playground, fieldsports
Douglass Township	Name of Facility	Location	Uses
Municipal	Municipal Park	Douglass Drive	Basketball, fieldsports, picnic, tennis, tot-lot/ playground
Municipal	Ironstone Park	Winding Drive	Basketball, fieldsports, picnic, tot-lot/ playground, fishing, hiking trails
Private	YMCA(of Pottstown) Camp	Rattlesnake Hill Road	Camping, swimming
Private	Glen Dale Swimming Association	Grist Mill Road	Fieldsports, swimming, picnicing
Private	Catacomb's Church		Basketball, fieldsports
Private School	Pine Forge Academy	Pine Forge Road	Fieldsports, basketball
Private	Pine Forge Sportsman Club	Pine Forge Road	Hiking trails
Public School	Pine Forge Elementary		Playground, fieldsports
			47
			1.5

Manatawny Historical Resources



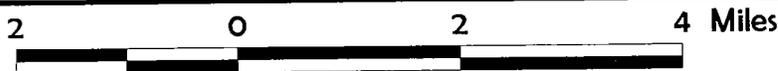
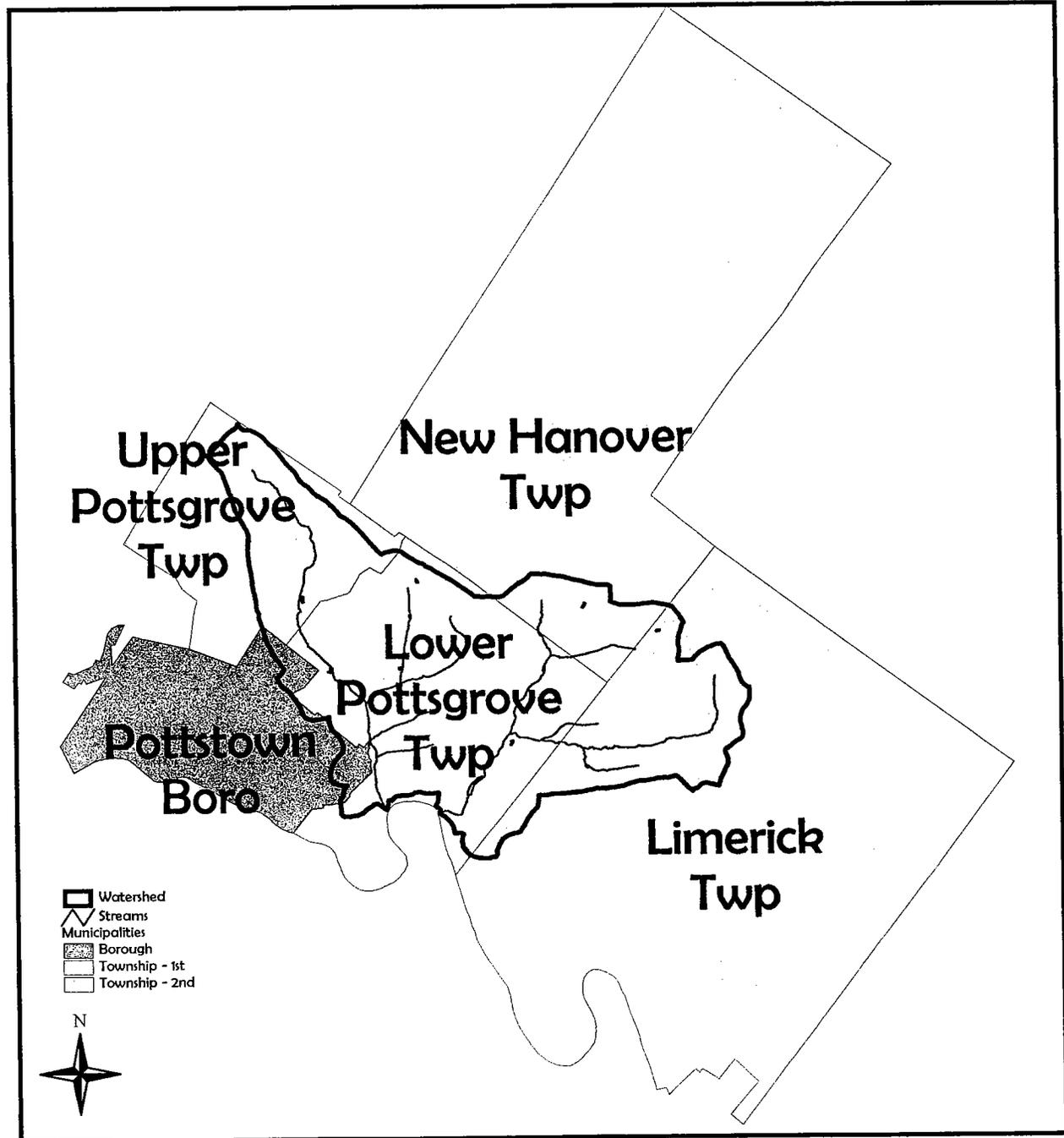
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Sanatoga Creek and Sprogels Run Watershed Location



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Sanatoga Creek and Sprogels Run Municipalities



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SPROGELS RUN WATERSHED

The Sprogels Run Watershed is located in Montgomery County. It rises in Upper Pottsgrove Township and flows in a southeasterly direction through Lower Pottsgrove Township where it meets the Schuylkill River. A portion of the Borough of Pottstown is considered part of the watershed as it is immediately adjacent to a portion of the stream.

These two townships have experienced heavy growth over the last decade. For example, Upper Pottsgrove Township's population increased by almost 24% from 1990 to the year 2000. Development pressure continues and the townships are recognizing the importance of greenways and open space.



The Sprogels Run Watershed consists of 6,225 acres that include a variety of uses. The four primary land uses are broken down as follows; 55% Forested lands, 29% Agricultural lands, 13% Residential Use, and 2% Commercial/Industrial Use.

As illustrated on the Sanatoga Creek and Sprogels Run Land Use Map, a majority of the developed areas lie near the stream corridor. Sections of the stream corridor are surrounded by a mix of High Intensity, Low Intensity Residential, and Commercial & Industrial Use, with the exception of the upper reaches of the stream surrounded mostly by deciduous forest and the middle reach of the stream which consists of primarily pasture/hay lands.

Biological communities in the Sprogels Run Watershed are similar to those found in the mid-lower reaches of the Manatawny Creek Watershed. The headwaters of Sprogels Run are surrounded by a mixed deciduous forest, the most common forest type in temperate zones of the eastern U.S. This forest type has a preponderance of broad-leaved trees with dozens of species competing for light and space, nutrients and water. In comparison with more northern forest types, it is immensely diverse and productive.

The composition of the forest varies as a result of selective climate, soil and topographical features. Its canopy commonly contains mixtures of chestnut oak, sweet birch, scarlet oak, red oak, white oak, black cherry, tulip tree, American beech, red maple, and white ash. Wet, lowland areas may include red maple, black ash, pin oak, black walnut, black gum,

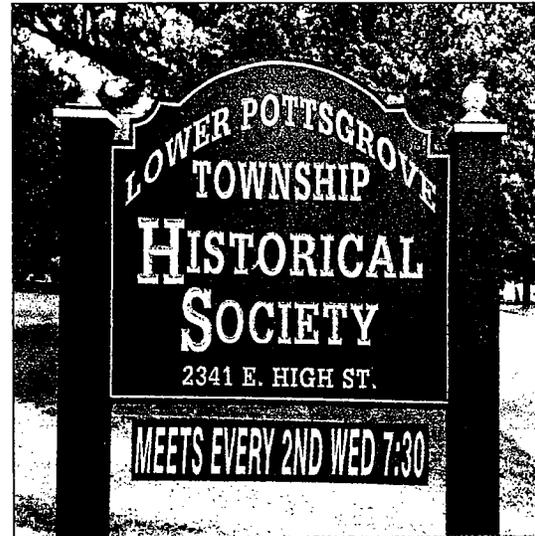
American beech, shagbark hickory, basswood, sycamore, and river birch. Understory trees and shrubs include ironwood, dogwoods, viburnum, winterberry, blueberry, spicebush and witch-hazel. The forest floor features a wide variety of ferns, mosses and wildflowers such as trout lily, bloodroot, trillium, violets and mints.

The watershed is home to a few areas of Prime Agricultural Lands, mostly within the headwaters. Please refer to the Prime Agricultural Lands Map in this section. Fortunately this headwater region with prime agricultural soils is still fairly undeveloped. The Management Options provided with this plan contains examples of tools that can be used so agricultural land and open space can be permanently protected from development. Officials of Lower and Upper Pottsgrove Townships should encourage landowners in this headwater region to consider the permanent protection of these deciduous forests and agricultural lands. This would in turn provide protection of the water resources in the townships which include not only Sprogels Run itself, but groundwater resources as well.

The Berks County Conservancy, along with the Greater Pottstown Watershed Alliance, conducted chemical water quality sampling at three sites along Sprogels Run and macroinvertebrate sampling at one site. The macroinvertebrate sampling revealed a fairly diverse population of insects. Over 130 macroinvertebrates were identified at this sampling station, with the majority consisting of caddisflies. The data represents that of a stream capable of sustaining a diverse population of aquatic biota. This data, along with other related water quality data is available for review at

the offices of the Berks County Conservancy.

The Sprogels Run Watershed is home to numerous historic resources and is fortunate to have an active Lower Pottsgrove Township Historical Society to promote and recognize these resources.



There are fourteen recreational facilities within the Sprogels Run Watershed. This includes municipal-owned public parks, public and parochial school grounds, and recreational facilities under private ownership, such as a sportsman's club, swim club, and country club. Please refer to Tables 10 & 11 for a list of historic and recreational sites in both the Sprogels Run and Sanatoga Watersheds.

SANATOGA CREEK WATERSHED

The Sanatoga Creek originates in New Hanover Township and flows in a southwesterly direction through Lower Pottsgrove Township where it meets the Schuylkill River immediately upstream from PECO's Limerick Nuclear Power Plant. Hartenstine Creek is a major tributary of the Sanatoga Creek. It rises in Limerick Township, flows west and meets the Sanatoga Creek in Lower Pottsgrove Township. These townships have grown tremendously over the last decade.



The Sanatoga as it enters the Schuylkill River

The Sanatoga is much more rural in nature than Sprogels Run and is a significantly larger watershed. The watershed consists of 9,955 acres and is primarily agricultural in nature (5,868 acres or 59%). Forested lands are the other primary land use in the

watershed, consisting of 3,648 acres or 37%. Residential use makes up 3.4% of the watershed (340 acres). As shown on the Land Use Map, the headwaters of the Sanatoga Creek are primarily wooded and the region surrounding the Sanatoga Memorial Park is open space as well. Biological communities in the Sanatoga Creek Watershed are very similar to those found in the Sprogels Run Watershed, since the headwaters of the Sanatoga are also surrounded by a mixed deciduous forest. The Hartenstine Creek travels through agricultural lands and some low intensity residential before it meets the Sanatoga Creek in Lower Pottsgrove Township.

The Berks County Conservancy, along with the Greater Pottstown Watershed Alliance, conducted chemical water quality sampling at three sites along Sanatoga Creek and macroinvertebrate sampling at one site. The macroinvertebrate sampling revealed a fairly diverse population of insects, very similar to the population identified at the Sprogels Run sampling station. Over 125 macroinvertebrates were identified at this station along the Sanatoga, with the majority consisting of an equal number of midges and caddisflies. The data collected from the Sanatoga Creek also represents that of a stream capable of sustaining a diverse population of aquatic biota.

There is great potential for a greenway and trail connection project surrounding the Sanatoga Creek and the Schuylkill River. The Montgomery County Lands Trust has recognized this potential and is working with the townships on creating this 'green network'.



Sanatoga Park

Sanatoga Park is the predominant recreational facility in the Sanatoga Creek Watershed. There are also several municipal-owned public parks and a privately-owned facility, the Pottstown Youth Centre.

Tables 10 and 11 list a sample of the numerous historic sites and recreational facilities found in the Sprogels Run and Sanatoga Creek Watersheds.

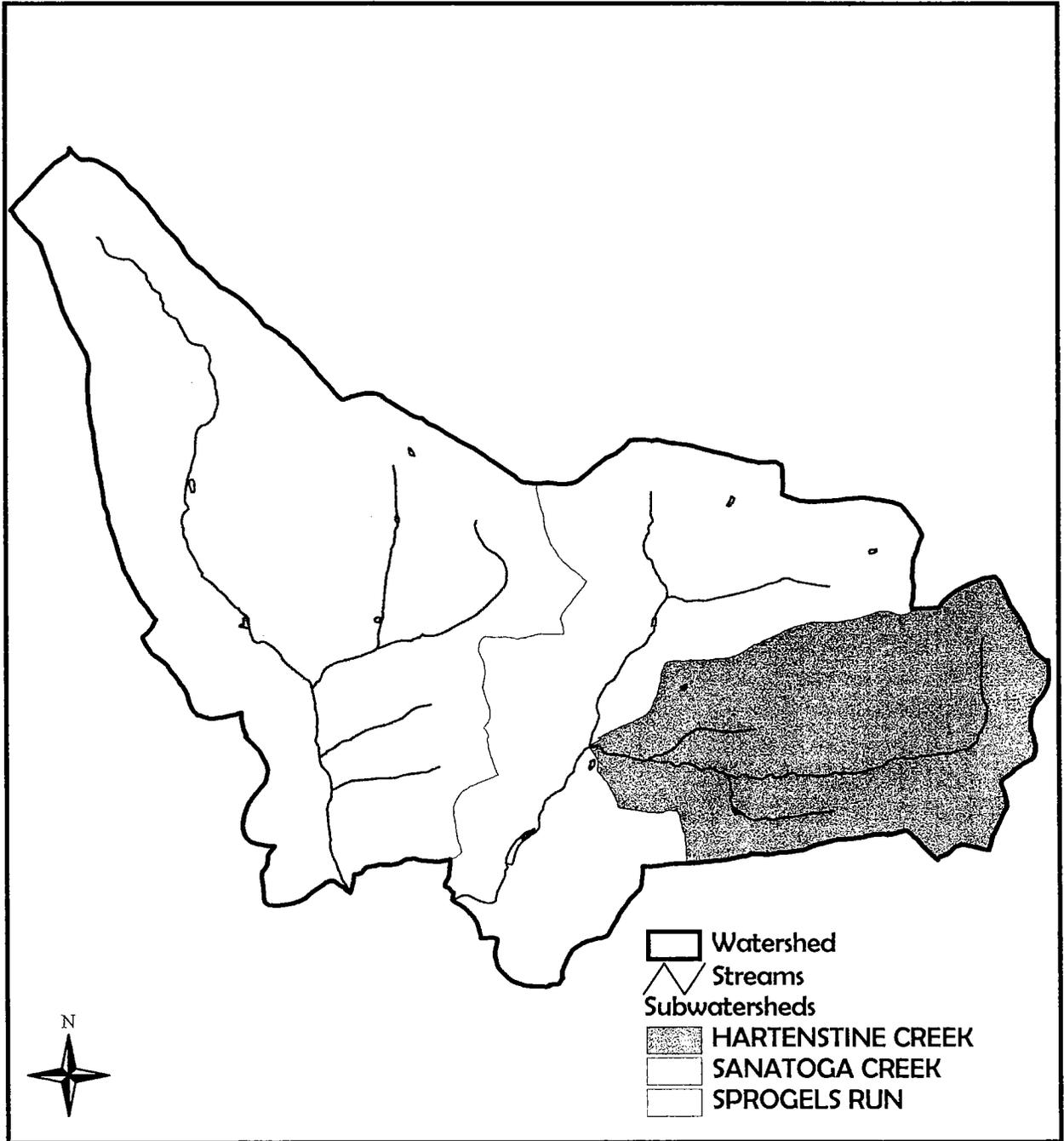
Table 12. A sample of Pennsylvania Historic Resource Properties in the Sprogels Run and Sanatoga Watersheds.

<i>Historic Name</i>	<i>Location</i>	<i>Date</i>
<i>Lower Pottsgrove Twp.</i>		
Wagner, Jonas S. Home	High Street	1885
Bridge	Ridge Pike at Sunnybrook Rd.	1830
Sanatoga Fire House	High Street & Green Lane Rd	1910
Sanatoga Union SS Chapel	High Street	1880
John Brandt House	Pleasant View & Sanatoga Station Rd	1815
Ringling Rocks Park	Mill Road	c.1900
<i>Upper Pottsgrove Twp.</i>		
Hoffman Farm	Farmington Avenue	1890
Halfway House Tavern	Farmington Avenue	1840
Cedar Grove School	Gilbertsville Road	1870
<i>Borough of Pottstown</i>		
The Grubb Mansion	High Street	1895
The Hill School	High Street & Green Lane Rd	1840

Table 13. A sample of Recreational Facilities in the Sprugels Run and Sanatoga Watersheds

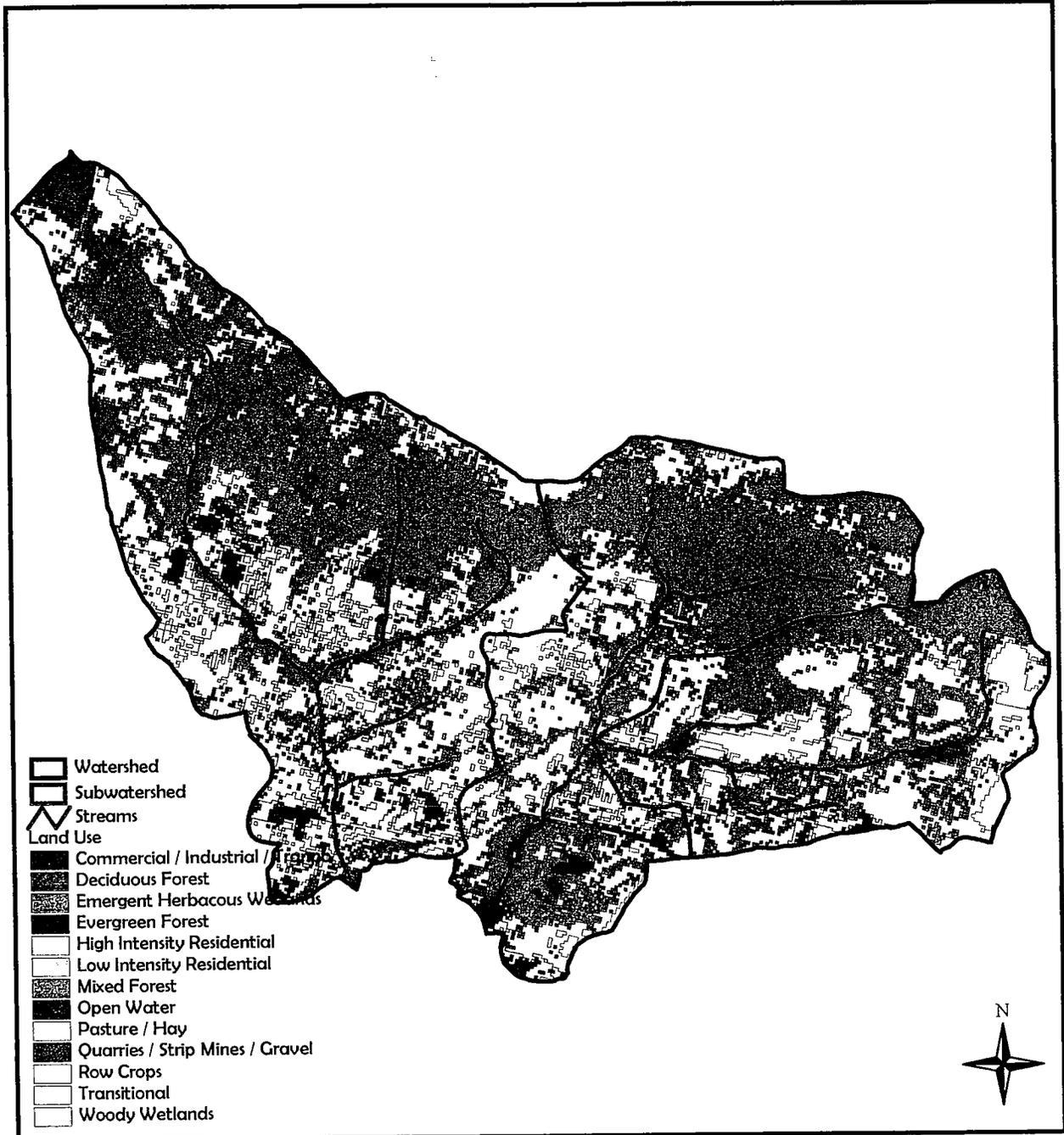
Sprugels Run		Location	Use
Municipal	<i>Alfred B. Miles Park & Nature Area</i>	Sunnybrook Road	Play area, picnic tables, nature trails - eight acres
Municipal	<i>Gerald G. Richards Community Park</i>	Buckert Road and North Pleasantview Road	Soccer fields, ball fields, basketball court, play area, rest rooms, jogging trail - 32 acres
Municipal	<i>Township Park at Sprugel's Run and Schuylkill</i>	Sanatoga Station Road	Open space - day use
Municipal	<i>Township Park at West Branch of Sprugel's Run</i>	The Woods at Sprougels Run	Open space along creek permanently donated to the municipality.
Private	<i>Sunnybrook</i>	East High Street	Pool, picnic grove, dance pavillion - days and evenings, seasonal
Private	<i>Ringing Rock Park</i>	White Pine Lane	Historic pavillion and picnic grounds, seasonal
Private	<i>Lower Pottsgrove Sportman's Club</i>	Sanatoga Station Road	Rifle and archery range, open space
Private	<i>Northend Swim Club</i>	North Adams St.	Swimming pool, playground, seasonal - summers
Private -	<i>Brookside Country Club</i>	North Adams St.	Golf course -
School - public	<i>Ringing Rocks Elementary School</i>	Kauffman Road	Fieldsports
School - public	<i>Pottsgrove Jr. & Sr. High School</i>	Kauffman Road	Fieldsports, tennis
School - parochial	<i>St. Pius X High School</i>	Keim Road	Fieldsports
School - public	<i>Pottsgrove Intermediate School</i>	Buckert Road	Fieldsports
School - public	<i>Lower Pottsgrove Elementary School</i>	North Pleasant View Road	Fieldsports, playground
Sanatoga			
Municipal	<i>Sanatoga Park</i>	Sanatoga Road	Baseball field, basketball hoops, two tot lots, picnic pavillions, boating and fishing on small lake - 54 acres
Municipal	<i>Winding Brooke Estates</i>	Heather Lane	Open space along creek permanently donated to the municipality.
Municipal	<i>Shire Drive</i>	Rupert Rd to Shire Dr	Open space along creek permanently donated to the municipality.
Private	<i>Pottstown Youth Centre, Inc.</i>	2675 East High Street	Field sports and swimming at the Beulah Land Swim Club - indoor year-round and outdoor seasonal

Sanatoga Creek and Sprogels Run Subwatersheds



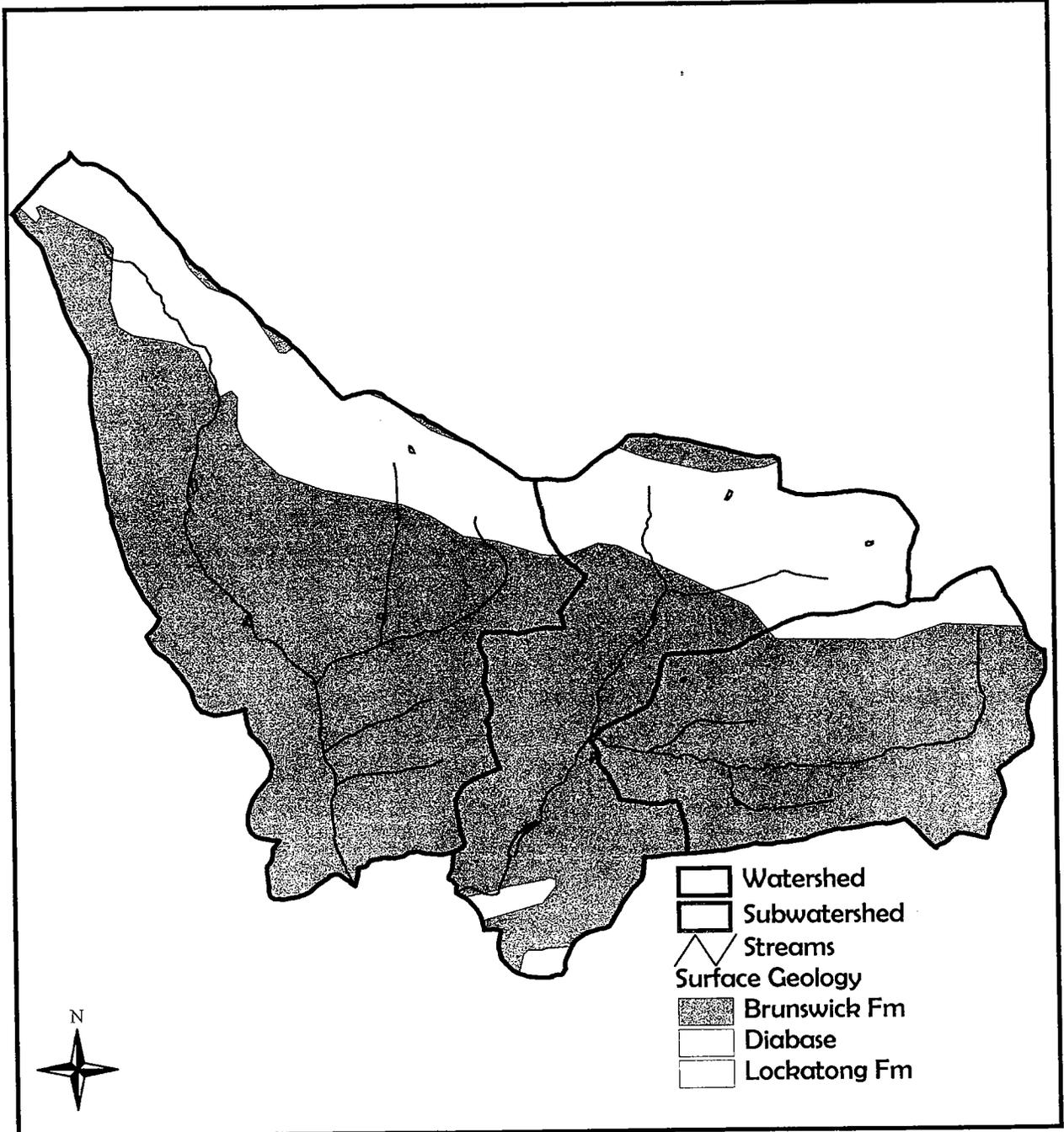
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Sanatoga Creek and Sprogels Run Land Use



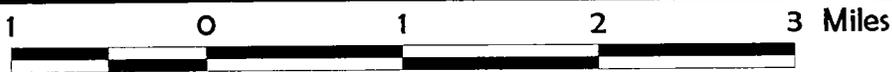
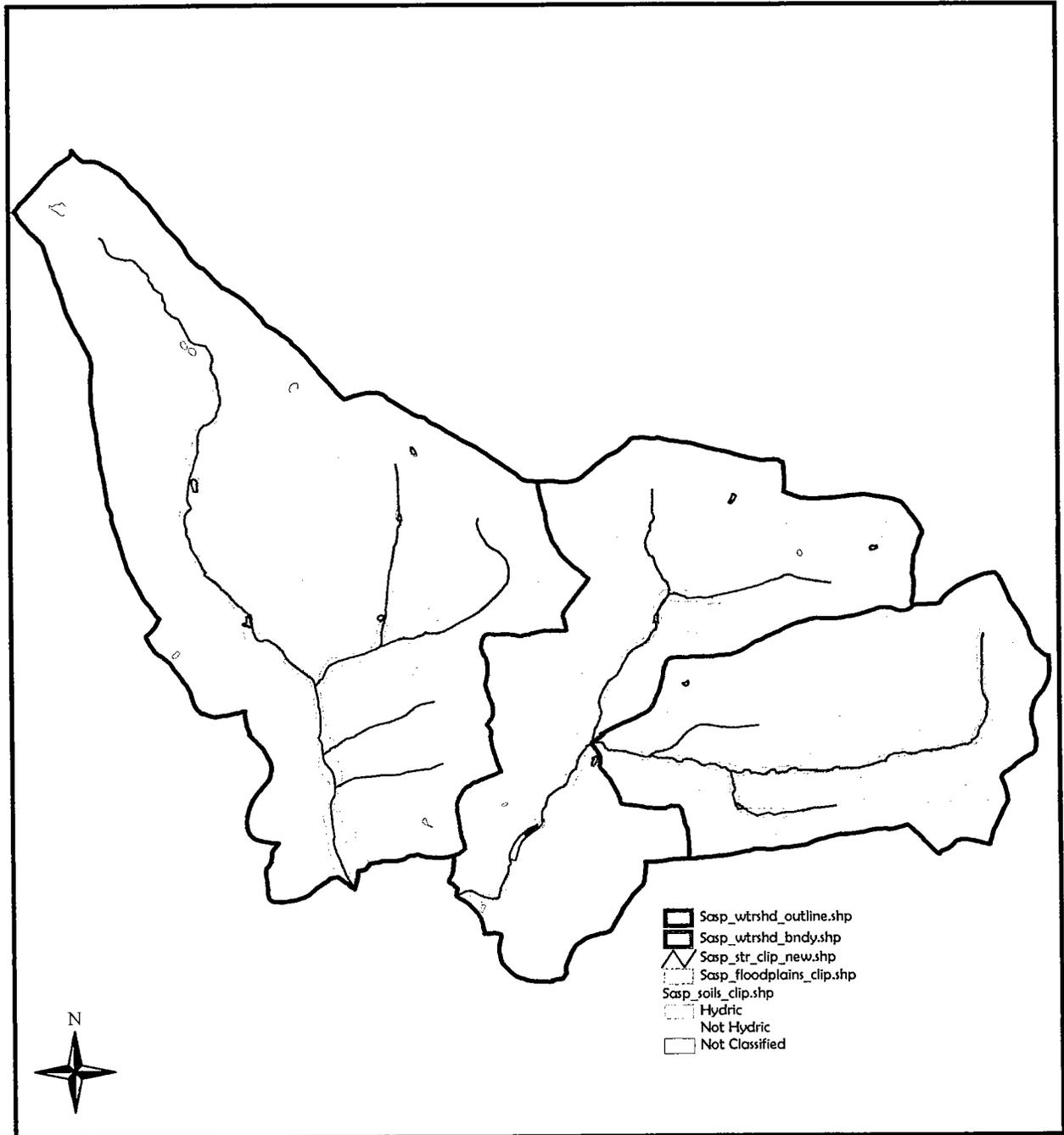
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Sanatoga Creek and Sprogels Run Surface Geology



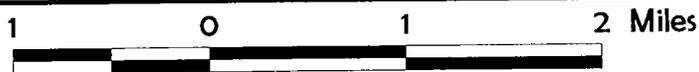
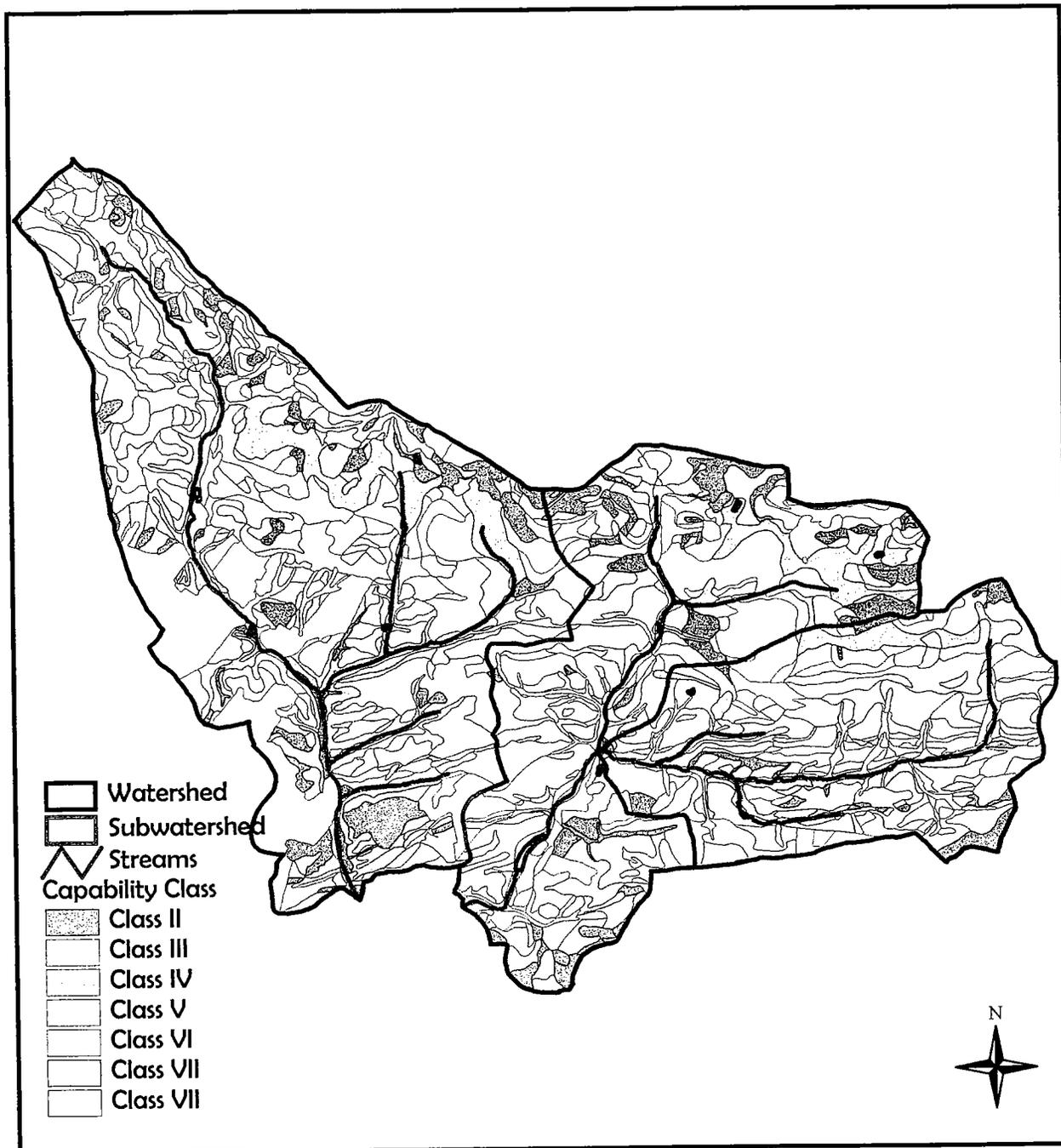
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Sanatoga Creek and Sprogels Run Hydric Soils & Floodplains



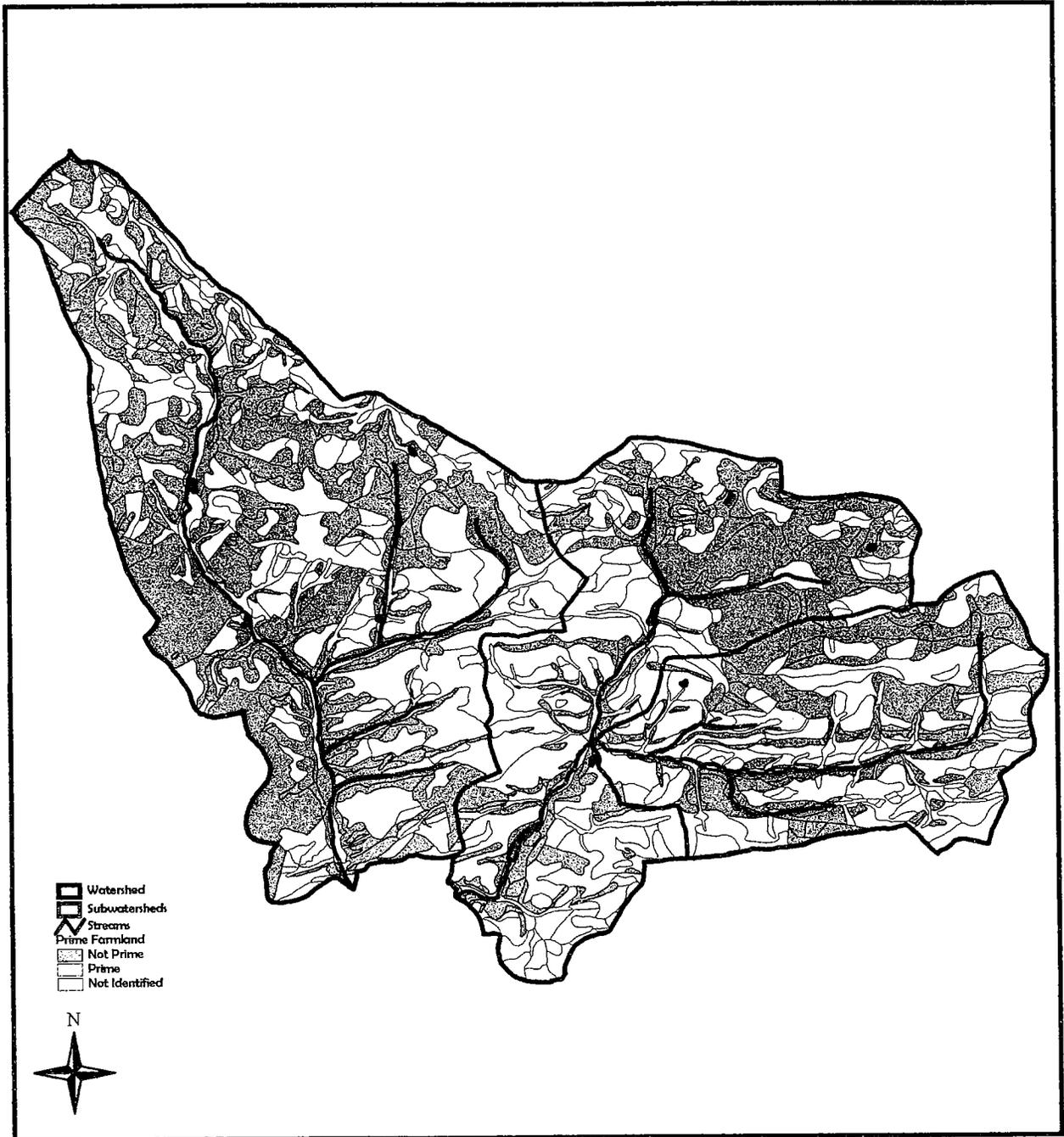
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Sanatoga Creek and Sprogels Run Non-Irrigated Soil Capability Class



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Sanatoga Creek and Sprogels Run Prime Agricultural Lands



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November 2001

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ISSUES, CONCERNS, AND OPPORTUNITIES

Residents of the Manatawny Creek, Sprogels Run, and Sanatoga Creek watersheds feel strongly about issues concerning resource protection and quality of life. A long list of issues and concerns was voiced at public meetings in Berks and Montgomery Counties, in personal visits to landowners, in questionnaires mailed to owners of large parcels along the Manatawny Creek, and in discussions with local citizens who visited a display on the Manatawny Watershed Planning Project at the Oley Valley Community Fair 2001.

Community Concerns

Throughout the region, the overriding concern is dealing with change. The area is experiencing rapid growth, termed by many residents “uncontrolled development”, which is raising concerns about supply of groundwater, loss of farmland, inadequacy of roads to handle increased traffic, need to build new schools, need to increase community services, and the consequent need to raise additional tax revenues to meet these demands. There is also concern with the ability of local municipalities to deal effectively with growth and change. The lack of communication among adjacent municipalities in the watershed is regarded by citizens as detrimental to coordinated efforts to deal with problems that cross municipal boundaries.

Water Issues

Population and housing growth has raised questions about water quality and water quantity. People have reported increased bacteria counts in private wells; lowering of the water table; springs and streams going

dry; and lower levels in the Manatawny Creek during dry seasons. Flooding seems to be more frequent and more severe. Stormwater runoff is bringing pollutants into the streams, culverts are backing up the stormwater into farm fields, and the force of flooded waterways is causing bank erosion and changes in the stream channel. Floods have also washed out dams and weakened bridge abutments.

The surface water quality of the Manatawny Creek and its tributaries is important to local residents who use it for recreational fishing, swimming, canoeing, and observing wildlife. At the same time these streams accommodate the discharge of treated effluent from sewage plants, landfills, industries, and community waste disposal systems. People in Pottstown cited the dumping of untreated wastes into storm sewers. People in Oley Township questioned the application of biosolids to fertilize farm fields.

Farmers who live along the Manatawny have a special interest in the health of the stream. They depend upon it for livestock watering, irrigation, and general farm uses. They have a great stake in protecting its quality because it directly affects the health of their farm animals and crops, and ultimately, their livelihood. It is therefore important for farmers to use conservation practices that control erosion and excess nutrients that can degrade the water. On the other hand farmers do not want to be burdened with restrictive regulations. Farming is the major industry in this area, and “permitting farmers to do their jobs” is important. A commonsense approach to Best Management Practices is recommended.

Exploring ways to bolster the farm economy is in everybody's best interest.

Working with Home Builders and Developers was also identified as important in devising methods of safeguarding water quality. Housing tracts increase impervious surfaces, diminish aquifer recharge areas and increase the types and amounts of nutrients and chemicals that have a potential for getting into surface or groundwater. Tracts that abut the stream can be designed with natural buffers adjacent to the stream, rather than backyard lawns that interrupt the existing corridor habitat. This is especially true in Amity Township, where several new developments along the Manatawny are in the planning stage and along Sprogels Run and the Sanatoga Creek.

Stream bank restoration is an issue at numerous sites along the Manatawny and its tributaries, but none more important to the public than the Memorial Park stream restoration project in Pottstown. Removal of the dam at this site has resulted in a large area of un-vegetated and eroded land formerly covered by the silted-in pond, and the current challenge is to stabilize and seed this area and to introduce natural vegetation to the buffer area.

Land Issues

Sprawling development takes a toll in the conversion of farmland and forestland into housing subdivisions. This is a major concern expressed by many who responded to the project's outreach activities. Much of the land being developed in Amity Township is prime farmland. Here, at the western end of the Route 422 Pottstown Bypass, market forces have made the land attractive to developers, and unattractive to farmers looking to buy land. In Oley, on the other hand, land preservation efforts have

resulted in farmers' interest in purchasing protected land, feeling that a stable farming region exists in this township. The enactment of effective agricultural zoning and the sale of Agricultural Conservation Easements by many farmers under the State-County Agricultural Preservation Program have brought about that stability.

Sustaining a viable agricultural industry for the future is the top issue for area farmers, feed businesses, and equipment dealers, who are all active in this area. Pike Township's farm supply businesses serve local farmers, and those over a wide region, as the agricultural land base diminishes in neighboring counties to the east. It is also a leading concern for residents who want to preserve the historic setting and the many rural historic properties. Farmland protection to preserve the land base is essential to the continued sustainability of farm economy.

Protection of natural areas is also a popular cause, especially in Exceptional Value watershed areas. Several local organizations have embraced this challenge, and are seeking to work with local landowners to encourage voluntary land protection actions. These organizations include the Pine Creek Valley Watershed Association, the Pike-Oley-District Coalition, and the Berks County Conservancy.

The Montgomery County Lands Trust is working in collaboration with Lower Pottsgrove and Upper Pottsgrove Townships to establish a green riparian corridor along Sprogels Run. The two townships have experienced heavy growth over the last decade. The potential greenway will follow Sprogels Run from the Schuylkill River through the western edge of Lower Pottsgrove and then bisecting Upper

Pottsgrove from the southeast to the northwest corner of the township.

Similarly, New Hanover Township and Lower Pottsgrove Township are interested in creating a trail system and green infrastructure along the Sanatoga Creek. The Montgomery County Lands Trust has been advising and working with both townships to craft a strategy to complete this greenway.

The Borough of Pottstown has been working with the Montgomery County Lands Trust over the past four years to establish and expand their green infrastructure, with an emphasis in the open space/greenway along the Schuylkill River and its connection with the borough and Memorial Park. Two key acquisitions have been completed to achieve this Pottstown Schuylkill Greenway, and this will be integrated into the Schuylkill River Greenway, which is a priority project for Montgomery County.

Maintaining and improving transportation facilities is an issue for local, county and state governments, and a concern for area citizens. Major routes are experiencing increased commuter traffic during rush hour. Routes 12, 73, and 662 are especially congested at times. Road widening is difficult because of lack of adequate right-of-way space. Probably the biggest transportation issue, locally, is the Pleasantville Covered Bridge Restoration Project. The bridge was closed after the collapse of an abutment in July 1993. Penn DOT commissioned studies, which determined the bridge achieved top Historical Ranking in the state, and that restoration could be done at far less cost and far more appropriateness than replacement. An Agreement was reached with Oley Township and Berks County for the state to do a historically faithful restoration, and

subsequently transfer ownership to the county. The restoration process has been delayed repeatedly, while costs have escalated. Oley Township Supervisors and the Oley Valley Business Association keep pushing for action, which now is promised in 2002.

Other concerns expressed by landowners are trespassing, dumping trash along roads, use of ATVs on private lands, and general disregard for private property rights. Also, people are concerned about damage done by invasive species of plants, such as purple loosestrife and multiflora rose, and overpopulation of animals such as White-tailed Deer and Canada Geese, which are causing significant damage to woodland, cropland, ponds and stream banks throughout the region.

Education, Communication and Planning

There exists a general feeling in the watersheds that there are many unanswered questions about the state of the environment. What is the quality of the water supply, both in surface and groundwater? What changes are occurring in groundwater levels, and is there an adequate supply to support all the new development that is being planned? How safe are the landfills, the biosolids being put on farm fields, the air being breathed in Pottstown? Many questions arise, and they all point to a need for greater knowledge, communication, education, and planning. Asking these questions, finding answers to them, and communicating the information to the general public can help formulate actions to deal with environmental problem situations in a proactive or preventative mode.

Studies of groundwater, monitoring of water quality, and coordinating land use planning will yield better results if done regionally, as

such studies deal with regional resources. Regional planning is being sponsored by the Berks County Planning Commission, and is presently under discussion by various groups of municipalities in the Manatawny Watershed. Participation in regional planning will help the region formulate and coordinate ways to deal with growth and change.

Opportunities and Goals

Identifying issues and concerns is the first step in seeking opportunities to address them. For the purpose of this Plan, these issues have led to the formulation of goals that will be addressed in the Management Options section of the Plan. The goals are:

- *Protect and Sustain Water Quality and Water Quantity*
- *Protect and Preserve Important Agricultural and Natural Lands*
- *Encourage Stewardship of Natural and Cultural Resources*
- *Encourage Coordinated Regional Planning Initiatives*

Please note: The Goals and Management Options in this plan relate to the Manatawny Creek Watershed, Sprogels Run, and Sanatoga Creek – with more emphasis placed on the Manatawny Creek Watershed due to its size and characteristics.



GOALS AND MANAGEMENT OPTIONS SUMMARY

GOALS

- ***Protect and Sustain Water Quality and Water Quantity***
- ***Protect and Preserve Important Agricultural and Natural Lands***
- ***Encourage Stewardship of Natural and Cultural Resources***
- ***Encourage Coordinated Regional Planning Initiatives***

MANAGEMENT OPTIONS

Protect and Sustain Water Quality and Water Quantity

- Establish riparian buffers
- Stream bank fencing
- Water management
- Nutrient management
- Stormwater management
- Stream bank stabilization and restoration
- Wetlands Management and Protection
- Groundwater Research and Protection
- Water Quality Monitoring
- Improve Impaired Areas
- Upgrade streams to EV and HQ Classifications

Protect and Preserve Important Agricultural and Natural Lands

- Institute effective Agricultural Preservation Zoning
- Establish Agricultural Security Areas
- Encourage participation in the County Agricultural Preservation Program
- Protect Natural Areas
- Protect Environmental Hazard Areas
- Develop program to fund stream buffer and wetlands protection

Encourage Stewardship of Natural and Cultural Resources

- Develop educational programs about resource protection
- Encourage identification and monitoring of natural resources
- Develop outreach programs for landowners and municipalities
- Encourage Forestry Stewardship Plans
- Encourage Conservation Plans
- Encourage enrollment in Conservation Reserve Program
- Encourage enrollment in Clean and Green Program
- Encourage Historic Preservation Initiatives

Encourage Regional Planning Initiatives

- Participate in Berks County Regional Planning Program
- Encourage planning on a watershed or subwatershed basis
- Watershed Conservation Management Plans

MANAGEMENT OPTIONS

Goal: Protect and Sustain Water Quality and Water Quantity

Riparian Buffers

Establishing a permanently protected riparian buffer along the Manatawny Creek, Sprogels Run and Sanatoga Creek and their tributaries is one of the best actions that can be taken to protect water quality for the future. A riparian buffer is the area of natural vegetation maintained adjacent to a stream. It is managed to protect the integrity of the stream channel and reduce the impact of upland sources of pollution by trapping, filtering and converting sediments, nutrients, and chemicals, and to supply food cover, and thermal protection to fish and other wildlife. Buffers can be either forested or herbaceous. Forested buffers, with trees and shrubs, provide added benefits in shading the stream and providing more diverse wildlife habitat.

The greatest loss of riparian buffers is occurring through the conversion of farms and open lands to suburban development. Municipal ordinances can require retention of riparian buffers in developments along stream banks. This will assure a continuous conservation corridor along the length of a watercourse that will be an important action to protect water quality and habitat from the impacts of development.

Landowners can voluntarily conserve or restore such buffers. It is also possible to develop a conservation easement program for stream buffers, either through the donation of easements or the purchase of easements. Such a program would designate

the width of the buffer strip and provide maintenance guidelines. The guidelines can include recommendations for establishment of wildlife habitat and control of noxious weeds and invasive species. Much of Manatawny Creek already has a natural floodplain buffer, which could be made a more attractive and desirable area through the attention of landowners. Some suburban and rural lot owners have demonstrated these principles by maintaining their stream frontage areas as nature preserves, complete with trails, bird feeders and nesting boxes, and have enjoyed spectacular results. The Manatawny corridor is an excellent wildlife area.

Stream Bank Fencing

In farmland, riparian buffers can be established by stream bank fencing, a *best management practice* to enhance water quality. There are many farms along streams in the Manatawny watershed that utilize the land along the stream as pasture for livestock. It is common to see cows standing in the stream or crossing from one side to another, breaking down the bank and discharging wastes into the water. Where the number of cows is excessive, or feedlots are located near the waterway, degradation of water quality occurs. Where streams have been fenced and cattle crossings constructed there has been dramatic improvement in the condition of the stream. Because this program has been proven successful in farming areas, there are incentives for farmers to participate. Cost share programs will support stream bank fencing, cattle-crossings, and water management projects.

Water Management

The installation of *best management practices* for water management is recommended in this watershed plan. These practices include barnyard watershed management systems, storm water management systems, and spring development systems. Collecting rainwater from roofs and impermeable surfaces, directing it away from barnyards, and providing watering facilities for livestock that are out of floodplain and wetlands areas can provide cleaner conditions for cattle as well as cleaner water entering the streams. Funding incentives are available.

Nutrient Management

Under Act 6 of 1999, the Nutrient Management Act, certain agricultural operations are required to have nutrient management plans that specify how livestock waste is managed. The purpose of the law is to prevent pollution from animal feeding operations. Improper nutrient management can be a significant source of ground and surface water pollution. Nutrient management plans are therefore an important tool for protecting water quality. Plans are developed through consultation with the County Conservation District. Cost share funds are available.

Stormwater Management

Inadequate management of accelerated stormwater runoff resulting from development throughout a watershed increases flood flows and velocities, contributes to erosion and sedimentation, overtaxes the carrying capacity of existing streams and storm sewers, greatly increases the cost of public facilities to convey and manage stormwater, reduces groundwater

recharge, and threatens public health and safety. For these reasons, municipalities are charged with the responsibility of enacting a comprehensive program of stormwater management.

Model ordinances have been designed to assist municipalities in meeting these obligations.

Stream Bank Stabilization and Restoration

Stream banks are vulnerable to erosion as a result of human activities along streams, such as removal of trees and natural vegetation, urbanization, overgrazing of livestock, cultivation too close to the stream, and earthmoving and paving for development. These activities promote changes in stream bank structure, increased sediment in stream channels, and increases in the flow of stormwater.

Stream bank stabilization measures can reduce nonpoint source pollution caused by sediment and the contaminants that accompany soil particles into waterways, including heavy metals, phosphorus and other nutrients. They can improve aquatic habitat by reducing the level of suspended and deposited sediments in streams, which impact the ability of fish to breed and reproduce.

A number of programs exist to assist landowners in stabilizing and restoring stream banks. Trout Unlimited specializes in projects to design and implement stream improvement and bank restoration using volunteer labor. County Conservation Districts conduct a wide range of programs to improve water quality, including improvement of riparian corridors and stream bank stabilization. Among the techniques is the installation of fiberlogs at the base of the bank to provide a good

medium for the planting of shrub seedlings. The fiberlogs trap sediment and build up a stable foundation for revegetation.

Wetlands Management and Protection

Wetlands are critical resources that provide important wildlife habitat and play a key role in flood prevention, surface water management, groundwater recharge, and ground and surface water quality. They provide biofiltration, or the removal of sediment and pollutants of ground and surface water.

The Manatawny and its tributaries have extensive wetlands connected to flood plains near the stream, and also in more remote areas. Wetlands are found in meadows, pastures, woodland, and open space areas. Some of these wetlands provide habitat for species of special concern, and are considered top priorities for protection.

Federal and state regulatory programs protect wetlands by requiring permits for activities in or affecting wetlands. Wetlands management tools may be included in municipal zoning, subdivision, and land development ordinances. Townships can designate natural resource based zoning overlay districts and nonprofit conservation organizations can work with property owners to protect important wetland areas with conservation easements.

Groundwater

Groundwater wells furnish nearly all the drinking water in the Manatawny watershed, except for the boroughs of Pottstown and Boyertown. It is important that this water supply be kept free from pollutants. Activities and land uses that have the potential for harming groundwater include: agriculture, storage tanks, home lawns, golf courses, chemicals used on highways,

landfills, quarries, malfunctioning on-lot septic systems and improper disposal of used motor oil. While the soil acts to filter out harmful substances, an excessive amount of pollutants can overcome the soils self-cleaning capacity. Detection of pollution is difficult and clean up is expensive. Dealing with these issues demands preventative measures to protect groundwater by both government entities and citizens.

Programs that deal with protection of groundwater quality are wellhead protection measures, nutrient management and pesticide regulation. The testing of public water sources is regulated, but the testing of private wells is left up to the property owners. Past surveys in rural Berks County have indicated that a significant percentage of private wells have unacceptable levels of bacteria and nitrates, which require treatment by the homeowners. Unless regular periodic testing is done, most homeowners are not aware of this risk.

The quantity of groundwater is perhaps more of an unknown factor than the quality. There have been very few hydrological studies to determine the amount of groundwater that is available for residential, commercial and industrial uses. Yet a safe and plentiful water supply is essential for any development to take place. Some property owners consider groundwater a major concern, citing evidence of lower levels in wells and springs going dry. In many areas of the country there are strict water use controls and water rights are valuable commodities. In this area more effort to collect and interpret groundwater supply and variables is needed as part of the planning process.

A study of the Water Resource in Oley Township by the United States Geological Survey (U.S.G.S.), based on data collected

in 1981-82, determined that the Manatawny Creek is directly connected to groundwater aquifers, and that pumping from wells near the stream could substantially reduce the flow of water within the stream. The study found a great variation of the yield of wells in different geological formations, and that certain areas in the northern section of the township with rocks of low permeability did not have an adequate on-lot water supply for domestic purposes. It also found pollution problems in the higher-yielding carbonate rocks in southern Oley Township.

Carbonate rocks are particularly susceptible to contamination, because bacteria-laden recharge water may enter these aquifers relatively unimpeded. High-density housing with on-lot septic systems in areas underlain by the more permeable carbonate rocks has the potential for producing serious groundwater quality problems. These findings point up the need for an assessment of ground water quantity as well as quality when making land use development decisions.

Continue Water Quality Monitoring

Monitoring of water quality in the Manatawny Creek, Sprogels Run, Sanatoga Creek and their tributaries has been carried out by numerous agencies and organizations during the last several years. It is the recommendation of this Plan to continue this monitoring in a more coordinated way, so that the sharing and interpretation of results may result in a better understanding of the dynamics of water quality in the stream systems, and can point to remediation of known problems, and prevention of incipient problems. The Berks County Conservancy can assist in coordinating such an effort.

Improve Impaired Areas

Two small streams in the Manatawny Watershed were judged to be *impaired* in

the Pennsylvania DEP Stream Water Quality Assessment. One is the unnamed tributary which enters the Manatawny south of Spangsville in Oley Township. This is impaired due to fluctuations in flow that causes an unstable condition for aquatic habitat. The stream is dependent to a large extent upon groundwater levels, because the source of its main branch is the inactive Lehigh Portland Cement Company quarry. If groundwater in the quarry lowers, the stream flow is interrupted. The other impaired stream is a tributary that enters the Manatawny at Memorial Park in Pottstown. Part of this stream is piped underground through the urban area. The specific causes of impairment should be determined and a means of addressing these causes formulated. Other areas of stream bank degradation, flood damage, or cases of point or non-point pollution should also be identified and addressed. In some situations, a property owner can deal with the problem. In other cases, local or state government assistance may be required.

Upgrade Streams to HQ and EV Classifications

Results of the DEP Stream Quality Assessment revealed that many of the Manatawny tributaries support sensitive aquatic life, and compare favorably with other subwatersheds that have achieved Exceptional *Value* and *High Quality* rank. If this is true, it is worth the effort to conduct further studies and analysis of the opportunities for stream upgrades. Gaining Special Protection status for all streams that qualify will go a long way toward sustaining water quality in the Manatawny Watershed, because the quality of the headwaters streams greatly enhance both surface water and ground water resources for the future.

*Goal: Protect and Preserve
Agricultural and Natural Lands*

**Institute Effective Agricultural
Preservation Zoning**

The Manatawny Watershed is one of Berks County's best farming regions, and it is a goal of the County and the Watershed to sustain the existing agricultural industry by assuring that there will be enough farmland to support local agricultural services. The best way to do this, in most municipalities, is through Effective Agricultural Preservation Zoning. Effective agricultural zoning stabilizes the agricultural land base by keeping large tracts of land relatively free of non-farm development. The particular zoning technique should be based on a variety of factors, including sizes of existing farms and local land use priorities. Area-based allowance can use a specific number of acres per dwelling (usually from 20 to 50 acres), or can utilize a sliding scale that bases the number of dwelling permitted upon the size of the farm. Other types are based on a large minimum lot size, or a percentage figure for the land to be developed.

Oley Township enacted "Sliding Scale" agricultural zoning in 1992 in the southeastern portion of township, not without controversy, and this has lessened the encroachment of non-farm uses. It has also played a large part in bolstering the confidence of landowners and encouraging their subsequent initiatives to permanently protect their farms through the sale of Agricultural Conservation Easements.

It is a Berks County priority to preserve the most viable agricultural land for agricultural use, and support agriculture as a primary land use and a valued element of the County's economy. While respecting

individual property rights, the overriding objective is to maintain the agricultural economy and to conserve farmland for future agricultural use. A target area for sustained agricultural use is the fertile limestone region in the Manatawny Watershed. This land extends beyond Oley Township into Pike to the north and Earl, Amity and Douglass to the south. The hilly land in Colebrookdale, Earl and Pike Townships includes well-established orchards. Also, highlands sections of District, Rockland and Ruscombmanor Townships have many scattered farms that add to the county agricultural base. All Berks County municipalities in the watershed could support effective agricultural zoning, based upon acceptance by the farming community and the citizens at large. Both the Berks County Planning Commission and the Penn State Agricultural Extension Service can assist in helping define these areas.

The County has established its Agricultural Zoning Incentive Program (AZIP), which will give local municipalities technical and financial assistance to encourage them to enact effective agricultural zoning regulations in Agricultural Preservation Areas. Berks County will pay the costs associated with either amending or revising the municipality's zoning ordinance. The Berks County Planning Commission will be the sole judge of whether a municipality has met the standard of effective agricultural zoning.

Establish Agricultural Security Areas

Most rural municipalities in the Manatawny Watershed have already established Agricultural Security Areas (ASAs). This program was established under the Agricultural Area Security Law, PA Act 43, in 1981. A landowner or group of

landowners whose parcels together comprise at least 250 acres may apply to a municipality for the designation of an ASA. The parcels must be viable agricultural land and may be comprised of non-contiguous tracts of at least 10 acres. The ASA gives a landowner protection from local ordinances that restrict farm practices, protects against nuisance ordinances, and limits land condemnation procedures. The ASA also is a requirement for application to the County-State Agricultural Preservation Program for purchase of agricultural conservation easements. It is not a permanent designation, and is reviewed every seven years.

Encourage Participation in the County Agricultural Preservation Program

The County administers the County-State Agricultural Conservation Easement Program through the Berks County Agricultural Land Preservation Board. It purchases easements on parcels of suitable farmland, giving priority to parcels located in Agricultural Preservation Areas, where farms are clustered, and where an active farming community exists. Applications from landowners are accepted and reviewed on an annual basis. Farms are scored on criteria that include soil capabilities, farm location, productivity, zoning, the presence of other protected farms in the area, etc. The Applications are ranked, and offers of easement purchase are made in rank order.

The value of an easement is determined by appraisal, and represents the difference between the value of land for “highest and best use” and its value for agricultural use. At present there is a cap of \$2,000/ acre in Berks County. If the easement value is greater than the price offered, the difference can be considered a charitable deduction for income tax purposes.

Protect Natural Resource Areas

Natural Resource Areas include environmentally sensitive areas such as prominent forest cover, slopes greater than 15 percent, ridgelines, headwaters for streams, springs, rock outcrops, scenic vistas, and PNDI sites. These areas are important to sustain ecological resources, such as native plants and animals, and also to protect scenic and aesthetic qualities of the watershed. With a few exceptions, these properties are privately owned and are not restricted from development.

A combination of municipal action and landowner initiative is recommended to protect high priority natural areas. Overlay zoning or Natural Resource Preservation zoning can restrict those land uses that would compromise the environmental or ecological value of the prescribed area. A more permanent means of land protection is through a program encouraging the landowner’s donation or sale of conservation easements that protect individual properties. Private non-profit land protection organizations such as Berks County Conservancy, Pine Creek Valley Watershed Association, Montgomery County Lands Trust, Wildlands Conservancy, Montgomery County Lands Trust, or Natural Lands Trust can work with property owners to discuss mutual goals for the long-term protection of such lands.

Protect Environmental Hazard Areas

Environmental hazard areas are lands that cannot, and should not, be developed because of their proximity to water, slope or soil conditions. Areas in this category consist of slopes greater than 25%, wetlands, floodplains, watercourses, aquifers, and those watersheds used as a public drinking supply. Although self-limiting to a large

extent, these areas should be further protected from development through municipal regulations or ordinances.

New structures and on-site septic systems should be prohibited on slopes of 25% or greater. Growth should be restricted on soils or slopes that have been identified as hazardous for structures with on-lot sewage disposal systems or in areas where geology limits the availability of water from on-site wells.

National Wetlands Inventory maps and hydric soils maps identify areas that may contain wetlands. In addition to restricting any building or development in wetlands, buffer areas should be established to further protect them. In a similar fashion, floodplains should be maintained in natural vegetation with a protective buffer.

Public water supplies should be protected by their municipal owners. A good example is the Borough of Boyertown, which maintains a 520-acre hilltop watershed around its two reservoirs. This large tract of woodlands, with many springs and seeps, maintains the high quality of the water that is impounded for use by the residents of Boyertown and vicinity. Publicly owned watershed protection properties should be retained in forest cover. Forestry management principles should be structured to provide optimum protection for the water resources.

Develop Program to Fund Stream Buffer and Wetlands Protection

Establishing streamside buffers and protecting wetlands areas have been recommended to enhance water quality and natural resource values in the watersheds. Yet many landowners feel that giving up recreational and agricultural uses in such

areas is a hardship, and that maintenance of the buffers is expensive and time consuming. A special funding or management program should be devised to encourage landowners to protect their streamside buffer or wetlands areas, and to identify compatible uses of these areas.

Goal: Encourage Stewardship of Natural and Cultural Resources

Develop Educational Programs about Resource Protection

Resource Protection is an important issue in the Manatawny Watershed, as the region is primarily rural, but is undergoing rapid growth and change. Citizens living in the watershed are concerned with issues affecting their quality of life and the degradation of natural and cultural resources. In conducting surveys and talking with local residents during the course of this planning project, it has become apparent that people are very concerned about protecting water quality, learning more about groundwater resources, protecting farmland and natural areas, and preserving the historic countryside. There exists a great need to increase public awareness of resource protection issues through community education about these topics, and to foster better communication among all those who have an interest or involvement.

Among those with interest and involvement are private landowners, citizens groups, nonprofit organizations, local government officials, developers, local and state agencies, schools, civic groups, sportsmen's clubs, etc. There are many organizations that can help coordinate educational forums and projects. There is much that can be done in cooperation with the public schools.

In addition to education, there is a need for action programs. When a specific natural resource problem is identified, it needs to be addressed. Coordinated citizen action can be a powerful force to address local concerns. There have been numerous case studies that illustrate a grassroots response

to environmental threats and issues in this watershed. Three successful examples will be briefly cited here:

Case Study One: Oley Township Resource Conservation Project 1980-83

Oley Township was one of two communities chosen for the Rural Conservation Demonstration Project of the National Trust for Historic Preservation. Technical assistance was provided by the Trust and many existing agencies. Funding came from public and private sources. Local citizens organized themselves into five study groups to address issues concerning water resources, agricultural resources, historic resources, scenic resources, and land use. About 100 community volunteers conducted studies and action projects. Results were: 1) USGS groundwater study; 2) 5,000 acre Agricultural Security Area; 3) National Register nomination for whole township; 4) Photograph and slide inventory; 5) Set of maps and draft comprehensive plan. This grassroots-planning project formed the foundation for subsequent conservation-oriented municipal ordinances.

Case Study Two: Protection of Lobachsville Trout Hatchery 1995-2000

The Wissahickon Water Company of Philadelphia leased the 42-acre Lobachsville Trout Hatchery, applied for DEP and Delaware River Basin permits to extract water for bottling, and applied to Pike Township for a zoning change. The permits were routinely issued, but Pike and Oley Townships and local citizens vehemently objected, seeking legal recourse. A new citizens group, Pike Oley District Preservation Coalition, was formed to raise funds and raise awareness. An existing nonprofit organization, the Pine Creek Valley Watershed Association, funded scientific

studies to contradict data included in the permit applications. After a series of legal hearings, costing local groups \$150,000, the PA Environmental Hearing board ruled in favor of the “Oley Objectors” and the permit was remanded because it failed to recognize the impact of a large sustained water withdrawal on the Exceptional Value stream and wetlands at the site. As a follow-up, Oley and Pike Townships, the local conservation groups, and the Berks County Conservancy raised more money and purchased a conservation easement on the property, permanently protecting its land and water resources.

Case Study Three: Memorial Park Dam Removal, Pottstown 1998-2002

The Greater Pottstown Watershed Alliance spearheaded an effort to remove Dam #46-017 from the Manatawny Creek just below Memorial Park in Pottstown. The dam had filled with silt, forming a nutrient laden pool and a severe erosion problem where the stream formed new channels through the park. The plan for dam removal included a scientific research component, carried out by the Philadelphia Academy of Natural Sciences, to measure before and after effects on water quality and aquatic biota. After the dam was removed the effort to restore the stream channel and revegetate its banks began.

Encourage Identification and Monitoring of Natural Resources

An excellent impetus for citizen involvement in watershed stewardship is the development of projects for the identification and monitoring of natural resources. Not only can this provide valuable data and a better understanding of the status of the resources, but also it enables local citizens and/or students to

become active participants in resource protection. Pennsylvania is putting great effort into establishing a Citizen’s Volunteer Monitoring Program, believing that volunteers are an essential element in statewide watershed protection and restoration. The state program groups monitoring into two broad categories: *Watershed ecosystem monitoring*, which collects data on characteristics that determine the health and functioning of the ecosystem; and *Monitoring human users and uses*, which investigates characteristics that determine whether the water supports human uses, and whether the uses themselves are supporting public health, safety and welfare. Although monitoring has occurred in the watershed, it has not been coordinated, and its results have not led to the next step – actions to correct problem areas.

Develop Outreach Programs for Landowners and Municipalities

This Plan and other watershed plans feature many recommendations concerning actions that can be taken by landowners and municipalities in protecting land, water, biological and cultural resources. Some actions are listed as priorities, and these should be the first to be pursued. To communicate these findings and recommendations to those who can do something about them, it is further recommended that an outreach program be initiated to conduct personal visits to landowners, and to make formal presentations to municipal officials. Such a program could be conducted on a subwatershed level by local citizens groups, or on a municipal level by the Berks County Conservancy. Information and maps from this Plan could be used as points of discussion, and copies could be distributed at these meetings.

Encourage Forest Stewardship Plans

Sustainable forestry practices provide both current and long-term benefits to a watershed. Proper timber management encourages the preservation of open space by providing a local landowner with income from standing timber and a market-driven incentive to maintain their property as forestland. Timber management also promotes forest health, lessens the potential of wildfire, protects sites of special significance, provides a rich and diverse wildlife habitat and encourages recreational opportunities.

The Pennsylvania Forestry Stewardship Program assists property owners in managing their forestland for sustained, productive use without having negative impacts on the ecological balance of the forest community. This program helps private landowners better manage, protect and utilize their forests through assisting with the development of multi-resource forest stewardship plans. The landowner's statement of goals and objectives for his woodland forms the foundation of the management plan. It includes a description of the property based on an overall inventory of its resources. The property is then broken into smaller management units, which are inventoried and described in more detail. A map of the property is drawn to illustrate significant features and the forest management units. Finally, there is a list of activities or projects to meet the stated objectives. The Pennsylvania Bureau of Forestry sponsors a cost share program to pay major costs of plan preparation by a professional forester.

Encourage Conservation Plans

Conservation Plans are recommended for working farmland and other large tracts in

the Manatawny watershed. The Natural Resource Conservation Service (NRCS) provides technical assistance to farmers and landowners in the development of Conservation Plans that analyze and map soils, topography, drainage, productive capability and recommend practices to best utilize the land for productive agriculture or to meet the landowner's objectives for their property.

Conservation Plans promote good stewardship of the land and water resources that are essential for sustainable agriculture and wise land use.

Encourage Enrollment in Conservation Reserve Program

Farmers in Berks County can enroll marginal farmland in the Conservation Reserve Program (CRP) administered by the Farm Service Agency (FSA). The purpose of the program is to improve water quality and wildlife habitat by converting highly erodible land and/or riparian areas from agricultural production to conservation uses. To be eligible, land must have been cropped two of the previous five years, or be marginal pastureland. Participants must agree to establish and maintain eligible practices under a ten to fifteen year contract. CRP practices include planting of permanent grasses, hardwood trees, or wildlife habitat; establishing grassed waterways, filter strips, contour grass strips, or riparian forested buffers; and restoring wetlands. The Federal Government will pay up to 50% of the cost of installing conservation practices, and an additional annual rental payment based on the soil rental rate per acre as calculated by FSA.

Encourage Enrollment in Clean and Green Program

The Pennsylvania Farmland and Forest Land Assessment Act of 1974 (Act 319) provides for preferential assessment of tracts of farmland and forest land over ten acres. To be eligible land must meet qualifications for agricultural use, agricultural reserve, or forest use. If enrolled in the program, land will be assessed at its actual use value, rather than its market value for highest and best use. This usually results in a significant property tax reduction. Application forms are available at the County Assessment Office.

Encourage Historic Preservation Initiatives

There is great interest in historic preservation in the Manatawny watershed. Most owners of historic buildings have expended time, research, and considerable financial investment into restoration of their own unique properties. This area is truly one of the premier historic areas in the state, due in large part to the stewardship already practiced here over many generations.

In addition to interested and knowledgeable property owners, this region has excellent craftsmen, skilled restoration specialists, experts in fields such as milling technology, antiques, quilts, fractur, graveyard preservation, genealogy, historical research and the Pennsylvania German culture. There are historic preservation organizations in Oley and Amity Townships, Boyertown and Pottstown. There are historic sites open to the public such as the Bahr Mill, the Boyertown Museum of Historic Vehicles, Pottsgrove Manor, and properties of the Historic Preservation Trust of Berks County. All of these individuals and organizations seek to preserve heritage values.

Several new projects or initiatives can augment the ongoing preservation activities in this region. These include:

- National Register Nominations of individual buildings or historic districts, including districts that have already been declared eligible such as the Pikeville-Lobachsville Historic District
- Updates of historic site surveys and inventories
- Publication of books, articles and manuscripts dealing with local historic topics
- Appointment of Historic Preservation Commissions in townships and boroughs
- Development of municipal Historic Preservation Plans pursuant to Act 68 of 2000
- Development of historic resource overlay districts on municipal zoning ordinances

Goal: Encourage Regional Planning Initiatives

Participate in Berks County Regional Planning Program

Many issues local municipalities deal with are regional in nature, such as planning and zoning, sewer and water provision, agricultural preservation, and transportation. Neighboring municipalities frequently face the same problems, yet do not communicate with one another about them. To improve this situation, the Berks County Planning Commission initiated a Joint Comprehensive Planning Program in 1992. This program has been very successful, achieving participation from one-third of the municipalities in the county. Since then the County has developed a Joint Zoning program for municipalities that have prepared joint comprehensive plans. The County has also completed a sewer and water regionalization study that explores potential regional solutions to sewer and water provision and infrastructure maintenance. Municipalities in the Manatawny region could benefit from these programs.

Two or more municipalities are eligible for the regional planning program. The county will fully fund the cost of preparing the plans and ordinances. Municipalities select the planning consultants from a list approved by the County. Ordinances must conform to the Pennsylvania Municipalities Planning Code and must be consistent with the County Comprehensive Plan.

Planning on a Watershed Basis

Sustaining the water quality and quantity of the Manatawny Creek, Sprogels Run, and Sanatoga Creek watersheds is mutually beneficial for all municipalities. Actions

that occur in one area of the watershed have impacts on other areas. Protecting surface and ground water resources is a goal throughout the watersheds, and requires intermunicipal communication and cooperation. One example of watershed-based planning involves stormwater management.

Watershed Planning for stormwater management is being undertaken by the Berks County Planning Commission. Under PA Act 167, the Stormwater Management Act, all counties, in consultation with its municipalities, must prepare and adopt a stormwater management plan for each of its designated watersheds. In Berks County the designated watersheds are: Tulpehocken Creek, Maiden Creek, Manatawny Creek, and Schuylkill River. Within six months following adoption and approval of the plan, each municipality is required to adopt or amend stormwater ordinances as laid out in the plan. These ordinances must regulate development within the municipality in a manner consistent with the watershed stormwater plan. Developers are required to manage the quantity, velocity, and direction of resulting stormwater runoff in a manner that adequately protects health and property from possible injury. They must implement control measures that are consistent with the provisions of the watershed plan and the Act. The Act also provides for civil remedies for those aggrieved by inadequate management of accelerated stormwater runoff.

Development in a watershed causes an increase in stormwater runoff and a reduction in groundwater recharge. A number of negative effects result from uncontrolled stormwater runoff. These include: downstream flooding, erosion and sedimentation problems, reduction in stream quality, increase in stream temperature,

impairment of the aquatic food chain, and reduction in the base flow of the stream during the dry summer months. Stormwater management entails bringing surface runoff caused by precipitation events under control. This is not simply a site-specific problem, but requires an understanding of the dynamics of the whole watershed. It involves proper planning, engineering, construction, operation and maintenance.

Watershed Conservation Management Plans

The PA Department of Conservation and Natural Resources provides funds for local governments and private non-profit conservation organizations to prepare Watershed Conservation Management Plans on a watershed basis. In 2000 the Schuylkill River Conservation Plan was published.

The Schuylkill Watershed River Conservation Plan presents a broad overview of the 1,916 square mile watershed with its primary focus on water quality, landscape sustainability and institutional assessment. It provides a summary of recommendations and issues by subwatershed. It identifies the Upper Manatawny subwatershed as one of the most-threatened watersheds for population growth in the next decade. Its recommendations for the Manatawny Creek watershed include:

- Maintain the integrity of the “Reading Horseshoe” habitat zone
- Protect first-order streams
- Proactively protect PNDI sites

This Manatawny Creek Watershed Conservation Management Plan provides a more focused overview of this 92 square mille subwatershed of the Schuylkill River. The Plan includes: descriptions and GIS

maps of watershed characteristics, a listing of issues and concerns, and management options to address watershed conservation priorities. Inclusion in both Watershed Conservation Management Plans opens the way for matching implementation grants to carry out recommended projects.

The Berks County Conservancy has now completed Watershed Conservation Plans for the County’s major tributaries of the Schuylkill River: Tulpehocken Creek, Maiden Creek and Manatawny Creek. Future projects will address other Berks County watersheds: Hay Creek, Wyomissing Creek, and other Schuylkill River Tributaries. Each plan will seek to identify local concerns and issues and to recommend actions that will meet community watershed goals. All Plans demand follow up actions and efforts to be carried out by a broad spectrum of partners – state, county and local agencies, municipalities, non-profits, schools, and the general public.

A Sample of Prioritized Potential Projects Related to the Management Options of the Manatawny Creek Watershed Conservation Management Plan

- Develop a prioritized list of Manatawny Creek Watershed municipalities to contact and provide education and information to encourage the development or amendment of ordinances to protect the resources of the watershed, such as buffer ordinances.
- Partner with organizations and agencies to hold public educational meetings for the residents and municipal officials in the Manatawny, Sprogels Run, and Sanatoga Watersheds.
- Encourage Ag and/or Open Space Zoning to townships throughout the watersheds.
- Develop implementation projects that can address each subwatershed as a whole.
- Work with Earl and Pike Townships to develop a township-wide purchase of conservation easements program.
- Partner with organizations such as the Pine Creek Valley Watershed Association, the Pike Oley District Preservation Coalition, the Greater Pottstown Watershed Alliance, The Nature Conservancy, and the Montgomery County Lands Trust for land preservation and educational activities.
- Upgrade headwater streams within the Manatawny Creek watershed to EV & HQ status.
- Work with Trout Unlimited on stream restoration projects in the Pine Creek watershed, such as the assessed Coult and Wallace Properties.
- Work with Amity Township to conduct groundwater studies in relation to new development.
- Increase levels of funding sources for habitat management of PNDI sites in the watershed
- Encourage greater participation in the Berks County Student Watershed Council.
- Hold public workshops on the management of invasive species as part of the *Natural Habitat Workshop Series*.
- Develop a Virtual Tour of the Manatawny Creek Watershed
- Work with Lehigh Portland Cement Company to encourage a continuous discharge into the stream to improve the impaired stream at Spangsville.

- Partner with DEP and the County Planning Commission on educating the municipalities about stormwater management issues.
- Reinvigorate the Oysterville Valley Conservation Easement Program
- Recommend sensitive timbering, if any, and minimal development within the Trout Run subwatershed through the use of zoning ordinances and forest stewardship plans
- Conduct a feasibility study to address the development of an 'ATV Park' in the region.
- Encourage townships to develop projects to increase and/or improve recreational facilities in the Manatawny Creek Watershed
- Address the two historic dams in the Manatawny Creek Watershed
- Encourage the completion of the Pleasantville Bridge restoration project
- Develop a PL566 cost share funding program for the Manatawny Creek Watershed
- Support the development of a greenway along Sanatoga Creek in New Hanover and Lower Pottsgrove Townships in Montgomery County
- Conduct a 'Biosolids' Education Project in the Manatawny, Sprogels Run, and Sanatoga Creek Watersheds
- Complete National Register Nominations for the Pikeville-Lobachsville historic district

Appendix A



DEP and USGS Monitoring Data for the
Manatawny Creek Watershed

SWP 3D MANATAWNY

COUNTY



- STATE WATER PLAN BOUNDARY
- 2000 ASSESSMENT RESULTS
- IMPAIRED
- ATTAINING USE
- STREAMS WATER QUALITY STATUS
- IMPAIRED
- UNASSESSED
- ATTAINING USE
- LAKE
- HOPEWELL LAKE
- PICKERING CREEK RESERVOIR
- SCOTTS RUN LAKE
- COUNTY
- BOROUGH
- TOWNSHIP



2 0 2 4 6 8 MILES



DEP WATER MONITORING STATIONS

STATION_ID	LATITUDE	LONGITUDE	STREAM	STA #	ROAD	BIOTA	HABITAT
981211-1026-GLW	40 25' 35.08609"	75 42' 2.94795"	PINE	PI-1	LONG LANE	A	200
981209-1357-GLW	40 25' 0.824119"	75 43' 38.7225"	PINE	PI-2	LONG LANE	A	196
981209-1306-GLW	40 24' 34.1187"	75 44' 6.25908"	PINE	PI-3	LOBACHSVILLE RD	A	166
981210-1420-GLW	40 24' 50.01439"	75 44' 32.71629"	PINE	PI-4	BOYER RD	A	184
980908-1424-GLW	40 24' 11.83489"	75 44' 30.95029"	BIEBER	BB-2	BERTOLET MILL RD	A	200
980916-1403-GLW	40 25' 9.26433"	75 45' 51.09059"	BIEBER	BB-1	FORGEDALE RD	A	191
990610-1130-DSB	40 24' 12.6153"	75 41' 43.48629"	OYSTERVILLE	OY-1	HARTMAN RD	A	203
981209-1046-GLW	40 23' 50.47989"	75 42' 23.83749"	OYSTERVILLE	OY-2	CARL RD	A	169
981209-1210-GLW	40 23' 18.23469"	75 41' 57.82499"	OYSTERVILLE	OY-3	BECHTEL	A	169
990610-1100-DSB	40 23' 47.6016"	75 43' 13.5534"	OYSTERVILLE	OY-4	PIKEVILLE	A	186
981209-0950-GLW	40 22' 35.13079"	75 43' 25.55899"	OYSTERVILLE	OY-5	HAFER ROAD	A	162
981209-0842-GLW	40 22' 34.56829"	75 44' 3.405499"	OYSTERVILLE	OY-6	TOLLHOUSE RD	A	169
981113-1419-GLW	40 24' 0.460209"	75 48' 32.82099"	LITTLE MANATAWNY	LM-1	OLEY RD	A	195
981116-1341-GLW	40 23' 53.98729"	75 48' 31.20969"	LITTLE MANATAWNY	LM-2	RT 73	A	203
981116-1443-GLW	40 23' 4.219209"	75 46' 12.9153"	L. MANATAWNY(FURNACE)	LM-3	RT 73	A	150
981113-1320-GLW	40 23' 6.293779"	75 45' 9.790329"	LITTLE MANATAWNY	LM-4	SNYDER RD	A	168
990128-1431-GLW	40 21' 16.68399"	75 44' 2.944819"	FURNACE RUN	FU-1	MANATAWNY RD	A	144
990129-1220-GLW	40 21' 12.42039"	75 44' 55.87839"	MANATAWNY UNIT	MN-1	COVERED BRDG RD	IMP*	188
990128-1243-GLW	40 19' 29.15529"	75 43' 50.96409"	TROUT RUN	TR-1	MANATAWNY RD	A	175
981118-1440-GLW	40 21' 44.61729"	75 44' 12.9009"	MANATAWNY	MN-2	SPANGSVILLE RD	A	179
981118-1258-GLW	40 19' 4.557999"	75 44' 2.884189"	MANATAWNY	MN-3	RT 562	A	190
981117-1454-GLW	40 16' 55.8459"	75 42' 25.27859"	MANATAWNY	MN-4	PINE FORGE RD	A	190
990127-1539-GLW			IRONSTONE	IR-1	RT 73	A	198
990127-1432-GLW			IRONSTONE	IR-2	POWDERMILL RD	A	178
990121-1048-GLW			IRONSTONE	IR-3	RT 562	A	199
990120-1101-GLW	40 18' 27.91299"	75 39' 30.29439"	IRONSTONE	IR-4	GRESHVILLE RD	A	196
990127-1252-GLW	40 17' 11.68179"	75 41' 6.164389"	IRONSTONE	IR-5	RR BRIDGE	A	195
981120-1244-GLW	40 17' 42.52689"	75 40' 36.7929"	IRONSTONE	IR-6	RR/GRISTMILL RD	A	193
981120-0957-GLW	40 16' 58.03059"	75 41' 6.318789"	IRONSTONE	IR-7	PINE FORGE RD	A	200
990129-1024-GLW	40 16' 33.56519"	75 40' 21.28309"	GOOSE RUN	GR-1	GOOSE RUN RD	A	152
981117-1326-GLW	40 15' 22.26969"	75 39' 28.88649"	MANATAWNY	MN-5	RT 100	A	146
990203-1343-GLW	40 15' 18.71579"	75 38' 51.75089"	UNT MANATAWNY	MN-6	POTTSTOWN 8TH ST	IMP**	

A Ranking = Attained Use for stream based upon its classification standards
 IMPAIRED* caused by siltation and excessive plant growth in farmland, and hydromidification due to flow alterations at abandoned quarry
 IMPAIRED* caused by highway runoff, urban runoff, flow alterations, siltation, and habitat alterations in urban area



Water Resources

skip navigation

Data Category:

Site Information

Geographic Area:

Pennsylvania

GO

Site Map for Pennsylvania

USGS 01471980 MANATAWNY CREEK NEAR POTTSTOWN, PA

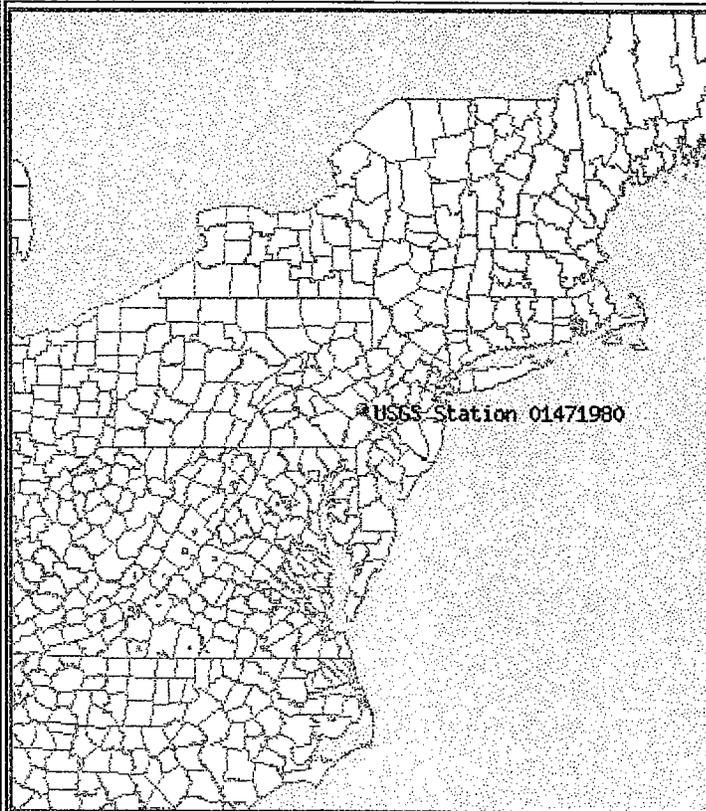
Available data for this site

Station site map

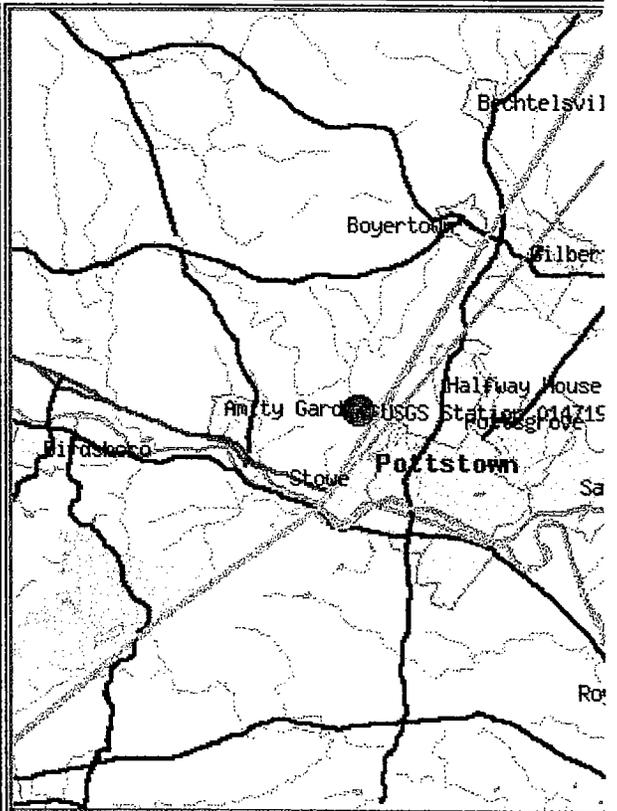
GO

Berks County, Pennsylvania
 Hydrologic Unit Code 02040203
 Latitude 40°16'22", Longitude 75°40'49" NAD27
 Drainage area 85.50 square miles
 Gage datum 150.00 feet above sea level NGVD29

Location of the site in Pennsylvania.



Site map.



ZOOM IN 2X, 4X, 6X, 8X, or ZOOM OUT 2

Calendar Year Streamflow Statistics for Pennsylvania

USGS 01471980 MANATAWNY CREEK NEAR POTTSTOWN, PA

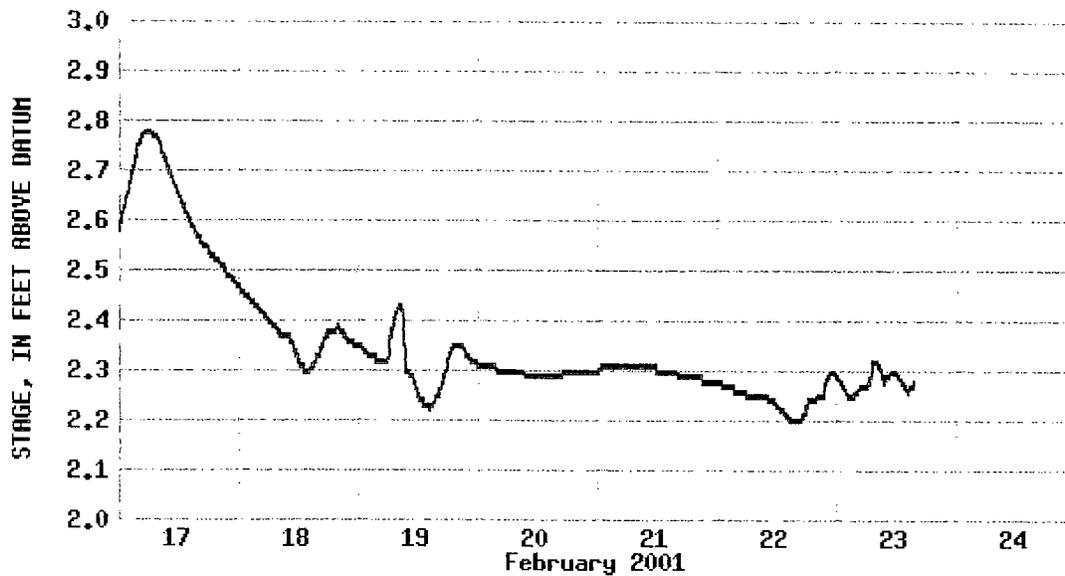
Available data for this site

Berks County, Pennsylvania Hydrologic Unit Code 02040203 Latitude 40°16'22", Longitude 75°40'49" NAD27 Drainage area 85.50 square miles Gage datum 150.00 feet above sea level NGVD29	Output formats <input type="button" value="HTML table of all data"/> <input type="button" value="Tab-separated data"/> <input type="button" value="Reselect output format"/>
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Year	Annual mean streamflow, in ft ³ /s	Year	Annual mean streamflow, in ft ³ /s	Year	Annual mean streamflow, in ft ³ /s
1975	204	1984	193	1992	93.7
1976	113	1985	90.3	1993	167
1977	134	1986	123	1994	149
1978	152	1987	112	1995	97.2
1979	185	1988	130	1996	224
1980	93.2	1989	132	1997	105
1981	62.9	1990	135	1998	121
1982	113	1991	88.7	1999	94.6
1983	166				

Questions about data gs-w-pa_NWISWeb_Data_Inquiries@usgs.gov
 Feedback on this website gs-w-pa_NWISWeb_Maintainer@usgs.gov
 Surface Water data for Pennsylvania: Calendar Year Streamflow Statistics
http://water.usgs.gov/pa/nwis/annual/calendar_year?

[Return to top of page](#)



- [Data used in graph](#)
- [Historical daily mean or peakflow data for this station](#)

Station Description

STATION.--01471980 MANATAWNY CREEK NEAR POTTSTOWN, PA

LOCATION.--Lat 40° 16' 22", long 75° 40' 49", Berks County, Hydrologic Unit 02040203, on left bank 180 ft upstream from bridge on Manatawny Street, 0.7 mi downstream from Ironstone Creek, 2.4 mi northwest of Pottstown, 3.1 mi upstream from mouth, and 4.7 mi southwest of Boyertown.

DRAINAGE AREA.--85.5 mi².

PERIOD OF RECORD.--August 1974 to current year.

GAGE.--Water-stage recorder. Datum of gage is 150.00 ft above sea level (levels by U.S. Army Corps of Engineers).

COOPERATION.--Funding for the operation of this station is provided by the U.S. Army Corps of Engineers.

Daily Mean Flow Statistics for 02/23 based on 25 years of record, in ft³/s

Latest flow 02/23 16:00	Minimum	Mean	Maximum	80 percent exceedance	50 percent exceedance	20 percent exceedance
125	68	197	392	104	176	329

Percent exceedance means that 80, 50, or 20 percent of all daily mean flows for 02/23 have been greater than the the value shown.

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USGS 01471875 MANATAWNY CREEK NEAR SPANGSVILLE, PA

Available data for this site:

Station Description

LOCATION

Latitude 40°20'22", Longitude 75°44'33" NAD27,
Berks County, Pennsylvania, Hydrologic Unit 02040203

DRAINAGE AREA

56.9 square miles; Contributing drainage area 56.9 square miles,

GAGE

Datum of gage is 265. feet above sea level NGVD29.

STATION TYPE:

Surface Water

STATION DATA:

Data Type	Begin Date	End Date	Count
Real-time	This is a real-time site		
Peak streamflow	1993-11-28	2000-03-22	7
Daily streamflow	1993-10-01	2000-09-30	2557

SITE OPERATION:

Site is located in Pennsylvania; record is maintained by Pennsylvania

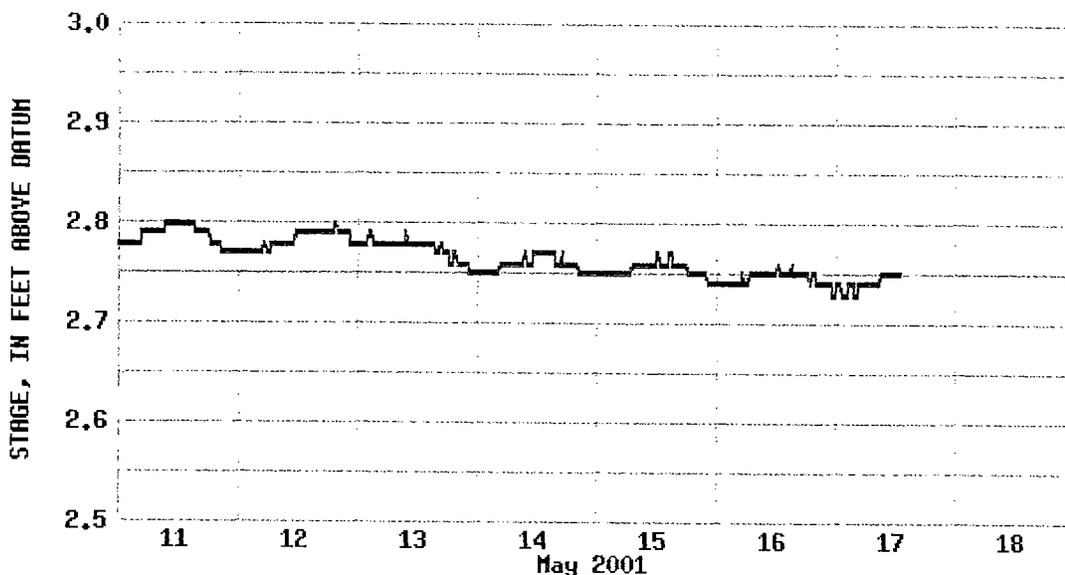
CONTACT INFORMATION

Email questions about this station to gs-w-pa_NWISWeb_Data_Inquiries@usgs.gov

ADDITIONAL INFORMATION

STATION.--01471875
MANATAWNY CREEK NEAR SPANGSVILLE, PA

LOCATION.--Lat 40`20'22", long 75`44'33",
Berks County, Hydrologic Unit 02040203,
on left bank 200 ft north of powerline across stream,
1.2 mi south of Spangsville, and
1.3 mi north of SR 562 and Earlville.



- [Data used in graph](#)
- [Historical daily mean or peakflow data for this station](#)
- [Return to Current Streamflow Conditions table](#)

Station Description

STATION.--01471875 MANATAWNY CREEK NEAR SPANGSVILLE, PA

LOCATION.--Lat 40°20'22", long 75°44'33", Berks County, Hydrologic Unit 02040203, on left bank 200 ft north of powerline across stream, 1.2 mi south of Spangsville, and 1.3 mi north of SR 562 and Earlville.

DRAINAGE AREA.--56.9 mi².

PERIOD OF RECORD.--October 1993 to current year.

GAGE.--Water-stage recorder. Datum of gage is 265 ft above sea level, from topographic map.

COOPERATION.--Funding for the operation of this station is provided by the Delaware County Solid Waste Authority.

Daily Mean Flow Statistics for 05/17 based on 6 years of record, in ft³/s

Latest flow 05/17 13:30	Minimum	Mean	Maximum	80 percent exceedance	50 percent exceedance	20 percent exceedance
55	45	83	130	49	70	128
Percent exceedance means that 80, 50, or 20 percent of all daily mean flows for 05/17 have been greater than the the value shown.						

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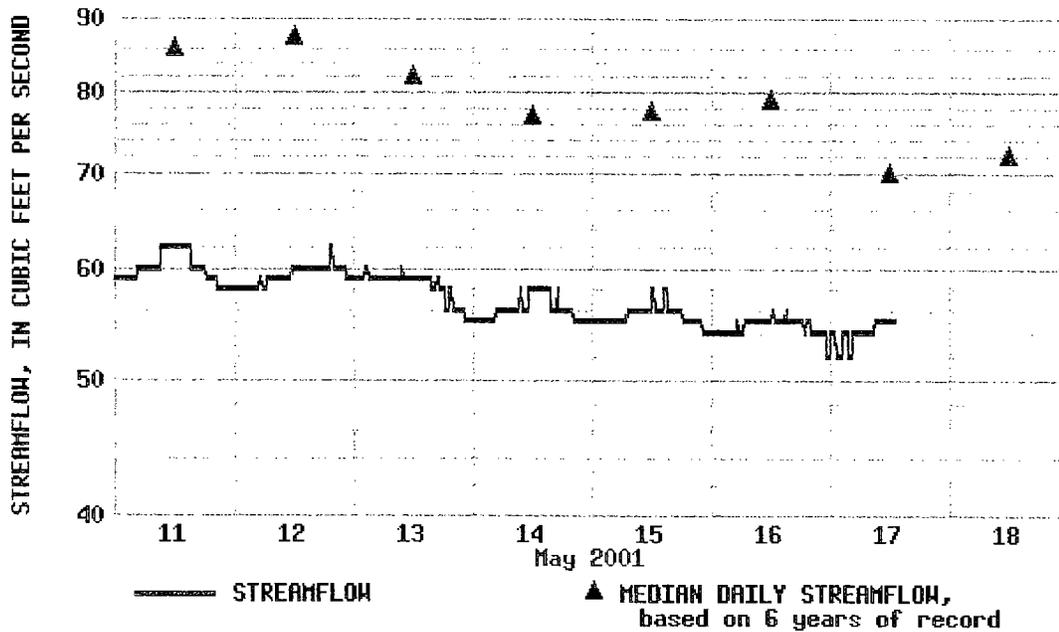
PROVISIONAL DATA SUBJECT TO REVISION

01471875— MANATAWNY CREEK NEAR SPANGSVILLE, PA

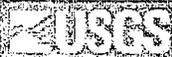
Current Conditions

Flow (ft ³ /s)	Stage (ft)	Date	Time
55	2.75	05/17	13:30

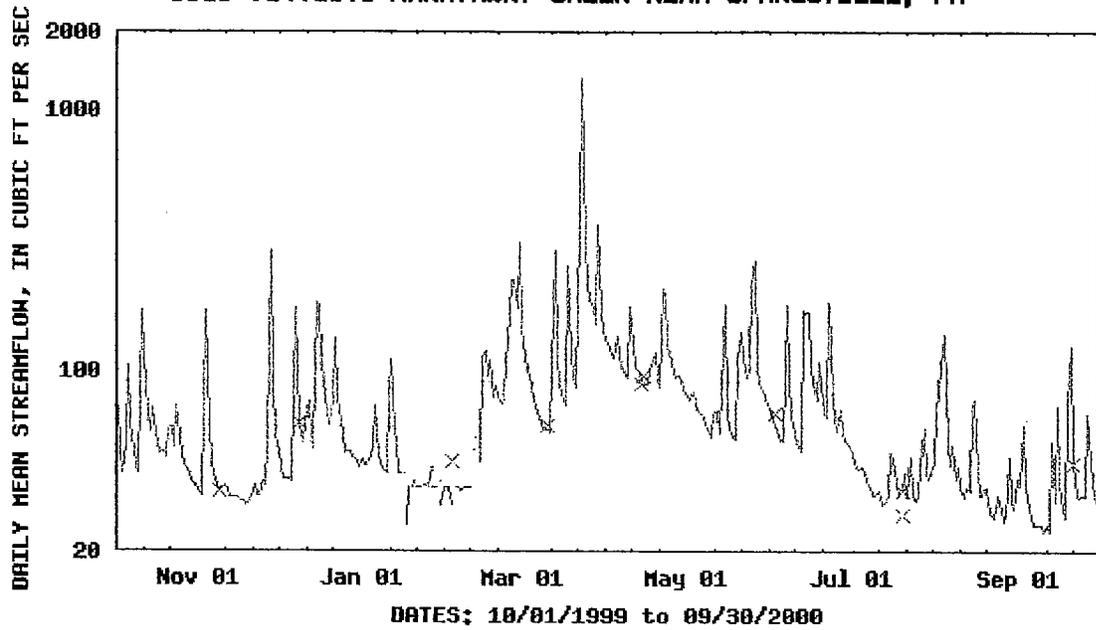
Streamflow -- updated Thu May 17 13:30 2001 -- [download presentation-quality graph](#)



Stage -- updated Thu May 17 13:30 2001 -- [download presentation-quality graph](#)



USGS 01471875 MANATAWNY CREEK NEAR SPANGSVILLE, PA



EXPLANATION

— DAILY MEAN STREAMFLOW × MEASURED STREAMFLOW — ESTIMATED STREAMFLOW



25 North 11th Street
Reading, Pa 19601
610-372-4992
www.berks-conservancy.org