

TWO RIVERS AREA GREENWAY PLAN

Northampton County, Pennsylvania

January 2005

Prepared for:

Two Rivers Area Council of Governments

Prepared by:

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Bethlehem, Pennsylvania

TWO RIVERS AREA GREENWAY PLAN NORTHAMPTON COUNTY, PENNSYLVANIA

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This project was financed in part by a Keystone Recreation, Park and Conservation Fund Grant from the Pennsylvania Department of Conservation and Natural Resources, Bureau of Recreation and Conservation; and with funding from Northampton County and the municipalities of the Two Rivers Area Council of Governments.

CONTENTS

	PAGE
EXECUTIVE SUMMARY	v
INTRODUCTION	1
Background for the Greenways Plan	1
Concept and Purpose of a Greenway Network	1
Greenways Planning Process	3
EXISTING CONDITIONS	5
Study Area Location	5
Natural Features	7
History	17
Demographics	23
Existing Land Use and Zoning	35
Significant Recreation, Historical and Cultural Resources	48
DEMAND FOR GREENWAYS	67
Community Character	67
Demographic Patterns and Trends	67
Profile of Potential Users	68
Indicators of Future Demand	68
Economic Development	71
GREENWAY ISSUES	75
Natural Resources	75
Cultural Resources	77
Land Use, Development, and Transportation	78
Recreation	80
Land Ownership	81
Municipal Governments	82
Design, Management, and Funding	83
GREENWAY PLAN	85
Greenway Design and Facilities	86
Compatibility with Adjacent Land Uses	103
Greenway Concept Plan	105

IMPLEMENTATION PLAN 119
 Action Plan 119
 Land Preservation Techniques 122
 Cost Estimates 127
 Possible Sources of Greenway Funding 130
 Organizational Framework 137
 Pilot Projects 147

APPENDICES 157
 Appendix A - Survey Questionnaire 157
 Appendix B - Sample Resolution 165
 Appendix C - Published Sources 167
 Appendix D - Public Meetings 169
 Appendix E - Case Studies 193

MAPS AND TABLES

MAPS

Map 1 - Study Area Location	following page 6
Map 2 - Physiography	following page 8
Map 3 - Soils	following page 8
Map 4 - Steep Slopes	following page 10
Map 5 - Streams and Watersheds	following page 12
Map 6 - Hydrologic Features	following page 12
Map 7 - Woodlands and Outstanding Natural Areas	following page 14
Map 8 - Natural Features Composite	following page 16
Map 9 - Existing and Proposed Land Use	following page 40
Map 10 - Generalized Municipal Zoning	following page 40
Map 11 - Recreational and Cultural Resources	following page 60
Map 12 - Historic Resources	following page 66
Map 13 - Conservation Greenways “Hubs and Spokes” Concept	following page 106
Map 14 - Recreation Greenways “Hubs and Spokes” Concept	following page 106
Map 15 - The Present and The Future	following page 118
Map 16 - The Greenway Plan	following page 118
Map 17 - Trail Plan for the Urban Core	following page 118

TABLES

Table 1 - State Stream Designations	11
Table 2 - Outstanding Natural Areas	15
Table 3 - Total Population	24
Table 4 - Population Projections	25
Table 5 - Population Density	26
Table 6 - Age Distribution	28
Table 7 - Total Housing Units	29
Table 8 - Household Size	31
Table 9 - Housing Type	32
Table 10 - Median Income and Poverty	33
Table 11 - Commute to Work	34
Table 12 - Environmental Provisions in Municipal Zoning Ordinances	41
Table 13 - Recreation and Open Space Sites	50
Table 14 - Public and Private Schools	58
Table 15 - Major Government Properties	59
Table 16 - Cemeteries	60
Table 17 - Preserved Farms	61
Table 18 - National Register Listed Historic Sites	62
Table 19 - National Register Listed Historic Districts	63

Table 20 - National Register Eligible Historic Sites 63
Table 21 - Selected Additional Historic Sites 64
Table 22 - Standard Trail Width Recommendations 94
Table 23 - Trail Surface Synopsis 96
Table 24 - Bench and Rest Areas 102
Table 25 - Action Program 119
Table 26 - Greenway Development Cost Estimates 129
Table 27 - Possible Greenway Funding Sources 130

EXECUTIVE SUMMARY

Introduction

Development patterns are currently changing the landscape of the Two Rivers Area in Northampton County, Pennsylvania. Farm fields and woodlands are giving way to housing developments, shopping centers, expanded industry, and new roads. Fortunately, the area still maintains an impressive array of natural, historic, and agricultural amenities. Through this plan, members of the Two Rivers Area Council of Governments and the Bushkill Stream Conservancy, a non-profit organization consisting of a diverse group of volunteers, are making a concerted effort to protect and enhance these amenities. In particular, they wish to protect linear areas of open space centered on important natural features such as streams and ridgelines, known as *greenways*. Additionally, these two groups have recognized the need for increased recreational activities in the Two Rivers area for local residents and tourists alike. These improvements in recreation and conservation could make the Two Rivers area an even more livable place, producing immeasurable social, environmental and economic benefits.

The Two Rivers Area Greenways plan employs a comprehensive approach for the study area. The plan is based upon the publication *Pennsylvania Greenways: An Action Plan for Creating Connections*, which outlines a process for developing a statewide greenway system of hubs and spokes. Greenways, as defined by the *Action Plan*, are corridors of open space that protect natural, cultural and scenic resources, provide recreational benefits, enhance natural beauty and quality of life in neighborhoods and communities, and stimulate economic development opportunities. The Two Rivers Area Greenway Plan has been developed with input from many different sources, including key individuals, the public, local municipalities, regional planning departments and non-profit groups. The plan recognizes the complex nature of greenways and incorporates numerous key resources such as natural, cultural, historic, agricultural and recreational components. The design of trails and other greenways components have been incorporated into the plan. Important actions items are also identified for implementing the plan, including pilot projects.

The greenway planning process undertaken to formulate the Two Rivers Area Greenway Plan involves many components. Monthly meetings were held with the Bushkill Stream Conservancy, an organization comprised of individuals with diverse backgrounds who reviewed and commented on each section of the plan. A concept plan was formulated for the Two Rivers study area using the information gathered, evaluated and prioritized in these meetings, background research, data on greenway demand, issues, goals and objectives. This concept plan set about to incorporate the state's goals and objectives for greenway creation and implementation. The concept plan for the Two Rivers Area Greenway was generated for the study area as a whole. There are also four diverse sub-areas which incorporate the overall concept goals but have more location specific ones as well. Design elements and facilities were also recommended. Recommendations have also been made based on the compatibility between the greenway and adjacent land uses. Finally, an implementation plan has been developed outlining the various tasks needed to be completed in order to create the greenway network. Some tasks are ongoing, such as education and community outreach, while others have a

defined time frame. The implementation plan also outlines possible funding sources and pilot projects for the Two Rivers Area Greenway Plan.

Existing Conditions

Before beginning to plan a greenway network, it is important to understand the diverse environmental and social components of the study area. To do this, background information has been gathered relevant to the creation of a plan for greenways. Natural features, history, demographics, existing land use, existing zoning and significant recreation, historical and cultural resources are documented for the study area. Demand is also part of the background information researched for the plan. This includes the character of the various communities found in the study area, the profile of potential greenway users, indicators of future demand and the potential for economic development associated with greenway development. The information gathered during the background research has been evaluated as it relates to creating a plan for greenways in the Two Rivers area.

The Two Rivers study area consists of a 109 square mile region in Northampton County. The 17 municipalities found in the study area, which have a population of 130,000, are part of the third largest metropolitan area in Pennsylvania and have a projected population growth of nearly 38% by 2030. There are also two very large metropolitan areas within 60 miles, New York City to the east and Philadelphia to the south. The study area spans Northampton County, bounded by Blue Mountain to the north and Bucks County to the south. There are many recreational amenities found within the Two Rivers study area, some of the more prominent being the Delaware & Lehigh Canal Trail, the Appalachian Trail and Jacobsburg Environmental Education Center.

The study area is divided into four sub-areas to further understand the region and to facilitate better planning efforts. These are the Upper Watershed and Williams Township, which are predominantly rural in character, the more suburban Middle Watershed and the Urban Core. The Upper Watershed encompasses the area north of Nazareth and Stockertown to Blue Mountain, including Jacobsburg Environmental Education Center and the Plainfield Township Trail. The Middle Watershed covers Nazareth and Stockertown south to the Lehigh River, excluding the City of Easton and surrounding boroughs, which constitute the Urban Core. The final sub-area, Williams Township, includes the Reading Prong.

The significant natural features included in the study area are soils, including those hydric in nature, steep slopes, streams, watersheds, floodplains, wetlands, woodlands and outstanding natural areas. The Upper Watershed has a plethora of significant natural features including woodlands, wetlands, hydric soils and numerous headwater streams. The Middle Watershed has significant floodplain coverage and the Urban Core has wooded corridors and slopes along waterways. The Nature Conservancy has identified 20 outstanding natural areas within the entire study area, a number of which are in Williams Township. This area also contains significant belts of upland forest. In addition, Bushkill Creek and Fry's Run are classified as high-quality cold-water fisheries by the state, affording them additional protection.

At this time, 60% of the study area consists of agricultural or vacant land, but this land use is quickly being diminished by increased development. The Upper Watershed exhibits sporadic, large-lot residential development amidst farmland and woodland. The Middle Watershed, one of the fastest growing areas in eastern Pennsylvania, is predominantly suburban in character with some interspersed significant cement and pigment industry. The Urban Core represents the highest density of population in the study area, being predominantly residential and institutional in character. Williams Township's ridges and valleys demonstrate a significant large-lot development pattern.

Population and housing trends influence the land use patterns found in the sub-areas. Nearly one-half (48%) of the population of Northampton County lives in the Two Rivers study area, with Easton being the most populated municipality at 26,139. The study area is predicted to have a 37.5% increase in population by the year 2030. The 15.2% growth in housing units between 1990 and 2000 experienced in the study area is greater than the whole of Northampton County (11.9%) with Forks Township, which is in the Middle Watershed, experiencing a growth rate of 39.8%. For comparison, the growth rate during the same ten-year period for the entire state of Pennsylvania was 6.3%.

Numerous recreation and cultural resources can be found within the study area and can be considered existing components for the greenway network. These include state, county, municipal and private recreation amenities and open spaces. The most significant of these resources are the Jacobsburg State Park and Environmental Education Center, State Game Lands, and Delaware & Lehigh National Heritage Corridor Canal and Trail. Numerous schools, government buildings, churches, cemeteries, historic sites and areas of preserved farmland are also potential components for the greenways network.

Demand

The demand for greenways is also a key component to the plan. A diverse list of greenway users exists, a result of the interviews and questionnaires from this study. The most common greenway users include: cyclists, hikers, anglers, leisure walkers, community residents, and nature watchers. Other users may include: children going to school, animals, runners, hunters, horseback riders, skateboarders, motorized vehicles, and a various other users. Future greenway use will continue to be diverse with potential increases anticipated in certain users such as horseback riders, tourists, fitness walkers, commuters, and local and regional residents. This diversity, and the projected population increase, points to the demand for multiple use greenway options. Another indicator of demand is the voter approved Northampton County Bond Initiative of 2002 for open space preservation. On a state-wide scale, the Pennsylvania Outdoor Recreation Plan, released in January 2004, indicates there is an increase in interest for greenways and greenway-related activities, with 56% of responses requesting an increase in greenways or improved greenways in the state. The Plan, which also investigated demand by region, found for this area the most popular recreation activities include many that can take place along greenways. Walking for pleasure or fitness lead a top ten list that also included such greenway oriented activities as nature viewing, picnicking, nature walks, hiking, fishing and jogging.

Another important component to the plan is the economic development potential greenways offer. There are a number of areas where the economic benefits of greenways can occur including quality of life appeal, increased property values, economic revitalization, increased spending and lower health care costs. Quality of life appeal refers to the ability of an area to attract and retain businesses and residents. One of the components factored into this is preserved quality open space and access to natural areas and recreation opportunities. Increased property values is another element of economic development potential associated with greenways. Studies have demonstrated people are willing to pay more for properties near or adjacent to greenways. The economic revitalization of an area experiencing decline has also been attributed to the development of greenways. In Pittsburgh, public officials have credited the greenway system developed in the area with helping to turn around the city's economic woes. Increased spending on trail related items such as footwear, bicycles and other equipment helps to fuel the local economy. Lower health care costs can also be found as greenways offer people an opportunity to lead more active lifestyles. Studies indicate more physically fit people have increased productivity levels at work.

Issues

There are a variety of issues, opportunities and potential threats present in the Two Rivers Greenway Study Area. A number of issues pertaining to greenways have been generated from various interviews, meetings and discussions. Although many of these items are interrelated, they have been divided into the following categories: Natural Resources, Cultural Resources, Land Use, Development and Transportation, Recreation, Land Ownership, Municipal Governments and Greenway Design, Management and Funding. Important natural and cultural resources are threatened, with the loss of woodlands, wetlands riparian areas and farmland to development being a major issue to be addressed in the plan. Another issue, the increased demand for protected open space and recreation opportunities, as demonstrated by the state and local surveys, also should be addressed in the plan. The opportunities that exist now for creating a greenway network, in the form of contiguous stream corridors, ridges and abandoned rail lines, must be taken advantage of before they are lost to development. The issue of establishing a coordinated plan for natural resource protection and recreation improvements should be addressed in this plan.

Greenway Plan

Pennsylvania Greenways: An Action Plan for Creating Connections outlines goals and strategies for establishing a greenway network for the Commonwealth. These goals and strategies include the following:

Plan and Establish Greenway Connections

- “Hubs and Spokes” - A Statewide Network of Greenways
- Greenway Plans
- Places for All People
- Pennsylvania Wellness
- Alternative Transportation
- Natural Resources Protection

Create a Greenways Organizational Network

- Greenways Organizational Structure

Provide Funding for Greenways

- Greenways Funding

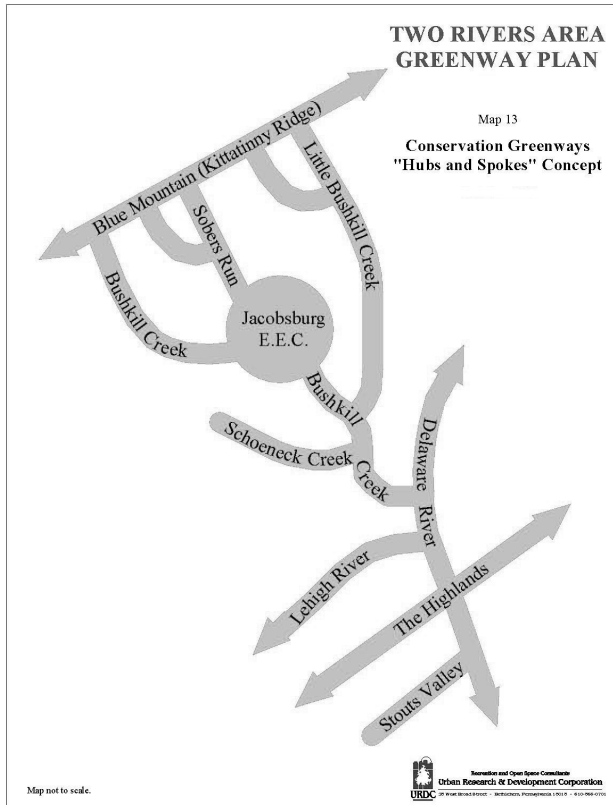
Provide Technical Assistance and Outreach

- Greenways Toolbox
- Greenways Education and Training
- Greenways Promotional Campaign
- The Greenways Volunteer Network

The applicable elements from above have been incorporated in the Two Rivers Area Greenway Plan. Two types of greenways will be established in the Two Rivers area, conservation greenways and recreation greenways.

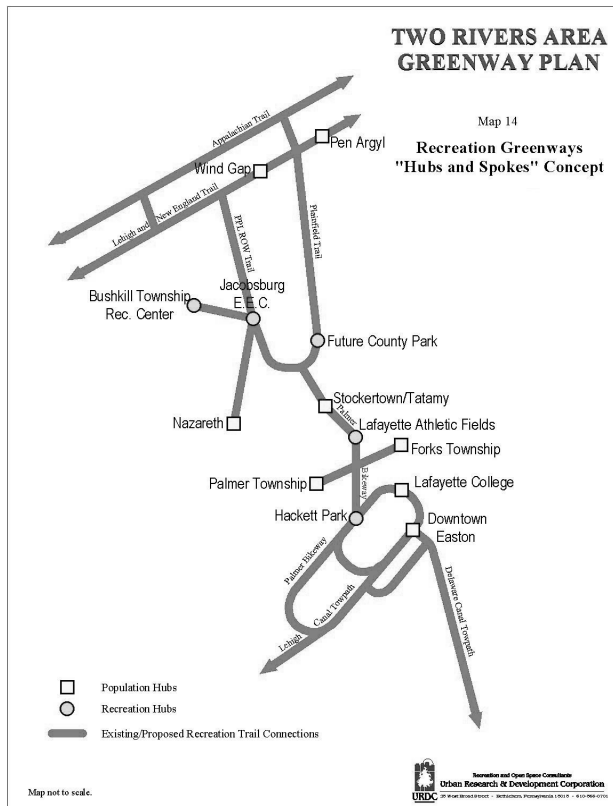
Conservation greenways, corridors where little or no public access is envisioned, are implemented for the protection of environmentally significant features. These areas can serve as riparian buffers, wildlife habitat, migration corridors, floodplains and other locations where human impact could be potentially harmful to the resources. There are two sub-categories of conservation greenways. These are conservation greenways with no trail development and conservation greenways with low-impact development. Conservation greenways with no trail development consist of areas where the creation of trails or other means of access is undesirable or impossible because of environmental concerns. Conservation greenways with low-impact development focus on the preservation of natural areas and their resources while allowing trails to be created for uses such as hiking and nature observation.

Recreation greenways contain trails and other means of access for human use, such as launches for canoes or kayaks. These corridors are designed for low-impact, non-motorized recreation activities such as hiking, horseback riding, nature watching, cycling, canoeing, running and inline skating. Recreation corridors can include single use trails or multiple use trails. As with conservation greenways, there are two sub-categories of recreation greenways. These are recreation greenways with unpaved multiple use trail development and recreation greenways with paved multiple use trail development. Recreation greenways with unpaved multiple use trail development are located outside areas where frequent flooding occurs and include surfaces such as crushed stone, wood chips or grass. These surfaces generally require more maintenance and should therefore be used in locations where less heavy use is anticipated. Recreation greenways with paved multiple use trail development



are typically found in urban and suburban locations where a higher rate of use is present. Paved trails are better suited to withstand the heavier use typically found in more developed areas. Due to the increased use, these greenways are typically the most developed, incorporating additional signage, developed trailheads and, in some cases, amenities such as restrooms.

Greenway trails are designed to meet accessibility guidelines, which have been developed to provide outdoor recreation access for people with disabilities. The surface of the trail should be firm, stable and slip resistant, a minimum of three feet wide and not exceed a running slope of 12.5% and a cross slope of 5%. Depending on the location of the trail, adhering to additional guidelines may be necessary. The preparation of the trail itself, including the sub-grade, sub-base and surface are also important in creating a recreation element that will withstand the rigors of everyday use. There are various types of trail surfaces, including stone, bituminous concrete, concrete, wood, soil and wood chips, each of which has advantages and disadvantages that should be considered. Factors that should be considered when choosing a trail surface are the amount and type of use desired or anticipated, location and the resources available for maintaining the trail.



The concept and purpose of a greenway network is to create “spokes” or linkages between existing or proposed “hubs,” also known as nodes. Greenway networks provide places for people of all ages and abilities to experience various outdoor activities. In this time of concern regarding the status of the health of our citizens, greenway networks provide a location for people to participate in more active and healthy lifestyles. The trails that can be incorporated into greenway networks can provide not only recreation benefits but transportation benefits, offering commuters, school aged children and others an alternative means of getting from place

to place. Finally, greenway networks provide an element for protecting natural and cultural resources. Creating greenway networks can allow for the uninterrupted movement of people and wildlife along contiguous corridors and direct development to more suitable locations.

The concept and purpose of the Two Rivers Area Greenway Network is to create a contiguous greenway along the Bushkill Creek Corridor with an emphasis on protecting the headwaters areas of the Bushkill Creek, providing recreation opportunities in the Urban Core, Middle and Upper Watershed areas, preserving the riparian buffers along the tributaries within the study area, the creation of a conservation greenway in Williams Township along the Reading Prong and reinforcing the connection to the Delaware & Lehigh National Heritage Corridor and Trail. The elements that should be included in the greenway corridor include the 100-year floodplain, outstanding natural areas, existing woodland and riparian buffer areas, wetlands and hydric soils, steep slopes and prime agricultural soils. The width of the corridor should be dependant upon the width of the 100-year floodplain, existing riparian woodlands, the development potential of surrounding land due to restrictions such as steep slopes, hydric soils and other environmental constraints and the existing adjacent land uses. In areas where there are large tracts of woodland or prime agricultural soil adjacent to existing streams, the greenway corridor should include these components. In more urbanized areas, where the corridor is restricted by existing development, its width may be narrower, although an effort should be made to incorporate as many adjacent greenway elements as possible.

The plan also seeks to enhance the existing greenways found along the Delaware and Lehigh rivers. This can be done by protecting the wooded slopes along these rivers and encouraging the adaptive reuse of brownfield sites into eco-tourism or recreation based businesses. The various islands and parks along each of the rivers, especially those that have been identified as outstanding natural areas at the state or local level, should also be incorporated into the greenways plan.

Other goals of the concept plan should include the implementation of an educational outreach program regarding the value of greenway creation and protection. This program should target municipal officials and private landowners near proposed greenways but also include the general public. Municipalities should be strongly encouraged to develop ordinances that require greenway dedication of open space along the greenways, which may protect wooded riparian buffers and prime agricultural soils along the corridors. This can help to encourage more sustainable growth patterns. Another emphasis of this program should be the importance of maintaining riparian buffers along streams and working to implement best management practices for residential and agricultural areas. Agricultural best management practices should be encouraged, especially the reparation of riparian buffers where they have been removed.

The following are the most significant goals established for the entire study area and each of the sub-areas.

Entire Study Area

- Establish a contiguous greenway along the Bushkill Creek Corridor with an emphasis on protecting the headwaters areas while providing recreation opportunities.
- Establish an education program to inform the public, including municipal officials, of the benefits conservation and recreation greenways provide, with an emphasis on the importance of riparian buffers.
- Encourage riparian easements and land donations through education and outreach.
- Work with landowners adjacent to existing greenways to maintain, enhance or reestablish riparian buffers.
- Preserve additional agricultural farmland with a focus on large areas of contiguous farmland, especially those adjacent to existing or potential greenways while encouraging best management practices on all farms.
- Investigate the concept of establishing greenways along existing rail corridors to be converted to recreational greenways if the lines are abandoned and using existing rail corridors, and rights of way for road and utilities to establish greenways.
- Provide guidance to municipalities for updating zoning and subdivision and land development ordinances to promote sustainable growth and conservation of natural resources by incorporating sustainable development practices such as requiring open space dedication along water courses.
- Promote water quality, wildlife habitat, recreation opportunities and conservation of the 100-year floodplain, agricultural farmland, woodlands, wetlands, hydric soils, slopes over 25% and 100' and 50' riparian buffers of perennial and intermittent streams, respectively.
- Conserve existing greenway infrastructure by encouraging riparian buffer conservation, land donations or easements and conservation of existing woodlands.
- Redevelop brownfield sites within the watershed, especially those located along or near greenway corridors, to encourage sustainable development practices. Sites within close proximity to the greenway should be developed with an emphasis on recreation, tourism and eco-businesses.
- Incorporate and enhance existing recreation and open space areas into the greenway plan such as Jacobsburg Environmental Education Center and continue to support the development of the Delaware & Lehigh National Heritage Corridor.
- Encourage farmland preservation by developing equestrian farms and bed & breakfasts in appropriate locations.
- Develop separate parking areas for equestrian use in suitable areas.

Upper Watershed

- Promote environmentally sensitive economic development on brownfield sites near Sober's Run headwaters near Wind Gap.
- Establish an unpaved, multiple use trail on the PPL utility ROW connecting Jacobsburg Environmental Education Center to Blue Mountain.
- Create conservation greenways along the Bushkill Creek, Sober's Run (including all tributaries) as well as the Little Bushkill Creek and its tributaries. These conservation greenways should promote water quality and wildlife habitat protection and connectivity, protect riparian woodlands, wetlands and floodplains, work to improve existing riparian buffers, secure

agricultural easements for farmland adjacent to these stream corridors, work with landowners to reestablish riparian buffers where they have been removed. Areas such as the Moorestown Wetlands, Knechts Pools and Rismiller Woods, which are of state significance, should be high priorities for conservation greenways.

- Establish a multiple use trail on the abandoned Lehigh & New England Railroad grade. A feasibility study for this project should be completed.
- Create recreation greenways connecting Jacobsburg Environmental Education Center with the Palmer Township Bikeway, Plainfield Township Trail, Blue Mountain, Nazareth Borough and Bushkill Center.
- Establish a multiple use trail connecting Jacobsburg Environmental Education Center, Plainfield Trail and Tatamy Trail through Stockertown Borough.
- Enhance Jacobsburg Environmental Education Center with improved visitor facilities.

Middle Watershed

- Require open space dedication along streams in new developments through mandatory dedication for developers.
- Preserve additional farmland west of Route 33 with a focus on large areas of contiguous farmland in Lower Nazareth Township and Northern Forks Township while encouraging best management practices on all farms.
- Keep development away from existing sinkholes, while addressing the overall sinkhole problem with scientific monitoring and regulatory action.
- Provide historic interpretation along the greenways, especially in areas surrounding Bushkill Creek, by installing interpretation signs at historic sites.
- Establish conservation greenways along unnamed tributaries of Bushkill and Schoeneck creeks
- Establish recreational greenways along Schoeneck Creek and Bushkill Creek.
- Complete the Tatamy Trail and establish a Stockertown Borough trail, connecting the Palmer Township Trail to the Plainfield Township Trail and establish multiple use trail connecting these trails to Jacobsburg Environmental Education Center.
- Complete the connection of the Delaware River and Bushkill Creek through Forks Township
- Complete the Palmer Township Trail along Bushkill Creek from Wilson to Tatamy, a means of connecting the main campus of Lafayette University to the school's athletic fields.
- Incorporate existing recreation and open space features into the greenway plan, such as Binney & Smith Woods, Lafayette sports complex and the numerous municipal parks in Forks and Palmer Townships.

Urban Core

- Complete recreation greenways to create a multiple use trail system linking Palmer Bikeway, Delaware & Lehigh Trail and Center City Easton incorporating the hubs of Hackett Park, Hugh Moore Park, Easton Business District, Palmer Town Center, Palmer Recreation Center, Easton Area High School, Lafayette College, Binney & Smith Woods, Easton Bluff and abandoned rail corridors and infrastructure.

- Redevelop brownfield sites along Bushkill Creek and Lehigh River, such as the Simon Silk Mill, North Third Street at Bushkill Creek, South Easton rail yards and the Reda Property in West Easton, encouraging recreation, tourism and eco-based businesses.
- Clean-up, enhance and protect riparian areas.
- Enhance existing tourism-based amenities such as the Two Rivers Landing area in Easton by establishing a link to the greenway network.

Williams Township

- Protect upland forest and geologic features of Gaffney Hill, Hexenkopf Rock and Elephant Rock by creating a woodlands ordinance or through designation on an official map.
- Protect remaining woodlands along Morgan Hill and encourage grassland vegetation at the Chrin and Country Classics properties.
- Preserve additional agricultural land in Stout's Valley with a focus on large areas of contiguous farmland while encouraging best management practices on all farms.
- Conserve streamside buffers along Fry's Run.
- Restrict development and tree-cutting on north facing slopes south of I-78.
- Encourage riparian easements and land donations through education and outreach.
- Protect wooded slopes along the Delaware River.
- Consider a possible extension of the Highlands Trail into Pennsylvania.

Implementation

In an effort to create an employable plan, an extensive implementation component has been created. Major actions are summarized and descriptions of land preservation techniques, possible funding sources, key organizations and individuals and a greenway management structure has been provided.

Action Plan

The following are some of the Major Actions recommended in the plan and the key organizations responsible for carrying them out.

- Adopt the Two Rivers Area Greenway plan (Municipalities, Bushkill Stream Conservancy).
- Initiate the *Lasting Landscapes*® program with the Heritage Conservancy (Bushkill Stream Conservancy).
- Establish a greenway education outreach program with the end goal being conservation easements or dedication (Bushkill Stream Conservancy, Heritage Conservancy).
- Amend municipal zoning and development ordinances (Township Boards of Supervisors, Borough Councils, Municipal Planning Commissions).
- Enhance Jacobsburg Environmental Education Center with a combined visitor center, education center, public meeting facility Bushkill Stream Conservancy office and history museum (DCNR).
- Initiate grant writing process for trail improvements and natural resource enhancement projects (Bushkill Stream Conservancy, Municipalities, Northampton County).

For all types of greenways, it is necessary to protect the desired corridor in some fashion. Many greenway corridors in the area are currently well in-tact, but are at risk of development due to the lack of restrictions. To ensure that a greenway will remain “green” in perpetuity, and to facilitate the addition of any recreation trails, certain land preservation techniques should be implemented. The following is a list of various tools for greenway preservation.

- Fee simple acquisition
- Conservation easements
- Pedestrian easements
- Right of public access easements
- Joint use easements
- Municipal ordinances
- Official map
- Purchase and lease-back or resale
- Donations
- Land exchange
- Mandatory dedication
- Low-impact development
- Transfer of development rights
- *Lasting Landscapes*® initiative

Costs

The costs involved with the development of greenways can vary greatly. The cost of purchasing a greenway through fee simple acquisition is one of the more expensive options. Less expensive means of acquiring greenways are through the use of easements or land donations. Once the greenway has been acquired, there are also costs associated with how it is developed and maintained. Installing trails, signage, trailheads and various other facilities all have various costs. Greenway corridors maintained as conservation greenways should have the lowest cost basis for development and maintenance. Recreation greenways, with all of the associated amenities, generally have a higher cost basis. In 2004 dollars, the range for developing a recreation greenway trail can be from \$200,000 to \$400,000. Studies have indicated the average cost for maintaining a recreation greenway trail to be approximately \$1.00 per linear foot.

Funding Sources

To help offset some of the costs associated with greenway development, the federal, state, county and local governments, private organizations, and foundations provide various opportunities for funding. Each of these entities may provide funding through grants or loans to help develop greenway networks. The following is a list of some of the more common sources of greenways funding.

Federal

- Transportation Equity Act for the 21st Century (TEA21)
- Community Development Block Grant
- Land and Water Conservation Fund Grants
- Rivers, Trails, and Conservation Assistance Program

State

- Pennsylvania Department of Transportation
- Department of Conservation and Natural Resources
 - The Community Conservation Partnership Program

- Heritage Park Grants
- Land Trust Grants
- Rails-to-Trails Grants
- The Recreational Trails Program
- Community Revitalization Program
- Community Development Block Grants
- Growing Greener

Local

- Taxes
- Impact Fees
- Bond Referendums
- Capital Improvements Program
- Private Sector Sources
- Local Businesses
- Trail Sponsors

Partners

Throughout the planning, implementation, and maintenance processes, certain organizations and individuals will be paramount in making a successful system of greenways. These include federal, state, county and municipal governments, as well as private and non-profit groups and companies. Major stakeholders, partners, and other possible participants are listed below in order of importance as determined from the results of the surveys distributed for the plan.

Northampton County Government

- Parks and Recreation Division
- Conservation District
- The Open Space Committee
- Agricultural Preservation Board
- Department of Community and Economic Development

Municipal Governments

- Bethlehem Township
- Bushkill Township
- Easton City
- Forks Township
- Glendon Borough
- Lower Nazareth Township
- Moore Township
- Nazareth Borough
- Palmer Township
- Plainfield Township
- Stockertown Borough
- Tatamy Borough
- Upper Nazareth Township
- West Easton Borough
- Williams Township
- Wilson Borough
- Wind Gap Borough

State Agencies

- Department of Conservation and Natural Resources (DCNR)
- Pennsylvania Game Commission
- Pennsylvania Fish and Boat Commission
- Department of Environmental Protection
- Department of Transportation
- Department of Community and Economic Development

Federal Agencies

- Delaware & Lehigh National Heritage Corridor
- Delaware River Basin Commission
- Environmental Protection Agency

Private and Non-Profit Conservancies

- Bushkill Stream Conservancy
- Wildlands Conservancy
- Heritage Conservancy
- Highlands Coalition
- Pennsylvania Environmental Council

Major Landowners

- The Commonwealth of Pennsylvania
- The City of Easton
- Palmer Township
- Lafayette College
- Hercules Cement Company
- Essroc
- Pennsylvania American Water Company
- Waste Management
- Binney & Smith
- Elementis Pigments
- Mineral Technologies
- Easton Cemetery
- Norfolk and Southern Railroad
- Met-Ed
- PPL

Other Key Organizations and Individuals

- Lehigh Valley Planning Commission
- Councils of Governments
- Chambers of Commerce
- Volunteer Organizations
- Land Developers

- Other Private Landowners

Possible Management Structure

A formal, legal entity should be used to lead implementation and management of this plan. This entity could be a single, existing organization such as the Bushkill Stream Conservancy (BSC) or a newly-created partnership that blends expertise and experience from several different specialties, including watershed management, parks and recreation, economic development and tourism, grants funding, open space and agricultural preservation, greenways acquisition and management, and greenway/trail, river and waterway management among others. Major responsibilities of the management entity should include continuing the planning efforts set forth in the Two Rivers Area Greenway Plan, identifying and applying for funding, and coordinating the many partners and greenway activities.

Based on discussions with the committee, the most plausible management structure for carrying out the Two Rivers Area Greenways Plan would entail the existing Bushkill Stream Conservancy, utilizing the *Lasting Landscapes*® approach established by the Heritage Conservancy. The Bushkill Stream Conservancy could also create, oversee, participate in, and coordinate various “action groups” to help carry out greenway plan actions. The action groups would be comprised of people from both the public and private sector who have a specific interest or expertise in an action or activity area. Each action group should have at least one member of the BSC Executive Board.

Pilot Projects

To help initiate action on the goals of the Two Rivers Area Greenway Plan, pilot projects have been identified. These are projects that can be started immediately to maintain the momentum developed in producing this plan and to actualize the some of it’s visions. The projects collectively address a variety of greenway goals and are also seen as the most important according to the various individuals and organizations involved in the planning process. These pilot projects are:

- Landowner Outreach through the *Lasting Landscapes*® initiative
- Municipal Ordinance Review
- Bushkill Creek Corridor Enhancement Project
- Lehigh & New England Trail Feasibility Study
- Sobers Run Headwaters Development
- Jacobsburg Environmental Education Center Facility Enhancement
- Official Map
- The Jacobsburg - Blue Mountain Connection
- Riparian Buffers on Farms

INTRODUCTION

Development patterns are currently changing the landscape of the Two Rivers Area in Northampton County, Pennsylvania. Farm fields and woodlands are giving way to housing developments, shopping centers, expanded industry, and new roads. Fortunately, the area still maintains an impressive array of natural, historic, and agricultural amenities. Through this plan, members of the Two Rivers Area Council of Governments and the Bushkill Stream Conservancy are making a concerted effort to protect and enhance these amenities. In particular, they wish to protect linear areas of open space centered on important natural features such as streams and ridgelines, known as *greenways*. Additionally, these two groups have recognized the need for increased recreational activities in the Two Rivers area, for local residents and tourists alike. These improvements in recreation and the environment could make the Two Rivers area an even more livable place, producing immeasurable societal, environmental and economic benefits.

Background for the Greenways Plan

Before beginning to plan a greenway network, it is important to understand the diverse environmental and social components of the study area. To do this, background information was gathered pertaining to the creation of a plan for greenways. Natural features, history, demographics, existing land use, existing zoning and significant recreation, historical and cultural resources were documented for the study area. Demand was also part of the background information researched for the plan. This included the character of the various communities found in the study area, the profile of potential greenway users, indicators of future demand and the potential for economic development associated with greenway development. The information gathered during the background research was evaluated as it related to creating a plan for greenways in the Two Rivers area.

Concept and Purpose of a Greenway Network

The concept and purpose of a greenway network is to create “spokes” or linkages between existing or proposed “hubs,” also known as nodes. Greenway networks provide places for people of all ages and abilities to experience various outdoor activities. In this time of concern regarding the status of the health of our citizens, greenway networks provide a location for people to participate in more active and healthy lifestyles. The trails that can be incorporated into greenway networks can provide not only recreation benefits but transportation benefits, offering commuters, school aged children and others an alternative means of getting from place to place. Finally, greenway networks provide an element for protecting natural and cultural resources. Creating greenway networks can allow for the uninterrupted movement of people and wildlife along contiguous corridors and redirect development to more suitable locations.

The concept and purpose of the Two Rivers Area Greenway Network is to create a contiguous greenway along the Bushkill Creek Corridor with an emphasis on protecting the headwaters areas of the Bushkill Creek, providing recreation opportunities in the Urban Core, Middle and Upper Watershed areas, preserving the riparian buffers along the tributaries within the watershed, the creation of a greenway in Williams Township along the Reading Prong and reinforcing the connection to the Delaware & Lehigh National Heritage Corridor and Trail. The elements that should be included in the greenway corridor include the 100-year floodplain, outstanding natural areas, existing woodland and riparian buffer areas, wetlands and hydric soils, steep slopes and prime agricultural soils. The width of the corridor should be dependant upon the width of the 100-year floodplain, existing riparian woodlands, the development potential of surrounding land due to restrictions such as steep slopes, hydric soils and other environmental constraints and the existing adjacent land uses. In areas where there are large tracts of woodland or prime agricultural soil adjacent to existing streams, the greenway corridor should include these components. In more urbanized areas, where the corridor is restricted by existing development, its width may be narrower, although an effort should be made to incorporate as many adjacent greenway elements as possible.

The plan also seeks to enhance the existing greenways found along the Delaware and Lehigh rivers. This can be done by protecting the wooded slopes along these rivers and encouraging the adaptive reuse of brownfield sites into eco-tourism or recreation based businesses. The various islands and parks along each of the rivers, especially those that have been identified as outstanding natural areas at the state or local level, should also be incorporated into the greenways plan.

Other goals of the concept plan should include the implementation of an educational outreach program regarding the value of greenway creation and protection. This program should target municipal officials and private landowners near proposed greenways but also include the general public. Municipalities should be strongly encouraged to develop ordinances that require greenway dedication of open space along the greenways, which may protect wooded riparian buffers and prime agricultural soils along the corridors. This can help to encourage more sustainable growth patterns. Another emphasis of this program should be the importance of maintaining riparian buffers along streams and working to implement best management practices for residential and agricultural areas. Agricultural best management practices should be encouraged, especially the reparation of riparian buffers where they have been removed.

The purpose of the greenways network is to preserve and enhance the existing environmental and cultural resources found in the Two Rivers area and provide a system for connecting these elements. The greenways network outlines the corridors and nodes contained within or directly adjacent to them that are important, both environmentally and socially. Using this greenway network as a guide, future development patterns can be directed to appropriate areas while preserving the resources residents value.

Greenways Planning Process

The greenway planning process undertaken to formulate the Two Rivers Area Greenway Plan involved many components. Monthly meetings were held with the Bushkill Stream Conservancy, an organization comprised of individuals with diverse backgrounds who reviewed and commented on each section of the plan. A concept plan was formulated for the Two Rivers study area using the information gathered, evaluated and prioritized in these meetings, background research, information on greenway demand, issues, goals and objectives.

This concept plan set about to incorporate the state's goals and objectives for greenway creation and implementation. The concept plan

for the Two Rivers Area Greenway was generated for the study area as a whole and also the four diverse sub-areas in an effort to relate the overall concept goals as well as develop more location specific ones to each area. Design elements and facilities were also recommended. Recommendations were also made based on the compatibility between the greenway and adjacent land uses. Finally, an implementation plan was developed outlining the various tasks that needed to be completed in order to create the greenway network. Some are ongoing, such as education and community outreach, while others have a defined time frame. The implementation plan also outlines the possible funding sources and pilot projects for the Two Rivers Area Greenway Plan. The draft plan was presented for public review and comment at two separate locations.



Members of the Bushkill Stream Conservancy and project consultants presented the plan for public review and comment.

EXISTING CONDITIONS

An important component of this greenway plan is the identification of existing features that can become part of this greenway network, or provide a framework for the greenway network. Topics discussed in this section include the following:

- Study Area Location
- Natural Features
- History
- Demographics
- Existing Land Use
- Municipal Zoning Policies
- Significant Recreation, Historical, and Cultural Resources

Study Area Location

The Two Rivers area is a region including all or part of 17 municipalities in Northampton County, Pennsylvania (Map 1). The entirety of the Bushkill Creek watershed is found within this region, as well as numerous smaller watersheds, including those of Fry’s Run, Raubsville Run, Frost Hollow Run, and several unnamed streams. The region also contains the final 5-mile stretch of the Lehigh River, and a 13-mile stretch of the free-flowing Delaware River. The Two Rivers area is 20 miles in the north-south dimension, varies between 3½ and 9 miles in east-west width, and encompasses 109 square miles, nearly 30% of the land area of Northampton County. The seven cooperating municipalities of the Two Rivers Area Council of Governments are included in the Two Rivers area. These, along with the remaining municipalities, are listed below:

- Bethlehem Township*
- Bushkill Township
- Easton City ◇
- Forks Township ◇
- Glendon Borough
- Lower Nazareth Township*◇
- Moore Township*
- Nazareth Borough*
- Palmer Township ◇
- Plainfield Township*
- Stockertown Borough
- Tatamy Borough
- Upper Nazareth Township*
- West Easton Borough ◇
- Williams Township ◇
- Wilson Borough ◇
- Wind Gap Borough

* - Only portion of municipality is found within Two Rivers Area.

◇ - Participant in Two Rivers Area Council of Governments

Regionally speaking, the Two Rivers area lies at the eastern end of the Allentown-Bethlehem-Easton metropolitan area and its rural perimeter. This region, often referred to as the “Lehigh Valley”, is the third largest metropolitan area in the state of Pennsylvania. Easton, the largest city in the Two

Rivers area, anchors the eastern end of this developed region. To the north, on the other side of Blue Mountain, lies Monroe County and the Pocono Mountain region. To the south lies Bucks County, and across the Delaware River to the east lies Warren County in New Jersey.

Three limited access, four-lane highways traverse the Two Rivers area. U.S. Route 22 and Interstate 78 cross the area in an east-west fashion, providing access to Bethlehem, Allentown and Harrisburg to the west, and Northern New Jersey and New York City to the east. State Route 33 spans the north-south length of the Two Rivers area, and connects to the Pocono Mountain region and Interstate 80 to the north. The Two Rivers area is within one and a half hours travel time from both Philadelphia (60 miles to the south), and New York City (70 miles to the east). The area is also crossed by two important trail systems. The Delaware and Lehigh Trail, along the namesake rivers, will eventually connect the cities of Philadelphia, Trenton (NJ), Easton, Allentown, Wilkes-Barre and Scranton. Along the northern fringe of the Two Rivers area lies the Appalachian National Scenic Trail, a footpath running more than 2,000 miles from Georgia to Maine.

Natural Features

The Two Rivers area spans the north-south height of Northampton County, extending from Blue Mountain in the north, across rolling farmland and developed areas to the wooded Highlands of Williams Township. This broad swath encompasses a variety of topographies, and a complex layering of interconnected natural features. As one of the primary goals of the Two Rivers Area Greenway Plan is the preservation of important natural features, the following section will provide background on several categories of natural features found within the geographic scope of the Plan.

Physiography

Physiographic provinces are large regions, typically including multiple states, that exhibit similar topography and geology. Pennsylvania contains six such provinces, and two of these, the Ridge and Valley Province and the New England Province, exist within the Two Rivers area (Map 2). The former section, defined by parallel, flat-topped mountains and agricultural valleys, comprises a significant portion of eastern and central Pennsylvania. The Ridge and Valley Province is further divided into physiographic “sections”, which locally include the Blue Mountain section and Great Valley section. Blue Mountain, occupying



Blue Mountain provides a backdrop for the rolling farmland of the Great Valley.

the northern fringe of the Two Rivers area, is a generally flat-topped ridge of erosion-resistant sandstone and quartzite conglomerate, rising one thousand feet above the surrounding valleys. The ridge defines the northern extent of the Bushkill Creek watershed. The highest point in the Two Rivers area, 1,576 feet above sea level, is found along Blue Mountain in northwestern Bushkill Township. Southward from Blue Mountain lies the Great Valley, a broad lowland with gently rolling hills eroded into shale bedrock on the north side of the valley and a lower, more level landscape developed on limestones and dolomite bedrock on the south side. Nearly all of the Bushkill Creek watershed lies within the Great Valley. The rocks of this section are known for their suitability as raw materials. In the northern tier, the shales of the Martinsburg geologic formation were used in the manufacturing of slate. The Jacksonburg formation, which occupies an east-west belt through Nazareth Borough, is quarried as a raw material for cement making. The dolomites and limestones of the Allentown formation, which underlie the namesake city as well as Easton and

Bethlehem, are extracted for use as crushed stone. South of the Ridge and Valley lands lies the New England Province, a region of rounded hills and ridges that also includes New Jersey's Skylands Region, Connecticut's Litchfield Hills, and the Berkshire Mountains of Massachusetts. This multi-state region is also known as "The Highlands." Locally, the province exists as the Reading Prong section, the most southerly extent of this physiography. These steep hills rise sharply south of the Lehigh River, and offer a contrasting, wooded landscape different from the flatter farmland to the north. The Reading Prong is underlain by a variety of gneiss, granite, schist and quartzite rocks. The Delaware River meanders southward through these formations, and leaves Northampton County at its lowest elevation of 150 feet.

Soils

The U.S. Soil Conservation Service divides Northampton County soils into four "associations" of like characteristics. These associations largely reflect differences in bedrock geology described in the previous section. Due to the generally east-west orientation of these groups, the Two Rivers area contains all four associations (Map 3). In the north, along Blue Mountain, soils have very stony, sometimes boulder-ridden surface layers underlain by "cobbly or gravelly" subsoils. To the south, a broader belt contains soils that are shaly both at the surface and in the subsoil. South of an imaginary line drawn from Nazareth to Stockertown, soils are deep, well-drained, and of a moderately fine to medium texture. The portions of this soil south of Interstate 78 are steeper and underlain by non-limestone geology. Finally, along the Lehigh and Delaware Rivers, lie deep soils underlain by sand and gravel from terminal moraines, outwash terraces and floodplains.

In the Two Rivers area, certain soils intrinsically lend themselves to agricultural purposes. In Lower Nazareth Township, northern Palmer Township and Forks Township, more than 90% of soils are considered "highly tillable". In Bushkill and Plainfield Townships, soils tend to have moderate productivity for agriculture due to hillier terrain. Areas that either exhibit low productivity or are completely unsuitable for agriculture occur in locations with steep slopes, wetlands, hydric soils or existing urban development. In the Two Rivers area, this includes Blue Mountain, the non-valley portions of Williams Township, and the urban areas in and around Easton and Nazareth.

Hydric Soils

According to the U.S. Natural Resources Conservation Service, hydric soils are those soils that have formed "under the conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part." In anaerobic conditions, molecular oxygen is absent and therefore promotes a different vegetation makeup. Indications of hydric soils include poor drainage, high water tables, frequent ponding and frequent flooding. The most important implication of hydric soils is that they may contain wetlands. In this Greenways Plan, soils containing major or minor hydric components are mapped. Major hydric component soils are very likely to *be* wetlands, while minor components are likely to *contain* wetlands. Most hydric soils occur in or near stream valleys, floodplains and other low-lying areas. Land at the base of Blue Mountain contains a significant concentration of hydric soils, originally formed from the slowing and pooling of runoff from the slopes of the Mountain. Much of the Bushkill Creek's feeder brooks

originate here. In addition, many portions of the urban and suburban Easton area contain soils with minor hydric components. The health of the Bushkill Creek watershed as a whole greatly depends on the quality of streams and vegetative cover in these hydric soil areas, especially near Blue Mountain. Hydric soils are shown on both Maps 3 and 6.

Steep Slopes

Steep slopes in the Two Rivers area are found in two major concentrations: along the south slope of Blue Mountain, and along the sides of large hills in Williams Township (Map 4). Other steep areas occur beside the Lehigh River, Delaware River and Bushkill Creeks, functionally defining the riparian areas of those streams. Man-made steep slopes occur in highway embankments such as those along U.S. 22 and PA 33, and in the walls of rock quarries in the Nazareth area. The middle third of the Two Rivers area, including portions of Lower Nazareth and Forks Townships, contains the least amount of steep slopes.

Vegetation of steep slopes is crucial in controlling erosion, slowing storm water runoff, and preserving viewsheds. In many cases, steep slopes have remained wooded due to their lack of suitability for agriculture, especially in Williams Township. However, some steep slopes contain homes, roads and other developments that are not well-suited to the terrain. Some municipalities restrict building in steeply-sloped areas. Typically, steep slopes are classified into 15-25% slopes and slopes greater than 25%. The latter category is generally recommended for permanent open space. Steep slopes, due to their soil conservation and visual resource values, are often targeted for greenway designation, especially in stream corridor areas.

Streams

Streams are in many ways the central feature of this Greenways Plan, as the surrounding floodplains, hydric soils and woodlands create continuous natural corridors ideal for greenway designation. Streams in the Two Rivers area range from small brooks and rivulets to major rivers (Map 5).

Forming part of the eastern boundary of the Two Rivers area is the Delaware River. The main stem of the Delaware originates at the confluence of its east and west branches in Hancock, New York, and flows southward 330 miles to the mouth of the Delaware Bay. The Delaware is the only free-flowing major river on the eastern seaboard, unimpeded by dams or locks. Significant measures were undertaken from the 1960's onward to combat water pollution in the basin. The middle portion of the Delaware River, from Port Jervis, New York to Washington's Crossing near Trenton, New Jersey, has been designated as a National Wild and Scenic River. This includes the Two Rivers area.

Meeting the Delaware River at Easton is the Lehigh River, the second largest tributary of the Delaware. The Lehigh River begins on the Pocono Plateau in southwestern Wayne County, Pennsylvania, cutting southward through gorges and gaps to emerge into the Great Valley near Slatington. In the Two Rivers area, the Lehigh is a broad river flowing northeastward, separating downtown Easton and suburban areas from South Easton and the more rural Williams Township.

Drainage from coal strip mines, major industry and agriculture have posed a challenge to water quality in the Lehigh River. The Delaware and Lehigh Trail, occupying canal towpaths and abandoned railroad beds along both rivers, is a major linear recreational resource. This multiple use riverside path is virtually seamless from Allentown to Bristol, Bucks County, and is planned to extend northward to Wilkes-Barre and southward to Philadelphia.

The most relevant stream to the Greenways Plan is the Bushkill Creek, whose watershed defines the boundary of the northern two thirds of the study area. The Bushkill originates as numerous small brooks at the wooded base of Blue Mountain in northern Moore and Bushkill Townships. Flowing generally southeastward, the creek traverses rolling farmland and rural residential areas in Bushkill Township, then enters the forested enclave of Jacobsburg State Park. Tree cover diminishes as the creek heads south through the farms of Palmer and Forks Townships. The final, eastward stretch of Bushkill Creek occupies a vegetated ravine with development on either side, before emptying into the Delaware River just north of the Route 22 bridge. Bushkill Creek is fed by smaller streams as it proceeds southward. These include Sober's Run in Bushkill Township, Little Bushkill Creek in Plainfield Township, Schoeneck Creek in Palmer Township, and Spring Brook in the City of Easton.

The extreme southern portion of the Two Rivers area is drained by Fry's Run, occupying a farmed valley near the Bucks County border. In addition, areas immediately adjacent to the Delaware River feature numerous small brooks descending directly into the Delaware.

Pennsylvania's Water Quality Standards designate protection categories for streams, which are the basis of water quality criteria. These are called for under Pennsylvania Code Chapter 93. These classifications are important in regulating the discharge of wastewater into streams. Cold Water Fisheries are streams that should be protected as habitat for cold water fish and other fauna and flora indigenous to cold water. High Quality Cold Water Fisheries are cold water fisheries with excellent water quality and other environmental attributes. Trout Stock Fisheries are streams that qualify for seasonal trout stocking by the Pennsylvania Fish and Boat Commission. Migratory Fisheries are streams that should be protected for the movement of trout and other anadromous fish species which ascend streams to spawn.



The Bushkill Creek is a central feature of Jacobsburg Environmental Education Center.

Table 1 below shows state designations for streams within the Two Rivers area.

**Table 1
STATE STREAM QUALITY DESIGNATIONS**

Stream	Segment	Designation
Delaware River	Main stem, Tocks Island, Monroe County to Lehigh River	Warm Water Fishery, Migratory Fishery
Unnamed tributaries to Delaware River	Basins, Brodhead Creek, Monroe County to Lehigh River	Cold Water Fisheries
Delaware River	Main stem, Lehigh River to head of tide	Warm Water Fishery, Migratory Fishery
Unnamed tributaries to Delaware River	Basins, Lehigh River to Pidock Creek, Bucks County	Trout-Stocking Fisheries
Fry's Run	Basin	High-Quality Cold Water Fishery, Migratory Fishery
Lehigh River	Main stem, Allentown Dam to mouth	Warm Water Fishery
Unnamed tributaries to Lehigh River	Basins, Allentown Dam to mouth	Cold Water Fisheries
Bushkill Creek	Main stem	High-Quality Cold Water Fishery
Unnamed tributaries to Bushkill Creek	Basins	High-Quality Cold Water Fisheries
Little Bushkill Creek	Basin	High-Quality Cold Water Fishery, Migratory Fishery
Schoeneck Creek	Basin	Warm Water Fishery

Source: Commonwealth of Pennsylvania, 2003

Watersheds

A watershed is an area where all runoff is naturally directed into a particular creek or river. Watersheds are defined by topographic ridge lines, which may be prominent ridges such as Blue Mountain, or less notable areas of high ground. Since the activities occurring within a watershed affect the quality of the collecting stream, environmental protection measures are often performed on a watershed basis.

On a large scale, the entire Two Rivers area is part of the Delaware River Basin, a 13,539 square mile area including portions of the states of Delaware, New Jersey, New York and Pennsylvania. The entirety of the Basin is managed by the Delaware River Basin Commission, a regional, multi-state planning, development and regulation body. Locally, drainage is organized into sub-watersheds. These include the Bushkill Creek, Lehigh River, Delaware River, Fry's Run and Cook's Creek watersheds, as well as four unnamed tributary watersheds (Map 5). The Bushkill Creek watershed, which covers a majority of the Two Rivers area, contains 79 square miles.

Floodplains

100-year floodplains are areas that would theoretically be inundated in a storm event of such magnitude that it would only occur once in a hundred years, according to the Federal Emergency Management Agency (FEMA). Floodplains usually surround streams, and vary in width according to the surrounding terrain. Besides carrying flood waters and helping moderate flood heights, these areas provide a natural corridor of vegetation and habitat, including environmentally-sensitive riparian areas. Development and/or excessive vegetation removal in these areas can cause erosion, stream pollution, and flooding of increased severity. Some human uses, however, are acceptable in 100-year floodplains, provided that they are built and maintained in low-impact, environmentally-sound fashions. Such uses include non-motorized multi-use trails, nature viewing areas, and canoe/kayak launch sites. 100-year floodplains are often included in greenway corridors.

In the Two Rivers area, 100-year floodplains are found along the entirety of the Delaware and Lehigh Rivers, and along all but the very beginnings of Bushkill, Little Bushkill and Schoeneck Creeks, and Fry's Run (Map 6). An additional swath of floodplain is found in an unnamed natural drainage area that channels runoff southwestward through Forks Township. Floodplains in the area of northern Palmer Township and Stockertown are somewhat wider than other floodplains, due to the flatter nature of the surrounding topography.

Wetlands

Wetlands are areas that have water present, and also exhibit vegetation and soil types characteristic of a permanent or frequently saturated environment. Marshes, vernal pools, swamps are all types of wetlands. Wetlands are important groundwater recharge areas that support wildlife and fish, sometimes harboring endangered species such as the bog turtle. Wetlands also reduce flooding by slowing or detaining storm water. In addition to protecting against floods, slowing storm water discharge helps filter impurities that could contribute to surface water and groundwater pollution.

Map 6 shows wetland areas identified in the National Wetland Inventory (NWI) performed by the U.S. Fish and Wildlife Service. These areas are identified based on reflectivity from aerial remote sensing images. As a result, only the most prominent wetlands are shown. Hydric soil types can also indicate the approximate locations of areas that may include wetlands. There are many other wetlands which would need to be identified by a qualified professional at the time any individual tract is considered for preservation or development.

Wetlands in the Two Rivers area are common along the upper reaches of Bushkill Creek and its tributaries. Knechts Ponds and Moorestown Wetlands are found here, both in Bushkill Township, and are designated as unique natural areas in the Lehigh Valley Planning Commission inventory. Other wetlands occur along the banks of the area's other streams, and surrounding natural and man-made ponds. Parcels with significant coverage of wetlands are ideal for acquisition as they are severely restricted for development.

Woodlands

Map 7 shows woodland areas greater than 5 acres in size, digitized from aerial photography captured in the year 2000. Northampton County contains 96 square miles of such woodlands, much of which is found in the Two Rivers area.

Originally, the region was entirely forested, with the exception of slash-and-burn areas created by Native Americans. Between 1730 and the present, however, most land suitable for farming or settlement was cleared. Woodlands that remain commonly coincide with steep slopes, excessively rocky soils, and wet or frequently flooded areas. In the Two Rivers area, woodlands are concentrated along Blue Mountain, on the hillsides of Williams Township, and in the Jacobsburg Environmental Education Center. Woodlands also occur linearly along Bushkill Creek and its tributaries. Near Blue Mountain, woodland extends significantly southward into the Great Valley due to the abundance of hydric soils and streams. In the area of Sober's Run, a continuous band of woodlands connects the forest of Jacobsburg Environmental Education Center with Blue Mountain.

Woodlands are an important natural resource in several regards. The root systems of trees and other woodland vegetation stabilize the soil, preventing erosion. Woodlands are a natural stormwater control, the vegetation and forest floor absorbing and reducing surface runoff. With these controls on erosion and runoff, water quality in nearby streams benefits immensely. Woodlands also add character and visual relief to the landscape, providing a sense of "place." Woodlands are also important wildlife habitats. Blue Mountain serves as a linear band of habitat stretching 200 miles from the Delaware Water Gap to the Potomac River in Western Maryland. The woods of Jacobsburg E.E.C. provide refuge for local wildlife, but in a more isolated fashion. It is often recommended to connect such "island ecologies" to larger habitats to promote biodiversity.

Outstanding Natural Areas

In 1999, the Pennsylvania Science Office (PSO) of the Nature Conservancy (in contract with the Lehigh Valley Planning Commission) prepared a Natural Areas Inventory (NAI) for Lehigh and Northampton Counties. The NAI identifies critical areas of plant and animal habitat, and also includes inherently unique natural features. Critical habitat areas are based on the Pennsylvania Natural Diversity Index, a comprehensive database of outstanding natural habitats and sensitive plant and animal species. Natural areas are grouped into two categories by the PSO. Sites of statewide significance are identified for the protection of biological diversity. These sites contain exemplary natural communities and documented habitats for species of special concern. Those state-significant sites that are the most critical to biodiversity in the future have been labeled "top priority" by the PSO. Sites of local significance are unique areas chosen because of size, diversity of wildlife and plant life, water quality protection, and recreation potential. Not all locally-significant sites exhibit outstanding natural habitat. Williams Quarry in Easton, for example, saw significant disturbance in the past, but is now an important open space resource. The Two Rivers area contains 20 outstanding natural areas, listed in Table 2 on page 15, and shown on Map 7.



Easton Bluff, home to an endangered sedge species, is an outstanding natural area within an urban setting.

Table 2
OUTSTANDING NATURAL AREAS

Natural Area	Location	Priority	Unique Feature
Big Offset Barren	Blue Mountain, Plainfield Township	Top priority	Forested plateau with heath species
Binney & Smith Woods	Palmer Township & Wilson Borough	Local significance	Mature, diverse forest in suburban area
Easton Bluff	Bushkill Creek, City of Easton	State significance	Endangered sedge species
Getters Island	Delaware River, City of Easton	State significance	Animal species of concern
Grand Central Woods	Plainfield Township	Local significance	Mesic hardwood forest
Hexenkopf Rock	Williams Township	Local significance	Rock outcrop
Hexenkopf Slopes	Williams Township	Local significance	Forested slope
Hexenkopf Wetlands	Williams Township	State significance	Wetlands and seepy forests
Island Park	Lehigh River, City of Easton	State significance	Isolated emergent marsh
Jacobsburg State Park	Bushkill Township	Local significance	150+ acres of forest
Knechts Pools	Bushkill & Moore Townships	State significance	Ephemeral/fluctuating natural pools
Mariton Slopes	Williams Township	Local significance	Forested slopes, shaded escarpments
Mariton Uplands	Williams Township	State significance	Forest, threatened plant species
Moorestown Wetlands	Bushkill Township	Top priority	Marsh and shrub swamp
Old Sow Island	Delaware River, Williams Township	State significance	Rare plant species
Raub Island	Delaware River, Williams Township	State significance	Rare plant species, large bird habitat
Raubsville Lock 22-23	Williams Township	State significance	Animal species of special concern
Rismiller Woods	Bushkill Township	Top priority	Ephemeral/fluctuating natural pools
Whippoorwill Island	Delaware River, Williams Township	State significance	Rare plant species, large bird habitat
Williams Quarry	City of Easton	Local significance	Rock outcrop

Source: The Nature Conservancy, 1999

In addition, the NAI lists the Delaware River and Blue Mountain as exceptional natural features, larger scale systems that are important in the movement and diversity of living things. Both features are major, continuous corridors of natural habitat, among the most important ones in Eastern Pennsylvania.

Other public and private organizations maintain lists of important natural areas. The Pennsylvania DCNR lists “outstanding scenic geological features”. In the Two Rivers area, this includes Elephant Rock and Hexenkopf Rock in Williams Township, Williams Quarry in Easton, and the Wind Gap of Blue Mountain. The Highlands Coalition, a citizens organization seeking the protection of the Highlands province from Pennsylvania to Connecticut, lists Bougher Hill, the Delaware and Lehigh Corridor, South Mountain, and Stouts Valley in Northampton County. Bougher Hill contains the Mariton Wildlife Preserve, which includes the aforementioned Mariton Slopes and Uplands in the NAI. The Delaware and Lehigh Corridor includes the abandoned canals and towpaths from the 19th Century, now a linear recreation area. South Mountain, proper, exists to the west of the Two Rivers area, near Lehigh University, but is sometimes considered to be the first major ridge at the southern edge of the Great Valley in this area. Stouts Valley is the agricultural and residential valley formed around Fry’s Run in Williams Township, considered to be one of the most visually attractive areas of Northampton County.

Natural Features Composite

Map 8 shows an overlay of the natural features of the Two Rivers area described in above sections. Areas with many overlapping natural features are ideal candidates for protection efforts.

History

The fertile valleys, numerous watercourses, and abundant mineral resources of the Two Rivers area have created an ideal setting for human settlement and activity. The Lenape farmed and hunted the land, followed by Europeans who re-established themselves in the New World and fought off foreign rule. Agriculture was soon augmented by industry that transformed and transported natural resources to international markets. The modern age brought continued industry but also an influx of residential and retail commercial land use. In every epoch, the area's natural resources and geographic location have played a crucial role in its development. Understanding these processes provides insight into why the Two Rivers area looks and feels the way it does today. What follows is a history of the Two Rivers area, then an inventory of particular historic resources.

Original Inhabitants

The Two Rivers area was originally settled by the Lenape, part of the larger Algonquin nation that once inhabited the Eastern United States and Canada. For the Lenape, the land was sacred, providing all the necessities of life in the form of crops and game for food, rock for tools and trade, and materials for shelter and clothing. The Lenape were known to “fire the forest”, that is, deliberately burn forest to promote the growth of fire-resistant, nut-bearing trees that attracted larger populations of wild game. This was especially true in the limestone belt and the lower slate belt, resulting in a scrub-like land cover when the Europeans arrived.

Lenape society was still very strong when William Penn was granted the area now known as Pennsylvania in 1681. The “Delaware” moniker was given to the Lenape by Englishmen. At first, dealings between the Penn family and the Lenape were generally fair. Penn's sons, however, falsely claimed deed rights to as much land as could be covered in a day and a half's walk from the Delaware River northwestward. In the infamous “Walking Purchase” of 1737, Penn's sons measured this distance by sending a team of long-distance runners northwestward along a cleared path, then drawing a line perpendicular to the Delaware River. As a result, Penn's sons “acquired” most of what is now Upper Bucks, Lehigh, Northampton, Monroe, and Eastern Pike Counties. Relations further deteriorated as more land was taken, causing continuous violent encounters generally known as the “Indian Wars” throughout the 1740's and 50's. Eventually the Lenape were forcibly moved westward, first to Indiana, then to Oklahoma. Although no Lenape archaeological sites have been formally identified in the Two Rivers area, artifacts are often found on the surface, especially near waterways.

European Colonization

In the early 1600's, Dutch traders passed through the Two Rivers area in search of beaver pelts and other furs valuable in European markets. It was not until the 1730's, however, that permanent European settlement began. English and Scotch-Irish, followed by Germans, arrived in Philadelphia and made their way to the Lehigh Valley through the river valleys and Lenape paths. German-

speaking newcomers quickly became the largest immigrant group. In many areas of the Lehigh Valley, German was the primary language used in schools, churches and business dealings.

Many new settlers had been farmers in Europe, and were therefore attracted by the fertile limestone-based soils in the Lower Bushkill and Stouts valleys. Forests and scrublands were quickly cleared to accommodate agriculture, primarily in the form of wheat farming. The land, then owned entirely by the Penn family, was gradually sold to the new farmers. Another buyer was the Moravian religious sect, who established their first successful colony in North America at Nazareth in 1740. Unlike most German immigrants, the Moravians chose to build urban settlements that also included Bethlehem and Emmaus. In 1750, under the order of the Penn brothers, a 1,000 acre tract at the confluence of the Delaware and Lehigh Rivers was surveyed for the town of Easton. Two years later, the Penns successfully lobbied for the creation of Northampton County from what was then Bucks and Berks Counties. Easton was selected as the county seat, after which the town grew quickly. Easton's position on the two rivers allowed it to develop into a major trade center for Pennsylvania and New Jersey.

Outside Easton and Nazareth, in the farming areas, small villages such as Jacobsburg, Belfast, Glendon and Seipsville formed. Hotels and taverns here catered to travelers and prospective new residents. One of the more famous taverns, the Rose Inn north of Nazareth, also served as a safe haven for colonists during the Indian Wars. As more settlers arrived, roads were widened for increased wagon traffic, and the two rivers saw ever-increasing loads of wheat and timber making their way to Philadelphia on rafts. During the American Revolution, the area played a key role in one major military action. From a base in Easton, an army commanded by Major General John Sullivan marched up the Bushkill Creek valley and eventually into New York to attack and defeat Iroquois allies of the British. The area was also important in providing food and iron for the Continental Army. Battles at Morristown, Monmouth, Trenton, and Valley Forge were all within 50 to 70 miles of the Lehigh Valley.

Early Industry

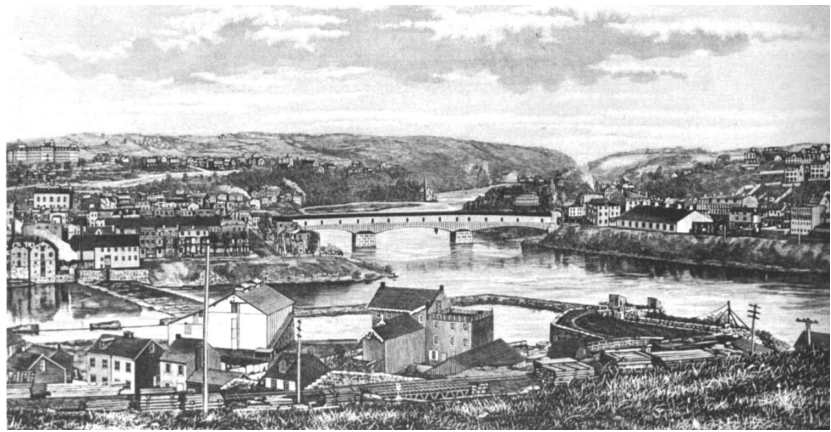
As early as colonial times, settlers were harnessing the power of the area's waterways in the form of mills. Nowhere was this more true than along the Bushkill Creek. In a typical mill, a "raceway" diverted creek water into a channel to power a large waterwheel. Often, a dam was built across the creek at the head of the race, to further control the rate of inflowing water. The waterwheel, which could be housed within a building or next to it, powered a series of mechanisms to transfer motion into a specific task. The most common mills were grist mills, which processed wheat grain into flour, and saw mills that cut local timber into boards. Other types of mills included oil mills, which produced linseed oil for paint, wood sealant, lamp fuel, and ink; fulling mills, which produced cloth of a higher durability than handwoven cloth; tanneries, which used the mill wheel to grind tree bark used in the tanning process, and clover seed mills. Iron forges and distilleries (which turned corn and rye mash into whiskey), also used the water resources of the Bushkill Creek. Other operations not requiring water power often took place next to mills and along the creeks, including limekilns and slaughterhouses. At Jacobsburg, the Henry family operated a series of iron furnaces that

produced bar iron for gun making. At a larger facility in nearby Boulton, the Henrys produced guns on contract for the U.S. Government, the American Fur Company, and for private sportsmen.

Mill operations continued through the 19th Century, with peak timber and grain productions occurring around 1840. Though the grain industry was largely moving to the Midwest and Great Plains after 1840, several grist mills along the Bushkill Creek continued operating well into the 20th Century. Today, a number of the mill buildings still exist, some restored as houses and businesses, and others in various states of ruin. Local industries long ago shifted to other sources of energy, but the earlier mill activities continue to impact the stream. Approximately six dams survive on the Lower Bushkill Creek, and several existing enterprises are direct descendants of the old mills, often on the same sites. More significantly, the industrialized areas along the Bushkill from Tatamy to the Delaware River are directly linked to their colonial predecessors.

Canals

In the early 19th Century, the vast amount of raw materials and products available in the Two Rivers area and Lehigh Valley were impressive, but transportation of these goods proved difficult. The over-land journeys to Philadelphia and New York were long and arduous, and the Delaware and Lehigh Rivers only provided reliable raft transportation during high water. Further north in Carbon County, coal entrepreneurs Josiah White and



The confluence of the Lehigh and Delaware Rivers featured an outlet lock for transfers between the Lehigh Canal and New Jersey's Morris Canal. (Courtesy of Hugh Moore, Jr.)

Erskine Hazard successfully introduced anthracite coal to the world, but faced similar challenges in transportation. With their new wealth, White and Erskine purchased coal fields and river lands to construct the Lehigh Navigation Canal from Mauch Chunk (now Jim Thorpe) to Easton. This section of the canal was completed in 1827. Mules, walking on parallel towpaths, pulled flatboats along the canal, while the world's first hydrostatic locks lowered boats to the next canal segment. Two years later, the Commonwealth constructed the Pennsylvania Canal (or Delaware Canal) from Easton to Bristol in Lower Bucks County. The entire navigation system, once extended north to Wilkes-Barre via canal and gravity railroad, was 150 miles in length. Across the Delaware River in Phillipsburg, the Morris Canal was built, leading to busy New York City markets. In Easton, Glendon and other sites in the Lehigh Valley, numerous factories opened along the Lehigh Navigation Canal, taking advantage of the new transportation feat. The canal operated as late as 1942, making it the longest-operating towpath canal in the world. Thanks in part to industrialist and

park enthusiast Hugh Moore, a 2½-mile stretch of the Lehigh Navigation Canal is now restored and operating as a museum.

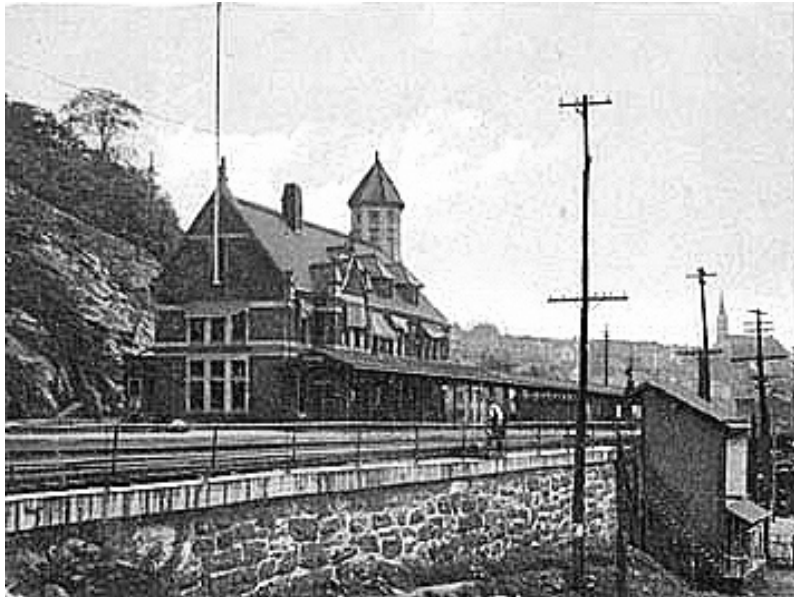
Railroads

Gravity railroads in the coal regions to the north, built as early as 1827, were the first commercial railroads in the United States. This initiated a spirit of railroad-building in the Lehigh Valley that eventually spread across the nation. In the 1850's, industrialist Asa Packer completed the Lehigh Valley Railroad (LVRR) from Carbon County to Phillipsburg, New Jersey. From Phillipsburg, the LVRR's Morris and Essex line then led directly to Jersey City on New York Harbor. The Central Railroad of New Jersey extended lines into Pennsylvania along the north shore of the Lehigh River in Easton. The Lehigh and New England Railroad, which connected Schuylkill County, PA with Orange County, NY, skirted the base of Blue Mountain in the Two Rivers area. A spur tracked south from Benders Junction in Moore Township on its way to Allentown. From this line, another spur traversed eastward through Nazareth, Stockertown and Forks Township, ending at Martins Creek on the Delaware River. Another railroad, unique to the Two Rivers area, was the Easton and Nazareth Railroad of 1890. Built through the narrow valley of the Bushkill Creek from Easton to Stockertown, the railroad connected the existing hub of Easton to the Bangor and Nazareth Railroad, which connected to Scranton.

Trolley lines were also common in the Industrial era. The Easton-Nazareth trolley and the Easton, Tatamy and Bangor trolley made stops in those towns, as well as in Palmer, Forks, Plainfield and Stockertown. Northampton Transit Company, the owner of both lines, also owned and operated Bushkill Park, an amusement park along Bushkill Creek in Forks Township. The City of Easton operated several additional electric street cars within city limits.

Heavy Industry

During the late 19th and early 20th Centuries, with canals and railroads in place, the Lehigh Valley became a regional haven for industrial activity. Agriculture, while still strong, was declining as farmworkers were attracted to the steady employment and higher wages offered by industrial employers in Easton and Bethlehem. Large cargoes of milled steel from Bethlehem rolled through Easton on their way to construction sites worldwide. In the Two Rivers area, the largest



Easton train station, circa 1900.

operation in this time period was the Simon Silk Mill, along the Bushkill Creek at 13th Street in Easton. Opened in 1883, the mill was developed by New Jersey entrepreneurs who were attracted by bonds from local investors, and by the cheaper labor available in Pennsylvania. Because of Simon and other silk mills, the Lehigh Valley became second only to Paterson, NJ in silk production nationwide. The Rinek Cordage Factory established operations on the Bushkill Creek across from Easton Cemetery in 1877, soon producing 1,000 tons of rope annually. Upstream, in Tatamy, the Empire Agricultural Works manufactured plows, reaping machines, and other equipment from a complex of buildings. Binney and Smith, which started as a soapstone and slate pencil manufacturer, established their first Pennsylvania facility in Palmer Township in 1902. The facility, part of which is still in use by the crayon giant, occupies the former Union Flour Mill along the Bushkill Creek at Edgewood Avenue.

The Two Rivers area also saw significant mineral extraction operations, as it does today. With the help of quarries and factories near Nazareth and Stockertown, the Lehigh Valley became the leading worldwide producer of Portland cement from 1900 to 1920. Hercules Cement established their facility west of Stockertown in 1917. Other quarries in the limestone belt extracted stone for structural and road surface purposes. Further north, slate quarries and processing facilities gave Lehigh Valley the honor of world's largest slate producer from 1880 to 1930. In Williams Township, iron ore mines were quite common until the early 20th Century.

Post-War Development

Industry and population growth slowed during the two World Wars and the Great Depression of the 1930's. Many municipalities lost population between 1910 and 1920, and between 1930 and 1940. The mills along the Bushkill Creek dwindled, and many industries not viable during wartime ceased to operate. After the conclusion of the Second World War, however, an unprecedented development pattern began. The post-war economic boom and "baby boom" created a need for new housing for families. With the help of generous car loans and an improved road network, suburbanization took hold in the Two Rivers area. No longer confined to city centers, families established households in outlying areas and drove to work. Palmer Township saw the most post-war growth in the Two Rivers area, more than doubling in population between 1950 and 1960. Meanwhile, Easton lost population, most likely to nearby suburbs. Residential subdivisions developed along William Penn Highway and Freemansburg Avenue in Palmer Township, along Sullivan Trail in Forks Township, and in Upper Nazareth Township. With the completion of Route 22 in the mid-1950's, workers began to commute longer distances. Existing industries began to rely more on trucking, and new industries set up facilities near Route 22 interchanges. Commercial development occurred in the "strip" fashion along major surface roads, and the Palmer Park Mall was built.

By the 1980's and 1990's, suburban development in Forks Township began to rival that in Palmer. Even rural areas such as Bushkill Township saw significant residential development in the form of large-lot subdivisions. Interstate 78 was completed through Williams Township, and later, in 2002, Route 33 was extended to Route 78. These transportation improvements fueled an already-strong

influx of residents from New Jersey. Many established homes in the areas surrounding Easton, but continued to commute to New Jersey or New York City for high salaries.

With more than a half-century of growth that has resulted in a 50% increase in County population, communities have increased planning efforts. There is increased interest in the preservation of natural features, the smart growth of communities, urban revitalization, and the preservation of historic resources.

An inventory and map of particular historic resources is provided in the upcoming section entitled, *Significant Recreation, Historical and Cultural Resources*.

Demographics

Greenway users will largely consist of people already residing within the study area. An analysis of population, housing, and economic characteristics provides a good concept of the human landscape of the Two Rivers area. In the following sections, demographic data is organized by township, borough, and city. Although some municipalities do not lie entirely within the study area, they are included in full, as some greenway users will come from outside the area. Totals for all 17 municipalities are given, as well as figures for Northampton County. Where appropriate, state and national figures have been added for comparison. Except where indicated, all data originates from the U.S. Census Bureau.

Total Population

The total population of the Two Rivers area municipalities was 127,793 in the year 2000 (Table 3). Estimates for 2002 exceed 132,000, nearly half the population of Northampton County. The City of Easton is the most populated municipality; Bethlehem Township, the most populated township. Palmer Township, which lies entirely within the study area, is the third most populated municipality. Forks Township saw the greatest increase in population between 1990 and 2000, at 42%. Forks, due to its flat topography and location near New Jersey, has recently become a haven for people moving from that state, many still keeping jobs there. Glendon Borough has the least number of residents, and also saw the greatest percentage loss of residents from 1990 to 2000. The total population growth rate for all municipalities in the Two Rivers area between 1990 and 2000 was about 12%, which is several percentage points higher than the county as a whole, and nearly four times as much as the growth of Pennsylvania.

Table 3
TOTAL POPULATION
1990 - 2002

MUNICIPALITY	POPULATION			CHANGE (1990-2000)	
	1990 Census	2000 Census	2002 Estimate	NUMBER	%
Bethlehem Township	16,425	21,171	22,027	4,746	28.9
Bushkill Township	5,512	6,982	7,299	1,470	26.7
Forks Township	5,923	8,419	10,792	2,496	42.1
Lower Nazareth Township	4,483	5,259	5,306	776	17.3
Moore Township	8,418	8,673	8,883	255	3.0
Palmer Township	14,965	16,809	16,998	1,844	12.3
Plainfield Township	5,444	5,668	5,844	224	4.1
Upper Nazareth Township	3,413	4,426	4,686	1,013	29.7
Williams Township	3,982	4,470	4,731	488	12.3
Glendon Borough	391	367	365	(24)	-6.1
Nazareth Borough	5,713	6,023	5,986	310	5.4
Stockertown Borough	641	687	714	46	7.2
Tatamy Borough	873	930	952	57	6.5
West Easton Borough	1,163	1,152	1,147	(11)	-0.9
Wilson Borough	7,830	7,682	7,620	(148)	-1.9
Wind Gap Borough	2,741	2,812	2,811	71	2.6
City of Easton	26,276	26,263	26,139	(13)	0.0
Two Rivers Municipalities	114,193	127,793	132,300	13,600	11.9
NORTHAMPTON COUNTY	247,105	267,066	273,324	19,961	8.1
PENNSYLVANIA	11,881,643	12,281,054	12,335,091	399,411	3.4
UNITED STATES	248,709,873	281,421,906	288,368,698	32,712,033	13.2

Source: U.S. Census

Population Projections

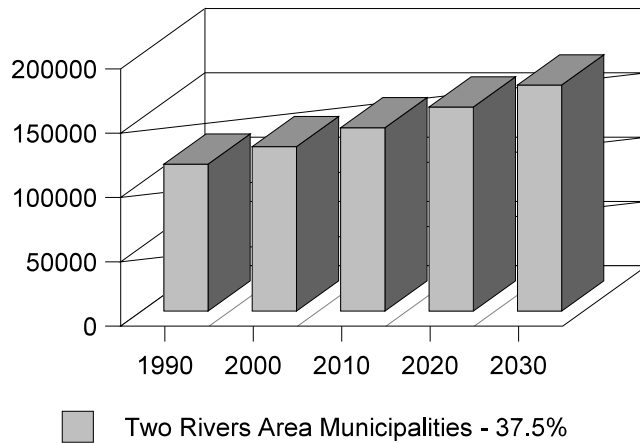
The Lehigh Valley Planning Commission has projected population figures for 2010, 2020 and 2030, shown in Table 4. The greatest forecasted increases are to be in Forks and Upper Nazareth Townships, which both have a significant amount of vacant, residentially-zoned land. While the population in most boroughs is expected to remain constant, Tatamy is projected to see a 73% increase in population by 2030. Also by this time, Bethlehem Township is to exceed Easton as the most populous municipality in the Two Rivers area.

**Table 4
POPULATION PROJECTIONS
2000-2030**

MUNICIPALITY	2000 CENSUS	PROJECTIONS			CHANGE 2000-2030	
		2010	2020	2030	NUMBER	%
Bethlehem Township	21,171	24,099	27,288	30,572	9,401	44.4
Bushkill Township	6,982	8,171	9,199	10,006	3,024	43.3
Forks Township	8,419	10,543	13,477	17,556	9,137	108.5
Lower Nazareth Township	5,259	7,037	8,727	10,142	4,883	92.9
Moore Township	8,673	9,936	11,077	12,052	3,379	39.0
Palmer Township	16,809	18,384	20,418	23,240	6,431	38.3
Plainfield Township	5,668	6,866	8,008	9,002	3,334	58.8
Upper Nazareth Township	4,426	5,876	7,581	9,089	4,663	105.4
Williams Township	4,470	5,359	6,309	7,131	2,661	59.5
Glendon Borough	367	368	368	368	1	0.3
Nazareth Borough	6,023	6,134	6,252	6,383	360	6.0
Stockertown Borough	687	687	687	687	0	0.0
Tatamy Borough	930	1,112	1,330	1,605	675	72.6
West Easton Borough	1,152	1,152	1,152	1,152	0	0.0
Wilson Borough	7,682	7,682	7,682	7,682	0	0.0
Wind Gap Borough	2,812	2,812	2,812	2,812	0	0.0
City of Easton	26,263	26,272	26,282	26,293	30	0.1
Two Rivers Municipalities	127,793	142,490	158,649	175,772	47,979	37.5
NORTHAMPTON COUNTY	267,066	290,919	316,052	341,518	74,452	27.9

Source: U.S. Census, Lehigh Valley Planning Commission

Population Projections



Population Density

Easton, with its dense assemblage of historic townhouses, has the most people per square mile (Table 5). Wilson is the most densely-populated borough, and Palmer the most densely-populated township. The lowest density is found in Moore Township, followed closely by Plainfield, Williams and Bushkill Townships. While Moore Township is the largest municipality in the study area, Bushkill Township is the largest municipality found entirely within the study area. West Easton Borough, the smallest municipality, barely encompasses 200 acres.

Table 5
POPULATION DENSITY
1990-2000

	LAND AREA (Square miles)	POPULATION		POPULATION DENSITY (Persons per square mile)	
		1990	2000	1990	2000
Bethlehem Township	14.85	16,425	21,171	1,106	1,426
Bushkill Township	25.71	5,512	6,982	214	272
Forks Township	12.28	5,923	8,419	482	686
Lower Nazareth Township	13.54	4,483	5,259	331	388
Moore Township	38.25	8,418	8,673	220	227
Palmer Township	11.03	14,965	16,809	1,357	1,524
Plainfield Township	24.38	5,444	5,668	223	232
Upper Nazareth Township	7.35	3,413	4,426	464	602
Williams Township	18.85	3,982	4,470	211	237
Glendon Borough	0.79	391	367	495	465
Nazareth Borough	1.72	5,713	6,023	3,322	3,502
Stockertown Borough	0.89	641	687	720	772
Tatamy Borough	0.52	873	930	1,679	1,788
West Easton Borough	0.31	1,163	1,152	3,752	3,716
Wilson Borough	1.18	7,830	7,682	6,636	6,510
Wind Gap Borough	1.43	2,741	2,812	1,917	1,966
City of Easton	3.81	26,276	26,263	6,897	6,893
Two Rivers Municipalities	176.89	114,193	127,793	646	722
NORTHAMPTON COUNTY	379.75	247,105	267,066	651	703

Source: U. S. Census

Age Distribution

Age distribution data can help project what age groups will be using greenways in the Two Rivers area. The median age is the age at which half of residents are younger and half are older. For the

Two Rivers area municipalities, this figure is approximately 39.5, slightly higher than that of Northampton County as a whole (Table 6). Upper Nazareth Township has the highest median age, Easton the lowest. Ages are then separated into the following categories:

- Ages 0-9, young children who typically require adult supervision while recreating
- Ages 10-17, teens and pre-teens who usually recreate without supervision
- Ages 18-24, a mobile population of college students and others who have “moved out”
- Ages 25-44, the younger half of the working population
- Ages 45-64, the older half of the working population
- Ages 65 and up, mostly retirees.

Glendon Borough has the greatest percentage of young children. Forks Township, a more typical municipality, also has a high concentration of children, mostly from young professional couples in new homes. Plainfield Township has the least percentage of young children. Pre-teens and teens are most common in Lower Nazareth Township, and least common in Wind Gap. Persons aged 18-24 are most frequent in Easton, home of Lafayette College, a significant service industry, and numerous entertainment outlets. Neighboring Forks has the smallest percentage of college-age persons, its high-end homes not within the financial range of most people this age. Percentages of working age population, from age 25 to 64, do not differ drastically from place to place. Senior citizens are found in greatest percentage in Upper Nazareth Township, and similarly in Nazareth Borough. Several large elder-care and retirement communities exist in these municipalities. Lower Nazareth, neighboring both of these, has the smallest percentage of seniors.

Table 6
AGE DISTRIBUTION
2000

	Ages 0-9		Ages 10-17		Ages 18-24		Ages 25-44		Ages 45-64		Ages 65+		Total	Median Age (years)
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%		
Bethlehem Township	2,735	12.9	2,587	12.2	1,355	6.4	5,956	28.1	5,409	25.5	3,129	14.8	21,171	40.0
Bushkill Township	973	13.9	992	14.2	409	5.9	2,082	29.8	1,877	26.9	649	9.3	6,982	38.5
Forks Township	1,290	15.3	1,031	12.2	366	4.3	2,638	31.3	2,028	24.1	1,066	12.7	8,419	38.6
Lower Nazareth Township	639	12.2	814	15.5	326	6.2	1,380	26.2	1,619	30.8	481	9.1	5,259	40.3
Moore Township	954	11.0	966	11.1	560	6.5	2,461	28.4	2,540	29.3	1,192	13.7	8,673	41.2
Palmer Township	1,919	11.4	1,708	10.2	829	4.9	4,590	27.3	4,305	25.6	3,458	20.6	16,809	42.7
Plainfield Township	587	10.4	673	11.9	348	6.1	1,534	27.1	1,577	27.8	949	16.7	5,668	42.1
Upper Nazareth Township	502	11.3	465	10.5	187	4.2	1,142	25.8	832	18.8	1,298	29.3	4,426	43.7
Williams Township	519	11.6	562	12.6	262	5.9	1,256	28.1	1,288	28.8	583	13.0	4,470	40.7
Glendon Borough	63	17.2	43	11.7	16	4.4	111	30.2	86	23.4	48	13.1	367	36.5
Nazareth Borough	638	10.6	579	9.6	405	6.7	1,726	28.7	1,203	20.0	1,472	24.4	6,023	41.4
Stockertown Borough	90	13.1	75	10.9	46	6.7	199	29.0	168	24.5	109	15.9	687	38.3
Tatamy Borough	129	13.9	102	11.0	56	6.0	269	28.9	265	28.5	109	11.7	930	39.7
West Easton Borough	132	11.5	156	13.5	89	7.7	370	32.1	247	21.4	158	13.7	1,152	37.6
Wilson Borough	1,031	13.4	880	11.5	582	7.6	2,453	31.9	1,545	20.1	1,191	15.5	7,682	36.2
Wind Gap Borough	355	12.6	231	8.2	212	7.5	833	29.6	640	22.8	541	19.2	2,812	39.3
City of Easton	3,362	12.8	2,746	10.5	4,283	16.3	7,862	29.9	4,880	18.6	3,130	11.9	26,263	32.0
Two Rivers Municipalities	15,918	12.5	14,610	11.4	10,331	8.1	36,862	28.8	30,509	23.9	19,563	15.3	127,793	≈39.5
NORTHAMPTON CO.	32,578	12.2	29,689	11.1	24,665	9.2	75,662	28.3	62,442	23.4	42,030	15.7	267,066	38.5

Source: U.S. Census

Housing Stock

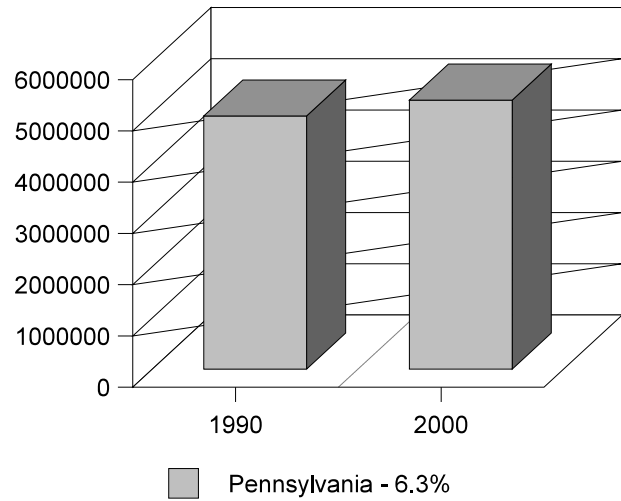
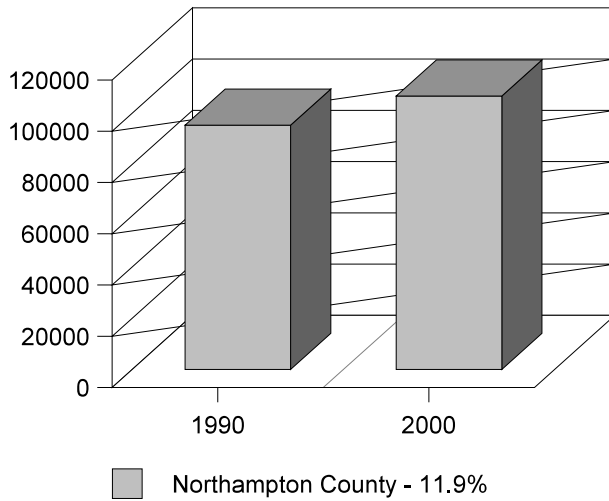
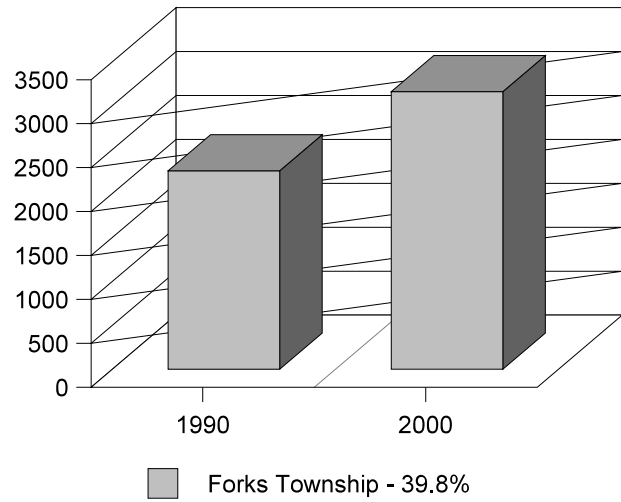
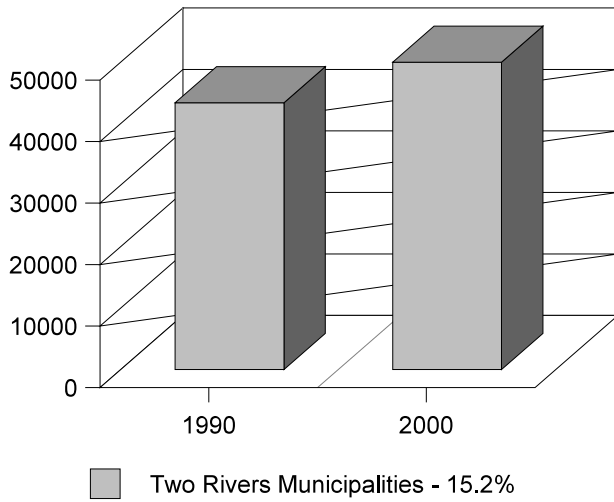
The total number of housing units in the municipalities of the Two Rivers area is increasing at a rate faster than the county, state and national rates. Within the region, Easton has the greatest number of total housing units (Table 7). Bethlehem and Palmer Townships are in second and third place, respectively, similar to their placing in total population. The largest percentage increases in housing units were seen in Forks Township, then in Bethlehem Township and Upper Nazareth Township. The boroughs, especially ones near Easton, have had little land remaining for new housing stock, and have gained fewer housing units.

Table 7
TOTAL HOUSING UNITS
1990-2000

MUNICIPALITY	TOTAL HOUSING UNITS		CHANGE (1990-2000)	
	1990	2000	NUMBER	PERCENT
Bethlehem Township	5,925	7,831	1,906	32.2
Bushkill Township	1,883	2,406	523	27.8
Forks Township	2,259	3,159	900	39.8
Lower Nazareth Township	1,419	1,821	402	28.3
Moore Township	3,124	3,464	340	10.9
Palmer Township	5,647	6,865	1,218	21.6
Plainfield Township	2,051	2,191	140	6.8
Upper Nazareth Township	1,036	1,364	328	31.7
Williams Township	1,504	1,738	234	15.6
Glendon Borough	152	150	(2)	-1.3
Nazareth Borough	2,546	2,658	112	4.4
Stockertown Borough	254	293	39	15.4
Tatamy Borough	330	356	26	7.9
West Easton Borough	457	482	25	5.5
Wilson Borough	3,325	3,345	20	0.6
Wind Gap Borough	1,164	1,294	130	11.2
City of Easton	10,309	10,545	236	2.3
Two Rivers Municipalities	43,385	49,962	6,577	15.2
NORTHAMPTON COUNTY	95,345	106,710	11,365	11.9
PENNSYLVANIA	4,938,140	5,249,750	311,610	6.3
UNITED STATES	102,263,678	115,904,641	13,640,963	13.3

Source: U.S. Census

Growth in Housing Units 1990 - 2000



Household Size

A household is composed of related or unrelated persons living in the same housing unit. A nationwide trend in decreasing household sizes affected almost every count level between 1990 and 2000. Declines in household size may be due to later marriages, more divorces, fewer children, and more elderly households. The Two Rivers area has seen decreases similar to those of the County and State, though Forks and Upper Nazareth Townships saw increases (Table 8). These can be explained partially by more young couples moving in from outside the area and starting families. In 2000, family-oriented Bushkill Township had the largest average household size, followed by Lower Nazareth and Forks Townships. Nazareth Borough had the smallest household size, due to a high

percentage of senior citizens. The average household size of the Two Rivers area municipalities collectively is approximately 2.58, very similar to the figure for the United States as a whole.

Table 8
HOUSEHOLD SIZE
1990-2000

	AVERAGE PERSONS PER HOUSEHOLD		CHANGE
	1990	2000	
Bethlehem Township	2.84	2.69	-0.15
Bushkill Township	3.03	2.99	-0.04
Forks Township	2.71	2.76	+0.05
Lower Nazareth Township	3.10	2.94	-0.16
Moore Township	2.80	2.62	-0.18
Palmer Township	2.67	2.46	-0.21
Plainfield Township	2.78	2.62	-0.16
Upper Nazareth Township	2.60	2.73	+0.13
Williams Township	2.79	2.70	-0.09
Glendon Borough	2.81	2.64	-0.17
Nazareth Borough	2.27	2.22	-0.05
Stockertown Borough	2.62	2.46	-0.16
Tatamy Borough	2.70	2.63	-0.07
West Easton Borough	2.66	2.55	-0.11
Wilson Borough	2.42	2.40	-0.02
Wind Gap Borough	2.47	2.25	-0.22
City of Easton	2.51	2.46	-0.05
Two Rivers Municipalities	2.66	≈2.58	-0.08
NORTHAMPTON COUNTY	2.62	2.53	-0.09
PENNSYLVANIA	2.57	2.48	-0.09
UNITED STATES	2.63	2.59	-0.04

Source: U.S. Census

Housing Type

People often need different types of housing as they mature. Young people often start in apartments or small homes, then move to larger homes as they build their families. Later, as children leave and remaining occupants grow older, requirements often return full circle to smaller units. Typically, townhouses and apartments are more common in the boroughs and cities than in the townships. The Two Rivers area is no exception, with Wind Gap and Nazareth boroughs having the greatest percentage of units in buildings with 5 or more units (Table 9). Dwelling units in structures of 2-4 units are most common in Easton, where many older townhomes have been converted to several

apartments. Single-family attached housing, or “rowhomes” are most common in Wilson borough, followed by Easton. Single-family detached housing is the rule in most townships, especially rural Bushkill Township, where 96% of all homes are single-family detached. Moore Township has the greatest percentage of mobile homes. The distribution of housing types in the Two Rivers area is very similar to the whole of Northampton County.

Table 9
HOUSING TYPE
2000

	Single-Family Detached		Single-Family Attached		Units in 2-4 Unit Structures		Units in 5+ Unit Structures		Mobile Homes / Other		Total Housing Units
	NUMBER	%	NUMBER	%	NUMBER	%	NUMBER	%	NUMBER	%	
Bethlehem Township	5,871	75.0	928	11.9	333	4.3	513	6.6	186	2.4	7,831
Bushkill Township	2,309	96.0	24	1.0	6	0.2	7	0.3	60	2.5	2,406
Forks Township	2,585	81.8	295	9.3	115	3.6	101	3.2	63	2.0	3,159
Lower Nazareth Township	1,658	91.0	79	4.3	68	3.7	11	0.6	5	0.3	1,821
Moore Township	2,612	75.4	38	1.1	69	2.0	8	0.2	736	21.3	3,463
Palmer Township	5,262	76.7	872	12.7	429	6.2	302	4.4	0	0.0	6,865
Plainfield Township	1,803	82.3	94	4.3	164	7.5	8	0.4	122	5.6	2,191
Upper Nazareth Township	1,125	82.5	62	4.5	38	2.8	91	6.7	48	3.5	1,364
Williams Township	1,513	87.1	41	2.4	73	4.2	8	0.5	103	5.9	1,738
Glendon Borough	86	57.3	50	33.3	4	2.7	0	0.0	10	6.7	150
Nazareth Borough	1,247	46.9	476	17.9	374	14.1	561	21.1	0	0.0	2,658
Stockertown Borough	195	67.0	42	14.4	39	13.4	11	3.8	4	1.4	291
Tatamy Borough	244	68.2	67	18.7	41	11.5	6	1.7	0	0.0	358
West Easton Borough	268	55.7	153	31.8	36	7.5	24	5.0	0	0.0	481
Wilson Borough	815	24.4	1,456	43.5	690	20.6	385	11.5	0	0.0	3,346
Wind Gap Borough	601	46.4	168	13.0	164	12.7	289	22.3	72	5.6	1,294
City of Easton	2,479	23.5	3,863	36.6	2,389	22.7	1,809	17.2	5	0.0	10,545
Two Rivers Municipalities	30,673	61.4	8,708	17.4	5,032	10.1	4,134	8.3	1,414	2.8	49,961
NORTHAMPTON CO.	62,018	58.1	20,866	19.6	10,824	10.1	9,579	9.0	3,423	3.2	106,710

Source: U.S. Census

Median Income and Poverty

In the Two Rivers area municipalities, median income is higher, and poverty lower than the County as a whole (Table 10). Lower Nazareth Township has the highest median income, Easton the lowest. Poverty rates are based on federally-established minimum income levels based on household size. Poverty is most common in Glendon, followed by Easton. The lowest percentage of families in poverty is found in Upper Nazareth Township.

Table 10
MEDIAN INCOME AND POVERTY
1999

	Median Household Income	Percentage of Families in Poverty
Bethlehem Township	\$60,317	2.2
Bushkill Township	\$63,966	1.9
Forks Township	\$66,055	2.7
Lower Nazareth Township	\$70,250	1.5
Moore Township	\$48,371	3.5
Palmer Township	\$55,419	2.6
Plainfield Township	\$49,019	1.7
Upper Nazareth Township	\$55,291	0.7
Williams Township	\$56,196	1.7
Glendon Borough	\$42,969	12.9
Nazareth Borough	\$39,098	4.2
Stockertown Borough	\$48,542	5.1
Tatamy Borough	\$48,942	2.9
West Easton Borough	\$39,615	9.5
Wilson Borough	\$37,400	4.5
Wind Gap Borough	\$35,030	7.2
City of Easton	\$33,162	12.3
Two Rivers Municipalities	≈ \$49,500	4.4
NORTHAMPTON COUNTY	\$45,234	5.7

Source: U.S. Census

Commute to Work

In the Two Rivers area, mean travel times to work vary from 19 minutes in Nazareth to 30 minutes in Forks Township (Table 11). Many residents of Forks Township commute to jobs in metropolitan New York / New Jersey, accounting for this high travel time. In Williams Township, the second longest commute, lengthy travel times can be attributed to the same reason, combined with more challenging rural roads and isolated residential areas. The shortest travel times, in Nazareth, Stockertown and other boroughs, are a result of their central location and their more local employment base.

Also shown in Table 11 are commuting methods. Like most areas in the United States outside of major metropolitan areas, single-occupancy auto commuting is the rule. This is especially true in Bushkill and other rural townships where limited public transit exists, and households are relatively isolated. Carpooling is most common in Easton, comprising nearly 17% of all commuting trips. Other relatively high carpooling rates are seen in West Easton and Wilson. Public transportation is the least used mode of getting to work in the Two Rivers area. At best, 3% of commuters in Easton use transit, and 2% in Wilson. Easton also has the greatest percentage of people biking or walking

to work, at over 11%. In Nazareth Borough, more people walk or bike to work than carpool. Upper Nazareth’s 4% rate of foot or bike commuting is much higher than the other townships.

**Table 11
COMMUTE TO WORK
2000**

	Mean Travel Time to Work (minutes)	Method of Commuting to Work			
		Drive Alone (%)	Carpool (%)	Public Transportation (%)	Bicycle or Walk (%)
Bethlehem Township	25.2	89.2	7.2	0.3	1.4
Bushkill Township	26.0	89.8	5.9	0	1.0
Forks Township	29.5	85.8	9.4	0.8	0.2
Lower Nazareth Township	24.7	87.4	6.3	0.3	0.7
Moore Township	26.7	85.7	9.0	0.1	0.3
Palmer Township	25.3	85.8	10.2	0.4	0.8
Plainfield Township	27.9	85.7	10.0	0	1.3
Upper Nazareth Township	24.3	86.6	7.6	0.3	4.1
Williams Township	28.9	87.2	5.4	0.7	1.7
Glendon Borough	27.1	83.1	9.4	1.3	0
Nazareth Borough	18.8	84.4	5.6	0	6.4
Stockertown Borough	19.6	85.8	8.1	0	1.4
Tatamy Borough	22.7	88.6	6.6	0	2.1
West Easton Borough	20.2	81.6	12.1	1.6	2.6
Wilson Borough	22.2	77.1	11.0	2.1	7.1
Wind Gap Borough	25.2	87.2	7.1	0	3.1
City of Easton	22.5	66.4	16.9	3.4	11.4
Two Rivers Municipalities	≈ 24.9	82.6	9.8	1.0	3.7
NORTHAMPTON CO.	24.2	82.2	9.6	1.1	4.3

Source: U. S. Census

The Projected Effect of Greenways on Demographics

Greenways typically have the dual effect of preserving more land, while attracting additional population and commerce. In the Two Rivers area, population growth is going to occur under any and all circumstances. Therefore a greenways plan is one helpful tool for ensuring that the new population does not infringe on important natural, scenic and cultural resources. In addition, attractive communities (such as those with greenways) often draw new employers. This, combined with increased revenue from tourism, may raise household income and drop poverty levels. Greenways may also change commuting habits. Recreation trails within greenways create a safe, alternative means for traveling to employment places within the Two Rivers area.

Existing Land Use and Zoning

The Two Rivers area displays a wide variety of land uses, due in part to its north-south cross-section of the diverse County of Northampton (Map 9). A proposed greenway network would weave through nearly every type of land use, augmenting and linking existing recreation and open space uses, and providing contrast and relief to the more built-up, intensive land uses. An inventory of existing land use helps to realize the context into which a greenway network will be integrated, and outlines some of the opportunities and threats facing the greenway effort. The underlying municipal zoning in the area provides insight into why certain land uses exist where they do, and forecasts what land uses may occur there in the future (Map 10). Major land uses and zoning are described below, and shown on the accompanying Existing Land Use Map and Generalized Existing Zoning Map.

Agricultural and Vacant Land

Agricultural and vacant land comprise the largest percentage of total land in the Two Rivers area, over 60%. Agriculture, primarily in the form of corn and soybean farming, exists on a majority of the undeveloped land that is free of steep slopes, rocky soil, and wetlands. The largest farmland parcels are found in Lower Nazareth, Palmer and Forks Townships, where modest terrain and well-drained soils have promoted this activity. In the northern townships, agriculture takes place on smaller land holdings, with more rolling terrain. Pasture land mixes with crop land in this area, especially in the largely agricultural Plainfield Township. Stouts Valley, along Fry's Run in Williams Township, is another important farming area. All of these agricultural areas are experiencing significant developmental pressure due to their ideal physical characteristics, and the ubiquitous pressures from outside the region. Most agricultural areas are zoned for low-density residential uses, though many of the remaining farms in Palmer and Forks Townships are zoned for medium-density residential, light industrial, or commercial uses.

Non-agricultural vacant land is found largely in the northern fringes of the Two Rivers area, and in Williams Township. In the north, privately-owned wooded land contains numerous springs, seeps, and small streams. Along the base of Blue Mountain, numerous small, narrow parcels have been created from former railroad land, but these tracts are primarily undeveloped. In Williams Township, the sharp, wooded ridges of the Reading Prong formation coincide with large, private landholdings. This includes unique geologic features such as Hexenkopf Rock and Elephant Rock. A steep slope overlay in the Williams Township zoning ordinance protects these and other resources from development. Other "vacant" parcels in the Two Rivers area include floodplains, weed lots no longer farmed, and the occasional urban vacant lot.

Numerous property owners in the Two Rivers area are employing preservation methods to keep their land in agricultural or vacant use. *Act 319 "Clean and Green"*, and its predecessor, *Act 515*, are the most common methods. Under these programs, Northampton County offers lower real estate tax rates for parcels greater than 10 acres, based on its value for non-development uses. In return, the property owner is legally bound to keeping the land undeveloped. In the region's *Agricultural Security Areas (ASA)*, farmers petitioned to create districts of at least 250 contiguous acres where special consideration is given regarding local ordinances and nuisance complaints. The two largest

ASA's in the Two Rivers area are in northern Forks Township, and along Fry's Run in Williams Township. Another provision of the ASA is eligibility for the *Easement Purchase Program*. State, county, or local governments may purchase the development rights of a farm if it meets certain criteria. Farms are rated on soil quality, management practices, contiguity with other farmland, and the likelihood of development. The farmer receives the entirety of the purchase money, and in return must keep the land in an agricultural or undeveloped state permanently. In the Two Rivers area, agricultural easements have been purchased in Bushkill, Lower Nazareth, Moore, Plainfield, and Williams Townships. The largest cluster of agricultural easements are the Clewell, Mikol and Setzer farms in Lower Nazareth Township. Act 319/515, ASA, and Agricultural Easement parcels are shown on the Existing Agricultural Protection Map.

Residential Land

Residential land comprises approximately 25% of all land in the Two Rivers area. Residential land, which is ever increasing in the area, displays many different densities and housing types. In Easton and the seven boroughs, double homes, row homes and other "attached" housing are common. These structures are the original housing stock from the early 1900's, 1800's, and even 1700's. In some cases, large homes in these urban areas have been converted to multi-family apartments. In other areas, especially along major streets, buildings contain commercial enterprises on the ground floor, and apartments on the higher floors. Homes in these densely-packed urban areas nearly all predate zoning, and most ordinances have been retrofitted to allow for these high-density uses.

Outward from the Easton-Wilson urban complex lie suburban residential neighborhoods that are progressively more recent as one drives away from Easton. Most of these are situated on former farm fields, and tend towards single-family detached housing on lots of a half acre or less. Townhomes are also a major part of the new, suburban housing stock, especially in Forks Township. In these areas, medium-density residential zoning has facilitated these developments, and is allowing for the continued development of farmland tracts in the central and northern sections of Palmer and Forks Township. Eastern areas of Upper Nazareth Township are also largely suburban-residential in nature.



A 1990's subdivision climbs Chestnut Hill in Forks Township.

In Moore, Bushkill and Plainfield Townships, low-density and/or *rural residential* zoning has generally kept lot sizes relatively large, with the exception of central and southern Bushkill Township, and the Sullivan Trail corridor in Plainfield Township. Subdivisions here are much smaller than Palmer/Forks developments, but are scattered among larger-lot residential areas and farms. As a result, the remaining undeveloped land is largely fragmented, with the exception of Blue

Mountain. Williams Township is similar to the northern townships in its residential land. The eastern end of Stouts Valley is becoming increasingly developed with homes on lots of three acres or less, while the steep ridges of Williams have held onto large lot sizes. Some residential zoning districts, such as Bushkill Township's *Conservation Residential* and Forks Township's *Open Space Residential*, are intended to promote a rural landscape while still permitting large-lot residential construction.

Commercial Land

Commercial land, about 3% of all land uses in the area, includes retail, service, and office uses. The resulting structures and landscape may include self-contained shopping centers, highway "strip" development, and the traditional business districts in the centers of urban areas and villages. Shopping centers tend to be near major highways, as demonstrated by the Palmer Park Mall on Route 248 near Route 22, the Northampton Crossings shopping center at Routes 248 and 33, and Wind Gap's K-Mart Plaza at Routes 512 and 33. Major linear commercial corridors in the Two Rivers area include William Penn Highway in Palmer Township, Route 248 between Routes 22 and 33 in Palmer, 25th Street and Northampton Street in Wilson, and Sullivan Trail in Forks Township. Traditional commercial areas can still be found in the Two Rivers area, especially in Easton, where various retail, restaurant, and tourist operations have helped to revitalize the downtown and waterfront. The boroughs and villages also feature commercial clusters, including Broad Street in Nazareth, Main Street in Stockertown, Broadway in Wind Gap, and Route 611 in Raubsville.

Commercial zoning underlies most of the aforementioned business areas. Densities and permitted uses may vary. Forks Township's *Employment Center* district along Kesslerville Road is intended for moderately large operations on lots greater than 2 acres in area, while Palmer's *General Commercial* district along William Penn Highway is designated for retail and service uses on small lots. The Route 33 interchanges at Route 248 and Route 512 contain several large tracts of vacant, commercially-zoned land. In Bushkill Township, *Limited Commercial/Residential* and *General Commercial/Industrial* zoning districts along Route 512 may spur new commercial development. A similar district in Plainfield Township along Route 512 east of Wind Gap may be the site of a new shopping center. In Easton and the boroughs, zoning has commonly been retrofitted to accommodate existing commercial clusters. Easton's downtown is zoned for *Business/Regional Trade* and Wind Gap's Broadway is zoned, *Community Commercial*.

Industrial Land

Industry has always played an important role in the economic development of the Two Rivers area, and this is evident today in the area's 4% coverage of industrial land. Industrial land uses range from heavy operations such as quarrying and chemical manufacturing, to lighter uses including machine shops and warehousing facilities.

In general, industrial operations in and near the City of Easton tend to be older and “heavier” in nature. Along 25th Street in Wilson, companies such as Bethlehem Corporation and James River Dixie Northern create an industrial hub with access to Route 22. Across the Lehigh River in Glendon Borough lies the Ashland Oil site, a chemical processing plant. Elementis Pigments, a worldwide producer of paints, occupies several contiguous tracts of land along the Bushkill Creek in Wilson Borough. Across the stream lies a processing plant owned by Mineral Technologies. Working with these two landowners will be crucial in connecting future trails in Palmer Township and Easton City. Numerous smaller industrial operations line the banks of Bushkill Creek downstream from Elementis, including an auto salvage yard. Between Nazareth and Stockertown, several



Hercules Cement Plant, Stockertown.

cement quarries operate on large tracts of land, including those of Essroc and Hercules Cement companies. In the northern portions of Forks and Palmer Townships, industrial parks are developing on land zoned for light industrial and office commercial uses. These parks contain manufacturers and shippers of small products such as plastics, blocks and metal. Binney and Smith, producer of Crayola crayons, and a major economic force in the area, has office and manufacturing buildings in Forks Township on Church Lane. The northern section of the Two Rivers area sees primarily small, family-owned industrial operations scattered near major roads. One exception is Waste Management’s Grand Central Sanitary Landfill, which occupies a 345-acre site in northern Plainfield Township. Another large landfill, owned by Chrin Brothers, is located on Morgan Hill along the south side of Interstate 78 in Williams Township.

In general, land zoned for industrial use is clustered near existing industry, or in areas with flat topography and facilitated highway access. The largest undeveloped, industrially-zoned area is centered near the Route 33-Route 248 interchange in Lower Nazareth and Palmer Townships. Other such areas include Route 512 at Route 33 near Wind Gap, Route 512 between Wind Gap and Pen Argyl, and the *Employment Center* zoning district in north-central Forks Township.

Institutional Land

Institutional land uses can either be publically or privately owned. Public institutional land includes municipal and county government centers, public schools, libraries, post offices, police headquarters, and some firehouses. Townships such as Palmer, Forks, and Plainfield have clustered their governmental and police operations onto singular tracts of land. Likewise, some area school districts have conglomerated their school buildings into campuses, most notably the Nazareth Area School District.

Private institutional land includes private and parochial schools, private universities, volunteer fire companies, places of worship, and cemeteries. The largest single owner of institutional land in the Two Rivers area is Lafayette College, which maintains its main campus in the College Hill neighborhood of Easton, and owns more than 200 acres of athletic facilities and vacant land between Sullivan Trail and Bushkill Creek in Forks Township. Another significant institutional land holding

is the Easton Cemetery, which occupies the southern slopes of the Bushkill Creek corridor from 13th Street to 6th Street in Easton.

Underlying zoning on institutional land is varied, with many facilities occurring on residentially-zoned land. Forks Township, however, employs a *Recreation/Education/Municipal* zoning designation for a majority of its institutional land. An inventory of schools, government properties, and cemeteries can be found on the Potential Greenway Nodes map.

Public and Private Recreation Land

Public recreation land includes neighborhood parks, athletic fields, regional parks, game lands, mini-parks, and open space that are governmentally-owned and open to the public. Private recreation land may include many of the same features, but are owned by private entities. Some private recreation sites are open to the public, such as community group-owned parks, homeowner association land, and nature conservancies. Other private recreation land includes golf courses, youth camps, sportsmen clubs, and university-owned recreation areas. Specific recreation land holdings are described further in the section entitled, *Existing Recreation Sites and Other Possible Greenway Nodes*.

Certain zoning regulations aid in the preservation of open space and parkland throughout the Two Rivers area. In some cases, specific zoning districts delineate areas where recreation and open space are the intended land uses, such as Palmer Township's *Conservation and Recreation* district, Moore and Plainfield Townships' *Blue Mountain Conservation* districts, Williams Township's *Special Conservation* District along the Delaware River, and Forks Township's *Heritage Corridor* along the Bushkill Creek.

Zoning overlays and general environmental guidelines provide additional protection for sensitive natural features. The aforementioned steep slope overlay in Williams Township is also seen in Plainfield and Moore Townships. Most townships in the Two Rivers area have enacted either stream setbacks and/or floodplain ordinances. Palmer Township prohibits the building of structures and pavements fewer than 100 feet from the banks of major streams, 60 feet from the center of minor streams, and 50 feet from the center of drainage swales. In all municipal zoning ordinances, nearly every type of development is prohibited within the 100-year floodplain. Other natural features are protected, as well. Forks Township dictates land clearing percentage maximums for woodland *associations*, including 10% for floodplain forests, 30% for mesic (moist) forests, and 50% for upland forests. Moore Township calls for a detailed logging plan for the extraction of any timber worth more than \$1,000. All of these municipal measures provide the opportunity for additional open space and greenways.

Transportation and Utility Land

Transportation land uses include parking lots, railroad yards, and airports. The Easton Airport in Forks Township is the largest such property in the Two Rivers area. Utility land uses contain facilities needed to keep electric, gas, telephone, water and sewer infrastructure working. Electricity in the Two Rivers area is provided primarily by First Energy Company (formerly Met Ed), which

keeps offices and maintenance facilities on Meco Road in Forks Township. First Energy and PPL Electric Utilities both operate electric substations and transmission lines in the Two Rivers area. Similarly, gas companies such as Allentown-Bethlehem Gas and United Gas operate valve stations scattered throughout the area. Water utilities such as the Pennsylvania-American Water Company and Easton Suburban Water Authority operate treatment plants, standpipes and covered reservoirs in addition to conveying water through pipeline easements across the area. The City of Easton operates a sanitary sewage treatment plant on the Delaware River in South Easton. Municipal garages, firehouses and storage facilities are included in this land use category. The Existing Transportation and Utility Land Map displays all such land in the Two Rivers area.

Mixed Uses

Some portions of the Two Rivers area contain a variety of land uses in a concentrated area. This is particularly true in the area's urban areas and villages. Zoning designations in these places reflect this heterogeneity. Stockertown contains a *Mixed Use* designation in its center. A stretch of Route 512 in central Bushkill Township is zoned, *Limited Commercial / Residential*. In Forks Township, the retail, service and municipal uses along Sullivan Trail exist in a *Town Center* zoning district.



Downtown Nazareth features residential, office, and institutional uses along a town green.

Environmental Provisions in Municipal Zoning Ordinances

Land use policies are guided not just by the location of zoning districts, but also by the language contained within municipal zoning ordinances. With respect to greenways, the most important language is that dealing with environmental protection. Many zoning ordinances include a separate section that spells out specific regulations for different types of natural features. Other zoning ordinances have environmental regulations infused into other sections. Table 12 is a matrix summarizing the environmental protection policies found in municipal zoning ordinances in the Two Rivers area. Policies are organized by the type of natural feature.

Table 12
ENVIRONMENTAL PROVISIONS IN MUNICIPAL ZONING ORDINANCES

MUNICIPALITY	Surface Waters	Floodplains / Alluvial Soils	Wetlands / High Water Tables / Hydric Soils	Steep Slopes	Woodlands	Other
Bethlehem Township	<p>Major S.W. (Lehigh R. & Monocacy Cr.): no structures or surfaces within 75' of top of bank.</p> <p>Minor S.W. (Nancy Run Cr.): s/a above, 50' from top of bank. Observe "reasonable efforts" to not disturb these areas during grading.</p>	<p>Floodplains: No floodplains exist in the Two Rivers portion of Bethlehem Township.</p> <p>Alluvial Soils: If construction is proposed in alluvial soils (as determined by USSCS), study must be done to determine extent of 100-year floodplain. If no study is done, then 100-year floodplain regulations apply in alluvial soils.</p>	<p>Reasonable doubt clause: "If a reasonable doubt exists in the determination of the zoning officer or engineer whether a portion of a site would meet one or more State or Federal definitions of a wetland, then the zoning officer shall require the applicant to provide a study by a qualified professional delineating whether wetlands exist." After which, building on wetland is prohibited, and existing structures may have to be removed.</p>	<p>15-25% slopes: 1-acre minimum lot size for residential use, 2-acre minimum lot size for commercial/industrial/institutional use.</p> <p>25%+ slopes: 2-acre minimum for residential use, 4-acre minimum for commercial/industrial/institutional use. Site plans required for lots with any slopes over 15%.</p>	<p>No trees with trunk width 6" or greater shall be removed unless they are within a proposed cartway, or 20 feet from a proposed foundation.</p> <p>Buffer yards (20'-50' wide) required between certain intense uses and residential uses, if the intense uses are 250' or less from the residential area.</p>	<p>Developers must identify any sinkholes or closed topical depressions. Zoning officer may require that proper methods be used to minimize subsidence threats.</p>
Bushkill Township	<p>Perennial streams: 100' building setback, 50' paving setback.</p> <p>Intermittent streams: 50' building and paving setback.</p> <p>Swales dry during most of the year: no regulations, as long as not within the 100-year floodplain.</p>	<p>Floodplains: No new structures or improvements to structures are allowed within 100-year floodplain.</p> <p>Alluvial Soils: No new structures or improvements on alluvial soils unless study shows that it is not within the 100-year floodplain. Developer may ask for variance on both issues.</p>	<p>No construction, filling, or altering of land permitted on wetlands. 25% maximum wetland coverage on any lot, based on minimum lot size.</p>	<p>If 500 or more square feet of steeply-sloped land is found within 20' of a proposed building site, the following regulations apply:</p> <p>15-25% slopes: 3-acre minimum, 15% maximum impervious coverage.</p> <p>25%+ slopes: no construction allowed.</p>	N/A	<p>Cluster development permitted under ordinance.</p>

Two Rivers Area Greenway Plan

MUNICIPALITY	Surface Waters	Floodplains / Alluvial Soils	Wetlands / High Water Tables / Hydric Soils	Steep Slopes	Woodlands	Other
Forks Township	Lakes, ponds and watercourses must remain as open space. Areas within 50 feet of lake or pond shores must have no more than 30% development.	All 100-year floodplains and floodplain soils must remain as open space.	Wetlands must remain as open space.	<p>15-20% slopes: No more than 20% of these areas shall be developed or stripped of vegetation.</p> <p>20%+ slopes: No more than 10% of these areas shall be developed or stripped of vegetation.</p>	<p>Floodplain woodlands: No more than 10% development.</p> <p>Mesic woodlands: No more than 30% development.</p> <p>Upland woodlands: No more than 50% development. Remainder shall be open space. Fore mesic and upland forests, cleared area shall be no greater than 1.5 times the canopy height.</p>	N/A
Lower Nazareth Township	<p>Major S.W. (E. and W. Branches of Monocacy Cr.): No buildings, parking, or storage within 75' of top of bank.</p> <p>Minor S.W. (Schoeneck Cr.): s/a above, 50' from top of bank.</p>	<p>Floodplains: In 100-year floodplain, new structures are prohibited except for DEP-approved dams, bridges & culverts. Also prohibited are topsoil removal, watercourse alteration, private on-site septic and wells, landfills, and storage of haz-mats. Agriculture, forestry, and passive recreation are allowed, but must comply with natural resource conservation practices.</p> <p>Alluvial Soils: New structures on alluvial soils must submit a plan showing the extent of the 100-year floodplain.</p>	Reasonable doubt clause.	<p>If steeply-sloped areas are found within 25' of a proposed building site, the following regulations apply:</p> <p>15-25% slopes: 87,000 sq.ft. minimum for residential use, 2-acre minimum for commercial/ industrial/institutional use.</p> <p>25%+: 4-acre minimum for residential use, 5-acre minimum for c/i/i use.</p>	<p>Remove no more than 10 trees per lot, unless they are found in or within 10' of a proposed cartway, sidewalk, paved area, or detention basin, or within 25' of a proposed foundation.</p> <p>For forestry purposes, no more than 10% of trees may be removed (trees with 6" or greater trunk diameter.)</p>	N/A

Two Rivers Area Greenway Plan

MUNICIPALITY	Surface Waters	Floodplains / Alluvial Soils	Wetlands / High Water Tables / Hydric Soils	Steep Slopes	Woodlands	Other
Moore Township	Building/altering structures or land 100 feet on either side of the top of bank of a year-round or intermittent stream requires zoning permit, County Cons. Dist. review, State permits, notification of all affected municipalities.	Building/altering structures or land in FEMA 100-year floodplain requires zoning permit, County Cons. Dist. review, State permits, notification of all affected municipalities.	N/A	Building site may not exceed 15% slope for residential, 10% for com./ind. Slopes greater than 25% shall remain as open space.	All timber harvesting worth more than \$1,000 requires twp-approved logging plan. Plan must comply with State logging regulations.	Blue Mountain Conservation District
Palmer Township	Major S.W. (Lehigh R. & Bushkill Cr.): No structure or pavement within 100' of top of bank. Minor S.W. (Schoeneck Cr.) - s/a above, within 60' of top of bank. Major Natural Drainage Swales: No buildings within 50', keep 100-year floodplain in open space whenever reasonable.	No new or improved residential, commercial, industrial, institutional uses are permitted in 100-year floodplain. No hospitals, jails, mobile home parks, or waste storage facilities are permitted in the 100-year floodplain.	Reasonable doubt clause. Buildings on soils with water table at a depth of 4' or less must be waterproofed below grade.	For areas with 1,000 or more sq. feet of steeply-sloped land, the following regulations apply: 15-25% slopes: 1-acre minimum residential use, 2-acre minimum commercial/industrial use. 25%+ slopes: 2-acre minimum residential use, 4-acre minimum commercial/industrial use. In the proposed construction area, there can be no more than 500 sq. ft. of slopes 15% and greater, and no slopes greater than 33%.	Trees greater than 6" in trunk width may only be cut when: - 5 trees are cut in one year - Selective cutting is practiced (15% maximum extraction) - Tree is 10' from a proposed cartway - Tree is 3' from a proposed driveway, sidewalk, parking area, or utility corridor - Tree is in a proposed golf course fairway - Major grade changes are proposed under a site plan.	Conservation Easement: Board of Supervisors may ask for a C.E. of 99 or more years to protect natural features, which would be referenced on the deed of each affected lot.
Plainfield Township	All areas within 50' of banks of any stream, lake, or pond shall remain in open space.	New or improved structures are prohibited within 100-year floodplains and alluvial soil areas.	Any land use which may directly or indirectly result in groundwater pollution shall be prohibited in areas with high or seasonably high water tables.	15%+ slopes are treated as "Special Exception Uses" subject to review. No building site may exceed a natural slope of 20%.	N/A	N/A

Two Rivers Area Greenway Plan

MUNICIPALITY	Surface Waters	Floodplains / Alluvial Soils	Wetlands / High Water Tables / Hydric Soils	Steep Slopes	Woodlands	Other
Upper Nazareth Township	Development within 50' of any watercourse is prohibited <i>within floodplains</i> .	Within 100-year floodplains, development within 50' of any watercourse is prohibited. Otherwise, buildings must be 1.5' above flood level or be floodproofed. Hospitals, nursing homes, jails, and mobile home parks are prohibited in 100-year floodplains.	N/A	For areas with slopes of 15% or greater, a 1-acre minimum lot size is imposed if public sewer is available, 3-acre minimum is imposed if no public sewer is available. Earth-moving and removal of vegetation should be minimized.	N/A	"Existing natural features such as trees, watercourses, drainage channels, rock outcroppings and vistas shall be retained to the greatest extent possible."
Williams Township	Major S.W. (Delaware R. and Lehigh R.): No structures, impervious surfaces, off-street parking, or storage within 75, of top of bank. All other streams: s/a above, 25' from top of bank.	No structure may be built, altered or enlarged in the 100-year floodplain.	Reasonable doubt clause.	If steeply-sloped areas are found within 25' of a proposed building site, the following regulations apply: 15-25% slopes: 3-acre minimum lot size, 30% maximum vegetation disturbance. 25% slopes: 5-acre minimum lot size, 15% maximum vegetation disturbance.	No trees 6" or more in diameter shall be removed unless they are: - In or within 5' of a cartway. - Within 5' of a detention basin. - Within 5' of a driveway. - Within 35' of a building foundation. - Within a utility corridor. - Dead, diseased, or damaged. - Within an area of principal or accessory use.	Canal District: - 20' buffer yard required between Delaware and Lehigh Canal and any new commercial//industrial/loading uses. - 150' building setback from Delaware Canal required. - 125' building setback from Lehigh Canal required. - 75' building setback from Route 611 required. Wall signs and billboards restricted within 800' of Delaware and Lehigh Canals and any "scenic roads" on zoning map.

Two Rivers Area Greenway Plan

MUNICIPALITY	Surface Waters	Floodplains / Alluvial Soils	Wetlands / High Water Tables / Hydric Soils	Steep Slopes	Woodlands	Other
Glendon Borough	N/A	In “flood zones”, permit and site plan required, showing efforts to minimize flood damage. Lowest floor of any new structure must be at least 1.5' above flood level.	N/A	Land <i>partially</i> characterized by steep slopes: no lot size restrictions. Land <i>wholly</i> characterized by steep slopes: 1-acre minimum with public sewer, 2-acre minimum with on-lot septic field. M a x i m u m building coverage for lots with <i>any</i> steep slopes is 15%.	N/A	N/A
Nazareth Borough	N/A	Floodproofing required, minimum Federal requirements must be followed.	N/A	N/A	N/A	N/A
Stockertown Borough	N/A	Within the Floodplain District: - All structures must be completely dry 1.5' above 100-year flood level. - Structures must be designed to prevent pollution during 100-year flood. - No hospitals, nursing homes, or jails are permitted. - No new structures in the <i>floodway</i> area are permitted unless improvements offset flood height changes.	N/A	N/A	N/A	N/A

Two Rivers Area Greenway Plan

MUNICIPALITY	Surface Waters	Floodplains / Alluvial Soils	Wetlands / High Water Tables / Hydric Soils	Steep Slopes	Woodlands	Other
Tatamy Borough	Major S.W. (Bushkill Creek): No building, off-street parking, or storage within 75' of top of bank. Utilities and recreation are exempt from these regulations. Efforts should be made to leave these areas undisturbed while grading.	Floodway: New construction is prohibited. Flood Fringe: No new construction unless the cumulative effect will not raise flood level more than one foot. Any permitted construction in 100-year floodplain must be 50' or more from top of bank of stream, and have lowest floor up to regulatory flood elevation. Any non-residential structures with floors below 1.5' above flood level must be flood-proofed. Non-floodproofed accessory structures under 600 sq. ft. are permitted.	Reasonable doubt clause.	N/A	N/A	N/A
West Easton Borough	N/A	New construction or improvements to existing structures must comply with Federally-prescribed construction standards.	N/A	15-25% slopes: Agricultural and recreation uses are permitted with a maximum of 6% impervious coverage. Structures must be 25' or more from steep slope areas. 25%+ slopes: No new buildings permitted on slopes. Yards and recreation are OK. Buildings must be 50' or more from steep slope areas. Agriculture not permitted.	N/A	N/A

Two Rivers Area Greenway Plan

MUNICIPALITY	Surface Waters	Floodplains / Alluvial Soils	Wetlands / High Water Tables / Hydric Soils	Steep Slopes	Woodlands	Other
Wilson Borough	Rivers, streams, and ponds shall be left as permanent open space. All development proposed within 100' of a bank or a river, stream or pond is subject to Board review.	Any development of flood-prone areas shall be designed in accordance with sound floodplain management principles. Areas not suitable for development may be used for agriculture, forestry, or outdoor recreation, as long as water flow is not obstructed.	National Wetland Inventory is used as legal basis for wetland delineation. All wetlands and 100' buffers thereof must comply with State & Federal wetland regulations. If development is required on wetlands, DEP wetland mitigation measures must be followed.	15%+ slopes: Site plan required, stabilization & reclamation measures must be undertaken. 25%+ slopes: No grading may be done without special approval.	N/A	Aquifers & Recharge Areas: "No use, either directly through effluent, or indirectly through leaching of stored materials, may occur in aquifer outcrops and recharge areas.
WindGap Borough	Watercourses may not be moved.	Structures are permitted in flood zones, as long as flood heights do not rise, lowest floor is at or above flood height, and no hazardous materials are stored.	If wetlands exist in a subdivision or land development, Borough may ask for a letter or copy of permit from the Army Corps of Engineers verifying the existence of wetlands.	15-25% slopes: 1-acre minimum lot size, 30% maximum impervious cover. 25-35% slopes: 3-acre minimum, 20% maximum impervious cover. 35%+ slopes: 5-acre minimum, 10% maximum impervious cover.	N/A	N/A
City of Easton	N/A	Floodway District: Recreation, agriculture, accessory uses, utilities, and existing residences are permitted. Storage is limited. Flood Fringe District: New construction permitted, with lowest floor no lower than base flood elevation, and all utility and sanitary facilities watertight below flood elevation.	N/A	25%+ slopes: Lots with an average slope of 25% or more shall have lot size minimums increased by 50%, and a maximum impervious coverage of 25%. Vegetation removal and grading are not permitted on steep slopes areas unless necessary for the proposed construction.	N/A	N/A

Significant Recreation, Historic, and Cultural Resources

One of the most important functions of a greenway is to provide linkages between sites with recreational, historic, or cultural value. This is especially true in recreation-based greenways, where trails can provide alternative transportation options between locations, or “nodes.” Existing greenway nodes are described in the following section and displayed on Map 11. These include recreation and open space sites, trails, schools, municipal government properties, cemeteries, preserved farms, and historic resources of national, state and local significance.

Recreation and Open Space Sites

An inventory of land holdings in the Two Rivers area reveals 138 parcels or groups of parcels that can be classified as parks, recreation facilities, or open space (Table 13). Of these sites, 101 are publicly-owned, either by a municipality, Northampton County, the Commonwealth of Pennsylvania, or in one case, the federal government. The remaining sites are owned privately, by park associations, conservancies, sportsman clubs, universities and other entities. While some privately-owned recreation sites require membership or school enrollment for use, many others are open to the public, such as nature preserves and various ball fields.



The Boulton House at Jacobsburg Environmental Education Center is a significant example of the rich history to be discovered in the Two Rivers area.

In Table 13, recreation sites are divided into six different classes, modeled after National Recreation and Park Association classifications. These include neighborhood parks (such as tot lots and small community parks), regional parks (such as Jacobsburg Environmental Education Center), special use parks (such as hunting clubs, golf courses, and horse riding areas), linear parks (including the area’s rail trails and canal trails), conservancies (public and private open space holdings and nature preserves), and game lands. Park types are further described in the “type” column. Park ownership is listed as either federal, state, county, municipal or other. “Access” indicates whether the site is open to the public, regardless of whether the site is publicly or privately owned. Site area, in acres, is listed in the last column. Acreage figures are derived from GIS calculation. The Two Rivers area is calculated to contain 7,657 acres, or 12 square miles, of recreation land. This is 11% of total land area of the Two Rivers area.

The accompanying map shows existing recreation sites in the Two Rivers area, classified by ownership, and labeled with numbers

corresponding to listings in Table 13. Some properties, such as undeveloped municipal land holdings, are assigned the same number due to their small size and frequency (e.g. #131, miscellaneous open space owned by Palmer Township). Other sites are currently undeveloped, but may serve as future neighborhood parks and/or athletic facilities (e.g. #127 in Forks Township). The four largest contiguous park sites in the Two Rivers area are State Game Land 168 on Blue Mountain, the Jacobsburg Environmental Education Center, Easton's Hugh Moore Park, and the Mariton Wildlife Sanctuary in Williams Township.

Table 13
RECREATION AND OPEN SPACE SITES

#	Site Name	Municipality	Class	Type	Owner	Access	Acreage
1	Chetwin Terrace Playground	Bethlehem Twp.	Neighborhood	Mini-Park	Municipality	Public	2.64
2	Country Club of Northampton	Bethlehem Twp.	Special Use	Golf Course - Regular	Other	Private	174.34
3	Green Pond Country Club	Bethlehem Twp.	Special Use	Golf Course - Regular	Other	Public	128.33
4	Hope Lock Farm	Bethlehem Twp.	Special Use	Riding Stables	Other	Public	18.35
5	Louise W. Moore Park	Bethlehem Twp.	Regional	Regional Park	County	Public	109.70
6	4-H Center of Northampton	Bushkill Twp.	Special Use	Miscellaneous	Other	Public	4.99
7	Bady's Grove	Bushkill Twp.	Special Use	Picnic Grove	Other	Public	12.11
8	Bushkill Township Recreation Center	Bushkill Twp.	Neighborhood	Community Park	Municipality	Public	78.16
9	Cortez Picnic Grove	Bushkill Twp.	Special Use	Picnic Grove	Other	Public	34.63
10	Graver Arboretum	Bushkill Twp.	Special Use	Educational Area	Other	Public	53.20
11	Jacobsburg Environmental Education Center	Bushkill Twp.	Regional	State Park	State	Public	1130.69
12	Mountainview Drive Inn and Miniature Golf	Bushkill Twp.	Special Use	Miniature Golf or Driving Range	Other	Public	2.04
13	Sport's Spot	Bushkill Twp.	Special Use	Miniature Golf or Driving Range	Municipality	Public	0.79
14	State Game Lands No. 168 (Bushkill Twp.)	Bushkill Twp.	Game Land	State Game Lands	State	Public	1204.07
15	Bushkill Street Park	Easton City	Neighborhood	Mini-Park	Municipality	Public	0.08
16	Butz Park	Easton City	Neighborhood	Open Space	Municipality	Public	1.62
17	Centennial Park	Easton City	Neighborhood	Mini-Park	Municipality	Public	0.31
18	Cheston / Pioneer Park	Easton City	Neighborhood	Mini-Park	Municipality	Public	0.66
19	Circle Park	Easton City	Neighborhood	Mini-Park	Municipality	Public	0.55
20	Condran Playlot	Easton City	Neighborhood	Mini-Park	Municipality	Public	0.14
21	Cooper Street Park	Easton City	Neighborhood	Mini-Park	Municipality	Public	0.64
22	Cottingham Stadium	Easton City	Neighborhood	School Recreation Area	Other	Public	5.43
23	Easton Area Neighborhood Center	Easton City	Neighborhood	Mini-Park	Municipality	Public	2.52

Two Rivers Area Greenway Plan

#	Site Name	Municipality	Class	Type	Owner	Access	Acreage
24	Eddyside Park	Easton City	Neighborhood	Park / Playground	Municipality	Public	3.74
25	Hackett Park	Easton City	Neighborhood	Community Park	Municipality	Public	99.20
26	Heil Park	Easton City	Neighborhood	Park / Playground	Municipality	Public	15.03
27	Hugh Moore Historical Park	Easton City	Linear	National Register Historic Site	Municipality	Public	232.86
28	Jackson Street Park	Easton City	Neighborhood	Mini-Park	Municipality	Public	0.15
29	Lachenour Park	Easton City	Neighborhood	Park / Playground	Municipality	Public	8.55
30	Mauch Chunk Park	Easton City	Neighborhood	Mini-Park	Municipality	Public	1.15
31	Milton Street Park	Easton City	Neighborhood	Mini-Park	Municipality	Public	1.27
32	Municipal Beach	Easton City	Neighborhood	Fishing - Public	Municipality	Public	0.72
33	Nesquehoning Street Park	Easton City	Neighborhood	Mini-Park	Municipality	Public	0.28
34	Nevin Park	Easton City	Neighborhood	Park / Playground	Municipality	Public	5.34
35	Open Space - Wildlands Conservancy	Easton City	Conservancy	Private Conservancy Land	Other	Public	11.32
36	Raspberry - Spruce Streets Park	Easton City	Neighborhood	Mini-Park	Other	Public	0.34
37	Riverside Park	Easton City	Neighborhood	Open Space	Municipality	Public	1.87
38	Scott Park	Easton City	Neighborhood	Open Space	Municipality	Public	3.31
39	Shull Field	Easton City	Neighborhood	Ball Field	Other	Public	1.47
40	St. Joseph Street Park	Easton City	Neighborhood	Mini-Park	Municipality	Public	0.36
41	Stonehouse Park	Easton City	Neighborhood	Open Space	Municipality	Public	0.04
42	Sullivan Park	Easton City	Neighborhood	Park / Playground	Municipality	Public	3.98
43	Baseball Field (Winchester Street)	Forks Twp.	Neighborhood	Ball Field	Municipality	Public	2.73
44	Braden Park	Forks Twp.	Neighborhood	Park / Playground	Municipality	Public	8.27
45	Bushkill Park	Forks Twp.	Special Use	Miscellaneous	Other	Public	13.95
46	Community Park (Forks Township)	Forks Twp.	Neighborhood	Community Park	Municipality	Public	45.42
47	Frost Hollow Overlook	Forks Twp.	Special Use	County Natural Area	County	Public	3.28
48	Future Park Site (South of Airport)	Forks Twp.	Conservancy	Open Space	Municipality	Public	25.13

Two Rivers Area Greenway Plan

#	Site Name	Municipality	Class	Type	Owner	Access	Acreage
49	Gollub Park	Forks Twp.	Neighborhood	Open Space	Municipality	Public	20.22
50	Lafayette University Athletic Fields	Forks Twp.	Special Use	College Recreation Area	Other	Private	58.30
50A	Lafayette University Property	Forks Twp.	Special Use	College Recreation Area	Other	Private	154.67
51	Park (along Bushkill Creek)	Forks Twp.	Neighborhood	Fishing - Public	Municipality	Public	5.07
52	Ramblewood Recreation Swale	Forks Twp.	Neighborhood	Mini-Park	Municipality	Public	2.69
53	Recreation Trail	Forks Twp.	Linear	Recreation Trail	Municipality	Public	21.52
54	Two T's Mini Golf and Driving Range	Forks Twp.	Special Use	Miniature Golf or Driving Range	Other	Public	15.22
55	Poswistilo Pavilion	Glendon Borough	Neighborhood	Mini-Park	Municipality	Public	0.19
56	Pennsylvania International Raceway	Lower Nazareth Twp.	Special Use	Miscellaneous	Other	Public	97.94
57	Appalachian Trail Lands (Moore Twp.)	Moore Twp.	Linear	National Natural Area	Federal	Public	188.32
58	Evergreen Lake Campground	Moore Twp.	Special Use	Miscellaneous	Other	Public	58.18
59	Moore Township Appalachian Park	Moore Twp.	Conservancy	Open Space	Municipality	Public	173.36
60	State Game Lands No. 168 (Moore Twp.)	Moore Twp.	Game Land	State Game Lands	State	Public	1529.65
61	Coplay Park	Nazareth Borough	Neighborhood	Mini-Park	Municipality	Public	1.52
62	Fairview Playlot	Nazareth Borough	Neighborhood	Mini-Park	Municipality	Public	0.34
63	Kraemer Park	Nazareth Borough	Neighborhood	Ball Field	Other	Public	3.76
64	Nazareth Community Park	Nazareth Borough	Neighborhood	Community Park	Municipality	Public	39.11
65	Nazareth Hall Park	Nazareth Borough	Neighborhood	Ball Field	Municipality	Public	2.24
66	Sauerzopf Park	Nazareth Borough	Neighborhood	Mini-Park	Other	Public	1.65
67	Square (Center and Main Streets)	Nazareth Borough	Special Use	Open Space	Municipality	Public	0.50
68	Washington Park	Nazareth Borough	Neighborhood	Mini-Park	Municipality	Public	0.68
69	Briarcliffe Park	Palmer Twp.	Neighborhood	Park / Playground	Municipality	Public	17.58
70	Fairview Park (Palmer Township)	Palmer Twp.	Neighborhood	Park / Playground	Municipality	Public	13.16
71	Keystone Park (Palmer Township)	Palmer Twp.	Neighborhood	Park / Playground	Municipality	Public	10.14
72	LaBarre Park	Palmer Twp.	Neighborhood	Park / Playground	Municipality	Public	5.71

Two Rivers Area Greenway Plan

#	Site Name	Municipality	Class	Type	Owner	Access	Acreage
73	Newburg Park	Palmer Twp.	Neighborhood	Mini-Park	Municipality	Public	0.62
74	Old Orchard Park	Palmer Twp.	Neighborhood	Park / Playground	Municipality	Public	5.29
75	Charles Chrin Community Center	Palmer Twp.	Neighborhood	Community Park	Municipality	Public	33.92
76	Palmer-Bethlehem Township Bikeway	Palmer Twp.	Linear	Recreation Trail	Municipality	Public	109.52
77	Penn Pump Park	Palmer Twp.	Neighborhood	Park / Playground	Municipality	Public	8.33
78	Penn's Grant Open Space	Palmer Twp.	Conservancy	Open Space	Municipality	Public	33.50
79	Riverview Park	Palmer Twp.	Neighborhood	Community Park	Municipality	Public	58.36
80	Stephens Street Park	Palmer Twp.	Neighborhood	Mini-Park	Municipality	Public	0.63
81	Stone's Crossing Swim Club	Palmer Twp.	Neighborhood	Outdoor Swimming Pool	Other	Private	4.82
82	Wolf's Run Open Space	Palmer Twp.	Conservancy	Open Space	Municipality	Public	17.54
83	Belfast-Edelman Sportsmen Association	Plainfield Twp.	Special Use	Sportsmen Club	Other	Private	19.23
84	Belfast-Edelman Youth Club	Plainfield Twp.	Neighborhood	Park / Playground	Other	Private	13.56
85	Bit-By-Bit	Plainfield Twp.	Special Use	Riding Stables	Other	Public	24.18
86	Meixsell Tract	Plainfield Twp.	Conservancy	Open Space	Municipality	Public	29.89
87	Plainfield Riding Club	Plainfield Twp.	Special Use	Riding Stables	Other	Private	4.33
88	Plainfield Township Farmers' Grove	Plainfield Twp.	Special Use	Miscellaneous	Municipality	Public	37.34
89	Plainfield Township Recreation Trail	Plainfield Twp.	Linear	Recreation Trail	Municipality	Public	59.00
90	Recreation Area (at Township Building)	Plainfield Twp.	Neighborhood	Mini-Park	Municipality	Public	1.67
91	Sawmill Golf Course	Plainfield Twp.	Special Use	Golf Course - Regular	Other	Public	74.39
92	St. Peter's Church Playground and Ballfield	Plainfield Twp.	Neighborhood	Mini-Park	Other	Private	4.34
93	State Game Lands No. 168 (Plainfield Twp.)	Plainfield Twp.	Game Land	State Game Lands	State	Public	217.82
94	The Brocknell Farm	Plainfield Twp.	Special Use	Riding Stables	Other	Public	22.12
95	Newhart Park	Stockertown Borough	Neighborhood	Park / Playground	Municipality	Public	2.83
96	Open Space (along Bushkill Creek)	Stockertown Borough	Conservancy	Open Space	Municipality	Public	12.10
97	Schoolground (Stockertown Borough)	Stockertown Borough	Neighborhood	Mini-Park	Municipality	Public	1.77

Two Rivers Area Greenway Plan

#	Site Name	Municipality	Class	Type	Owner	Access	Acreage
98	Stockertown Rod and Gun Club	Stockertown Borough	Special Use	Sportsmen Club	Other	Private	24.12
99	Mark A. Metz Memorial Park	Tatamy Borough	Neighborhood	Mini-Park	Municipality	Public	1.12
100	Ballfield (Upper Nazareth Township)	Upper Nazareth Twp.	Neighborhood	Ball Field	Other	Public	5.68
101	Liebert School Play Area	Upper Nazareth Twp.	Neighborhood	Mini-Park	Municipality	Public	3.19
102	Mini Park	Upper Nazareth Twp.	Neighborhood	Mini-Park	Municipality	Public	0.94
103	Upper Nazareth Athletic Association	Upper Nazareth Twp.	Neighborhood	Park / Playground	Municipality	Public	5.59
104	Borough Park	West Easton Borough	Neighborhood	Mini-Park	Municipality	Public	1.76
105	Park (Center and 7 th Streets)	West Easton Borough	Neighborhood	Open Space	Municipality	Public	0.71
106	Delaware Canal State Park	Williams Twp.	Linear	State Park	State	Public	75.37
107	Fry's Run Park	Williams Twp.	Neighborhood	County Natural Area	County	Public	4.82
108	Mariton Wildlife Sanctuary	Williams Twp.	Conservancy	Private Conservancy Land	Other	Public	197.69
109	Williams Township Recreational Facility	Williams Twp.	Neighborhood	Community Park	Municipality	Public	39.99
110	Raubsville Park	Williams Twp.	Neighborhood	Park / Playground	Municipality	Public	3.66
111	Williams Township Park	Williams Twp.	Neighborhood	Community Park	Municipality	Public	26.83
112	Williams Township Sportsman's Association	Williams Twp.	Special Use	Sportsmen Club	Other	Private	14.77
113	Wy-Hit-Tuk Park	Williams Twp.	Neighborhood	Community Park	County	Public	22.24
114	Ballfield (Elementis Pigments, Incorporate)	Wilson Borough	Neighborhood	Ball Field	Other	Public	10.20
115	James H. Jeffery Athletic Field	Wilson Borough	Neighborhood	Ball Field	Municipality	Public	1.25
116	Liberty Playground	Wilson Borough	Neighborhood	Mini-Park	Municipality	Public	0.40
117	Meuser Park	Wilson Borough	Neighborhood	Park / Playground	Municipality	Public	13.02
118	Totlot (23 rd Street)	Wilson Borough	Neighborhood	Mini-Park	Municipality	Public	0.06
119	Wilson Midget Football	Wilson Borough	Neighborhood	Multi-purpose Field	Municipality	Public	1.13
120	Puttorama	Wind Gap Borough	Special Use	Miniature Golf or Driving Range	Other	Public	0.78
121	Wind Gap Park	Wind Gap Borough	Neighborhood	Community Park	Municipality	Public	34.68
122	Future County Park at the Gall Farm	Plainfield Township	Special Use	Regional Park	County	Public	181.43

Two Rivers Area Greenway Plan

#	Site Name	Municipality	Class	Type	Owner	Access	Acreage
123	Forks Township Park Land	Forks Twp.	Neighborhood	Ball Field	Municipality	Public	19.87
124	Frost Hollow Open Space	Forks Twp.	Neighborhood	Open Space	Municipality	Public	11.14
125	Subdivision Exercise Path	Forks Twp.	Linear	Recreation Trail	Other	Private	3.53
126	Wind Gap Borough Park Land	Wind Gap Borough	Neighborhood	Open Space	Municipality	Public	2.29
127	Lafayette Park	Forks Twp.	Special use	Ball Field	Municipality	Public	52.37
128	Miscellaneous Open Space (Forks Twp.)	Forks Twp.	Neighborhood	Open Space	Municipality	Public	11.00
129	Palmer-Tatamy Trail	Palmer Twp.	Linear	Recreation Trail	Municipality	Public	36.39
130	Mill Race Park	Palmer Twp.	Neighborhood	Community Park	Municipality	Public	28.05
131	Miscellaneous Open Space (Palmer Twp.)	Palmer Twp.	Neighborhood	Open Space	Municipality	Public	22.21
132	Palmer Municipal Complex Land	Palmer Twp.	Neighborhood	Open Space	Municipality	Public	15.04
133	Future Rail-Trail Land	West Easton Borough	Linear	Recreation Trail	Municipality	Public	34.88
134	Bushkill Township Property	Bushkill Twp.	Special Use	Open Space	Municipality	Public	3.57
135	Williams Township Property	Williams Twp.	Special Use	Open Space	Municipality	Public	5.61
136	Miscellaneous Open Space (U. Naz. Twp.)	Upper Nazareth Twp.	Neighborhood	Open Space	Municipality	Public	4.52
137	City of Easton Property	Easton City	Special Use	Open Space	Municipality	Mix	39.64
	TOTAL						7636.11

Source: Lehigh Valley Planning Commission, 2003

Trails

Existing trails in the Two Rivers area vary in size and type, from 8-foot paved bike paths through residential developments, to narrow footpaths on ridgetops. Trails are often the central feature of recreation greenways, and the Two Rivers area would undoubtedly contain a number of these types of greenways in addition to conservation corridors. Existing trails are shown as brown dashed lines on Map 11.

Along the crest of Blue Mountain is the Appalachian National Scenic Trail, a 2,200 mile footpath stretching from Georgia to Maine. The trail can be accessed at Wind Gap, and by a State Game Land trail in Bushkill Township. The Appalachian Trail and Blue Mountain together are part of an already-established greenway extending nearly 200 miles through Southeastern Pennsylvania. Additional connections to the Appalachian Trail are desired, including an extension of the Plainfield Trail, and a connection to Jacobsburg Environmental Education Center in Bushkill Township.

In Plainfield Township, the Plainfield Township Trail occupies an abandoned railroad right-of-way from near Wind Gap to Stockertown. The surrounding tree canopy and nearby Little Bushkill Creek make this trail a strong candidate for further greenway protection. In nearby Jacobsburg Environmental Education Center, numerous trails through mature woodlands offer loop options for hikers and mountain bikers alike. A possible connection to the Plainfield Township Trail would create a multi-township network of trails.

Forks Township features a network of paved exercise paths connecting various residential developments and parks. Forks also contains a one-mile gravel rail trail in the northeastern part of the Township, which is slated for extension. Palmer Township, a local pioneer of rail trails, contains the Palmer Bikeway, a popular system of paved trails. The Township recently acquired additional railroads rights-of-way in and outside the township, transferring those segments outside Township borders to the containing municipalities. The Township plans to improve these trails, resulting in a continuous trail along Bushkill Creek from Tatamy Borough to the City of Easton, connecting to the Palmer-Bethlehem Bikeway, and extending eastward again to the Lehigh River in Easton. The City of Easton plans to improve their section of the Bushkill Creek into a pair of trails, one paved, and one natural. To the north, Tatamy Borough will extend Palmer's trail along Bushkill Creek. There is hope to connect this trail to the southern terminus of the Plainfield Township Trail.



A portion of the Palmer Bikeway explores the riparian woodlands of Schoeneck Creek.

The Delaware and Lehigh Towpath Trail follows the historic canal of the same name from White Haven in Luzerne County to Bristol in Bucks County, near Philadelphia. The Two Rivers area

contains an important portion of this gravel and cinder trail, heading east along the Lehigh River to Easton, then turning south along the Delaware River.

Several inactive or abandoned railroads still exist in the Two Rivers area, presenting opportunities for trail construction. The aforementioned railroad bed along the Bushkill Creek from Easton to Stockertown is a key link that could eventually connect the Delaware and Lehigh Towpath to the Appalachian Trail. In Forks Township, a former rail right-of-way may eventually connect the gravel rail trail near Route 611 to existing exercise trails in the southern part of the Township. Along the base of Blue Mountain, two parallel railroad beds traverse private property in an east-west fashion. Public access to one or both of these would provide further access to Blue Mountain, and create loop options.

Other possible trail schemes exist in the Two Rivers area, along sewer easements, transmission line easements, through new developments, and elsewhere. The desired end result is a system of trails of varying surfaces and uses, all interconnected, creating a web of recreational and scenic opportunities throughout the entire Two Rivers area and beyond.

Schools

Table 14 lists public and private schools, shown in yellow on Map 11. Schools are important greenway nodes as they typically contain expanses of recreation land, and occasionally include small patches of undeveloped land in a natural or semi-natural state. In addition, greenways with trails provide an alternate means of traveling to and from school, for both students and employees. Including schools in greenways also promotes quality of life, providing serene settings for forming minds.

Lafayette College occupies land that is very significant to a Bushkill Creek Greenway. The college is currently working with the City of Easton and private consultants to develop an improvement plan that will provide recreation and economic development while maintaining or improving the natural environment. Other school properties, including sites in Upper Nazareth Township and Wilson Borough, are located near river or stream corridors and could be considered for greenway designation and protection.

**Table 14
PUBLIC AND PRIVATE SCHOOLS**

#	School	Acreage	Enrollment (2000)
200	Avona Elementary School	1.3	343
201	Bushkill Elementary School	19.0	624
202	Career Institute of Technology	31.0	569
203	Cheston Elementary School	8.6	475
204	Easton Area High School	45.4	2,255
205	Easton Area Middle School	6.5	1,939
206	Easton Catholic High School and St. Joseph Elementary School	0.8	207
207	Easton Children's Home	18.1	16
208	Edward Tracy Elementary School	22.1	590
209	Forks Elementary School	16.0	452
210	Holy Family School	4.6	399
211	Lafayette College	81.6	2,179
212	March Elementary School	1.0	267
213	Moravian Academy	53.5	278
214	Nazareth Area Junior and Senior High Schools	41.9	1,175
215	Nazareth Area Middle School	42.1	1,115
216	Palmer Elementary School	20.3	707
217	Paxinosa Elementary School and Shawnee Intermediate School	58.1	1,845
218	Philip F. Lauer Middle School	35.4	734
219	Plainfield Elementary School	17.7	N/A
220	Shafer Elementary School	8.5	735
221	Williams Township Elementary School	17.3	323
222	Wilson Area High School	9.0	703
223	Wilson Elementary School	5.2	346
224	Wind Gap Middle School	22.5	636
	TOTAL	587.5	18,912

Source: Lehigh Valley Planning Commission, 2003

Major Government Properties

The municipal buildings of 14 of the 17 constituent municipalities are found within the Two Rivers area boundary, and are shown on Map 11. Like schools, many municipal buildings have adjacent or included recreation facilities, such as the Plainfield Township Municipal Complex. Other municipally owned parcels that cannot be classified as parks are shown on the map. These include municipal utility land, fire company land, and equipment garages. Many of these facilities are situated on land with high natural resource value, such as the Bushkill Township Garage on Bushkill

Creek (#315), and the Plainfield Township Volunteer Fire Company land along the west fork of the Little Bushkill Creek (#322). It should be noted that not all public land holdings are appropriate for human access. The City of Easton, for example, owns properties that house water, sewer and garage facilities (#'s 316-320), but also have significant natural resource value. All of the above properties are listed in Table 15 below.

Table 15
MAJOR GOVERNMENT PROPERTIES

#	Property	Acreage
300	Bushkill Township Building	1.13
301	Easton City Hall	0.21
302	Forks Township Building and Police Headquarters	2.35
303	Glendon Borough Hall	0.50
304	Nazareth Borough Hall	0.13
305	Northampton County Government Center	10.03
306	Palmer Township Municipal Centre	27.20
307	Plainfield Township Building	11.01
308	Stockertown Borough Hall	0.68
309	Tatamy Borough Hall	0.77
310	Upper Nazareth Township Building	3.19
311	West Easton Borough Hall	0.71
312	Williams Township Building	26.83
313	Wilson Borough Hall	1.16
314	Wind Gap Borough Hall	0.30
315	Bushkill Township Garage	3.60
316	Easton City Water Reservoirs	12.52
317	Easton City Garage	8.35
318	Easton City Water Treatment Plant	8.93
319	Easton City Water Standpipes	1.10
320	Easton City Sewage Treatment Plant	11.99
321	Nazareth Borough Municipal Authority	24.49
322	Plainfield Volunteer Fire Company Land	26.35
	TOTAL	183.51

Source: Lehigh Valley Planning Commission, 2003

Cemeteries

Cemeteries, by nature, are green gardens of peace. While cemeteries are not intended for frequent public visitation, they serve as patches of greenspace, exempt from development. In some cases, cemeteries contain unused land that is not suitable for burial grounds. In Easton Cemetery (#408), portions found within the Bushkill Creek floodplain would fit this description, and could instead be considered for greenway designation and trail routing. In other areas where cemetery access is not permitted, these sanctuaries serve as green backdrops that preserve local viewsheds. Cemeteries

shown on Map 11 were derived from tax map information, and are listed in Table 16. This inventory excludes numerous small cemeteries associated with churches.

**Table 16
CEMETERIES**

#	Property	Acreage
400	Arndt's Cemetery Company	4.17
401	Black Rock Grove Moravian Congregation	7.48
402	Bushkill Interdenominational Church	0.86
403	Bushkill United Methodist Church	1.04
404	Congregation of United Brethren Schoeneck Cemetery	2.46
405	Congregation of Abraham Cemetery	0.35
406	Congregational Children of Israel Cemetery	0.58
407	Dougherty, Cardinal Dennis, Cemetery	10.86
408	Easton Cemetery	65.47
409	Easton Heights Cemetery	24.19
410	Grace Evangelical Lutheran Church Cemetery	5.86
411	Great Shepherd Christian Fellowship Cemetery	0.70
412	Greenwood Cemetery	14.87
413	Holy Cross Evangelical Lutheran Church Cemetery	2.20
414	Holy Family Catholic Church Cemetery	10.11
415	Northampton Memorial Shrine	52.53
416	Pen Argyl Evergreen Cemetery	5.48
417	Plainfield Church Cemetery	9.81
418	Raubsville Cemetery	4.18
419	South Easton Cemetery	12.01
420	St. Bernards Cemetery	1.96
421	St. John Union Cemetery	5.07
422	St. Johns Evangelical Lutheran Church Cemetery	2.91
423	St. Joseph Cemetery	6.01
424	St. Michaels Cemetery	2.55
425	St. Peters Lutheran and Reformed Cemetery	5.28
426	Trinity Evangelical Lutheran Church Cemetery	12.45
427	Union Church and Cemetery	13.83
428	Forks Church Cemetery	36.18
	TOTAL	321.45

Source: Lehigh Valley Planning Commission, 2003

Preserved Farms

Under the Northampton County Agricultural Preservation Program, farmers may relinquish their right to sell their land to a developer or to subdivide the land themselves, in exchange for a monetary sum. The farmer is then legally bound to keep the farm in an agricultural or open space use. While farms are not exactly natural landscapes in the true sense, they do functionally preserve open space and provide a serene landscape that echoes the farming heritage that once predominated in this area of Pennsylvania. In addition, many farmland tracts contain important natural resources along streams, and in woodlands. Farmers can be encouraged or required to not plow land or raise livestock within a certain distance of streams, or above a certain percentage slope. Many already practice as such, leaving wooded corridors along major streams, unmown grass inside swales, and woodland along steep slopes. These practices are key in promoting stream quality and wildlife habitat.

The Two Rivers area contains several significant clusters of preserved farms, some of which could be integrated into a greenway network. The Fulmer Farm in Plainfield Township, the Wright Farm in Moore Township, and the Wolfe Farm in Williams Township all contain significant stretches of stream corridors. Preserved farms are shown on the accompanying map and listed in Table 17.

Table 17
PRESERVED FARMS

#	Property	Acreage
500	Clewell Farm	80.45
501	Fulmer Farm	209.85
502	Heimer Farm	77.12
503	Kahler Farm	142.19
504	Meixell Farm	35.76
505	Mikol Farm	86.80
506	Schlegel (Daniel & Diane) Farm	93.91
507	Schlegel (Paul) Farm	76.33
508	Setzer (Randy & Kimberly) Farm	69.94
509	Setzer (Willard) Farm	303.06
510	Wolfe Farm	92.41
511	Wright Farm	261.46
	TOTAL	1803.33

Source: Northampton County Farmland Preservation Board, 2004

Historic Resources

The Two Rivers area contains a seemingly unlimited collection of structures dating from the past three centuries. Some of these houses, buildings, mills, bridges, and other structures remain, while others may be in ruin or completely gone. Nevertheless, these structures and sites serve as important,

fascinating reminders of how the area appeared and functioned during those times, and how we have arrived at the present condition. While some sites are protected at the government level, many others are recognized only as items in historic inventories. Historic resources are described below and shown on Map 12.

National Register of Historic Places

The National Register of Historic Places (NRHP) is an inventory of buildings, sites, structures, objects and districts that are significant to American history, architecture, archeology, engineering, and culture. The NRHP coordinates public and private efforts to identify and protect these sites. The NRHP was authorized by the National Historic Preservation Act of 1966, and is administered by the National Park Service. Properties are either “listed,” that is, officially included in the NRHP, or are “eligible,” in which the application process is underway. In the Two Rivers area, most NRHP sites are buildings. Some, however, are linear, such as the Delaware and Lehigh Canals, and the Lehigh and New England Railroad. Yet other sites have areal extent, such as the Easton Cemetery, several farms, and the historic districts. NRHP sites are listed in Tables 18 through 20, with numbers corresponding to features on Map 12.

**Table 18
NATIONAL REGISTER LISTED HISTORIC SITES**

Number	Site	Municipality
1	Bridge in Williams Township	Williams Township
2	Chain Bridge (ruins)	Palmer / Williams Townships
3	Coffeetown Grist Mill	Williams Township
4	Delaware Division of the Pennsylvania Canal	Williams Township
5	Easton Cemetery	Easton City
6	Easton House	Easton City
7	Heller, William Jacob, House	Easton City
8	Lehigh Navigation Canal	Easton, Glendon, Palmer
9	Mixsell, Jacob, House	Easton City
10	Nazareth Hall Tract	Nazareth Borough
11	Nicholas, Jacob, House	Easton City
12	Parsons-Taylor House	Easton City
13	Seipsville Hotel	Palmer Township
14	Simon, Herman, House	Easton City
15	State Theater	Easton City
16	Whitefield House & Gray Cottage	Nazareth Borough
17	Zeta Psi Fraternity House	Easton City

Source: Pennsylvania Historic and Museum Commission, 2003

Table 19
NATIONAL REGISTER LISTED HISTORIC DISTRICTS

District	Municipality
College Hill Neighborhood	Easton City
Easton	Easton City
Jacobsburg	Bushkill Township
Nazareth	Nazareth Borough

Source: Pennsylvania Historic and Museum Commission, 2003

Table 20
NATIONAL REGISTER ELIGIBLE SITES

Number	Site	Municipality
18	Arndt, Abraham, Farmstead	Williams Township
19	Broad Street School	Nazareth Borough
20	Children's Home for Friendless Children	Wilson Borough
21	Easton U.S. Post Office	Easton City
22	Ebert/Knecht Farm Store	Moore Township
23	Foothills Apartments	Easton City
24	Gernet Farm	Palmer Township
25	Heinley / Culbertson Farmstead	Palmer Township
26	Lehigh & New England Railroad	Moore Township
27	Lerch Farm	Palmer Township
28	McCullum & Post Silk Mill	Nazareth Borough
29	Moritz Grist Mill	Williams Township
30	Nevin, John D., House	Palmer Township
31	Northampton Street Bridge	Easton City / Phillipsburg, NJ
32	Opp, M., Bridge	Williams Township
33	Rinek Cordage Company	Easton City
34	Rodenback, G. Miller, Farmstead	Williams Township
35	Sandt, Jonas, Farm	Forks Township
36	Shull School	Easton City
37	Stout, Isaac, House	Williams Township
38	Unangst / Wirth Farm	Williams Township
39	Waegener / Newlin's Mill Historic District	Forks / Palmer Townships
40	Whitfield School	Nazareth Borough

Source: Pennsylvania Historic and Museum Commission, 2003

Other Sites

A plentitude of historic sites exist within the Two Rivers area that are not listed in the NRHP. Those included here were gathered from Joan Steiner's essay, "The Bushkill Creek," as well as from municipal documents and several other sources. This list focuses on sites along the Bushkill Creek, though other sites have been included as well. Many of these do not exist as structures at the present

time, but their location alone serves as a historic resource. This is not an exhaustive list of historic sites, as hundreds of other sites of historic significance may exist within the Two Rivers area, including cemeteries, churches, homes, Lenape activity sites, and other locations. As in the NRHP site list, numbers here correspond to the provided map.

**Table 21
SELECTED ADDITIONAL HISTORIC SITES**

Number	Site	Municipality
41	Aluta Mill	Bushkill Township
42	Boulton	Bushkill Township
43	Bridge at Bushkill Park	Forks Township
44	Bridge at Michael Stocker's	Forks / Palmer Townships
45	Bridge at Stockertown	Stockertown Borough
46	Bridge at Walter's Upper Mill	Forks / Palmer Townships
47	Bushkill Park	Forks Township
48	Butz's Flour, Grist and Planing Mills	Easton City
49	C.T. Mattes & Brothers Quarry	Easton City
50	Catherine Furnace	Bushkill Township
51	Cemetery Bridge	Easton City
52	D.W. Howell Smoke & Hide House	Easton City
53	Dietz's Blockhouse	Plainfield Township
54	Easton Icehouse	Easton City
55	Empire Agricultural Works	Tatamy Borough
56	Friendenthal Mill	Stockertown Borough
57	Groetzingers Mount Jefferson Mill	Easton City
58	Henry Gun Factory	Bushkill Township
59	Hartser Flour Mill & Distillery	Easton City
60	Haynes or Heyer Mill	Bushkill Township
61	Henry's Forge	Bushkill Township
62	Hogtown Distillery	Easton City
63	Inclined Railroad	Easton City
64	Lafona Mill	Plainfield Township
65	Lehicton/Williams Flour Mills (now Minerals Technology)	Easton City
66	Mann and Allsouse Lafayette Mills	Easton City
67	Messinger's Mill	Tatamy Borough
68	Nennig's Tannery	Easton City
69	Peter Kichline Grist & Saw Mills	Easton City
70	Richard & Walters Soapstone Manufacturing	Easton City
71	Rock Mill	Forks Township
72	Rose Inn	Bushkill Township
73	Schweyer Quarry	Easton City

Two Rivers Area Greenway Plan

Number	Site	Municipality
74	Simon Silk Mill	Easton City
75	Slaughterhouses	Easton City
76	Sours Mill	Bushkill Township
77	Thirteenth Street Bridge	Easton City
78	Union Mill / Binney & Smith Plant	Palmer Township
79	Upper Stockertown Mill	Stockertown Borough
80	Wagener Oil Mill	Easton City
81	Walter's Lower Mill	Forks Township
82	Walter's Upper Mill	Palmer Township
83	Woodring's Mill	Stockertown Borough
84	Zuck's Mill (now Blue Easel)	Palmer Township
85	Sullivan Trail (multiple locations)	Multiple municipalities

Source: *The Bushkill Creek*, Joan Steiner



These mechanisms opened and closed this lock chamber on the Delaware Canal near Raubsville.

DEMAND FOR GREENWAYS

Community Character

The Two Rivers Area is rich in history and exhibits a variety of human landscapes, as discussed in the *Existing Conditions* section of this report. It is situated in a growth area within the Lehigh Valley, where significant future growth is expected. The Two Rivers Area displays a wide variety of land uses, due in part to its north-south cross-section of the diverse County of Northampton. Potential exists to establish a greenway network that would weave through nearly every type of land use, augmenting and linking existing recreation and open space uses, and providing contrast and relief to the more built-up, intensive land uses.

As discussed in the *Land Use* section of this report, agricultural and vacant land comprise the largest percentage of total land in the Two Rivers area, over 60%. Non-agricultural vacant land is found largely in the northern fringes of the Two Rivers area, and in Williams Township. Residential land comprises approximately 25% of all land in the Two Rivers area. Outward from the Easton-Wilson urban complex lie suburban residential neighborhoods that are progressively more recent as one drives away from Easton. Shopping centers tend to be near major highways, as demonstrated by the Palmer Park Mall on Route 248 near Route 22, the Northampton Crossings shopping center at Routes 248 and 33, and Wind Gap's K-Mart Plaza at Routes 512 and 33. Major commercial/business corridors in the Two Rivers area include William Penn Highway in Palmer Township, Route 248 between Routes 22 and 33, 25th Street and Northampton Street in Wilson, and Sullivan Trail in Forks Township. Traditional commercial areas can still be found in the Two Rivers Area, especially in Easton. The boroughs and villages also feature commercial clusters, including Broad Street in Nazareth, Main Street in Stockertown, Broadway in Wind Gap, and Route 611 in Raubsville. Industry has always played an important role in the economic development of the Two Rivers Area. Industrial land uses range from heavy operations such as quarrying and chemical manufacturing, to lighter uses including machine shops and warehousing facilities.

Demographic Patterns and Trends

As discussed in the *Demographics* section of this report, the total population of the Two Rivers municipalities was 127,793 in the year 2000. The Lehigh Valley Planning Commission has projected a 37.5% increase in population for the 17 Two Rivers-area municipalities from year 2000 to Year 2030. This represents an increase of approximately 48,000 additional people. Many of these people will participate in greenway-related recreation activities (see participation rates in the *Indicators of Future Demand* section).

The greatest forecasted increases are to be in Forks and Upper Nazareth Townships, which both have a significant amount of vacant, residentially-zoned land. While the population in most boroughs is expected to remain constant, Tatamy is projected to see a 73% increase in population by 2030. Also by this time, Bethlehem Township is to exceed Easton as the most populous municipality in the Two Rivers area.

The significant new population growth in the area suggests there will be an increased demand for greenways in the future. Also, the demand for greenways will come from other areas in the Lehigh Valley and beyond, which are expected to have population increases.

Profile of Potential Users

Greenway users are a very diverse group. Based on the results of the interviews and questionnaires from this study, the most common greenway users include: bikers, hikers, anglers, leisure walkers, community residents, and nature watchers. Other users may include: children going to school, animals, runners, hunters, horseback riders, skateboarders, motorized vehicles, depending on the exact nature of the greenway.

Future greenway use will continue to be diverse with potential increases anticipated in certain users such as horseback riders, tourists, fitness walkers, and local and regional residents. This diversity points to the demand for multi-use greenway options.

Indicators of Future Demand

There are several indicators which suggest the demand for greenways in the study area will increase in the future. Significant population growth, referendums, the increased use and growing appreciation of greenways documented in PA DCNR's draft *Blueprint for Action*, survey data from the *Pennsylvania Outdoor Recreation Plan 2004-2008*, and the responses from the interviews conducted as part of this study, all indicate that the demand for greenways will undoubtedly increase in the future.

Local Referendums

According to PA DCNR's draft *Blueprint for Action* (January 2004), Pennsylvanians are showing an increased willingness to support land conservation measures. Of the 14 land conservation ballot questions introduced in 2003, 10 passed. Locally, Northampton County voters (in 2002) overwhelmingly supported the issuance of bonds for land conservation measures. Bond funds issued in 2003 will provide:

- \$14 million to preserve environmentally sensitive lands,
- \$11 million to acquire and develop public parks, and
- \$12 million to preserve agriculture.

Some Pennsylvania municipalities have used referendums to ask voters if they would support a 0.25 percent increase in the earned income tax to help pay for open space and farmland preservation. Williams Township is now considering this approach for land conservation.

State Plan Information/Data

The following excerpt taken from PA DCNR’s *Pennsylvania Outdoor Recreation Plan 2004-2008*, documents the continued demand for greenways and greenway-related activities:

“In the research for the current update of Pennsylvania’s Recreation Plan, new survey data continues to confirm the public’s interest in greenways. Specifically, survey data revealed that trail-oriented greenways including bicycle paths (63 percent of respondents), hiking and backpacking trails (57 percent of respondents) and walking paths (53 percent of respondents) were most often identified as needing to be improved or increased in the Commonwealth. There was also strong agreement that greenways should link neighborhoods, parks and communities throughout the state. Survey results also indicated that there is a growing recognition by our citizens (66 percent of respondents) that greenways can have a positive affect on property values.”

In regard to facility needs to be addressed in the plan, 56 percent of the survey respondents indicated that *greenways* should be improved or increased in the Commonwealth.

Other survey data in the plan show that significant percentages of people in PA DCNR’s Planning Region 2 (Northampton, Lehigh and Berks counties) participate in greenway-related recreation activities:

<u>Activity</u>	<u>Participation Rate</u>
• Walking for pleasure or fitness	65.2 %
• Nature walks	36.4 %
• Hiking	31.8 %
• Bicycling	24.4 %
• Horseback riding	6.1 %

This trend of using greenways for health and fitness related activities as well as for environmental education and appreciation will also result in increased future use of these facilities.

Questionnaire Responses

From the survey questionnaires (25) conducted as part of this study, answers to a question about the demand for greenways over the next 10 years yielded the following:

- 44% of the respondents said demand will increase at a “moderate rate.”
- 32% of the respondents said demand will increase at a “high rate.”
- 20% of the respondents said demand will increase at a “slow rate.”
- 4% of the respondents did not know.

The following specific reasons were given for this anticipated increase in demand:

- “When the existing infrastructure can’t handle transportation more people will use trails.”

- “As the population increases, the need for recreation space, including greenways, will also increase.”
- “Costs of recreation and vacations are rising. Therefore, people will rely more on close-to-home recreation activities with low or no costs.”
- “Increased population will put additional demands on “static” open space recreation opportunities.”
- “The demand will increase in my area due to the additional residential development that will occur.”
- “More city people from New York and New Jersey will be moving into the area.”
- “Decrease in de facto open space resulting from increased land development and a larger population producing proportionately greater numbers of potential users.”
- “Past history and trends.”
- “As more development takes place and with more people, the demand for greenways will increase.”
- “People will realize open space is disappearing.”
- “A lot of future construction will take place and more people will want access to greenways.”
- “Population increase. Plus, with a general decline in open space, more people will be channeled into existing greenways.”
- “Lack of monies, and people want their own piece of property at the expense of the public good.”
- “Population growth. People need an escape.”
- “As a result of future development.”
- “Growth in population and people looking for biking and horseback riding opportunities.”
- “1) Population growth in Northampton County; 2) tourism as major emphasis of economic development; 3) accelerating demand for linear-walk, run, bike-opportunities.”
- “People need a place to relax and get away-outdoors is more soothing than a gym. Health/exercise craze will continue. Open space will be needed to buffer urbanization and is better for environment.”
- “The demand for greenways will increase because people overwhelmingly want natural resources protected and places that will bring them in touch with nature.”
- “In Moore Township, the demand for greenways will increase slowly because the township is not developing as rapidly as neighboring areas. The demand will come from the headwaters and habitat preservation aspect. Recent studies show deep woodlands are vital habitat. As stream quality and wildlife habitat continue to be threatened, the demand for greenways to protect these areas will increase.”
- “As the Lehigh Valley urbanizes and attracts more residents, it should follow that more opportunities for recreation will also increase. A more demanding lifestyle requires the need for an outlet.”
- “Demand will increase at a slow rate because in the broad scheme of things, people will consider greenways a low priority. If this plan is implemented, it will provide a framework that might increase the demand for greenways. Special interest groups will probably demand greenways more than the general public. As long as people want to go out into nature, there will be a demand for greenways.”

- “Demand for greenways will increase at a high rate due to the number of people moving into the area. This is especially true for people who own horses and will be looking for places where they can ride.”
- “Demand for greenways will increase at a high rate because of the development that is occurring. Residents want to have an enhanced quality of life and greenways are one way they achieve this. As greenways become developed in the borough, the demand for greenway use within the borough, by its residents, will increase.”

Economic Benefits of Greenways

As an area becomes more developed, losing land to housing developments, shopping centers and office parks, the value of open space and greenways increases. This increase can occur in terms of environmental, social and economic importance. Much of the content of this document has identified the environmental and social benefits of greenways. While all of these benefits are important, it is often the economic impacts of projects that determine their predominate value. The economic impacts are as diverse as the of trails and greenways themselves. This can make the forecasting of the economic benefits of a particular project difficult. Overall, trends have indicated positive impacts on local economies, both directly and indirectly.

One of the overriding economic benefits of a greenway is the effect it has on quality of life appeal. A key component to attracting and retaining people and businesses to an area, quality of life can be defined as one’s personal satisfaction (or dissatisfaction) with elements one deems important in life. This component has been ranked third in reasons to locate a business in an area and because aspects of quality of life may include the convenient access to natural settings, recreation and cultural opportunities and open space, greenways can contribute in a positive manner to an area’s image. A 1998 study in California indicated preserved open space and high density development were important quality of life elements.¹

A number of studies have been conducted that bring to light the positive effect greenways and trails have on property values. These studies indicate home buyers are willing to pay higher prices for areas where the quality of life is greater because of the presence of greenways and trails. In April of 2000, the National Association of Home Builders (NAHB) found in a survey that trails with opportunities for walking or jogging ranked 2nd highest out of 18 community amenities desired by home buyers. The NAHB also reports that trails consistently rank in the top 5 of home buyer desired amenities. Three quarters of consumers ranked sufficient natural open space 2nd on a list of desired amenities, followed by walking and biking paths. Consumers also indicated a willingness to pay extra for natural areas that existed prior to the development.²

¹Lerner, Steve and William Poole. *The Economic Benefits of Parks and Open Space*. The Trust for Public Land.

²*Benefits of Trails and Greenways*. <http://www.americantrails.org/resources/benefits/10reasons.html>

As a result of this demand, property values near greenways and trails have increased and consumers are showing a willingness to pay extra for these amenities. One of the more famous examples of this is Central Park in New York City. An example here in Pennsylvania can be found in Confluence, where the creation of the Greater Allegheny Passage has helped to spur an increase in property values as properties adjacent to the trail are purchased as primary or secondary homes by people attracted to the area as a result of the trail.³ The growth in popularity of greenways and trails as amenities for consumers may provoke developers to start using them as marketing tools. In a new development in North



A recreation greenway adjacent to a new housing development in Forks Township.

Carolina, the developer added \$5,000 to the selling price of properties adjacent to a greenway and they were still the first properties to sell.⁴ Other surveys have shown similar trends. A project in Colorado that preserved two thirds of the site as open space and incorporated a network of multiple use and primitive trails linking site amenities to the regional trail system commanded 7-15% lot premiums.⁵ In some locations, clustered homes appreciate faster, indicating a desire for homes adjacent to or near permanently protected lands such as greenways. Property values have also been shown to decrease the further they are from the open space, greenway or trail. Greenbelt zoning in Oregon resulted in urban land prices being \$1,200 higher when adjacent to the greenbelt than 1000' away and in Minnesota, 61% of the landowners along the Luce Line Rail-Trail surveyed reported their property value increased as a result of the trail. This increase in property values results in an increase in real estate tax revenue, although there is usually a lag while the taxes catch up.⁶

Greenway and trail creation has also been linked to economic revitalization. In Pittsburgh, the development of a system of trails and greenways in the city has been attributed with helping the city to recover from its previous economic decline. The greenways and trails connect millions of dollars of economic development in the forms of new stadiums, housing, office space and riverfront parks.⁷ The institution of the Mispillion River Greenway brought a similar effect to Milford, Delaware,

³ *Transportation: Paving the Way for Walking and Biking*. <http://downloads.transportation.org/highroad/HighRoad-07.pdf>

⁴ Hoey, Don. "Prime Location on the Trail." *Rails-to-Trails*, Fall/Winter 1999.

⁵ *Benefits of Trails and Greenways*. <http://www.americantrails.org/resources/benefits/10reasons.html>

⁶ National Park Service, *Economic Impacts of Protecting Rivers, Trails and Greenway Corridors*. http://www.nps.gov/pwro/rtca/econ_all.pdf

⁷ Testimony before the Committee on the Judiciary of the U.S. House of Representatives, June 20, 2002.

where new jobs and downtown reinvestment were created in an area that was nearly vacant ten years prior.⁸ Likewise, Pueblo, Colorado, once known mainly as an industrial city, made an early decision in its highly successful economic revitalization effort to improve its appearance and amenities to attract new businesses. The resulting investments in parks and trails along a local river and creek have been credited by city officials as one of the most important components in turning around economic decline.⁹ As greenways and trails develop, associated “clean” business may be generated as a result of the needs of trail users, including bicycle shops, cafes and bed & breakfast establishments. Along the Baltimore and Annapolis Trail Park, six new trail-related businesses opened and two existing establishments relocated next to the trail in an effort to tap into an increased customer base.¹⁰

Another economic benefit greenways and trail can initiate is increased spending in activities associated with the use of these amenities. Such items as hiking boots and bicycles, which people purchase to use along the trails, can generate a significant amount of revenue for an area. A 2002 study was conducted by the Allegheny Trail Alliance (ATA) to determine the economic impacts the Great Allegheny Passage, a 100+ mile multiple use trail in south western Pennsylvania connecting Pittsburgh with Cumberland, Maryland. The study estimated the mean spending on bicycle and trail related equipment for trail users over a two year period was \$55.45 per person per year. The same study found that, on average, a visitor spent between \$9.11 and \$9.56 per trip to the Greater Allegheny Passage. These figures were generated by survey data collected from trail users and local businesses and obtained information on small item purchases such as food, clothing and gas as well as overnight lodging stays made in trail-



The Raubsville Inn displays a sign adjacent to the Delaware Canal Trail to attract users in for a bite to eat.

⁸Rails-to-Trails Conservancy, *Economic Benefits of Trails and Greenways*. http://www.trailsandgreenways.org/resources/benefits/topics/tgc_economic.pdf

⁹National Park Service, *Economic Impacts of Protecting Rivers, Trails and Greenway Corridors*. http://www.nps.gov/pwro/rtca/econ_all.pdf

¹⁰Greenways Incorporated, *Transportation Potential and Other Benefits of Off-Road Bicycle and Pedestrian Facilities (for FHWA)* Washington, D.C., 1992.

related communities. With an estimated 347,000 visits during the study period, these expenditures totaled between \$2.6 and \$3.7 million in local trail communities.¹¹

Greenways and trails can also generate economic savings through the form of lower health care costs. As our nation is gripped with an obesity epidemic, increased opportunities for recreation activities such as walking, jogging and cycling can help people lead more healthy and active lifestyles. Convenient access can encourage people to take advantage of greenways and trails. Studies have indicated people who lead more active lifestyles than their counterparts are less likely to be absent from work, are more productive and have fewer major health care claims, leading to lower health care costs for employers.¹²

In addition, greenways that preserve floodplains, riparian buffers, wetlands and other ecologically important elements can save municipalities money. By not permitting or removing structures in floodplains, communities save the money from damage incurred by flooding. Water filtration is also achieved in wetlands and by riparian buffers, creating healthier streams that may feed reservoirs.¹³

Another possible source of economic development is associated with the horse industry. The locations for equestrians to ride are becoming fewer and fewer. There is also a need for places for people to keep their animals, whether it is overnight or on a long term basis. Two Rivers area farmers could benefit by establishing horse boarding operations or selling their land to individuals who will maintain it's open space character by creating horse farms. In addition, farms adjacent to greenways where equestrian use is allowed may benefit by providing overnight accommodations for horse and rider alike in the form of a bed and breakfast.

¹¹ 2002 User Survey for the Allegheny Trail Alliance.
<http://www.atatrail.org/ata-info/UserSurvey2002/Rails%20to%20Trails.htm>

¹² Krieger, Lisa. 1991. *San Francisco Examiner*. "Image"

¹³ Rails-to-Trails Conservancy, *Economic Benefits of Trails and Greenways*.
http://www.trailsandgreenways.org/resources/benefits/topics/tgc_economic.pdf

GREENWAY ISSUES

There are a variety of issues, opportunities and potential threats present in the Two Rivers Greenway Study Area. For the purpose of this plan, large scale items will be documented and discussed. Although many of these items are interrelated, they have been divided into the following categories: Natural Resources, Cultural Resources, Land Use, Development and Transportation, Recreation, Land Ownership, Municipal Governments and Greenway Design, Management and Funding.

Natural Resources

The preservation of natural resources is one of the main concepts behind the implementation of a greenway plan. Because of this, it is necessary to identify the issues, opportunities and potential threats impacting these resources in an effort to understand their relationship to each other and how the plan can be developed to best preserve and protect these elements.

Issues

The major natural resource issues identified included sinkholes and the protection of riparian buffers. Other issues identified included the protection of high quality streams, large tracts of woodland and wetlands. Sinkholes present an issue because of the effect they can have on their surrounding environment. There are a number of state and local agencies currently investigating the sinkhole problem in the Stockertown area. While various solutions are being explored, work is also being done to identify the root of the problem. Sinkholes, because of the inability to predict where they will occur, present a challenge when attempting to locate a trail within a greenway. Therefore, in locations where sinkholes are most likely to occur, careful consideration toward long-term maintenance should be given when planning for trails within the greenway. In other cases where the concentration of existing and potential sinkholes is higher, this land may be identified as a potential greenway location to prevent future development.



Example of riparian buffers along Bushkill Creek in Moore Township. The wooded riparian buffer in the background provides better environmental protection than the mown areas in the foreground.

Greenways also present an ideal method of preserving established riparian buffers and restoring buffers that have been removed. Riparian buffers vary in size and type and are vital for stream quality and habitat. Establishing greenways, together with public education, can be used to deter landowners from removing established riparian buffers.

Other issues that were identified relating to natural resources include protecting high quality streams, a valuable recreation resource for fishermen, preserving large tracts of woodlands, which are vital habitat for migrating birds, and the preservation of wetlands, important habitat and water resource elements. Another issue is the preservation of vernal pools, which are important breeding areas for a variety of amphibian species, many of which breed only in this habitat. The preservation of unique flora and fauna and their associated habitats is another a natural resource issue associated with greenways.

Opportunities

The preservation of the headwaters area of the Bushkill Creek was the major opportunity concerning natural resources. The area containing the headwaters for the Bushkill Creek has not begun to develop as rapidly as others within the study location have but it is perceived time is not long before the development starts. For this reason, now is the opportunity to preserve the vital headwaters area in an attempt to maintain the quality of the Bushkill Creek through Jacobsburg Environmental Center and beyond. By incorporating these areas into the greenway plan, the framework will be outlined for this preservation to take place. The reclassification of some of the streams to exceptional value should also be investigated within the study area.



The second most important opportunity is to preserve of the health and vitality of Jacobsburg Environmental Center. The Center has the potential to become an isolated habitat if work is not done to preserve and re-establish greenway connections, which serve as migratory routes for the wildlife visitors have come to expect to see at the Center. Without these connections, the health of the various populations of species at the Center could become threatened.

A portion of the trail system in Jacobsburg Environmental Education Center. The adjacent PPL utility corridor could establish a link between the center and Blue Mountain.

In addition to establishing greenway connections to Jacobsburg Environmental Center, there is also the opportunity to create a greenway in Williams Township incorporating Fry's Run. An opportunity for the creation of the greenway system regarding natural resources is incorporating riparian buffers, as was discussed above. There is also an opportunity to protect unique flora and fauna and their

associated habitat. The protection of vernal pools, which may go unnoticed during the dry times of the year, is also a natural resource opportunity.

Potential Threats

Sinkholes are perceived to be the greatest potential threat from a natural resource perspective for the study area because of the negative effect they have on the Bushkill Creek between Stockertown and Tatamy. In this location, the creek has the potential to be dry during drought conditions. As discussed above, work has begun to identify the source of the problem and to find a viable solution. The loss of riparian buffers and, in turn, the fragmentation of habitat in these areas is also a potential threat to the creation of greenways. Flooding, while it is seen as a potential threat to greenways, can be used to identify properties that should be considered for inclusion in the greenway plan. In addition, the heavy use of salt along roads during the winter months is a potential threat.

Cultural Resources

Cultural resources play an important role in reminding us who we are, where we have come from and where we might be heading. In the case of the Two Rivers Greenway Plan study area, many of these resources are found in places conducive to be preserved and protected by the plan.

Issues

The major cultural resource issues identified in the survey were the use of the abandoned railway lines for greenways and the preservation of farmland. The use of abandoned rail lines preserves an element that played an important role in the development of the area. These linear elements provide ideal recreation facilities and can serve as greenways if maintained properly. In the case of the D&L Corridor and the abandoned Lehigh & New England Railroad, these items are federally recognized for their historical significance.

Farmland, long a part of the landscape in the study area, can be preserved to help to strengthen the greenway system by maintaining existing tree lines and open space. Due to the rate and magnitude of development occurring within certain parts of the study area, time is critical to pursue farmland preservation. In areas where the development has not yet started, it is necessary to begin the process of farmland preservation before it is too late. Maintaining agricultural land uses adjacent to streams is especially beneficial in establishing an open space network.

Another cultural resource issue to be identified are the waterways that exist in the Study Area. Many of the waterways played important roles in the development of the area, as is evidenced in the many mills found along their courses. These waterways also continue to provide benefits through their scenic and environmental qualities. The preservation of the waterways through the creation of greenways is an important cultural resource issue.

Opportunities

The majority of the opportunities for cultural resources for the greenway plan have to do with preserving or connecting these resources. The opportunity to connect the Appalachian Trail with the D&L Corridor through a greenway trail system should be investigated, which could present the opportunity for a looping network of trails. In addition, the completion of existing Rails-to-Trails projects and pursuing new projects, specifically along the abandoned Lehigh & New England rail bed at the base of Blue Mountain, should also be undertaken to preserve these cultural resources. As was discussed above, the preservation of the farmland should also be undertaken as a means of saving this cultural resource. Planning efforts to revitalize historic structures, such as the Silk Mill in Easton, are also an opportunity to preserve cultural resources within potential greenway corridors.

Another opportunity for preserving and enhancing a cultural resource within a greenway network is presented in the work the Jacobsburg Historical Society has completed for the development of the Jacobsburg National Historic District. The Society completed a facilities master plan in 2000, outlining plans for the creation of an environmental and heritage education center, a replicated Boulton Gun Factory near the factory's original site and a building for the Pennsylvania and Kentucky Longrifle Museum. The plan also calls for returning some of the adjacent property to its agricultural character at the time when the Boulton Gun Factory was in operation and linking the proposed and existing facilities together with a network of trails.

Potential Threats

Many of the potential threats to the cultural resources that could be integral to greenways include development, ownership issues, lack of funding and poor planning, and will be discussed under other categories.

Land Use, Development and Transportation

The various types of land uses, developments and modes of transportation have an impact on the region's landscape, which in turn impacts the need for and development of greenways. As more development occurs, with its ensuing land use and transportation patterns, the need for greenways becomes greater.

Issues

Development, both residential and commercial, is the overwhelming issue for the study area. This issue involves the impact of development on existing greenways and the implications for potential greenways. The overriding concern is for impact development may be imparting on potential greenways. It is felt that although regulations are in place to protect areas best fit for greenways, they are not always enforced and in other potential greenway locations, traditional development practices do little to conserve these sites. While negative effects are definitely more prevalent, the potential

to connect open space developments to greenways does exist and should be pursued wherever possible. With development comes other issues such as storm water runoff, pollution, financial impacts and the safe integration of roads with greenways. Greenways, and the riparian buffers they contain, can protect streams from pollution associated with development.



Opportunities

With the development taking place in the study area, the opportunity arises to pursue more

Views such as this one from Hackett Park are being threatened by the rapid development being experienced in the study area.

progressive planning practices, including conservation planning practices where developers are required to set aside land for open space, which can be incorporated into greenways. An attempt should be made to stay ahead of development and protect vital greenway corridors. The ordinances regulating development that are adopted should be enforced. The opportunity to preserve large greenway corridors in the upper watershed is available now because this area has not yet received the development pressure. This opportunity should be pursued through the form of more progressive zoning ordinances and land development practices. There is also the opportunity to reinforce the value of greenways through the potential impact they can have for increased property values on adjacent houses.

Potential Threats

The development occurring in the study area is the major potential threat to greenways. This is particularly important in the headwaters area of the Bushkill Creek because of the potential negative impact development may impart on stream water quality. There is a need to protect these areas from development through careful planning practices, which, to a degree, will help alleviate this threat. Often, the traditional development practices in place and the lack of more progressive ones continue to threaten the areas vital for greenway protection. An increase in development also leads to an increase in the cost of land, making it more cost prohibitive for areas to be acquired that are ideal for the creation and preservation of greenways.

Other potential threats include poor roads, advances in technology that make development possible on previously undevelopable land and the Route 33 interchange in Wind Gap that is being conceptually considered and that will require sensitive planning.

Recreation

While greenways can also be designed solely for protecting environmental resources, they can also provide recreation opportunities and links between larger recreation facilities, such as community and regional parks.

Issues

The major issues impacting the recreation opportunities in the study area is the lack of a regional greenway plan that incorporates recreation. This plan could serve as a guide for the region, indicating where and how to develop a system for connecting the parks and recreation facilities in the study area. The results of this plan should be incorporated into the development of a regional recreation plan. Another issue is achieving a balance between environmental and recreational needs.

Opportunities

Linear in nature, greenways present the opportunity to create an extensive network of trails. Trails can also be an impetus for greenway creation. Trails in greenways can be used for environmental education, providing an ideal location for people to gain an appreciation for the natural environment. One challenge exists when it is necessary for greenways to cross private land. Another challenge is how to educate the landowners about the benefits of the greenways. Providing the opportunity for these individuals to understand the importance of preserving these areas is critical for gaining their support. The opportunity also exists for connecting Jacobsburg Environmental Education Center with the Appalachian Trail, Blue Mountain, Wind Gap and other trails in the study area. Trails in greenways also offer people the opportunity to recreate safely close to home. As walking is a popular recreation activity, trails provide a location for people to practice healthier lifestyles. There is also the opportunity to develop additional locations for horseback riding. This could also be an opportunity to develop a horseback riding tourism industry with overnight accommodations provided by private establishments for riders and their horses.



This trail in the state game lands could become part of a network of recreation trails in the Two Rivers Area.

Potential Threats

The major potential threat to recreation and greenway development is the inability to acquire necessary funds for creating these elements. In some cases, funding is available but due to requirements set by the agencies administering the money, many communities become overwhelmed with the process of implementing their recreation facilities. In other cases, there are insufficient funds to support a sound recreation program because these funds are needed for other necessary items. Another potential threat is the lack of municipal cooperation regarding recreation planning. As this pertains to greenway planning, neighboring communities should be interacting to ensure the greenways remain contiguous. Another potential threat is the public perception that trails through backyards brings crime to their doorstep. Education is a key means of changing this perception.

Land Ownership

One of the components to establishing a successful greenway system is to have cooperation between the various land owners. It is important to have these various individuals and groups support the vision of a successful greenway network.

Issues

The major issues involving land ownership are the lack of funds necessary to secure easements for developing and maintaining greenways. As land prices increase, the option of purchasing property outright for greenways becomes cost prohibitive, making easements the next most suitable solution. It becomes necessary to work with landowners and developers in an effort to educate them about the value of greenways, with the goal of securing easements along their properties. In the case of developers who will be subdividing large land holdings, it would be beneficial to work with them at the outset of the project to have greenways established.

Opportunities

The outright ownership of land or easements are an opportunity for private non-profit organizations to become involved. There is also the opportunity to work with property owners in educating them of the importance of greenways for the purpose of establishing greenways along their properties. There also is the opportunity to educate land owners about the financial benefit of living adjacent to or near greenways, which comes in the form of increased property values.

Potential Threats

Private property ownership and a hesitancy to allow easements and access are major potential threats to the establishment of greenways. There are no guidelines establishing how private land owners should manage the property for the purpose of maintaining a riparian buffer or other critical elements for a greenway. Other threats are the land development projects involving land owners not willing

to work towards maintaining existing potential greenway lands or setting aside undevelopable land to become part of a greenway system. In order to alleviate these threats, public education should be used to increase awareness about the benefits of greenways.

Municipal Governments

The role of the various municipal governments is important in laying the groundwork for a successful greenway system. Without the support of the governing bodies, the establishment efforts could be lost if the laws and planning guidelines do not lend themselves to the creation of greenways.

Issues

The major issues regarding municipal involvement with greenways are planning, education and public services. The planning efforts undertaken by individual municipalities and by intermunicipal partnerships (COG organizations) need to be cognizant of the importance of greenways. A concerted effort should be made between the municipalities to work toward establishing a greenway system. Another issue is the public services that will be required to maintain a greenway system. With many municipalities operating on tight budgets, the additional burden of policing, managing and maintaining greenways can be perceived as an unnecessary addition. It is here that the role public education plays becomes important. The benefits of greenways, both socially and environmentally, need to be brought to light in order for the citizens and elected officials to provide support.

Opportunities

The major opportunity for municipalities to support a greenway system is to work towards developing and implementing ordinances that do so. These ordinances can protect greenways, natural areas and open space elements before they are victims of development. Partnerships can be formed between the municipalities, tying them together with common goals. The opportunity to link the municipalities along the Bushkill Creek along a greenway also exists, using the extensive planning initiative underway. The creation of a regional comprehensive plan, one that is more environmentally conscious, will work toward better land development practices. In the headwaters area of the study, this will guide growth in those communities and protect land. The impact of this protection will be able to be seen downstream as the health of the creeks are maintained. Again, the opportunity to get the public involved through public education is at the forefront of the role municipalities can play.

Potential Threats

The major potential threat on the municipal level is the lack of planning, both within individual municipalities and as a region. Inadequate municipal ordinances do little to protect the existing, intact resources, making them vulnerable to the traditional development patterns. This threat can be viewed as a lack of municipal concern and action. The inability of municipalities to work together

also threatens greenway planning efforts. The development of cooperating municipal organizations in the form of Council of Governments is a step toward eliminating this threat.

Greenway Design, Management and Funding

The design, management and funding of greenways are the final steps to bringing the greenway plan to fruition. The issues, opportunities and potential threats to this category are affected by the categories outlined above as well as additional, more site specific situations.

Issues

The issues that are most prominent for the design, management and funding of greenways include public education, the preservation of existing potential greenway corridors, the establishment of links between greenways, regulation and funding. Educating the public about the importance of greenways is an important issue, as has been previously stated. Public perception that greenways containing trails can lead to an increase in crime is one stumbling block that may be alleviated by education. The issue of preserving potential greenway corridors is important because as these vanish, it becomes more difficult to establish the links necessary for a successful greenway system. The implementation of open space development is one method to work toward solving this issue. The establishment of links between potential greenway corridors is another issue. Reestablishing lost greenway corridors and connections is one way of making these links. The regulation of greenways is another issue that needs to be addressed. It may be necessary to look toward the state, with regulation methods similar to those effecting streams but applied instead to “Lands of the Commonwealth.” The final major issue is who is going to pay for the development of the greenways? With the financial burden of developing greenways placed on municipalities, it may become difficult to implement any plans. Grants, donations and creative funding measures should be pursued.

Opportunities

There are many opportunities regarding the design, management and funding for greenways. Concerning design, the creation of a Bushkill Creek Greenway, an Easton Greenway, a Reading Prong Greenway and a greenway in Williams Township to include Fry’s Run and the linking the Appalachian Trail with the D&L Corridor and Jacobsburg Environmental Center are opportunities for creating links within the greenway system. The design of greenways with trails to make them more public friendly by including restroom facilities, using existing trails as a foundation for greenway creation, encouraging developers to donate land for greenways and coordinating land use and greenway planning efforts are opportunities to aid in the design process of greenways.

The opportunities for management and funding of greenways come in the form of public education, as has been previously discussed. If the public does not understand the value of greenways, the average homeowner will clear their property to the stream. Environmental education, which can occur in greenways with trails, can give the public the opportunity to gain an appreciation for the

benefit of greenways. When the public supports an idea, the opportunity exists to get funding in the form of donations or volunteer efforts for maintenance projects. There may also be the opportunity to use tax money for greenway funding, similar to the bond that passed in Northampton County for land conservation measures. Grants and loans are also opportunities to secure funding. In addition, municipalities, non-profits and other agencies are possible sources of management and funding support.

Potential Threats

Potential threats to the design, management and funding of greenways include the continued fragmentation of existing potential greenway corridors, private property ownership, and the lack of funding and public education. The traditional development practices in place, also as previously discussed, do little to preserve the existing potential greenway corridors. Private property ownership, and owners who



A new golf course and townhouse development has taken the place of woodlands on Morgan Hill in Williams Township.

fail to see the benefits of greenway and trails, threaten to lead to further fragmentation of greenway corridors by not working towards the greenway system. The lack of funding necessary to purchase land or set up easements threatens to make land crucial for greenway establishment out of reach of the municipalities and organizations striving to preserve it. The perception of increased crime brought by greenways with trails, as discussed above, can lead to strong public opposition to trail creation. Without guidelines in place, the maintenance of greenways on private property is also left to the owner, who might be more inclined to clear to the stream, removing the riparian buffer and, in turn, diminishing the value of the greenway.

GREENWAY PLAN

Before creating a concept plan for the Two Rivers Area Greenway, it is helpful to understand the basic framework Pennsylvania has outlined for creating greenways. The Pennsylvania Greenways Partnership Commission and the Pennsylvania Environmental Council, recognizing the wealth of opportunity present to preserve greenway and trail corridors in the Commonwealth, published a document entitled *Creating Connections: The Pennsylvania Greenways and Trails How-To Manual*. The purpose of this guide was to provide information specific to Pennsylvania for the creation and protection of greenways and trails throughout the Commonwealth. This publication was followed by the release of *Pennsylvania Greenways: An Action Plan for Creating Connections*, which was penned by the Pennsylvania Greenways Partnership Commission and the Greenways Partnership Advisory Committee to provide goals and strategies for greenway creation in the Commonwealth. These two resources served as guides for the creation of the concept plan set forth in this document.

Pennsylvania Greenway Concept Plan

Pennsylvania Greenways: An Action Plan for Creating Connections outlines goals and strategies for establishing a greenway network for the Commonwealth. These goals and strategies include the following:

Plan and Establish Greenway Connections

“Hubs and Spokes” - A Statewide Network of Greenways

Greenway Plans

Places for All People

Pennsylvania Wellness

Alternative Transportation

Natural Resources Protection

Create a Greenways Organizational Network

Greenways Organizational Structure

Provide Funding for Greenways

Greenways Funding

Provide Technical Assistance and Outreach

Greenways Toolbox

Greenways Education and Training

Greenways Promotional Campaign

The Greenways Volunteer Network

Greenway Design and Facilities

Pennsylvania's greenway vision is for a statewide network of "hubs and spokes." The "hubs" of this network will include natural areas, such as game lands, forests and large open space areas found in national and state parks, cultural, historic and recreation sites as well as urban and suburban development. The "spokes" of this network will include greenways that connect these natural, recreational, cultural and developed areas. These greenways should attempt to provide a location for all citizens to recreate, participate in activities that will help generate a healthier lifestyle, have access to alternative transportation options and protect natural resources. Greenways should also help define a sustainable growth pattern for development.¹⁴

When considering greenway development options, there are two basic types, conservation greenways and recreation greenways. Generally speaking, a recreation greenway can serve on some level as a conservation greenway because it should protect a linear corridor. Greenways function to protect riparian buffers, landscape corridors and natural areas. They can also serve as greenbelts, which are interconnected conservation tracts where limited development can occur and, as the name implies, are located around more developed areas.

Conservation Greenways

Greenway corridors, both natural and man-made, can serve conservation purposes and may range in width from feet to miles. Greenways can contain a high concentration of ecological features and processes, which can range from locally significant to state or federally protected features. Generally speaking, the number of these features increase if the greenway contains a water course. The Natural Features section of this document describes the environmentally significant features of the Two Rivers area.

Conservation greenways, corridors where little or no public access is envisioned, are an important element for the protection of environmentally significant features. These areas serve as stream buffers, wildlife habitat, migration corridors, floodplains and other environmental and ecological sanctuaries. These are areas where human impact is potentially harmful to the resources. The interconnectivity of open space is important for sustaining a healthy ecological balance. Conservation greenways provide corridors for migration routes, allowing wildlife to experience a more diverse genetic exchange, an important factor in helping to maintain healthier populations. These greenways also work towards protecting sensitive environmental resources, such as hydric soils and steep slopes, from negative encroachments.

Preventing the fragmentation of habitat and eliminating barriers that impede wildlife movement are also functions of conservation greenways. Continuous corridors can help to maintain migration

¹⁴*Pennsylvania Greenways: An Action Plan for Creating Connections. 2001*

routes for birds, mammals and other wildlife. In some cases, it is necessary to restrict access and protect the interior habitat, which is habitat where outside influences, such as human activities, have less of an impact. Certain wildlife species require this habitat for survival, making it important to implement conservation and preservation measures. It is recommended that greenway corridors intended for conservation of interior habitat have equal amounts of interior and edge habitat, which is the area where outside influences have a greater impact. Depending on their width, greenway corridors may contain some interior habitat but more frequently they serve as vital connections between areas of this nature.



The landscape ecology of an area can help to identify important corridors to consider for conservation greenways. Landscape ecology is the study of the complex relationships between the changing elements that make up a geographic area. These relationships exist between open space and developed areas connected by corridors such as rivers and other linear natural

Fry's Run, a High Quality Stream in Williams Township, would benefit from being included in the Two Rivers Area Greenway network.

features. Landscapes are dynamic, a result of the seasons, succession, environmental stresses such as introduced species, and disturbances such as development or flooding. Because the environment is not static, it is necessary to try understand how these changes will affect a conservation greenway. Outside influences such as adjacent land uses or unforeseen natural events can lead to dramatic changes in the conservation greenway corridor. Will the resources intended to be protected from these outside influences remain as such? One way to ensure conservation greenways protect these sensitive areas is to establish a wide buffer along the corridor.

The role of conservation greenways as protectors of natural resources often must need to be quantitative in order for those involved with acquisition and maintenance to understand the value in pursuing preservation efforts. This can be done by reinforcing the value of conservation greenways as places to mitigate flooding, control the quality of streams by serving as buffers, which in turn leads to cleaner air and water, moderate climate and provide locations for education and species protection. By preventing development in floodplains, communities reduce the risk of personal property injury and loss that can be incurred in the event of a flood. Conservation greenways also provide a buffer that can serve as a filter for runoff containing pollutants and other sediments. By preventing these potentially toxic substances from reaching a water course, the quality of the stream is maintained. The same plants that filter water-borne pollutants also remove air-borne contaminants,

leading to cleaner air and helping to moderate the climate. Educating people about the value of the natural environment is another important contribution of conservation greenways. These areas can also provide protection for rare and endangered species as well as economically valuable species such as trout. Improving water quality and riparian buffers helps to protect cold water habitat essential for trout, an important species for recreational fishing.

It is important to know the ecological objectives when developing a conservation greenway corridor. In the case of the Two Rivers Area Greenway Plan, many locations to consider implementing these corridors have been identified and described in the Natural Features section. The Two Rivers area contains two physiographic provinces that provide various geologic formations, including prime agricultural soils, hydric soils, wetlands, streams, floodplains, woodlands and outstanding natural areas. Some of these elements are identified as outstanding natural areas and are significant on a state or local level.

Conservation greenways may sustain various levels of human intervention. More sensitive areas, such as wetlands and some of the outstanding natural areas, should be considered for conservation greenway corridors where there is little or no public access. Restricting access to these areas will maintain the environmental characteristics by not building trails or other public access routes, which helps to protect habitat and reduce costs. Only limited development should take place in these greenways, such as interpretive signs explaining the value of conservation greenways. In some locations, it may be appropriate to explain the value of the resource being protected by the greenway. It may be possible to implement conservation greenways for the protection of prime agricultural soils, riparian buffers or other sensitive elements on private property similar to existing wetland and floodplain regulations.



An example of a floodplain area that could be designated a conservation greenway.

Conservation Greenways with No Trail Development

Conservation greenways with no trail development are intended to protect environmentally sensitive areas such as wetlands or habitat of endangered or threatened flora or fauna. Functions of these corridors may include floodplain management, water quality protection, preservation of prime agricultural soils and conservation of important wildlife habitat. In these greenways, even sustainable trail development could negatively impact the landscape elements that are to be protected. Therefore, to maintain the natural balance in these areas, it is necessary to limit access by not creating trails and their associated facilities. Signage can be installed in appropriate areas to educate and inform the public of the importance of conservation greenways and the role they play in protecting environmentally sensitive landscapes.

Conservation Greenways with Low-Impact Development

The primary function of these greenways is to protect environmentally sensitive areas. However, unlike conservation greenways with no trail development, there may be locations that are suitable for sustainable, low-impact trail development. In these locations, which have been carefully evaluated for their ability to support human intervention without negatively impacting the resources the greenway is to be protecting, low-impact trails and facilities may be developed to allow access for hiking and nature viewing. In areas near trailheads, ADA compliant trails should be implemented when possible, although the trails in this category are typically not always going to be universally accessible. Trail surfacing should be constructed from low-impact, durable materials that blend well with the surrounding environment. These include wood chips, crushed gravel, stone screenings or earth. In special situations, where no alternatives are present, it may be desired to develop boardwalks. Trailhead facilities and signage should be limited to major entry points and intersections with more developed trails.

Recreation Greenways

Recreation greenways contain trails and other means of access for human use, such as kayak/canoe launches. These corridors are designed for low-impact, non-motorized recreation activities such as hiking, horseback riding, nature watching, cycling and canoeing. Depending on the location and size of the greenway, they may also provide hunting and fishing opportunities or preserve significant cultural elements. Recreation corridors can include single use trails, such as those that allow only hiking, or multiple use trails, which accommodate a wide range of non-motorized uses.

Recreation Greenways with Unpaved Multiple Use Trail Development

Due to the increased intensity of use anticipated these greenways are capable of developing, it may not be appropriate to implement trails near any environmentally sensitive areas contained within the greenway. In addition, because of the trail surfacing materials available, trails should not be developed in locations where heavy use is expected and outside areas prone to flooding because the surfacing materials used in constructing unpaved multiple use trails, such as crushed stone, wood chips, grass or earth, are not suitable for heavy use and are easily damaged by rising



Jacobsburg Environmental Education Center provides unpaved multiple use recreation trails, allowing hikers, cyclists and equestrians to experience the park.

flood waters. In addition, while they are generally less expensive to install than bituminous paved trails, they may require more maintenance depending on the amount of use they receive. If it is expected that the trail will become popular, it is recommended it is installed with provisions to allow it to be paved in the future. Trail users of this type of greenway include pedestrians, cyclists, nature observers and equestrians. Equestrians may require a separate trail in an effort to minimize conflicts with other users and maintenance. In urban settings, users can access these greenways at smaller, more frequent trailheads whereas those in suburban or rural areas will find trailheads in fewer locations but these will be bigger in size, allowing for more parking facilities. Signage should be installed at the trailheads and in areas where it is needed for the safety of trail users.

Recreation Greenways with Paved Multiple Use Trail Development

Greenway corridors containing paved trails are typically found in urban and suburban locations where a higher rate of use is present, including as an alternative transportation route. Paved trails are better suited to withstand the heavier use typically found in more developed areas. These trails, because their surface is more durable, can be installed in areas where frequent flooding occurs. The use of a paved surface allows for pedestrians, cyclists and inline skaters and is more accessible to users of various abilities. Because of increased use, the need for signage, more developed trailheads and amenities increases. The increased intensity of use may make it inappropriate to locate these trails near environmentally sensitive locations.

Recreational Greenway Connections using Transportation or Utility Right of Way Corridors

In some cases, in order to have a contiguous recreational greenway, it may be necessary to have the trail follow an existing road or sidewalk. It may also be appropriate to use the right of way corridors created by utility companies for establishing connections. These can include power lines, sewer easements, gas and petroleum pipelines among others. Along roads, this may involve installing appropriate signage, linestriping or, in extreme instances, retrofitting the roadway with a shoulder. These connections may also involve the construction of a separate trail within the right of way corridor. For safety, federal, state and local guidelines will be applicable for designing and implementing the improvements essential for routing the trail along these routes. It will be necessary to contact the appropriate managing bodies when considering the implementation of a connection using a transportation utility right of way corridor.



An example of a utility right of way corridor being used as a recreational greenway.

In the Two Rivers area, there are options to implement both conservation and recreation greenways. In the Upper Watershed and Williams Township sections of the study area, opportunity for implementing conservation greenways is more prevalent than in the Middle and Urban Core sections. The Middle Watershed and Urban Core sections lend themselves to the creation of recreation greenways due in part to the amount of development and condition of existing corridor opportunities. It is important to remember that all greenways function as conservation elements to some degree.

Additional Greenway Corridor Design Concepts

While trails are typically the most common design element included in greenways, there are additional design concepts that can be applied to these corridors. These include heritage corridors, such as the D&L Corridor, scenic byways and blueways. The greenway concepts of preservation and conservation can also be applicable to these corridors although in these areas this is often more relevant towards scenic or cultural resources rather than environmental ones. Greenway trails can be an alternative means of experiencing each of these corridors.

Heritage Corridor

A heritage corridor preserves and interprets the cultural and historic features within its boundary. Part or all of a heritage corridor may be contained within a greenway and vice versa. Areas like the Delaware & Lehigh National Heritage Corridor and the National Historic Districts as identified in the History section of this document are examples that can be connected using trails from greenway corridors.

Scenic Byways

These trails are usually designed with the intent to be traversed by automobile and may function as greenways if in the right location. Scenic byways are designated roadways that recognize the beauty and cultural legacy of the local region. They often provide communities with an effective way to preserve and promote their special scenic, historic, natural, cultural, recreational and archeological resources. More often than not, these routes offer travelers an alternate route that incorporates picturesque wilderness or pastoral landscapes, cultural and historic resources, and recreational activities. These areas can be preserved from visual clutter by conservation efforts such as easements. Local governments can use their planning authority to protect the scenic and historic features of these viewsheds. The route may also link historically significant locations or similar landscape elements such as covered bridges. Routes that may be traversed by bicycle can also be incorporated into scenic byways and form connections to greenways.

Blueways

Blueways, also known as blue trails or water trails, are water-based recreation routes through scenic areas where the corridor is located along a river or another waterway. These routes are often used for extended trips by non-motorized watercraft such as a canoe, kayak or raft. Blueways may be considered part of a greenway when they incorporate protected areas of habitat along shorelines. They may also provide a corridor where adjacent land use and public access is maintained for the benefit of recreational use. This can happen by properly managing non-river oriented activities by

entering into cooperative agreements, implementing careful land use planning and enforcing existing regulations.

Types of Greenway Trail Users

The types of trail users expected determine the design of the trails and facilities along the greenway. There are several user groups, each with different needs to meet. This plan is directed toward the non-motorized users of greenway trails, which include, but are not limited to, pedestrians, cyclists, equestrians and people on inline skates. Because greenways often also involve an element of water, in the form of streams, rivers or other water bodies, non-motorized water trail users can include fishermen, canoeists and kayakers.

While some of these user groups have needs that overlap, others, such as equestrians, inline skaters, kayakers and canoeists, have very distinct requirements to be met. Designing greenway trails to accommodate these user groups from the outset will help to minimize conflicts and direct uses to intended areas.

Types of Greenway Trails

There are four broad categories of types of greenway trails. These are land-based, water-based, single-user and multi-user routes. Greenway trails include hiking trails, nature trails, hike-and-bike trails, multiple use trails, exercise trails, bike paths, bike routes, rails-to-trails, rails-with-trails, tow paths and utility corridors. Land-based routes, which can be found in urban, suburban, rural and wilderness landscapes, are the most common. Rails to Trails projects are a typical land-based greenway trail route. Water-based routes are determined by the width, depth and navigability of the waterway. Single-user routes, which can exist on both land and water, are defined by the primary trail users. Examples include the Appalachian Trail and white water kayak courses. The most common greenway trail type is the multi-user trail, which is becoming the norm for urban, suburban and rural greenways. An example of this type of trail is the Palmer Township Bike Trail. Conflicts can be generated by an increased demand, poor management, under-designed facilities, lack of user etiquette and disregard of users with varying abilities.¹⁵

Greenway Trail Layout

The layout of trails should be sensitive to the environment the greenway is trying to preserve. The trail should be compatible with the natural landscape and follow the contours, so as to minimize disturbance to the surrounding environment. The trail should be designed to accommodate the intended user groups without negatively impacting its surroundings. If this cannot be done, it is necessary to reevaluate the location, need and design of the trail. The trail should also be routed to increase environmental awareness and be able to be built and maintained in a sustainable, cost-

¹⁵Flink, Charles A. and Robert M. Searns. *Greenways, A Guide to Planning, Design and Development*. Island Press, Washington, D.C. 1993. P 193-194.

effective, and timely fashion. Improper trail implementation can lead to long-term maintenance problems, which are often more difficult to find funding to fix.¹⁶

Greenway trails should be accessible. The Americans with Disabilities Act (ADA) establishes accessibility guidelines for people with disabilities. The design of any new greenway trail should meet the current standards set forth by ADA guidelines. At this time, accessible trails must meet the following technical provisions:

- Surface - the trail surface shall be firm, stable and slip resistant
- Clear Tread Width - 36" minimum
- Tread Obstacles - 2" high maximum (up to 3" high where running and cross slopes are 5% or less)
- Cross Slope - 5% maximum
- Passing Space - provided at least every 1,000' where the trail width is less than 60" (5'-0")
- Signs - shall be provided indicating the length of accessible trail segment
- Running Slope (trail grade) shall meet one or more of the following:
 - 5% or less for any distance
 - Up to 8.33% for 200' maximum with resting intervals no more than 200' apart
 - Up to 10% for 30' maximum with resting intervals no more than 30' apart
 - Up to 12.5% for 10' maximum with resting intervals no more than 10' apart.
 - No more than 30% of the total trail length may exceed a running slope of 8.33%

Trail tread width recommendations have been developed for bicycle trails and urban, suburban and rural settings. The American Association of State Highway Transportation Officials (AASHTO) recommendations for trail widths are shown in Table 22.

¹⁶Flink, Charles A. and Robert M. Searns. *Greenways, A Guide to Planning, Design and Development*. Island Press, Washington, D.C. 1993. P 198.

Table 22
STANDARD TRAIL WIDTH RECOMMENDATIONS¹⁷

AASHTO Standard Tread Width for Bicycle-only Trails			
<i>AASHTO Standards</i>	<i>Recommended Minimum Width</i>		
One way, single lane	5'		
Two way, dual lanes	10'		
Three lanes of bicycle travel	12.5' minimum		
Recommended Trail Tread Widths for User-Specific Trails			
<i>Trail User Type</i>	<i>Recommended Tread Width</i>		
Bicyclist	10' (2-way travel)		
Hiker/walker/jogger/runner	4' rural; 5' urban		
Cross-country skier	8-10' for 2-track trail		
Equestrian	4' tread; 8' cleared width		
Minimum Recommended Tread Widths for Multiple Use Trails			
<i>Tread Type</i>	<i>Urban</i>	<i>Suburban</i>	<i>Rural</i>
Pedestrian, non-motorized	12'	10'	10'
Pedestrian, equestrian	16'	12'	10'

In certain environments, it may be necessary to restrict certain user groups, such as cyclists and equestrians, and to implement trails that have less of an impact on the environment or attempt to preserve environmentally sensitive areas. Boardwalks near wetlands are an example of a restrictive trail option that attempts to minimize environmental impacts.

Trail Surface Options

A well built trail is made of three components, the sub-grade, the sub-base and the trail surface. The sub-grade is the trail's foundation, which is made up of the native soils that bears the load generated by the trail users. The sub-base distributes the weight of the trail surface and users to the sub-grade. The surface is the point of contact between the trail and the users. The surface can be either soft or hard, depending on its ability to absorb or repel water.

The Sub-grade

The sub-grade provides the foundation for the trail to be developed. Any imperfections in the sub-

¹⁷Flink, Charles A. and Robert M. Searns. *Greenways, A Guide to Planning, Design and Development*. Island Press, Washington, D.C. 1993. P 200-201.



An example of a paved multiple use trail.

grade will eventually become apparent in the final trail surface. The ability of the sub-grade to provide a good foundation for a trail depends on its susceptibility to freezing, its permeability, its bearing strength and its shrink and swell characteristics. To maintain a sound sub-grade, it is necessary to provide adequate drainage. This can be accomplished with surface or sub-surface drainage systems, or a combination of the two.¹⁸

The Sub-base

The sub-base distributes the load of the trail and trail users to the sub-grade. It also provides drainage. The design load of the trail, or the maximum weight able to be carried by the trail, along with the type of material used for the sub-base and the use of geotextiles, will determine the depth of the sub-base necessary. In the case of rails to trails projects, the sub-base is the former railroad bed. Like the sub-grade, any imperfections in this layer will become apparent in the trail surface.¹⁹

The Trail Surface

The surface of the trail can be constructed of either soft or hard materials. Soft materials are defined as those that are able to absorb moisture, such as earth and wood chips. Hard materials repel moisture and include crushed stone, bituminous concrete, soil cement, resin-based stabilized material and concrete. The type of trail surface installed can encourage or discourage different types of use. Trails surfaced with soft materials are preferred by equestrians because horses are less susceptible to injury on these materials. Hard materials with a smooth finished surface such as bituminous concrete are preferred by inline skaters because a surface is provided that is more conducive to the sport. The surface of the trail should be chosen conservatively when first installed because it can always be upgraded as use and demand increase. Trail surface options are summarized in Table 23.²⁰

¹⁸Flink, Charles A., Kristine Olka and Robert M. Searns. *Trails for the Twenty-First Century*. Island Press, Washington, D.C. 2001. P 62-65.

¹⁹Flink, Charles A., Kristine Olka and Robert M. Searns. *Trails for the Twenty-First Century*. Island Press, Washington, D.C. 2001. P 65-68.

²⁰Flink, Charles A., Kristine Olka and Robert M. Searns. *Trails for the Twenty-First Century*. Island Press, Washington, D.C. 2001. P 66-74.

Table 23
TRAIL SURFACE SYNOPSIS²¹

<i>Surface Material (longevity)</i>	<i>Advantages</i>	<i>Disadvantages</i>
<u>Hard Materials</u>		
Soil Cement, medium	Uses natural materials, more durable than native soils, smoother surface, low cost, accommodates multiple use	Surface wears unevenly, not a stable all-weather surface, erodes, difficult to achieve the correct mix
Granular Stone, medium-long (7-10 years)	Soft but firm surface, natural material, moderate cost, smooth surface, accommodates multiple use	Surface can rut or erode with heavy rainfall, regular maintenance needed to keep consistent surface, replenishing stones may be a long-term expense, not for areas prone to flooding or steep slopes
Bituminous Concrete, medium-long (7-15 years)	Hard surface, supports most types of use, all-weather, accommodates most users simultaneously, smooth surface to comply with ADA guidelines, low maintenance	High installation cost, costly to repair, not a natural surface, freeze/thaw an crack surface, heavy construction vehicles need access
Concrete, long (20 years plus)	Hardest surface, easy to form to site conditions, supports multiple use, lowest maintenance, resists freeze/thaw, best cold weather surface, most resistant to flooding	High installation cost, costly to repair, not a natural-looking surface, construction vehicles will need access to the trail corridor
Boardwalk, medium-long	Necessary in wet or ecologically sensitive areas, natural-looking surface, low maintenance, supports multiple use	High installation cost, costly to repair, can be slippery when wet
Resin-stabilized, medium-long depending on type of application	Aesthetics, less environmental impact, possible cost savings if soil can be used, can be applied by volunteers	Need to determine site suitability and durability, may be more costly in some cases
<u>Soft Materials</u>		
Native Soil, short to long depending on local use and conditions	Natural material, lowest cost, low maintenance, can be altered for future improvements, easiest for volunteers to build and maintain	Dusty, ruts when wet, not an all-weather surface, can be uneven and bumpy, limited use, possibly not accessible
Wood Chips, short (1-3 years)	Soft, spongy surface good for walking, moderate cost, natural material	Decomposes under high temperature and moisture, requires constant replenishment, not typically accessible, limited availability, not appropriate for flood prone areas
<u>Other</u>		
Recycled Materials, varies	Good use of recyclable materials, surface can vary depending on materials	Design appropriateness and availability vary.

²¹Flink, Charles A., Kristine Olka and Robert M. Searns. *Trails for the Twenty-First Century*. Island Press, Washington, D.C. 2001. P 74-75.

Crossings²²

Trails cross roads or rail lines at-grade, above-grade or below-grade. At-grade crossings are the most common although certain situations may call for or present the opportunity to provide a bridge or tunnel. Crossings are site specific and require careful evaluation and planning.

At-Grade

The most ideal at-grade road crossing will experience very light traffic or provide a traffic signal that can be actuated by trail users to allow for safe passage. A professional should be employed to evaluate the intersection and establish a safe method of crossing. Ideally, the crossing should take place as close to an intersection as possible, preferably in the location of the crosswalk. "Trail Crossing" signs should be put up along the road and, if necessary, a painted crosswalk should be installed. If the crossing involves curb cuts, these should be as wide as the trail itself. Access to the trail can be controlled if the need arises. The most common method is the installation of bollards, which can be removable or hinged to allow access for authorized vehicles, such as emergency and maintenance vehicles, while preventing unauthorized vehicle access to the trail. Bollards should be placed 10' from the intersection. One bollard should be placed in the center of the trail, with two additional bollards placed 5' from the center if desired. Two bollards should not be used because they tend to direct users to the center of the trail, increasing the potential for a collision. Another effective vehicle barrier are gates, which extend completely across the trail. If barriers are desired to prevent unauthorized vehicle access, it is necessary to mark them well so they are visible and do not become a hazard by conflicting with trail use. They should be placed on straightaways instead of curves in order to maintain satisfactory sight distances. Barriers should allow for ease of use by trail users with disabilities and meet current ADA guidelines.



An example of a potential trail with an above-grade road crossing that will need to be evaluated and improved.

Alternative methods can be used to alert users of the intersection such as warning signs, a change in surface pavement for a short distance or a centerline along paved trails. Stop signs should be placed 4-5' from the road to allow time for users, especially cyclists, to stop. Site stopping distances should be evaluated by a professional and adequate warning should be given to allow cyclists to stop. AASHTO guidelines, which incorporate curves, slopes and other factors, have been developed to help determine the necessary warning distances needed for cyclists to stop.

Above- or Below-Grade

Above- or below-grade crossings are a way to

²²Flink, Charles A., Kristine Olka and Robert M. Searns. *Trails for the Twenty-First Century*. Island Press, Washington, D.C. 2001. P 85-88.

minimize conflicts between trail users and vehicles but also can be costly. When dealing with road ways that have a large volume of high speed traffic, the only feasible alternative may be an above-or below-grade crossing. Above-grade crossings, such as pedestrian overpasses, are perceived to be less threatening and safer by users than below-grade crossings, or tunnels. Above-grade crossings can be unsightly and may require long access ramps in order to meet ADA requirements. It will be necessary to consult with a professional to evaluate each situation when determining the style of crossing to employ.

Railroad Crossings

Due to the danger railroad crossing present to cyclists, the safest method is for the trail to cross perpendicular to the tracks. This prevents the front tire from becoming lodged in the track, which could lead to an accident. Where it is not possible to cross at a right angle, devices such as compressible flangeway fillers can be installed to reduce the chance of an accident for a cyclist. Another design solution would be to widen the trail, giving cyclists the opportunity to approach the crossing at right angle to the tracks. Signs requiring cyclists to dismount when crossing the tracks, which would be used in conjunction with track crossing warning signs, could also be installed. The railroad company will need to be consulted prior to installing any crossing.

Signs for Greenway Trails²³

Signs, because of the vital information they portray, play an important role in the success of greenway trails. Signs can serve to regulate, warn, inform and educate trail users. The U.S. Department of Transportation's Federal Highway Administration (FHWA) has outlined the size, shape and color criteria for signs in the *Manual on Uniform Traffic Control Devices* (MUTCD). Where feasible, and to reduce exposure to liability and promote safe trail use, the standard color and shapes should be followed. Signs need to be designed and placed appropriately within



Examples of Pedestrian Signage from the Delaware & Lehigh National Heritage Corridor.

²³Flink, Charles A., Kristine Olka and Robert M. Searns. *Trails for the Twenty-First Century*. Island Press, Washington, D.C. 2001. P 88-93.

the greenway but done so in a manner that does not lead to cluttering the landscape.

Creating a uniform graphic system of signs is an important method for linking various elements of the greenway corridor together. It is a way to establish an immediate connection between the user and the greenway. The Delaware & Lehigh National Heritage Corridor has established design guidelines for developing a signage system. These guidelines should be referenced when developing signs for the Two Rivers Area Greenway.

The materials chosen to use for constructing a sign system should be consistent and take into account budget, aesthetics, durability and maintenance costs. Some options for materials include plastics, fiberglass, wood, aluminum, steel, brass, bronze, stone, fabric and recycled products. Consideration should be taken when selecting materials to give the sign prominence but still blend well with the surrounding environment. Creating a uniform sign system can provide a basis for defining a greenway trail's identity. This can be reinforced by the creation of a trail logo, which can be used throughout the greenway system and provide users a visual key to identify.



easy



moderate



difficult



most difficult

Universal Design Symbol

Regulatory Signs

Regulatory signs describe the laws and regulations that apply within the greenway, such as stop signs, speed limit signs and permitted use signs. These signs are usually posted where the regulation applies.

Warning Signs

Warning signs inform the users of existing or potentially hazardous conditions along the trail. These signs are mounted prior to the condition to allow time to make the necessary preparations, such as reducing speed. Signs should be used near intersections, bridges and tunnels. Warning signs can also be used to bring attention to changes in the trail's grade or surface.

Informational Signs

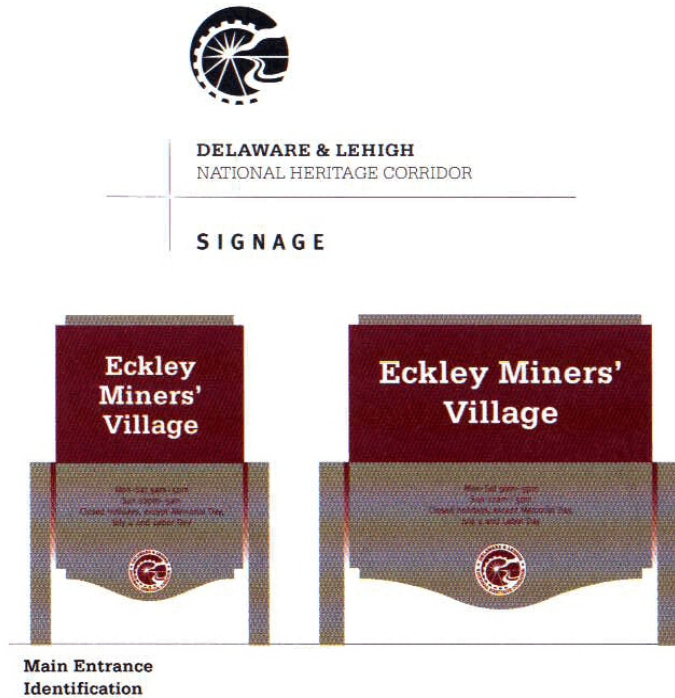
Informational signs orient users to their position within the greenway. They are used to provide knowledge to users about travel distances, orientation to the trail and nearby amenities such as restrooms or food. Informational signs also can provide temporary public information such as concerts or other events. These temporary signs are often contained at kiosks in central locations like trailheads. Informational signs can also tell users about the level of difficulty of the trail before they chose to go on it. The Universal Design Symbols and trail difficulty rating system can help individuals determine if the trail is within their ability and interest. This information, which is provided at the trailhead and at trail intersections, should include the Universal Design Symbol for trail difficulty, trail length, elevation change, running slope (average and maximum), cross slope (average and maximum), trail width (average and maximum) and surface conditions.

Educational Signs

Educational signs point out areas of interest that make the trail unique, including natural or cultural features. Interpretive displays for greenways can provide educational information about the significant environmental or cultural qualities of the area. The standards devised for the Delaware & Lehigh National Heritage Corridor can provide an solid baseline to work from for creating an interpretive display style distinctive to the Two Rivers Area Greenway. These guidelines can be found in *Visually Speaking: Design Guidelines* (1995) and the *Delaware & Lehigh National and State Heritage Corridor Landing Exhibits and Flexible Exhibit System* (1997).

Sign placement along the trail is important because a poorly located sign may not properly inform the trail user and could become potentially hazardous. Signs located on posts should be at least three feet off the edge of the trail and be raised four to five feet off the ground. Information or education signs that do not contain traffic oriented material should be placed a minimum of four feet off the edge of the trail. This will allow the sign to be viewed by people while keeping a clear travel area for the trail. Adequate site distances should be allowed for users to read warning and regulatory signs. In the case of a

cyclist moving 20 mph, a minimum site distance is 100-125'. Warning signs should be placed 125-150' prior to the condition they address. Stop signs should be visible from a minimum of 200', with warning signs placed a minimum of 400' from the intersection. The MUTCD provides guidelines for proper placement of signs along trails designed for cyclists.



Main Entrance Identification
Main Entrance Signage Example from the Delaware & Lehigh National Heritage Corridor

Greenway Trail Infrastructure

Greenway trail infrastructure are the support facilities the trail should have in order for users to have a pleasurable experience. The location and amount of support facilities provided will be dependant on the trail's popularity, the resources of the managing agency and the infrastructure that is already in place. Although the trail may not warrant the creation of restrooms or large trailhead parking areas when it is first constructed, there may be a desire to develop these facilities as popularity increases.

Access Points, Trailheads and Parking Facilities

Access to the greenway trail system can occur from a variety of locations, the most common of these being road crossings and trailheads. Access points may contain trail maps and other signs. Road crossings, especially in urban and suburban environments, can provide an easily accessible means for local residents to reach greenway trails. Trailheads can be located near public parks, shopping centers or other prominent sites near the greenway trail system. Access points, trailheads and parking areas are often the first and last impression of the greenway so it is important to put time and energy into their design, appearance and function. These facilities should be located in areas that make it convenient for people to use the trail system for commuting to and from work or school by providing an opportunity for an alternative transportation route. This helps to reduce congestion on the roads and may promote a healthier lifestyle. Whenever a private landowner is involved in the process of establishing access points, it is important to make contact early on in the project in order to establish a positive working relationship.²⁴

Prior to undertaking the construction of additional parking areas, an evaluation of existing facilities should be completed. Wherever it is possible, existing parking areas should be taken advantage of, although agreements may need to be reached to allow trail users access. This helps to reduce the need for developing new parking areas, which is contradictory to the preserve and conserve concept for establishing greenways. If new parking facilities are required, they should be located at the edge of the greenway, in a location that will require minimum disturbance and away from environmentally sensitive areas. Existing brownfields should be locations to consider for developing parking facilities. Providing a minimum amount of parking spaces at first will reduce development impacts and costs. Allowing for expansion in the future, if demand increases, is recommended but parking areas should be no larger than ten to twenty spaces. If additional spaces are needed, these should be located in other areas along the greenway, first taking advantage of existing facilities. The parking area can be constructed using natural materials such as stone or from surfaces such as porous asphalt or concrete and grid pavers. Handicap accessible spaces will be required to have firm, stable and slip resistant surfacing. The parking area should have an obvious connection to the trail. Convenient pedestrian access should be maintained to the trails, which can be in the form of an accessible route from the handicap spaces and drop-off area. This will help to minimize the desire to create shortcuts to the trail, which can result in negative environmental impacts or trespassing on private property. In areas where equestrian use is allowed, larger stalls should be provided for horse trailers.²⁵

Restrooms

Restrooms are a facility that requires careful consideration prior to installation. Expensive to install and maintain, they can be the target of acts of vandalism. Access to public water and sewer can also play a role in the decision to install restroom facilities. If one or both of these utilities are not

²⁴Flink, Charles A. and Robert M. Searns. *Greenways, A Guide to Planning, Design and Development*. Island Press, Washington, D.C. 1993. P 268.

²⁵Flink, Charles A. and Robert M. Searns. *Greenways, A Guide to Planning, Design and Development*. Island Press, Washington, D.C. 1993. P 242-244.

available, alternatives may include wells, septic systems, portable toilets or composting toilets. The use of these options is dependant on local codes. Restroom facilities can be an opportunity to exercise green architecture practices when designing, locating and constructing the building. As with parking, it may be possible to institute agreements with adjacent establishments to use existing facilities. This may reduce or alleviate the need to create new restrooms. Signs should be installed indicating the location of the restroom facilities.²⁶

Benches, Rest Areas and Receptacles

Benches and rest areas along the greenway trail system provide a place for users to rest, gather, picnic or partake in nature viewing. Benches come in numerous designs and, along with rest areas, should be located at regular intervals along the trail as well as at trailheads. Benches, like signs, should be located three feet from the trail's edge. Receptacles for trash and recyclable material trail users generate should be located at rest areas and trailheads and should be easily accessible to users as well as maintenance personnel. By placing these at regular convenient intervals along the trail, users should be more inclined to take advantage of them in place of littering. The need for additional receptacles may arise depending on use trends, the location of establishments selling beverages, food or other trash generating wares and other unforeseen factors that may generate a litter problem. Table 24 illustrates the frequency and size of rest areas in different trail settings.²⁷

Table 24
BENCH AND REST AREAS

<i>Location</i>	<i>Interval</i>	<i>Persons Accommodated</i>
Wilderness	5 mile	2-4
Rural	2 mile	4-6
Suburban	½ mile	4-6
Urban	As often as necessary	-

*Landscaping*²⁸

Landscaping helps to beautify the trail and provide buffers or screening. It also should enhance the ecological value of the greenway corridor. The use of native vegetation can help to strengthen the environment and restore areas that have been degraded, such as riparian buffers. The type of

²⁶Flink, Charles A., Kristine Olka and Robert M. Searns. *Trails for the Twenty-First Century*. Island Press, Washington, D.C. 2001. P 96-97.

²⁷Flink, Charles A. and Robert M. Searns. *Greenways, A Guide to Planning, Design and Development*. Island Press, Washington, D.C. 1993. P 270.

²⁸Flink, Charles A., Kristine Olka and Robert M. Searns. *Trails for the Twenty-First Century*. Island Press, Washington, D.C. 2001. P 105-109.

landscaping implemented along the greenway trail is contingent upon the desired goals to be achieved and the conditions of the area. An inventory of the environmental features of the area will help to determine if remediation measures will be necessary. Site conditions will help to determine the types of plants most suitable, such as those that are wetland or drought tolerant species. Although there will always be a need to provide some upkeep along the trail, the use of native plants in “natural” designs can help to minimize maintenance costs.

Large trees and shrubs can be used for creating shade, defining spaces, providing a visual screen for adjacent properties, blocking wind and framing views. Smaller shrubs and plants help to reduce maintenance by crowding out weeds and provide additional visual interest for the trail users. Ground cover, in the form of native grasses, vines and other perennial plants, provides food and cover for wildlife. A maintenance schedule will need to be established in urban, suburban and rural settings for mowing and trimming to keep the trail corridor free of encroaching plant material. Safety is an important element along any trail and visibility is an important factor regarding safety. A safe sight distance should be maintained along urban and suburban trails.

Fencing

In some instances, a vegetative buffer may not suffice to provide the desired separation or barrier between the greenway trail and adjacent land use. If no satisfactory alternative solution can be reached, it may be necessary to install a fence. Fences come in different styles depending on their desired function and can be constructed from various materials, including wood, metal and stone. Fences should be constructed so as to not detract from the greenway corridor by creating barriers to wildlife or being visually unattractive. Agreements may be reached at the beginning of a project to forego constructing a fence for a period of time if a landowner perceives a need to have a fence installed because of a fear related to trail use near their property. After the allotted time, if it is still desired to construct the fence, this can be done.²⁹

Compatibility with Adjacent Land Uses

When planning any type of land use, it is necessary to study the compatibility of that land use with surrounding ones. Fortunately, greenways are compatible with nearly all other land uses. It is important to tactfully explain this compatibility when approaching existing landowners to request easements. The following describes the potential impacts of developing or maintaining a greenway adjacent to other land uses.

Agricultural and Vacant Land

Greenways next to agricultural or vacant land area creates a mutually beneficial relationship. The possibility for farms to be preserved in an agricultural easement is greater when they are next to

²⁹Flink, Charles A. and Robert M. Searns. *Greenways, A Guide to Planning, Design and Development*. Island Press, Washington, D.C. 1993. P 267-268.

greenways, rather than next to developed areas. Likewise, greenways become more attractive when they connect large areas of open space. The adjacent farms, fields, and woods then become an unofficial component of the greenway, resulting in larger, more contiguous areas of open space. This is a benefit to both wildlife and scenery. Greenways among tracts of unprotected vacant land can help in securing *green infrastructure* inside future developments before they are built. In areas that will remain agricultural, greenways help filter runoff, which may contain fertilizer, herbicides, and animal waste.



An example of existing greenway infrastructure adjacent to agricultural lands.

Residential Land

Greenways have been shown to improve the quality of life for those live near it. In residential areas, greenways provide the scenic benefit of protected woodlands in contrast to the developed landscape. In the case of recreation greenways, nearby residents can enjoy exercise opportunities and alternative transportation options. In addition, property values of homes and lots adjacent to greenways can be slightly higher than comparable homes and lots away from a greenway. Perceived negative aspects of greenways adjacent to residential areas include criminal access and wildlife nuisances. Very few, if any, greenway trails have resulted in an increase crime. In fact, the positive benefits of a greenway often improve neighborhoods and reduce crime in the long run. With regard to wildlife, landowners should expect to see animals when living next to woodlands, regardless of whether or not it is designated as a greenway.

Commercial and Industrial Land

Commercial and industrial properties tend to include the most intense land uses, and experience heavy traffic, large impervious areas, and sometimes pollution. Adjacent greenways can help in several regards. Just like in residential areas, greenways in commercial and industrial areas can provide scenic relief in an otherwise built-up environment. Greenways containing riparian buffers can help filter runoff that may contain automotive fluids, industrial by-products, and warm water. This keeps streams clean and at the correct temperature for aquatic life. Recreation greenways offer an alternative means for both customers and employees to arrive at commercial and industrial destinations. When recreation greenways are located near town centers, they may become part of the destination (e.g. dinner, shopping, and a stroll along the nearby creek.)

Institutional Land

Schools, colleges, municipal offices, churches, post offices, and other institutional facilities are used on a regular basis by the public, sometimes heavily. Many area schools are at capacity, and school traffic accounts for a significant percentage of total trips in any community. Recreation greenways offer an alternative means for arriving at these places. Schools and colleges can use the greenways for educational purposes, as a research ground and showcase for environmental science and planning. Volunteer clean-up and maintenance efforts of greenways are likely to be performed by institutions that are located adjacent to the greenways.

Recreation and Open Space Land

Greenways belong to this land use category, and are therefore very compatible. Parks and open spaces provide the destinations or *nodes* around which greenways are designed. Together, parks, open spaces and greenways create a healthy network of green infrastructure that benefits scenic, recreational, and wildlife resources. Recreation greenways offer alternate ways of arriving at parks. This becomes an attractive option for organized sports practices and games, as well as informal use.

Transportation and Utility Land

Greenways have varying degrees of compatibility with transportation and utility corridors. Roadways inside or along greenways have a two-sided relationship. On one side, new roadways should not be built in these areas, as the greenways are designed primarily to protect sensitive natural resources. On the other side, many greenways can be established in corridors that already contain both a waterway and a roadway. In this respect, the greenway becomes a scenic by-way where motorists can enjoy a tree canopy and visit various natural or historic sites. Vegetation between the road and the stream can filter roadway runoff. Railroads are less intrusive and more pervious than roads, but can also pose a safety hazard along recreation greenways. Signage and signals would alleviate this concern. Public utilities, such as electric, gas, or sewer lines, are compatible with greenways. These linear features often provide a cleared pathway where a trail can be developed. They also provide the opportunity to negotiate with a single landowner or easement holder in an extended corridor. Non-linear transportation and utility land, such as substations, treatment plants, and compressor stations, are compatible with greenways as long as they are fenced. Some zoning ordinances require a tree buffer to surround such features.

Greenway Concept Plan

The Two Rivers Area Greenway Plan presents the opportunity to implement a number of the strategies outlined above. The following concept plan works to establish connections between the hubs of Blue Mountain, the Reading Prong, Jacobsburg Environmental Education Center, the Delaware & Lehigh National Canal Heritage Corridor and Trail, Easton and many of the other population centers found in the study area. The corridors will attempt to provide a location for all

citizens to recreate, participate in activities that will help generate a healthier lifestyle, have access to alternative transportation options and protect natural resources.

Key Nodes and Special Features for Preservation in the Two Rivers Area

As defined in the *Pennsylvania Greenways: An Action Plan for Creating Connections*, greenway corridors, or “spokes,” may connect with numerous nodes, or “hubs.” These may range from small municipal parks to large areas of preserved land and they may be environmentally significant locations or cultural centers. These nodes can include areas identified as special features for preservation. For the purpose of this plan, major key nodes will be identified. Minor nodes, such as parks, schools, historic locations, preserved farms and unique natural areas will be listed. Potential corridors for linking these nodes will be identified and mapped in this section of the plan. In some cases, the identified cultural or institutional resources may not be able to be directly linked to the greenway corridor and will require the use of sidewalks or streets to establish a connection.

Maps 13 and 14 show the conceptual “hub and spoke” configurations of the proposed greenways. Map 13 demonstrates the proposed conservation greenway network. Jacobsburg E.E.C. serves as the major hub of open space, while the Bushkill Creek, Blue Mountain, Delaware River, Lehigh River, and Highlands function as linear spokes of open space. Smaller spokes include Fry’s Run and Schoeneck Creek. Map 14 is a schematic of the proposed recreation greenway network for the Two Rivers Area. These link major population hubs such as Easton and Wind Gap, as well as recreation hubs including Jacobsburg E.E.C., Hackett Park, and the Lafayette University Athletic Fields. The Plainfield Trail, D&L Towpath Trail, Palmer Bikeway, and other trails become the connecting spokes.

Major existing hubs and spokes in the Two Rivers Area include the following:

- Blue Mountain - Blue Mountain is an important environmental component in the Study Area and part of a larger greenway corridor protecting the approximately 2,160 mile Appalachian Trail from Georgia to Maine.
- Reading Prong - Part of the Highlands Region, this geologic formation is the southern counterpart to Blue Mountain and contains a number of unique natural areas.
- Jacobsburg Environmental Education Center - This state park provides numerous outdoor recreation activities and habitat protection and includes portions of Sober’s Run and Bushkill Creek.
- The City of Easton and surrounding boroughs of Glendon, Wilson and West Easton - These municipalities contain the highest population concentration in the Study Area. They also provide a number of cultural and historic resources that should continue to be developed and promoted for tourism. The brownfield sites contained within these communities also provide an opportunity to redevelop and establish recreation and eco-based businesses within the Study Area.

- The boroughs of Wind Gap, Pen Argyl, Stockertown, Tatamy and Nazareth - These smaller municipalities provide a concentrated population to serve with a greenway. They also provide cultural and historic resources that should be preserved interpreted.
- Delaware & Lehigh Canal National Heritage Corridor and Trail - This existing corridor provides a number of historic and cultural resources as well as an existing trails system that will eventually be contiguous from Wilkes-Barre to Bristol.

The following is a list of additional historic, cultural, environmental or institutional nodes within close proximity to potential greenway corridors in the Two Rivers area.

Historic Elements

Isaac Stout House	Coffeetown Grist Mill
M. Opp Bridge	Chain Bridge (ruins)
Lehigh Navigation Canal	Delaware Division of the Pennsylvania Canal
Foothills Apartments	Lerch Farm
Heinley/Cubertson Farmstead	Waegener/Newlin's Mill Historic District
Gernet Farm	Lehigh & New England Railroad
Ebert/Knecht Store & House	Gun Factory
Catherine Furnace	Aluta Mill
Sours Mill	Dietz's Blockhouse
Haynes or Heyer Mill	Boulton
Lafon Mill	Upper Stockertown Mill
Henry's Forge	Friedensthal Mill
Woodring's Mill	Empire Agricultural Works
Messinger's Mill	Bridge at Michael Stocker's
Zuck's Mill	Walter's Upper Mill
Bridge at Walter's Upper Mill	Bridge at Bushkill Park
Walter's Lower Mill	Union Mill/Binney & Smith Plant
Rock Mill	Harster Flour Mill & Distillery
D.W. Howell Smoke & Hide House	Thirteenth Street Bridge
Wagener Oil Mill	Richard & Walters Soapstone MFG
Cemetery Bridge	Peter Kichline Grist Mill & Saw Mill
Nennig's Tannery	Groetzinger's Mt. Jefferson Mill
Slaughterhouses	Mann and Allshouse Lafayette Mills
Easton Icehouse	Hogtown Brewery
Simon Silk Mill	

Historic Districts

Easton Historic District	College Hill Residential Historic District
Jacobsburg Historic District	

Schools

Easton Children's Home	Philip F. Lauer Middle School
Easton Area High School	Wilson Area High School
Wilson Elementary School	Lafayette College
Nazareth Area High School	

Recreation and Open Space Sites

Fry's Run Park	Mariton Wildlife Sanctuary
Williams Township Sportsman Association	Melchor Tract
Delaware Canal State Park	Williams Township Park
Wy Hit Tuk Park	Raubsville Park
Palmer Bethlehem Township Bikeway	Bushkill Street Park
Hugh Moore Historical Park	Riverview Park
Riverside Park	Scott Park
Fairview Park	Butz Park
Hackett Park	Meuser Park
Bushkill Park	Palmer Municipal Complex Open Space
Forks Township Park	Penn Pump Park
Penn's Grant Open Space	Forks Township Athletic Fields
Branden Park	Lafayette University Land
Sawmill Golf Course	Stockertown Rod & Gun Club
Belfast Eberman Youth Club	Plainfield Township - Future County Park
Plainfield Township Farmers Grove	Jacobsburg Environmental Education Center
Bushkill Township Recreation Center	Meixsell Tract
Appalachian Lands - Moore Township	Graver Arboretum
Evergreen Lake Campground	Appalachian Park - Moore Township
Wolf Run Open Space	State Game Lands #168

Unique Natural Areas

Hexenkopf Wetlands	Hexenkopf Rock
Hexenkopf Slopes	Mariton Slopes & Uplands
Binney & Smith Woods	Easton Bluff
Rismiller Woods	Grand Central Woods
Moorestown Wetlands	Knechts Ponds
Jacobsburg Woodlands	

Preserved Farms

Kahler Farm	Wolfe Farm
Willard Setzer Farm	Wright Farm
Fulmer Farm	

Using the *Pennsylvania Greenways: An Action Plan for Creating Connection* publication as a guideline for creating a network of spokes and hubs, the Two Rivers Area Greenway Concept plan establishes a means to institute connections between the above mentioned major nodes and many of the minor ones as well. The Study Area encompasses approximately 109 square miles and includes the Bushkill Creek watershed; areas in the Easton vicinity that drain directly into the Lehigh and Delaware rivers; and Fry's Run, Raubsville Run, Morgan Valley run, Bull Run, Frost Hollow Run and four unnamed tributaries. In an effort to better facilitate planning efforts, the study area has been divided into four sub-areas (shown on Map 16). These are the Upper Watershed, Middle Watershed, Urban Core and Williams Township. The Upper Watershed encompasses the area north of Nazareth and Stockertown to Blue Mountain, including Jacobsburg Environmental Education Center and the Plainfield Township Trail. The Middle Watershed covers Nazareth and Stockertown south to the Lehigh River, excluding the City of Easton and surrounding boroughs, which constitute the Urban Core. The final sub-area is Williams Township, which includes the Reading Prong.

The overall concept and purpose of the Two Rivers Area Greenway Network is to create a contiguous greenway along the Bushkill Creek Corridor with an emphasis on protecting the headwaters areas of the Bushkill Creek, providing recreation opportunities in the Urban Core, Middle and Upper Watershed areas, preserving the riparian buffers along the tributaries within the watershed, the creation of a greenway in Williams Township along the Reading Prong and reinforcing the connection to the Delaware & Lehigh National Heritage Corridor and Trail. The natural elements that should be included in the greenway corridor vary depending on their location, but generally include:

- The 100-year floodplain
- Existing woodlands that are contiguous with riparian areas
- Existing wetlands and hydric soils that are contiguous with riparian areas
- Existing slopes greater than 25% that are contiguous with riparian areas
- 100-foot buffers of perennial streams
- 50-foot buffers of intermittent streams

The width of the corridor should be dependant upon the width of the 100-year floodplain, existing riparian woodlands, the development potential of surrounding land due to restrictions such as steep slopes, hydric soils and other environmental constraints and the existing adjacent land uses. Large areas of woodlands contiguous to streams can be included in the preserved greenway corridor, and contiguous areas of farmed prime agricultural soil should be preserved under agricultural conservation easements. In more urbanized areas, where the corridor is restricted by existing development, its width may be narrower, although an effort should be made to incorporate as many adjacent greenway elements as possible.

The plan also seeks to enhance the existing greenways found along the Delaware and Lehigh rivers. This can be done by protecting the wooded slopes along these rivers and encouraging the adaptive reuse of brownfield sites into eco-tourism or recreation based businesses. The various islands and parks along each of the rivers, especially those that have been identified as outstanding natural areas

at the state or local level, should also be incorporated into the greenways plan.

Other goals of the concept plan should include the implementation of an educational outreach program regarding the value of greenway creation and protection. This program should target municipal officials and private landowners near proposed greenways but also include the general public. Municipalities should be strongly encouraged to develop ordinances that require greenway dedication of open space along the greenways, which may protect wooded riparian buffers and prime agricultural soils along the corridors. This can help to encourage more sustainable growth patterns. Another emphasis of this program should be the importance of maintaining riparian buffers along streams and working to implement best management practices for residential and agricultural areas. Agricultural best management practices should be encouraged, especially the reparation of riparian buffers where they have been removed.

This plan also supports the creation of a new education/visitor center at Jacobsburg E.E.C. Park officials state a need for enhanced visitor facilities, more office space, formal meeting facilities, and classroom space. Such a facility would not only enhance the park, but also become a resource for watershed-oriented education and a meeting place for community environmental groups.

Entire Study Area Goals

- Establish a contiguous greenway along the Bushkill Creek Corridor with an emphasis on protecting the headwaters areas while providing recreation opportunities.
- Establish an education program to inform the public, including municipal officials, of the benefits conservation and recreation greenways provide, with an emphasis on the importance of riparian buffers.
- Encourage riparian easements and land donations through education and outreach.
- Work with landowners adjacent to existing greenways and water courses to maintain, enhance or reestablish riparian buffers.
- Preserve additional agricultural farmland with a focus on large areas of contiguous farmland, especially those adjacent to existing or potential greenways while encouraging best management practices on all farms.
- Investigate the establishment of greenways along existing rail corridors (if the lines are abandoned), as well as on road rights of way, and utility rights of way.



This existing trail to the Delaware River in Forks Township should be completed to the Bushkill Creek.

- Incorporate and enhance existing recreation and open space areas into the greenway plan such as Jacobsburg Environmental Education Center and continue to support the development of the Delaware & Lehigh National Heritage Corridor.
- Provide guidance to municipalities for updating zoning and subdivision and land development ordinances to promote sustainable growth and conservation of natural resources by incorporating sustainable development practices such as requiring open space dedication along water courses.
- Promote water quality, wildlife habitat, recreation opportunities and conservation of the 100-year floodplain, agricultural farmland, woodlands, wetlands, hydric soils, slopes over 25% and 100' and 50' riparian buffers of perennial and intermittent streams, respectively.
- Redevelop brownfield sites within the watershed, especially those located along or near greenway corridors, to encourage sustainable development practices. Sites within close proximity to the greenway should be developed with an emphasis on recreation, tourism and eco-businesses.
- Install signage delineating the greenway along roadways similar to those used for identifying watershed districts.
- Encourage riparian easements and land donations through education and outreach.
- Promote water quality, wildlife habitat, recreation opportunities and conservation of the 100-year floodplain and riparian buffers.
- Conserve existing greenway infrastructure by encouraging riparian buffer conservation, land donations or easements and conservation of existing woodlands.
- Encourage farmland preservation by developing equestrian farms and bed & breakfasts in appropriate locations.
- Develop separate parking areas for equestrian use in appropriate areas.

Upper Watershed

The Upper Watershed, because it has not yet experienced the development pressures occurring elsewhere in the study area, provides an opportunity to establish protection for the headwaters of the Bushkill Creek watershed, important for maintaining water quality, and existing natural corridors. These may be in the form of conservation greenways, some with low impact trail development. These corridors provide a migration route between Blue Mountain and Jacobsburg Environmental Education Center. Areas to be protected as greenways in the Upper Watershed should include the following:

- The 100-year floodplain
- Existing woodlands that are contiguous with riparian areas
- Existing wetlands and hydric soils that are contiguous with riparian areas
- Existing slopes greater than 25% that are contiguous with riparian areas
- 100-foot buffers of perennial streams
- 50-foot buffers of intermittent streams

Those conservation greenways within outstanding natural areas such as the Moorestown Wetlands, Knechts Pools and Rismiller Woods, which are of state significance, should have higher priorities

for protection. Conservation greenways along the upper Bushkill Creek and Sober's Run, including their headwaters areas, joined with Jacobsburg Environmental Education Center and Blue Mountain, can form a greenbelt in Bushkill Township around an area zoned for medium-density residential development. The Plainfield Township Trail Greenway, which can protect woodlands along the Little Bushkill Creek, should continue to be developed as a recreational greenway, linking with the proposed Tatamy Rail Trail via Stockertown Borough. This trail can also be linked to the Appalachian Trail and to Wind Gap and Pen Argyl boroughs.

Recreation greenways with unpaved trails may be created along the abandoned Lehigh & New England Railroad grade and the PPL right of way between Blue Mountain and Jacobsburg Environmental Education Center. The trail along the Lehigh & New England Railroad grade will provide a parallel route to the Appalachian Trail along the base of Blue Mountain following this nationally recognized historic transportation route. Environmentally sensitive sustainable economic development could be implemented on brownfield sites located near the headwaters for Sober's Run. Development of this nature would help to mitigate any environmental degradation that may have occurred and improve the health of the stream by reestablishing riparian buffers.

Upper Watershed Goals

- Promote water quality and wildlife habitat protection and continuity through conservation of riparian woodlands, 100-year floodplains, wetlands, hydric soils, slopes over 25% and 100' and 50' buffers of perennial and intermittent streams, respectively.
- Enhance Jacobsburg E.E.C. with a new education/visitor center, featuring expanded visitor interpretation facilities, office space, meeting space, and classroom accommodations.
- Promote environmentally sensitive economic development on brownfield sites near Sober's Run headwaters near Wind Gap.
- Establish an unpaved, multiple use trail on the PPL utility ROW connecting Jacobsburg Environmental Education Center to Blue Mountain.
- Create conservation greenways along the Bushkill Creek, Sober's Run (including all tributaries) as well as the Little Bushkill Creek and its tributaries. These conservation greenways should promote water quality and wildlife habitat protection and connectivity, protect riparian woodlands, wetlands and floodplains, work to improve existing riparian buffers, secure agricultural easements for farmland adjacent to these stream corridors, work with landowners to reestablish riparian buffers where they have been removed. Areas such as the Moorestown Wetlands, Knechts Pools and Rismiller Woods, which are of state significance, should be high priorities for conservation greenways.
- Establish a multiple use trail on the abandoned Lehigh & New England Railroad grade. A feasibility study for this project should be completed.
- Create recreation greenways connecting Jacobsburg Environmental Education Center with the Palmer Township Bikeway, Plainfield Township Trail, Blue Mountain, Nazareth Borough and Bushkill Center.
- Establish a multiple use trail connecting Jacobsburg Environmental Education Center, Plainfield Trail and Tatamy Trail through Stockertown Borough.
- Limit trail development and human access to appropriate corridors.

- Protect portions of Blue Mountain under non-public ownership.
- Establish trail connection from Plainfield Trail to Appalachian Trail and Pen Argyl.
- Create a greenbelt the corridors along Bushkill Creek, Sober's Run and incorporating Jacobsburg and Blue Mountain to promote sustainable growth in the Upper Watershed.

Middle Watershed

The Middle Watershed connects the Upper Watershed with the Urban Core. The primary greenway type established here should be a recreation greenway, with either unpaved or paved multiple use trails. This should be created along the main greenway corridor surrounding Bushkill Creek. The Little Bushkill Creek joins Bushkill Creek near the Tatamy Borough and Stockertown Borough borders and it is through these municipalities the Palmer Township Trail should be connected to the Plainfield Township Trail, via abandoned rail beds and the proposed Tatamy Rail Trail. A recreation greenway can also be established connecting the Delaware River with Bushkill Creek via Forks Township. Segments of this potential connection have already been completed. The Palmer Township Trail along Bushkill Creek from Wilson Borough to Tatamy Borough should be completed. This should incorporate the Binney & Smith Woods. Where applicable, interpretation signs may be located along the trail identifying historic sites or locations. These signs should be done to reflect the design guidelines of the Delaware & Lehigh National Heritage Corridor.



An existing rail bed in Palmer Township proposed to receive improvements and become a multiple use recreation greenway trail.

The Middle Watershed should contain conservation greenways in coexistence with the recreation trail improvements, and also in areas without proposed trails. These should include the 100-year floodplain, 100-foot buffers of Bushkill and Schoeneck Creek, and 50-foot buffers of all other perennial streams.

The municipalities in this area of the project should be strongly encouraged to develop ordinances that require greenway dedication of open space along the corridors, protecting wooded riparian buffers and prime agricultural soils along the stream corridors. Agricultural best management practices should be encouraged along the corridor, especially the reparation of riparian buffers that have been removed.

The Middle Watershed also contains a number of sinkholes, due to its underlying carbonate geology. Existing sinkholes and other karst features should be protected from development by a buffer ordinance. This plan also supports scientific monitoring and regulatory action to address the occurrence of sinkholes that may or may not be related to quarry operations in the area. Interpretive signs on the causes of sinkholes could be placed along nearby recreation trails.



An example of a historic element that could receive an interpretive display.

Middle Watershed Goals

- Preserve 100-year floodplains and 100' and 50' streamside buffers for water quality and scenic purposes.
- Keep development away from existing sinkholes, while addressing the overall sinkhole problem with scientific monitoring and regulatory action.
- Require open space dedication along streams in new developments through mandatory dedication for developers.
- Preserve additional farmland west of Route 33 with a focus on large areas of contiguous farmland in Lower Nazareth Township and Northern Forks Township while encouraging best management practices on all farms.
- Provide historic interpretation along the greenways, especially in areas surrounding Bushkill Creek, by installing interpretation signs at historic sites.
- Establish conservation greenways along unnamed tributaries of Bushkill and Schoeneck creeks
- Establish recreational greenways along Schoeneck Creek and Bushkill Creek.
- Complete the Tatamy Trail and establish a Stockertown Borough trail, connecting the Palmer Township Trail to the Plainfield Township Trail and Establish multiple use trail connecting these trails to Jacobsburg Environmental Education Center.
- Complete the connection of the Delaware River and Bushkill Creek through Forks Township
- Complete the Palmer Township Trail along Bushkill Creek from Wilson to Tatamy, a means of connecting the main campus of Lafayette University to the school's athletic fields.
- Incorporate existing recreation and open space features into the greenway plan, such as Binney & Smith Woods, Lafayette sports complex and the numerous municipal parks in Forks and Palmer Townships.
- Enhance stream banks and riparian areas and protect them from erosion during times of flooding with additional trees and vegetation.

Urban Core

The municipalities constituting the Urban Core include the City of Easton and the boroughs of Wilson, West Easton and Glendon. This area provides the most dense population concentration in the study area. As a result, this area presents the best opportunity for creating recreation greenways with paved multiple use trails (Map 17). The existing trail systems along the Delaware and Lehigh Rivers and the nearby Palmer Bikeway can be enhanced by linking them together. One major link should be created in Easton along the Bushkill Creek between the Binney & Smith Black Mill and the Delaware River. In Wilson and West Easton Boroughs, paths should be established along abandoned railroad lines and associated infrastructure. The close proximity of a well designed and implemented multiple use trail system can provide area residents the opportunity to participate in recreation activities and encourage a healthier lifestyle. The system can also provide commuters an alternative means to get to and from work or school, reducing traffic volume in the Easton area.

As another major goal, the Urban Core presents plentiful opportunities for the redevelopment of brownfield sites. The Simon Silk Mill, Bushkill Street buildings, South Easton Rail Yard, Reda Property, and other sites stand either vacant or underutilized. These sites can be adaptively reused by renovating and/or replacing structures. When doing so, efforts should be made to restore the buildings that have exceptional historic or architectural qualities. Brownfield sites can house a number of new enterprises, including retail businesses, offices, high-density residential dwellings, and active recreation facilities. Recreation and eco-based businesses would be especially appropriate here. As an end result, new attractions in the Urban Core could keep tourists in the area for more than an afternoon, new infill development could populate the Easton area in a smart-growth fashion, and the Urban Core could be revitalized as a whole.

Establishing a greenway corridor through the Urban Core also provides the opportunity for riparian buffers to be enhanced, reestablished or cleaned up. Some streamside areas are currently tainted junkyard contaminants, illegal dumping and the cumulative wastes of past industry. Other streamside areas simply lack any type of buffer, having been replaced with concrete walls or highway embankments in the last century. The Bushkill Creek and Spring Brook especially offer an opportunity for environmental upgrades in an urban setting.

Urban Core Goals

- Complete a multiple use trail system linking the Palmer Bikeway, Delaware & Lehigh Trail, and Center City Easton, including trails along the Bushkill Creek and along abandoned rail corridors.
- Redevelop brownfield sites along Bushkill Creek and Lehigh River, encouraging recreation and eco-based businesses.
- Clean-up, enhance and protect riparian areas.
- Complete recreation greenways to create a multiple use trail system linking Palmer Bikeway, Delaware & Lehigh Trail and Center City Easton incorporated the hubs of Hackett Park, Hugh Moore Park, Easton Business District, Palmer Town Center, Palmer Recreation Center Easton Area High School, Lafayette College, Binney & Smith Woods, Easton Bluff and abandoned rail corridors and infrastructure.

- Redevelop brownfield sites along Bushkill Creek and Lehigh River, such as the Simon Silk Mill, North Third Street at Bushkill Creek, South Easton rail yards and the Reda Property in West Easton, encouraging recreation, tourism and eco-based businesses
- Clean-up, enhance and protect riparian areas
- Enhance existing tourism-based amenities such as the Two Rivers Landing area in Easton by establishing a link to the greenway network.



The Simon Silk Mill presents an opportunity to redevelop an abandoned industrial site into a business center for recreation-based enterprises as well as other economically viable ventures.

Williams Township

Williams Township presents an opportunity to create greenways based not only on water resources, but also on wooded ridges. The Reading Prong, which is part of the larger Highlands Region, blankets the township with substantial belts of upland forest. Although much of these areas are in private ownership, an opportunity exists to create a conservation greenway along these steep, wooded slopes and ridges. Such a greenway would protect the upland forest and geologic features of the Reading Prong, including Gaffney Hill, Hexenkopf Rock and Wetlands and Elephant Rock, which are identified outstanding natural areas. By nature of geometry, these features are also visually prominent. Protecting them in a conservation greenway would preserve the associated viewsheds, maintaining the scenic value of the area. This greenway could be designated as the Reading Prong Greenway, and recognized as a positive effort in protecting Pennsylvania's portion of the Highlands Region.

Also in Williams Township is the Mariton Wildlife Sanctuary, which contains the Mariton slopes and uplands. These features have been identified as outstanding natural areas of local and state significance, respectively and are included in the Bougher Hill critical treasure area as identified by the Highlands Coalition. This area could be incorporated into the greenway network.



The wooded ridge lines and fertile valleys in Williams Township could receive valuable protection as part of the Two Rivers Area Greenway network.

Stout's Valley offers the opportunity to preserve agricultural land through easements and the implementation of best management practices for farming. The Highlands Coalition has identified Stouts Valley as a critical treasure, containing

Class I and II Prime Agricultural soils and Fry's Run, a high-quality cold water fishery. Fry's Run currently has a modest riparian buffer that could be enhanced through ordinance or conservation easement. Together, Fry's Run and the surrounding farmland could comprise a Stouts Valley conservation greenway, which would be connected to the Delaware River greenway.

Immediately south of Interstate 78, north-facing steep slopes have been under development. These slopes are highly visible from the populous Urban Core and beyond. Most notably, the Chrin Brothers landfill and Country Classics at Morgan Hill townhouse/golf course development occupy large portions of north-facing Morgan Hill. Due to the visual prominence and erosion-prone nature of these slopes, this plan recommends the protection of remaining woodlands and the re-vegetation of vacant areas on developed properties. Chrin Brothers may consider implementing a conservation plan that would re-establish native grasses on permanently-capped landfills. This will help to recreate an environment indigenous to the area, providing more habitat for species that would otherwise become permanently displaced by the mown grass environment typical of closed landfills.

Enhancing the existing greenway along the Delaware River and Delaware Canal is another major goal. This includes protecting the steep, wooded slopes that drop down to the river valley. Raubsville, identified by the Delaware & Lehigh Canal National Heritage Corridor Plan as a key site within the corridor yet to be interpreted, can be incorporated as a cultural resource in the greenway plan along the Delaware Canal State Park. This area contains the Raubsville Lock 22-23 site, an outstanding natural area of state significance.

Across the Delaware River in New Jersey, the New York / New Jersey Trail Conference (NYNJTC) is developing the Highlands Trail, which will link numerous existing recreation and open space areas in the Highlands province between Storm King Mountain on the Hudson River, southwestward to Phillipsburg. Appropriate entities in Williams Township may consider cooperating with the NYNJTC to extend the trail into Pennsylvania, using existing trails and roads, and possibly using new trails within future open space areas that are publicly-accessible.



The Delaware Canal Trail and adjacent steep, wooded slopes are existing greenways components in Williams Township near Raubsville.

Williams Township Goals

- Protect upland forest and geologic features of Gaffney Hill, Hexenkopf Rock and Elephant Rock by creating a woodlands ordinance or through designation on an official map.
- Protect remaining woodlands along Morgan Hill and encourage grassland vegetation at the Chrin and Country Classics properties.
- Preserve additional agricultural land in Stout's Valley with a focus on large areas of contiguous farmland while encouraging best management practices on all farms.
- Conserve streamside buffers along Fry's Run.
- Restrict development and tree-cutting on north facing slopes south of I-78.
- Encourage riparian easements and land donations through education and outreach.
- Protect wooded slopes along the Delaware River.
- Add additional interpretation along Delaware Canal at Raubsville.
- Consider a possible extension of the Highlands Trail into Pennsylvania.

The following three maps summarize the major goals of this greenway plan. Map 15 shows the current amount of protected green space compared to the potential amount of green space upon the full implementation of this plan. Current green space includes recreation and open space sites, agricultural conservation easements, as well as natural features that are formally protected under municipal ordinance (as summarized in Table 12 of this report). Proposed greenways includes areas recommended for protection under the "goals" portion of this Greenway Plan. Map 16 is a more detailed graphic, showing existing and proposed greenways, accompanied by major points of this plan. Map 17 is an enlargement of the Urban Core, showing recommended trail improvements in the context of major activity hubs.

IMPLEMENTATION PLAN

The following section summarizes recommendations for establishing a greenways network in the Two Rivers Area. Major actions are summarized in the Action Table below, followed by descriptions of land preservation techniques, possible sources of funding, key organizations and individuals, and a possible greenway management structure. These actions, their priorities, timing and responsible organizations are intended to serve as guidelines. Opportunities may occur that require deviation from these guidelines in order to achieve other goals in the greenway plan

Table 25
ACTION PROGRAM

Recommended Action	High Priority	Timing*	Responsible Organizations
Organize for Plan implementation using the Bushkill Stream Conservancy as the lead entity and initiate the Lasting Landscapes® program with the Heritage Conservancy.	✓	S	BSC
Pursue a Two Rivers Greenway Implementation Project, bringing together multiple state agencies to apply this greenway plan, and to serve as a demonstration project for the PA Greenways Action Plan.	✓	C	DCNR, BSC
Establish an educational outreach program to educate private landowners, municipalities, developers, etc. of the importance of the greenway and its associated features.	✓	C	BSC, NC
Work with Municipalities to amend zoning and subdivision and land development ordinances to protect greenways and to require the dedication of open space along greenway corridors, streams, steep slopes and other environmentally sensitive features.	✓	C	BSC, GBs, NC, PCs, LVPC
Work with municipalities to incorporate the greenway plan features in their official map.		C	BSC, GBs, NC, PCs, LVPC
Work with municipalities to adopt the Two Rivers Area Greenway plan.	✓	S	BSC, GBs, NC, PCs, LVPC
Work with municipalities to develop or update their Park, Recreation and Open Space Plans to incorporate the greenway plan.		C	BSC, LVPC, GBs, NC, PCs
Acquire easements along proposed greenway corridors where outright land purchase or open space dedication is not possible or necessary.	✓	C	BSC, NC
Prioritize the key parcels to acquire outright or secure easements along for the greenway.	✓	S	BSC, NC, LVPC, PCs, GBs
Continue to develop existing recreation paths such as the Palmer Township Trail, Tatamy Rail Trail and Plainfield Township Trail.		M	BSC, GBs, DCNR, PennDOT, NC
Establish a connection via Stockertown between the Tatamy Rail Trail, Jacobsburg Environmental Education Center and the Plainfield Township Trail.	✓	M	BSC, PennDOT, DCNR, NC, LVPC

Two Rivers Area Greenway Plan

Recommended Action	High Priority	Timing*	Responsible Organizations
Establish a positive working relationship with landowners in the headwaters area in order to facilitate protection of the conservation greenways designed to protect the quality of the source of Bushkill Creek.	✓	C	BSC, DEP, DCNR
Identify specific brownfield sites within the greenway corridor reach to restore and create new sustainable uses such as eco- or tourism based businesses.	✓	M	BSC, GBs, EPA, NC, LVPC, PCs, DEP, DCED
Establish a relationship with area businesses in an effort to give them an understanding of the greenways for quality of life with the intent they may contribute in some way to the development of the plan.	✓	S	BSC, DCED, NC, LVPC
Create and install a signage system, based upon the standards developed by the Delaware & Lehigh National Heritage Corridor, identifying key nodes and access points along the greenway.		S	BSC, DCNR, PennDOT
Approach PPL regarding the designation of the powerline corridor between Blue Mountain and Jacobsburg Environmental Center as a conservation greenway.	✓	S	BSC, LVPC, NC
Research the feasibility of creating a Rail Trail along the Lehigh & New England railroad grade based upon landownership and continuity of the existing abandoned railbed.	✓	L	BSC, DCNR, PennDOT, NC, LVPC
Create and market a map and guide to the key features of the Two Rivers Area Greenway. This can be done in cooperation with the Delaware & Lehigh National Heritage Corridor.		S	BSC, DCNR, DCED, NC, LVPC
Institute a program for reestablishing riparian buffers with support from grants and volunteer efforts by local landowners, conservation groups, etc.		C	BSC, NC, USDA, DEP, DCNR
Institute a program for educating local farmers regarding best management practices with support from grants and volunteer efforts by local landowners, conservation groups, etc.	✓	C	BSC, NC, USDA, DEP, DCNR
Identify and map sinkholes along the greenway corridor.		C	BSC, NC, LVPC, EPA, DEP
Work with landowners and developers to establish the missing links for the trail in Forks Township between the Bushkill Creek and Delaware River.		S	BSC, NC, DCNR, PennDOT, GBs, PCs
Complete a multiple use loop trail system linking Palmer Bikeway, D&L Trail and downtown Easton by acquiring and constructing proposed routes.	✓	M	BSC, NC, DCNR, PennDOT, GBs, PCs
Protect significant upland forest and geologic features in Williams Township through conservation easements or acquisition.		M	BSC, DEP, DCNR, LVPC, GBs
Preserve additional agricultural land adjacent to the proposed greenway network by implementing farmland preservation techniques in areas targeted for preservation by LVPC, Northampton County, and this plan.	✓	S	BSC, DEP, DCNR, USDA, LVPC, NC, PCs

Two Rivers Area Greenway Plan

Recommended Action	High Priority	Timing*	Responsible Organizations
Protect remaining woodland on north facing slopes south of I-78 through municipal zoning and development regulations.		M	BSC, DEP, DCNR, GBs, PCs
Work with Chrin Brothers, the landfill operator in Williams Township, to establish a plan for reestablishing native seasonal grasses when the landfill operation is complete.		L	BSC, DEP, EPA, DCNR
Work to protect the natural areas adjacent to or within the proposed greenway corridors identified as state and locally significant by establishing easements or outright acquisition of these properties.	✓	M	BSC, DEP, DCNR, LVPC, NC
Seek funding for greenway plan implementation.	✓	C	BSC, GBs, NC

***Notes**

S = Short Range (1 year)
M = Medium Range (2-5 years)

L = Longer Range (5-10 years)
C = Continuous

Abbreviations of Responsible Agencies/Groups	
BSC	Bushkill Stream Conservancy
EPA	U.S. Environmental Protection Agency
GBs	Township Board of Supervisors, Borough and City Councils
NC	Northampton County
PCs	Municipal Planning Commissions
LVPC	Lehigh Valley Planning Commission
DEP	Pennsylvania Department of Environmental Protection
DCNR	Pennsylvania Department of Conservation and Natural Resources
DCED	Pennsylvania Department of Community and Economic Development
PennDOT	Pennsylvania Department of Transportation
USDA	U.S. Department of Agriculture

In addition, other interested parties, such as the Lehigh Valley Horse Council, should be involved in carrying out the various actions required for this plan.

Land Preservation Techniques

For all types of greenways, it is necessary to protect the desired corridor in some fashion. Many greenway corridors in the area are currently well in-tact, but are at risk of development due to the lack of restrictions. To ensure that a greenway will remain “green” in perpetuity, and to facilitate the addition of any recreation trails, certain land preservation techniques should be implemented. The following section describes various tools for greenway preservation.

Fee Simple Acquisition

The most direct means of obtaining open space is through fee simple acquisition, the outright purchase of a tract of land. The main advantage of this procedure is that the owner will have full control of the land, including all public access and conservation practice decisions. In many situations, fee simple acquisition is the most appropriate manner by which to preserve land. Municipal governments and conservancies are two of the more likely groups to be able to acquire land in this manner. However, the expense of fee simple purchase can sometimes exceed available funding sources. In this regard, the Northampton County Open Space bond issue and state grant funds become likely funding sources.



Fee simple acquisition of abandoned rail corridors in West Easton vary in price from \$1 to \$134,000.

Conservation Easements

Conservation easements are used to preserve land at a relatively low cost without acquiring it. Under a conservation easement, the land remains privately-owned. The easement involves the property owner voluntarily agreeing to donate or sell the right to develop his or her land. The property owner agrees to place a restriction in the deed of the property, which then becomes binding on all future owners of the land. The easement is “held” by the municipality, county, or a private conservancy. Most conservation easements prohibit the construction of new buildings and cutting down woods. Often, the granting of a conservation easement can provide property owners with several tax benefits.

Other Easements

Conservation easements are typically used for environmental preservation, often prohibiting public use of the land. However, a conservation easement can also be combined with a *pedestrian easement* or *right of public access easement* to allow the public the right to walk, hike and ride bicycles along a specific area, provided users follow pre-established rules. With such an easement, the landowner

is not held liable for any injuries, crimes, or death associated with public use of his/her land.

Another easement type is the *joint-use easement*, which accommodates multiple uses under one easement. This is particularly appropriate for public utility corridors. Electric transmission lines, sanitary sewer lines, petroleum or gas pipelines, and other such corridors may be ideal for trail connections, as they often contain a cleared pathway. Joint-use easements are advantageous in that landowners will know the exact purposes of the singular easement, rather than dealing with multiple easements.

In areas with prime farmland, it may be appropriate to pursue agricultural conservation easements adjacent to greenways. This action would preserve additional contiguous land, and help maintain the scenic character of both the greenway, and the area as a whole. Local, county or state governments may purchase easements from owners of prime farmland, provided that the owner keep the land in agricultural use. To qualify for this program, certain acreage, soil, and production criteria must be met. Farmers may also form an *Agricultural Security Area* as a precursor to applying for an agricultural easement.

Official Map

Under the Pennsylvania Municipalities Code (Act 247, as amended), a municipality or county may adopt an *official map* that shows desired future public lands and facilities. This includes, “proposed public parks, playgrounds and open space reservations.” The official map does not call for the taking of private land, nor does it obligate the municipality to develop facilities. Rather, it gives the governing body the first right to acquire or preserve a tract of land when it is proposed for development or sale. It also gives the governing body the right to deny building permits in designated areas. However, this reservation for public grounds expires one year after a property owner submits a letter to the governing body announcing plans to subdivide, develop, or improve his/her land. Before this one-year period expires, the governing body must acquire the land, or have begun condemnation procedures. Any acquisitions or easements must include a metes-and-bounds description by a licensed surveyor. The official map is ideal for seriously pursuing the policies described in any adopted planning documents, including this greenway plan.

Municipal Ordinances

One of the least expensive ways to protect environmentally-sensitive land is through municipal zoning ordinances and subdivision and land development ordinances (SALDOs). These ordinances contain environmental provisions that prohibit or limit activities on or near sensitive areas. With regard to greenways, the most important provisions are the following:

- Riparian buffers - Prohibiting or restricting development and certain other activities within a specified distance (or *setback*) of a stream. Most township ordinances establish setbacks between 50 and 100 feet, while many borough and city ordinances do not contain any riparian buffer provisions. The most appropriate buffer size depends on the size of the stream, and the existing natural and human features along the stream. A two-

- tiered buffer can set different standards for two different setbacks (e.g. no development within 100 feet, and no mowing within 50 feet). All municipalities, rural or urban, should consider expert consultation on riparian buffers.
- Floodplain regulations - Prohibiting development and certain other activities within the 100-year floodplain. Often this is mandated in a separate floodplain ordinance. The 100-year floodplain corridor is composed of a *floodway* and *flood fringe* area. State floodplain regulations form a bare minimum of floodplain protection. The recommended course of action is to keep all floodplains in open space. Activities such as tree-cutting, clearing of vegetation, storage of hazardous materials, landfill operations would have a negative effect during flood events, and should therefore be prohibited. In places where existing structures are located within the floodplain, regulation options include establishing a lowest floor level for buildings, requiring floodproofing, and prohibiting further development or improvements.
 - Wetland / High Water Table Soils / Hydric Soils - Areas containing permanently or frequently saturated soil conditions or standing water. These three features often coincide with one another. Most zoning ordinances take a site-by-site approach to wetlands regulation. In this scenario, a zoning officer or engineer will determine if there is a “reasonable doubt” whether wetlands exist on a parcel being developed. If there is doubt, the applicant must have a qualified wetland specialist delineate wetlands, which will become off-limits to development. An alternative to this method is having a complete wetlands map database for a municipality, which would be prepared by a wetlands specialist.
 - Steep Slopes - For planning purposes, steep slopes are usually divided into 15-25% slopes, and 25% and greater slopes. Development densities and buildings sites are typically restricted in slopes between 15 and 25 %, and restricted or prohibited on slopes 25% and greater. Keeping steep slopes in open space can be a benefit to ridge-based greenways, as well as stream-based greenways where the riparian zone is surrounded by slopes.
 - Woodlands - Many ordinances contain tree-cutting provisions, permitting unlimited tree-cutting in areas necessary to accommodate home sites and road right-of-ways, and otherwise providing a maximum tree extraction number or rate for other areas. A more protective option is to declare a maximum percentage of tree removal per lot. To protect woodlands along stream corridors and ridges, cutting restrictions can be placed on floodplain forests and upland forests, respectively.

Environmental provisions may appear as a text-only section of an ordinance, or may also be indicated as an *overlay* district with distinct boundaries on the zoning map. Mapped overlays show exactly where special regulations apply in addition to the base zoning district regulations. In some cases, base zoning districts have been established along natural corridors such as the Bushkill Creek and Blue Mountain, separate from all other zoning districts.

Municipalities should consider reviewing the environmental provisions in their ordinances to see if they adequately protect natural features. (For a complete list of existing zoning provisions in the Two Rivers area related to environmentally-sensitive features, see Table 12 in the *Existing Land Use and Zoning* section.) Reviewing and modifying zoning ordinances and SALDOs also provide the opportunity to add provisions on mandatory dedication, cluster development, transfer of development rights, and official maps, which are described below. Also important in the conservation effort is the uncompromised enforcement of all regulations by municipal zoning officers and engineers.

Mandatory Dedication

The Pennsylvania Municipalities Planning Code (Act 247, as amended) enables municipalities to require that residential developers dedicate land, or fees in lieu of land, for public recreation. This process is also known as *exaction*. Municipalities must have an adopted recreation plan and an adopted ordinance relating to mandatory dedication before land or fees can be accepted. The amount of land required must be related to the demand for recreation land typically created by new development. If a tract slated for development contains floodplains, wetlands, steep slopes, woodlands, or other sensitive natural features, these features should be included in the dedicated land area.

Low-Impact Development

In areas where greenways pass through land that is zoned for development, low-impact alternatives to standard development patterns should be considered. One option that has been successful nationwide is *cluster development* (also called *open space development*). When a tract is developed in the cluster scheme, increased development densities are allowed in exchange for mandatory open space. As an example, one can consider an 100-acre lot adjacent to a stream. Under standard suburban development schemes, this tract could be subdivided into 100 one-acre lots. Under cluster development, 40 acres of open space could be set aside near the stream, and the remaining areas could be subdivided into 100 lots each containing 6/10 of an acre. In this example, the resulting open space should be situated on environmentally-sensitive land, and in a contiguous fashion to be most effective. Cluster development can be facilitated with cluster provisions in the zoning ordinance and SALDO. A cluster ordinance is typically an amendment to existing lot size requirements in each zoning district. (e.g. “Low Density Residential District: One acre minimum lot size, or 0.60 acre with 40% open space.”) The resulting open space tract can be retained under homeowner association ownership, or dedicated to the municipality. Cluster development is most effective where public sewer and water lines are in place, allowing for smaller lot sizes.

Other important development alternatives to consider are reuse and infill. The Two Rivers area contains a multitude of former industrial buildings or vacant sites where industrial buildings once stood. These sites, also called *brownfields*, are ideal for reuse and redevelopment. After a brownfield site is environmentally remediated, redevelopment options are plentiful, including loft apartments, marketplaces, office parks, active recreation facilities, and much more. Growing Greener and other grant programs offer funding to redevelop sites. On a larger scale, infill

development promotes using or reusing land contained within existing developed areas, keeping outlying areas in a rural state.

In any type of development or redevelopment project, efforts should be made to build in an environmentally-friendly manner. Practices that positively affect stream health include pervious concrete pavements and grass drainage swales (see Appendix E), which both allow greater rainwater infiltration and less polluting runoff. Efforts should also be made to keep as many existing trees as possible, and plant new trees where appropriate.

Transfer of Development Rights

Transfer of Development Rights (TDR) could be a voluntary option in a zoning ordinance that would provide incentives for private developers to pay to preserve environmentally-sensitive land. If a developer pays a private landowner to permanently preserve his/her land, the developer could receive approval to build at a higher density in an area more suitable for intense development. The developer and the owner of the sensitive land would privately negotiate a price. The municipality would then approve the higher density development, and at the same time a conservation easement would go into effect on the sensitive land.

Donations

Land frequently is acquired through donations from private owners, organizations and corporations. Local governments should encourage land donations by pointing out benefits of such actions, such as public relations values and federal income and estate tax benefits. Prior to accepting a donation, a municipality should consider two points: first, it should analyze the location of the parcel and the anticipated development and maintenance costs. If the location is poor and/or projected costs will be excessive, the municipality should strongly consider accepting a fee rather than the land. Second, if the land is found to be suitable, the municipality should encourage the donor to provide an endowment fund along with the land to assist with development and/or maintenance costs. In addition to land, corporations and other private parties can also be solicited for cash donations.

Land Exchange

A *land exchange*, or land swap, involves a two-party agreement between private or public landowners. This is appropriate when a development interest and a conservation interest both own the wrong type of land for their pursuits, and therefore exchange their land holdings. For example, a residential developer may own a wetland area next to a park while a Township government owns a vacant tract near an existing developed area. With the land exchange, the environmentally-sensitive land is preserved by the Township, and the developer builds houses in an appropriate location. Any mismatches in land value can be negotiated with money transfer.

Purchase and Lease-Back or Resale

In certain cases, it is appropriate for a municipality to purchase land in fee simple, place restrictions on the deed prohibiting certain uses (e.g., residential development) and lease it back to interested parties. One advantage of this method is that the municipality can purchase land for future use (before the price increases, perhaps prohibitively so) and, through leasing, recoup some or all of the purchase price. In this way, land is maintained in open space and can be developed as a park when future demand warrants. Resale of some or all of the land (after placement of deed restrictions) would maintain open space while also relieving the municipality of maintenance obligations and returning the land to the tax rolls.

Lasting Landscapes®

The Bushkill Stream Conservancy has partnered with the Doylestown-based Heritage Conservancy to initiate a Lasting Landscapes® program in the Bushkill Creek Watershed. This program seeks to protect open space and historic elements at a landscape level using a four-step process. This process involves research, planning, implementation and stewardship and identifies significant landscapes containing a vital number of natural and historic resources to be protected. Different techniques are developed to maintain the integrity of the resources to be preserved. The Lasting Landscapes® initiative is a unique single preservation strategy that seeks to unite compatible natural and historic resources involving input from local communities to create large, contiguous preserved areas within an area's cultural heritage and regional context.

Cost Estimates

The costs involved with the development of greenways can vary greatly. The cost of purchasing a greenway through fee simple acquisition is one of the more expensive methods, often requiring more funding than is available. Once the greenway has been purchased, there are the associated development and maintenance costs.

Education Visitor Center

Initial cost estimates for a new Education Visitor Center were included in the Boulton Facilities Master Plan (June 2000):

Building	\$ 2,398,200	
Site Phase I	\$ 367,598	
Site Phase II	\$ 166,148	
Sub-Total	\$ 2,931,966	
Inflation Factor 5% for 5 yrs		\$ 810,048
Total		\$3,742,014

A detailed, itemized cost breakdown is included in the Boulton Facilities Master Plan report.

Ordinance Review

Costs related to professional review and revision of zoning and subdivision/land development ordinances in regard to greenway protection and enhancement will vary per municipality depending upon the specific scope of services and required mapping. Cost per municipality could range from approximately \$3,000 to \$6,000 per municipality depending upon the extent of work; for example, the higher end cost might also include working with a municipal Environment Advisory Council in the preparation of an Official Map.

Land Acquisition

Land acquisition costs are best determined by appraisal, when specific “subject” sites are known and comparable recent sales are used. Many variables will determine actual costs. These variables include such items as type of acquisition used (fee simple vs conservation easement), the site’s development limitations (e.g., flood plains, wetlands, steep slopes, woodland), the site’s specific location and situation (e.g., rural vs. urban, farm/rural vs. commercial/industrial zoning, site accessibility/road frontage), and various other items.

It will be important to create and maintain a data base on acquisition costs. This information can be given to appraisers for comparable sales analysis. The cost information will also be helpful in developing “ballpark” cost estimates for similar situations. For example, the costs below show some ranges based on discussions with committee members and review of limited available information:

<u>Item</u>	<u>Estimated Costs/Acre</u>
Farmland (fee simple)	\$10,000 - \$20,000
Farmland (conservation easement)	\$ 3,000 - \$ 6,000
Flood plain (fee simple)	\$ 3,000 - \$10,000 (w/ no building)
Flood plain (conservation easement)	Less than fee simple

Once the greenway has been acquired, there are also costs associated with how it is developed and maintained. Installing trails, signage, trailheads and various other facilities all carry a number of different costs. Greenway corridors maintained as conservation greenways probably have the lowest cost basis for development. Recreation greenways, with all of the associated amenities, generally have a much higher cost basis. The cost for developing a recreation greenway trail depends on a number of factors, including the existing conditions, the type of trail surface chosen and, in some cases, the source of the funds. The following are generalized cost estimates for trail development associated with greenways. Items such as restroom facilities are not included due to the complex nature of their design, which impacts their cost basis. The costs are given in 2004 dollars and are considered to be bid prices at Prevailing Wage rates.

**Table 26
GREENWAY DEVELOPMENT COST ESTIMATES**

<i>Item</i>	<i>Unit</i>	<i>Unit Cost</i>
Clear and Grub for Trail Installation	Acre	\$5,000.00
Wooden Mile Markers	Each	\$150.00
Signage (stop, warning, etc.)	Each	\$150.00
Informal Entrance Sign	Each	\$400.00
Formal Entrance Sign	Each	\$1,500.00 - \$3,000.00
Benches	Each	\$500.00
Picnic Table	Each	\$800.00
Trash and Recycling Receptacles	Each	\$500.00
Bicycle Rack	Each	\$500.00
Gravel Parking Space	Each	\$600.00
Bituminous Parking Space	Each	\$1,000.00
Landscaping Shrub	Each	\$100.00
Landscaping Tree	Each	\$400.00
Compacted Crushed Stone Trail	Linear Foot	\$12.00
Bituminous Paving for Multiple Use Trail	Linear Foot	\$24.00
Earthwork for Trail Installation	Cubic Yard	\$6.00
Fine Grade and Seed	Square Yard	\$2.50
Design & Engineering Fees	Lump Sum	15% Total Estimated Project Cost
Total	Per Mile	\$200,000.00 - \$400,000.00

Source: Urban Research & Development Corporation

In addition to implementing the plan, there are also costs associated with maintaining the greenway network. There are numerous factors that play into the maintenance costs associated with greenways and the trails they may contain. For that reason, there have been some studies conducted regarding the costs of maintaining trails, especially using Rails to Trail projects. These studies have lead to the conclusion that the average yearly maintenance costs should be budgeted at about \$1.00 per linear foot. This number assumes the need for repairs, mowing and seasonal maintenance.

Possible Sources of Greenway Funding

The federal government, state government, county and local government, private organizations, and foundations provide various opportunities for greenways funding. Some of the most commonly used funding sources, including grants and loans, can help fund greenways and related projects (see Table 27). Since funding sources are always changing, with new programs being added and older programs being revised or deleted, it will be important to continually add and revise the table below as funding sources change.

Table 27
POSSIBLE GREENWAY FUNDING SOURCES

Name of Program	General Description of Program	Administering Agency
Growing Greener Program	As part of Pennsylvania’s Growing Greener Program, PA DEP offers various grants that can be used for greenway related projects. They include: Watershed Grants, Technical Assistance Grants, and New or Innovative Technology Grants.	PA DEP
Community Conservation Partnerships Program (C2P2) - Land Trust Grants	Grants to well-established non-profit land trusts and conservancies to plan for and acquire critical natural areas. Land that is acquired must be open to the public.	PA DCNR
C2P2 - Community Grants	Provides 50% matching grants to municipalities to fund: <ul style="list-style-type: none"> • Develop a plan for parks/recreation • Acquire parkland/nature preserves • Rehabilitate and improve public recreation areas. Grants up to \$20,000, without a local match, are available for material and design costs in small municipalities.	PA DCNR
Northampton County Bond issue	Bond issue funding will be available for open space preservation, agricultural preservation, and park and recreation (including trails) projects. Guidelines are being developed for project applications.	Northampton County
Community Development Block Grant (CDBG)	Offers grants for a wide variety of activities, provided the applicant proves by survey or census that the project will benefit 51% low and moderate income persons or handicapped persons or eliminate "blighted" conditions in officially designated areas. For example, funds can be used for water and sewage improvements, storm drainage, handicapped accessibility, parks / recreation / greenways, street and sidewalk improvements, planning, and historic rehabilitation.	Northampton County Department of Community and Economic Development & PA DCED
TEA-21 Transportation Enhancements Program (part of federal Transportation Efficiency Act)	Provides grants up to 75% of costs for projects within state-designated “Heritage Parks” to preserve and interpret the significant contribution that certain areas made upon the industrial heritage of the state and nation. Funds four types of projects: <ul style="list-style-type: none"> • Feasibility studies • Management Action Plan • Special purpose studies • Implementation projects. Projects are intended to conserve natural, historic and recreational resources relating to industrial heritage to stimulate regional tourism.	U.S. DOT funds administered by PennDOT

Two Rivers Area Greenway Plan

Name of Program	General Description of Program	Administering Agency
Home Town Streets and Safe Routes to School	The Home Town Streets Program provides funding for a variety of streetscape improvements that are aimed at reestablishing downtown and commercial centers. The Safe Routes to School Program provides grants and is designed to work with both school districts and pedestrian and bicycle safety advocates to make physical improvements that promote safe walking and biking passages to schools. Both programs require a 20% local match.	PennDOT
Community Revitalization Program	Very broad grant program. Officially intended to promote community stability, increase tax bases and improve quality of life. Applications may be made by municipalities, authorities, economic development organizations, and nonprofit corporations. Public/non-profit/profit partnerships are encouraged. Generally can be used for infrastructure, community revitalization, building rehabilitation, demolition of blighted structures, public safety, and park and greenways projects.	PA DCED & Governor's Office
Conservation Corps, PA	Provides funding for work crews for community projects, such as trail improvements.	PA DCNR
Environmental Protection Agency (EPA) Watershed Initiative's	The Environmental Protection Agency (EPA) provides large Watershed Initiative grants ranging in size from approximately \$300,000 to \$1.3 million. Twenty grants are given out each year. The program is very competitive and requires state endorsement of the proposed project(s).	U.S. EPA (Philadelphia)
Environmental Protection Agency (EPA) Water Quality	Grants for improving water quality are available for the U.S. Environmental Protection Agency.	U.S. EPA (Philadelphia)
Environmental Protection Agency (EPA) Brownfields Program	Grants for a very limited number of pilot demonstration projects for cleanup of contaminated underused industrial sites.	U.S. EPA (Philadelphia)
Flood Control - Army Corps of Engineers (COE): U.S. Natural Resources Conservation Service (NRCS)	Various types of projects to manage flooding. Typically, the CoE is involved in larger watersheds, while NRCS has primary responsibility for smaller watersheds.	U.S. Army CoE U.S. NRCS
Flood Hazard Mitigation Grant Program	Provides 75% funding to relieve imminent hazards from flooding, such as voluntary buy-outs and demolitions of highly flood-prone properties.	Federal Emergency Management Agency
Conservation Reserve Program	The U.S. Department of Agriculture, through its Agricultural Stabilization and Conservation Service, provides payments to farm owners and operators to place highly erodible or environmentally sensitive landscapes into a 10-15 year conservation contract. The participant, in return for annual payments during this period, agrees to implement a conservation plan approved by the local conservation district for converting these sensitive lands to a less intensive use. Individuals, associations, corporations, estates, trusts, cities, counties and other entities are eligible for this program. This program can be used to fund the maintenance of open space and non-public use greenways along water bodies and ridge lines.	U.S. Department of Agriculture

Two Rivers Area Greenway Plan

Name of Program	General Description of Program	Administering Agency
Wetlands Reserve Program	The U.S. Department of Agriculture also provides direct payments to private landowners who agree to place sensitive wetlands under permanent easements. This program can be used to fund the protection of open space and greenways within riparian corridors.	U.S. Department of Agriculture (USDA)
Watershed Protection and Flood Prevention (Small Watersheds) Grants	The USDA Natural Resources Conservation Service (NRCS) provides funding to state and local agencies or nonprofit organizations authorized to carry out, maintain and operate watershed improvements involving less than 250,000 acres. The NRCS provides financial and technical assistance to eligible projects to improve watershed protection, flood prevention, sedimentation control, public water-based fish and wildlife enhancements, and recreation planning. The NRCS requires a 50 percent local match for public recreation, and fish and wildlife projects.	USDA Natural Resources Conservation Service (NRCS)
Rivers, Trails, and Conservation Assistance Program	The National Parks service operates this program aimed at conserving land and water resources for communities. Eligible projects include conservation plans for protecting these resources, trail development, and greenway development.	National Park Service
Flood Protection Program, PA	Offers design and construction of flood protection projects. The project must be deemed economically justifiable under the state capital budget process.	PA DEP Bureau of Waterways Engineering
Historic Preservation Tax Credits	Offers federal income tax credits for a percentage of the qualified capital costs to rehabilitate a certified historic buildings, provided the exterior is restored. The program is generally limited to income-producing properties.	National Park Service
Historic Preservation - Certified Local Government Grants	Provides modest-sized matching grants to provide technical assistance to municipalities that have official historic districts and meet other criteria to be "certified."	Federal, administered by PA Historical and Museum Commission (PHMC)
Historic Preservation Survey and Planning Grants	Matching grants for historic surveys, historic preservation planning and National Register nominations. Available to municipalities and nonprofit organizations. Cannot be used for construction.	Federal, administered by PHMC
Heritage Parks Program	Provides grants up to 75% of costs for projects within state-designated "Heritage Parks" to preserve and interpret the significant contribution that certain areas made upon the industrial heritage of the state and nation. Funds four types of projects: <ul style="list-style-type: none"> • Feasibility studies • Special purpose studies • Management Action Plan • Implementation projects. Projects are intended to conserve natural, historic and recreational resources relating to industrial heritage to stimulate regional tourism.	PA DCNR
Industrial Sites Reuse Program, PA ("Brownfields")	Provides grants of up to 75% and low-interest loans for assessment of environmental contamination and remediation work at former industrial sites. Available to private companies, nonprofit economic development agencies, or authorities that own the land. Mainly targeted towards cities. Financing is not available to the company that caused the contamination.	PA DCED in cooperation with PA DEP
Intermunicipal Projects Grants	Promotes cooperation between neighboring municipalities so as to foster increased efficiency and effectiveness in the delivery of municipal services at the local level.	PA DCED

Two Rivers Area Greenway Plan

Name of Program	General Description of Program	Administering Agency
Keystone Historic Preservation Funds	Provides 50% matching grants to fund analysis, acquisition, or rehabilitation of historic sites. The site must be on the National Register of Historic Places or officially determined to be eligible for listing. The site must be accessible to the public after funding. Grants can be made to public agencies or nonprofit organizations.	PHMC
Land Use Planning and Technical Assistance Program (LUPTAP)	This program provides grant funds for the preparation of community comprehensive plans and the ordinances to implement them. It promotes cooperation between municipalities in making sound land use decisions that follow or adhere to the Governor's Executive Order on Land Use. Priority is given to any county government acting on behalf of its municipalities, any group of two or more municipalities, or a body authorized to act on behalf of two or more municipalities. Applicants are to provide a minimum of 50% match consisting of cash or in-kind services. There are no minimum or maximum amounts.	PA DCED
Local Government Capital Projects Loan Program	Provides low-interest loans to municipalities with populations of 12,000 or less for the purchase of equipment and the purchase, construction, renovation or rehabilitation of municipal facilities. Priorities are given to projects that are necessary for public health and safety or involve intergovernmental cooperation.	PA DCED
Municipalities Financial Recovery Act, PA	Provides technical advice and grants for special purposes (such as studies to improve service efficiency) within municipalities that have been officially designated as "financially distressed." After application and designation, the municipality must follow a financial recovery plan.	PA DCED
National Recreational Trails Funding (Symms NRTA)	Provides grants for the acquisition and development of recreation trails (which may include trails for motorized vehicles). A 50% local match is required. Applications may be made by federal, state or local government agencies or organizations.	Federal, administered by PA DCNR
On-Lot Septic System Program	Offers low-interest loans to limited income households to repair failing on-lot septic systems.	PennVest, PHFA
PA Infrastructure Investment Authority (PennVest)	Offers low-interest loans for construction and improvement of drinking water and wastewater systems. 100% grants may be available for highly-distressed communities. Mainly intended for public systems, but some private systems may be approved. Water projects are funded through the Drinking Water Revolving Loan Fund. Sewage projects are funded through the Clean Water Revolving Fund. PennVest is also authorized to provide loans for projects to control existing stormwater problems, such as separating stormwater from sanitary sewage. The "Advance Funding Program" provides low-interest loans for feasibility studies and engineering of systems if the utility cannot fund such work itself.	PennVest PA DEP (Bureau of Water Supply Management) — Involves both U.S. EPA and state funds
Nutrient Management Plan Development Incentive Program	Grants of \$4 per acre are available to farmers to cover up to 75% of the cost of preparing nutrient management plans. Low-interest loans are also available through the state to help implement nutrient management-related best management practices.	County Conservation District
Rails to Trails, PA	Provides grants for feasibility studies, master site plans, acquisition, and improvement of former railroad lines for recreation trails. A 50% local match is required. Open to municipalities, authorities, and non-profit.	DCNR
Recycling Market Development Loan Fund	Provides low-interest loans to businesses to purchase recycling source-separating equipment.	PA DEP Bureau of Land Recycling and Waste Management

Two Rivers Area Greenway Plan

Name of Program	General Description of Program	Administering Agency
Recycling Grants (Act 101 of 1988)	Grants for up to 90% of municipal costs to develop and implement recycling programs, such as the purchase of recycling bins and composting equipment. Grants are also available to counties for a recycling coordinator, waste management plans, and pollution prevention education.	PA DEP Bureau of Land Recycling and Waste Management
Rivers Conservation Program, PA	Offers 50% grants to conserve and enhance river resources. Typically, funding is first provided for a conservation plan for a waterway. Grants are available to implement an approved plan. Available to municipalities, authorities, and non-profit.	PA DCNR
Rural Utilities Service Financing	Offers low-interest loans for drinking water and sewage projects for rural areas and small towns. The "Water and Water Disposal Loan Program" provides loans for water supply, wastewater disposal, solid waste disposal, and stormwater management systems for rural areas and towns with a population less than 10,000 persons. Available to municipalities, authorities, and nonprofit corporations. Grants up to 75% of project costs may be available for highly distressed areas. Also guarantee loans by private lenders. <ul style="list-style-type: none"> • Provides grants to nonprofit organizations to provide technical assistance to rural communities or for a circuit rider to serve several rural water systems. • Offers emergency grants to communities that have experienced a significant decline in quantity or quality of drinking water. 	U.S. Dept. of Ag., Rural Utilities Service
Shared Municipal Services	Provides modest-sized 50/50 matching grants to promote cooperation among municipalities, in order to increase the efficiency of public services. Two or more municipalities may apply, or a council of governments.	PA DCED
Sewage Facility Planning Grants	Grants to pay up to 50% of the costs to prepare a new sewage facilities plan or update an existing plan, under State Act 537 of 1966.	PA DEP
Small Water System Regionalization Grants	Provides grants for feasibility studies concerning the merger of small drinking water systems.	PA DEP Bureau of Water Supply
Stormwater Management Grants (PA Act 167 of 1978)	Grants for cooperative efforts at the watershed level among municipalities for stormwater planning and ordinances. Grants are typically made to counties, but may be made to municipalities.	PA DEP, Bureau of Watershed Conservation
Forest Legacy Program	The Forest Legacy Program (FLP), a federal program in partnership with the state, supports state efforts to protect environmentally sensitive forest lands. The FLP directly supports property acquisition and also supports efforts to acquire donated conservation easements. Participation in the FLP is limited to private forest landowners.	USDA Forest Service in cooperation with State Foresters
Land & Water Conservation Fund	The Land & Water Conservation Fund (LWCF) provides matching grants to state and local governments for the acquisition and development of public outdoor recreation areas and facilities.	National Park Service in cooperation with PA DCNR
The Agricultural Conservation Easement Purchase Program	The Agricultural Conservation Easement Purchase Program provides funds for the purchase of development rights on farmland. The perpetual easement ensures the farmland will be available for agricultural use indefinitely.	Pennsylvania Bureau of Farmland Preservation and the Northampton County Agricultural Preservation Board

Two Rivers Area Greenway Plan

Name of Program	General Description of Program	Administering Agency
Stream Improvement Program	Provides design and construction assistance to eliminate imminent threats to flooding and streambank erosion.	PA DEP Bureau of Waterways Engineering
Urban Forestry Grants	Provides grants for tree planting projects. Is also a Federal "America the Beautiful" grant program for tree planting.	PA DCNR
Water Supply Plan & Wellhead Protection Grants	Provides grants to counties to plan for water supplies at the county level and to implement programs to protect the wellheads of public wells.	PA DEP Bureau of Water Supply

Sources: Publications and internet sites of various agencies; *Pennsylvanian* magazine; PA DCED *Resource Directory*
PA DCNR and PA Growing Greener Websites

Other Techniques for Greenway Funding

Pay-As-You Go

“Pay-as-you-go” refers to the practice of financing capital projects with current revenues—paying cash instead of borrowing against future revenues. The amount available to spend is the difference between current revenue collected and expenditures required for operating cost and debt service payment. Pay-as-you-go financing works well where needs are steady and modest and financial capability is adequate.

Advantages of this method include the saving of interest costs on borrowed money and the protection of borrowing capacity for unforeseen major outlays that are beyond any current year’s capability. The major disadvantage is the need to have uncommitted cash available, which often precludes the use of this financing technique for extensive capital improvements in smaller municipalities. Another disadvantage is that those benefitting from the capital improvement in the future may not have helped pay for the improvement.

“Reserve fund financing” is a variation of the pay-as-you-go method in which funds are accumulated in advance for a capital project. The funds may accumulate from surplus revenues, “earmarked” or “set aside” revenues, or from the sale of capital assets.

Bond Issues

Different types of bonds are briefly described below:

- *General Obligation Bonds* are backed by a municipality’s full faith and credit. General obligation bonds (principal and interest) are payable from any and all revenue sources available to the municipality. Payment on general obligation bonds may come from the general fund. The primary advantage of general obligation bonds is a lower interest rate because the municipality’s credit is pledged.
- *Revenue Bonds* are obligations issued to finance a revenue-producing enterprise. Principal

and interest of revenue bonds is payable exclusively from the earnings of the enterprise which is financed. Revenue bonds rely exclusively on the earnings of the project financed and have no claim on the general credit or taxing power of the issuing municipality.

- *Special Assessment Bonds* are obligations payable through assessments levied on property directly benefitted by the construction of the project for which the obligation is issued. Such bonds generally carry a higher rate of interest than general obligation bonds but have the advantage of not being charged against the municipal debt limit.

Short-Term Notes

Some capital projects may be financed by short-term notes issued by local banks or statewide banking establishments. The interest on notes is generally less than interest on bonds, and there are no marketing costs for bond counsel, printing, or paying agents. (Short-term note financing is not permitted in some states or municipal charters, so legal restrictions must be checked.)

Authorities and Special Districts

Authorities and special districts are created in most cases to manage facilities that are supported by user charges. Water and sewerage systems are examples of such facilities. Special districts with the power to tax are also created for the purpose of issuing bonds and constructing facilities that may not be self-supporting. Authorities offer a convenient method of financing interjurisdictional facilities. Debt incurred by an authority or special district is still part of a community's total financial obligation, even where it is not counted in the debt limit of a municipal government.

Joint Financing

Joint financing between municipal and county governments can benefit both governments and can bring about projects that would otherwise have to be deferred for many years. Joint financing frequently results in better service and lower costs for the area.

Lease-Purchase

Local governments utilizing the lease-purchase method prepare specifications for a needed public facility and take steps to have it constructed by a private company or authority. The facility is then leased by the municipality at an annual or monthly rental. At the end of the lease period, the title to the facility can be conveyed to the municipality without any future payments. The rental over the years will have paid the total original costs plus interest.

Private Gifts/Donations

Private gifts and donations from individuals, corporations, and foundations can sometimes be obtained for certain projects, such as parks, community centers, and libraries. Civic associations have provided parks and playgrounds in many communities.

Foundation Grants

Various foundations, including the William Penn Foundation, provide grants that can be used for greenways planning and implementation and related projects.

Organizational Framework

Implementation of the *Two Rivers Area Greenway Plan* will require cooperation of many diverse interests, including groups in both the private and public sectors. Successful implementation will also require a strong organizational framework. Suggestions relating to greenway partners and a possible organizational structure are provided below.

Greenway Partners

Throughout the planning, implementation, and maintenance processes, certain organizations and individuals will be paramount in making a successful system of greenways. These include federal, state, county and municipal governments, as well as private and non-profit groups and companies. Major stakeholders, partners, and other possible participants are described below, listed in order of importance as determined from the results of the surveys distributed for the plan.

Northampton County Government

The County government has a presence in several levels of land use, recreation and environmental planning and management, as well as economic development. These include the following:

Parks and Recreation Division - A division of the County Public Works Department, this government body provides for the maintenance, improvement and development of park lands, and also administers several recreation programs. Within the Two Rivers area, County parks include Louise W. Moore Park in Lower Nazareth and Bethlehem Townships, Wy-Hit-Tuk Park and Fry's Run Parks in Williams Township, Frost Hollow Overlook in Forks Township, and an 180-acre, undeveloped park site in Plainfield Township. The County Parks and Recreation Division is an important stakeholder in the actualizing of the Two Rivers Area Greenway system in that they may be responsible for developing and maintaining future sections of the greenway.



The Conservation District can provide guidance and funding to farmers for improving and maintaining riparian buffers.

Conservation District - This agency plays an important role in the environmental protection aspect of greenways. This seven-member non-paid board promotes the conservation of natural resources, particularly soil and water. The Conservation District reviews development plans to check for threats to soil stability and water quality, educates farmers on best management practices, and actively works with other agencies to enhance water quality countywide. In addition, farmers in Northampton County may sign up as a *conservation district cooperators*, whereby they receive monetary and/or technical assistance to implement conservation practices on their farms. The Conservation District is an important partner in the management of private

land holdings in the proposed greenway, particularly in agricultural areas. The Conservation District can recommend and monitor riparian buffers, streambank restoration, and other management practices that result in better water quality and enhanced greenways along streams.

The Open Space Committee - This is an assemblage of Northampton County Council members. The committee is administering the County Open Space Preservation Initiative, approved by voters in November 2002. Under this bond issue, the county may raise \$40 million for three purposes: the protection of environmentally-sensitive areas, the preservation of agricultural land, and the development of additional recreation areas and facilities. The money will be divided into sums of \$12 million, \$14 million, and \$14 million, respectively. The latter \$14 million for recreation improvements will be further divided into \$7 million for county parks, \$4 million for municipal parks, and \$3 million for a new park in East Allen Township. The Committee is working with the Lehigh Valley Planning Commission to develop a prioritized system for identifying and protecting land. When the program is operating (perhaps in 2005), each application will be rated based on this system, then reviewed by an appointed citizens advisory committee, before being sent to the full County Council for a final approval vote. The County will need to establish methods of raising money for the bond, such as property taxes, hotel taxes, and waste hauling tipping fees. The bond issue will be an important tool in preserving land and developing trails in the proposed greenway system.

Agricultural Preservation Board - An appointed board oversees the selection and purchase of Agricultural Conservation Easements, whereby farmland is permanently preserved through the purchase of development rights. As the facilitators of farmland preservation, the Board will have an important role in keeping sizable areas of agriculture a permanent feature of the Two Rivers area.

Department of Community and Economic Development - Maintaining and attracting economic activity in the area is a major goal of this agency. The DCED is related to greenways in two ways. First, they are an appropriate partner when considering the redevelopment of abandoned buildings and sites along the area's creeks and rivers. Secondly, they may increase outside awareness of the greenways as a commodity that can attract tourism and economic development.

Municipal Governments

The governments of the 17 constituent municipalities will be instrumental in the realization of the Two Rivers Area Greenway Plan, both in the formal adoption of the plan, and in the carrying out of the plan's recommendations. As mentioned earlier, these governments include:

- Bethlehem Township
- Bushkill Township
- Easton City
- Forks Township
- Glendon Borough
- Lower Nazareth Township
- Moore Township
- Nazareth Borough
- Palmer Township
- Plainfield Township
- Stockertown Borough
- Tatamy Borough
- Upper Nazareth Township
- West Easton Borough
- Williams Township
- Wilson Borough
- Wind Gap Borough

One major role of municipal governments will be to acquire additional land for open space and/or recreation purposes. This process may be as easy as requiring mandatory dedication of floodplains in new developments, or as difficult as raising property taxes to fund recreation and open space budgets. Suburban municipalities such as Palmer and Forks Townships have been able to collect significant revenue from development fees and property taxes from new homes and businesses, which has been used to fuel ongoing park and open space acquisition efforts. If a municipality has acquired land for park or trail development, it must then employ or retain professionals to develop appropriate facilities. After the completion of a municipally-owned park or trail, police protection and maintenance becomes necessary. For municipalities with their own police force or a regional police force, this means additional areas for patrolling. For most other municipalities, police protection is handled by the State Police. Municipal public works departments will be involved in the upkeep of new facilities.

Another important function of the municipal government with regard to greenways is the adoption and enforcement of environmental provisions in the zoning ordinance, subdivision and land ordinance (SALDO), and floodplain ordinance. Some municipalities in the Two Rivers area have strict, well-defined requirements and guidelines, while others have few restrictions. Strong wording in ordinances cannot be the only effort: it is the responsibility of the municipal zoning officer and/or engineer to determine that existing activities and future development comply with all rules and regulations. Having a well-written, environmentally-conscious zoning ordinance and SALDO is one way of preserving sensitive natural features such as floodplains, wetlands and steep slopes with little to no cost.

It is recommended that municipalities establish Environmental Advisory Councils (EACs) to recommend and oversee decisions regarding land preservation, protection, and regulation. An EAC is typically a volunteer group with environmental professionals that can lend their professional knowledge to better guide the actions of the municipal government. A municipality can receive up to \$5,000 in grant money from the Pennsylvania Environmental Council to establish an EAC. Currently, EACs are active in Bushkill Township and Palmer Township.

State Agencies

Various divisions of the Commonwealth of Pennsylvania will be involved in making greenways a reality, due in part to three significant state land holdings in the Two Rivers area: Jacobsburg Environmental Education Center, Delaware Canal State Park, and State Game Land #168. These amenities are existing *green infrastructure* that will serve as components and destinations in the proposed greenway network. The State will have several other roles, as well.

Department of Conservation and Natural Resources (DCNR) - DCNR manages all Pennsylvania state parks, which includes Jacobsburg E.E.C. and the Delaware Canal State Park. Working with DCNR staff at both of these locations will be helpful in establishing trail and open space connections to these parks, as well as coordinating environmental education programs. On a larger scale, DCNR is the lead agency responsible for implementing the Pennsylvania Greenways Action Plan. DCNR can achieve its goals locally through a Two Rivers Greenway Implementation Project, which could actualize the goals of this plan through state funding and assistance, and also serve as a

demonstration project for the Pennsylvania Greenways Action Plan.

Pennsylvania Game Commission - This body oversees all hunting regulations statewide, and manages all State Game Lands. The Game Commission is accustomed to dealing with multiple recreation uses on their lands, and Game Land #168 is no exception. The Appalachian Trail passes through the center of the game lands. Improving trails, creating new trails, or allowing new recreation users in the game lands will involve cooperation with the Game Commission.

Pennsylvania Fish and Boat Commission - This body regulates recreational fishing and boating on all Pennsylvania streams, and often provides access points with parking along streams and rivers. The Fish and Boat Commission will be an ideal contact for helping to establish additional access to popular fishing and boating streams. They may also be a regulatory agency to contact in the event of a serious or continued breach of fishing or boating regulations in the watershed.

Pennsylvania Department of Environmental Protection (DEP) - DEP will have a passive but necessary role in the implementation of this greenway plan. DEP establishes environmental guidelines that regulate many processes, including storm water and wastewater management, mineral extraction, smokestack venting, vehicle emissions, and any development near wetlands and other sensitive natural features. Many DEP regulations are either modeled or referenced in municipal zoning and land development ordinances. Also, in the event of major environmental challenges or disagreements, DEP officials may become involved locally.

Pennsylvania Department of Transportation (PennDOT) - The owner and maintenance entity of all State-owned roads. PennDOT approval is necessary when considering trail crossings or bike lanes in state road right-of-ways. The agency also oversees the distribution of certain grant monies for trail and path construction.

Department of Community and Economic Development (DCED) - Like the smaller county agency, the Pennsylvania DCED can provide guidance and funding for revitalization and redevelopment projects. This will be a worthwhile contact when pursuing the redevelopment of brownfield sites.

The Commonwealth itself is an important source of funding for land acquisition. The Growing Greener initiative provides grant money for projects aimed at preserving natural features and farmland, improving environmental conditions, redeveloping brownfield sites, and revitalizing communities. An \$800 million State bond issue, proposed by Governor Rendell in the 2004-05 budget, would infuse additional money into the Growing Greener program. The total sum would include \$300 million for parks, recreation and farmland preservation, \$330 million for environmental clean-up, and \$170 million for revitalizing older communities. The Commonwealth offers other grants, including the Community Conservation Partnerships Program, Heritage Park Grants, Land Trust Grants, Rails-to-Trails Grants, Urban and Community Forestry Grants, Safe Routes to School Grants, and many more.

Federal Agencies

Federal involvement consists of at least three possibilities:

Delaware and Lehigh National Heritage Corridor - The federal government is involved in greenways at a local level through this body. Created in 1988 by an act of Congress, the corridor is managed by a 21-member commission of federal, state, and local officials and citizens. The self-described purpose of the National Heritage Corridor is to provide a management framework that will assist in the following activities:

- Preserving the 170-year-old Lehigh Navigation Canal and Pennsylvania Canal
- Designing visitor and interpretive facilities
- Increasing public awareness of corridor resources
- Assisting in restoration of historic structures
- Encouraging appropriate economic and industrial development
- Encouraging local planning policies that are consistent with the goals of the National Heritage Corridor
- Establishing consistent signage identifying access points and points of interest
- Providing interpretive events, programs, and educational materials
- Establishing recreation corridors and greenways that provide access and linkages to corridor resources
- Conserving natural and scenic resources

The National Heritage Corridor will be a key player in future planning of areas along the Delaware and Lehigh Rivers. While the Two Rivers area is fortunate to have numerous existing amenities along the Delaware and Lehigh Rivers, the involvement of the National Heritage Corridor Commission will help in enhancing the corridor with improved trails, historic interpretation, and many other possibilities.

Delaware River Basin Commission - This regional commission is not strictly federal, but rather multilateral. The board of directors consists of the governors of Pennsylvania, New Jersey, New York and Delaware, and one federal representative appointed by the President of the United States. High-ranking members of each state's environmental protection agencies serve as commissioners who make a majority of decisions. Through various programs, the Commission promotes water conservation, watershed planning, water quality protection, and recreation. The Commission can be an ideal partner when seeking federal grant money.

Environmental Protection Agency (EPA) - This is an appropriate contact in the event of major environmental problems. Several superfund sites in the Two Rivers area have been remedied through the EPA. Future brownfield redevelopment may require EPA coordination. It is also possible that the Stockertown area sinkhole problem may require EPA involvement.

Private and Non-Profit Conservancies

These crucial organizations provide the hands-on activism and volunteerism needed to actualize the greenway vision. Conservancies are often able to solicit support and organize resources when other entities cannot. These bodies will be instrumental in establishing greenways through fund raising and grant writing, natural resource-based planning, increasing public awareness through events and publications, and coordinating with local and governmental entities. Important partners should include the following:

Bushkill Stream Conservancy - An Easton-based group of educators, scientists, municipal officials, and concerned citizens. The group assisted extensively in crafting this plan, and is currently involved with numerous stream enhancement, water monitoring, erosion control, and public awareness efforts. The Conservancy will be key in coordinating and raising funds for projects that benefit the Bushkill Creek watershed.

Wildlands Conservancy - A member-supported group that strives to increase the quality of life in the Lehigh Valley through conservation-based planning and environmental education. The conservation of valuable land and water features, improvements in trails and alternative transportation, and protection of plants and wildlife are major goals of the Wildlands Conservancy, all of which fit well with the goals of this plan.

Heritage Conservancy - This Doylestown-based organization involves itself with the preservation of both natural and historic resources in Eastern Pennsylvania and New Jersey. The Heritage Conservancy is very active in pursuing acquisition, easements, or protection status for properties with special natural or historic value. The Conservancy also is involved with conservation-based planning, including its *Lasting Landscapes*® initiative. The Heritage Conservancy could assist in the coordination and implementation of greenway-oriented actions in the Two Rivers area.

Highlands Coalition - An assemblage of 110 individual conservation organizations with the common goal of protecting the natural features of the Highlands Region stretching from Northwestern Connecticut to Reading, Pennsylvania. Most of Williams Township falls into this region. The coalition seeks to protect and enhance water quality, forested habitat, large open spaces, and outdoor recreation opportunities in this belt of forested hills and farms. Stouts Valley and Bougher Hill are listed as critical resources of the Highlands within the Two Rivers area. Local greenway efforts and Highland Coalition efforts should be made aware of each other continually, so that resources and ideas can be shared. Both Heritage Conservancy and Wildlands Conservancy are members of the Highlands Coalition.

Pennsylvania Environmental Council (PEC) - PEC, like the above-mentioned conservancies, performs conservation-based planning and environmental education. But PEC also has connections to the State government, serving as a policy consultant for legislative and judicial decisions in Harrisburg. PEC also delves into environmental innovation such as new wastewater treatment and renewable energy techniques, and performs planning for brownfield redevelopment and transit-oriented developments. PEC could be a wealth of knowledge for redeveloping the Urban Core of the Two Rivers area, and enhancing water quality in its streams in rivers.

Other conservation organizations that could take part in the conservation of greenways in the Two Rivers area include:

- The Sierra Club
- Lehigh Valley Audubon Society
- Green Valley Coalition
- Trout Unlimited
- Ducks Unlimited
- Friends of the Delaware Canal
- Delaware River Shad Fisherman's Association
- Allentown Hiking Club
- Appalachian Mountain Club
- Alliance for Sustainable Communities of the Lehigh Valley
- Kittatinny Ridge Coalition
- Lehigh Valley Canoe Club
- Northampton County Federation of Sportsmen

Major Land Owners

Greenway planning and implementation needs to involve corporations or institutions with land holdings that are large and/or near greenway corridors. Keeping in contact with major land owners will be crucial in establishing trail connections, preserving open space, enhancing stream quality, and may even help secure funding. Major land owners include the following:

The Commonwealth of Pennsylvania - As mentioned previously, the State Game Lands #168, Jacobsburg Environmental Education Center, and Delaware Canal State Park are major existing areas of greenspace.

The City of Easton - In addition to owning numerous recreation and municipal tracts within the City proper, the Easton city government owns and maintains Hugh Moore Parkway along the Lehigh River, from Bethlehem Township to the Delaware River. The City also owns Hackett and Lower Hackett Parks, a major connection point in the proposed Palmer Bikeway.

Palmer Township - While all of the Two Rivers area municipalities own park land, Palmer Township has acquired a significant amount of linear property on railroad right-of-ways. This includes the former Easton-Nazareth railroad that parallels the Bushkill Creek from Easton to Tatamy. The Township plans to build a paved recreation path on this railbed.

Lafayette College - A private college with its main campus on the north side of the Bushkill Creek in Easton and a large recreation complex on the east side of the Creek in Forks Township. In addition to being a major land owner, Lafayette College has several degree programs that involve environmental monitoring of the Bushkill Creek and other natural features.

Hercules Cement Company - A major cement manufacturing and quarry operation along the Bushkill Creek in Stockertown Borough and Upper Nazareth Township. Coordination with Hercules will be

crucial in enhancing water quality, maintaining a continuous Bushkill Creek greenbelt, and assessing the sinkhole problem in the Stockertown area.

Essroc - Another cement quarry and manufacturing company, with two separate operations adjacent to Nazareth's south side. The headwaters of the Schoeneck Creek and several of its tributaries are within Essroc property.

Pennsylvania American Water Company - This public water utility owns the portion of Blue Mountain east of Route 33, one of the few non-public land holdings along the mountain. Protecting the fragile mountaintop barrens ecosystem, and establishing a trail connection between the Plainfield and Appalachian Trails will inevitably involve the water company.

Waste Management - The hauling company's main landfill is located in the headwaters area of Little Bushkill Creek. Environmental monitoring of this facility is key in maintaining stream health.

Binney & Smith - The producer of Crayola crayons owns a facility along the Bushkill Creek where a recreation trail is planned. This facility, along with its main campus in northern Forks Township, employs a large number of local residents. Binney & Smith is an important member of the community at large.

Elementis Pigments - This paint manufacturer occupies a critical piece of land along the south side of Bushkill Creek primarily in Wilson Borough. A trail connection between the Palmer Bikeway and downtown Easton may hinge on decisions made by this landowner.

Mineral Technologies - Located across the Bushkill Creek from Elementis Pigments, this landowner is equally instrumental in establishing a trail connection between the Palmer Bikeway and downtown Easton.

Easton Cemetery - Occupying the south side of the Bushkill Creek between 6th and 10th Streets, the Cemetery owns land along the creek that is proposed for a greenway and trail by the City of Easton. Adjacent to the west is the separately-owned Easton Heights Cemetery, which extends to 12th Street.

Norfolk and Southern Railroad - This freight railroad giant owns several abandoned railroads, trestles, and railyards along the Lehigh River in Easton, West Easton and Wilson. The abandoned railroads offer the opportunity for two recreation trails, the end result being several loop options for bikers and other recreationists in the Easton area. The abandoned railyard on the south side of the Lehigh River presents opportunities for redevelopment.

Met-Ed - The electric utility provider of the Two Rivers area may be a major contact when considering trail connections both on and off roads.

PPL - Pennsylvania Power and Light does not distribute electricity to the Two Rivers area, but operates several high-voltage transmission lines that cross the area. One critical line would help provide a trail link between Jacobsburg Environmental Education Center and Blue Mountain, and

possibly to Nazareth Borough.

Various - Several entities own the former Simon Silk Mill site on the Bushkill Creek at 13th Street in Easton, including James Garofolo, et al, and the Northampton County Industrial Development Authority. These landowners will need to be contacted for the possibility of redeveloping the site and routing a recreation trail through it.

Other Key Organizations and Individuals

Lehigh Valley Planning Commission - The LVPC serves as a joint planning commission for Lehigh and Northampton Counties. While reviewing planning documents and ordinances created by other organizations, the LVPC also writes their own comprehensive plans for communities, regions, and the two counties as a whole. LVPC is involved in establishing criteria for the preservation of land in Northampton County under the 2002 Bond issue. The LVPC is a valuable source of information for planning purposes, holding a wealth of natural resource, demographic, economic, transportation, and GIS data, as well as municipal contact lists, current development projects, and much more. Future greenway-related efforts should take advantage of this information source. It would also be wise to compare individual project goals with overall goals established in LVPC planning documents and maps.

Councils of Governments - The area's COGs, including Two Rivers Area, Nazareth Area, and Slate Belt, are an ideal opportunity to coordinate planning across municipal borders. While it is up to the individual municipalities to make formal decisions and approvals, meeting with entire COGs can be helpful in sharing ideas for greenway development and preservation. Getting feedback from multiple municipalities in one sitting saves time and offers better perspective.

Chambers of Commerce - Spreading awareness of greenways and funding specific greenway efforts could be a function of the Chamber of Commerce. Like the DCED, the chambers publicize local amenities to foster economic growth in the area. The Two Rivers Area Chamber of Commerce assisted in securing funding for this plan. Other chambers affecting the area include the Nazareth Chamber of Commerce, Slate Belt Chamber of Commerce, and the Greater Lehigh Valley Chamber of Commerce. The latter chamber encompasses several business councils that have more local focus. In the case of this plan, that is the Easton Area Business Council.

Volunteer Organizations - During and after the establishment of additional greenways in the Two Rivers area, volunteer efforts will be necessary to help build and maintain trails, clean and monitor parks open spaces, and assist with interpretive materials and events. Numerous existing groups would be ideal for such purposes. These include any and all of the conservancies listed above as well as youth organizations such as the Boy Scouts, Girl Scouts, Kids Peace, and perhaps religious-affiliated youth groups.

Land Developers - The Two Rivers area is one of the fastest growing areas in the Commonwealth, with this being especially evident in the Middle Watershed area. While a list of current land developers is too lengthy to include here, the sum of all developers will undoubtedly have an effect on the future landscape of the Two Rivers area. Throughout the development review process, municipal officials, conservation groups, and the general public should convene with developers to assure that new developments respect sensitive natural features, leave ample buffers along streams, adequately control storm water and erosion, allow for connectivity of open space, and facilitate the building of any proposed recreation trails. Efforts should also be made to educate developers on innovative, environmentally-conscious practices such as cluster development and traditional neighborhood developments.

Other Private Landowners - When proposing any type of greenway-oriented trail or open space preserve on private land, the proposing body needs to have careful dialogue with landowners. Private land in the Two Rivers area ranges from small residential lots, to hundred-or-more-acre farms and woodlands, to shopping center partnerships. Having the cooperation of private landowners is important not only in making localized greenway links, but is also crucial to instill a good feeling about greenways in the entire region.

Possible Management Structure

A formal, legal entity should be used to lead implementation and management. This entity could be a single, existing organization such as the Bushkill Stream Conservancy (BSC) or a newly-created partnership that blends expertise and experience from several different specialties, including: watershed management; parks and recreation; economic development and tourism; grants funding; open space and agricultural preservation; greenways acquisition and management; and greenway/trail, river and waterway management, among others.

Major responsibilities of the management entity should include:

- *Planning* – The management entity will be responsible for implementing the plan’s goals and for conducting and commissioning more detailed planning studies;
- *Funding* – The management entity will be responsible for preparing grant funding applications; and
- *Coordination* – Given the many partners and the many greenway activities, coordination will be a major responsibility of the management entity.

Based on discussions with the committee, the most plausible management structure for carrying out the *Two Rivers Area Greenways Plan* would entail the existing Bushkill Stream Conservancy, utilizing the *Lasting Landscapes®* approach established by the Heritage Conservancy. The Bushkill Stream Conservancy, working with the Heritage Conservancy and others, would be the lead entity responsible for coordinating the many greenway activities. Eventually, the Conservancy could have a full-time professional director and staff, although volunteers and part-time staffing may be required initially. Direct participation of the municipalities will be essential, since many of the plan’s recommendations will involve local government support and action.

Public and private resources, from within and outside the county should be used to help implement the greenway plan. Since this plan helps implement the *Pennsylvania Greenways Plan*, the technical and financial resources of the Pennsylvania Department of Conservation and Natural Resources (PA DCNR) should be used to help implement the plan. The Bushkill Stream Conservancy could also create, oversee, participate in, and coordinate various “action groups” to help carry out greenway plan actions.

The action groups would be comprised of people from both the public and private sector who have a specific interest or expertise in an action or activity area. Each action group should have at least one member of the BSC Executive Board.

The BSC could continue to enter into agreements with public or private agencies and organizations such as the Heritage Conservancy to provide technical assistance, financial information, and other assistance to help carry out the greenways plan.

Pilot Projects

To help initiate action on the goals of this Greenway Plan, nine pilot projects have been identified. These are projects that can be started immediately to actualize the visions set forth in the plan. These nine projects collectively address a variety of greenway goals, and are also seen as the most important according to the Plan Committee, interviewees, and public meeting attendees. The projects are described below, and are *not* listed in order of priority.

Pilot Project #1 - Landowner Outreach through the *Lasting Landscapes*® Initiative

The Heritage Conservancy, a non-profit regional land trust, offers the *Lasting Landscapes*® initiative for protecting the combined natural and historic treasures of a particular area. This is accomplished in a four-step process including research, planning, implementation, and stewardship. This pilot project has already begun to be implemented through the process of developing this greenway plan, with the first two steps, research and planning, having largely been completed. *Lasting Landscapes*® will be particularly useful in greenway implementation and stewardship, and the Bushkill Stream Conservancy’s partnership with the Heritage Conservancy will maintain the momentum developed in the greenways planning process.

The Bushkill Creek Watershed has been chosen as the geographic scope for the *Lasting Landscapes*® initiative. Using data provided by this and other plans, the research and planning steps can be completed in a short time. Planning tasks not already covered by this greenway plan may include the identification and prioritization of lands for protection. Next, the Heritage Conservancy could use its resources to make contacts with municipal governments and individual landowners. These meetings would serve to educate on the benefits of preserving natural or historical features, as well as to present various options for protection, including land donations and conservation easements. During this process, it would be appropriate to involve other key people and entities already involved in outreach efforts, including officials at Jacobsburg Environmental Education Center and the municipal Environmental Advisory Councils. The desired end result of these public

contacts is the formal protection of important natural and/or historic areas through easement, acquisition, or other agreement. One likely target area is the many streams and riparian areas of the upper Bushkill Watershed. In past scenarios, the Heritage Conservancy has used its role as a land trust to acquire or hold easements on properties. This is certainly possible in the Two Rivers Area. After this point, the Heritage Conservancy would continue to monitor all protected lands, lending assistance in resource restoration and other stewardship matters.

Pilot Project #2 - Municipal Ordinance Review

This action, which received the most support at public meetings, is also one of the least costly means of protecting important natural resources. In this scenario, a municipality would hire a consultant (such as a planning or environmental firm) to review all ordinances that relate to land development and protection, and provide specific recommendations to modify these ordinances. This includes the zoning ordinance, the subdivision and land development ordinance (SALDO), and sometimes a separate floodplain ordinance. Key items for review include the following:

- Surface water setback / riparian buffer ordinance
- Floodplain restrictions
- Wetland /hydric soil identification and delineation
- Steep slope restrictions
- Woodlands/tree-cutting ordinance
- Lot-size and other development restrictions in areas zoned as “Agricultural” or “Conservation”
- Provisions to adopt an Official Map
- Provisions requiring land donation or fee in lieu of land upon development

This pilot project provides the opportunity not only to enhance environmental provisions in municipal ordinances, but also provides education to public officials on the reasons why these changes are important. It is critical that any such consulting have very clear recommendations, which may involve rewriting sections of the ordinances for the municipalities. Eliminating vagueness reduces the chance of disputes during development plan reviews. Finally, it is important for municipalities to enforce compliance with environmental ordinances through the work of the zoning officers, zoning hearing board, and municipal engineers. Municipalities should consider establishing an environmental advisory council (EAC) to further guide environmental decisions.

The municipal ordinance review for Bushkill Township has recently been completed by F.X. Browne. This firm has also started the process of reviewing the ordinances for other townships in the study area including Plainfield, Forks, Palmer and Upper and Lower Nazareth. The Heritage Conservancy, in cooperation with F.X. Browne, will be reviewing the municipal ordinances for the boroughs of Stockertown, Tatamy, Nazareth and Wilson as well as the City of Easton. The remaining municipalities, Williams Township, Moore Township, Bethlehem Township, and the boroughs of Glendon, West Easton and Wind Gap, should begin the process of having their ordinances reviewed.

Pilot Project #3 - Bushkill Creek Urban Corridor Enhancement Project

This pilot project is recommended not only by this plan, but also in the *Bushkill Creek Corridor Enhancement Study* written by Land Concepts Group of Blue Bell, Pennsylvania for the City of Easton. This project would be undertaken by the City of Easton, Lafayette College, and ideally a number of private businesses, with financial assistance from a variety of state grants.

The main thrust of this project is twofold: developing a multi-use trail or series of trails along the Bushkill Creek in Easton, and redeveloping several brownfield sites along this corridor. The trail component of the project could involve several paths of various surface types, but at the least should include a continuous, paved trail from the Binney & Smith Black Mill on Bushkill Drive northwest of 13th Street, to Riverside Park along the Delaware River. This connection would functionally link Downtown Easton with the Palmer Bikeway and Tatamy Borough. The trail would be constructed on several different existing features, including an abandoned railroad bed, an informal woods path, a cemetery access drive, and the shoulders of several streets. Additional trail ideas in the Land Concepts study include an earthen nature trail and a boardwalk, and pedestrian bridges across the creek at two locations.

Brownfield sites for redevelopment include the Simon Silk Mill on 13th Street, an auto junkyard on Bushkill Drive, and a series of vacant or underutilized buildings along the Bushkill Creek between 4th Street and Riverside Drive. In the case of standing structures like the Simon Silk Mill, buildings of historic and/or architectural value should be restored and reused for retail, office and residential use, while less valuable buildings may be demolished to make way for other facilities such as public parks with athletic facilities and playgrounds.



A portion of the existing greenway in the City of Easton to be improved through the Bushkill Creek Urban Corridor Enhancement Project.

Another aspect of this pilot project would be the clean-up and revegetation of the Bushkill stream bank. In many locations along the Bushkill Creek in the Urban Core, the stream quality is compromised by pollution and by the lack of a vegetated riparian buffer.

The ultimate goal of a paved, multi-use recreation trail linking vibrant destinations in re-used historic buildings along a healthy stream would be gradual, involving many different projects. A trail along the creek, however, is a singular effort that could be initiated immediately. The City of Easton recently received \$9 million in Redevelopment Assistance Capital Program funds from Governor

Rendell to begin work on redevelopment efforts along the Bushkill Creek Corridor. The City is expected to earmark \$3.5 million to begin work on multiple use trails along the Bushkill Creek Urban Corridor. PennDOT TEA-21 funding seems a likely source, as well as grants from DCED.

Pilot Project #4 - Lehigh & New England Trail Feasibility Study

The idea of a multi-use trail on the bed of the former Lehigh & New England Railroad was supported at public meetings and municipal interviews. The railroad once skirted the base of Blue Mountain for 32 miles between Lehigh Gap and Portland in Northampton County. Eight of these miles fall within the Two Rivers Study Area, in Moore, Bushkill and Plainfield Townships, and the Borough of Wind Gap. The portion of the former railroad within Moore Township is eligible for inclusion in the National Register of Historic Places. The railroad grade in most places remains in tact, but is found within numerous private landholdings. In some places, the railroad grade has been bulldozed or built on.

Due to the challenging nature of creating a trail on the Lehigh & New England railroad bed, a feasibility study is the most appropriate next step. This effort could be footed by the constituent municipalities, Northampton County, a non-profit conservancy, or a combination thereof. A trail feasibility study, usually performed by a recreation consultant, would thoroughly address physical conditions of the railroad bed, opportunities and impediments to trail development, and land ownership status. Throughout the development of the feasibility study, all affected land owners and municipalities should be contacted and involved. The study would most likely recommend a phased approach to trail development, and would include a time table and cost analysis.

The benefits of a Lehigh & New England Trail are numerous. Area recreationists, including mountain bikers, hikers, bird watchers, and equestrians, would have as many as 32 new miles of publically-accessible pathway for enjoyment. The trail would pass through a primarily wooded environment, showcasing the springs, wetlands, and rivulets that exist at the base of Blue Mountain. The proposed trail would also provide additional access points to the Appalachian Trail, situated on the crest of Blue Mountain, 3/4 mile to the north.

Pilot Project #5 - Sobers Run Headwaters Development

This pilot project blends economic development with natural resource conservation. An area immediately to the west of the Route 512 or “Slate Belt” interchange of Route 33 near Wind Gap poses a tremendous opportunity for economic development, particularly for heritage or recreation-based industries. Route 33 provides quick access from Wind Gap to the more populated areas of the Lehigh Valley. It also connects to Interstates 78 and 80, which in turn, provide quick and efficient access to the major cities of the Northeastern United States. This ease of access is a plus in boosting the economy of the Slate Belt region of Northampton County.

The site itself has a unique setting that provides an opportunity for environmentally-responsible land development. Unique characteristics include the following:

- 1) The site is immediately adjacent to Rismiller Woods and Sobers Run. Rismiller Woods is an outstanding natural area identified by The Nature Conservancy known to contain a rare ephemeral/fluctuating pools natural community. Sobers Run is an important headwater stream that feeds the Bushkill Creek. Its existing high water quality and vegetated riparian buffer make it one of the healthiest streams in the Lehigh Valley.
- 2) The site contains vacant and underutilized brownfield sites. Redeveloping brownfield sites is an environmentally sound alternative to developing farms or woodland.
- 3) The site is in close proximity to the Appalachian Trail, State Game Lands #168, and Jacobsburg E.E.C. Several opportunities exist to connect the site with these recreational amenities by means of greenway trails.
- 4) The site contains readily available sources of geothermal and wind energy.

With this setting, the Sobers Run Headwaters Site can accommodate a unique development that will stimulate the local economy while showcasing environmentally-sound development practices. Major goals of this pilot project include the following:

- 1) To offer a variety of attractive, functional multiple-use business, industrial, residential and/or public accommodation settings that appeal to innovative forms of development and take advantage of the unique site characteristics and the recreational and tourism potentials of the area.
- 2) To locate and plan development of the site in a manner that will take greatest advantage of previous industrial and business development and existing highway access and public utilities.
- 3) To ensure that new development on this site is well planned and sensitively designed to promote protection of nearby stream headwaters and is compatible with both adjacent land uses and regional and local land use and conservation planning guidelines.
- 4) To create a model for the use of green technology in infrastructure development and building construction, and to promote the success of environmentally sound business and industrial development.

Possible types of businesses that could locate at the site include:

- Outdoor recreation/eco-tourism outfitter
- Recreation and sports equipment demonstration and sales
- Recreation-oriented mixed residential/business community
- Health provider campus
- Health resort and spa
- Technology-oriented office/industrial campus
- Innovative public accommodation/recreation/food complex
- Geothermal or wind power energy supplier
- Visitor center/tourism complex
- Education complex
- Other appropriate light industrial/business uses

To attract developers to the site, matching funding should be sought from DCNR, DCED, Northampton County, D&L National Heritage Corridor, and possibly others.

Pilot Project #6 - Jacobsburg Education / Visitor Center

As the Lehigh Valley's only state park with the exception of the Delaware Canal, Jacobsburg Environmental Education Center (E.E.C.) sees significant use by many different types of recreationists, including hikers, mountain bikers, equestrians, wildlife enthusiasts, and history buffs. Unfortunately, the current visitor center and park office are located in a building too small for either purpose. This pilot project addresses the facility needs of Jacobsburg E.E.C., and the possibility to accommodate other groups, as well.

The *Boulton Facilities Master Plan* of 2000 addressed a related need for interpretation facilities at the park's historic Boulton gun factory site and nearby homesteads. This plan called for the development of three facilities:

- 1) Environmental & Heritage Education/Visitors Center
- 2) Henry Gun Factory Replication
- 3) Pennsylvania Longrifle Museum

Since the publication of that report, the Jacobsburg Historical Society has completed a museum dedicated to the Pennsylvania Longrifle in the existing Henry Homestead. However, the two remaining ventures have not been initiated. This pilot project focuses on what park officials feel to be the more pressing need: an education/visitor center.

A new education/visitor center could have many purposes and contain several facilities, including the following:

- 1) A larger office facility for the Jacobsburg E.E.C. staff.
- 2) The park's primary visitor center, providing a wealth of information on the park's environmental, historic, and recreational resources. This could include permanent exhibits on wildlife, history, and environmental science, as well as a wealth of take-away maps and pamphlets for use within the park.
- 3) A high-tech, ample-sized meeting space for the E.E.C. staff, visiting DCNR officials, Delaware and Lehigh National Heritage Corridor functions, Jacobsburg Historical Society meetings, Bushkill Stream Conservancy meetings, and possibly others. Such a room should have capabilities for digital presentations and internet access.
- 4) A classroom for environmental education, to be used by school groups and organized youth or adult groups. Depending on design and budget, this could be the same room as the above-mentioned meeting room, or a separate room.
- 5) Permanent office space for non-DCNR groups, including the Bushkill Stream Conservancy, D&L National Heritage Corridor, Jacobsburg Historical Society, and others. Depending on design and budget, this may be in the form of individual rooms,

or as a shared office space. Since these facilities would likely be built entirely with state funding, some type of lease agreement may be necessary to cater to non-state groups.

The *Boulton Facilities Mater Plan* identifies the northwest corner of Henry Road and Route 33 as an ideal location for an education/visitor center. Locating adjacent to an existing Route 33 interchange provides easy access, high visibility, and reduces traffic volume in the interior of the park. The site, on state land, is also within steps of the many historic sites of Boulton. A nearby environmentally sensitive area would need to be addressed in an impact study.

Other possible locations for an education/visitor center cannot be ruled out. It is important, however, that any such site be large enough to accommodate the desired facilities while having minimal impact on the environment.

Pilot Project #7 - Official Map

As noted previously in this greenway plan, an official map may be used to identify future open space reservations desired by the municipality. In 2004, Bushkill Township officials adopted a resolution to place riparian woodland greenways on their official map. In 2000, Mount Joy Township officials (Lancaster County) adopted an official map showing 27 properties they wished to acquire for recreation or open space, and 4 trails they wished to develop in the future. While an official map does not guarantee that every goal shown on the map will be achieved, it gives a municipality “first dibs” on a piece of land when it is formally proposed for development or subdivision. If the municipality cannot secure the funds it needs to purchase the tract before the year has passed, it may resort to agreements with the developer on where to appropriately place homes and open space.

This an inexpensive pilot project that could be undertaken by any of the 17 municipalities in the Two Rivers Study Area. In particular, the official map could be used to protect areas designated as proposed greenways in this plan. Although most official maps use existing property boundaries to show future land acquisitions, a municipality may also use natural features such as floodplain boundaries and edges of woods. Under the State Municipalities Planning Code, the municipality may show map elements using “property records, aerial photography, photogrammetric mapping or



Bushkill Township's official map includes riparian woodlands.

other method sufficient for identification, description and publication of the map.” For most municipalities, a GIS or CADD print would be most convenient. Later, when an opportunity arises to purchase land, the municipality must have a metes-and-bounds boundary description of the land made by a licensed surveyor.

When creating an official map for environmental preservation purposes, a municipality needs to decide or be guided as to which areas have the high natural resource value. This plan identifies many of these areas, especially those along streams and prominent ridgelines. In the Upper Watershed, riparian woodlands are the most important feature. In the Middle Watershed and Urban Core, undeveloped floodplain areas should be reserved. In Williams Township, large, contiguous areas of woodlands should be added to the map. Municipalities can also use the official map to show desired trail routes and future parks. This would be especially helpful in the Urban Core.

Pilot Project #8 - The Jacobsburg-Blue Mountain Connection

Interviews with environmental professionals and Jacobsburg E.E.C. officials have revealed an pressing need to preserve a corridor of riparian woodlands between the state park and Blue Mountain. Doing so would help ensure a healthy ecosystem at the park, protect water quality in the Bushkill Creek watershed, and possibly provide a setting for a recreation trail. This pilot project would address all three issues.

For animals, a healthy ecosystem means a diverse gene pool, and access to abundant resources for food and shelter. Blue Mountain (or Kittatinny Ridge) maintains a healthy ecosystem intrinsically. For more than 200 miles between New Jersey and Maryland, the mountain maintains a swath of forest two or more miles in width, interrupted only by occasional roads and rivers. Jacobsburg E.E.C., while containing one of the largest areas of contiguous woodlands in the Lehigh Valley, is surrounded by residential development and open fields. This isolated situation gives Jacobsburg E.E.C. an *island ecology*, which could worsen upon further development of the area. Sobers Run, with three forks originating at the base of Blue Mountain, offers the most direct and most in-tact ecological connection to Jacobsburg E.E.C., 3½ miles to the south. Maintaining a wooded corridor along Sobers Run is a goal of this greenway plan, and this pilot project would focus preservation efforts in that corridor.

Additionally, area recreationists have voiced a desire to connect the trails of Jacobsburg E.E.C. to the Appalachian Trail on Blue Mountain. An electric transmission line owned by PPL could help realize this goal. The power line runs parallel to the east branch of Sobers Run along its west bank. Many portions of the power line are within an owned right-of-way corridor, different from the standard easement agreements usually associated with power lines. This decreases the number of landowners involved, thus increasing the potential for a trail. Once reaching the base of Blue Mountain, recreationists could reach the Appalachian Trail by walking east on Eighth Street into Wind Gap, or perhaps turning west onto a future Lehigh & New England trail, and then north onto the existing Katellen Trail.

Implementation of this pilot project would likely be two-tiered, focusing first on preservation of the riparian woodlands, then on a trail. Education and outreach to landowners for the purpose of land or easement donation has already been initiated by the Bushkill Township Environmental Advisory Council. A number of landowners are interested in allowing conservation easements on their property. The trail would likely be developed only after careful dialogue with PPL and other landowners. A formal feasibility study could organize these efforts, and could be bundled with the open space preservation efforts along Sobers Run.

DCNR is a likely funding source for land acquisition, as its most recent grant offerings focus on the enhancement of existing state parks. Northampton County Open Space bond money is another promising source. Trail development could be funded by a number of sources listed elsewhere in the Action Plan of this report.

Pilot Project #9 - Riparian Buffers on Farms

As much of the Two Rivers Area remains in agriculture, the water quality of area streams can be largely affected by the management practices on farms. Soil erosion, livestock waste, and herbicide use can all contribute to poor stream quality. Maintaining a vegetated buffer along watercourses can reduce erosion and filter the impurities associated with dairy and crop farming (see also Appendix E). This pilot project aims to organize an effort to educate farmers on best management practices (BMPs), especially with regard to riparian buffers, and to provide avenues of funding for riparian buffer practices.

Funding and technical assistance for conservation is available on many levels. Locally, the Northampton County Conservation District provides guidance on riparian buffers and other BMPs. At the federal level, the Natural Resource Conservation Service (NRCS) offers numerous funding and assistance programs on a rolling basis. The Conservation Reserve Program (CRP) offers direct federal funding for farmers to employ conservation methods. Under CRP, farmers plant a vegetative cover plant in riparian areas, and receive annual “rental” money for a multi-year contract. Similarly, the Conservation Security Program and Environmental Quality Incentive Program offer technical and financial assistance to employ conservation practices on private agricultural land. A larger scale NRCS program, the Public Law 566 Small Watershed Program, provides assistance in implementing conservation plans and practices throughout entire watersheds smaller than 250,000 acres.

To implement this pilot project, a continuous, organized outreach effort would be necessary to inform farmers of BMPs and to set up enrollment in conservation programs. As an example, the Lebanon County Conservation District continually offers direct assistance by writing conservation plans, and indirect assistance by helping farmers sign up with state and federal assistance programs. This Conservation District also maintains a comprehensive website describing numerous conservation assistance options. In the Two Rivers Area, the Northampton County Conservation District could join forces with a non-profit agency such as the Bushkill Stream Conservancy to increase outreach and education efforts on local farms.

APPENDIX A - SURVEY QUESTIONNAIRE

Date: _____

Interviewee: _____

Affiliation: _____
(Organization/Agency/Entity)

Two Rivers Greenways Plan - Questionnaire

What is a Greenway? The Pennsylvania Greenways Plan defines a greenway as follows:

“A greenway is a corridor of open space. Greenways vary greatly in scale, from narrow ribbons of green that run through urban, suburban and natural areas to wider corridors that incorporate diverse natural, cultural and scenic features. They can incorporate both public and private property, and can be land- or water-based. They may follow old railways, canals or ridge tops, or they may follow stream corridors, shorelines or wetlands, and include water trails for non-motorized craft. Some greenways are recreational corridors or scenic byways that may accommodate motorized and non-motorized vehicles. Others function almost exclusively for environmental protection and are not designed for human passage. Greenways differ in their location and function, but overall, a greenway will protect natural, cultural and scenic resources, provide recreational benefits, enhance natural beauty and quality of life in neighborhoods and communities, and stimulate economic development opportunities.”

a) Do you agree with the above definition of a greenway?

___ Yes ___ No (if no, please comment on how would you would define a greenway in the space below)

b) What is your vision of a greenway within your municipality or region?

c) What would be an example of a desirable greenway that already exists in your municipality or region?

Greenway Issues, Opportunities and Threats

a) What are the three major Issues and Opportunities in the Two River Greenways Plan Study Area? (See and use the attached map to note key locations relating to issues/areas of concern and areas of opportunity.)

Issues:

Opportunities:

- 1. _____
- 2. _____
- 3. _____

- A. _____
- B. _____
- C. _____

b) What are the major threats in the Two River Greenways Plan Study Area? (See and use the attached map to identify and note any key locations relating to threats.)

- I. _____
- II. _____
- III. _____

Priorities for Greenway Preservation

Since a municipality is obligated to allow for community development, what would be your priorities for establishing Greenway preservation protection? Would you re-order the following list (#1 being most important)?

___ No ___ Yes (if yes, please renumber with #1 being most important)

1. Streams and other Waterbodies
2. Identified Floodway
3. Identified 100-year Floodplains
4. Wetlands
5. Unique /Critical Wildlife Habitat or Unique/Endangered Plant Groupings
6. Riparian Buffers
7. Major Forest Acreage
8. Wetland Buffers
9. Non-wetland Hydric Soils or Soils with Seasonal High Water Table
10. Minor Woodland Clumps, Tree Lines, and Hedge Rows
11. Farmland
12. Cultural and Historical Resources
13. Unique Geologic or Scenic Features
14. Trails and Other Linear Features
15. Park and Recreation Areas

Other Priorities? (If so, please list and insert # regarding relative importance):

____. _____

____. _____

____. _____

____. _____

____. _____

____. _____

Key Greenway Corridors

What are the key Greenway corridors that should be preserved in the Two Rivers Greenway Plan Study Area? (Use the attached map to mark the locations of these greenway corridors.)

I. _____

II. _____

III. _____

Key Greenway Areas or Parcels

In your municipality / locale, please name some areas or parcels where either:

- a. Existing natural features and/or open space are at risk of destruction: _____

- b. Currently vacant or agricultural land is being considered for development: _____

- c. Former industrial or other buildings are vacant: _____

- d. Opportunities for outdoor recreation are lacking, especially in the realm of hiking and biking trails: _____

- e. Opportunities exist for Greenway connections: _____

Demand for Greenways

Over the next 10 years, do you believe the demand for greenways will:

- Decrease Remain the same Increase at slow rate
 Increase at moderate rate Increase at high rate Don't Know

Why?

Greenway Users

Who are the current and potential future existing Greenway users?

Current Greenway Users: _____

Potential Future Greenway Users: _____

Tools for Greenway Preservation

What do you believe are the three most important tools for preserving greenways in the Two Rivers Greenways Plan Study Area (#1 being the most important)?

1. _____

2. _____

3. _____

Partners for Greenway Development and Operation

a) Who should be the major partners for Greenway Establishment/Development?

b) Who should be the major partners for Greenway Operation/Maintenance?

Thank you very much for your cooperation and input!

Please return completed questionnaire to:

(Study Area Map to be attached)

Two Rivers Area Greenway Plan
Key Person Contact List - Questionnaires/Interviews
 February 2004

Municipalities

MUNICIPALITY	Contact	Position	Phone #
Bethlehem Township	Howard Kuntzler	Planning Director	610.814.6440
	Tim Brady		
Bushkill Township	Aaron Hook	Twp Secretary	610.759.1250
	Jason Smith	EAC Officer	610.759.8424
Forks Township	Cathy Kichline	Twp Manager	610.250.2251 610.252.2081
Lower Nazareth Township	Timm Tenges	Twp Manager	610.759.7434
Moore Township	Ronnie Jerinko	Twp Supervisor	610.759.9449
Palmer Township	Ted Sales	Public Services Director	610.253.7191
Plainfield Township	Matt Glennon	Supervisor	610.759.6944
	Bob Cornman	P.C. Chairman	
Upper Nazareth Township	Vicky Osbourne	COG member	610.759.5341
Williams Township	Deborah Patterson	Twp Manager	610.258.6788
	Robert Doerr	Twp Supervisor	
	John Cusick	Chairman of Supervisors	
Glendon Borough	Charlie Seip	Borough Council	610.330.2200
	Ronnie Schaffer	Secretary	
Nazareth Borough	Don Keller	Borough Engineer	610.759.0202
Stockertown Borough	Sherman Metzgar	Mayor	610.759.8393
Tatamy Borough	Luke Duignam	Mayor	610.252.7123
	Brian Kocher	Borough Engineer	
	David Dorshimer	Planning Commission	610.923.5291
West Easton Borough	Bill Bogari	Borough Council	610.252.6651
	Bill Concolino	Borough Council	
Wilson Borough	Walter Boran	Borough Manager	610.258.6142
Wind Gap Borough	Winton Male	Borough Council	610.863.7288
City of Easton	Miriam Huertas	Dir. Economic Development	610.250.6712
	Jeanette De Renne	City Planner	610.250.6651

Two Rivers Area Greenway Plan

Entities

ENTITY	Contact	Phone #
Brookwood Group	Linda Iudicello	610.746.5804
D&L National Heritage Corridor	Bill Mineo Sherry Acevedo	610.923.3548
Easton Area High School	Rob Reese	610.252.7528 610.250.2781
farmers	Matt Glennon	610.759.6944
F.X. Browne	Jason Smith	610.759.8424 570.588.7900
Lafayette College	David Brandes	610.330.5441
Lehigh Valley Horse Council	Kathy Grube	610.759.7985
Lehigh Valley Planning Commission	Fritz Brock	610.264.4544
	Laura Eberly	610.264.4544
Muhlenburg College (Graver Arboretum)	Ken Lauer, Graver Arb. mgr.	610.759.3132 610.746.4882
Northampton County Farmland Preservation Board	Beverly Hoyer, chairperson Maria Bentzoni, administrator	610.746.1993
Northampton County Conservation District	Bruce Pysher, Dist. Mgr.	610.746.1971
Northampton County Dept. of Community & Economic Development	Drew Lewis, John Kingsley, Michele Sparich	610.559.3200
Northampton County Federation of Sportsmen Clubs	Alan & Pauline Florey Andrew R. Curtis	
Northampton County Department of Parks & Recreation	Gordon Heller, Superintendent	610.746.1979 610.746.1975
Pennsylvania DCNR - Jacobsburg E.E.C.	Dale Princkey	610.746.2801
	Bill Sweeney	610.746.2808
RSVP	Bill Spafford	610.588.2037
Sierra Club of the Lehigh Valley	David Macguire	610.264.4544
Trout Unlimited	Brian Wagner	610.759.0492
Two Rivers Council of Governments	Michael Moorehead	610.253.4211
Wildlands Conservancy	Kate Brandes Thomas Kerr	610.258.5994

APPENDIX B - SAMPLE RESOLUTION

RESOLUTION _____

**(Name of Municipality)
NORTHAMPTON COUNTY, PENNSYLVANIA**

A RESOLUTION OF THE (NAME OF MUNICIPALITY)
TO ADOPT THE TWO RIVERS AREA GREENWAY PLAN

WHEREAS, the Two Rivers Area Greenway Planning Committee of the Bushkill Stream Conservancy, Northampton County, Pennsylvania has participated in the preparation of the Two Rivers Area Greenway Plan; and

WHEREAS, the municipalities within the Two Rivers Area Greenway Plan Study Area provided information and input for this Plan; and

WHEREAS, the purpose of this Plan is to guide the location, establishment, preservation and enhancement of greenways, and to further the implementation of the Pennsylvania Greenways Plan; and

WHEREAS, the Plan was financed in part by a Community Conservation Partnerships Program grant under the administration of the Pennsylvania Department of Conservation and Natural Resources, Bureau of Recreation and Conservation.

NOW, THEREFORE, BE IT RESOLVED by the (Governing body of the Municipality) that the Two Rivers Area Greenway Plan is hereby adopted as the (name of the municipality) greenway plan for the Two Rivers Area Greenway Plan Study Area.

THIS RESOLUTION adopted by the (Governing body of Municipality) this ____ day of 2004.

(MUNICIPALITY)

ATTEST:

Secretary

By: _____

Chairperson

APPENDIX C - PUBLISHED SOURCES

- Delaware & Lehigh Canal National Heritage Corridor. *Delaware & Lehigh Canal National Heritage Corridor and State Heritage Park - Landing Exhibits and Flexible Exhibit System*. 1997.
- Delaware & Lehigh Canal National Heritage Corridor. *Visually Speaking - Design Guidelines*. 1995.
- Delaware & Lehigh Canal National Heritage Corridor Commission, U.S. Department of the Interior. *Delaware & Lehigh Canal National Heritage Corridor and State Heritage Park - Management Action Plan*. 1993.
- Flink, Charles A. and Robert M. Searns. *Greenways, A Guide to Planning, Design and Development*. Island Press, Washington, D.C. 1993.
- Flink, Charles A, Kristine Olka and Robert M. Searns. *Trails for the Twenty-First Century*. Island Press, Washington, D.C. 2001.
- Fritts, Peter. *History of Northampton County, Pennsylvania*. 1877.
- Greenways Incorporated. *Region 2000 Greenways and Blueways Plan; Amherst, Appomattox, Bedford & Campbell Counties and the Cities of Bedford and Lynchburg*. 2003.
- Johnson, Russ. *Creating Connections: The Pennsylvania Greenways and Trails How-To Manual*. Philadelphia, Pennsylvania. 1998.
- McMillen, Barbara. *Designing Sidewalks and Trails for Access, Part II of II: Best Practices Design Guide*. 2001.
- Pennsylvania Greenways Partnership Commission. *Pennsylvania Greenways: An Action Plan for Creating Connections*. 2001.
- Pennsylvania Science Office of The Nature Conservancy. *A Natural Areas Inventory of Lehigh and Northampton Counties Pennsylvania*. 1999.
- PLAE. Inc. *Universal Access to Outdoor Recreation, A Design Guide*. Berkeley, California. 1993.
- Steiner, Joan. *The Bushkill Creek*.
- Wright, James & Linda. *Place Names of Northampton County, Pennsylvania*. 1988.

APPENDIX D - PUBLIC MEETINGS

Public Meeting
Draft Two Rivers Area
Greenway Plan

The Two Rivers Area Greenway Plan Steering Committee of the Bushkill Stream Conservancy is developing a Greenway Plan for the Bushkill Creek Watershed/Two Rivers Area. The plan provides goals, recommendations and actions for greenway preservation and enhancement in the following communities:

Bethlehem Township
Bushkill Township
Easton City
Forks Township
Glendon Borough
Lower Nazareth Township
Moore Township
Nazareth Borough
Palmer Township

Plainfield Township
Stockertown Borough
Tatamy Borough
Upper Nazareth Township
West Easton Borough
Williams Township
Wilson Borough
Wind Gap Borough

Please attend the public meeting sponsored by the committee to: learn more about the greenways planning program, review background study maps and key findings, and provide input on the draft Greenway Plan and its goals, recommendations and actions.

Where: Plainfield Township Fire Co. **When:** July 28, 2004 7:30
6840 Sullivan Trail (Wednesday)
Wind Gap, PA 18091

An open house will begin at 7:00 p.m. to provide an informal opportunity to ask questions and review maps before the meeting.

Two Rivers Area Greenway Plan

Public Meeting Participants
July 28, 2004 at the Plainfield Township Volunteer Fire Company

NAME	AFFILIATION	CONTACT INFO.
<u>B. R. Carman</u>	<u>BSC</u>	<u></u>
<u>Roger Rehrig</u>	<u></u>	<u>R27ac@aol</u>
<u>M. Bilyn</u>	<u></u>	<u></u>
<u>R. Bilyn</u>	<u>Bilyn Court</u>	<u></u>
<u>Kate Brandes</u>	<u>BSC</u>	<u></u>
<u>Gordon Heller</u>	<u>Northampton County Parks</u>	<u>610-746-1975</u>
<u>Matt Glennon</u>	<u>Plainfield Twp. Supervisor</u>	<u>610-863-4045</u>
<u>Sherry Acevedo</u>	<u>D&L NHC 610-923-3548</u>	<u>dele.sherry@verizon.net</u>
<u>Doris Betzenberger</u>	<u>LVHC</u>	<u>610-767-2346</u>
<u>Harvey W. Eckhart</u>	<u>LVHC</u>	<u>610-767-3448</u>
<u>Mary Jane Eckhart</u>	<u>LVHC</u>	<u>610-767-3448</u>
<u>Kathy Grube</u>	<u>Lehigh Valley Horse Council</u>	<u>610-759-7985</u>
<u>Lori Williamson</u>	<u>LVHC</u>	<u>610-759-4577</u>
<u>Ben Giralico</u>	<u></u>	<u>610-614-0225 giralico@ptd.net</u>
<u>Polly Beste</u>	<u>Bushkill Twp. landowner</u>	<u>pbeste@ptd.net</u>
<u>Gail E. Cerva</u>	<u>LVHC</u>	<u>linebacker3@juno.com</u>
<u>Chris Henricks</u>	<u></u>	<u>JCLSHenric@aol.com</u>
<u>Ken Laner</u>	<u>Bushkill Stream</u>	<u></u>
<u>Marjorie Laner</u>	<u>Coraver Arboretum</u>	<u></u>
<u>Ron Marshall</u>	<u></u>	<u></u>
<u>Terry Pinder</u>	<u></u>	<u>Kresgeville, PA</u>
<u>Terry Strockburg</u>	<u>Jacobsburg</u>	<u></u>
<u>Don Strockburg</u>	<u></u>	<u></u>
<u>Pauline & Allen Flory</u>	<u>Nor. Cty. Fed. Sportsmen,</u>	<u>610-588-7839</u>
<u></u>	<u>Belfast Edelman Club</u>	<u></u>
<u>Carolyn Cook</u>	<u>Author, Ride PA Horse Trails</u>	<u>610-760-0549</u>
<u>Terry & Suzanne Newhard</u>	<u></u>	<u>terrynewhard@msn.com</u>
<u>Terry L. Kleintop</u>	<u>Plainfield Township</u>	<u></u>

**Comments Received at Public Meeting
July 28, 2004 at the Plainfield Township Volunteer Fire Company**

Land Preservation

- How does the plan address the action of farmland preservation? The concept of preserving farmland is great but if there are no methods for protection, these areas will be lost to developers offering large sums of money.
- The action plan should be developed simultaneously with the goals and objectives. This will help to eliminate the lag time that often leads to important areas being lost.
- It is important to protect the woodlands at the base of Blue Mountain. This needs to be done by working with the municipalities and counties.
- Owner of 35 acres in Bushkill Township receives solicitations for development every week, and feels that the County must be approached about finding the money for land preservation immediately, before it is too late.
- A team consisting of The Nature Conservancy, Wildlands Conservancy, and Heritage Conservancy would “get noticed” by the state, and would be very effective in saving land.
- A Plainfield Township official maintains an impressive list of property owners interested in conservation easements.
- The County Bond Issue is even more valuable when considering how it can be leveraged with matching state funding.
- Preserving smaller tracts of farmland can be done by encouraging horse farms of approximately ten acres. These could be clustered together, adjacent to the greenway. Equestrians need places to ride as they are being barred from state game lands and other areas.
- A County Council member feels that agricultural preservation is only cost-effective when it preserves 1200-1500 acre crop farms. On the contrary, a municipal official feels that the smaller farms of the Upper Bushkill Watershed are worthy targets for preservation. Many of these farms can support a growing interest in organic farms, orchards, tree farms and other smaller-scale operations. In addition, many farmers from New Jersey are searching for additional tracts of farmland, no matter what the size. If we strive for perfection in agricultural preservation, i.e. 1,000 + acre farms, we will achieve nothing.
- [Via phone call the next day] A resident of environmentally-sensitive stream-side land in Bushkill Township feels very threatened by this plan, stating that its goals are communistic and

that they go against the Constitution. He feels that there should be no stream setbacks, no wetlands restrictions, and that a property owner should be able to do whatever he wishes. He feels that if a landowner is not allowed to use a portion of his property, he should either not have to pay taxes on it, or it should be purchased in fee by the state government. He applied numerous times to fill in a wetland on his property for a driveway. Both DEP and private wetland scientists said that there was no way his plans could ever be approved. In addition, he said that all affected property owners of this greenway plan should have been notified by letter, that only people who support the greenway were allowed to speak at the public meeting, and that we are “hiding something” from the public.

Recreation

- The Lehigh & New England Rail Trail is important because it will link Lehigh Gap and the Delaware Water Gap National Recreation Area. This connection has already been a topic of discussion and should be noted in the text and on the maps.
- The D&L water trail system that is being developed should be mentioned as a compliment to the land based trail system.
- Equestrians have a major need of a place to park their trailer and vehicle. This should ideally be separate from other parking, preferably a field.
- While ATVs seem not to be appropriate for any of these greenways, ATV drivers do need a place to go. There are no places in the Lehigh Valley for ATV use. The Bureau of Forestry has been inviting ATV’s into State Forest lands. [There are no state forests in the Lehigh Valley.]

Funding and Economic Development

- The D&L Corridor is also a PA Heritage Park, and therefore can receive Heritage Park funding. This money could help fund connections between the D&L Trail and Jacobsburg, which is a major goal of the commission.
- Equestrian bed and breakfasts with horse boarding are a possible area of economic development.
- Volunteer organizations should be used for constructing and maintaining trails, thereby reducing public costs. Schools and community groups are potential sources for volunteer labor. “Adopt-a-trail” programs have been successfully used across the state, notably in Holidaysburg, PA.

Newspaper article released after the July 28, 2004 public meeting.

Greenway Plan Presented for Public Comment

Proposal aims to create open space corridors in Northampton County

By Joshua Stewart of the Morning Call

July 30, 2004

Before the Two Rivers Area Greenway plan becomes a reality, it must be modified to reflect public concerns and be adopted by the 17 municipalities in eastern Northampton County that it affects.

Tom Palmer of the Urban Research and Development Corporation in Bethlehem said many people, municipalities and organizations will be involved with the plan.

Those involved will be responsible for, among other things, acquiring key tracts of land as identified by the plan, rezoning proposed greenways, maintaining greenways and educating the public and businesses about greenways.

Their efforts will result in a newly beautified region, an improved economy, a protected local environment, and a halt on unnecessary land development, officials said.

Palmer presented the plan, prepared for Two Rivers Chamber of Commerce in Easton, to the public for the first time Wednesday night at Plainfield Fire Company hall in Plainfield Township.

The plan is designed to create new greenways - corridors of open space, such as a trail or a creek, that protect natural resources while offering recreational benefits. Nature trails are a central feature of greenways. They link points of cultural, historical or environmental interest while providing alternative means of transportation and recreational opportunities. The plan will cover more than 109 square miles.

The success of the plan depends on support from local governments.

“A lot of greenways can be protected by good zoning and land ordinances,” Palmer said.

At the meeting, Northampton County Councilman Ron Angle expressed concern that the greenway plan was counterproductive. He said greenways boost adjacent economies, which in turn, encourages development, harming the land the greenways are designed to protect.

Angle also said municipalities are reluctant to protect greenways and halt development. He cited a \$2.6 million road project in Wind Gap that would benefit a proposed shopping center that will

interrupt what he called an existing greenway.

Despite Angle's comments, the 30 people attending the meeting expressed interest in encouraging local municipalities to adopt greenway-friendly zoning and land ordinances.

The plan will take existing greenways and link them together by creating new greenways, adding to a statewide greenway system.

"This is one piece of [the statewide greenway system] finally coming to fruition, said Sandy Merwarth, president of the Bushkill Stream Conservancy and a member of the plan's steering committee.

"We thought it was very important for this greenway plan to be very compatible and consistent with the statewide greenway plan," Palmer said.

A plan that conforms to the state's vision is more likely to receive funding from the state, Palmer said.

The final cost of the greenway plan has yet to be determined but funding is expected from several sources, including a proposed Northampton County open space bond.

The municipalities that will be affected are Easton, the townships of Bethlehem, Bushkill, Forks, Lower Nazareth, Moore, Palmer, Plainfield, Upper Nazareth and Williams and the boroughs of Glendon, Nazareth, Stockertown, Tatamy, West Easton, Wilson and Wind Gap.

Two Rivers Area Greenway Plan

Press Release for August 25, 2004 Public Meeting

FOR IMMEDIATE RELEASE

CONTACT: Sandra Merwarth, President
Bushkill Stream Conservancy
Phone: 610-253-4467

PUBLIC MEETING ON DRAFT TWO RIVERS AREA GREENWAY PLAN

Bushkill Stream Conservancy's Two Rivers Area Greenway Plan Steering Committee will hold a public meeting on Wednesday, August 25, 2004 to review a draft of the plan and receive public comment. The meeting will begin at 7:30 at the West Easton Municipal Building, 237 Seventh Street, in West Easton.

The greenway plan, commissioned by the Two Rivers Council of Governments, has been in preparation for the past year, with Urban Research and Development Corporation of Bethlehem serving as consultants. It encompasses greenway proposals covering the Bushkill Creek Watershed, the lower Lehigh River, and portions of Williams Township including Fry's Run.

The Conservancy's steering committee has met monthly for more than a year to review background studies, study maps, and discuss specific proposals for the greenways.

The draft plan calls for an ambitious program to link existing bike, walking, and riding trails into an integrated system stretching through central Northampton County, from the Lehigh River to the Appalachian Trail atop Blue Mountain near Wind Gap, using abandoned rail lines, power line rights-of-way, conservation areas and acquired open space.

The proposed greenways would reach into a total of 17 municipalities: the City of Easton; Glendon, Nazareth, Stockertown, Tatamy, West Easton, Wind gap, and Wilson Boroughs; and Bethlehem, Bushkill, Forks, Lower Nazareth, Moore, Palmer, Plainfield, Upper Nazareth and Williams Townships.

Maps and other materials relating to the plan will be on display starting at 7:00 p.m., with members of the steering committee and consultants on hand to answer questions and receive comments.

-end-

Two Rivers Area Greenway Plan

One of the letters sent to the 17 municipalities in the Study Area.

August 13, 2004

Aaron Hook, Secretary/Treasurer
Bushkill Township
1114 Bushkill Center Road
Nazareth, PA 18064

RE: TWO RIVERS AREA GREENWAY PLAN – PUBLIC MEETING

Dear Township Officials and Planners:

The Two Rivers Area Greenway Plan Steering Committee of the Bushkill Stream Conservancy, with assistance from URDC, is developing a Greenway Plan for the Bushkill Creek Watershed / Two Rivers Area. We are enclosing copies of posters relating to an upcoming public meeting on the draft Two Rivers Area Greenway Plan to be held on Wednesday, August 25, 2004 at 7:30 p.m. in the West Easton Municipal Building. Please circulate the posters among the township officials, planners and recreation board/commission members, and try to attend this meeting (or send a representative). Also, please post a copy of the poster at your municipal building.

Thanks for your cooperation!

Sincerely,

URBAN RESEARCH AND DEVELOPMENT CORPORATION

Tom Palmer
Executive Vice President

Enclosures

Two Rivers Area Greenway Plan

Public Meeting Participants
August 25, 2004 at the West Easton Borough Hall

NAME	AFFILIATION	CONTACT INFO.
<u>Brian Wagner</u>	<u>BSC</u>	<u></u>
<u>Judy Houch</u>	<u>Bethlehem Township Parks</u>	<u>610- 814-6470</u>
<u>David A. Dorshimer</u>	<u>BSC & Tatamy Planning Com</u>	<u>610-923-5291</u>
<u>Joe Judge</u>	<u>BSC</u>	<u>610-250-8649</u>
<u>Bill Spafford</u>	<u>BSC</u>	<u>610-588-2037</u>
<u>Jessica Wacker</u>	<u>City of Bethlehem resident</u>	<u></u>
<u>Amanda Jensen</u>	<u>Palmer Township</u>	<u>610-253-7191</u>

**Comments Received at Public Meeting
August 25, 2004 at the West Easton Borough Hall**

- Sinkholes- How can development be prevented in areas prone to sinkholes? All of Palmer Township is prone to sinkholes.
- How do greenways connect to preserved farmland? Will the public have access or will these be primarily for conservation purposes?
- A connection should be established to the new Palmer Recreation Center, which is just beyond the Palmer Town Center.
- The importance of riparian buffers in the middle and lower watersheds should be emphasized more. There are native brown trout fisheries here that need to be protected.

Newspaper article released after the August 25, 2004 public meeting.

Consultant Presents Bushkill Creek Plan

Thursday, August 26, 2004

By Jeff Schogol of The Express-Times

WEST EASTON - Redeveloping old, polluted industrial sites and connecting recreational trails are major themes of a plan presented Wednesday to protect the Bushkill Creek watershed.

The plan calls for creating a greenway, or an area of linear open space, along the Bushkill Creek.

The proposed greenway would encompass 17 municipalities: the city of Easton; Glendon, Stockertown, Nazareth, Tatamy, West Easton, Wind Gap and Wilson boroughs; and Bethlehem, Bushkill, Forks, Lower Nazareth, Moore, Palmer, Plainfield, Upper Nazareth and Williams townships.

Besides presenters, eight people attended Wednesday's meeting at borough hall. This was the second of four public meetings scheduled to discuss the plan.

The plan calls for redeveloping several industrial sites in the Easton area, said Steven Szigethy, a planner with Urban Research & Development Corp., the consulting firm for the project.

Szigethy said sites to be redeveloped include the following: The Simon Silk Mill complex, North Third Street at the Bushkill Canal, the South Easton Rail Yards and the Reda property.

Hopefully, the sites could be redeveloped into eco-businesses, Szigethy said. Examples of such businesses include stores that rent sports equipment, such as bicycles and kayaks, so that people could use the surrounding recreational trails, said Jonathan Logan of Urban Research & Development Corp.

The plan also calls for connecting recreational trails to form a loop around the Easton area, Szigethy said.

The idea is to connect Center City Easton with Hackett Park, Hugh Moore Park, Easton Area High School and the Palmer Township Bikeway, Szigethy said.

Palmer Township Director of Planning Amanda Jensen suggested also connecting the Charles Chrin Community Center with the bikeway. Szigethy said he would explore this suggestion.

Thomas Palmer of Urban Research & Development Corp. said he will be working on cost estimate for the plan next week.

The municipalities involved with the plan are expected to vote on it in the fall, Palmer said. Between now and then, the plan will be discussed at two more public meetings, he said.

Prioritized Action Plan

According to Public Meeting Participants, July 28 and August 25, 2004

Recommended Action	Priority
Work with Municipalities to amend zoning regulations to require the dedication of open space along greenway corridors, streams, steep slopes and other environmentally sensitive features.	✓✓✓✓✓✓✓✓✓✓ ✓✓✓✓✓✓✓✓✓✓ ✓✓✓✓✓✓✓✓✓✓ - (27)
Organize for Plan implementation using the Bushkill Stream Conservancy as the lead entity and initiate the Lasting Landscapes® program with the Heritage Conservancy	✓✓✓✓✓✓✓✓✓✓ ✓✓✓✓✓✓ - (15)
Complete a multiple use loop trail system linking Palmer Bikeway, D&L Trail and downtown Easton by acquiring and constructing proposed routes	✓✓✓✓✓✓✓✓✓✓ ✓✓ - (11)
Research the feasibility of creating a Rail Trail along the Lehigh & New England railroad grade based upon landownership and continuity of the existing abandoned railbed.	✓✓✓✓✓✓✓✓✓✓ - (9)
Continue to develop existing recreation paths such as the Palmer Township Trail, Tatamy Rail Trail and Plainfield Township Trail	✓✓✓✓✓✓✓✓✓ - (8)
Approach PPL regarding the designation of the powerline corridor between Blue Mountain and Jacobsburg Environmental Center as a conservation greenway.	✓✓✓✓✓✓✓✓✓ - (8)
Establish an educational outreach program to educate private landowners, municipalities, developers, etc. of the importance of the greenway and its associated features.	✓✓✓✓✓✓✓ - (7)
Identify specific brownfield sites within the greenway corridor reach to restore and create new sustainable uses such as eco- or tourism based businesses	✓✓✓✓✓✓ - (6)
Acquire easements along proposed greenway corridors where outright land purchase or open space dedication is not possible	✓✓✓✓✓✓ - (6)
Establish a connection via Stockertown between the Tatamy Rail Trail, Jacobsburg Environmental Education Center and the Plainfield Township Trail.	✓✓✓✓✓ - (5)
Work to protect the natural areas adjacent to or within the proposed greenway corridors identified as state and locally significant by establishing easements or outright acquisition of these properties.	✓✓✓✓ - (4)
Create and market a map and guide to the key features of the Two Rivers Area Greenway. This can be done in cooperation with the Delaware & Lehigh National Heritage Corridor.	✓✓✓✓ - (4)
Work with landowners and developers to establish the missing links for the trail in Forks Township between the Bushkill Creek and Delaware River	✓✓✓ - (3)
Establish a positive working relationship with landowners in the headwaters area in order to facilitate protection of the conservation greenways designed to protect the quality of the source of Bushkill Creek	✓✓✓ - (3)
Preserve additional agricultural land adjacent to the proposed greenway network by implementing farmland preservation techniques in areas targeted for preservation by LVPC, Northampton County and this plan.	✓✓✓ - (3)
Establish a relationship with area businesses in an effort to give them an understanding of the greenways for quality of life with the intent they may contribute in some way to the development of the plan	✓✓ - (2)
Institute a program for reestablishing riparian buffers with support from grants and volunteer efforts by local landowners, conservation groups, etc.	✓✓ - (2)
Prioritize the key parcels to acquire outright or secure easements along for the greenway.	✓ - (1)
Restrict development and tree-cutting on north facing slopes south of I-78 through comprehensive planning	✓ - (1)

Two Rivers Area Greenway Plan

Recommended Action	Priority
Create and install a signage system, based upon the standards developed by the Delaware & Lehigh National Heritage Corridor, identifying key nodes and access points along the greenway	
Institute a program for educating local farmers regarding best management practices with support from grants and volunteer efforts by local landowners, conservation groups, etc.	
Identify and map sinkholes along the greenway corridor	
Protect significant upland forest and geologic features in Williams Township through conservation easements or acquisition.	
Work with Chrin Brothers, the landfill operator in Williams Township, to establish a plan for reestablishing native seasonal grasses when the landfill operation is complete.	

Recommended Action	High Priority (✓)	Timing (S, M, L, C)*	Do you agree or disagree?		
			Agree	Disagree	Comments
Organize for Plan implementation using the Bushkill Stream Conservancy as the lead entity and initiate the Lasting Landscapes® program with the Heritage Conservancy	✓	S	-5		
Establish an educational outreach program to educate private landowners, municipalities, developers, etc. of the importance of the greenway and its associated features.		C	-5		
Work with Municipalities to amend zoning regulations to require the dedication of open space along greenway corridors, streams, steep slopes and other environmentally sensitive features.	✓	C	-6		
Acquire easements along proposed greenway corridors where outright land purchase or open space dedication is not possible	✓	C	-5		
Prioritize the key parcels to acquire outright or secure easements along for the greenway.	✓	S	-4		
Continue to develop existing recreation paths such as the Palmer Township Trail, Tatamy Rail Trail and Plainfield Township Trail	<u>-1</u>	M	-4	-1	<ul style="list-style-type: none"> • Very important to put together • Trails should be multi-use (Hike/bike/horse)
Establish a connection via Stockertown between the Tatamy Rail Trail, Jacobsburg Environmental Education Center and the Plainfield Township Trail.	✓	M	-6		<ul style="list-style-type: none"> • Connections are especially necessary • Strongly agree
Establish a positive working relationship with landowners in the headwaters area in order to facilitate protection of the conservation greenways designed to protect the quality of the source of Bushkill Creek	✓	C	-7		
Identify specific brownfield sites within the greenway corridor reach to restore and create new sustainable uses such as eco- or tourism based businesses	✓	M	-4		
Establish a relationship with area businesses in an effort to give them an understanding of the greenways for quality of life with the intent they may contribute in some way to the development of the plan	✓	S	-6		<ul style="list-style-type: none"> • Good idea
Create and install a signage system, based upon the standards developed by the Delaware & Lehigh National Heritage Corridor, identifying key nodes and access points along the greenway	<u>-2</u>	S	-5		
Approach PPL regarding the designation of the powerline corridor between Blue Mountain and Jacobsburg Environmental Center as a conservation greenway.		S	-5		
Research the feasibility of creating a Rail Trail along the Lehigh & New England railroad grade based upon landownership and continuity of the existing abandoned railbed.		L	-5		
Create and market a map and guide to the key features of the Two Rivers Area Greenway. This can be done in cooperation with the Delaware & Lehigh National Heritage Corridor.	✓	S	-7		

Recommended Action	High Priority (✓)	Timing (S, M, L, C)*	Do you agree or disagree?		
			Agree	Disagree	Comments
Institute a program for reestablishing riparian buffers with support from grants and volunteer efforts by local landowners, conservation groups, etc.	✓	C	-6		
Institute a program for educating local farmers regarding best management practices with support from grants and volunteer efforts by local landowners, conservation groups, etc.	✓	C	-6		
Identify and map sinkholes along the greenway corridor	✓	C	-5		
Work with landowners and developers to establish the missing links for the trail in Forks Township between the Bushkill Creek and Delaware River	<u>-1</u>	S	-6		
Complete a multiple use loop trail system linking Palmer Bikeway, D&L Trail and downtown Easton by acquiring and constructing proposed routes	✓	M (S)	-6		• Need to be linked - very important
Protect significant upland forest and geologic features in Williams Township through conservation easements or acquisition.	<u>-1</u>	M (S)	-4		
Preserve additional agricultural land adjacent to the proposed greenway network by implementing farmland preservation techniques in areas targeted for preservation by LVPC, Northampton County, and this plan.	✓	S	-7		
Restrict development and tree-cutting on north facing slopes south of I-78 through comprehensive planning.	<u>-1</u>	M	-4		
Work with Chrin Brothers, the landfill operator in Williams Township, to establish a plan for reestablishing native seasonal grasses when the landfill operation is complete.	<u>-1</u>	L	-4		
Work to protect the natural areas adjacent to or within the proposed greenway corridors identified as state and locally significant by establishing easements or outright acquisition of these properties.	✓	M	-6		

Notes: *S = Short Range, M = Medium Range, L = Longer Range, C = Continuous

Additional Recommended Actions to be undertaken: ***Please use the space below to identify additional actions.***

• *Just a concern - maintenance of trails/easements & corridors - be [conscious] about how these greenways will be maintained*

• *Concern - will all the trails be paved?*

Agencies/Groups Responsible for Implementation:

- Bushkill Stream Conservancy
- U.S. Environmental Protection Agency
- Township Board of Supervisors, Borough and City Councils
- Northampton County
- Municipal Planning Commissions
- Lehigh Valley Planning Commission
- U.S. Department of Agriculture
- Pennsylvania Department of Environmental Protection
- Pennsylvania Department of Conservation and Natural Resources
- Pennsylvania Department of Community and Economic Development
- Pennsylvania Department of Transportation

Please identify other key partners for Implementation

• Lehigh Valley Equine Council

Please return this worksheet before you leave tonight. Thank you!

Public Meetings

Two Rivers Area Greenway Plan

The Two Rivers Area Greenway Plan Steering Committee of the Bushkill Stream Conservancy has developed a Greenway Plan for the Bushkill Creek Watershed / Two Rivers Area. The plan provides goals, recommendations and actions for greenway preservation and enhancement in the following communities:

Bethlehem Township
Bushkill Township
Easton City
Forks Township
Glendon Borough
Lower Nazareth Township
Moore Township
Nazareth Borough
Palmer Township

Plainfield Township
Stockertown Borough
Tatamy Borough
Upper Nazareth Township
West Easton Borough
Williams Township
Wilson Borough
Wind Gap Borough

Please attend one of the two following public meetings sponsored by the committee to: learn more about the greenways planning program, and to review plan maps, goals, recommendations and actions.

Where: Palmer Memorial Library
1 Weller Place (Palmer Municipal Complex near Rt. 248 & Newburg Rd.)
Palmer, PA 18043

When: November 22, 2004
7:30 p.m.
(Monday)

OR

Where: Plainfield Township Fire Co.
6840 Sullivan Trail
Wind Gap, PA 18091

When: November 23, 2004
7:30 p.m.
(Tuesday)

An open house will begin at 7:00 p.m. to provide an informal opportunity to ask questions and review maps before the meeting.

Press Release for November 22 and 23, 2004 Public Meetings.

Two Rivers Area Greenway Plan

FOR IMMEDIATE RELEASE

CONTACT: Sandra Merwarth, President
Bushkill Stream Conservancy
Phone: 610-253-4467

PUBLIC MEETING ON DRAFT TWO RIVERS AREA GREENWAY PLAN

Bushkill Stream Conservancy's Two Rivers Area Greenway Plan Steering Committee will hold public meetings to review and discuss the final draft of the Two Rivers Area Greenway Plan at the following dates, times, and places:

- November 22, 2004, 7:30 p.m., at the Palmer Memorial Library, 1 Weller Place (Palmer Municipal Complex near Rt. 248 & Newburg Rd.), Palmer, PA 18043
- November 23, 2004, 7:30 p.m., at the Plainfield Township Fire Company, 6840 Sullivan Trail, Wind Gap, PA 18091

The greenway plan, commissioned by the Two Rivers Council of Governments, has been in preparation for the past year, with Urban Research and Development Corporation of Bethlehem serving as consultants. It encompasses greenway proposals covering the Bushkill Creek Watershed, the lower Lehigh River, and portions of Williams Township including Fry's Run.

The Conservancy's steering committee has met monthly for more than a year to review background studies, study maps, and discuss specific proposals for the greenways. Two previous public meetings were held this past summer to review and obtain input on the draft plan.

The plan calls for both conservation and recreation greenways. This network of greenways will serve to both protect environmentally significant features such as stream corridors, and link existing bike, walking, and riding trails into an integrated system stretching through central Northampton County, from the Lehigh River to the Appalachian Trail atop Blue Mountain near Wind Gap.

The proposed greenways would reach into a total of 17 municipalities: the City of Easton; Glendon, Nazareth, Stockertown, Tatamy, West Easton, Wind Gap, and Wilson Boroughs; and Bethlehem, Bushkill, Forks, Lower Nazareth, Moore, Palmer, Plainfield, Upper Nazareth, and Williams Townships.

Maps and other materials relating to the plan will be on display starting at 7:00 p.m., with members of the steering committee and consultants on hand to answer questions and receive comments.

-end-

Newspaper article released before the November 22 and 23, 2004 public meetings.

Public Gets Its Final Say on Bushkill Creek Plan

Monday, November 22, 2004

by Jeff Schogol of The Express-Times

The public will get a chance tonight and Tuesday to comment on a plan to protect natural resources and enhance recreational trails along the Bushkill Creek and its tributaries.

Commissioned by the Twin Rivers Council of Governments, the plan calls for creating one contiguous area of open space known as a greenway along the Bushkill Creek corridor.

The plan also involves redeveloping old, polluted industrial sites and connecting recreational trails.

The plan would involve 17 municipalities: the city of Easton; Glendon, Stockertown, Nazareth, Tatamy, West Easton, Wind Gap and Wilson boroughs; and Bethlehem, Bushkill, Forks, Lower Nazareth, Moore, Palmer, Plainfield, Upper Nazareth and Williams townships.

The plan's final presentation is set for 7:30 tonight at the Palmer Memorial Library and 7:30 p.m. Tuesday at the Plainfield Township Volunteer Fire Co. hall, according to a news release from Urban Research & Development Corp., the consulting firm for the project.

After the meetings, a final version of the plan will be printed and sent to the 17 municipalities for their endorsement, said Sandra Merwarth of the Bushkill Stream Conservancy.

The municipalities could then decide whether to adopt relevant parts of the plan into their comprehensive plans, greenway plans, and open space and recreational plans, Merwarth said.

Steve Szigethy of the Urban Research & Development Corp. said the greenway plan contains "a whole slew of recommendations, anywhere from amending their zoning ordinances to (consideration for) building some of these trails."

The plan calls for protecting the Bushkill Creek watershed with zoning changes that move development farther away from waterways. And it encourages property owners to sell the development rights to their property along waterways to conservation organizations.

The plan also calls for linking recreational trails in a loop around the Easton area by connecting Downtown Easton with Hackett Park, Hugh Moore Park, Easton Area High School and the Palmer Township bikeway.

Another provision of the plan calls for redeveloping industrial sites in the Easton area, including:

- the Simon Silk Mill complex;
- North Third Street at the Bushkill Canal;
- the South Easton Rail Yards; and
- the Reda property in West Easton.

Szigethy said the plan has no overall price tag yet because we don't know to what degree the plan will be followed.

Merwarth said it was important for people to know they can make their final comments about the plan at the meetings tonight and Tuesday.

Two Rivers Area Greenway Plan

**Public Meeting Participants
November 22, 2004 at the Palmer Memorial Library**

NAME	AFFILIATION	CONTACT INFO. (OPTIONAL)
<u>Rob Reese</u>	<u>BSC</u>	<u>610-252-7528</u>
<u>Brian Wagner</u>	<u>BSC</u>	<u>610-759-0492</u>
<u>David Brandes</u>	<u>Lafayette College</u>	<u></u>
<u>Kate Brandes</u>	<u>BSC</u>	<u></u>
<u>Jill McLennan</u>	<u></u>	<u></u>
<u>Jackie McLennan</u>	<u>Student</u>	<u></u>
<u>Joe Judge</u>	<u>BSC</u>	<u>610-250-8649</u>
<u>John Zachmann</u>	<u></u>	<u>610-253-3768</u>
<u>Todd Klusha</u>	<u>BMPA</u>	<u>610-381-4794</u>
<u>Da Reed</u>	<u></u>	<u>610-258-3392</u>
<u></u>	<u></u>	<u>610-252-0789</u>
<u>Keith Horton</u>	<u>Palmer Twp. Employee</u>	<u>Unlisted</u>
<u>Kermit Finkbeiner</u>	<u>Palmer Township</u>	<u>610-258-2078</u>
<u>Robert Doepp</u>	<u>Williams Township</u>	<u>610-559-0062</u>
<u>Victor Dennis</u>	<u>Forks Township</u>	<u></u>
<u>Mr. & Mrs. Gillen</u>	<u>Forks Township</u>	<u></u>
<u>Bill Concolino</u>	<u>Sen. Rob Wonderling</u>	<u>610-250-5624</u>
<u>Mr. & Mrs. Seese</u>	<u>Bushkill Owner</u>	<u>610-759-3283</u>
<u>S Sound</u>	<u>Owner</u>	<u></u>
<u>Peg Ferraro</u>	<u>Northampton Cty. Council</u>	<u></u>
<u>Dominic Ferraro</u>	<u></u>	<u></u>
<u>Amanda Jensen</u>	<u>Palmer Township</u>	<u>610-253-7191</u>
<u>Bob Lemmi</u>	<u></u>	<u></u>
<u>Jim Stacy</u>	<u></u>	<u></u>
<u>Frank Coller</u>	<u>Palmer Township</u>	<u>610-438-3839</u>
<u>Rich Budihas</u>	<u>Trout Unlimited</u>	<u></u>
<u></u>	<u></u>	<u></u>
<u></u>	<u></u>	<u></u>
<u></u>	<u></u>	<u></u>

**Comments Received at Public Meeting
November 22, 2004 at the Palmer Memorial Library**

- Farms adjacent to greenways - should these be a higher priority for preservation than a farm not located near a greenway? A coordinated effort between greenway planning and farmland preservation could address this concern.
- Bushkill Creek Bikeway in Palmer Township should be completed in 2005.
- Are there any studies being completed to determine the effects of the recent hurricanes on the ecology of the streams? If not, is there money to implement a study? Trout Unlimited and an area resident have been studying the creek for a number of years. It is believed the creek will recover within a life cycle (about 1 year) and there is also a possibility the scouring action of the flood helped the creek bed by removing sediments that have been deposited over time.
- Concern for the undesirable activities that are being generated by the creation of a trail in close proximity to private residences. How will this plan address these negative actions? There have been instances where the homeowners have had to remove their children to their house because of the obscene language being used by people along the trail, which is not yet completed. In a separate location, there is concern about the trail being used by hunters and fishermen to access the creek, who do not seem to respect the rights of private property owners. In the past, there have been litter problems and hunters walking through private property, making it unsafe to be outside. These residents are not keen on the idea of creating more trails in areas adjacent to private, residential property.
- The Bushkill Creek should also be considered for a canoe trail.
- What is being done about establishing a connection along the Bushkill Creek west of the Simon Silk Mill? This is a difficult connection that will need to be worked out as the project develops.
- Are the dams along the creeks in the corridor considered a liability? The PA Dam Removal Program could be taken advantage of to remove dams, if so desired. BSC is looking into completing a dam removal study. There is a liability for boaters.
- Is the plan going to be coordinated and incorporated with any subsequent greenway plans for the area? It will be coordinated.
- What are appropriate widths for riparian buffers? This is dependent on many factors such as surrounding topography, soils, adjacent land use and practicality.

**Comments Received at Public Meeting
November 23, 2004 at the Plainfield Township Fire Company**

- Why isn't northeastern Northampton County addressed? Plainfield township "messed up" by not acquiring the Lehigh & New England rail bed. *Audience member response: Upper and Lower Mount Bethel Townships are looking at forming a watershed association.*
- Much of the Lehigh & New England railbed is privately-owned and has housing on it.
- Have you thought of encouraging the planting of trees along creeks and streets, and taking advantage of volume discounts at tree nurseries? *Audience member response: the County Conservation District has seedling sales.*
- What is the status of the horse park in Tatamy? One thousand horses would affect the creeks. Can you address this in the plan? *Audience member response: It is probably contingent on the sinkhole problem. Other audience member response: The county would probably love to have the racetrack.*
- The mode and tempo of sinkholes near Hercules Quarry has increased in the last five years.
- Developers prey on ignorant landowners and don't respect the land. Could there be a system where developers let buyers know all of the existing issues?
- Environmental enforcement is the biggest problem. Bushkill Township has poor enforcement of their zoning and SALDO. *Audience member response: The Conservation District and Environmental Advisory Councils are stretched to their limits and cannot address every single violation.*
- Both sides of a portion of Little Bushkill Creek were recently donated to the Borough of Stockertown. Grants to pursue environmental education here would be great. Also, the course of the creek has been changing, and trees are coming down.
- Two rare plant species were lost because of heavy trail use at Jacobsburg E.E.C.
- Key requests for DCNR: Land acquisitions in the Bushkill headwaters area, and trail connections.

APPENDIX E - CASE STUDIES

Case Study #1: Retaining Natural Drainage System within a Development Area

This case study represents a watershed drainage area of 2,000 acres or approximately three (3) square miles in Hanover Township, Northampton County. This area, between Jacksonville Road and PA 512 north of U.S. 22, was once agricultural in nature. During the initial agricultural production time period, the natural swales that carry runoff were not recognized or set aside as drainage courses. Since that time the watershed area has been nearly built out in a mixture of single family, townhome and apartment uses, as well as neighborhood shopping center, churches, schools, municipal complex, parks and other non-residential uses.

Portions of this watershed had already been developed prior to the community adopting regulations which preserve natural drainage courses and require detention basins to be installed within each development. However, during the history of this natural drainage system it has withstood 100 year storm flow discharges without damage to the natural grass swales or the surrounding buildings.

This case study shows how the use of storm water detention basins throughout a planned development can allow the existing major drainage channels to be maintained in a natural condition. These areas, in addition to carrying storm water flows in a natural grass area, also become desired open space with meandering pathway systems that link the various residential neighborhoods to schools and park areas.

This example depicts how storm water draining from 2000 acres of developed land can be allowed to flow through a broad grass swale without damage. In this example the municipality adopted an official storm water management map that required major swales to be kept in a natural condition with nearby storm water basins designed to retain water for each respective development before discharging into the community's naturally retained drainage course.



Natural drainage swale, Hanover Township.



Drainage swale and recreation path, Hanover Township.

Case Study #2: Grass Swales within Active Agricultural Fields

Grass Swales within active agricultural fields protect the water quality in receiving streams by filtering the impurities associated with farming, and reducing soil erosion within drainage courses. As described in Pilot Project #9, several federal programs are available to assist farmers in this endeavor.

The following photographs show a farm field and grass swale in Maryland’s Eastern Shore region over a two year period. The swale, directly adjacent to the tilled corn and subsequent soybean crop, is kept in a mowed grass condition throughout the seasons. The grass swale provides desired filtration and catchment of sediments and fertilizer prior to entering the farm pond in the distance. The farm pond is another measure of catchment that allows infiltration of rainwater runoff before release at higher water levels to receiving streams.

